**QC Development**
PO Box 916
Storrs, CT 06268
860-670-9068
Mark.Roberts@QCDevelopment.net

November 8, 2019

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

**Notice of Exempt Modification – New Cingular Wireless PCS, LLC (AT&T) – CT2164**
**68 Groton Long Point Road, Groton, CT 06340**
**N 41.34353611**
**W 72.00967778**

Dear Ms. Bachman:

AT&T currently maintains nine (9) antennas at the 133-foot level of the existing 140-foot Self Support Tower at 68 Groton Long Point Road, Groton, CT. The tower and property are owned by the Town of Groton. AT&T now intends to remove (3) KMW antennas and replace them with (3) CCI DMP65R-BU4DA antennas. AT&T will also remove (6) existing Ericsson Remote Radio Units (RRU) and install (3) Ericsson 4415-B30, (3) 4449 B5/B12 and (3) 8843 B2/B66A RRUs. The new antennas and RRUs will also be installed at the 133-foot level of the tower.

This facility was approved by the Connecticut Siting Council in Docket # 175 on November 21, 1996. The approval included a tower height limitation of 148 feet. Since no further modification to the overall facility height is proposed, this modification complies with the aforementioned approval.

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 Patrice Granatosky, Mayor of the Town of Groton, and the Groton Planning & Development Office, as well as the property owner and 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, AT&T 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).

Please feel free to call me at (860) 670-9068 with any questions regarding this matter. Thank you for your consideration.

Sincerely,

Mark Roberts
QC Development
Consultant for AT&T

Attachments

cc: Mayor Patrice Granatosky - Elected Official, Property Owner & Tower Owner
Jonathan Reiner, AICP – Director of Planning

# Power Density

**Existing Loading on Tower**

| Carrier | # of Channels | ERP/Ch (W) | Antenna Centerline Height (ft) | Power Density (mW/cm^2) | Freq. Band (MHz**) | Limit S (mW /cm^2) | %MPE |
|---|---|---|---|---|---|---|---|
| Other Carriers* | | | | | | | 2.26% |
| AT&T GSM | 1 | 262 | 130 | 0.0061 | 880 | 0.5667 | 0.11% |
| AT&T UMTS | 1 | 262 | 131 | 0.0060 | 880 | 0.5667 | 0.11% |
| AT&T UMTS | 1 | 330 | 131 | 0.0076 | 1900 | 1.0000 | 0.08% |
| AT&T LTE | 1 | 793 | 131 | 0.0183 | 700 | 0.4913 | 0.37% |
| AT&T LTE | 1 | 3837 | 130 | 0.0897 | 1900 | 1.0000 | 0.90% |
| AT&T LTE | 1 | 1656 | 131 | 0.0381 | 2100 | 1.0000 | 0.38% |
| Site Total | | | | | | | 4.21% |

*Per CSC Records (available upon request, includes calculation formulas)

** If a range of frequencies are used, such as 880-894, enter the lowest value, i.e. 880

**Proposed Loading on Tower**

| Carrier | # of Channels | ERP/Ch (W) | Antenna Centerline Height (ft) | Power Density (mW/cm^2) | Freq. Band (MHz**) | Limit S (mW /cm^2) | %MPE |
|---|---|---|---|---|---|---|---|
| Other Carriers* | | | | | | | 2.26% |
| AT&T UMTS | 1 | 500 | 133 | 0.0058 | 850 | 0.5667 | 0.10% |
| AT&T LTE | 1 | 1476 | 133 | 0.0329 | 700 | 0.4667 | 0.71% |
| AT&T LTE | 1 | 2951 | 133 | 0.0658 | 700 | 0.4667 | 1.41% |
| AT&T LTE | 1 | 1000 | 133 | 0.0223 | 850 | 0.5667 | 0.39% |
| AT&T 5G | 1 | 1000 | 133 | 0.0223 | 850 | 0.5667 | 0.39% |
| AT&T LTE | 2 | 3664 | 133 | 0.1634 | 1900 | 1.0000 | 1.63% |
| AT&T LTE | 2 | 3837 | 133 | 0.1711 | 2100 | 1.0000 | 1.71% |
| AT&T LTE | 1 | 1285 | 133 | 0.0287 | 2300 | 1.0000 | 0.29% |
| Site Total | | | | | | | 8.81% |

*Per CSC Records (available upon request, includes calculation formulas)

** If a range of frequencies are used, such as 880-894, enter the lowest value, i.e. 880

## PROJECT INFORMATION

| | |
|---|---|
| SCOPE OF WORK: | ITEMS TO BE MOUNTED ON THE EXISTING SELF SUPPORT TOWER:<br>• NEW AT&T ANTENNAS: DMP65R-BU4DA (TYP. OF 1 PER SECTOR, TOTAL OF 3).<br>• NEW AT&T RRUS: B5/B12 4449 (850/700) (TYP. OF 1 PER SECTOR, TOTAL OF 3).<br>• NEW AT&T RRUS: 8843 B2/B66A (AWS/PCS) (TYP. OF 1 PER SECTOR, TOTAL OF 3).<br>• NEW AT&T RRUS: 4415 B30 (WCS) (TYP. OF 1 PER SECTOR, TOTAL OF 3).<br>• NEW AT&T DC ONLY SURGE ARRESTOR DC6-48-60-0-8C-EV (TOTAL OF 1) WITH (2) DC POWER LINES.<br><br>ITEMS TO BE MOUNTED AT EQUIPMENT LOCATION:<br>• 4478 B14 (700) (TYP. OF 1 PER SECTOR, TOTAL OF 3).<br>• ADD RBS 6630 WITH IDLe.<br><br>ITEMS TO BE REMOVED:<br>•(3) KMW ANTENNAS (AM-X-CD-14-65-00T-RET).<br>•(3) RRUS-11 B4.<br>•(3) RRUS-11 B12.<br>•(3) RRUS-32 BS.<br><br>ITEMS TO REMAIN:<br>• (3) POWERWAVE ANTENNAS (7770).<br>• (3) QUINTEL ANTENNAS (QS66512-2).<br>•(6) POWERWAVE TMAS (TT19-08BP111-001).<br>•(2) SURGE ARRESTORS.<br>•(12) COAX CABLES, (4) DC POWER & (2) FIBER. |
| SITE ADDRESS: | 68 GROTON LONG POINT ROAD (GROTON PD)<br>GROTON, CT 06340 |
| LATITUDE: | 41.343548° N, 41° 20' 36.77" N |
| LONGITUDE: | 72.009667° W, 72° 0' 34.80" W |
| TYPE OF SITE: | SELF SUPPORT TOWER / INDOOR |
| STRUCTURE HEIGHT: | 140'-0"± |
| RAD CENTER: | 133'-0"± |
| CURRENT USE: | TELECOMMUNICATIONS FACILITY |
| PROPOSED USE: | TELECOMMUNICATIONS FACILITY |

## DRAWING INDEX

| SHEET NO. | DESCRIPTION | REV. |
|---|---|---|
| T-1 | TITLE SHEET | 1 |
| GN-1 | GENERAL NOTES | 1 |
| A-1 | COMPOUND & EQUIPMENT PLANS | 1 |
| A-2 | ANTENNA LAYOUTS & ELEVATION | 1 |
| A-3 | DETAILS | 1 |
| G-1 | GROUNDING DETAILS | 1 |
| RF-1 | RF PLUMBING DIAGRAM | 1 |

# SITE NUMBER: CT2164

# SITE NAME: NEW LONDON-GROTON PD

# FA CODE: 10035132

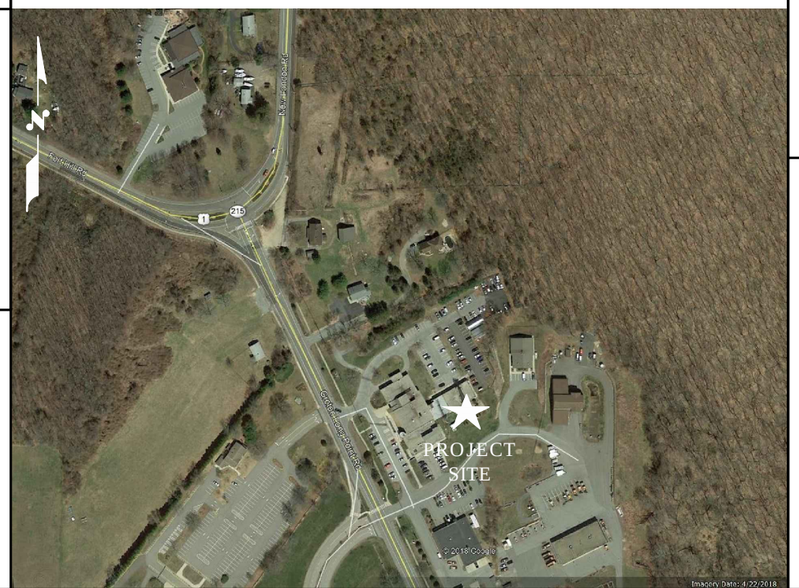
# PACE ID: MRCTB040368, MRCTB040521, MRCTB040800, MRCTB040452

# PROJECT: LTE 4C_5C_6C_BWE_2019 UPGRADE

## VICINITY MAP

DIRECTIONS TO SITE:

I95N TO EXIT 88 RTE. 117. TURN RIGHT AT BOTTOM OF RAMP AND FOLLOW TO END. TURN LEFT ONTO RT 1 CONTINUE APPROX 1 MILE AND BEAR RIGHT ON FORK ONTO RT 215. SITE BEHIND GROTON POLICE COMPLEX. ENTER AT 2ND DRIVEWAY AND PARK ON YOUR LEFT. WALK TOWARDS TOWER AND YOU WILL SEE ROW OF DOORS. WE ARE LOCATED AT THE END LAST DOOR.




## GENERAL NOTES

1. THIS DOCUMENT IS THE CREATION, DESIGN, PROPERTY AND COPYRIGHTED WORK OF AT&T. ANY DUPLICATION OR USE WITHOUT EXPRESS WRITTEN CONSENT IS STRICTLY PROHIBITED. DUPLICATION AND USE BY GOVERNMENT AGENCIES FOR THE PURPOSES OF CONDUCTING THEIR LAWFULLY AUTHORIZED REGULATORY AND ADMINISTRATIVE FUNCTIONS IS SPECIFICALLY ALLOWED.
2. THE FACILITY IS AN UNMANNED PRIVATE AND SECURED EQUIPMENT INSTALLATION. IT IS ONLY ACCESSED BY TRAINED TECHNICIANS FOR PERIODIC ROUTINE MAINTENANCE AND THEREFORE DOES NOT REQUIRE ANY WATER OR SANITARY SEWER SERVICE. THE FACILITY IS NOT GOVERNED BY REGULATIONS REQUIRING PUBLIC ACCESS PER ADA REQUIREMENTS.
3. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE AT&T MOBILITY REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.
4. CONSTRUCTION DRAWINGS ARE VALID FOR SIX MONTHS AFTER ENGINEER OF RECORD'S STAMPED AND SIGNED SUBMITTAL DATE LISTED HEREIN.

**72 HOURS**

CALL
BEFORE YOU DIG
CALL TOLL FREE 1-800-922-4455
OR CALL 811

**UNDERGROUND SERVICE ALERT**

STATE OF CONNECTICUT
DANIEL P. HAMM
No. 24178
LICENSED PROFESSIONAL ENGINEER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45 BEECHWOOD DRIVE
NORTH ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

12 INDUSTRIAL WAY
SALEM, NH 03079

500 ENTERPRISE DRIVE, SUITE 3A
ROCKY HILL, CT 06067


SITE NUMBER: CT2164
SITE NAME: NEW LONDON-GROTON PD

68 GROTON LONG POINT
ROAD (GROTON PD)
GROTON, CT 06340
NEW LONDON COUNTY

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| A | 10/02/19 | ISSUED FOR REVIEW | DJM | AT | DPH |

SCALE: AS SHOWN | DESIGNED BY: AT | DRAWN BY: DJM

AT&T

TITLE SHEET
LTE 4C_5C_6C_BWE_2019 UPGRADE

| SITE NUMBER | DRAWING NUMBER | REV |
|---|---|---|
| CT2164 | T-1 | 1 |

## GROUNDING NOTES

1. THE SUBCONTRACTOR SHALL REVIEW AND INSPECT THE EXISTING FACILITY GROUNDING SYSTEM AND LIGHTNING PROTECTION SYSTEM (AS DESIGNED AND INSTALLED) FOR STRICT COMPLIANCE WITH THE NEC (AS ADOPTED BY THE AHJ), THE SITE-SPECIFIC (UL, LPI, OR NFPA) LIGHTING PROTECTION CODE, AND GENERAL COMPLIANCE WITH TELCORDIA AND TIA GROUNDING STANDARDS. THE SUBCONTRACTOR SHALL REPORT ANY VIOLATIONS OR ADVERSE FINDINGS TO THE CONTRACTOR FOR RESOLUTION.

2. 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.

3. THE SUBCONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81 STANDARDS) FOR NEW GROUND ELECTRODE SYSTEMS. THE SUBCONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS.

4. 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.

5. EACH BTS CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, #6 AWG STRANDED COPPER OR LARGER FOR INDOOR BTS AND #2 AWG STRANDED COPPER FOR OUTDOOR BTS.

6. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.

7. APPROVED ANTIOXIDANT COATINGS (I.E., CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.

8. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED TO GROUND BAR.

9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.

10. MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.

11. METAL CONDUIT SHALL BE MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH #6 AWG COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.

12. ALL NEW STRUCTURES WITH A FOUNDATION AND/OR FOOTING HAVING 20 FT. OR MORE OF 1/2 IN. OR GREATER ELECTRICALLY CONDUCTIVE REINFORCING STEEL MUST HAVE IT BONDED TO THE GROUND RING USING AN EXOTHERMIC WELD CONNECTION USING #2 AWG SOLID BARE TINNED COPPER GROUND WIRE, PER NEC 250.50

## GENERAL NOTES

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:

   CONTRACTOR – SAI
   SUBCONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
   OWNER – AT&T MOBILITY

2. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING SUBCONTRACTOR 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 CONTRACTOR.

3. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. SUBCONTRACTOR 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.

4. DRAWINGS PROVIDED HERE ARE NOT TO BE SCALED AND ARE INTENDED TO SHOW OUTLINE ONLY.

5. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.

6. "KITTING LIST" SUPPLIED WITH THE BID PACKAGE IDENTIFIES ITEMS THAT WILL BE SUPPLIED BY CONTRACTOR. ITEMS NOT INCLUDED IN THE BILL OF MATERIALS AND KITTING LIST SHALL BE SUPPLIED BY THE SUBCONTRACTOR.

7. THE SUBCONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.

8. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE SUBCONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION SPACE FOR APPROVAL BY THE CONTRACTOR.

9. SUBCONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER AND T1 CABLES, GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. SUBCONTRACTOR SHALL UTILIZE EXISTING TRAYS AND/OR SHALL ADD NEW TRAYS AS NECESSARY. SUBCONTRACTOR SHALL CONFIRM THE ACTUAL ROUTING WITH THE CONTRACTOR.

10. THE SUBCONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT SUBCONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.

11. SUBCONTRACTOR 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.

12. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.

13. ALL CONCRETE REPAIR WORK SHALL BE DONE IN ACCORDANCE WITH AMERICAN CONCRETE INSTITUTE (ACI) 301.

14. ANY NEW CONCRETE NEEDED FOR THE CONSTRUCTION SHALL BE AIR-ENTRAINED AND SHALL HAVE 4000 PSI STRENGTH AT 28 DAYS. ALL CONCRETE WORK SHALL BE DONE IN ACCORDANCE WITH ACI 318 CODE REQUIREMENTS.

15. ALL STRUCTURAL STEEL WORK SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH AISC SPECIFICATIONS. ALL STRUCTURAL STEEL SHALL BE ASTM A36 (Fy = 36 ksi) UNLESS OTHERWISE NOTED. PIPES SHALL BE ASTM A53 TYPE E (Fy = 36 ksi). ALL STEEL EXPOSED TO WEATHER SHALL BE HOT DIPPED GALVANIZED. TOUCH UP ALL SCRATCHES AND OTHER MARKS IN THE FIELD AFTER STEEL IS ERECTED USING A COMPATIBLE ZINC RICH PAINT.

16. CONSTRUCTION SHALL COMPLY WITH SPECIFICATIONS AND "GENERAL CONSTRUCTION SERVICES FOR CONSTRUCTION OF AT&T SITES."

17. SUBCONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING ANY WORK. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS MUST BE VERIFIED. SUBCONTRACTOR SHALL NOTIFY THE CONTRACTOR OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.

18. THE EXISTING CELL SITE IS IN FULL COMMERCIAL OPERATION. ANY CONSTRUCTION WORK BY SUBCONTRACTOR SHALL NOT DISRUPT THE EXISTING NORMAL OPERATION. ANY WORK ON EXISTING EQUIPMENT MUST BE COORDINATED WITH CONTRACTOR. ALSO, WORK SHOULD BE SCHEDULED FOR AN APPROPRIATE MAINTENANCE WINDOW USUALLY IN LOW TRAFFIC PERIODS AFTER MIDNIGHT.

19. SINCE THE CELL SITE IS ACTIVE, ALL SAFETY PRECAUTIONS MUST BE TAKEN WHEN WORKING AROUND HIGH LEVELS OF ELECTROMAGNETIC RADIATION. EQUIPMENT SHOULD BE SHUTDOWN PRIOR TO PERFORMING ANY WORK THAT COULD EXPOSE THE WORKERS TO DANGER. PERSONAL RF EXPOSURE MONITORS ARE ADVISED TO BE WORN TO ALERT OF ANY DANGEROUS EXPOSURE LEVELS.

20. **APPLICABLE BUILDING CODES:**
    SUBCONTRACTOR'S WORK SHALL COMPLY WITH ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES AS ADOPTED BY THE LOCAL AUTHORITY HAVING JURISDICTION (AHJ) FOR THE LOCATION. THE EDITION OF THE AHJ ADOPTED CODES AND STANDARDS IN EFFECT ON THE DATE OF CONTRACT AWARD SHALL GOVERN THE DESIGN.

    **BUILDING CODE: IBC 2015 WITH 2018 CT STATE BUILDING CODE AMENDMENTS**
    **ELECTRICAL CODE: 2017 NATIONAL ELECTRICAL CODE (NFPA 70-2017)**

    SUBCONTRACTOR'S WORK SHALL COMPLY WITH THE LATEST EDITION OF THE FOLLOWING STANDARDS:

    **AMERICAN CONCRETE INSTITUTE (ACI) 318; BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE;**

    **AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) MANUAL OF STEEL CONSTRUCTION, ASD, FOURTEENTH EDITION;**

    **TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA) 222-G, STRUCTURAL STANDARDS FOR STEEL**

    FOR ANY CONFLICTS BETWEEN SECTIONS OF LISTED CODES AND STANDARDS REGARDING MATERIAL, METHODS OF CONSTRUCTION, OR OTHER REQUIREMENTS, THE MOST RESTRICTIVE REQUIREMENT SHALL GOVERN. WHERE THERE IS CONFLICT BETWEEN A GENERAL REQUIREMENT AND A SPECIFIC REQUIREMENT, THE SPECIFIC REQUIREMENT SHALL GOVERN.

## ABBREVIATIONS

| | | | | | |
|---|---|---|---|---|---|
| AGL | ABOVE GRADE LEVEL | EQ | EQUAL | REQ | REQUIRED |
| AWG | AMERICAN WIRE GAUGE | GC | GENERAL CONTRACTOR | RF | RADIO FREQUENCY |
| BBU | BATTERY BACKUP UNIT | GRC | GALVANIZED RIGID CONDUIT | TBD | TO BE DETERMINED |
| BTCW | BARE TINNED SOLID COPPER WIRE | MGB | MASTER GROUND BAR | TBR | TO BE REMOVED |
| BGR | BURIED GROUND RING | MIN | MINIMUM | TBRR | TO BE REMOVED AND REPLACED |
| BTS | BASE TRANSCEIVER STATION | P | PROPOSED | TYP | TYPICAL |
| E | EXISTING | NTS | NOT TO SCALE | UG | UNDER GROUND |
| EGB | EQUIPMENT GROUND BAR | RAD | RADIATION CENTER LINE (ANTENNA) | VIF | VERIFY IN FIELD |
| EGR | EQUIPMENT GROUND RING | REF | REFERENCE | | |


HUDSON Design Group LLC
45 BEECHWOOD DRIVE
NORTH ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

12 INDUSTRIAL WAY
SALEM, NH 03079


SITE NUMBER: CT2164
SITE NAME: NEW LONDON-GROTON PD

**68 GROTON LONG POINT ROAD (GROTON PD)**
**GROTON, CT 06340**
**NEW LONDON COUNTY**


at&t
500 ENTERPRISE DRIVE, SUITE 3A
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| A | 10/02/19 | ISSUED FOR REVIEW | DJM | AT | DPH |

SCALE: AS SHOWN | DESIGNED BY: AT | DRAWN BY: DJM

STATE OF CONNECTICUT · DANIEL J. HAMM · No.24178 · LICENSED PROFESSIONAL ENGINEER

AT&T

**GENERAL NOTES**
**LTE 4C_5C_6C_BWE_2019 UPGRADE**

| SITE NUMBER | DRAWING NUMBER | REV |
|---|---|---|
| CT2164 | GN-1 | 1 |

NOTE:

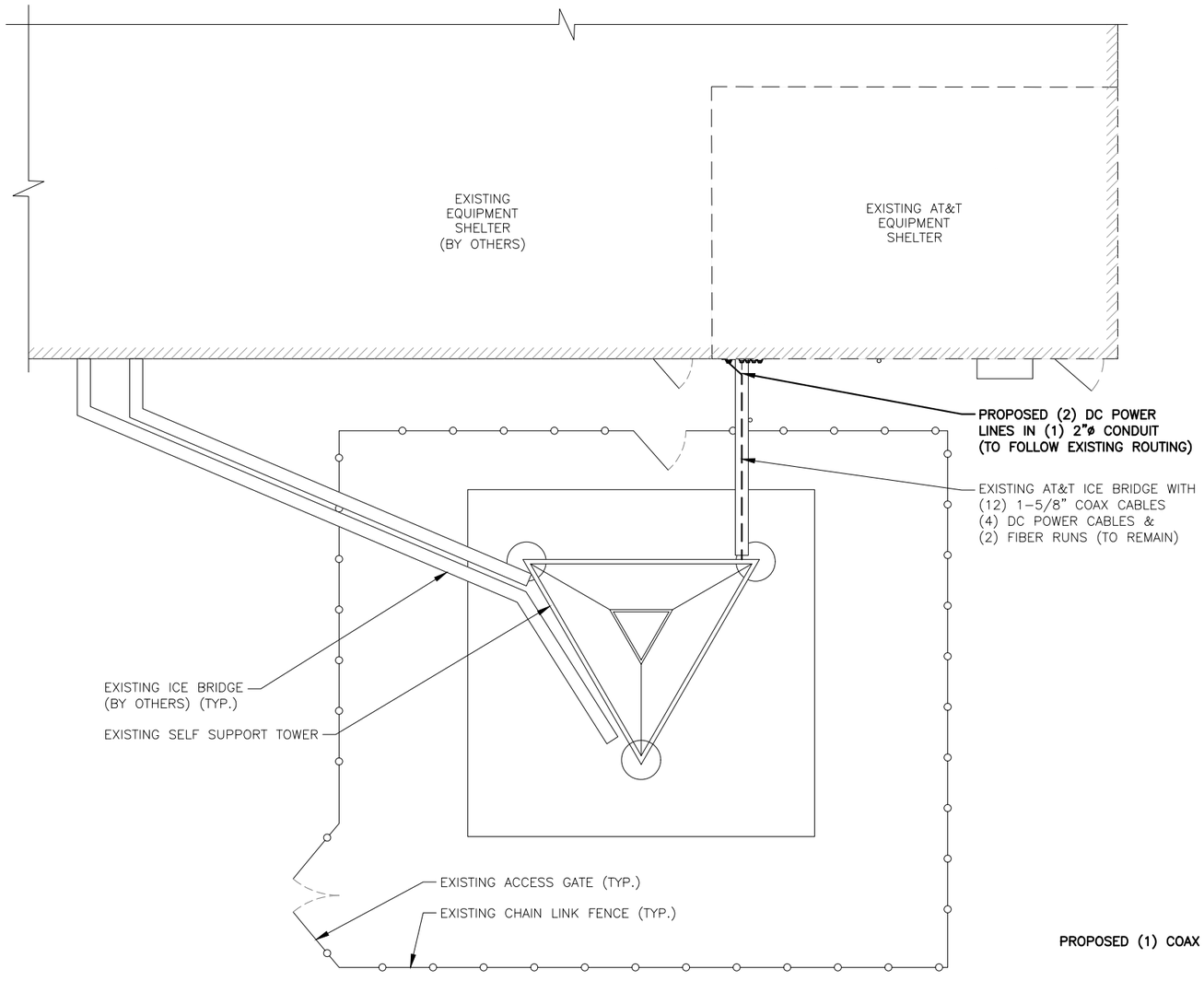
REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

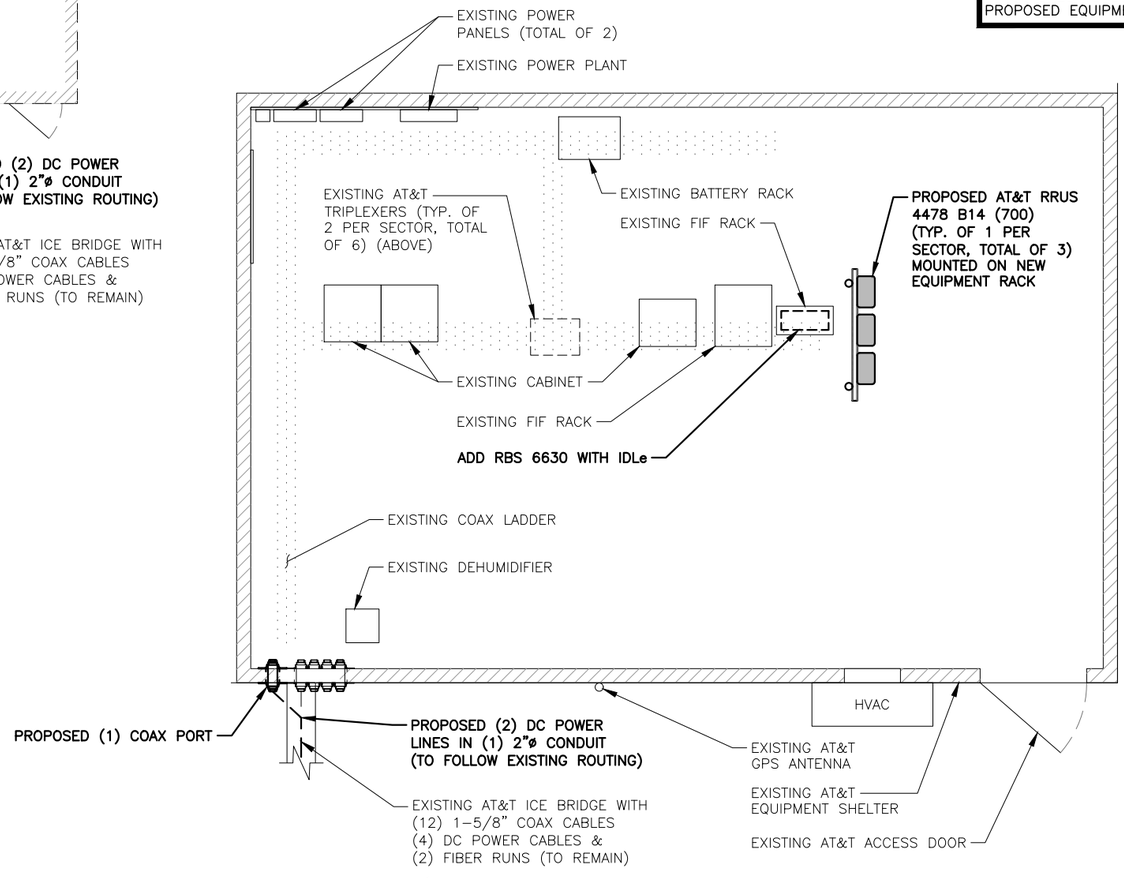
NOTE:

AN ANALYSIS FOR THE CAPACITY OF THE EXISTING **ANTENNA MOUNT** TO SUPPORT THE PROPOSED LOADING HAS BEEN COMPLETED BY:
HUDSON DESIGN GROUP, LLC.
DATED: AUGUST 15, 2019

NOTE:

REFER TO STRUCTURAL ANALYSIS BY: HUDSON DESIGN GROUP, LLC, DATED: OCTOBER 23, 2019, FOR THE CAPACITY OF THE EXISTING STRUCTURES TO SUPPORT THE PROPOSED EQUIPMENT.




MAGNETIC NORTH 13°48' TRUE NORTH

**COMPOUND PLAN** 1 A-1
22x34 SCALE: 3/16"=1'-0"
11x17 SCALE: 3/32"=1'-0"
0 2'-8" 5'-4" 10'-8" 16'-0"

MAGNETIC NORTH 13°48' TRUE NORTH

**EQUIPMENT PLAN** 2 A-1
22x34 SCALE: 3/8"=1'-0"
11x17 SCALE: 3/16"=1'-0"
0 1'-4" 2'-8" 5'-4" 8'-0"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STATE OF CONNECTICUT DANIEL P. HAMM No.24178 LICENSED PROFESSIONAL ENGINEER

AT&T

COMPOUND & EQUIPMENT PLANS
LTE 4C_5C_6C_BWE_2019 UPGRADE

| SITE NUMBER | DRAWING NUMBER | REV |
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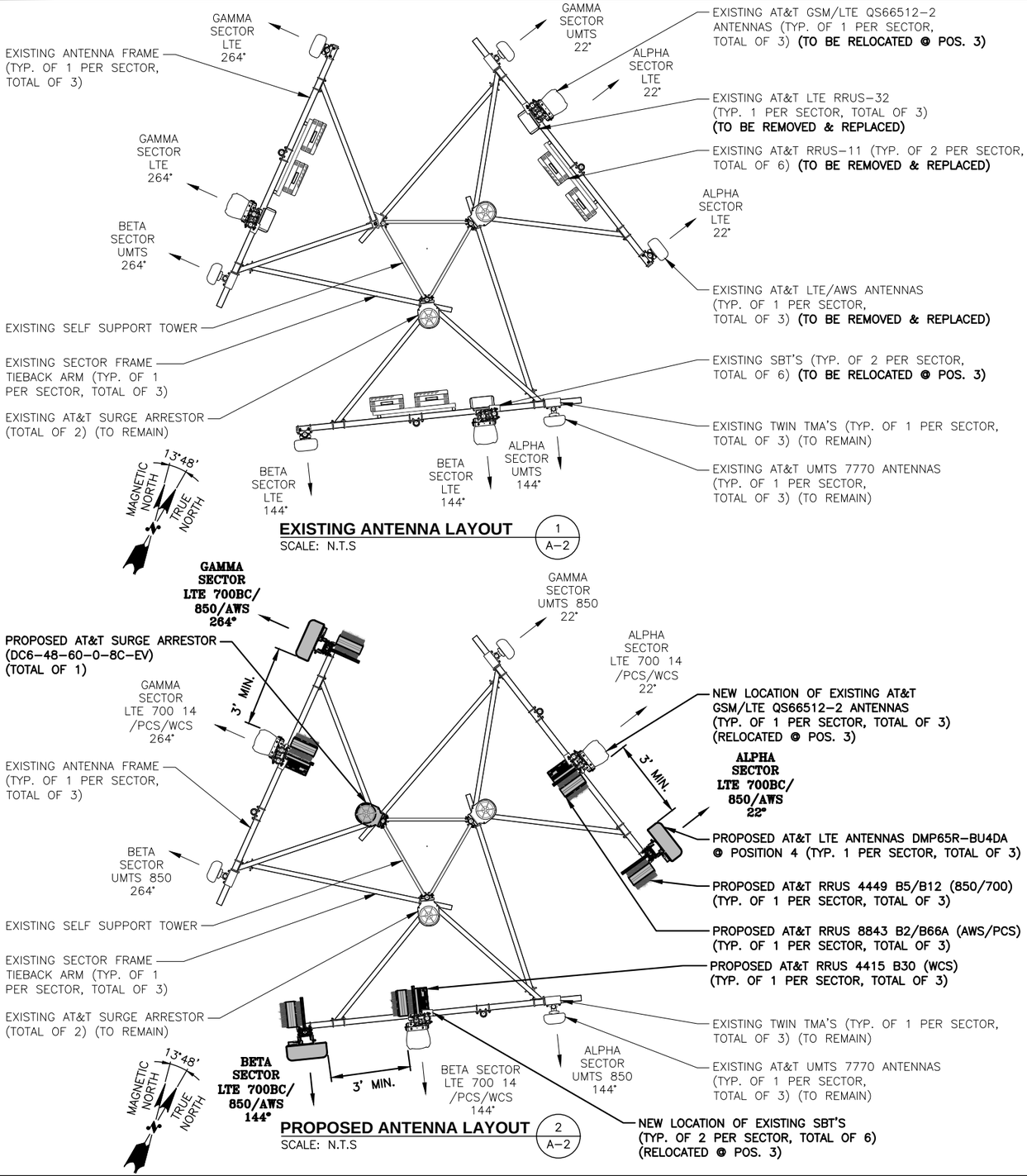
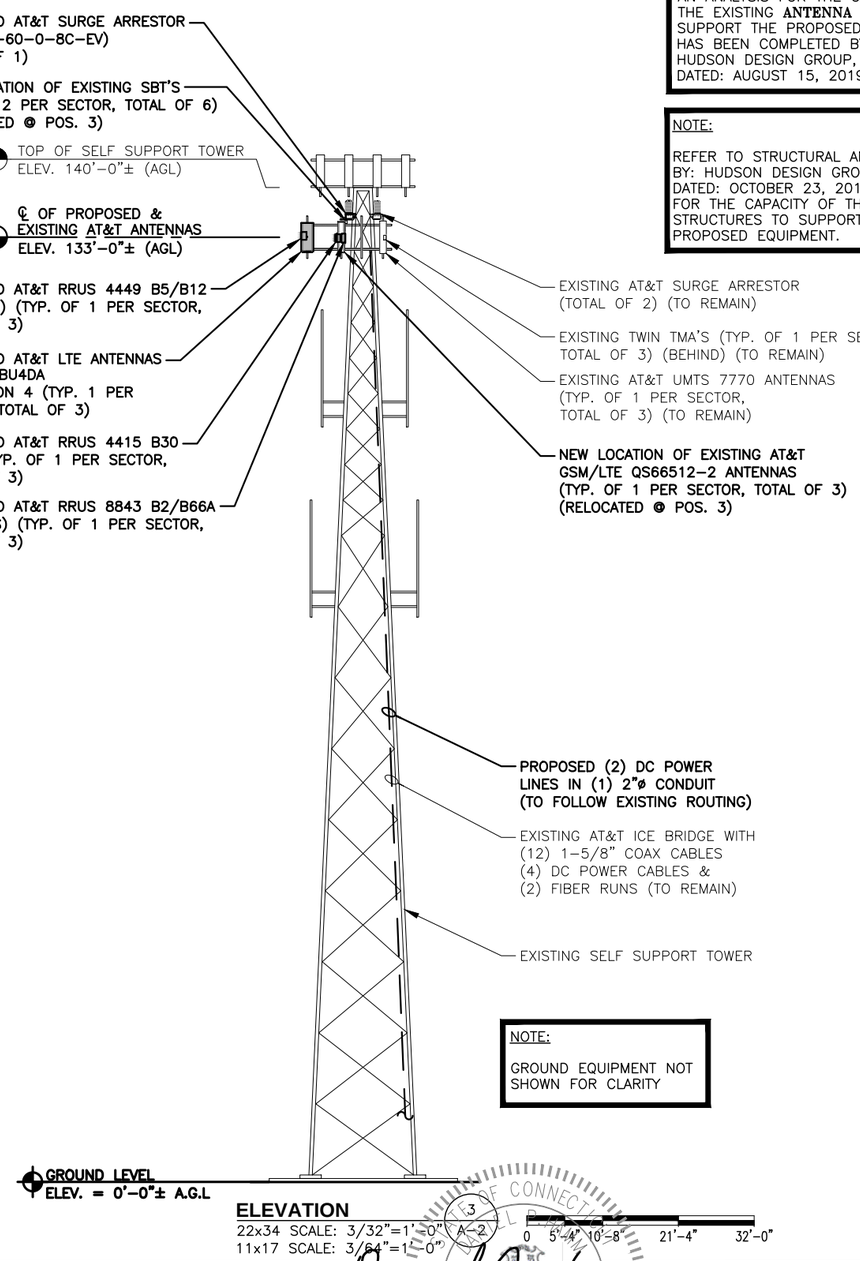



**EXISTING ANTENNA LAYOUT** (1 / A-2)
SCALE: N.T.S




**PROPOSED ANTENNA LAYOUT** (2 / A-2)
SCALE: N.T.S




**ELEVATION** (3 / A-2)
22x34 SCALE: 3/32"=1'-0"
11x17 SCALE: 3/64"=1'-0"
0 5'-4" 10'-8" 21'-4" 32'-0"

NOTE:
REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

NOTE:
AN ANALYSIS FOR THE CAPACITY OF THE EXISTING **ANTENNA MOUNT** TO SUPPORT THE PROPOSED LOADING HAS BEEN COMPLETED BY:
HUDSON DESIGN GROUP, LLC.
DATED: AUGUST 15, 2019

NOTE:
REFER TO STRUCTURAL ANALYSIS BY: HUDSON DESIGN GROUP, LLC, DATED: OCTOBER 23, 2019, FOR THE CAPACITY OF THE EXISTING STRUCTURES TO SUPPORT THE PROPOSED EQUIPMENT.

NOTE:
GROUND EQUIPMENT NOT SHOWN FOR CLARITY

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SITE NUMBER: CT2164
SITE NAME: NEW LONDON-GROTON PD

68 GROTON LONG POINT ROAD (GROTON PD)
GROTON, CT 06340
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at&t
500 ENTERPRISE DRIVE, SUITE 3A
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| NO. | DATE | REVISIONS | BY | CHK | APP'D |
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| A | 10/02/19 | ISSUED FOR REVIEW | DJM | AT | DPH |

SCALE: AS SHOWN | DESIGNED BY: AT | DRAWN BY: DJM

CONNECTICUT LICENSED PROFESSIONAL ENGINEER No.24178

AT&T

ANTENNA LAYOUTS & ELEVATION
LTE 4C_5C_6C_BWE_2019 UPGRADE

| SITE NUMBER | DRAWING NUMBER | REV |
|---|---|---|
| CT2164 | A-2 | 1 |

## ANTENNA SCHEDULE

| SECTOR | EXISTING/ PROPOSED | BAND | ANTENNA | SIZE (INCHES) (L x W x D) | ANTENNA ℄ HEIGHT | AZIMUTH | TMA/ DIPLEXER | RRU | SIZE (INCHES) (L x W x D) | FEEDER | RAYCAP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A1 | EXISTING | UMTS 850 | 7770 | 55X11X5 | 133'-0"± | 144° | (1)(E)(G) LGP21901<br>(1)(E) TT19-08BP111-001 | – | – | (2)1-5/8 COAX | (E) (1) RAYCAP DC6-48-60-18-8F |
| A2 | – | – | – | – | – | – | – | – | – | – | |
| A3 | EXISTING **RELOCATED** | **LTE 700 14 /PCS/WCS** | QS66512-2 | 72x12x9.6 | 133'-0"± | 22° | (2)(E)(G) TPX-070821<br>(2)(E) TPX-070821 | **(1)(P)(G) 4478 B14<br>(1)(P) 8843 B2/B66A<br>(1)(P) 4415 B30** | **18.1"X13.4"X8.3"<br>14.9"X13.2"X10.9"<br>16.5"X13.4"X5.9"** | (2)1-5/8 COAX | |
| **A4** | **PROPOSED** | **LTE 700BC/ 850/AWS** | **DMP65R-BU4DA** | **78.7x20x6.9** | **133'-0"±** | **22°** | – | **(1)(P) 4449 B5/B12** | **14.9"X13.2"X10.4"** | – | |
| B1 | EXISTING | UMTS 850 | 7770 | 55X11X5 | 133'-0"± | 264° | (1)(E)(G) LGP21901<br>(1)(E) TT19-08BP111-001 | – | – | (2)1-5/8 COAX | (E) (1) RAYCAP DC6-48-60-18-8F |
| B2 | – | – | – | – | – | – | – | – | – | – | |
| B3 | EXISTING **RELOCATED** | **LTE 700 14 /PCS/WCS** | QS66512-2 | 72x12x9.6 | 133'-0"± | 144° | (2)(E)(G) TPX-070821<br>(2)(E) TPX-070821 | **(1)(P)(G) 4478 B14<br>(1)(P) 8843 B2/B66A<br>(1)(P) 4415 B30** | **18.1"X13.4"X8.3"<br>14.9"X13.2"X10.9"<br>16.5"X13.4"X5.9"** | (2)1-5/8 COAX | |
| **B4** | **PROPOSED** | **LTE 700BC/ 850/AWS** | **DMP65R-BU4DA** | **78.7x20x6.9** | **133'-0"±** | **144°** | – | **(1)(P) 4449 B5/B12** | **14.9"X13.2"X10.4"** | – | |
| C1 | EXISTING | UMTS 850 | 7770 | 55X11X5 | 133'-0"± | 22° | (1)(E)(G) LGP21901<br>(1)(E) TT19-08BP111-001 | – | – | (2)1-5/8 COAX | **(P) (1) RAYCAP DC6-48-60-0-8C-EV** |
| C2 | – | – | – | – | – | – | – | – | – | – | |
| C3 | EXISTING **RELOCATED** | **LTE 700 14 /PCS/WCS** | QS66512-2 | 72x12x9.6 | 133'-0"± | 264° | (2)(E)(G) TPX-070821<br>(2)(E) TPX-070821 | **(1)(P)(G) 4478 B14<br>(1)(P) 8843 B2/B66A<br>(1)(P) 4415 B30** | **18.1"X13.4"X8.3"<br>14.9"X13.2"X10.9"<br>16.5"X13.4"X5.9"** | (2)1-5/8 COAX | |
| **C4** | **PROPOSED** | **LTE 700BC/ 850/AWS** | **DMP65R-BU4DA** | **78.7x20x6.9** | **133'-0"±** | **264°** | – | **(1)(P) 4449 B5/B12** | **14.9"X13.2"X10.4"** | – | |

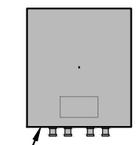
**FINAL ANTENNA SCHEDULE** (1 / A-3)
SCALE: N.T.S

### RRU CHART

| QUANTITY | MODEL | SIZE (L x W x D) |
|---|---|---|
| 3(P) | 4449 (850/700) | 14.9"x13.2"x10.4" |
| 3(P) | 8843 (AWS/PCS) | 14.9"x13.2"x10.9" |
| 3(P)(G) | 4478 B14 (700) | 18.1"x13.4"x8.3" |
| 3(P) | 4415 | 16.5"x13.4"x5.9" |

NOTE:
MOUNT PER MANUFACTURER'S SPECIFICATIONS

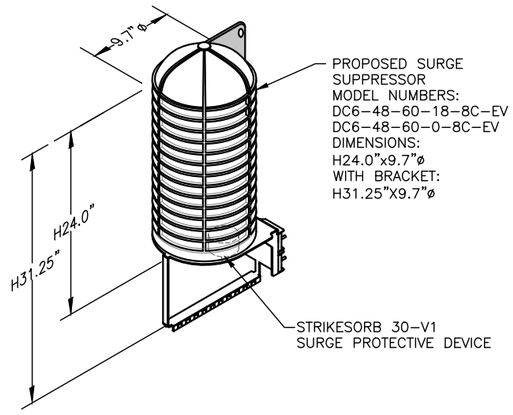
NOTE:
SEE RFDS FOR RRH FREQUENCY AND MODEL NUMBER



PROPOSED RRU REFER TO THE FINAL RFDS AND CHART FOR QUANTITY, MODEL AND DIMENSIONS

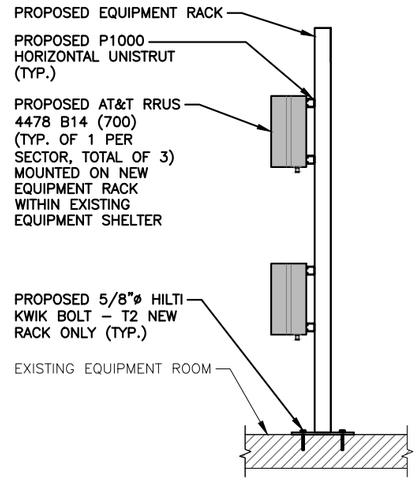
NOTE:
MOUNT PER MANUFACTURER'S SPECIFICATIONS.

**PROPOSED RRUS DETAIL** (2 / A-3)
SCALE: N.T.S




NOTE:
MOUNT PER MANUFACTURER'S SPECIFICATIONS.

**DC SURGE SUPPRESSOR DETAIL** (3 / A-3)
SCALE: N.T.S

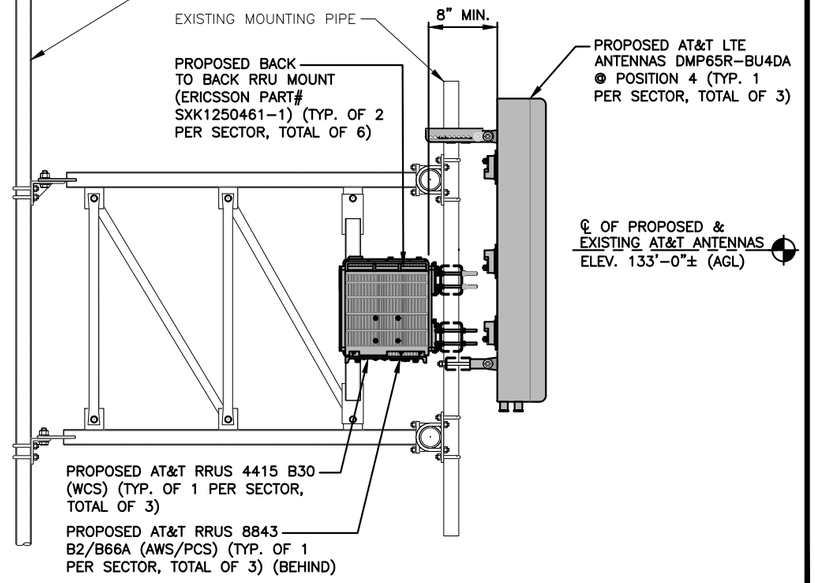



**PROPOSED RRUS MOUNTING DETAIL ON NEW RACK (IN EQUIPMENT SHELTER)** (4 / A-3)
22x34 SCALE: 3/4"=1'-0"
11x17 SCALE: 3/8"=1'-0"
0 8" 1'-4" 2'-8" 4'-0"

NOTE:
REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

NOTE:
AN ANALYSIS FOR THE CAPACITY OF THE EXISTING **ANTENNA MOUNT** TO SUPPORT THE PROPOSED LOADING HAS BEEN COMPLETED BY:
HUDSON DESIGN GROUP, LLC.
DATED: AUGUST 15, 2019

NOTE:
REFER TO STRUCTURAL ANALYSIS BY: HUDSON DESIGN GROUP, LLC, DATED: OCTOBER 23, 2019, FOR THE CAPACITY OF THE EXISTING STRUCTURES TO SUPPORT THE PROPOSED EQUIPMENT.




**PROPOSED LTE ANTENNA MOUNTING DETAIL** (5 / A-3)
22x34 SCALE: 1"=1'-0"
11x17 SCALE: 1/2"=1'-0"
0 0'-6" 1'-0" 2'-0" 3'-0"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500 ENTERPRISE DRIVE, SUITE 3A
ROCKY HILL, CT 06067


SITE NUMBER: CT2164
SITE NAME: NEW LONDON-GROTON PD

68 GROTON LONG POINT ROAD (GROTON PD)
GROTON, CT 06340
NEW LONDON COUNTY

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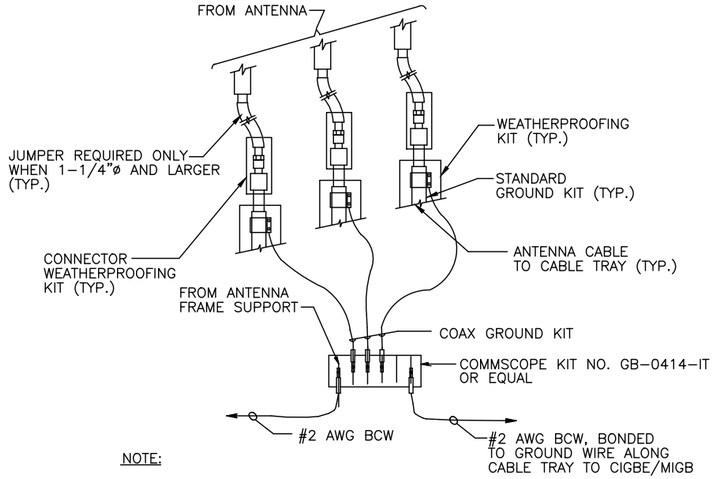
SCALE: AS SHOWN | DESIGNED BY: AT | DRAWN BY: DJM

STATE OF CONNECTICUT DANIEL P. HAMM No.24178 LICENSED PROFESSIONAL ENGINEER

AT&T

DETAILS
LTE 4C_5C_6C_BWE_2019 UPGRADE

| SITE NUMBER | DRAWING NUMBER | REV |
|---|---|---|
| CT2164 | A-3 | 1 |

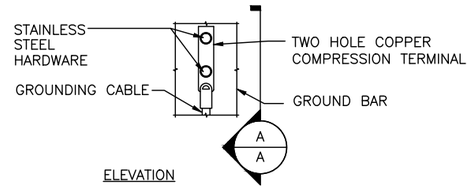



NOTE:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO CIGBE.

## GROUND WIRE TO GROUND BAR CONNECTION DETAIL (1 / G-1)

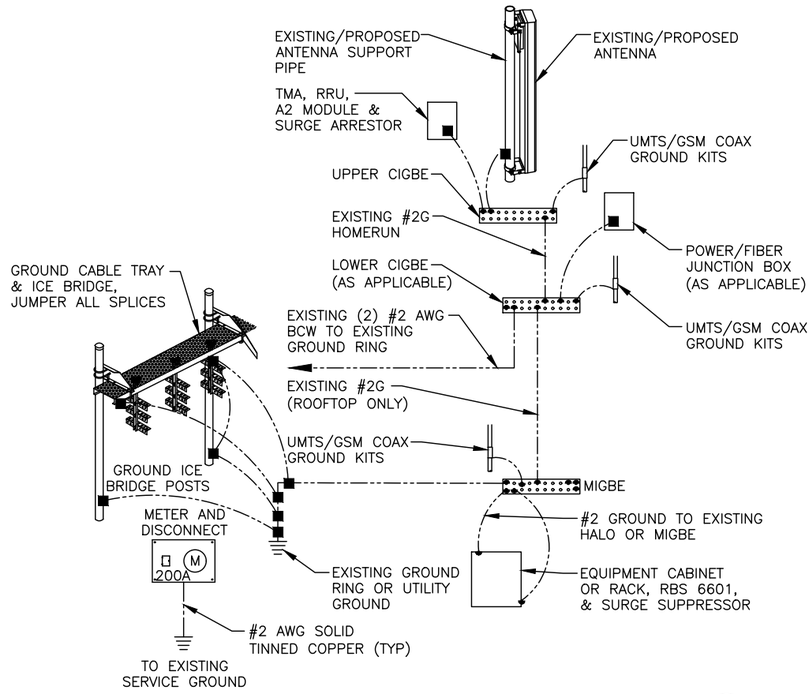
SCALE: N.T.S




NOTES:
1. "DOUBLING UP" OR "STACKING" OF CONNECTION IS NOT PERMITTED.
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATION.
3. CADWELD DOWNLEADS FROM UPPER EGB, LOWER EGB, AND MGB

## TYPICAL GROUND BAR CONNECTION DETAIL (3 / G-1)

SCALE: N.T.S




## GROUNDING RISER DIAGRAM (2 / G-1)

SCALE: N.T.S

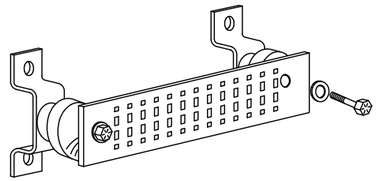
EACH GROUND CONDUCTOR TERMINATING ON ANY GROUND BAR SHALL HAVE AN IDENTIFICATION TAG ATTACHED AT EACH END THAT WILL IDENTIFY ITS ORIGIN AND DESTINATION.

SECTION "P" – SURGE PRODUCERS

CABLE ENTRY PORTS (HATCH PLATES) (#2 AWG)
GENERATOR FRAMEWORK (IF AVAILABLE) (#2 AWG)
TELCO GROUND BAR
COMMERCIAL POWER COMMON NEUTRAL/GROUND BOND (#2 AWG)
+24V POWER SUPPLY RETURN BAR (#2 AWG)
-48V POWER SUPPLY RETURN BAR (#2 AWG)
RECTIFIER FRAMES.

SECTION "A" – SURGE ABSORBERS

INTERIOR GROUND RING (#2 AWG)
EXTERNAL EARTH GROUND FIELD (BURIED GROUND RING) (#2 AWG)
METALLIC COLD WATER PIPE (IF AVAILABLE) (#2 AWG)
BUILDING STEEL (IF AVAILABLE) (#2 AWG)



## GROUND BAR - DETAIL (4 / G-1)

SCALE: N.T.S

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SAI
12 INDUSTRIAL WAY
SALEM, NH 03079

SITE NUMBER: CT2164
SITE NAME: NEW LONDON-GROTON PD

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at&t
500 ENTERPRISE DRIVE, SUITE 3A
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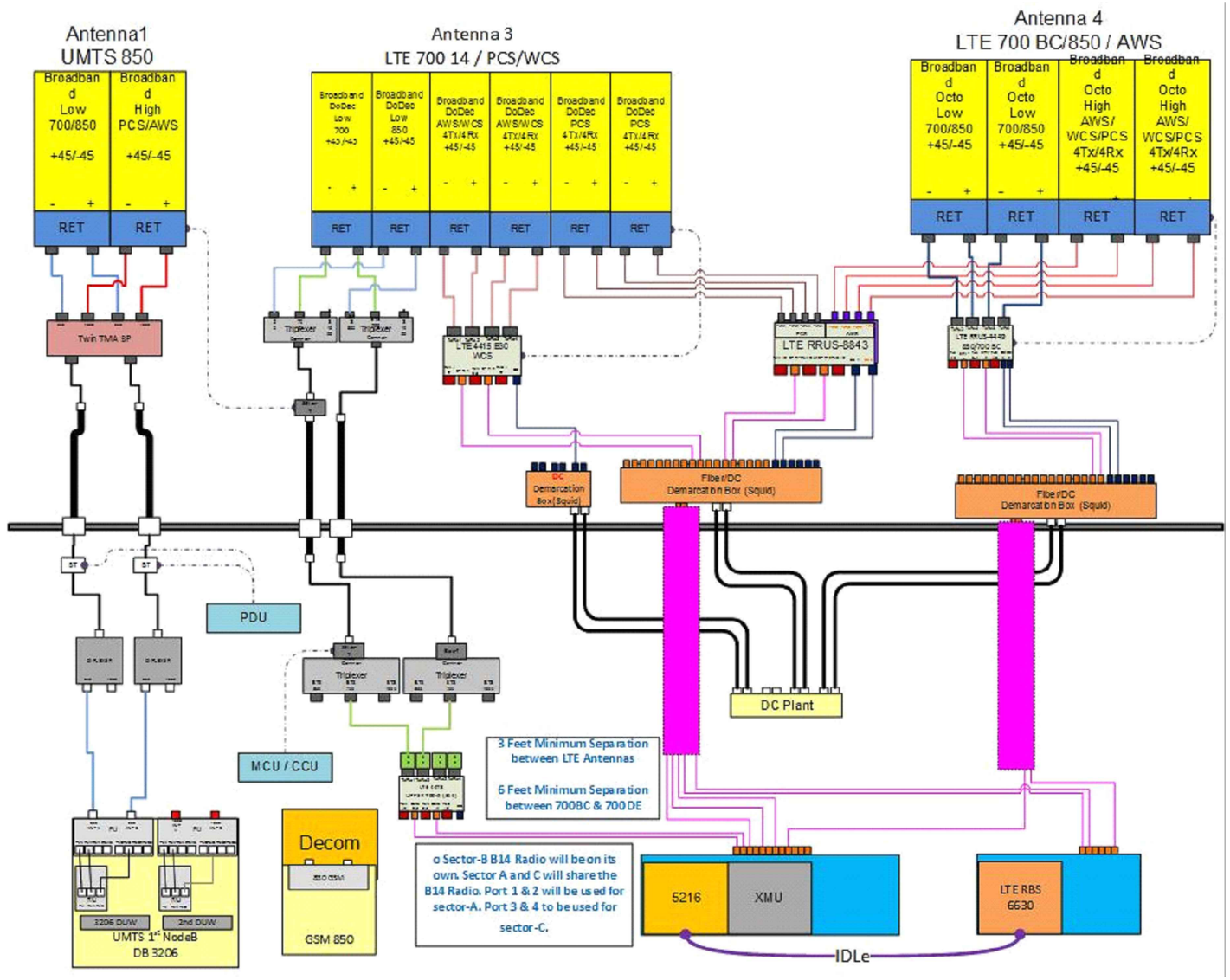
SCALE: AS SHOWN | DESIGNED BY: AT | DRAWN BY: DJM

STATE OF CONNECTICUT · DANIEL P. HAMM · No.24178 · LICENSED PROFESSIONAL ENGINEER

AT&T

GROUNDING DETAILS
LTE 4C_5C_6C_BWE_2019 UPGRADE

| SITE NUMBER | DRAWING NUMBER | REV |
|---|---|---|
| CT2164 | G-1 | 1 |




**RF PLUMBING DIAGRAM** 1 / RF–1
SCALE: N.T.S

NOTE:
1. CONTRACTOR TO CONFIRM ALL PARTS.
2. INSTALL ALL EQUIPMENT TO MANUFACTURER'S RECOMMENDATIONS

NOTE:

REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.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SCALE: AS SHOWN | DESIGNED BY: AT | DRAWN BY: DJM

AT&T

RF PLUMBING DIAGRAM
LTE 4C_5C_6C_BWE_2019 UPGRADE

| SITE NUMBER | DRAWING NUMBER | REV |
|---|---|---|
| CT2164 | RF–1 | 1 |

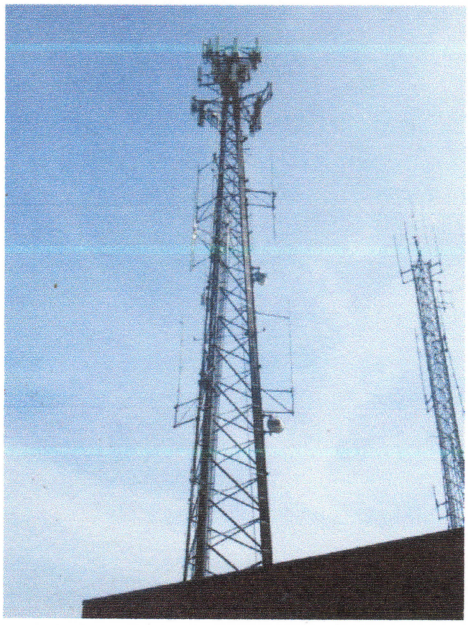
# STRUCTURAL ANALYSIS REPORT

For

## CT2164
## NEW LONDON GROTON PD

68 GROTON LONG POINT ROAD
GROTON, CT 06340

## Antennas Mounted on the Tower



**Prepared for:**

SAI

at&t

**Dated: October 23, 2019**

**Prepared by:**

HDG | HUDSON Design Group LLC


45 Beechwood Drive
North Andover, MA 01845
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www.hudsondesigngroupllc.com


STATE OF CONNECTICUT
GI KAI WANG
No. 28220
LICENSED PROFESSIONAL ENGINEER

10/23/2019

## SCOPE OF WORK:

Hudson Design Group LLC (HDG) has been authorized by AT&T to conduct a structural evaluation of the 140' self-supporting tower supporting the proposed AT&T's antennas located at elevation 133' above the ground level.

This report represents this office's findings, conclusions and recommendations pertaining to the support of AT&T's existing and proposed antennas listed below.

Record drawings of the existing tower prepared by Rohn Inc., dated April 2, 1997, were available for our use. The previous structural analysis report prepared by Fullerton Engineering, dated October 24, 2016, was also available and obtained for our use.

## CONCLUSION SUMMARY:

Based on our evaluation, we have determined that the existing tower and foundation **are in conformance** with the ANSI/TIA-222-G Standard for the loadings considered under the criteria listed in this report. The tower structure is rated at **92.2%** - (Leg at Tower Section T2 from EL.100' to EL.120' Controlling).

HUDSON Design Group LLC

**APPURTENANCES CONFIGURATION:**

| Tenant | Appurtenances | Elev. | Mount |
|---|---|---|---|
| | Flash Beacon Lighting | 145' | Tower Leg |
| | Lightning Rod | 143' | Tower Leg |
| | (6) DB846 Antennas | 143' | Steel Platform |
| | (6) DB948 Antennas | 143' | Steel Platform |
| AT&T | (3) Powerwave 7770 Antennas | 133' | T - Frame |
| AT&T | (3) QS66512-3 Antennas | 133' | T - Frame |
| AT&T | ***(3) DMP65R-BU4D Antennas*** | 133' | T - Frame |
| AT&T | ***(3) 8843 B2/B66A*** | 133' | T - Frame |
| AT&T | ***(3) 4415 B30*** | 133' | T - Frame |
| AT&T | ***(3) 4449 B5/B12*** | 133' | T - Frame |
| AT&T | ***(1) DC6-48-60-0-8C-EV*** | 133' | Tower Leg |
| AT&T | (3) TT19-08BP111-001 | 133' | T - Frame |
| AT&T | (6) TPX-070821 | 133' | T - Frame |
| AT&T | (2) DC6-48-60-18-8F | 133' | Tower Leg |
| | DB212 | 121' | Tower Leg |
| | DB212 | 119' | Tower Leg |
| | DB212 | 110' | Tower Leg |
| | DB540 | 110' | Side Mount Standoff |
| | DB212 | 104' | Tower Leg |
| | PD340 | 112.5' | Side Mount Standoff |
| | PD340 | 89.5' | Side Mount Standoff |
| | DB810 | 108.3' | Side Mount Standoff |
| | DB810 | 93.8' | Side Mount Standoff |
| | (2) PD1121 | 101' | Side Mount Standoff |
| | DB212 | 96' | Tower Leg |
| | DB212 | 90' | Tower Leg |
| | 3' Dish | 80' | Tower Leg |
| | DB212 | 68' | Tower Leg |
| | (2) Obstruction Lights | 67' | Tower Leg |
| | Camera | 66' | Tower Leg |
| | PD340 | 65.5' | Side Mount Standoff |
| | PD220 | 64' | Side Mount Standoff |
| | 3' Dish | 58' | Tower Leg |
| | PD220 | 44' | Side Mount Standoff |
| | 2' Dish | 44' | Tower Leg |
| | (2) BA1012 | 40' | Side Mount Standoff |
| | Panel Antenna 18"X12" | 44' | Side Mount Standoff |
| | Panel Antenna 18"X12" | 37' | Side Mount Standoff |
| | 3' Dish | 40' | Tower Leg |
| | 2' Dish | 37' | Tower Leg |

***Proposed AT&T Appurtenances shown in Bold.***

HUDSON Design Group LLC

**AT&T EXISTING/PROPOSED COAX CABLES:**

| Tenant | Coax Cables | Elev. | Mount |
|---|---|---|---|
| ***AT&T*** | (12) 1 5/8" Cables | 133' | Tower Face |
| ***AT&T*** | (4) DC Power Cables | 133' | Tower Face |
| ***AT&T*** | (2) Fiber Cables | 133' | Tower Face |
| ***AT&T*** | ***(2) DC Power Cables*** | 133' | Tower Face |

***Proposed AT&T Coax Cables shown in Bold.***

**ANALYSIS RESULTS SUMMARY:**

| Component | Max. Stress Ratio | Elev. of Component (ft) | Pass/Fail | Comments |
|---|---|---|---|---|
| **Legs** | **92.2 %** | 100 – 120 | PASS | **Controlling** |
| **Diagonals** | 79.5 % | 40 – 60 | PASS | |
| **Top Girt** | 6.0 % | 120 – 140 | PASS | |

**FOUNDATION ANALYSIS RESULTS SUMMARY:**

| | Original Design Reactions X 1.35 | Proposed Reactions | Pass/Fail | Comments |
|---|---|---|---|---|
| **AXIAL** | **58.1 k** | 34.6 k | PASS | |
| **SHEAR** | **60.1 k** | 51.4 k | PASS | |
| **MOMENT** | **5148 ft-k** | 4429 ft-k | PASS | |

HUDSON Design Group LLC

**DESIGN CRITERIA:**

1. EIA/TIA-222-G Structural Standards for Steel Antenna Towers and Antenna Supporting Structures

2. Connecticut State Building Code

   County: New London
   City/Town: Groton
   Wind Load: 120 mph
   Structural Class: II
   Exposure Category: B
   Topographic Category: 1
   Crest Height: 0 ft.
   Ice Thickness: 0.75 inch

**ASSUMPTIONS:**

1. The tower dimensions, member sizes and material strength are as indicated in the previous structural analysis report prepared by Fullerton Engineering, dated October 24, 2016.

2. The appurtenances configuration is as stated in the previous structural analysis report prepared by Fullerton Engineering, dated October 24, 2016. All antennas, coax cables and waveguide cables are assumed to be properly installed and supported as per the manufacturer's requirements.

3. The tower and foundation are properly constructed and maintained. All structural members and their connections are assumed to be in good condition and are free from defects with no deterioration to its member capacities.

4. The support mounts and platforms are not analyzed and are considered adequate to support the loading. The analysis is limited to the primary support structure itself.

5. All prior structural modification, if any, are assumed to be as per the data supplied (if available), and installed properly.

**SUPPORT RECOMMENDATIONS:**

HDG recommends that the proposed antennas and RRHs be mounted on the existing T-frame supported by the tower; the proposed surge arrestor be mounted on the tower leg.

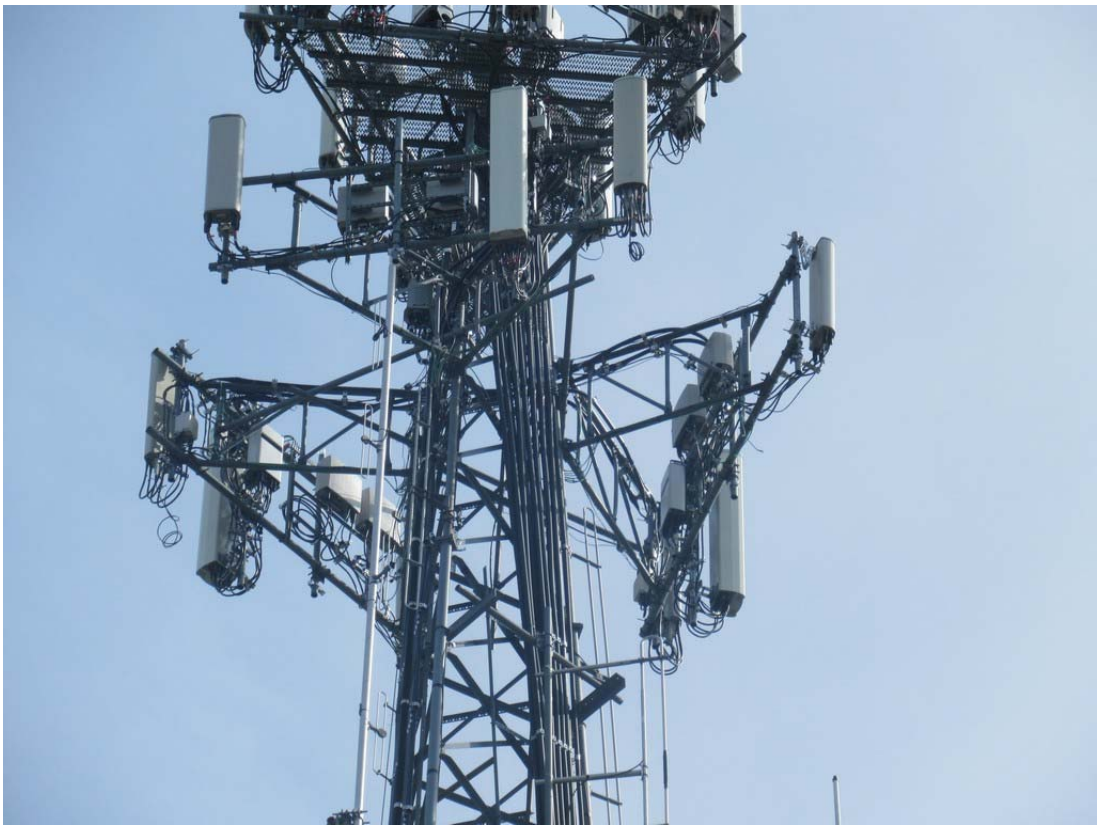
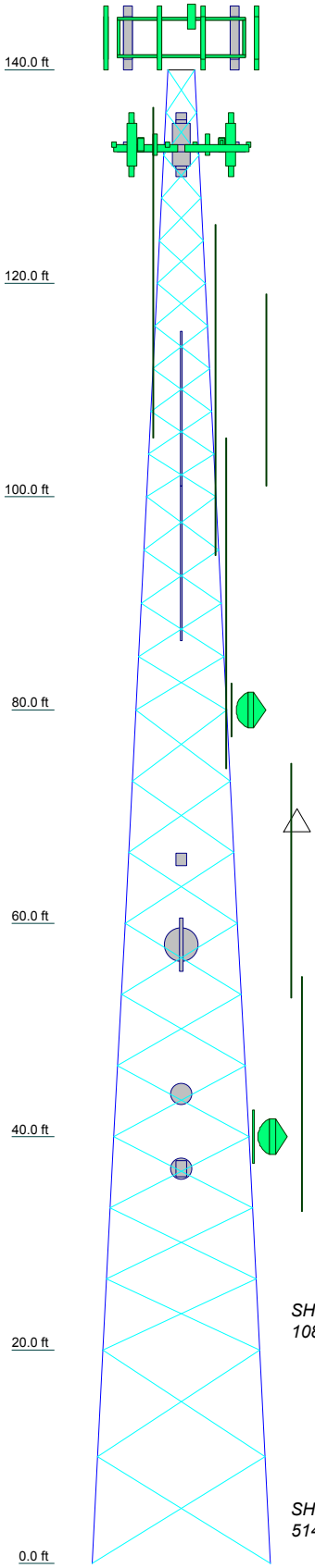


**Photo 1:** Photo illustrating the Tower with Appurtenances shown.

HUDSON
Design Group LLC

# CALCULATIONS

| Section | Legs | Leg Grade | Diagonals | Diagonal Grade | Top Girts | Face Width (ft) | # Panels @ (ft) | Weight (lb) |
|---|---|---|---|---|---|---|---|---|
| T1 | ROHN 2.5 EH | | | | L2x2x1/4 | 2.5 | | 996.2 |
| T2 | ROHN 3 EH | | L2x2x1/4 | | | 4.52 | 10 @ 4 | 1272.0 |
| T3 | ROHN 4 EH | | | | | 6.56 | 4 @ 5 | 1596.2 |
| T4 | ROHN 5 EH | A572-50 | L2 1/2x2 1/2x1/4 | A36 | N.A. | 8.56 | | 2099.9 |
| T5 | ROHN 6 EHS | | | | | 10.56 | 9 @ 6.66667 | 2347.2 |
| T6 | ROHN 6 EH | | L3x3x1/4 | | | 12.6 | | 3057.6 |
| T7 | ROHN 8 EHS | | L3 1/2x3 1/2x1/4 | | | 14.66 | 2 @ 10 | 3271.5 |
| | | | | | | 16.7 | | 14640.6 |




## DESIGNED APPURTENANCE LOADING

| TYPE | ELEVATION | TYPE | ELEVATION |
|---|---|---|---|
| Flash Beacon Lighting | 145 | DC6-48-60-0-8C-EV | 133 |
| Lightning Rod 5/8x4' | 143 | DB212-2-C | 121 |
| PiROD 13' Rotatable Platform w/handrails (Lattice) | 143 | DB212-2-C | 119 |
| (2) DB846F65ZASX w/Mount Pipe | 143 | PD340-1 | 112.5 |
| (2) DB846F65ZASX w/Mount Pipe | 143 | DB540K-E | 110 |
| (2) DB846F65ZASX w/Mount Pipe | 143 | DB212-2-C | 110 |
| (2) DB948F65T2E-M w/Mount Pipe | 143 | DB810T3-XC | 108.25 |
| (2) DB948F65T2E-M w/Mount Pipe | 143 | DB212-2-C | 104 |
| (2) DB948F65T2E-M w/Mount Pipe | 143 | SO 308-1 | 101 |
| PiROD 12' T-Frame (ATI - existing) | 133 | SO 308-1 | 101 |
| PiROD 12' T-Frame | 133 | SO 308-1 | 101 |
| PiROD 12' T-Frame | 133 | (2) PD1121 | 101 |
| Powerwave 7770 w/mount pipe | 133 | DB212-2-C | 96 |
| Powerwave 7770 w/mount pipe | 133 | DB810T3-XC | 93.75 |
| Powerwave 7770 w/mount pipe | 133 | DB212-2-C | 90 |
| Quintel QS66512-3 w/mpount pipe | 133 | PD340-1 | 89.5 |
| Quintel QS66512-3 w/mpount pipe | 133 | 3"x5' pipe | 80 |
| Quintel QS66512-3 w/mpount pipe | 133 | SC3-190A | 80 |
| Powerwave TT19-08BP111-001 | 133 | DB212-2-C | 68 |
| Powerwave TT19-08BP111-001 | 133 | obstruction lights | 67 |
| Powerwave TT19-08BP111-001 | 133 | obstruction lights | 67 |
| (2) TPX-070821 Triplexer | 133 | Security Camera | 66 |
| (2) TPX-070821 Triplexer | 133 | PD340-1 | 65.5 |
| (2) TPX-070821 Triplexer | 133 | PD220 | 64 |
| DC6-48-60-18-8F | 133 | 3"x5' pipe | 58 |
| DC6-48-60-18-8F | 133 | VHLP3-11W | 58 |
| DMP65R-BU4D w/mount pipe (ATI - proposed) | 133 | SO 308-1 | 54 |
| DMP65R-BU4D w/mount pipe | 133 | SO 308-1 | 54 |
| DMP65R-BU4D w/mount pipe | 133 | Panel Antenna 18"X12" | 44 |
| 8843 B2/B66A | 133 | SO 312-1 | 44 |
| 8843 B2/B66A | 133 | PD220 | 44 |
| 8843 B2/B66A | 133 | P2-57W | 44 |
| 4415 B30 | 133 | (2) BA1012 | 40 |
| 4415 B30 | 133 | 3"x5' pipe | 40 |
| 4415 B30 | 133 | SC3-190A | 40 |
| 4449 B5/B12 | 133 | SO 312-1 | 37 |
| 4449 B5/B12 | 133 | Panel Antenna 18"X12" | 37 |
| 4449 B5/B12 | 133 | P2-57W | 37 |
| | | SO 308-1 | 33 |

## MATERIAL STRENGTH

| GRADE | Fy | Fu | GRADE | Fy | Fu |
|---|---|---|---|---|---|
| A572-50 | 50 ksi | 65 ksi | A36 | 36 ksi | 58 ksi |

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MAX. CORNER REACTIONS AT BASE:
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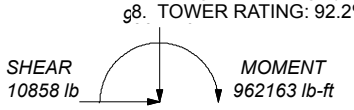
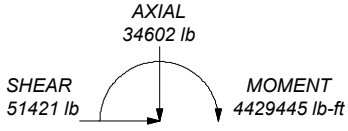
## TOWER DESIGN NOTES

1. Tower is located in New London County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 120 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 92.2%




TORQUE 7456 lb-ft
50 mph WIND - 0.7500 in ICE




TORQUE 25761 lb-ft
REACTIONS - 120 mph WIND


**Hudson Design Group LLC**
45 Beechwood Drive
North Andover, MA 01845
Phone: (978) 557-5553
FAX: (978) 336-5586


| | | |
|---|---|---|
| Job: **CT2164** | | |
| Project: ***140 ft Self Supporting Tower*** | | |
| Client: AT&T | Drawn by: kw | App'd: |
| Code: TIA-222-G | Date: 10/23/19 | Scale: NTS |
| Path: C:\Users\kwang\Documents\HUDSON DESIGN GROUP\AAA\CT2164 rev - SST (AT&T SAI)\CT2164\CT2164.eri | | Dwg No. E-1 |

# Tower Input Data

The main tower is a 3x free standing tower with an overall height of 140.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 2.50 ft at the top and 16.70 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Tower is located in New London County, Connecticut.
Basic wind speed of 120 mph.
Structure Class II.
Exposure Category B.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 0.7500 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

# Tower Section Geometry

| *Tower Section* | *Tower Elevation* | *Assembly Database* | *Description* | *Section Width* | *Number of Sections* | *Section Length* |
|---|---|---|---|---|---|---|
| | *ft* | | | *ft* | | *ft* |
| T1 | 140.00-120.00 | | | 2.50 | 1 | 20.00 |
| T2 | 120.00-100.00 | | | 4.52 | 1 | 20.00 |
| T3 | 100.00-80.00 | | | 6.56 | 1 | 20.00 |
| T4 | 80.00-60.00 | | | 8.56 | 1 | 20.00 |
| T5 | 60.00-40.00 | | | 10.56 | 1 | 20.00 |
| T6 | 40.00-20.00 | | | 12.60 | 1 | 20.00 |
| T7 | 20.00-0.00 | | | 14.66 | 1 | 20.00 |

# Tower Section Geometry *(cont'd)*

| *Tower Section* | *Tower Elevation* | *Diagonal Spacing* | *Bracing Type* | *Has K Brace End Panels* | *Has Horizontals* | *Top Girt Offset* | *Bottom Girt Offset* |
|---|---|---|---|---|---|---|---|
| | *ft* | *ft* | | | | *in* | *in* |
| T1 | 140.00-120.00 | 4.00 | X Brace | No | No | 0.0000 | 0.0000 |
| T2 | 120.00-100.00 | 4.00 | X Brace | No | No | 0.0000 | 0.0000 |
| T3 | 100.00-80.00 | 5.00 | X Brace | No | No | 0.0000 | 0.0000 |
| T4 | 80.00-60.00 | 6.67 | X Brace | No | No | 0.0000 | 0.0000 |
| T5 | 60.00-40.00 | 6.67 | X Brace | No | No | 0.0000 | 0.0000 |

| Tower Section | Tower Elevation ft | Diagonal Spacing ft | Bracing Type | Has K Brace End Panels | Has Horizontals | Top Girt Offset in | Bottom Girt Offset in |
|---|---|---|---|---|---|---|---|
| T6 | 40.00-20.00 | 6.67 | X Brace | No | No | 0.0000 | 0.0000 |
| T7 | 20.00-0.00 | 10.00 | X Brace | No | No | 0.0000 | 0.0000 |

## Tower Section Geometry *(cont'd)*

| Tower Elevation ft | Leg Type | Leg Size | Leg Grade | Diagonal Type | Diagonal Size | Diagonal Grade |
|---|---|---|---|---|---|---|
| T1 140.00-120.00 | Pipe | ROHN 2.5 EH | A572-50 (50 ksi) | Equal Angle | L2x2x1/4 | A36 (36 ksi) |
| T2 120.00-100.00 | Pipe | ROHN 3 EH | A572-50 (50 ksi) | Equal Angle | L2x2x1/4 | A36 (36 ksi) |
| T3 100.00-80.00 | Pipe | ROHN 4 EH | A572-50 (50 ksi) | Equal Angle | L2x2x1/4 | A36 (36 ksi) |
| T4 80.00-60.00 | Pipe | ROHN 5 EH | A572-50 (50 ksi) | Equal Angle | L2 1/2x2 1/2x1/4 | A36 (36 ksi) |
| T5 60.00-40.00 | Pipe | ROHN 6 EHS | A572-50 (50 ksi) | Equal Angle | L2 1/2x2 1/2x1/4 | A36 (36 ksi) |
| T6 40.00-20.00 | Pipe | ROHN 6 EH | A572-50 (50 ksi) | Equal Angle | L3x3x1/4 | A36 (36 ksi) |
| T7 20.00-0.00 | Pipe | ROHN 8 EHS | A572-50 (50 ksi) | Equal Angle | L3 1/2x3 1/2x1/4 | A36 (36 ksi) |

## Tower Section Geometry *(cont'd)*

| Tower Elevation ft | Top Girt Type | Top Girt Size | Top Girt Grade | Bottom Girt Type | Bottom Girt Size | Bottom Girt Grade |
|---|---|---|---|---|---|---|
| T1 140.00-120.00 | Equal Angle | L2x2x1/4 | A36 (36 ksi) | Solid Round | | A572-50 (50 ksi) |

## Feed Line/Linear Appurtenances - Entered As Round Or Flat

| Description | Face or Leg | Allow Shield | Exclude From Torque Calculation | Component Type | Placement ft | Face Offset in | Lateral Offset (Frac FW) | # | # Per Row | Clear Spacing in | Width or Diameter in | Perimeter in | Weight plf |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDF4-50A (1/2 FOAM) | B | No | No | Ar (CaAa) | 140.00 - 6.00 | 0.0000 | 0.25 | 1 | 1 | 0.6300 | 0.6300 | | 0.15 |
| LDF5-50A (7/8 FOAM) | B | No | No | Ar (CaAa) | 121.00 - 6.00 | 0.0000 | 0.252 | 1 | 1 | 1.0900 | 1.0900 | | 0.33 |
| LDF5-50A (7/8 FOAM) | B | No | No | Ar (CaAa) | 110.00 - 6.00 | 0.0000 | 0.254 | 1 | 1 | 1.0900 | 1.0900 | | 0.33 |
| LDF6-50A (1-1/4 FOAM) | B | No | No | Ar (CaAa) | 110.00 - 6.00 | 0.0000 | 0.3 | 1 | 1 | 1.5500 | 1.5500 | | 0.66 |
| LDF5-50A (7/8 FOAM) | B | No | No | Ar (CaAa) | 104.00 - 6.00 | 0.0000 | 0.256 | 1 | 1 | 1.0900 | 1.0900 | | 0.33 |
| LDF6-50A (1-1/4 FOAM) | B | No | No | Ar (CaAa) | 101.00 - 6.00 | 0.0000 | 0.31 | 2 | 2 | 1.5500 | 1.5500 | | 0.66 |
| LDF7-50A | B | No | No | Ar (CaAa) | 101.00 - | 0.0000 | 0.32 | 2 | 2 | 1.9800 | 1.9800 | | 0.82 |

| Description | Face or Leg | Allow Shield | Exclude From Torque Calculation | Component Type | Placement ft | Face Offset in | Lateral Offset (Frac FW) | # | # Per Row | Clear Spacing in | Width or Diameter in | Perimeter in | Weight plf |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1-5/8 FOAM) | | | | | 6.00 | | | | | | | | |
| LDF5-50A (7/8 FOAM) | B | No | No | Ar (CaAa) | 90.00 - 6.00 | 0.0000 | 0.2 | 1 | 1 | 1.0900 | 1.0900 | | 0.33 |
| LDF4-50A (1/2 FOAM) | B | No | No | Ar (CaAa) | 67.00 - 6.00 | 0.0000 | 0.21 | 1 | 1 | 0.6300 | 0.6300 | | 0.15 |
| 3/4 | B | No | No | Ar (CaAa) | 66.00 - 6.00 | 0.0000 | 0.22 | 1 | 1 | 1.1100 | 1.1100 | | 0.54 |
| LDF5-50A (7/8 FOAM) | B | No | No | Ar (CaAa) | 54.00 - 6.00 | 0.0000 | 0.23 | 3 | 3 | 1.0900 | 1.0900 | | 0.33 |
| LDF2-50 (3/8 FOAM) | B | No | No | Ar (CaAa) | 44.00 - 6.00 | 0.0000 | 0.325 | 1 | 1 | 0.4400 | 0.4400 | | 0.08 |
| LDF2-50 (3/8 FOAM) | B | No | No | Ar (CaAa) | 37.00 - 6.00 | 0.0000 | 0.33 | 2 | 2 | 0.4400 | 0.4400 | | 0.08 |
| LDF4-50A (1/2 FOAM) | B | No | No | Ar (CaAa) | 37.00 - 6.00 | 0.0000 | 0.34 | 1 | 1 | 0.6300 | 0.6300 | | 0.15 |
| LDF5-50A (7/8 FOAM) | B | No | No | Ar (CaAa) | 33.00 - 6.00 | 0.0000 | 0.35 | 1 | 1 | 1.0900 | 1.0900 | | 0.33 |
| LDF7-50A (1-5/8 FOAM) | C | No | No | Ar (CaAa) | 140.00 - 6.00 | 0.0000 | 0 | 12 | 12 | 1.9800 | 1.9800 | | 0.82 |
| ********** | | | | | | | | | | | | | |
| 1 5/8 (AT&T - existing) | A | No | No | Ar (CaAa) | 133.00 - 8.00 | 0.0000 | -0.2 | 12 | 12 | 0.0000 | 1.9800 | | 1.04 |
| WR-VG122ST-BRDA | A | No | No | Ar (CaAa) | 133.00 - 8.00 | 0.0000 | -0.3 | 4 | 4 | 0.0000 | 0.4000 | | 0.25 |
| FB-L98B-002 | A | No | No | Ar (CaAa) | 133.00 - 8.00 | 0.0000 | -0.31 | 2 | 2 | 0.0000 | 0.4000 | | 0.25 |
| ********** | | | | | | | | | | | | | |
| 2" Conduit (AT&T - proposed) | A | No | No | Ar (CaAa) | 133.00 - 8.00 | 0.0000 | -0.32 | 1 | 1 | 2.0000 | 2.0000 | | 2.80 |
| ********** | | | | | | | | | | | | | |
| LDF4P-50A (1/2 FOAM) | A | No | No | Ar (CaAa) | 80.00 - 6.00 | 0.0000 | -0.25 | 1 | 1 | 0.6300 | 0.6300 | | 0.15 |
| LDF4P-50A (1/2 FOAM) | A | No | No | Ar (CaAa) | 58.00 - 6.00 | 0.0000 | 0.3 | 1 | 1 | 0.6300 | 0.6300 | | 0.15 |
| LDF4P-50A (1/2 FOAM) | A | No | No | Ar (CaAa) | 40.00 - 6.00 | 0.0000 | -0.24 | 1 | 1 | 0.6300 | 0.6300 | | 0.15 |
| ********** | | | | | | | | | | | | | |
| Feedline Ladder (Af) | B | No | No | Af (CaAa) | 140.00 - 6.00 | 0.0000 | 0.25 | 1 | 1 | 3.0000 | 3.0000 | | 8.40 |
| Feedline Ladder (Af) | C | No | No | Af (CaAa) | 140.00 - 6.00 | 0.0000 | 0 | 1 | 1 | 3.0000 | 3.0000 | | 8.40 |
| Feedline Ladder (Af) | A | No | No | Af (CaAa) | 140.00 - 6.00 | 0.0000 | -0.25 | 1 | 1 | 3.0000 | 3.0000 | | 8.40 |

# Discrete Tower Loads

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral ft<br>Vert ft<br>ft | Azimuth Adjustment ° | Placement ft | | $C_AA_A$ Front $ft^2$ | $C_AA_A$ Side $ft^2$ | Weight lb |
|---|---|---|---|---|---|---|---|---|---|
| Flash Beacon Lighting | B | From Leg | 0.00<br>0.00 | 0.0000 | 145.00 | No Ice<br>1/2" Ice | 1.75<br>2.68 | 1.75<br>2.68 | 50.00<br>85.56 |

| 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 lb |
|---|---|---|---|---|---|---|---|---|---|
| | | | 0.00 | | | 1" Ice | 2.92 | 2.92 | 124.53 |
| Lightning Rod 5/8x4' | A | From Leg | 0.00 | 0.0000 | 143.00 | No Ice | 0.25 | 0.25 | 31.00 |
| | | | 0.00 | | | 1/2" Ice | 0.66 | 0.66 | 33.82 |
| | | | 0.00 | | | 1" Ice | 0.97 | 0.97 | 39.29 |
| PiROD 13' Rotatable Platform w/handrails (Lattice) | C | None | | 0.0000 | 143.00 | No Ice | 38.90 | 38.90 | 2166.00 |
| | | | | | | 1/2" Ice | 48.80 | 48.80 | 2888.00 |
| | | | | | | 1" Ice | 58.70 | 58.70 | 3610.00 |
| (2) DB846F65ZASX w/Mount Pipe | A | From Leg | 4.00 | 0.0000 | 143.00 | No Ice | 7.27 | 7.82 | 46.55 |
| | | | 0.00 | | | 1/2" Ice | 7.83 | 9.01 | 113.93 |
| | | | 0.00 | | | 1" Ice | 8.35 | 9.91 | 189.25 |
| (2) DB846F65ZASX w/Mount Pipe | B | From Leg | 4.00 | 0.0000 | 143.00 | No Ice | 7.27 | 7.82 | 46.55 |
| | | | 0.00 | | | 1/2" Ice | 7.83 | 9.01 | 113.93 |
| | | | 0.00 | | | 1" Ice | 8.35 | 9.91 | 189.25 |
| (2) DB846F65ZASX w/Mount Pipe | C | From Leg | 4.00 | 0.0000 | 143.00 | No Ice | 7.27 | 7.82 | 46.55 |
| | | | 0.00 | | | 1/2" Ice | 7.83 | 9.01 | 113.93 |
| | | | 0.00 | | | 1" Ice | 8.35 | 9.91 | 189.25 |
| (2) DB948F65T2E-M w/Mount Pipe | A | From Leg | 4.00 | 0.0000 | 143.00 | No Ice | 5.28 | 4.96 | 39.55 |
| | | | 0.00 | | | 1/2" Ice | 5.91 | 5.99 | 90.10 |
| | | | 0.00 | | | 1" Ice | 6.42 | 6.73 | 147.01 |
| (2) DB948F65T2E-M w/Mount Pipe | B | From Leg | 4.00 | 0.0000 | 143.00 | No Ice | 5.28 | 4.96 | 39.55 |
| | | | 0.00 | | | 1/2" Ice | 5.91 | 5.99 | 90.10 |
| | | | 0.00 | | | 1" Ice | 6.42 | 6.73 | 147.01 |
| (2) DB948F65T2E-M w/Mount Pipe | C | From Leg | 4.00 | 0.0000 | 143.00 | No Ice | 5.28 | 4.96 | 39.55 |
| | | | 0.00 | | | 1/2" Ice | 5.91 | 5.99 | 90.10 |
| | | | 0.00 | | | 1" Ice | 6.42 | 6.73 | 147.01 |
| ********** | | | | | | | | | |
| PiROD 12' T-Frame (AT&T - existing) | A | From Leg | 2.00 | 0.0000 | 133.00 | No Ice | 12.20 | 12.20 | 360.00 |
| | | | 0.00 | | | 1/2" Ice | 17.60 | 17.60 | 490.00 |
| | | | 0.00 | | | 1" Ice | 23.00 | 23.00 | 620.00 |
| PiROD 12' T-Frame | B | From Leg | 2.00 | 0.0000 | 133.00 | No Ice | 12.20 | 12.20 | 360.00 |
| | | | 0.00 | | | 1/2" Ice | 17.60 | 17.60 | 490.00 |
| | | | 0.00 | | | 1" Ice | 23.00 | 23.00 | 620.00 |
| PiROD 12' T-Frame | C | From Leg | 2.00 | 0.0000 | 133.00 | No Ice | 12.20 | 12.20 | 360.00 |
| | | | 0.00 | | | 1/2" Ice | 17.60 | 17.60 | 490.00 |
| | | | 0.00 | | | 1" Ice | 23.00 | 23.00 | 620.00 |
| Powerwave 7770 w/mount pipe | A | From Leg | 3.50 | 0.0000 | 133.00 | No Ice | 5.65 | 4.10 | 57.25 |
| | | | 0.00 | | | 1/2" Ice | 6.03 | 4.75 | 103.17 |
| | | | 0.00 | | | 1" Ice | 6.42 | 5.42 | 155.38 |
| Powerwave 7770 w/mount pipe | B | From Leg | 3.50 | 0.0000 | 133.00 | No Ice | 5.65 | 4.10 | 57.25 |
| | | | 0.00 | | | 1/2" Ice | 6.03 | 4.75 | 103.17 |
| | | | 0.00 | | | 1" Ice | 6.42 | 5.42 | 155.38 |
| Powerwave 7770 w/mount pipe | C | From Leg | 3.50 | 0.0000 | 133.00 | No Ice | 5.65 | 4.10 | 57.25 |
| | | | 0.00 | | | 1/2" Ice | 6.03 | 4.75 | 103.17 |
| | | | 0.00 | | | 1" Ice | 6.42 | 5.42 | 155.38 |
| Quintel QS66512-3 w/mpount pipe | A | From Leg | 3.50 | 0.0000 | 133.00 | No Ice | 8.85 | 8.94 | 137.85 |
| | | | 0.00 | | | 1/2" Ice | 9.61 | 10.33 | 218.75 |
| | | | 0.00 | | | 1" Ice | 10.39 | 11.73 | 308.20 |
| Quintel QS66512-3 w/mpount pipe | B | From Leg | 3.50 | 0.0000 | 133.00 | No Ice | 8.85 | 8.94 | 137.85 |
| | | | 0.00 | | | 1/2" Ice | 9.61 | 10.33 | 218.75 |
| | | | 0.00 | | | 1" Ice | 10.39 | 11.73 | 308.20 |
| Quintel QS66512-3 w/mpount pipe | C | From Leg | 3.50 | 0.0000 | 133.00 | No Ice | 8.85 | 8.94 | 137.85 |
| | | | 0.00 | | | 1/2" Ice | 9.61 | 10.33 | 218.75 |
| | | | 0.00 | | | 1" Ice | 10.39 | 11.73 | 308.20 |
| Powerwave TT19-08BP111-001 | A | From Leg | 2.50 | 0.0000 | 133.00 | No Ice | 0.55 | 0.45 | 16.00 |
| | | | 0.00 | | | 1/2" Ice | 0.65 | 0.53 | 21.80 |
| | | | 0.00 | | | 1" Ice | 0.75 | 0.63 | 29.22 |
| Powerwave | B | From Leg | 2.50 | 0.0000 | 133.00 | No Ice | 0.55 | 0.45 | 16.00 |

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral Vert<br>ft<br>ft<br>ft | Azimuth Adjustment<br>° | Placement<br>ft | | $C_AA_A$ Front<br>$ft^2$ | $C_AA_A$ Side<br>$ft^2$ | Weight<br>lb |
|---|---|---|---|---|---|---|---|---|---|
| TT19-08BP111-001 | | | 0.00 | | | 1/2" Ice | 0.65 | 0.53 | 21.80 |
| | | | 0.00 | | | 1" Ice | 0.75 | 0.63 | 29.22 |
| Powerwave | C | From Leg | 2.50 | 0.0000 | 133.00 | No Ice | 0.55 | 0.45 | 16.00 |
| TT19-08BP111-001 | | | 0.00 | | | 1/2" Ice | 0.65 | 0.53 | 21.80 |
| | | | 0.00 | | | 1" Ice | 0.75 | 0.63 | 29.22 |
| (2) TPX-070821 Triplexer | A | From Leg | 2.50 | 0.0000 | 133.00 | No Ice | 0.47 | 0.10 | 7.50 |
| | | | 0.00 | | | 1/2" Ice | 0.56 | 0.15 | 10.96 |
| | | | 0.00 | | | 1" Ice | 0.66 | 0.20 | 15.74 |
| (2) TPX-070821 Triplexer | B | From Leg | 2.50 | 0.0000 | 133.00 | No Ice | 0.47 | 0.10 | 7.50 |
| | | | 0.00 | | | 1/2" Ice | 0.56 | 0.15 | 10.96 |
| | | | 0.00 | | | 1" Ice | 0.66 | 0.20 | 15.74 |
| (2) TPX-070821 Triplexer | C | From Leg | 2.50 | 0.0000 | 133.00 | No Ice | 0.47 | 0.10 | 7.50 |
| | | | 0.00 | | | 1/2" Ice | 0.56 | 0.15 | 10.96 |
| | | | 0.00 | | | 1" Ice | 0.66 | 0.20 | 15.74 |
| DC6-48-60-18-8F | A | From Leg | 1.00 | 0.0000 | 133.00 | No Ice | 0.79 | 0.79 | 20.00 |
| | | | 0.00 | | | 1/2" Ice | 1.27 | 1.27 | 35.12 |
| | | | 0.00 | | | 1" Ice | 1.45 | 1.45 | 52.57 |
| DC6-48-60-18-8F | B | From Leg | 1.00 | 0.0000 | 133.00 | No Ice | 0.79 | 0.79 | 20.00 |
| | | | 0.00 | | | 1/2" Ice | 1.27 | 1.27 | 35.12 |
| | | | 0.00 | | | 1" Ice | 1.45 | 1.45 | 52.57 |
| ********** | | | | | | | | | |
| DMP65R-BU4D w/mount pipe | A | From Leg | 3.50 | 0.0000 | 133.00 | No Ice | 8.52 | 4.69 | 86.25 |
| | | | 0.00 | | | 1/2" Ice | 8.96 | 5.31 | 151.38 |
| (AT&T - proposed) | | | 0.00 | | | 1" Ice | 9.42 | 5.93 | 223.14 |
| DMP65R-BU4D w/mount pipe | B | From Leg | 3.50 | 0.0000 | 133.00 | No Ice | 8.52 | 4.69 | 86.25 |
| | | | 0.00 | | | 1/2" Ice | 8.96 | 5.31 | 151.38 |
| | | | 0.00 | | | 1" Ice | 9.42 | 5.93 | 223.14 |
| DMP65R-BU4D w/mount pipe | C | From Leg | 3.50 | 0.0000 | 133.00 | No Ice | 8.52 | 4.69 | 86.25 |
| | | | 0.00 | | | 1/2" Ice | 8.96 | 5.31 | 151.38 |
| | | | 0.00 | | | 1" Ice | 9.42 | 5.93 | 223.14 |
| 8843 B2/B66A | A | From Leg | 2.50 | 0.0000 | 133.00 | No Ice | 1.64 | 1.35 | 74.00 |
| | | | 0.00 | | | 1/2" Ice | 1.80 | 1.50 | 91.60 |
| | | | 0.00 | | | 1" Ice | 1.97 | 1.65 | 111.91 |
| 8843 B2/B66A | B | From Leg | 2.50 | 0.0000 | 133.00 | No Ice | 1.64 | 1.35 | 74.00 |
| | | | 0.00 | | | 1/2" Ice | 1.80 | 1.50 | 91.60 |
| | | | 0.00 | | | 1" Ice | 1.97 | 1.65 | 111.91 |
| 8843 B2/B66A | C | From Leg | 2.50 | 0.0000 | 133.00 | No Ice | 1.64 | 1.35 | 74.00 |
| | | | 0.00 | | | 1/2" Ice | 1.80 | 1.50 | 91.60 |
| | | | 0.00 | | | 1" Ice | 1.97 | 1.65 | 111.91 |
| 4415 B30 | A | From Leg | 2.50 | 0.0000 | 133.00 | No Ice | 1.84 | 0.82 | 47.40 |
| | | | 0.00 | | | 1/2" Ice | 2.01 | 0.94 | 61.47 |
| | | | 0.00 | | | 1" Ice | 2.19 | 1.07 | 78.06 |
| 4415 B30 | B | From Leg | 2.50 | 0.0000 | 133.00 | No Ice | 1.84 | 0.82 | 47.40 |
| | | | 0.00 | | | 1/2" Ice | 2.01 | 0.94 | 61.47 |
| | | | 0.00 | | | 1" Ice | 2.19 | 1.07 | 78.06 |
| 4415 B30 | C | From Leg | 2.50 | 0.0000 | 133.00 | No Ice | 1.84 | 0.82 | 47.40 |
| | | | 0.00 | | | 1/2" Ice | 2.01 | 0.94 | 61.47 |
| | | | 0.00 | | | 1" Ice | 2.19 | 1.07 | 78.06 |
| 4449 B5/B12 | A | From Leg | 2.50 | 0.0000 | 133.00 | No Ice | 1.64 | 1.29 | 74.00 |
| | | | 0.00 | | | 1/2" Ice | 1.80 | 1.44 | 91.12 |
| | | | 0.00 | | | 1" Ice | 1.97 | 1.59 | 110.94 |
| 4449 B5/B12 | B | From Leg | 2.50 | 0.0000 | 133.00 | No Ice | 1.64 | 1.29 | 74.00 |
| | | | 0.00 | | | 1/2" Ice | 1.80 | 1.44 | 91.12 |
| | | | 0.00 | | | 1" Ice | 1.97 | 1.59 | 110.94 |
| 4449 B5/B12 | C | From Leg | 2.50 | 0.0000 | 133.00 | No Ice | 1.64 | 1.29 | 74.00 |
| | | | 0.00 | | | 1/2" Ice | 1.80 | 1.44 | 91.12 |
| | | | 0.00 | | | 1" Ice | 1.97 | 1.59 | 110.94 |

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral Vert<br>ft<br>ft<br>ft | Azimuth Adjustment<br>° | Placement<br>ft | | $C_AA_A$ Front<br>$ft^2$ | $C_AA_A$ Side<br>$ft^2$ | Weight<br>lb |
|---|---|---|---|---|---|---|---|---|---|
| DC6-48-60-0-8C-EV | C | From Leg | 1.00 | 0.0000 | 133.00 | No Ice | 0.81 | 0.81 | 33.00 |
| | | | 0.00 | | | 1/2" Ice | 1.30 | 1.30 | 48.38 |
| | | | 0.00 | | | 1" Ice | 1.48 | 1.48 | 66.11 |
| ********** | | | | | | | | | |
| DB212-2-C | C | From Leg | 0.50 | 0.0000 | 121.00 | No Ice | 3.10 | 3.10 | 27.00 |
| | | | 0.00 | | | 1/2" Ice | 6.22 | 6.22 | 55.51 |
| | | | 0.00 | | | 1" Ice | 9.35 | 9.35 | 103.21 |
| DB212-2-C | B | From Leg | 0.50 | 0.0000 | 119.00 | No Ice | 3.10 | 3.10 | 27.00 |
| | | | 0.00 | | | 1/2" Ice | 6.22 | 6.22 | 55.51 |
| | | | 0.00 | | | 1" Ice | 9.35 | 9.35 | 103.21 |
| DB212-2-C | B | From Leg | 0.50 | 0.0000 | 110.00 | No Ice | 3.10 | 3.10 | 27.00 |
| | | | 0.00 | | | 1/2" Ice | 6.22 | 6.22 | 55.51 |
| | | | 0.00 | | | 1" Ice | 9.35 | 9.35 | 103.21 |
| SO 308-1 | B | From Leg | 3.00 | 0.0000 | 101.00 | No Ice | 0.98 | 3.03 | 53.00 |
| | | | 0.00 | | | 1/2" Ice | 1.70 | 5.22 | 78.75 |
| | | | 0.00 | | | 1" Ice | 2.42 | 7.41 | 104.50 |
| DB540K-E | B | From Leg | 6.00 | 0.0000 | 110.00 | No Ice | 4.50 | 4.50 | 66.00 |
| | | | 0.00 | | | 1/2" Ice | 6.33 | 6.33 | 99.30 |
| | | | 0.00 | | | 1" Ice | 8.18 | 8.18 | 144.00 |
| DB212-2-C | B | From Leg | 0.50 | 0.0000 | 104.00 | No Ice | 3.10 | 3.10 | 27.00 |
| | | | 0.00 | | | 1/2" Ice | 6.22 | 6.22 | 55.51 |
| | | | 0.00 | | | 1" Ice | 9.35 | 9.35 | 103.21 |
| SO 308-1 | C | From Leg | 3.00 | 0.0000 | 101.00 | No Ice | 0.98 | 3.03 | 53.00 |
| | | | 0.00 | | | 1/2" Ice | 1.70 | 5.22 | 78.75 |
| | | | 0.00 | | | 1" Ice | 2.42 | 7.41 | 104.50 |
| PD340-1 | C | From Leg | 6.00 | 0.0000 | 112.50 | No Ice | 3.30 | 3.30 | 40.00 |
| | | | 0.00 | | | 1/2" Ice | 5.94 | 5.94 | 52.00 |
| | | | 0.00 | | | 1" Ice | 8.58 | 8.58 | 64.00 |
| PD340-1 | C | From Leg | 6.00 | 0.0000 | 89.50 | No Ice | 3.30 | 3.30 | 40.00 |
| | | | 0.00 | | | 1/2" Ice | 5.94 | 5.94 | 52.00 |
| | | | 0.00 | | | 1" Ice | 8.58 | 8.58 | 64.00 |
| SO 308-1 | A | From Leg | 3.00 | 0.0000 | 101.00 | No Ice | 0.98 | 3.03 | 53.00 |
| | | | 0.00 | | | 1/2" Ice | 1.70 | 5.22 | 78.75 |
| | | | 0.00 | | | 1" Ice | 2.42 | 7.41 | 104.50 |
| DB810T3-XC | A | From Leg | 6.00 | 0.0000 | 108.25 | No Ice | 3.63 | 3.63 | 35.00 |
| | | | 0.00 | | | 1/2" Ice | 5.10 | 5.10 | 61.88 |
| | | | 0.00 | | | 1" Ice | 6.60 | 6.60 | 98.03 |
| DB810T3-XC | A | From Leg | 6.00 | 0.0000 | 93.75 | No Ice | 3.63 | 3.63 | 35.00 |
| | | | 0.00 | | | 1/2" Ice | 5.10 | 5.10 | 61.88 |
| | | | 0.00 | | | 1" Ice | 6.60 | 6.60 | 98.03 |
| (2) PD1121 | B | From Leg | 6.00 | 0.0000 | 101.00 | No Ice | 0.41 | 0.41 | 3.00 |
| | | | 0.00 | | | 1/2" Ice | 1.52 | 1.52 | 11.00 |
| | | | 0.00 | | | 1" Ice | 2.63 | 2.63 | 19.00 |
| DB212-2-C | C | From Leg | 0.50 | 0.0000 | 96.00 | No Ice | 3.10 | 3.10 | 27.00 |
| | | | 0.00 | | | 1/2" Ice | 6.22 | 6.22 | 55.51 |
| | | | 0.00 | | | 1" Ice | 9.35 | 9.35 | 103.21 |
| DB212-2-C | B | From Leg | 0.50 | 0.0000 | 90.00 | No Ice | 3.10 | 3.10 | 27.00 |
| | | | 0.00 | | | 1/2" Ice | 6.22 | 6.22 | 55.51 |
| | | | 0.00 | | | 1" Ice | 9.35 | 9.35 | 103.21 |
| 3"x5' pipe | B | From Leg | 0.50 | 0.0000 | 80.00 | No Ice | 1.43 | 1.43 | 40.00 |
| | | | 0.00 | | | 1/2" Ice | 1.80 | 1.80 | 52.73 |
| | | | 0.00 | | | 1" Ice | 2.12 | 2.12 | 69.03 |
| DB212-2-C | B | From Leg | 0.50 | 0.0000 | 68.00 | No Ice | 3.10 | 3.10 | 27.00 |
| | | | 0.00 | | | 1/2" Ice | 6.22 | 6.22 | 55.51 |
| | | | 0.00 | | | 1" Ice | 9.35 | 9.35 | 103.21 |
| obstruction lights | A | From Leg | 1.00 | 0.0000 | 67.00 | No Ice | 0.18 | 0.18 | 10.00 |
| | | | 0.00 | | | 1/2" Ice | 0.25 | 0.25 | 12.00 |

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral Vert<br>ft<br>ft<br>ft | Azimuth Adjustment<br>° | Placement<br>ft | | $C_AA_A$ Front<br>$ft^2$ | $C_AA_A$ Side<br>$ft^2$ | Weight<br>lb |
|---|---|---|---|---|---|---|---|---|---|
| | | | 0.00 | | | 1" Ice | 0.32 | 0.32 | 14.00 |
| obstruction lights | B | From Leg | 1.00 | 0.0000 | 67.00 | No Ice | 0.18 | 0.18 | 10.00 |
| | | | 0.00 | | | 1/2" Ice | 0.25 | 0.25 | 12.00 |
| | | | 0.00 | | | 1" Ice | 0.32 | 0.32 | 14.00 |
| Security Camera | A | From Leg | 0.50 | 0.0000 | 66.00 | No Ice | 0.58 | 0.58 | 15.00 |
| | | | 0.00 | | | 1/2" Ice | 0.95 | 0.95 | 28.21 |
| | | | 0.00 | | | 1" Ice | 1.09 | 1.09 | 43.51 |
| SO 308-1 | A | From Leg | 3.00 | 0.0000 | 54.00 | No Ice | 0.98 | 3.03 | 53.00 |
| | | | 0.00 | | | 1/2" Ice | 1.70 | 5.22 | 78.75 |
| | | | 0.00 | | | 1" Ice | 2.42 | 7.41 | 104.50 |
| PD340-1 | A | From Leg | 6.00 | 0.0000 | 65.50 | No Ice | 3.30 | 3.30 | 40.00 |
| | | | 0.00 | | | 1/2" Ice | 5.94 | 5.94 | 52.00 |
| | | | 0.00 | | | 1" Ice | 8.58 | 8.58 | 64.00 |
| SO 308-1 | B | From Leg | 3.00 | 0.0000 | 54.00 | No Ice | 0.98 | 3.03 | 53.00 |
| | | | 0.00 | | | 1/2" Ice | 1.70 | 5.22 | 78.75 |
| | | | 0.00 | | | 1" Ice | 2.42 | 7.41 | 104.50 |
| PD220 | B | From Leg | 6.00 | 0.0000 | 64.00 | No Ice | 3.08 | 3.08 | 23.00 |
| | | | 0.00 | | | 1/2" Ice | 5.30 | 5.30 | 48.68 |
| | | | 0.00 | | | 1" Ice | 7.54 | 7.54 | 88.10 |
| PD220 | B | From Leg | 6.00 | 0.0000 | 44.00 | No Ice | 3.08 | 3.08 | 23.00 |
| | | | 0.00 | | | 1/2" Ice | 5.30 | 5.30 | 48.68 |
| | | | 0.00 | | | 1" Ice | 7.54 | 7.54 | 88.10 |
| 3"x5' pipe | A | From Leg | 0.50 | 0.0000 | 58.00 | No Ice | 1.49 | 1.49 | 40.00 |
| | | | 0.00 | | | 1/2" Ice | 1.80 | 1.80 | 52.73 |
| | | | 0.00 | | | 1" Ice | 2.12 | 2.12 | 69.03 |
| SO 312-1 | A | From Leg | 2.00 | 0.0000 | 44.00 | No Ice | 2.97 | 4.03 | 70.00 |
| | | | 0.00 | | | 1/2" Ice | 4.39 | 6.12 | 106.38 |
| | | | 0.00 | | | 1" Ice | 5.81 | 8.21 | 142.76 |
| Panel Antenna 18"X12" | A | From Leg | 4.00 | 0.0000 | 44.00 | No Ice | 1.80 | 0.51 | 15.00 |
| | | | 0.00 | | | 1/2" Ice | 1.97 | 0.63 | 26.02 |
| | | | 0.00 | | | 1" Ice | 2.15 | 0.75 | 39.37 |
| 3"x5' pipe | B | From Leg | 0.50 | 0.0000 | 40.00 | No Ice | 1.50 | 1.50 | 40.00 |
| | | | 0.00 | | | 1/2" Ice | 1.80 | 1.80 | 52.73 |
| | | | 0.00 | | | 1" Ice | 2.12 | 2.12 | 69.03 |
| SO 312-1 | A | From Leg | 2.00 | 0.0000 | 37.00 | No Ice | 2.97 | 4.03 | 70.00 |
| | | | 0.00 | | | 1/2" Ice | 4.39 | 6.12 | 106.38 |
| | | | 0.00 | | | 1" Ice | 5.81 | 8.21 | 142.76 |
| Panel Antenna 18"X12" | A | From Leg | 4.00 | 0.0000 | 37.00 | No Ice | 1.80 | 0.51 | 15.00 |
| | | | 0.00 | | | 1/2" Ice | 1.97 | 0.63 | 26.02 |
| | | | 0.00 | | | 1" Ice | 2.15 | 0.75 | 39.37 |
| SO 308-1 | C | From Leg | 3.00 | 0.0000 | 33.00 | No Ice | 0.98 | 3.03 | 53.00 |
| | | | 0.00 | | | 1/2" Ice | 1.70 | 5.22 | 78.75 |
| | | | 0.00 | | | 1" Ice | 2.42 | 7.41 | 104.50 |
| (2) BA1012 | C | From Leg | 6.00 | 0.0000 | 40.00 | No Ice | 0.41 | 0.41 | 1.00 |
| | | | 0.00 | | | 1/2" Ice | 1.10 | 1.10 | 3.00 |
| | | | 0.00 | | | 1" Ice | 1.79 | 1.79 | 5.00 |

## Dishes

| Description | Face or Leg | Dish Type | Offset Type | Offsets: Horz Lateral Vert<br>ft | Azimuth Adjustment<br>° | 3 dB Beam Width<br>° | Elevation<br>ft | Outside Diameter<br>ft | | Aperture Area<br>$ft^2$ | Weight<br>lb |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SC3-190A | B | Paraboloid w/Radome | From Leg | 1.00<br>0.00<br>0.00 | 0.0000 | | 80.00 | 3.29 | No Ice<br>1/2" Ice<br>1" Ice | 8.50<br>8.95<br>9.39 | 40.00<br>78.00<br>116.00 |
| VHLP3-11W | A | Paraboloid w/Shroud (HP) | From Leg | 1.00<br>0.00<br>0.00 | 0.0000 | | 58.00 | 3.28 | No Ice<br>1/2" Ice<br>1" Ice | 8.47<br>8.90<br>9.34 | 53.00<br>100.00<br>140.00 |
| P2-57W | A | Paraboloid w/o Radome | From Leg | 1.00<br>0.00<br>0.00 | 0.0000 | | 44.00 | 2.00 | No Ice<br>1/2" Ice<br>1" Ice | 3.14<br>3.41<br>3.67 | 25.00<br>42.49<br>59.98 |
| SC3-190A | B | Paraboloid w/Radome | From Leg | 1.00<br>0.00<br>0.00 | 0.0000 | | 40.00 | 3.29 | No Ice<br>1/2" Ice<br>1" Ice | 8.50<br>8.95<br>9.39 | 40.00<br>78.00<br>116.00 |
| P2-57W | A | Paraboloid w/o Radome | From Leg | 1.00<br>0.00<br>0.00 | 0.0000 | | 37.00 | 2.00 | No Ice<br>1/2" Ice<br>1" Ice | 3.14<br>3.41<br>3.67 | 25.00<br>42.49<br>59.98 |

## Maximum Reactions

| Location | Condition | Gov. Load Comb. | Vertical<br>lb | Horizontal, X<br>lb | Horizontal, Z<br>lb |
|---|---|---|---|---|---|
| Leg C | Max. Vert | 18 | 292247.93 | 25915.28 | -14167.45 |
| | Max. $H_x$ | 18 | 292247.93 | 25915.28 | -14167.45 |
| | Max. $H_z$ | 7 | -261157.41 | -23577.62 | 12811.93 |
| | Min. Vert | 7 | -261157.41 | -23577.62 | 12811.93 |
| | Min. $H_x$ | 7 | -261157.41 | -23577.62 | 12811.93 |
| | Min. $H_z$ | 18 | 292247.93 | 25915.28 | -14167.45 |
| Leg B | Max. Vert | 10 | 314205.07 | -28059.66 | -15428.86 |
| | Max. $H_x$ | 23 | -284990.68 | 25906.77 | 14165.70 |
| | Max. $H_z$ | 23 | -284990.68 | 25906.77 | 14165.70 |
| | Min. Vert | 23 | -284990.68 | 25906.77 | 14165.70 |
| | Min. $H_x$ | 10 | 314205.07 | -28059.66 | -15428.86 |
| | Min. $H_z$ | 10 | 314205.07 | -28059.66 | -15428.86 |
| Leg A | Max. Vert | 2 | 303554.68 | 273.55 | 30854.28 |
| | Max. $H_x$ | 21 | 8366.42 | 2214.17 | 614.61 |
| | Max. $H_z$ | 2 | 303554.68 | 273.55 | 30854.28 |
| | Min. Vert | 15 | -275445.07 | -275.56 | -28368.03 |
| | Min. $H_x$ | 9 | 8238.78 | -2215.54 | 597.86 |
| | Min. $H_z$ | 15 | -275445.07 | -275.56 | -28368.03 |

## Tower Mast Reaction Summary

| Load Combination | Vertical<br>lb | $Shear_x$<br>lb | $Shear_z$<br>lb | Overturning Moment, $M_x$<br>lb-ft | Overturning Moment, $M_z$<br>lb-ft | Torque<br>lb-ft |
|---|---|---|---|---|---|---|
| Dead Only | 28835.17 | -0.00 | 0.00 | 7860.04 | 3037.57 | -0.00 |
| 1.2 Dead+1.6 Wind 0 deg - No Ice | 34602.20 | -68.46 | -49344.78 | -4223384.45 | 7902.79 | 8065.28 |
| 0.9 Dead+1.6 Wind 0 deg - No Ice | 25951.65 | -68.46 | -49344.78 | -4220741.51 | 6980.78 | 8073.45 |
| 1.2 Dead+1.6 Wind 30 deg - No | 34602.20 | 22700.43 | -39699.68 | -3440562.87 | -1975344.17 | 25007.04 |

| Load Combination | Vertical | $Shear_x$ | $Shear_z$ | Overturning Moment, $M_x$ | Overturning Moment, $M_z$ | Torque |
|---|---|---|---|---|---|---|
| | lb | lb | lb | lb-ft | lb-ft | lb-ft |
| Ice | | | | | | |
| 0.9 Dead+1.6 Wind 30 deg - No Ice | 25951.65 | 22700.43 | -39699.68 | -3438799.81 | -1973874.93 | 25004.62 |
| 1.2 Dead+1.6 Wind 60 deg - No Ice | 34602.20 | 38744.48 | -22570.91 | -1955201.48 | -3380111.14 | 20313.33 |
| 0.9 Dead+1.6 Wind 60 deg - No Ice | 25951.65 | 38744.48 | -22570.90 | -1955218.89 | -3376946.74 | 20299.78 |
| 1.2 Dead+1.6 Wind 90 deg - No Ice | 34602.20 | 45313.84 | -21.75 | 8331.98 | -3928618.23 | 9291.99 |
| 0.9 Dead+1.6 Wind 90 deg - No Ice | 25951.65 | 45313.84 | -21.75 | 5955.30 | -3924821.49 | 9272.05 |
| 1.2 Dead+1.6 Wind 120 deg - No Ice | 34602.20 | 44189.94 | 26044.89 | 2216617.05 | -3774841.33 | 20842.25 |
| 0.9 Dead+1.6 Wind 120 deg - No Ice | 25951.65 | 44189.94 | 26044.89 | 2211649.48 | -3771298.50 | 20819.11 |
| 1.2 Dead+1.6 Wind 150 deg - No Ice | 34602.20 | 25473.75 | 44667.90 | 3846440.79 | -2196559.22 | 20016.93 |
| 0.9 Dead+1.6 Wind 150 deg - No Ice | 25951.65 | 25473.75 | 44667.90 | 3839528.95 | -2194871.17 | 19998.34 |
| 1.2 Dead+1.6 Wind 180 deg - No Ice | 34602.20 | -19.41 | 47377.11 | 4116057.80 | 4860.32 | -7733.77 |
| 0.9 Dead+1.6 Wind 180 deg - No Ice | 25951.65 | -19.41 | 47377.11 | 4108768.20 | 3939.34 | -7741.74 |
| 1.2 Dead+1.6 Wind 210 deg - No Ice | 34602.20 | -22772.84 | 39855.47 | 3465543.73 | 1988813.34 | -25761.25 |
| 0.9 Dead+1.6 Wind 210 deg - No Ice | 25951.65 | -22772.84 | 39855.47 | 3459018.41 | 1985503.44 | -25758.84 |
| 1.2 Dead+1.6 Wind 240 deg - No Ice | 34602.20 | -40579.90 | 23881.59 | 2050964.34 | 3503796.70 | -21367.13 |
| 0.9 Dead+1.6 Wind 240 deg - No Ice | 25951.65 | -40579.91 | 23881.59 | 2046161.50 | 3498692.33 | -21353.36 |
| 1.2 Dead+1.6 Wind 270 deg - No Ice | 34602.20 | -45483.86 | -51.47 | 6484.29 | 3946510.00 | -9555.09 |
| 0.9 Dead+1.6 Wind 270 deg - No Ice | 25951.65 | -45483.86 | -51.47 | 4109.24 | 3940867.17 | -9535.14 |
| 1.2 Dead+1.6 Wind 300 deg - No Ice | 34602.20 | -42626.52 | -24789.79 | -2124282.05 | 3682733.15 | -20119.75 |
| 0.9 Dead+1.6 Wind 300 deg - No Ice | 25951.65 | -42626.52 | -24789.79 | -2124132.40 | 3677440.16 | -20097.09 |
| 1.2 Dead+1.6 Wind 330 deg - No Ice | 34602.20 | -25628.42 | -44577.33 | -3825499.84 | 2211876.41 | -18999.76 |
| 0.9 Dead+1.6 Wind 330 deg - No Ice | 25951.65 | -25628.41 | -44577.33 | -3823349.03 | 2208338.85 | -18981.14 |
| 1.2 Dead+1.0 Ice+1.0 Temp | 99014.01 | -0.00 | -0.00 | 53723.10 | -9856.35 | 0.23 |
| 1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp | 99014.01 | -8.68 | -10857.52 | -865647.77 | -9339.85 | 3385.16 |
| 1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp | 99014.01 | 5069.96 | -8829.87 | -698203.96 | -442420.32 | 7352.64 |
| 1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp | 99014.01 | 8258.30 | -4793.82 | -356295.63 | -717755.49 | 6067.08 |
| 1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp | 99014.01 | 9538.05 | -2.76 | 53667.88 | -827333.44 | 3521.93 |
| 1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp | 99014.01 | 8820.39 | 5162.81 | 491071.59 | -761403.87 | 3404.28 |
| 1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp | 99014.01 | 5304.32 | 9259.70 | 840812.78 | -462282.29 | 1976.90 |
| 1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp | 99014.01 | -2.46 | 10679.84 | 962113.61 | -9720.72 | -3343.02 |
| 1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp | 99014.01 | -5078.28 | 8851.16 | 806654.95 | 423423.65 | -7456.21 |
| 1.2 Dead+1.0 Wind 240 | 99014.01 | -8429.25 | 4926.96 | 471351.89 | 708579.37 | -6206.28 |

| Load Combination | Vertical | $Shear_x$ | $Shear_z$ | Overturning Moment, $M_x$ | Overturning Moment, $M_z$ | Torque |
|---|---|---|---|---|---|---|
| | lb | lb | lb | lb-ft | lb-ft | lb-ft |
| deg+1.0 Ice+1.0 Temp | | | | | | |
| 1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp | 99014.01 | -9559.62 | -6.53 | 53431.38 | 808929.58 | -3554.97 |
| 1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp | 99014.01 | -8683.94 | -5036.73 | -376458.32 | 733228.88 | -3307.52 |
| 1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp | 99014.01 | -5324.80 | -9246.69 | -732883.42 | 443566.24 | -1840.22 |
| Dead+Wind 0 deg - Service | 28835.17 | -10.70 | -7710.12 | -653027.28 | 3714.09 | 1261.01 |
| Dead+Wind 30 deg - Service | 28835.17 | 3546.94 | -6203.07 | -530769.92 | -305922.44 | 3903.20 |
| Dead+Wind 60 deg - Service | 28835.17 | 6053.83 | -3526.70 | -298861.63 | -525259.65 | 3173.08 |
| Dead+Wind 90 deg - Service | 28835.17 | 7080.29 | -3.40 | 7714.10 | -610900.79 | 1453.95 |
| Dead+Wind 120 deg - Service | 28835.17 | 6904.68 | 4069.51 | 352510.04 | -586923.20 | 3255.17 |
| Dead+Wind 150 deg - Service | 28835.17 | 3980.27 | 6979.36 | 606966.70 | -340489.32 | 3121.20 |
| Dead+Wind 180 deg - Service | 28835.17 | -3.03 | 7402.67 | 649067.42 | 3239.02 | -1209.43 |
| Dead+Wind 210 deg - Service | 28835.17 | -3558.26 | 6227.42 | 547487.36 | 313003.63 | -4021.30 |
| Dead+Wind 240 deg - Service | 28835.17 | -6340.61 | 3731.50 | 326645.55 | 549560.47 | -3337.54 |
| Dead+Wind 270 deg - Service | 28835.17 | -7106.85 | -8.04 | 7425.47 | 618652.45 | -1495.07 |
| Dead+Wind 300 deg - Service | 28835.17 | -6660.39 | -3873.40 | -325267.84 | 577474.59 | -3141.99 |
| Dead+Wind 330 deg - Service | 28835.17 | -4004.44 | -6965.21 | -590882.25 | 347815.07 | -2962.01 |

## Maximum Tower Deflections - Service Wind

| Section No. | Elevation | Horz. Deflection | Gov. Load Comb. | Tilt | Twist |
|---|---|---|---|---|---|
| | ft | in | | ° | ° |
| T1 | 140 - 120 | 3.104 | 44 | 0.2445 | 0.0207 |
| T2 | 120 - 100 | 2.137 | 44 | 0.2023 | 0.0184 |
| T3 | 100 - 80 | 1.390 | 44 | 0.1463 | 0.0139 |
| T4 | 80 - 60 | 0.849 | 44 | 0.1039 | 0.0099 |
| T5 | 60 - 40 | 0.465 | 44 | 0.0721 | 0.0072 |
| T6 | 40 - 20 | 0.206 | 44 | 0.0431 | 0.0044 |
| T7 | 20 - 0 | 0.056 | 44 | 0.0199 | 0.0018 |

## Critical Deflections and Radius of Curvature - Service Wind

| Elevation | Appurtenance | Gov. Load Comb. | Deflection | Tilt | Twist | Radius of Curvature |
|---|---|---|---|---|---|---|
| ft | | | in | ° | ° | ft |
| 145.00 | Flash Beacon Lighting | 44 | 3.104 | 0.2445 | 0.0207 | 68208 |
| 143.00 | Lightning Rod 5/8x4' | 44 | 3.104 | 0.2445 | 0.0207 | 68208 |
| 133.00 | PiROD 12' T-Frame | 44 | 2.751 | 0.2311 | 0.0201 | 48720 |
| 121.00 | DB212-2-C | 44 | 2.181 | 0.2048 | 0.0185 | 18487 |
| 119.00 | DB212-2-C | 44 | 2.093 | 0.1997 | 0.0182 | 17807 |
| 112.50 | PD340-1 | 44 | 1.828 | 0.1816 | 0.0169 | 19174 |
| 110.00 | DB212-2-C | 44 | 1.733 | 0.1744 | 0.0163 | 20003 |
| 108.25 | DB810T3-XC | 44 | 1.669 | 0.1693 | 0.0159 | 20628 |
| 104.00 | DB212-2-C | 44 | 1.521 | 0.1571 | 0.0149 | 22320 |
| 101.00 | SO 308-1 | 44 | 1.422 | 0.1489 | 0.0142 | 23593 |
| 96.00 | DB212-2-C | 44 | 1.267 | 0.1363 | 0.0130 | 25272 |
| 93.75 | DB810T3-XC | 44 | 1.202 | 0.1311 | 0.0125 | 25927 |
| 90.00 | DB212-2-C | 44 | 1.097 | 0.1229 | 0.0116 | 27095 |
| 89.50 | PD340-1 | 44 | 1.084 | 0.1219 | 0.0115 | 27258 |
| 80.00 | SC3-190A | 44 | 0.849 | 0.1039 | 0.0099 | 30719 |

| Elevation<br>ft | Appurtenance | Gov. Load Comb. | Deflection<br>in | Tilt<br>° | Twist<br>° | Radius of Curvature<br>ft |
|---|---|---|---|---|---|---|
| 68.00 | DB212-2-C | 44 | 0.602 | 0.0843 | 0.0083 | 35365 |
| 67.00 | obstruction lights | 44 | 0.584 | 0.0828 | 0.0082 | 35808 |
| 66.00 | Security Camera | 44 | 0.566 | 0.0812 | 0.0081 | 36263 |
| 65.50 | PD340-1 | 44 | 0.557 | 0.0805 | 0.0080 | 36494 |
| 64.00 | PD220 | 44 | 0.531 | 0.0782 | 0.0078 | 37206 |
| 58.00 | VHLP3-11W | 44 | 0.434 | 0.0691 | 0.0070 | 39806 |
| 54.00 | SO 308-1 | 44 | 0.375 | 0.0631 | 0.0064 | 41107 |
| 44.00 | P2-57W | 44 | 0.249 | 0.0485 | 0.0049 | 44619 |
| 40.00 | SC3-190A | 44 | 0.206 | 0.0431 | 0.0044 | 45658 |
| 37.00 | P2-57W | 44 | 0.177 | 0.0392 | 0.0039 | 45421 |
| 33.00 | SO 308-1 | 44 | 0.141 | 0.0343 | 0.0034 | 44494 |

## Section Capacity Table

| Section No. | Elevation<br>ft | Component Type | Size | Critical Element | P<br>lb | $\phi P_{allow}$<br>lb | %<br>Capacity | Pass Fail |
|---|---|---|---|---|---|---|---|---|
| T1 | 140 - 120 | Leg | ROHN 2.5 EH | 2 | -60248.10 | 83196.20 | 72.4 | Pass |
| T2 | 120 - 100 | Leg | ROHN 3 EH | 38 | -109764.00 | 119063.00 | 92.2 | Pass |
| T3 | 100 - 80 | Leg | ROHN 4 EH | 71 | -152573.00 | 175711.00 | 86.8 | Pass |
| T4 | 80 - 60 | Leg | ROHN 5 EH | 98 | -192101.00 | 239388.00 | 80.2 | Pass |
| T5 | 60 - 40 | Leg | ROHN 6 EHS | 119 | -231804.00 | 274768.00 | 84.4 | Pass |
| T6 | 40 - 20 | Leg | ROHN 6 EH | 140 | -271118.00 | 343093.00 | 79.0 | Pass |
| T7 | 20 - 0 | Leg | ROHN 8 EHS | 161 | -304505.00 | 386390.00 | 78.8 | Pass |
| T1 | 140 - 120 | Diagonal | L2x2x1/4 | 20 | -5663.77 | 19647.00 | 28.8 | Pass |
| T2 | 120 - 100 | Diagonal | L2x2x1/4 | 41 | -4735.55 | 15103.10 | 31.4 | Pass |
| T3 | 100 - 80 | Diagonal | L2x2x1/4 | 74 | -5775.46 | 9859.83 | 58.6 | Pass |
| T4 | 80 - 60 | Diagonal | L2 1/2x2 1/2x1/4 | 101 | -7113.77 | 12390.70 | 57.4 | Pass |
| T5 | 60 - 40 | Diagonal | L2 1/2x2 1/2x1/4 | 122 | -7609.86 | 9570.43 | 79.5 | Pass |
| T6 | 40 - 20 | Diagonal | L3x3x1/4 | 143 | -8054.41 | 13074.10 | 61.6 | Pass |
| T7 | 20 - 0 | Diagonal | L3 1/2x3 1/2x1/4 | 164 | -10386.10 | 14472.90 | 71.8 | Pass |
| T1 | 140 - 120 | Top Girt | L2x2x1/4 | 6 | -1139.13 | 18956.90 | 6.0 | Pass |
| | | | | | | | Summary | |
| | | | | | | Leg (T2) | 92.2 | Pass |
| | | | | | | Diagonal (T5) | 79.5 | Pass |
| | | | | | | Top Girt (T1) | 6.0 | Pass |
| | | | | | | **RATING =** | **92.2** | **Pass** |

August 15, 2019

SAI Communications
12 Industrial Way
Salem NH, 03079

| RE: | | |
|---|---|---|
| | Site Number: | CT2164 (LTE 4C/5C/6C) |
| | FA Number: | 10035132 |
| | PACE Number: | MRCTB040452 |
| | PT Number: | 2051A0PQSL |
| | Site Name: | NEW LONDON-GROTON PD |
| | Site Address: | 68 Groton Long Point Road (Groton PD)<br>Groton, CT 06340 |

To Whom It May Concern:

Hudson Design Group LLC (HDG) has been authorized by SAI Communications to perform a mount analysis on the existing AT&T antenna/RRH mounts to determine their capability of supporting the following additional loading:

- (3) 7770 Antennas (55.0"x11.0"x5.0" - Wt. = 35 lbs. /each)
- (3) QS66512-2 Antennas (72.0"x12.0"x9.6" – Wt. = 111 lbs. /each)
- (6) TPX-070821 Triplexers (5.9"x9.7"x2.1" – Wt. = 8 lbs. /each)
- (2) Squid Surge Arrestor (24.0"x9.7" Φ – Wt. = 33 lbs. /each) (Tower Mount)
- **(3) DMP65R-BU4DA Antennas (48.0"x20.7"x7.7" – Wt. = 67.9 lbs. /each)**
- **(3) 4415 B30 RRH's (16.5"x13.4"x5.9" – Wt. = 46 lbs. /each)**
- **(3) B5/B12 4449 RRH's (14.9"x13.2"x10.4" – Wt. = 73 lbs. /each)**
- **(3) B2/B66A 8843 RRH's (14.9"x13.2"x10.9" – Wt. = 72 lbs. /each)**
- **(3) TT19-08BP111-001 TMA's (9.9"x6.7"x5.4" - Wt. = 16 lbs. /each)**
- **(1) Squid Surge Arrestor (24.0"x9.7" Φ – Wt. = 33 lbs. /each) (Tower Mount)**

**Proposed equipment shown in bold*

No original structural design documents or fabrication drawings were available for the existing mounts. HDG's subconsultant, ProVertic LLC, conducted a survey climb and mapping of the existing AT&T antenna mounts on May 22, 2019.

Mount Analysis Methods:

- This analysis was conducted in accordance with EIA/TIA-222-H, Structural Standards for Steel Antenna Towers and Antenna Supporting Structures, the International Building Code 2015 with 2018 Connecticut State Building Code, and AT&T Mount Technical Directive – R13.
- HDG considers this mount to be asymmetrical and has applied wind loads in 30 degree increments all around the mount. Per TIA-222-H and Appendix N of the Connecticut State Building Code, the max basic wind speed for this site is equal to 135 mph with a max basic wind speed with ice of 50 mph and a max ice thickness of 1.0 in. An escalated ice thickness of 1.15 in was used for this analysis.
- HDG considers this site to be exposure category B; tower is located in an urban/suburban or wooded area with numerous closely spaced obstructions.
- HDG considers this site to be topographic category 1; tower is located on flat terrain or the bottom of a hill or ridge.
- The mount has been analyzed with load combinations consisting of 250 lbs live load using a service wind speed of 30 mph wind on the worst case antenna. Analysis performed on each antenna pipe to determine worst case location; worst case location was antenna position 4.
- The mount has been analyzed with load combinations consisting of a 250 lbs live load in a worst case location on the mount.
- The existing mount is secured to the existing tower with U-Bolts. The connection is considered OK by visual inspection.

Based on our evaluation, we have determined that the existing mounts **ARE CAPABLE** of supporting the proposed installation.

| | Component | Controlling Load Case | Stress Ratio | Pass/Fail |
|---|---|---|---|---|
| **Existing (LTE 4C/5C/6C) Mount Rating** | 2 | LC4 | 56% | **PASS** |

**Reference Documents:**

- Mount mapping report prepared by ProVertic LLC.

This determination was based on the following limitations and assumptions:

1. HDG is not responsible for any modifications completed prior to and hereafter which HDG was not directly involved.
2. All structural members and their connections are assumed to be in good condition and are free from defects with no deterioration to its member capacities.
3. All antennas, coax cables and waveguide cables are assumed to be properly installed and supported as per the manufacturer's requirements.
4. The existing mount has been adequately secured to the tower structure per the mount manufacturer's specifications.
5. All components pertaining to AT&T's mounts must be tightened and re-plumbed prior to the installation of new appurtenances.
6. HDG performed a localized analysis on the mount itself and not on the supporting tower structure.

Please feel free to contact our office should you have any questions.

Respectfully Submitted,
Hudson Design Group LLC


Michael Cabral
Vice President

Daniel P. Hamm, PE
Principal

**FIELD PHOTOS:**






p: 978.557.5553 f: 978.336.5586 a: 45 Beechwood Drive, N. Andover, MA 01845
p: 203.208.3919 f: 203.234.6398 a: 110 Washington Avenue, 4th Floor, North Haven CT 06473


p: 978.557.5553 f: 978.336.5586 a: 45 Beechwood Drive, N. Andover, MA 01845
p: 203.208.3919 f: 203.234.6398 a: 110 Washington Avenue, 4th Floor, North Haven CT 06473

HUDSON
Design Group LLC

# Wind & Ice
# Calculations

**Date:** 8/15/2019
**Project Name:** New London-Groton PD
**Project No.:** CT2164
**Designed By:** BCP **Checked By:** MSC

HUDSON Design Group LLC

## 2.6.5.2 Velocity Pressure Coeff:

$K_z = 2.01\ (z/z_g)^{2/\alpha}$

| | | |
|---|---|---|
| | z= | 133 (ft) |
| | $z_g$= | 1200 (ft) |
| **$K_z$= 1.072** | α= | 7.0 |

$Kzmin \le Kz \le 2.01$

**Table 2-4**

| Exposure | $Z_g$ | α | $K_{zmin}$ | $K_c$ |
|---|---|---|---|---|
| B | 1200 ft | 7.0 | 0.70 | 0.9 |
| C | 900 ft | 9.5 | 0.85 | 1.0 |
| D | 700 ft | 11.5 | 1.03 | 1.1 |

## 2.6.6.2 Topographic Factor:

**Table 2-5**

| Topo. Category | $K_t$ | f |
|---|---|---|
| 2 | 0.43 | 1.25 |
| 3 | 0.53 | 2.0 |
| 4 | 0.72 | 1.5 |

$K_{zt} = [1+(K_c K_t/K_h)]^2$

$K_h = e^{(f*z/H)}$

**$K_{zt}$= 1**

*(If Category 1 then $K_{zt}$ =1.0)*

| | |
|---|---|
| Category= | 1 |

| | | |
|---|---|---|
| $K_h$= | #DIV/0! | |
| $K_c$= | 0.9 | (from Table 2-4) |
| $K_t$= | | (from Table 2-5) |
| f= | | (from Table 2-5) |
| z= | 133 | |
| $z_s$= | 170 | (Mean elevation of base of structure above sea level) |
| H= | 0 | (Ht. of the crest above surrounding terrain) |
| $K_{zt}$= | 1.00 | (from 2.6.6.2.1) |
| $K_e$= | 0.99 | (from 2.6.8) |

## 2.6.10 Design Ice Thickness

| | | |
|---|---|---|
| **Max Ice Thickness =** | **$t_i$ =** | **1.00 in** |
| **Importance Factor =** | **I=** | **1.0 (from Table 2-3)** |
| | **$K_{iz}$ =** | **1.15 (from Sec. 2.6.10)** |

$t_{iz} = t_i * I * K_{iz} * (K_{zt})^{0.35}$

**$t_{iz}$ = 1.15 in**

Date: 8/15/2019
Project Name: New London-Groton PD
Project No.: CT2164
Designed By: BCP Checked By: MSC

HUDSON Design Group LLC

**2.6.9 Gust Effect Factor**

*2.6.9.1 Self Supporting Lattice Structures*

$G_h$ = 1.0 Latticed Structures > 600 ft

$G_h$ = 0.85 Latticed Structures 450 ft or less

$G_h$ = 0.85 + 0.15 [h/150 - 3.0] h= ht. of structure

| | | | |
|---|---|---|---|
| h= | 140 | $G_h$= | 0.85 |

*2.6.9.2 Guyed Masts* $G_h$= 0.85

*2.6.9.3 Pole Structures* $G_h$= 1.1

*2.6.9 Appurtenances* $G_h$= 1.0

*2.6.9.4 Structures Supported on Other Structures*

*(Cantilivered tubular or latticed spines, pole, structures on buildings (ht. : width ratio > 5)*

| | | | |
|---|---|---|---|
| $G_h$= | 1.35 | **Gh=** | **1.00** |

**2.6.11.2 Design Wind Force on Appurtenances**

$F = q_z * G_h * (EPA)_A$

$q_z = 0.00256 * K_z * K_{zt} * K_s * K_e * K_d * V_{max}^2$

| | | | | |
|---|---|---|---|---|
| | | $K_z$= | 1.072 | (from 2.6.5.2) |
| | | $K_{zt}$= | 1.0 | (from 2.6.6.2.1) |
| | | $K_s$= | 1.0 | (from 2.6.7) |
| **$q_z$=** | **42.26** | $K_e$= | 0.99 | (from 2.6.8) |
| **$q_{z\,(ice)}$=** | **5.80** | $K_d$= | 0.85 | (from Table 2-2) |
| **$q_{z\,(30)}$=** | **2.09** | $V_{max}$= | 135 | mph (Ultimate Wind Speed) |
| | | $V_{max\,(ice)}$= | 50 | mph |
| | | $V_{30}$= | 30 | mph |

**Table 2-2**

| Structure Type | Wind Direction Probability Factor, Kd |
|---|---|
| Latticed structures with triangular, square or rectangular cross sections | 0.85 |
| Tubular pole structures, latticed structures with other cross sections, appurtenances | 0.95 |
| Tubular pole structures supporting antennas enclosed within a cylindrical shroud | 1.00 |

Date: 8/15/2019
Project Name: New London-Groton PD
Project No.: CT2164
Designed By: BCP Checked By: MSC

HUDSON Design Group LLC

**Determine Ca:**

**Table 2-9**

| Force Coefficients (Ca) for Appurtenances | | | | |
|---|---|---|---|---|
| Member Type | | Aspect Ratio ≤ 2.5 | Aspect Ratio = 7 | Aspect Ratio ≥ 25 |
| | | Ca | Ca | Ca |
| Flat | | 1.2 | 1.4 | 2.0 |
| Square/Rectangular HSS | | 1.2 - 2.8($r_s$) ≥ 0.85 | 1.4 - 4.0($r_s$) ≥ 0.90 | 2.0 - 6.0($r_s$) ≥ 1.25 |
| Round | C < 39 (Subcritical) | 0.7 | 0.8 | 1.2 |
| | 39 ≤ C ≤ 78 (Transitional) | $4.14/(C^{0.485})$ | $3.66/(C^{0.415})$ | $46.8/(C^{1.0})$ |
| | C > 78 (Supercritical) | 0.5 | 0.6 | 0.6 |

Aspect Ratio is the overall length/width ratio in the plane normal to the wind direction.
(Aspect ratio is independent of the spacing between support points of a linear appurtenance,

Note: Linear interpolation may be used for aspect ratios other than those shown.

**Ice Thickness =** 1.15 in | **Angle =** 0 (deg) | **Equivalent Angle =** 180 (deg)

| Appurtenances | Height | Width | Depth | Flat Area | Aspect Ratio | Ca | Force (lbs) | Force (lbs) (w/ Ice) | Force (lbs) (30 mph) |
|---|---|---|---|---|---|---|---|---|---|
| 7770 Antenna | 55.0 | 11.0 | 5.0 | 4.20 | 5.00 | 1.31 | 233 | 40 | 11 |
| QS66512-2 Antenna | 72.0 | 12.0 | 9.6 | 6.00 | 6.00 | 1.36 | 344 | 58 | 17 |
| DMP65R-BU4DA Antenna | 48.0 | 20.7 | 7.7 | 6.90 | 2.32 | 1.20 | 350 | 56 | 17 |
| 4415 B30 RRH | 16.5 | 13.4 | 5.9 | 1.54 | 1.23 | 1.20 | 78 | 14 | 4 |
| 4415 B30 RRH (Shielded) | 16.5 | 1.4 | 5.9 | 0.16 | 11.79 | 1.56 | 11 | 4 | 1 |
| B5/B12 4449 RRH | 14.9 | 13.2 | 10.4 | 1.37 | 1.13 | 1.20 | 69 | 13 | 3 |
| B2/B66A 8843 RRH | 14.9 | 13.2 | 10.9 | 1.37 | 1.13 | 1.20 | 69 | 13 | 3 |
| TT19-08BP111-001 TMA | 9.9 | 5.4 | 6.7 | 0.37 | 1.83 | 1.20 | 19 | 5 | 1 |
| TPX-070821 Triplexers | 5.9 | 9.7 | 2.1 | 0.40 | 0.61 | 1.20 | 20 | 5 | 1 |
| Surge Arrestor | 24.0 | 9.7 | 9.7 | 1.62 | 2.47 | 0.70 | 48 | 9 | 2 |
| 2" Pipe | 2.4 | 12.0 | | 0.20 | 0.20 | 1.20 | 10 | 3 | 0 |
| 2-1/2" Pipe | 2.9 | 12.0 | | 0.24 | 0.24 | 1.20 | 12 | 4 | 1 |
| 1-1/2" Pipe | 1.4 | 12.0 | | 0.12 | 0.12 | 1.20 | 6 | 3 | 0 |

Date: 8/15/2019
Project Name: New London-Groton PD
Project No.: CT2164
Designed By: BCP Checked By: MSC

HUDSON Design Group LLC

## WIND LOADS

| Angle = | 30 | (deg) | Ice Thickness = | 1.15 | in. | Equivalent Angle = | 210 | (deg) |
|---|---|---|---|---|---|---|---|---|

**WIND LOADS WITH NO ICE:**

| Appurtenances | Height | Width | Depth | Flat Area (normal) | Flat Area (side) | Aspect Ratio | Aspect Ratio | Ca (normal) | Ca (side) | Force (lbs) (normal) | Force (lbs) (side) | Force (lbs) (angle) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7770 Antenna | 55.0 | 11.0 | 5.0 | 4.20 | 1.91 | 5.00 | 11.00 | 1.31 | 1.53 | 233 | 124 | 206 |
| QS66512-2 Antenna | 72.0 | 12.0 | 9.6 | 6.00 | 4.80 | 6.00 | 7.50 | 1.36 | 1.42 | 344 | 287 | 330 |
| DMP65R-BU4DA Antenna | 48.0 | 20.7 | 7.7 | 6.90 | 2.57 | 2.32 | 6.23 | 1.20 | 1.37 | 350 | 148 | 299 |
| 4415 B30 RRH | 16.5 | 13.4 | 5.9 | 1.54 | 0.68 | 1.23 | 2.80 | 1.20 | 1.21 | 78 | 35 | 67 |
| 4415 B30 RRH (Shielded) | 16.5 | 6.7 | 5.9 | 0.77 | 0.68 | 2.46 | 2.80 | 1.20 | 1.21 | 39 | 35 | 38 |
| B5/B12 4449 RRH | 14.9 | 13.2 | 10.4 | 1.37 | 1.08 | 1.13 | 1.43 | 1.20 | 1.20 | 69 | 55 | 66 |
| B2/B66A 8843 RRH | 14.9 | 13.2 | 10.9 | 1.37 | 1.13 | 1.13 | 1.37 | 1.20 | 1.20 | 69 | 57 | 66 |
| TT19-08BP111-001 TMA | 9.9 | 5.4 | 6.7 | 0.37 | 0.46 | 1.83 | 1.48 | 1.20 | 1.20 | 19 | 23 | 20 |
| TPX-070821 Triplexers | 5.9 | 9.7 | 2.1 | 0.40 | 0.09 | 0.61 | 2.81 | 1.20 | 1.21 | 20 | 4 | 16 |

**WIND LOADS WITH ICE:**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7770 Antenna | 57.3 | 13.3 | 7.3 | 5.29 | 2.90 | 4.31 | 7.85 | 1.28 | 1.43 | 39 | 24 | 35 |
| QS66512-2 Antenna | 74.3 | 14.3 | 11.9 | 7.38 | 6.14 | 5.20 | 6.24 | 1.32 | 1.37 | 56 | 49 | 54 |
| DMP65R-BU4DA Antenna | 50.3 | 23.0 | 10.0 | 8.03 | 3.49 | 2.19 | 5.03 | 1.20 | 1.31 | 56 | 27 | 49 |
| 4415 B30 RRH | 18.8 | 15.7 | 8.2 | 2.05 | 1.07 | 1.20 | 2.29 | 1.20 | 1.20 | 14 | 7 | 13 |
| 4415 B30 RRH (Shielded) | 18.8 | 7.8 | 8.2 | 1.02 | 1.07 | 2.39 | 2.29 | 1.20 | 1.20 | 7 | 7 | 7 |
| B5/B12 4449 RRH | 17.2 | 15.5 | 12.7 | 1.85 | 1.52 | 1.11 | 1.35 | 1.20 | 1.20 | 13 | 11 | 12 |
| B2/B66A 8843 RRH | 17.2 | 15.5 | 13.2 | 1.85 | 1.58 | 1.11 | 1.30 | 1.20 | 1.20 | 13 | 11 | 12 |
| TT19-08BP111-001 TMA | 12.2 | 7.7 | 9.0 | 0.65 | 0.76 | 1.58 | 1.36 | 1.20 | 1.20 | 5 | 5 | 5 |
| TPX-070821 Triplexers | 8.2 | 12.0 | 4.4 | 0.68 | 0.25 | 0.68 | 1.86 | 1.20 | 1.20 | 5 | 2 | 4 |

**WIND LOADS AT 30 MPH:**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7770 Antenna | 55.0 | 11.0 | 5.0 | 4.20 | 1.91 | 5.00 | 11.00 | 1.31 | 1.53 | 11 | 6 | 10 |
| QS66512-2 Antenna | 72.0 | 12.0 | 9.6 | 6.00 | 4.80 | 6.00 | 7.50 | 1.36 | 1.42 | 17 | 14 | 16 |
| DMP65R-BU4DA Antenna | 48.0 | 20.7 | 7.7 | 6.90 | 2.57 | 2.32 | 6.23 | 1.20 | 1.37 | 17 | 7 | 15 |
| 4415 B30 RRH | 16.5 | 13.4 | 5.9 | 1.54 | 0.68 | 1.23 | 2.80 | 1.20 | 1.21 | 4 | 2 | 3 |
| 4415 B30 RRH (Shielded) | 16.5 | 6.7 | 5.9 | 0.77 | 0.68 | 2.46 | 2.80 | 1.20 | 1.21 | 2 | 2 | 2 |
| B5/B12 4449 RRH | 14.9 | 13.2 | 10.4 | 1.37 | 1.08 | 1.13 | 1.43 | 1.20 | 1.20 | 3 | 3 | 3 |
| B2/B66A 8843 RRH | 14.9 | 13.2 | 10.9 | 1.37 | 1.13 | 1.13 | 1.37 | 1.20 | 1.20 | 3 | 3 | 3 |
| TT19-08BP111-001 TMA | 9.9 | 5.4 | 6.7 | 0.37 | 0.46 | 1.83 | 1.48 | 1.20 | 1.20 | 1 | 1 | 1 |
| TPX-070821 Triplexers | 5.9 | 9.7 | 2.1 | 0.40 | 0.09 | 0.61 | 2.81 | 1.20 | 1.21 | 1 | 0 | 1 |

Date: 8/15/2019
Project Name: New London-Groton PD
Project No.: CT2164
Designed By: BCP Checked By: MSC

HUDSON Design Group LLC

## WIND LOADS

| Angle = | 60 | (deg) | Ice Thickness = | 1.15 | in. | Equivalent Angle = | 240 | (deg) |
|---|---|---|---|---|---|---|---|---|

**WIND LOADS WITH NO ICE:**

| Appurtenances | Height | Width | Depth | Flat Area (normal) | Flat Area (side) | Ratio (normal) | Ratio (side) | Ca (normal) | Ca (side) | Force (lbs) (normal) | Force (lbs) (side) | Force (lbs) (angle) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7770 Antenna | 55.0 | 11.0 | 5.0 | 4.20 | 1.91 | 5.00 | 11.00 | 1.31 | 1.53 | 233 | 124 | 151 |
| QS66512-2 Antenna | 72.0 | 12.0 | 9.6 | 6.00 | 4.80 | 6.00 | 7.50 | 1.36 | 1.42 | 344 | 287 | 301 |
| DMP65R-BU4DA Antenna | 48.0 | 20.7 | 7.7 | 6.90 | 2.57 | 2.32 | 6.23 | 1.20 | 1.37 | 350 | 148 | 199 |
| 4415 B30 RRH | 16.5 | 13.4 | 5.9 | 1.54 | 0.68 | 1.23 | 2.80 | 1.20 | 1.21 | 78 | 35 | 45 |
| 4415 B30 RRH (Shielded) | 16.5 | 10.1 | 5.9 | 1.15 | 0.68 | 1.64 | 2.80 | 1.20 | 1.21 | 58 | 35 | 41 |
| B5/B12 4449 RRH | 14.9 | 13.2 | 10.4 | 1.37 | 1.08 | 1.13 | 1.43 | 1.20 | 1.20 | 69 | 55 | 58 |
| B2/B66A 8843 RRH | 14.9 | 13.2 | 10.9 | 1.37 | 1.13 | 1.13 | 1.37 | 1.20 | 1.20 | 69 | 57 | 60 |
| TT19-08BP111-001 TMA | 9.9 | 5.4 | 6.7 | 0.37 | 0.46 | 1.83 | 1.48 | 1.20 | 1.20 | 19 | 23 | 22 |
| TPX-070821 Triplexers | 5.9 | 9.7 | 2.1 | 0.40 | 0.09 | 0.61 | 2.81 | 1.20 | 1.21 | 20 | 4 | 8 |

**WIND LOADS WITH ICE:**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7770 Antenna | 57.3 | 13.3 | 7.3 | 5.29 | 2.90 | 4.31 | 7.85 | 1.28 | 1.43 | 39 | 24 | 28 |
| QS66512-2 Antenna | 74.3 | 14.3 | 11.9 | 7.38 | 6.14 | 5.20 | 6.24 | 1.32 | 1.37 | 56 | 49 | 51 |
| DMP6SR-BU4DA Antenna | 50.3 | 23.0 | 10.0 | 8.03 | 3.49 | 2.19 | 5.03 | 1.20 | 1.31 | 56 | 27 | 34 |
| 4415 B30 RRH | 18.8 | 15.7 | 8.2 | 2.05 | 1.07 | 1.20 | 2.29 | 1.20 | 1.20 | 14 | 7 | 9 |
| 4415 B30 RRH (Shielded) | 18.8 | 11.8 | 8.2 | 1.54 | 1.07 | 1.60 | 2.29 | 1.20 | 1.20 | 11 | 7 | 8 |
| B5/B12 4449 RRH | 17.2 | 15.5 | 12.7 | 1.85 | 1.52 | 1.11 | 1.35 | 1.20 | 1.20 | 13 | 11 | 11 |
| B2/B66A 8843 RRH | 17.2 | 15.5 | 13.2 | 1.85 | 1.58 | 1.11 | 1.30 | 1.20 | 1.20 | 13 | 11 | 11 |
| TT19-08BP111-001 TMA | 12.2 | 7.7 | 9.0 | 0.65 | 0.76 | 1.58 | 1.36 | 1.20 | 1.20 | 5 | 5 | 5 |
| TPX-070821 Triplexers | 8.2 | 12.0 | 4.4 | 0.68 | 0.25 | 0.68 | 1.86 | 1.20 | 1.20 | 5 | 2 | 2 |

**WIND LOADS AT 30 MPH:**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7770 Antenna | 55.0 | 11.0 | 5.0 | 4.20 | 1.91 | 5.00 | 11.00 | 1.31 | 1.53 | 11 | 6 | 7 |
| QS66512-2 Antenna | 72.0 | 12.0 | 9.6 | 6.00 | 4.80 | 6.00 | 7.50 | 1.36 | 1.42 | 17 | 14 | 15 |
| DMP65R-BU4DA Antenna | 48.0 | 20.7 | 7.7 | 6.90 | 2.57 | 2.32 | 6.23 | 1.20 | 1.37 | 17 | 7 | 10 |
| 4415 B30 RRH | 16.5 | 13.4 | 5.9 | 1.54 | 0.68 | 1.23 | 2.80 | 1.20 | 1.21 | 4 | 2 | 2 |
| 4415 B30 RRH (Shielded) | 16.5 | 10.1 | 5.9 | 1.15 | 0.68 | 1.64 | 2.80 | 1.20 | 1.21 | 3 | 2 | 2 |
| B5/B12 4449 RRH | 14.9 | 13.2 | 10.4 | 1.37 | 1.08 | 1.13 | 1.43 | 1.20 | 1.20 | 3 | 3 | 3 |
| B2/B66A 8843 RRH | 14.9 | 13.2 | 10.9 | 1.37 | 1.13 | 1.13 | 1.37 | 1.20 | 1.20 | 3 | 3 | 3 |
| TT19-08BP111-001 TMA | 9.9 | 5.4 | 6.7 | 0.37 | 0.46 | 1.83 | 1.48 | 1.20 | 1.20 | 1 | 1 | 1 |
| TPX-070821 Triplexers | 5.9 | 9.7 | 2.1 | 0.40 | 0.09 | 0.61 | 2.81 | 1.20 | 1.21 | 1 | 0 | 0 |

Date: 8/15/2019
Project Name: New London-Groton PD
Project No.: CT2164
Designed By: BCP Checked By: MSC

HUDSON Design Group LLC

## WIND LOADS

| Angle = | 90 | (deg) | Ice Thickness = | 1.15 | in. | Equivalent Angle = | 270 | (deg) |
|---|---|---|---|---|---|---|---|---|

**WIND LOADS WITH NO ICE:**

| Appurtenances | Height | Width | Depth | Flat Area (normal) | Flat Area (side) | Ratio (normal) | Ratio (side) | Ca (normal) | Ca (side) | Force (lbs) (normal) | Force (lbs) (side) | Force (lbs) (angle) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7770 Antenna | 55.0 | 11.0 | 5.0 | 4.20 | 1.91 | 5.00 | 11.00 | 1.31 | 1.53 | 233 | 124 | 124 |
| QS66512-2 Antenna | 72.0 | 12.0 | 9.6 | 6.00 | 4.80 | 6.00 | 7.50 | 1.36 | 1.42 | 344 | 287 | 287 |
| DMP65R-BU4DA Antenna | 48.0 | 20.7 | 7.7 | 6.90 | 2.57 | 2.32 | 6.23 | 1.20 | 1.37 | 350 | 148 | 148 |
| 4415 B30 RRH | 16.5 | 13.4 | 5.9 | 1.54 | 0.68 | 1.23 | 2.80 | 1.20 | 1.21 | 78 | 35 | 35 |
| 4415 B30 RRH (Shielded) | 16.5 | 1.4 | 5.9 | 0.16 | 0.68 | 11.79 | 2.80 | 1.56 | 1.21 | 11 | 35 | 35 |
| B5/B12 4449 RRH | 14.9 | 13.2 | 10.4 | 1.37 | 1.08 | 1.13 | 1.43 | 1.20 | 1.20 | 69 | 55 | 55 |
| B2/B66A 8843 RRH | 14.9 | 13.2 | 10.9 | 1.37 | 1.13 | 1.13 | 1.37 | 1.20 | 1.20 | 69 | 57 | 57 |
| TT19-08BP111-001 TMA | 9.9 | 5.4 | 6.7 | 0.37 | 0.46 | 1.83 | 1.48 | 1.20 | 1.20 | 19 | 23 | 23 |
| TPX-070821 Triplexers | 5.9 | 9.7 | 2.1 | 0.40 | 0.09 | 0.61 | 2.81 | 1.20 | 1.21 | 20 | 4 | 4 |

**WIND LOADS WITH ICE:**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7770 Antenna | 57.3 | 13.3 | 7.3 | 5.29 | 2.90 | 4.31 | 7.85 | 1.28 | 1.43 | 39 | 24 | 24 |
| QS66512-2 Antenna | 74.3 | 14.3 | 11.9 | 7.38 | 6.14 | 5.20 | 6.24 | 1.32 | 1.37 | 56 | 49 | 49 |
| DMP65R-BU4DA Antenna | 50.3 | 23.0 | 10.0 | 8.03 | 3.49 | 2.19 | 5.03 | 1.20 | 1.31 | 56 | 27 | 27 |
| 4415 B30 RRH | 18.8 | 15.7 | 8.2 | 2.05 | 1.07 | 1.20 | 2.29 | 1.20 | 1.20 | 14 | 7 | 7 |
| 4415 B30 RRH (Shielded) | 18.8 | 3.7 | 8.2 | 0.48 | 1.07 | 5.08 | 2.29 | 1.31 | 1.20 | 4 | 7 | 7 |
| B5/B12 4449 RRH | 17.2 | 15.5 | 12.7 | 1.85 | 1.52 | 1.11 | 1.35 | 1.20 | 1.20 | 13 | 11 | 11 |
| B2/B66A 8843 RRH | 17.2 | 15.5 | 13.2 | 1.85 | 1.58 | 1.11 | 1.30 | 1.20 | 1.20 | 13 | 11 | 11 |
| TT19-08BP111-001 TMA | 12.2 | 7.7 | 9.0 | 0.65 | 0.76 | 1.58 | 1.36 | 1.20 | 1.20 | 5 | 5 | 5 |
| TPX-070821 Triplexers | 8.2 | 12.0 | 4.4 | 0.68 | 0.25 | 0.68 | 1.86 | 1.20 | 1.20 | 5 | 2 | 2 |

**WIND LOADS AT 30 MPH:**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7770 Antenna | 55.0 | 11.0 | 5.0 | 4.20 | 1.91 | 5.00 | 11.00 | 1.31 | 1.53 | 11 | 6 | 6 |
| QS66512-2 Antenna | 72.0 | 12.0 | 9.6 | 6.00 | 4.80 | 6.00 | 7.50 | 1.36 | 1.42 | 17 | 14 | 14 |
| DMP65R-BU4DA Antenna | 48.0 | 20.7 | 7.7 | 6.90 | 2.57 | 2.32 | 6.23 | 1.20 | 1.37 | 17 | 7 | 7 |
| 4415 B30 RRH | 16.5 | 13.4 | 5.9 | 1.54 | 0.68 | 1.23 | 2.80 | 1.20 | 1.21 | 4 | 2 | 2 |
| 4415 B30 RRH (Shielded) | 16.5 | 1.4 | 5.9 | 0.16 | 0.68 | 11.79 | 2.80 | 1.56 | 1.21 | 1 | 2 | 2 |
| B5/B12 4449 RRH | 14.9 | 13.2 | 10.4 | 1.37 | 1.08 | 1.13 | 1.43 | 1.20 | 1.20 | 3 | 3 | 3 |
| B2/B66A 8843 RRH | 14.9 | 13.2 | 10.9 | 1.37 | 1.13 | 1.13 | 1.37 | 1.20 | 1.20 | 3 | 3 | 3 |
| TT19-08BP111-001 TMA | 9.9 | 5.4 | 6.7 | 0.37 | 0.46 | 1.83 | 1.48 | 1.20 | 1.20 | 1 | 1 | 1 |
| TPX-070821 Triplexers | 5.9 | 9.7 | 2.1 | 0.40 | 0.09 | 0.61 | 2.81 | 1.20 | 1.21 | 1 | 0 | 0 |

Date: 8/15/2019
Project Name: New London-Groton PD
Project No.: CT2164
Designed By: BCP Checked By: MSC

HUDSON Design Group LLC

## WIND LOADS

| Angle = | 120 | (deg) | Ice Thickness = | 1.15 | in. | Equivalent Angle = | 300 | (deg) |
|---|---|---|---|---|---|---|---|---|

**WIND LOADS WITH NO ICE:**

| Appurtenances | Height | Width | Depth | Flat Area (normal) | Flat Area (side) | Ratio (normal) | Ratio (side) | Ca (normal) | Ca (side) | Force (lbs) (normal) | Force (lbs) (side) | Force (lbs) (angle) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7770 Antenna | 55.0 | 11.0 | 5.0 | 4.20 | 1.91 | 5.00 | 11.00 | 1.31 | 1.53 | 233 | 124 | 151 |
| QS66512-2 Antenna | 72.0 | 12.0 | 9.6 | 6.00 | 4.80 | 6.00 | 7.50 | 1.36 | 1.42 | 344 | 287 | 301 |
| DMP65R-BU4DA Antenna | 48.0 | 20.7 | 7.7 | 6.90 | 2.57 | 2.32 | 6.23 | 1.20 | 1.37 | 350 | 148 | 199 |
| 4415 B30 RRH | 16.5 | 13.4 | 5.9 | 1.54 | 0.68 | 1.23 | 2.80 | 1.20 | 1.21 | 78 | 35 | 45 |
| 4415 B30 RRH (Shielded) | 16.5 | 10.1 | 5.9 | 1.15 | 0.68 | 1.64 | 2.80 | 1.20 | 1.21 | 58 | 35 | 41 |
| B5/B12 4449 RRH | 14.9 | 13.2 | 10.4 | 1.37 | 1.08 | 1.13 | 1.43 | 1.20 | 1.20 | 69 | 55 | 58 |
| B2/B66A 8843 RRH | 14.9 | 13.2 | 10.9 | 1.37 | 1.13 | 1.13 | 1.37 | 1.20 | 1.20 | 69 | 57 | 60 |
| TT19-08BP111-001 TMA | 9.9 | 5.4 | 6.7 | 0.37 | 0.46 | 1.83 | 1.48 | 1.20 | 1.20 | 19 | 23 | 22 |
| TPX-070821 Triplexers | 5.9 | 9.7 | 2.1 | 0.40 | 0.09 | 0.61 | 2.81 | 1.20 | 1.21 | 20 | 4 | 8 |

**WIND LOADS WITH ICE:**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7770 Antenna | 57.3 | 13.3 | 7.3 | 5.29 | 2.90 | 4.31 | 7.85 | 1.28 | 1.43 | 39 | 24 | 28 |
| QS66512-2 Antenna | 74.3 | 14.3 | 11.9 | 7.38 | 6.14 | 5.20 | 6.24 | 1.32 | 1.37 | 56 | 49 | 51 |
| DMP65R-BU4DA Antenna | 50.3 | 23.0 | 10.0 | 8.03 | 3.49 | 2.19 | 5.03 | 1.20 | 1.31 | 56 | 27 | 34 |
| 4415 B30 RRH | 18.8 | 15.7 | 8.2 | 2.05 | 1.07 | 1.20 | 2.29 | 1.20 | 1.20 | 14 | 7 | 9 |
| 4415 B30 RRH (Shielded) | 18.8 | 11.8 | 8.2 | 1.54 | 1.07 | 1.60 | 2.29 | 1.20 | 1.20 | 11 | 7 | 8 |
| B5/B12 4449 RRH | 17.2 | 15.5 | 12.7 | 1.85 | 1.52 | 1.11 | 1.35 | 1.20 | 1.20 | 13 | 11 | 11 |
| B2/B66A 8843 RRH | 17.2 | 15.5 | 13.2 | 1.85 | 1.58 | 1.11 | 1.30 | 1.20 | 1.20 | 13 | 11 | 11 |
| TT19-08BP111-001 TMA | 12.2 | 7.7 | 9.0 | 0.65 | 0.76 | 1.58 | 1.36 | 1.20 | 1.20 | 5 | 5 | 5 |
| TPX-070821 Triplexers | 8.2 | 12.0 | 4.4 | 0.68 | 0.25 | 0.68 | 1.86 | 1.20 | 1.20 | 5 | 2 | 2 |

**WIND LOADS AT 30 MPH:**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7770 Antenna | 55.0 | 11.0 | 5.0 | 4.20 | 1.91 | 5.00 | 11.00 | 1.31 | 1.53 | 11 | 6 | 7 |
| QS66512-2 Antenna | 72.0 | 12.0 | 9.6 | 6.00 | 4.80 | 6.00 | 7.50 | 1.36 | 1.42 | 17 | 14 | 15 |
| DMP65R-BU4DA Antenna | 48.0 | 20.7 | 7.7 | 6.90 | 2.57 | 2.32 | 6.23 | 1.20 | 1.37 | 17 | 7 | 10 |
| 4415 B30 RRH | 16.5 | 13.4 | 5.9 | 1.54 | 0.68 | 1.23 | 2.80 | 1.20 | 1.21 | 4 | 2 | 2 |
| 4415 B30 RRH (Shielded) | 16.5 | 10.1 | 5.9 | 1.15 | 0.68 | 1.64 | 2.80 | 1.20 | 1.21 | 3 | 2 | 2 |
| B5/B12 4449 RRH | 14.9 | 13.2 | 10.4 | 1.37 | 1.08 | 1.13 | 1.43 | 1.20 | 1.20 | 3 | 3 | 3 |
| B2/B66A 8843 RRH | 14.9 | 13.2 | 10.9 | 1.37 | 1.13 | 1.13 | 1.37 | 1.20 | 1.20 | 3 | 3 | 3 |
| TT19-08BP111-001 TMA | 9.9 | 5.4 | 6.7 | 0.37 | 0.46 | 1.83 | 1.48 | 1.20 | 1.20 | 1 | 1 | 1 |
| TPX-070821 Triplexers | 5.9 | 9.7 | 2.1 | 0.40 | 0.09 | 0.61 | 2.81 | 1.20 | 1.21 | 1 | 0 | 0 |

Date: 8/15/2019
Project Name: New London-Groton PD
Project No.: CT2164
Designed By: BCP Checked By: MSC

HUDSON Design Group LLC

## WIND LOADS

| Angle = | 150 | (deg) | Ice Thickness = | 1.15 | in. | Equivalent Angle = | 330 | (deg) |
|---|---|---|---|---|---|---|---|---|

**WIND LOADS WITH NO ICE:**

| Appurtenances | Height | Width | Depth | Flat Area (normal) | Flat Area (side) | Ratio (normal) | Ratio (side) | Ca (normal) | Ca (side) | Force (lbs) (normal) | Force (lbs) (side) | Force (lbs) (angle) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7770 Antenna | 55.0 | 11.0 | 5.0 | 4.20 | 1.91 | 5.00 | 11.00 | 1.31 | 1.53 | 233 | 124 | 206 |
| QS66512-2 Antenna | 72.0 | 12.0 | 9.6 | 6.00 | 4.80 | 6.00 | 7.50 | 1.36 | 1.42 | 344 | 287 | 330 |
| DMP65R-BU4DA Antenna | 48.0 | 20.7 | 7.7 | 6.90 | 2.57 | 2.32 | 6.23 | 1.20 | 1.37 | 350 | 148 | 299 |
| 4415 B30 RRH | 16.5 | 13.4 | 5.9 | 1.54 | 0.68 | 1.23 | 2.80 | 1.20 | 1.21 | 78 | 35 | 67 |
| 4415 B30 RRH (Shielded) | 16.5 | 6.7 | 5.9 | 0.77 | 0.68 | 2.46 | 2.80 | 1.20 | 1.21 | 39 | 35 | 38 |
| B5/B12 4449 RRH | 14.9 | 13.2 | 10.4 | 1.37 | 1.08 | 1.13 | 1.43 | 1.20 | 1.20 | 69 | 55 | 66 |
| B2/B66A 8843 RRH | 14.9 | 13.2 | 10.9 | 1.37 | 1.13 | 1.13 | 1.37 | 1.20 | 1.20 | 69 | 57 | 66 |
| TT19-08BP111-001 TMA | 9.9 | 5.4 | 6.7 | 0.37 | 0.46 | 1.83 | 1.48 | 1.20 | 1.20 | 19 | 23 | 20 |
| TPX-070821 Triplexers | 5.9 | 9.7 | 2.1 | 0.40 | 0.09 | 0.61 | 2.81 | 1.20 | 1.21 | 20 | 4 | 16 |

**WIND LOADS WITH ICE:**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7770 Antenna | 57.3 | 13.3 | 7.3 | 5.29 | 2.90 | 4.31 | 7.85 | 1.28 | 1.43 | 39 | 24 | 35 |
| QS66512-2 Antenna | 74.3 | 14.3 | 11.9 | 7.38 | 6.14 | 5.20 | 6.24 | 1.32 | 1.37 | 56 | 49 | 54 |
| DMP65R-BU4DA Antenna | 50.3 | 23.0 | 10.0 | 8.03 | 3.49 | 2.19 | 5.03 | 1.20 | 1.31 | 56 | 27 | 49 |
| 4415 B30 RRH | 18.8 | 15.7 | 8.2 | 2.05 | 1.07 | 1.20 | 2.29 | 1.20 | 1.20 | 14 | 7 | 13 |
| 4415 B30 RRH (Shielded) | 18.8 | 7.8 | 8.2 | 1.02 | 1.07 | 2.39 | 2.29 | 1.20 | 1.20 | 7 | 7 | 7 |
| B5/B12 4449 RRH | 17.2 | 15.5 | 12.7 | 1.85 | 1.52 | 1.11 | 1.35 | 1.20 | 1.20 | 13 | 11 | 12 |
| B2/B66A 8843 RRH | 17.2 | 15.5 | 13.2 | 1.85 | 1.58 | 1.11 | 1.30 | 1.20 | 1.20 | 13 | 11 | 12 |
| TT19-08BP111-001 TMA | 12.2 | 7.7 | 9.0 | 0.65 | 0.76 | 1.58 | 1.36 | 1.20 | 1.20 | 5 | 5 | 5 |
| TPX-070821 Triplexers | 8.2 | 12.0 | 4.4 | 0.68 | 0.25 | 0.68 | 1.86 | 1.20 | 1.20 | 5 | 2 | 4 |

**WIND LOADS AT 30 MPH:**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7770 Antenna | 55.0 | 11.0 | 5.0 | 4.20 | 1.91 | 5.00 | 11.00 | 1.31 | 1.53 | 11 | 6 | 10 |
| QS66512-2 Antenna | 72.0 | 12.0 | 9.6 | 6.00 | 4.80 | 6.00 | 7.50 | 1.36 | 1.42 | 17 | 14 | 16 |
| DMP65R-BU4DA Antenna | 48.0 | 20.7 | 7.7 | 6.90 | 2.57 | 2.32 | 6.23 | 1.20 | 1.37 | 17 | 7 | 15 |
| 4415 B30 RRH | 16.5 | 13.4 | 5.9 | 1.54 | 0.68 | 1.23 | 2.80 | 1.20 | 1.21 | 4 | 2 | 3 |
| 4415 B30 RRH (Shielded) | 16.5 | 6.7 | 5.9 | 0.77 | 0.68 | 2.46 | 2.80 | 1.20 | 1.21 | 2 | 2 | 2 |
| B5/B12 4449 RRH | 14.9 | 13.2 | 10.4 | 1.37 | 1.08 | 1.13 | 1.43 | 1.20 | 1.20 | 3 | 3 | 3 |
| B2/B66A 8843 RRH | 14.9 | 13.2 | 10.9 | 1.37 | 1.13 | 1.13 | 1.37 | 1.20 | 1.20 | 3 | 3 | 3 |
| TT19-08BP111-001 TMA | 9.9 | 5.4 | 6.7 | 0.37 | 0.46 | 1.83 | 1.48 | 1.20 | 1.20 | 1 | 1 | 1 |
| TPX-070821 Triplexers | 5.9 | 9.7 | 2.1 | 0.40 | 0.09 | 0.61 | 2.81 | 1.20 | 1.21 | 1 | 0 | 1 |

**Date:** 8/15/2019
**Project Name:** NEW LONDON-GROTON PD
**Project No.:** CT2164
**Designed By:** BCP **Checked By:** MSC

HUDSON Design Group LLC

## ICE WEIGHT CALCULATIONS

Thickness of ice: 1.15 in.
Density of ice: 56 pcf

### 7770 Antenna

Weight of ice based on total radial SF area:

| | | |
|---|---|---|
| Height (in): | 55.0 | |
| Width (in): | 11.0 | |
| Depth (in): | 5.0 | |
| Total weight of ice on object: | | 85 lbs |
| Weight of object: | 35.0 lbs | |
| Combined weight of ice and object: | | 120 lbs |

### QS66512-2 Antenna

Weight of ice based on total radial SF area:

| | | |
|---|---|---|
| Height (in): | 72.0 | |
| Width (in): | 12.0 | |
| Depth (in): | 9.6 | |
| Total weight of ice on object: | | 139 lbs |
| Weight of object: | 111.0 lbs | |
| Combined weight of ice and object: | | 250 lbs |

### DMP65R-BU4DA Antenna

Weight of ice based on total radial SF area:

| | | |
|---|---|---|
| Height (in): | 48.0 | |
| Width (in): | 20.7 | |
| Depth (in): | 7.7 | |
| Total weight of ice on object: | | 131 lbs |
| Weight of object: | 67.9 lbs | |
| Combined weight of ice and object: | | 198 lbs |

### 4415 B30 RRH

Weight of ice based on total radial SF area:

| | | |
|---|---|---|
| Height (in): | 16.5 | |
| Width (in): | 13.4 | |
| Depth (in): | 5.9 | |
| Total weight of ice on object: | | 31 lbs |
| Weight of object: | 46.0 lbs | |
| Combined weight of ice and object: | | 77 lbs |

### B5/B12 4449 RRH

Weight of ice based on total radial SF area:

| | | |
|---|---|---|
| Height (in): | 14.9 | |
| Width (in): | 13.2 | |
| Depth (in): | 10.4 | |
| Total weight of ice on object: | | 31 lbs |
| Weight of object: | 73.0 lbs | |
| Combined weight of ice and object: | | 104 lbs |

### B2/B66A 8843 RRH

Weight of ice based on total radial SF area:

| | | |
|---|---|---|
| Height (in): | 14.9 | |
| Width (in): | 13.2 | |
| Depth (in): | 10.9 | |
| Total weight of ice on object: | | 32 lbs |
| Weight of object: | 72.0 lbs | |
| Combined weight of ice and object: | | 104 lbs |

### TT19-08BP111-001 TMA

Weight of ice based on total radial SF area:

| | | |
|---|---|---|
| Height (in): | 9.9 | |
| Width (in): | 5.4 | |
| Depth (in): | 6.7 | |
| Total weight of ice on object: | | 11 lbs |
| Weight of object: | 16.0 lbs | |
| Combined weight of ice and object: | | 27 lbs |

### TPX-070821 Triplexers

Weight of ice based on total radial SF area:

| | | |
|---|---|---|
| Height (in): | 5.9 | |
| Width (in): | 9.7 | |
| Depth (in): | 9.7 | |
| Total weight of ice on object: | | 10 lbs |
| Weight of object: | 8.0 lbs | |
| Combined weight of ice and object: | | 18 lbs |

### Squid Surge Arrestor

Weight of ice based on total radial SF area:

| | | |
|---|---|---|
| Depth (in): | 24.0 | |
| Diameter(in): | 9.7 | |
| Total weight of ice on object: | | 30 lbs |
| Weight of object: | 33 lbs | |
| Combined weight of ice and object: | | 63 lbs |

### 1-1/2" Pipe

Per foot weight of ice:

| | | |
|---|---|---|
| diameter (in): | 1.9 | |
| Per foot weight of ice on object: | | 4 plf |

### 2" pipe

Per foot weight of ice:

| | | |
|---|---|---|
| diameter (in): | 2.38 | |
| Per foot weight of ice on object: | | 5 plf |

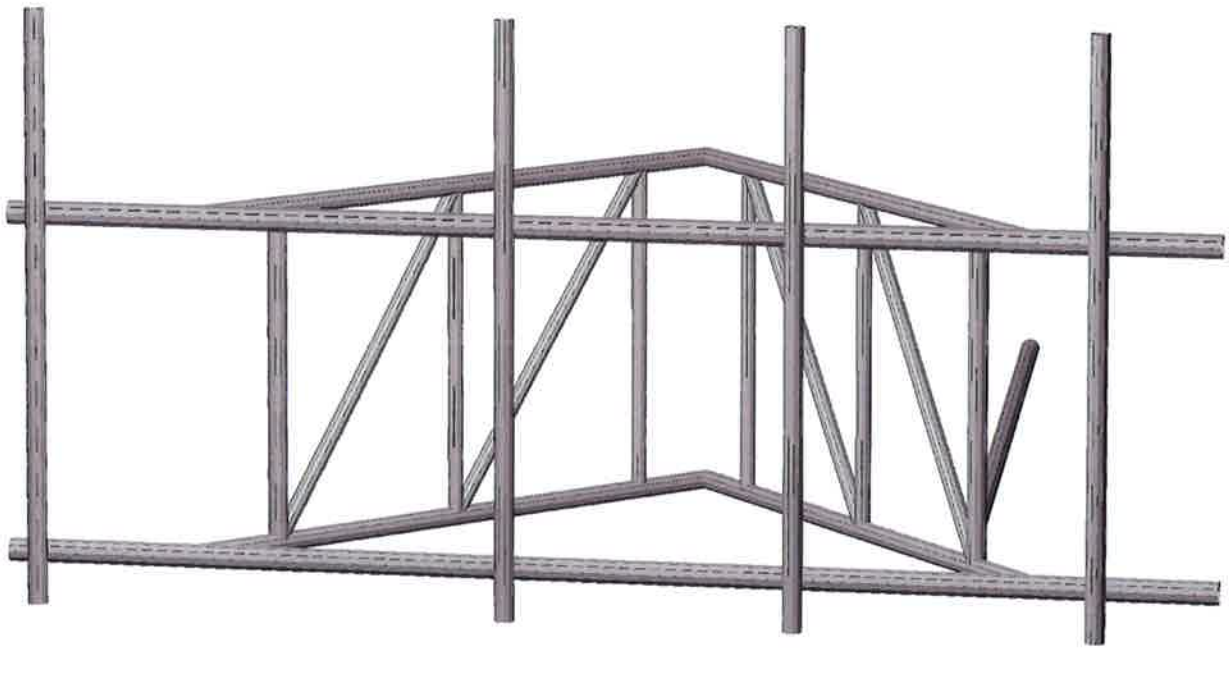
### 2-1/2" pipe

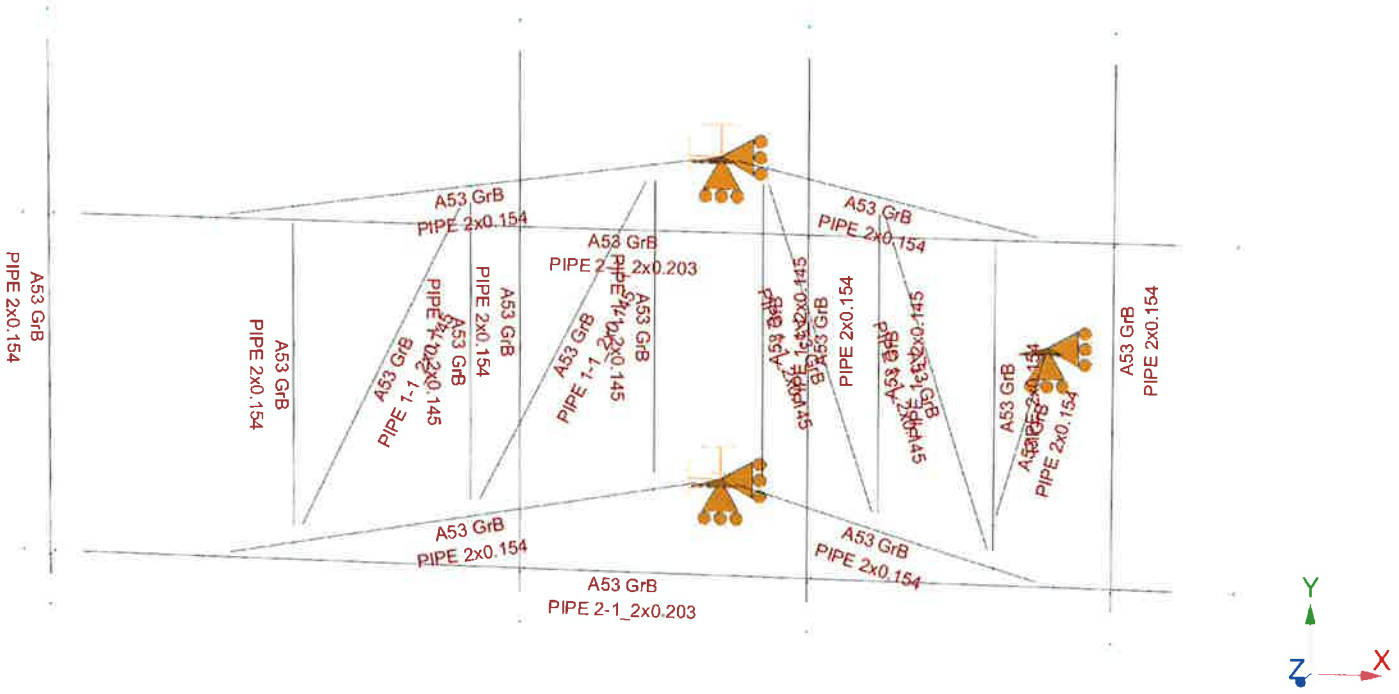
Per foot weight of ice:

| | | |
|---|---|---|
| diameter (in): | 2.88 | |
| Per foot weight of ice on object: | | 6 plf |

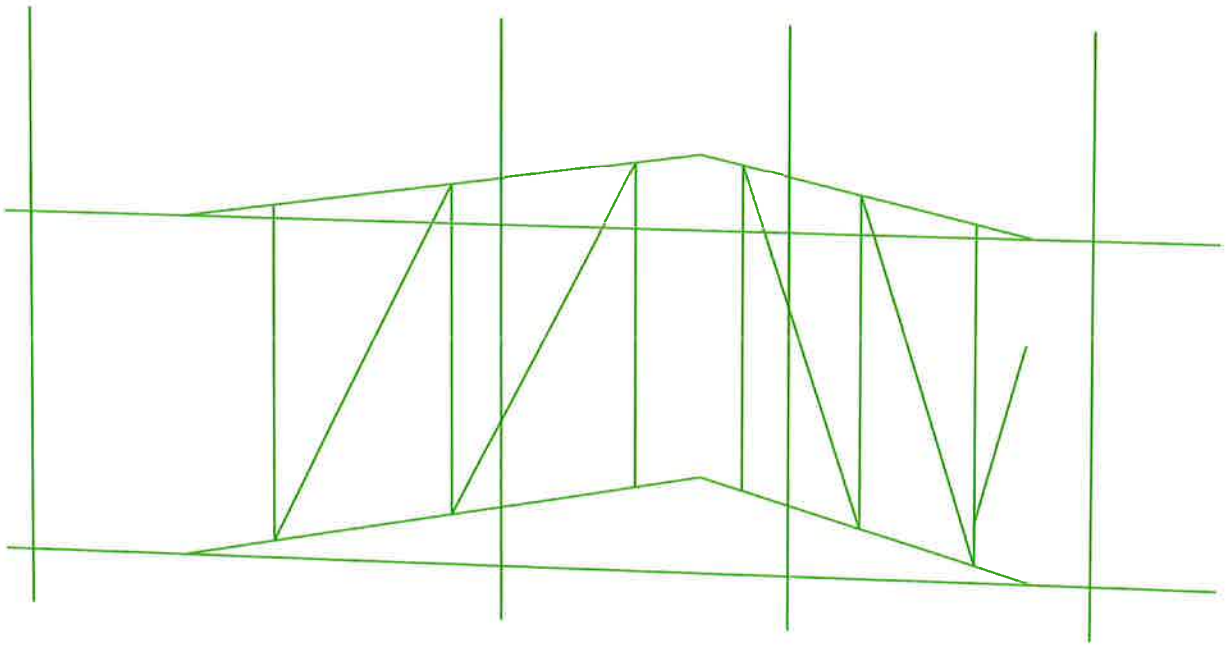
HUDSON
Design Group LLC

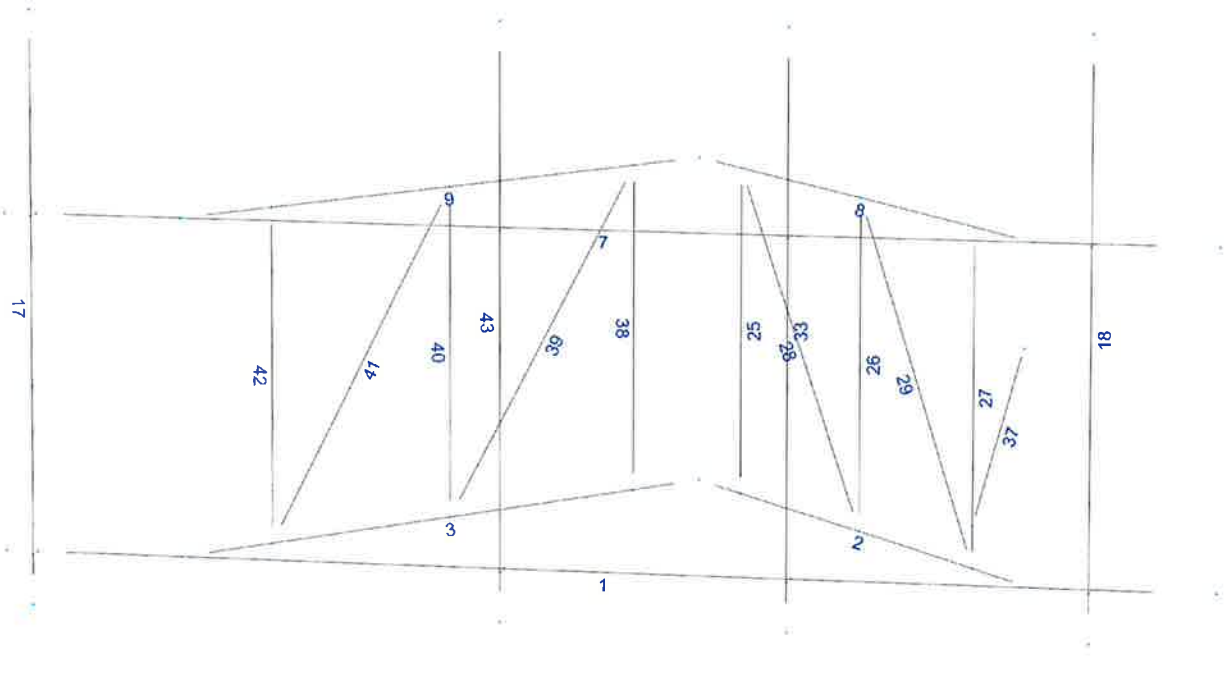
# Mount Calculations
# (Existing Conditions)


Y
Z
X


A53 GrB
PIPE 2x0.154
A53 GrB
PIPE 2-1_2x0.203
A53 GrB
PIPE 1-1_2x0.145
Y
Z
X

Not designed
Error on design
Design O.K.
With warnings




17
42
41
40
43
39
38
9
7
25
28
33
8
26
29
27
37
18
3
2
1
Y
Z
X

Bentley Hewlett-Packard Company

**Current Date:** 8/15/2019 10:41 AM
**Units system:** English
**File name:** W:\STRUCTURAL DEPARTMENT\ANALYSIS SOFTWARE\RAM Elements\RAM Projects\AT&T\CT\CT2164\CT2164.retx\

# Load data

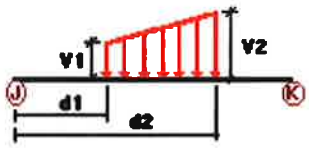
GLOSSARY

Comb : Indicates if load condition is a load combination

## Load Conditions

| Condition | Description | Comb. | Category |
|---|---|---|---|
| D | Dead Load | No | DL |
| Wo | Wind Load (NO ICE) | No | WIND |
| W30 | WL 30deg | No | WIND |
| W60 | WL 60deg | No | WIND |
| W90 | WL 90deg | No | WIND |
| W120 | WL 120deg | No | WIND |
| W150 | WL 150deg | No | WIND |
| Di | Ice Load | No | LL |
| WI0 | WL ICE 0deg | No | WIND |
| WI30 | WL ICE 30deg | No | WIND |
| WI60 | WL ICE 60deg | No | WIND |
| WI90 | WL ICE 90deg | No | WIND |
| WI120 | WL ICE 120deg | No | WIND |
| WI150 | WL ICE 150deg | No | WIND |
| WL0 | WL 30 mph 0deg | No | WIND |
| WL30 | WL 30 mph 30deg | No | WIND |
| WL60 | WL 30 mph 60deg | No | WIND |
| WL90 | WL 30 mph 90deg | No | WIND |
| WL120 | WL 30 mph 120deg | No | WIND |
| WL150 | WL 30 mph 150deg | No | WIND |
| LL1 | 250 lb Live Load Center of Mount | No | LL |
| LL2 | 250 lb Live Load Right End of Mount | No | LL |
| LL3 | 250 lb Live Load Left End of Mount | No | LL |
| LLa1 | 250 lb Live Load Antenna 1 | No | LL |
| LLa2 | 250 lb Live Load Antenna 2 | No | LL |
| LLa3 | 250 lb Live Load Antenna 3 | No | LL |
| LLa4 | 250 lb Live Load Antenna 4 | No | LL |

## Distributed force on members

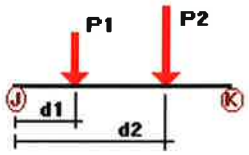


| Condition | Member | Dir1 | Val1 [Kip/ft] | Val2 [Kip/ft] | Dist1 [ft] | % | Dist2 [ft] | % |
|---|---|---|---|---|---|---|---|---|
| Wo | 1 | Z | -0.012 | -0.012 | 0.00 | Yes | 100.00 | Yes |
| | 2 | Z | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 3 | Z | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 7 | Z | -0.012 | -0.012 | 0.00 | Yes | 100.00 | Yes |
| | 8 | Z | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 9 | Z | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 25 | Z | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 26 | Z | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 27 | Z | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 28 | Z | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 29 | Z | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 37 | Z | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 38 | Z | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 39 | Z | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 40 | Z | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 41 | Z | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 42 | Z | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 43 | Z | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| W30 | 1 | Z | -0.012 | -0.012 | 0.00 | Yes | 100.00 | Yes |
| | 2 | Z | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 3 | Z | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 7 | Z | -0.012 | -0.012 | 0.00 | Yes | 100.00 | Yes |
| | 8 | Z | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 9 | Z | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 25 | Z | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 26 | Z | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 27 | Z | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 28 | Z | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 29 | Z | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 37 | Z | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 38 | Z | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 39 | Z | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 40 | Z | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 41 | Z | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 42 | Z | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 43 | Z | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| W60 | 2 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 3 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 8 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 9 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 17 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 18 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 25 | X | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 26 | X | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 27 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 28 | X | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 29 | X | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 33 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 37 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 38 | X | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 39 | X | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 40 | X | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 41 | X | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 42 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 43 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| W90 | 2 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 3 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 8 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 9 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 17 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 18 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 25 | X | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 26 | X | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 27 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 28 | X | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 29 | X | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 33 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 37 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 38 | X | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 39 | X | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 40 | X | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 41 | X | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 42 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 43 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| W120 | 2 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 3 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 8 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 9 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 17 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 18 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 25 | X | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 26 | X | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 27 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 28 | X | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 29 | X | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 33 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 37 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 38 | X | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 39 | X | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 40 | X | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 41 | X | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 42 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| | 43 | X | -0.01 | -0.01 | 0.00 | Yes | 100.00 | Yes |
| W150 | 1 | Z | 0.012 | 0.012 | 0.00 | Yes | 100.00 | Yes |
| | 2 | Z | 0.01 | 0.01 | 0.00 | Yes | 100.00 | Yes |
| | 3 | Z | 0.01 | 0.01 | 0.00 | Yes | 100.00 | Yes |
| | 7 | Z | 0.012 | 0.012 | 0.00 | Yes | 100.00 | Yes |
| | 8 | Z | 0.01 | 0.01 | 0.00 | Yes | 100.00 | Yes |
| | 9 | Z | 0.01 | 0.01 | 0.00 | Yes | 100.00 | Yes |
| | 25 | Z | 0.006 | 0.006 | 0.00 | Yes | 100.00 | Yes |
| | 26 | Z | 0.006 | 0.006 | 0.00 | Yes | 100.00 | Yes |
| | 27 | Z | 0.01 | 0.01 | 0.00 | Yes | 100.00 | Yes |
| | 28 | Z | 0.006 | 0.006 | 0.00 | Yes | 100.00 | Yes |
| | 29 | Z | 0.006 | 0.006 | 0.00 | Yes | 100.00 | Yes |
| | 37 | Z | 0.01 | 0.01 | 0.00 | Yes | 100.00 | Yes |
| | 38 | Z | 0.006 | 0.006 | 0.00 | Yes | 100.00 | Yes |
| | 39 | Z | 0.006 | 0.006 | 0.00 | Yes | 100.00 | Yes |
| | 40 | Z | 0.006 | 0.006 | 0.00 | Yes | 100.00 | Yes |
| | 41 | Z | 0.006 | 0.006 | 0.00 | Yes | 100.00 | Yes |
| | 42 | Z | 0.01 | 0.01 | 0.00 | Yes | 100.00 | Yes |
| | 43 | Z | 0.01 | 0.01 | 0.00 | Yes | 100.00 | Yes |
| Di | 1 | Y | -0.006 | -0.006 | 0.00 | Yes | 100.00 | Yes |
| | 2 | Y | -0.005 | -0.005 | 0.00 | Yes | 100.00 | Yes |
| | 3 | Y | -0.005 | -0.005 | 0.00 | Yes | 100.00 | Yes |
| | **7** | Y | **-0.006** | **-0.006** | **0.00** | **Yes** | **100.00** | **Yes** |
| | **8** | Y | **-0.005** | **-0.005** | **0.00** | **Yes** | **100.00** | **Yes** |
| | **9** | Y | **-0.005** | **-0.005** | **0.00** | **Yes** | **100.00** | **Yes** |
| | **17** | Y | **-0.005** | **-0.005** | **0.00** | **Yes** | **100.00** | **Yes** |
| | **18** | Y | **-0.005** | **-0.005** | **0.00** | **Yes** | **100.00** | **Yes** |
| | **25** | Y | **-0.004** | **-0.004** | **0.00** | **Yes** | **100.00** | **Yes** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 26 | Y | -0.004 | -0.004 | 0.00 | Yes | 100.00 | Yes |
| 27 | Y | -0.005 | -0.005 | 0.00 | Yes | 100.00 | Yes |
| 28 | Y | -0.004 | -0.004 | 0.00 | Yes | 100.00 | Yes |
| 29 | Y | -0.004 | -0.004 | 0.00 | Yes | 100.00 | Yes |
| 33 | Y | -0.005 | -0.005 | 0.00 | Yes | 100.00 | Yes |
| 37 | Y | -0.005 | -0.005 | 0.00 | Yes | 100.00 | Yes |
| 38 | Y | -0.004 | -0.004 | 0.00 | Yes | 100.00 | Yes |
| 39 | Y | -0.004 | -0.004 | 0.00 | Yes | 100.00 | Yes |
| 40 | Y | -0.004 | -0.004 | 0.00 | Yes | 100.00 | Yes |
| 41 | Y | -0.004 | -0.004 | 0.00 | Yes | 100.00 | Yes |
| 42 | Y | -0.005 | -0.005 | 0.00 | Yes | 100.00 | Yes |
| 43 | Y | -0.005 | -0.005 | 0.00 | Yes | 100.00 | Yes |

## Concentrated forces on members




| Condition | Member | Dir1 | Value1 [Kip] | Dist1 [ft] | % |
|---|---|---|---|---|---|
| D | 17 | Y | -0.034 | 0.50 | No |
| | | Y | -0.034 | 3.90 | No |
| | 18 | Y | -0.018 | 0.50 | No |
| | | Y | -0.018 | 4.50 | No |
| | | Y | -0.016 | 3.00 | No |
| | 33 | Y | -0.056 | 0.50 | No |
| | | Y | -0.056 | 5.90 | No |
| | | Y | -0.046 | 4.00 | No |
| | | Y | -0.016 | 1.00 | No |
| | 43 | Y | -0.145 | 4.00 | No |
| Wo | 17 | z | -0.175 | 0.50 | No |
| | | z | -0.175 | 3.90 | No |
| | 18 | z | -0.117 | 0.50 | No |
| | | z | -0.117 | 4.50 | No |
| | | z | -0.019 | 3.00 | No |
| | 33 | z | -0.172 | 0.50 | No |
| | | z | -0.172 | 5.90 | No |
| | | z | -0.011 | 4.00 | No |
| | | z | -0.02 | 1.00 | No |
| | 43 | z | -0.138 | 2.00 | No |
| W30 | 17 | 3 | -0.15 | 0.50 | No |
| | | 3 | -0.15 | 3.90 | No |
| | 18 | 3 | -0.103 | 0.50 | No |
| | | 3 | -0.103 | 4.50 | No |
| | | 3 | -0.02 | 3.00 | No |
| | 33 | 3 | -0.165 | 0.50 | No |
| | | 3 | -0.165 | 5.90 | No |
| | | 3 | -0.038 | 4.00 | No |
| | | 3 | -0.016 | 1.00 | No |
| | 43 | 3 | -0.132 | 4.00 | No |
| W60 | 17 | 3 | -0.10 | 0.50 | No |
| | | 3 | -0.10 | 3.90 | No |
| | 18 | 3 | -0.076 | 0.50 | No |

| | | | | | |
|---|---|---|---|---|---|
| | | 3 | -0.076 | 4.50 | No |
| | | 3 | -0.022 | 3.00 | No |
| | 33 | 3 | -0.151 | 0.50 | No |
| | | 3 | -0.151 | 5.90 | No |
| | | 3 | -0.041 | 4.00 | No |
| | | 3 | -0.016 | 1.00 | No |
| | 43 | 3 | -0.118 | 4.00 | No |
| W90 | 17 | x | -0.075 | 0.50 | No |
| | | x | -0.075 | 3.90 | No |
| | 18 | x | -0.062 | 0.50 | No |
| | | x | -0.062 | 4.50 | No |
| | | x | -0.023 | 3.00 | No |
| | 33 | x | -0.144 | 0.50 | No |
| | | x | -0.144 | 5.90 | No |
| | | x | -0.035 | 4.00 | No |
| | | x | -0.008 | 1.00 | No |
| | 43 | x | -0.112 | 4.00 | No |
| W120 | 17 | 2 | -0.10 | 0.50 | No |
| | | 2 | -0.10 | 3.90 | No |
| | 18 | 2 | -0.076 | 0.50 | No |
| | | 2 | -0.076 | 4.50 | No |
| | | 2 | -0.022 | 3.00 | No |
| | 33 | 2 | -0.151 | 0.50 | No |
| | | 2 | -0.151 | 5.90 | No |
| | | 2 | -0.041 | 4.00 | No |
| | | 2 | -0.016 | 1.00 | No |
| | 43 | 2 | -0.118 | 4.00 | No |
| W150 | 17 | 2 | -0.15 | 0.50 | No |
| | | 2 | -0.15 | 3.90 | No |
| | 18 | 2 | -0.103 | 0.50 | No |
| | | 2 | -0.103 | 4.50 | No |
| | | 2 | -0.02 | 3.00 | No |
| | 33 | 2 | -0.165 | 0.50 | No |
| | | 2 | -0.165 | 5.90 | No |
| | | 2 | -0.038 | 4.00 | No |
| | | 2 | -0.016 | 1.00 | No |
| | 43 | 2 | -0.132 | 4.00 | No |
| Di | 17 | Y | -0.066 | 0.50 | No |
| | | Y | -0.066 | 3.90 | No |
| | 18 | Y | -0.043 | 0.50 | No |
| | | Y | -0.043 | 4.50 | No |
| | | Y | -0.011 | 3.00 | No |
| | 33 | Y | -0.07 | 0.50 | No |
| | | Y | -0.07 | 5.90 | No |
| | | Y | -0.031 | 4.00 | No |
| | | Y | -0.02 | 1.00 | No |
| | 43 | Y | -0.063 | 4.00 | No |
| WI0 | 17 | z | -0.028 | 0.50 | No |
| | | z | -0.028 | 3.90 | No |
| | 18 | z | -0.021 | 0.50 | No |
| | | z | -0.021 | 4.50 | No |
| | | z | -0.005 | 3.00 | No |
| | 33 | z | -0.029 | 0.50 | No |
| | | z | -0.029 | 5.90 | No |
| | | z | -0.004 | 4.00 | No |
| | | z | -0.01 | 1.00 | No |
| | 43 | z | -0.026 | 4.00 | No |
| WI30 | 17 | 3 | -0.025 | 0.50 | No |
| | | 3 | -0.025 | 3.90 | No |
| | 18 | 3 | -0.018 | 0.50 | No |

| | | | | | |
|---|---|---|---|---|---|
| | | 3 | -0.018 | 4.50 | No |
| | | 3 | -0.005 | 3.00 | No |
| | 33 | 3 | -0.028 | 0.50 | No |
| | | 3 | -0.028 | 5.90 | No |
| | | 3 | -0.007 | 4.00 | No |
| | | 3 | -0.008 | 1.00 | No |
| | 43 | 3 | -0.024 | 4.00 | No |
| WI60 | 17 | 3 | -0.017 | 0.50 | No |
| | | 3 | -0.017 | 3.90 | No |
| | 18 | 3 | -0.014 | 0.50 | No |
| | | 3 | -0.014 | 4.50 | No |
| | | 3 | -0.005 | 3.00 | No |
| | 33 | 3 | -0.026 | 0.50 | No |
| | | 3 | -0.026 | 5.90 | No |
| | | 3 | -0.008 | 4.00 | No |
| | | 3 | -0.004 | 1.00 | No |
| | 43 | 3 | -0.022 | 4.00 | No |
| WI90 | 17 | x | -0.014 | 0.50 | No |
| | | x | -0.014 | 3.90 | No |
| | 18 | x | -0.013 | 0.50 | No |
| | | x | -0.013 | 4.50 | No |
| | | x | -0.005 | 3.00 | No |
| | 33 | x | -0.025 | 0.50 | No |
| | | x | -0.025 | 5.90 | No |
| | | x | -0.007 | 4.00 | No |
| | | x | -0.004 | 1.00 | No |
| | 43 | x | -0.022 | 4.00 | No |
| WI120 | 17 | 2 | -0.017 | 0.50 | No |
| | | 2 | -0.017 | 3.90 | No |
| | 18 | 2 | -0.014 | 0.50 | No |
| | | 2 | -0.014 | 4.50 | No |
| | | 2 | -0.005 | 3.00 | No |
| | 33 | 2 | -0.026 | 0.50 | No |
| | | 2 | -0.026 | 5.90 | No |
| | | 2 | -0.008 | 4.00 | No |
| | | 2 | -0.004 | 1.00 | No |
| | 43 | 2 | -0.022 | 4.00 | No |
| WI150 | 17 | 2 | -0.025 | 0.50 | No |
| | | 2 | -0.025 | 3.90 | No |
| | 18 | 2 | -0.018 | 0.50 | No |
| | | 2 | -0.018 | 4.50 | No |
| | | 2 | -0.005 | 3.00 | No |
| | 33 | 2 | -0.028 | 0.50 | No |
| | | 2 | -0.028 | 5.90 | No |
| | | 2 | -0.007 | 4.00 | No |
| | | 2 | -0.008 | 1.00 | No |
| | 43 | 2 | -0.024 | 4.00 | No |
| WL0 | 17 | z | -0.009 | 0.50 | No |
| | | z | -0.009 | 3.90 | No |
| | 18 | z | -0.006 | 0.50 | No |
| | | z | -0.006 | 4.50 | No |
| | | z | -0.001 | 3.00 | No |
| | 33 | z | -0.009 | 0.50 | No |
| | | z | -0.009 | 5.90 | No |
| | | z | -0.001 | 4.00 | No |
| | | z | -0.002 | 1.00 | No |
| | 43 | z | -0.006 | 4.00 | No |
| WL30 | 17 | 3 | -0.008 | 0.50 | No |
| | | 3 | -0.008 | 3.90 | No |
| | 18 | 3 | -0.006 | 0.50 | No |

| | | | | | |
|---|---|---|---|---|---|
| | | 3 | -0.006 | 4.50 | No |
| | | 3 | -0.001 | 3.00 | No |
| | 33 | 3 | -0.009 | 0.50 | No |
| | | 3 | -0.009 | 5.90 | No |
| | | 3 | -0.002 | 4.00 | No |
| | | 3 | -0.002 | 1.00 | No |
| | 43 | 3 | -0.006 | 4.00 | No |
| WL60 | 17 | 3 | -0.005 | 0.50 | No |
| | | 3 | -0.005 | 3.90 | No |
| | 18 | 3 | -0.004 | 0.50 | No |
| | | 3 | -0.004 | 4.50 | No |
| | | 3 | -0.001 | 3.00 | No |
| | 33 | 3 | -0.008 | 0.50 | No |
| | | 3 | -0.008 | 5.90 | No |
| | | 3 | -0.002 | 4.00 | No |
| | 43 | 3 | -0.006 | 4.00 | No |
| WL90 | 17 | x | -0.004 | 0.50 | No |
| | | x | -0.004 | 3.90 | No |
| | 18 | x | -0.004 | 0.50 | No |
| | | x | -0.004 | 4.50 | No |
| | | x | -0.001 | 3.00 | No |
| | 33 | x | -0.008 | 0.50 | No |
| | | x | -0.008 | 5.90 | No |
| | | x | -0.002 | 4.00 | No |
| | 43 | x | -0.006 | 4.00 | No |
| WL120 | 17 | 2 | -0.005 | 0.50 | No |
| | | 2 | -0.005 | 3.90 | No |
| | 18 | 2 | -0.004 | 0.50 | No |
| | | 2 | -0.004 | 4.50 | No |
| | | 2 | -0.001 | 3.00 | No |
| | 33 | 2 | -0.008 | 0.50 | No |
| | | 2 | -0.008 | 5.90 | No |
| | | 2 | -0.002 | 4.00 | No |
| | 43 | 2 | -0.006 | 4.00 | No |
| WL150 | 17 | 2 | -0.008 | 0.50 | No |
| | | 2 | -0.008 | 3.90 | No |
| | 18 | 2 | -0.006 | 0.50 | No |
| | | 2 | -0.006 | 4.50 | No |
| | | 2 | -0.001 | 3.00 | No |
| | 33 | 2 | -0.009 | 0.50 | No |
| | | 2 | -0.009 | 5.90 | No |
| | | 2 | -0.002 | 4.00 | No |
| | | 2 | -0.002 | 1.00 | No |
| | 43 | 2 | -0.006 | 4.00 | No |
| LL1 | 7 | Y | -0.25 | 6.09 | No |
| LL2 | 7 | Y | -0.25 | 12.18 | No |
| LL3 | 7 | Y | -0.25 | 0.00 | No |
| LLa1 | 18 | Y | -0.25 | 3.00 | No |
| LLa2 | 33 | Y | -0.25 | 3.00 | No |
| LLa3 | 43 | Y | -0.25 | 3.00 | No |
| LLa4 | 17 | Y | -0.25 | 3.00 | No |

**Self weight multipliers for load conditions**

| Condition | Description | Self weight multiplier Comb. | MultX | MultY | MultZ |
|---|---|---|---|---|---|
| D | Dead Load | No | 0.00 | -1.00 | 0.00 |
| Wo | Wind Load (NO ICE) | No | 0.00 | 0.00 | 0.00 |
| W30 | WL 30deg | No | 0.00 | 0.00 | 0.00 |
| W60 | WL 60deg | No | 0.00 | 0.00 | 0.00 |
| W90 | WL 90deg | No | 0.00 | 0.00 | 0.00 |
| W120 | WL 120deg | No | 0.00 | 0.00 | 0.00 |
| W150 | WL 150deg | No | 0.00 | 0.00 | 0.00 |
| Di | Ice Load | No | 0.00 | 0.00 | 0.00 |
| WI0 | WL ICE 0deg | No | 0.00 | 0.00 | 0.00 |
| WI30 | WL ICE 30deg | No | 0.00 | 0.00 | 0.00 |
| WI60 | WL ICE 60deg | No | 0.00 | 0.00 | 0.00 |
| WI90 | WL ICE 90deg | No | 0.00 | 0.00 | 0.00 |
| WI120 | WL ICE 120deg | No | 0.00 | 0.00 | 0.00 |
| WI150 | WL ICE 150deg | No | 0.00 | 0.00 | 0.00 |
| WL0 | WL 30 mph 0deg | No | 0.00 | 0.00 | 0.00 |
| WL30 | WL 30 mph 30deg | No | 0.00 | 0.00 | 0.00 |
| WL60 | WL 30 mph 60deg | No | 0.00 | 0.00 | 0.00 |
| WL90 | WL 30 mph 90deg | No | 0.00 | 0.00 | 0.00 |
| WL120 | WL 30 mph 120deg | No | 0.00 | 0.00 | 0.00 |
| WL150 | WL 30 mph 150deg | No | 0.00 | 0.00 | 0.00 |
| LL1 | 250 lb Live Load Center of Mount | No | 0.00 | 0.00 | 0.00 |
| LL2 | 250 lb Live Load Right End of Mount | No | 0.00 | 0.00 | 0.00 |
| LL3 | 250 lb Live Load Left End of Mount | No | 0.00 | 0.00 | 0.00 |
| LLa1 | 250 lb Live Load Antenna 1 | No | 0.00 | 0.00 | 0.00 |
| LLa2 | 250 lb Live Load Antenna 2 | No | 0.00 | 0.00 | 0.00 |
| LLa3 | 250 lb Live Load Antenna 3 | No | 0.00 | 0.00 | 0.00 |
| LLa4 | 250 lb Live Load Antenna 4 | No | 0.00 | 0.00 | 0.00 |

## Earthquake (Dynamic analysis only)

| Condition | a/g | Ang. [Deg] | Damp. [%] |
|---|---|---|---|
| D | 0.00 | 0.00 | 0.00 |
| Wo | 0.00 | 0.00 | 0.00 |
| W30 | 0.00 | 0.00 | 0.00 |
| W60 | 0.00 | 0.00 | 0.00 |
| W90 | 0.00 | 0.00 | 0.00 |
| W120 | 0.00 | 0.00 | 0.00 |
| W150 | 0.00 | 0.00 | 0.00 |
| Di | 0.00 | 0.00 | 0.00 |
| WI0 | 0.00 | 0.00 | 0.00 |
| WI30 | 0.00 | 0.00 | 0.00 |
| WI60 | 0.00 | 0.00 | 0.00 |
| WI90 | 0.00 | 0.00 | 0.00 |
| WI120 | 0.00 | 0.00 | 0.00 |
| WI150 | 0.00 | 0.00 | 0.00 |
| WL0 | 0.00 | 0.00 | 0.00 |
| WL30 | 0.00 | 0.00 | 0.00 |
| WL60 | 0.00 | 0.00 | 0.00 |
| WL90 | 0.00 | 0.00 | 0.00 |
| WL120 | 0.00 | 0.00 | 0.00 |
| WL150 | 0.00 | 0.00 | 0.00 |
| LL1 | 0.00 | 0.00 | 0.00 |
| LL2 | 0.00 | 0.00 | 0.00 |
| LL3 | 0.00 | 0.00 | 0.00 |

| | | | |
|---|---|---|---|
| LLa1 | 0.00 | 0.00 | 0.00 |
| LLa2 | 0.00 | 0.00 | 0.00 |
| LLa3 | 0.00 | 0.00 | 0.00 |
| LLa4 | 0.00 | 0.00 | 0.00 |

Bentley Hewlett-Packard Company

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# Steel Code Check

**Report: Summary - Group by member**

**Load conditions to be included in design :**

LC1=1.2D+Wo
LC2=1.2D+W30
LC3=1.2D+W60
LC4=1.2D+W90
LC5=1.2D+W120
LC6=1.2D+W150
LC7=1.2D-Wo
LC8=1.2D-W30
LC9=1.2D-W60
LC10=1.2D-W90
LC11=1.2D-W120
LC12=1.2D-W150
LC13=0.9D+Wo
LC14=0.9D+W30
LC15=0.9D+W60
LC16=0.9D+W90
LC17=0.9D+W120
LC18=0.9D+W150
LC19=0.9D-Wo
LC20=0.9D-W30
LC21=0.9D-W60
LC22=0.9D-W90
LC23=0.9D-W120
LC24=0.9D-W150
LC25=1.2D+Di+WI0
LC26=1.2D+Di+WI30
LC27=1.2D+Di+WI60
LC28=1.2D+Di+WI90
LC29=1.2D+Di+WI120
LC30=1.2D+Di+WI150
LC31=1.2D+Di-WI0
LC32=1.2D+Di-WI30
LC33=1.2D+Di-WI60
LC34=1.2D+Di-WI90
LC35=1.2D+Di-WI120
LC36=1.2D+Di-WI150
LC38=1.2D+1.5LL1
LC39=1.2D+1.5LL2
LC40=1.2D+1.5LL3
LC41=1.2D+WL0+1.5LLa1
LC42=1.2D+WL30+1.5LLa1
LC43=1.2D+WL60+1.5LLa1
LC44=1.2D+WL90+1.5LLa1
LC45=1.2D+WL120+1.5LLa1
LC46=1.2D+WL150+1.5LLa1
LC47=1.2D-WL0+1.5LLa1
LC48=1.2D-WL30+1.5LLa1
LC49=1.2D-WL60+1.5LLa1
LC50=1.2D-WL90+1.5LLa1
LC51=1.2D-WL120+1.5LLa1
LC52=1.2D-WL150+1.5LLa1
LC53=1.2D+WL0+1.5LLa2
LC54=1.2D+WL30+1.5LLa2

LC55=1.2D+WL60+1.5LLa2
LC56=1.2D+WL90+1.5LLa2
LC57=1.2D+WL120+1.5LLa2
LC58=1.2D+WL150+1.5LLa2
LC59=1.2D-WL0+1.5LLa2
LC60=1.2D-WL30+1.5LLa2
LC61=1.2D-WL60+1.5LLa2
LC62=1.2D-WL90+1.5LLa2
LC63=1.2D-WL120+1.5LLa2
LC64=1.2D-WL150+1.5LLa2
LC65=1.2D+WL0+1.5LLa3
LC66=1.2D+WL30+1.5LLa3
LC67=1.2D+WL60+1.5LLa3
LC68=1.2D+WL90+1.5LLa3
LC69=1.2D+WL120+1.5LLa3
LC70=1.2D+WL150+1.5LLa3
LC71=1.2D-WL0+1.5LLa3
LC72=1.2D-WL30+1.5LLa3
LC73=1.2D-WL60+1.5LLa3
LC74=1.2D-WL90+1.5LLa3
LC75=1.2D-WL120+1.5LLa3
LC76=1.2D-WL150+1.5LLa3
LC77=1.2D+WL0+1.5LLa4
LC78=1.2D+WL30+1.5LLa4
LC79=1.2D+WL60+1.5LLa4
LC80=1.2D+WL90+1.5LLa4
LC81=1.2D+WL120+1.5LLa4
LC82=1.2D+WL150+1.5LLa4
LC83=1.2D-WL0+1.5LLa4
LC84=1.2D-WL30+1.5LLa4
LC85=1.2D-WL60+1.5LLa4
LC86=1.2D-WL90+1.5LLa4
LC87=1.2D-WL120+1.5LLa4
LC88=1.2D-WL150+1.5LLa4

| Description | Section | Member | Ctrl Eq. | Ratio | Status | Reference |
|---|---|---|---|---|---|---|
| | ***PIPE 1-1_2x0.145*** | **25** | LC34 at 0.00% | 0.15 | OK | Eq. H1-1b |
| | | **26** | LC10 at 100.00% | 0.09 | OK | Eq. H1-1b |
| | | **28** | LC34 at 0.00% | 0.09 | OK | Eq. Sec. D2 |
| | | **29** | LC10 at 100.00% | **0.27** | **OK** | Eq. H1-1b |
| | | **38** | LC26 at 100.00% | 0.14 | OK | Eq. H1-1b |
| | | **39** | LC26 at 0.00% | 0.08 | OK | Eq. Sec. D2 |
| | | **40** | LC28 at 0.00% | 0.08 | OK | Sec. E1 |
| | | **41** | LC39 at 100.00% | 0.10 | OK | Eq. H1-1b |
| | ***PIPE 2-1_2x0.203*** | **1** | LC10 at 15.18% | **0.32** | **OK** | Eq. H1-1b |
| | | **7** | LC1 at 84.82% | 0.29 | OK | Eq. H1-1b |
| | ***PIPE 2x0.154*** | **2** | LC4 at 15.63% | **0.56** | **OK** | Eq. H1-1b |
| | | **3** | LC2 at 0.00% | 0.34 | OK | Eq. H1-1b |
| | | **8** | LC10 at 100.00% | 0.38 | OK | Eq. H1-1b |
| | | **9** | LC4 at 0.00% | 0.43 | OK | Eq. H1-1b |
| | | **17** | LC1 at 34.38% | 0.31 | OK | Eq. H1-1b |
| | | **18** | LC7 at 35.42% | 0.26 | OK | Eq. H1-1b |
| | | **27** | LC4 at 100.00% | 0.49 | OK | Eq. H1-1b |
| | | **33** | LC1 at 33.33% | 0.32 | OK | Eq. H1-1b |
| | | **37** | LC10 at 100.00% | 0.25 | OK | Eq. H1-1b |
| | | **42** | LC39 at 0.00% | 0.21 | OK | Eq. H1-1b |
| | | **43** | LC4 at 89.58% | 0.32 | OK | Eq. H1-1b |

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# Geometry data

GLOSSARY

| | |
|---|---|
| Cb22, Cb33 | : Moment gradient coefficients |
| Cm22, Cm33 | : Coefficients applied to bending term in interaction formula |
| d0 | : Tapered member section depth at J end of member |
| DJX | : Rigid end offset distance measured from J node in axis X |
| DJY | : Rigid end offset distance measured from J node in axis Y |
| DJZ | : Rigid end offset distance measured from J node in axis Z |
| DKX | : Rigid end offset distance measured from K node in axis X |
| DKY | : Rigid end offset distance measured from K node in axis Y |
| DKZ | : Rigid end offset distance measured from K node in axis Z |
| dL | : Tapered member section depth at K end of member |
| Ig factor | : Inertia reduction factor (Effective Inertia/Gross Inertia) for reinforced concrete members |
| K22 | : Effective length factor about axis 2 |
| K33 | : Effective length factor about axis 3 |
| L22 | : Member length for calculation of axial capacity |
| L33 | : Member length for calculation of axial capacity |
| LB pos | : Lateral unbraced length of the compression flange in the positive side of local axis 2 |
| LB neg | : Lateral unbraced length of the compression flange in the negative side of local axis 2 |
| RX | : Rotation about X |
| RY | : Rotation about Y |
| RZ | : Rotation about Z |
| TO | : 1 = Tension only member 0 = Normal member |
| TX | : Translation in X |
| TY | : Translation in Y |
| TZ | : Translation in Z |

## Nodes

| Node | X [ft] | Y [ft] | Z [ft] | Rigid Floor |
|---|---|---|---|---|
| 2 | 6.09 | 0.00 | 0.00 | 0 |
| 4 | 0.00 | 0.00 | -5.08 | 0 |
| 8 | 4.277 | 0.00 | 0.00 | 0 |
| 9 | -4.277 | 0.00 | 0.00 | 0 |
| 14 | 6.09 | 3.42 | 0.00 | 0 |
| 16 | 0.00 | 3.42 | -5.08 | 0 |
| 20 | 4.277 | 3.42 | 0.00 | 0 |
| 21 | -4.277 | 3.42 | 0.00 | 0 |
| 33 | -5.764 | -0.50 | 0.20 | 0 |
| 34 | 4.8817 | -0.50 | 0.20 | 0 |
| 35 | -5.764 | 5.50 | 0.20 | 0 |
| 36 | 4.8817 | 5.50 | 0.20 | 0 |
| 124 | 0.5703 | 3.42 | -4.4027 | 0 |
| 153 | 2.1147 | 3.42 | -2.5682 | 0 |
| 182 | 3.5563 | 3.42 | -0.8561 | 0 |
| 183 | 3.5563 | 0.00 | -0.8561 | 0 |
| 184 | 2.1147 | 0.00 | -2.5682 | 0 |
| 185 | 0.5703 | 0.00 | -4.4027 | 0 |
| 190 | 1.8817 | 5.50 | 0.20 | 0 |
| 193 | 3.00 | 1.00 | -8.00 | 0 |
| 194 | 3.5563 | 0.4275 | -0.8561 | 0 |
| 199 | -5.764 | 1.71 | 0.20 | 0 |

| | | | | |
|---|---|---|---|---|
| 200 | -0.5703 | 3.42 | -4.4027 | 0 |
| 201 | -2.1147 | 3.42 | -2.5682 | 0 |
| 202 | -3.5563 | 3.42 | -0.8561 | 0 |
| 203 | -3.5563 | 0.00 | -0.8561 | 0 |
| 204 | -2.1147 | 0.00 | -2.5682 | 0 |
| 205 | -0.5703 | 0.00 | -4.4027 | 0 |
| 206 | -1.00 | 5.50 | 0.20 | 0 |

## Restraints

| Node | TX | TY | TZ | RX | RY | RZ |
|---|---|---|---|---|---|---|
| 4 | 1 | 1 | 1 | 1 | 1 | 1 |
| 16 | 1 | 1 | 1 | 1 | 1 | 1 |
| 193 | 1 | 1 | 1 | 0 | 0 | 0 |

## Members

| Member | NJ | NK | Description | Section | Material | d0 [in] | dL [in] | lg factor |
|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | | PIPE 2-1_2x0.203 | A53 GrB | 0.00 | 0.00 | 0.00 |
| 2 | 8 | 4 | | PIPE 2x0.154 | A53 GrB | 0.00 | 0.00 | 0.00 |
| 3 | 4 | 9 | | PIPE 2x0.154 | A53 GrB | 0.00 | 0.00 | 0.00 |
| 7 | 14 | 15 | | PIPE 2-1_2x0.203 | A53 GrB | 0.00 | 0.00 | 0.00 |
| 8 | 20 | 16 | | PIPE 2x0.154 | A53 GrB | 0.00 | 0.00 | 0.00 |
| 9 | 16 | 21 | | PIPE 2x0.154 | A53 GrB | 0.00 | 0.00 | 0.00 |
| 17 | 35 | 33 | | PIPE 2x0.154 | A53 GrB | 0.00 | 0.00 | 0.00 |
| 18 | 36 | 34 | | PIPE 2x0.154 | A53 GrB | 0.00 | 0.00 | 0.00 |
| 25 | 124 | 185 | | PIPE 1-1_2x0.145 | A53 GrB | 0.00 | 0.00 | 0.00 |
| 26 | 153 | 184 | | PIPE 1-1_2x0.145 | A53 GrB | 0.00 | 0.00 | 0.00 |
| 27 | 182 | 183 | | PIPE 2x0.154 | A53 GrB | 0.00 | 0.00 | 0.00 |
| 28 | 124 | 184 | | PIPE 1-1_2x0.145 | A53 GrB | 0.00 | 0.00 | 0.00 |
| 29 | 153 | 183 | | PIPE 1-1_2x0.145 | A53 GrB | 0.00 | 0.00 | 0.00 |
| 33 | 190 | 187 | | PIPE 2x0.154 | A53 GrB | 0.00 | 0.00 | 0.00 |
| 37 | 193 | 194 | | PIPE 2x0.154 | A53 GrB | 0.00 | 0.00 | 0.00 |
| 38 | 205 | 200 | | PIPE 1-1_2x0.145 | A53 GrB | 0.00 | 0.00 | 0.00 |
| 39 | 200 | 204 | | PIPE 1-1_2x0.145 | A53 GrB | 0.00 | 0.00 | 0.00 |
| 40 | 204 | 201 | | PIPE 1-1_2x0.145 | A53 GrB | 0.00 | 0.00 | 0.00 |
| 41 | 201 | 203 | | PIPE 1-1_2x0.145 | A53 GrB | 0.00 | 0.00 | 0.00 |
| 42 | 203 | 202 | | PIPE 2x0.154 | A53 GrB | 0.00 | 0.00 | 0.00 |
| 43 | 206 | 207 | | PIPE 2x0.154 | A53 GrB | 0.00 | 0.00 | 0.00 |

## Orientation of local axes

| Member | Rotation [Deg] | Axes23 | NX | NY | NZ |
|---|---|---|---|---|---|
| 17 | 315.00 | 0 | 0.00 | 0.00 | 0.00 |
| 18 | 315.00 | 0 | 0.00 | 0.00 | 0.00 |
| 33 | 315.00 | 0 | 0.00 | 0.00 | 0.00 |
| 43 | 315.00 | 0 | 0.00 | 0.00 | 0.00 |

**Filing Guides**
**Meetings & Minutes**
**Public Participation**
**Audio Link to New Britain Hearing Rooms**
**Programs & Services**
**Telecommunications Database**
**Maps**
**Publications**
**Other Resources**
**Statutes & Regulations**
**Electric Transmission Upgrade Projects**
**Frequently Asked Questions**






Melanie Bachman,
Executive Director

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**DOCKET NO. 175** - An application of Cellco Partnership d/b/a Bell Atlantic NYNEX Mobile for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance, and operation of a cellular telecommunications facility at the Groton Police Department headquarters, Groton Long Point Road, Groton, Connecticut.

**Connecticut Siting Council**

November 21, 1996

**Decision and Order**

Pursuant to the foregoing Findings of Fact and Opinion, the Connecticut Siting Council (Council) finds that the effects associated with the construction, operation, and maintenance of a cellular telecommunications tower at the proposed prime site in Groton, Connecticut, including effects on the natural environment; ecological integrity and balance; public health and safety; scenic, historic, and recreational values; forests and parks; air and water purity; and fish and wildlife are not disproportionate either alone or cumulatively with other effects when compared to need, are not in conflict with the policies of the State concerning such effects, and are not sufficient reason to deny the application and therefore directs that a Certificate of Environmental Compatibility and Public Need, as provided by General Statutes § 16-50k, be issued to Cellco Partnership d/b/a Bell Atlantic NYNEX Mobile (BANM) for the construction, operation, and maintenance of a cellular telecommunications tower and associated equipment at the proposed site, located within a 37.6-acre parcel at the Town of Groton Municipal Services Complex, Groton Long Point Road, Groton, Connecticut.

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

1. The tower shall be constructed as proposed, no taller than necessary to provide the proposed communications service, sufficient to accommodate the antennas of Bell Atlantic Nynex Mobile, Springwich Cellular Limited Partnership and the Town of Groton, and not to exceed a height of 148 feet above ground level in accordance with Federal Aviation Administration recommendations.

2. The Certificate holder shall submit an erosion and sedimentation control plan as approved by the Town of Groton and consistent with the Connecticut Guidelines for Soil Erosion and Sediment Control, as amended.

3. The Certificate Holder shall provide notice to the Council two weeks prior the commencement of tower construction, the commencement of operation, and the transfer of ownership of the tower to the Town of Groton.

4. Upon the establishment of any new State or federal radio frequency standards applicable to frequencies of this facility, the facility granted herein shall be brought into compliance with such standards.

5. The Certificate Holder shall provide the Council a recalculated report or measurement of electromagnetic radio frequency power density after the Town of Groton completes their transfer of antennas to the 148-foot and 110-foot towers.

6. The Certificate Holder shall permit public or private entities to share space on the proposed tower for fair consideration, or shall provide any requesting entity with specific legal, technical, environmental, or economic reasons precluding such tower sharing.

7. If the facility does not initially provide, or permanently ceases to provide cellular services following completion of construction, this Decision and Order shall be void, and the Certificate Holder shall dismantle the tower and remove all associated equipment or reapplication for any continued or new use shall be made to the Council before any such use is made.

8. Unless otherwise approved by the Council, this Decision and Order shall be void if all construction authorized herein is not completed within three years of the effective date of this Decision and Order or within three years after all appeals to this Decision and Order have been resolved.

9. The Certificate Holder shall notify the Council upon completion of construction and provide the final cost to construct the facility.

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

By this Decision and Order, the Council disposes of the legal rights, duties, and privileges of each party named

or admitted to the proceeding in accordance with Section 16-50j-17 of the Regulations of Connecticut State Agencies.

The parties and intervenors to this proceeding are:

| | |
|---|---|
| **APPLICANT**<br>Cellco Partnership d/b/a | **ITS REPRESENTATIVE**<br>Kenneth C. Baldwin, Esq.<br>Brian C. S. Freeman, Esq.<br>Bell Atlantic NYNEX Mobile<br>Robinson & Cole<br>One Commercial Plaza<br>Hartford, CT 06103-3597<br><br>Mr. David S. Malko, P.E.<br>Jennifer Young Gaudet, Manager - Regulatory<br>Bell Atlantic NYNEX Mobile<br>20 Alexander Drive<br>Wallingford, CT 06492 |
| **INTERVENOR**<br>Springwich Cellular Limited Partnership | **ITS REPRESENTATIVE**<br>Peter J. Tyrrell, Esq.<br>Springwich Cellular Limited Partnership<br>500 Enterprise Drive<br>Rocky Hill, CT 06067-3900 |

Content Last Modified on 8/9/2002 11:51:05 AM

# Commercial Property Card

Print Date: 10/14/2019

**Card 1 of 10**

<<Back Next>>

| Account | Location | Zoning | Deed Book / Page | Acres |
|---|---|---|---|---|
| 260810364571 E | 68 GROTON LONG POINT RD | RS-20 | 142/151 | 28.74 |

| District | Use Code |
|---|---|
| POQUONNOCK BRIDGE | MUNICIPALITIES |

## Current Owner

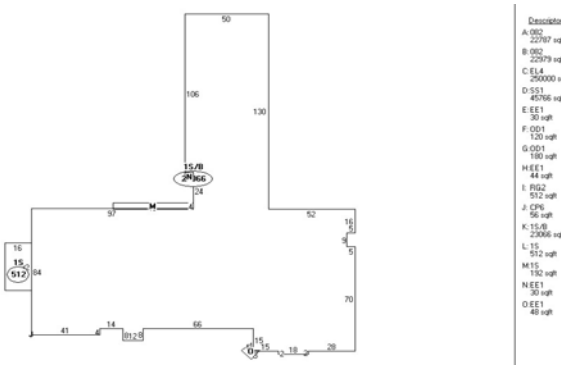
GROTON TOWN OF
POLICE/PUBLIC WORKS/TOWN HALL ANNEX COMPLEX
GROTON CT 06340

## Property Picture

## Building Information

| | |
|---|---|
| **Building No:** | 1 |
| **Year Built:** | 1975 |
| **No of Units:** | 1 |
| **Structure Type:** | POLICE/FIRE STATION |
| **Building Total Area:** | 45766 sqft. |
| **Grade:** | C+ |
| **Identical Units:** | 1 |

## Building Sketch



## Valuation

| | |
|---|---|
| **Land:** | $1,738,900 |
| **Building:** | $6,971,700 |
| **Total:** | $8,710,600 |
| **Total Assessed Value:** | $6,097,420 |

## Recent Sales

| Book / Page | Date | Price |
|---|---|---|

## Sketch Legend

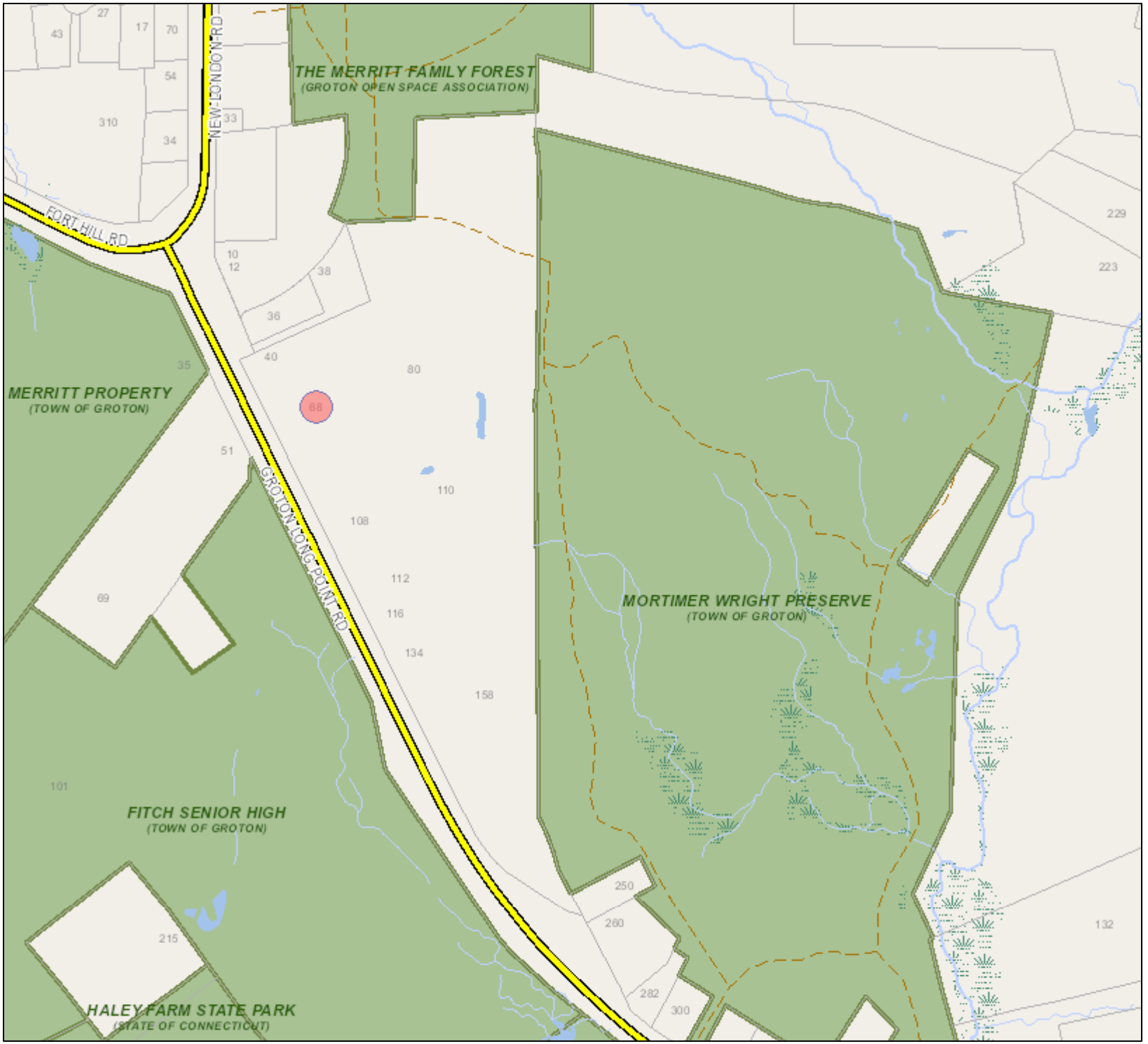
| | | | | | |
|---|---|---|---|---|---|
| ---- | Main Living Area | 1SMA | Masonry | GRHS | Attached Greenhouse |
| 1FR | Frame | OMP | Open Masonry Porch | CAT | Cathedral Ceiling |
| OFP | Open Frame Porch | EMP | Enclosed Msry Porch | SOP | Screen Open Frame Prch |
| EFP | Enclosed Frame Porch | MUB | Masonry Utility | SMP | Screen Open Msnry Prch |
| FUB | Frame Utility Building | MB | Masonry Bay | CPAT | Concrete Patio |
| FB | Frame Bay | MOH | Masonry Overhang | B | Basement |
| FG | Frame Garage | .5MA | 1/2 Story Masonry | | |
| FOH | Frame Overhang | MP | Masonry Patio | | |
| .5FR | 1/2 Story Frame | WD | Wood Deck | | |
| A(U) | Attic (Unfinished) | CPY | Canopy | | |
| A(F) | Attic (Finished) | | | | |

## Exterior / Interior Information

| Levels | Use Type | Ext. Walls | Const. Type | Heating | A / C | Condition |
|---|---|---|---|---|---|---|
| B1 - B1 | MULTI-USE OFFICE | BRICK VENEER | FIRE RESIST | HOT AIR | CENTRAL | NORMAL |
| 01 - 01 | MULTI-USE OFFICE | BRICK VENEER | WOOD JOIST | HOT AIR | CENTRAL | NORMAL |
| 01 - 01 | AUTO PARTS/SERVICE | CONCRETE BLOCK | FIRE RESIST | HOT AIR | NONE | NORMAL |

| | | | | | | |
|---|---|---|---|---|---|---|
| 01 - 01 | MULTI-USE OFFICE | CONCRETE BLOCK | FIRE RESIST | HOT AIR | NONE | NORMAL |
| 01 - 01 | MULTI-USE OFFICE | CONCRETE BLOCK | WOOD JOIST | HOT AIR | NONE | NORMAL |
| B1 - B1 | UNFINISHED RES BSMT | N/A | WOOD JOIST | NONE | NONE | NORMAL |
| 01 - 01 | MULTI-USE STORAGE | FRAME | WOOD JOIST | HW/STEAM | NONE | NORMAL |
| B1 - B1 | OFFICE BUILDING | N/A | FIRE RESIST | HOT AIR | CENTRAL | NORMAL |
| B1 - B1 | MULTI-USE STORAGE | N/A | FIRE RESIST | HOT AIR | CENTRAL | NORMAL |
| 01 - 01 | OFFICE BUILDING | CONCRETE NON-LOAD BEARING | FIRE RESIST | HOT AIR | CENTRAL | NORMAL |
| 01 - 01 | AUDITORIUM/THEATER | CONCRETE NON-LOAD BEARING | FIRE RESIST | HOT AIR | CENTRAL | NORMAL |
| 01 - 01 | AUTO PARTS/SERVICE | CONCRETE BLOCK | WOOD JOIST | UNIT HEAT | NONE | NORMAL |
| 01 - 01 | AUTO PARTS/SERVICE | METAL,LIGHT | WOOD JOIST | UNIT HEAT | NONE | NORMAL |
| 01 - 01 | MULTI-USE OFFICE | METAL,LIGHT | WOOD JOIST | UNIT HEAT | NONE | NORMAL |
| M1 - M1 | MULTI-USE OFFICE | METAL,LIGHT | WOOD JOIST | UNIT HEAT | NONE | NORMAL |
| 01 - 01 | MULTI-USE OFFICE | METAL,LIGHT | WOOD JOIST | UNIT HEAT | NONE | NORMAL |
| 01 - 01 | WAREHOUSE | FRAME | WOOD JOIST | HOT AIR | NONE | NORMAL |
| 02 - 02 | WAREHOUSE | FRAME | WOOD JOIST | NONE | NONE | NORMAL |
| 01 - 01 | MULTI-USE STORAGE | FRAME | WOOD JOIST | ELECTRIC | NONE | NORMAL |
| 01 - 01 | MULTI-USE OFFICE | CONCRETE BLOCK | FIRE RESIST | HW/STEAM | UNIT | NORMAL |
| 01 - 01 | MULTI-USE STORAGE | FRAME | WOOD JOIST | NONE | NONE | NORMAL |
| 01 - 01 | MULTI-USE STORAGE | FRAME | WOOD JOIST | NONE | NONE | NORMAL |
| 01 - 01 | MULTI-USE STORAGE | FRAME | WOOD JOIST | NONE | NONE | NORMAL |

# Town of Groton




68 GROTON
LONG POINT RD

N
W E
S

1 inch = 417 feet

Date: October 14, 2019

Disclaimer:

The planimetric and topographic information depicted on this map was compiled by The Sanborn Map Company based on an aerial flight performed in April 2009. The parcel and property line information depicted on this map has been compiled from recorded deeds, maps, assessor records, and other sources of information in the Town of Groton. The intent of this map is to depict graphical representation of real property information relative to the planimetric features for the Town of Groton and is subject to change as a more accurate survey may disclose. The Town of Groton and the mapping companies assume no legal responsibility for the information contained in this data.
THIS MAP ISNOT TO BE USED FOR THE TRANSFER OF PROPERTY.

Horizontal Datum:
Connecticut State Plane Coordinates, North American Datum of 1983 (NAD83 Feet).

Vertical Datum:
North American Vertical Datum of 1988 (NAVD88).

Map Created using Town of Groton GIS Viewer

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**$7.35**
**US POSTAGE**
Flat Rate Env

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MARK J ROBERTS
QC DEVELOPMENT
PO BOX 916
STORRS CT 06268-0916

**0024**

**Carrier -- Leave if No Response**

**C026**

SHIP TO: MAYOR PATRICE GRANATOSKY
TOWN OF GROTON
45 FORT HILL RD
CC: MR JONATHAN REINER - PLANNING DI
GROTON CT 06340-4360

**USPS TRACKING #**

**9405 5036 9930 0160 2218 25**

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|---|---|
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| Print Date: | 11/08/2019 |
| Ship Date: | 11/09/2019 |
| Expected Delivery Date: | 11/12/2019 |

| | |
|---|---|
| Priority Mail® Postage: | **$7.35** |
| Total: | **$7.35** |

**From:** MARK J ROBERTS
QC DEVELOPMENT
PO BOX 916
STORRS CT 06268-0916

**To:** MAYOR PATRICE GRANATOSKY
TOWN OF GROTON
45 FORT HILL RD
CC: MR JONATHAN REINER - PLANNING DI
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