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

July 27, 2018

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) – CT5457
181 A Norman Road, Griswold, CT 06351
N 41.60128611
W 71.95384722

Dear Ms. Bachman:

AT&T currently maintains nine (9) antennas at the 135-foot level of the existing 160-foot Self Support Tower at 181 A Norman Road, Griswold, CT. The tower is owned by SBA and the property is owned by Ernest R. Norman and Stuart & Priscilla Forschler. AT&T now intends to remove (3) Powerwave antennas and replace them with (2) KMW EPBQ-654L8H8-L2 antennas and (1) KMW EPBQ-654L8H6-L2 antenna. AT&T also intends to install (3) RRUS-32 B66 and (3) B14-4478 RRUs. The new antennas and RRUs will also be installed at the 135-foot level of the tower.

This facility was originally approved by the Planning and Zoning Commission of the Town of Griswold on June 8th, 1998 (ZP 12-98). This approval included no condition(s) that could feasibly be violated by this modification, including total facility height or mounting restrictions. This modification therefore 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 the Honorable Todd Babbitt, First Selectman for the Town of Griswold, and the Griswold Town

Planner, as well as the property and tower owners.

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: The Honorable Todd Babbitt - as Elected Official
Mario Tristany, Jr. – Town Planner
Ernest Norman and Stuart & Priscilla Forschler – as Property Owners

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*							5.86%
AT&T GSM	2	414	135	0.0179	850	0.5667	0.32%
AT&T UMTS	2	414	135	0.0179	850	0.5667	0.32%
AT&T UMTS	2	656	135	0.0284	1900	1.0000	0.28%
AT&T LTE	2	1239	135	0.0536	700	0.4667	1.15%
AT&T LTE	2	1876	135	0.0811	1900	1.0000	0.81%
Site Total							8.74%

*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*							5.86%
AT&T UMTS	2	303	135	0.0131	850	0.5667	0.23%
AT&T UMTS	2	341	135	0.0147	1900	1.0000	0.15%
AT&T LTE	2	2951	135	0.1275	700	0.4667	2.73%
AT&T LTE	2	3664	135	0.1584	1900	1.0000	1.58%
AT&T LTE	2	5070	135	0.2191	2100	1.0000	2.19%
Site Total							12.75%

*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:	UNMANNED TELECOMMUNICATIONS FACILITY MODIFICATIONS
SITE ADDRESS:	181 A NORMAN ROAD JEWETT CITY, CT 06351
LATITUDE: LONGITUDE:	41° 36' 05" N 71° 57' 14" W
JURISDICTION:	NATIONAL, STATE & LOCAL CODES OR ORDINANCES
CURRENT USE:	TELECOMMUNICATIONS FACILITY
PROPOSED USE:	TELECOMMUNICATIONS FACILITY
DESIGN GUIDELINE:	LTE 3C, LTE 4C

SITE NUMBER: CT5457

SITE NAME: GRISWOLD WEST

181 A NORMAN ROAD
JEWETT CITY, CT 06351
NEW LONDON COUNTY

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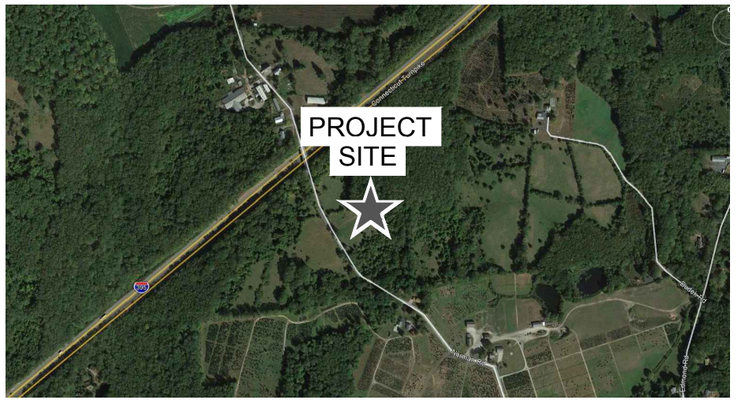
LOCUS MAP



DRIVING DIRECTIONS FROM 550 COCHITUATE ROAD, FRAMINGHAM, MA:
1. HEAD SOUTHWEST
2. TURN LEFT TOWARD LEGGATT MCCALL CONN
3. TURN LEFT ONTO LEGGATT MCCALL CONN
4. CONTINUE ONTO BURR ST
5. TURN LEFT ONTO COCHITUATE RD
6. USE THE RIGHT LANE TO TAKE THE RAMP TO I-90 E/MASSPIKE W/SPRINGFIELD/BOSTON
7. KEEP LEFT AT THE FORK, FOLLOW SIGNS FOR INTERSTATE 90 W/MASSACHUSETTS TURNPIKE/WORCHESTER/SPRINGFIELD AND MERGE ONTO I-90 W/MASSACHUSETTS TURNPIKE
8. MERGE ONTO I-90 W/MASSACHUSETTS TURNPIKE
9. TAKE EXIT 10 TOWARD MA-12 N/AUBURN/WORCESTER
10. KEEP RIGHT AT THE FORK, FOLLOW SIGNS FOR I-395 S/US-20 E/NORWICH CT
11. CONTINUE ONTO I-395 S
12. TAKE EXIT 24 FOR CT-201 TOWARD HOPEVILLE
13. TURN RIGHT ONTO CT-201 N/HOPEVILLE RD
14. TURN LEFT ONTO NORMAN RD

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 REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

LTE 3C, LTE 4C S.O.W.
- Swap GSM for 6' 12 Port (A), 8' 12 Port (B/G),
- Install (3) 700-4478,
- (3) AWS-32 On tower,
- Add Squid/DC/Fiber,
- Swap BB for 5216,
- add XMU.
- (3' Sep between P1 & P2 A/B, 3' Sep between P2 & P3 G)

STATE OF CONNECTICUT
MARC R. CHRETIEN
No. 29307
LICENSED
PROFESSIONAL ENGINEER

CONNECTICUT
CALL BEFORE YOU DIG
CALL TOLL FREE: 800-922-4455

UNDERGROUND SERVICE ALERT

ADVANCED ENGINEERING GROUP, P.C.
Civil Engineering - Site Development - Surveying - Telecommunications
500 North Broadway, East Providence, RI 02914
Phone: (401) 354-2403 Fax: (401) 633-6354

SAI COMMUNICATIONS
12 INDUSTRIAL WAY
SALEM, NH 03079

SITE NUMBER: CT5457
SITE NAME: GRISWOLD WEST
181 A NORMAN ROAD
JEWETT CITY, CT 06351
NEW LONDON COUNTY

at&t
550 COCHITUATE ROAD, SUITE 13,
FRAMINGHAM, MA 01701-4681

NO.	DATE	REVISIONS	BY	CHK
0	02/12/18	ISSUED FOR REVIEW	AAB	MRC
1	03/01/18	ISSUED FOR CONSTRUCTION	AAB	MRC
2	05/17/18	REVISED	AAB	MRC
3	05/21/18	REVISED	MER	MRC

TITLE SHEET

SHEET NO. T-1

GENERAL NOTES

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

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

3. THE CONTRACTOR OR BIDDER SHALL BEAR THE RESPONSIBILITY OF NOTIFYING (IN WRITING) THE LESEE/LICENSEE REPRESENTATIVE OF ANY CONFLICTS, ERRORS, OR OMISSIONS PRIOR TO THE SUBMISSION OF CONTRACTOR'S PROPOSAL OR PERFORMANCE OF WORK. IN THE EVENT OF DISCREPANCIES THE CONTRACTOR SHALL PRICE THE MORE COSTLY OR EXTENSIVE WORK, UNLESS DIRECTED IN WRITING OTHERWISE.

4. THE SCOPE OF WORK SHALL INCLUDE FURNISHING ALL MATERIALS, EQUIPMENT, LABOR AND ALL OTHER MATERIALS AND LABOR DEEMED NECESSARY TO COMPLETE THE WORK/PROJECT AS DESCRIBED HEREIN.

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

6. THE CONTRACTOR SHALL OBTAIN AUTHORIZATION TO PROCEED WITH CONSTRUCTION PRIOR TO STARTING WORK ON ANY ITEM NOT CLEARLY DEFINED BY THE CONSTRUCTION DRAWINGS / CONTRACT DOCUMENTS.

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

8. THE CONTRACTOR SHALL PROVIDE A FULL SET OF CONSTRUCTION DOCUMENTS AT THE SITE UPDATED WITH THE LATEST REVISIONS AND ADDENDUMS OR CLARIFICATIONS AVAILABLE FOR THE USE BY ALL PERSONNEL INVOLVED WITH THE PROJECT.

9. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE PROJECT DESCRIBED HEREIN. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES AND FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.

10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL NECESSARY CONSTRUCTION CONTROL SURVEYS, ESTABLISHING AND MAINTAINING ALL LINES AND GRADES REQUIRED TO CONSTRUCT ALL IMPROVEMENTS AS SHOWN HEREIN.

11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS WHICH MAY BE REQUIRED FOR THE WORK BY THE ARCHITECT/ENGINEER, THE STATE, COUNTY OR LOCAL GOVERNMENT AUTHORITY.

12. THE CONTRACTOR SHALL MAKE NECESSARY PROVISIONS TO PROTECT EXISTING IMPROVEMENTS, EASEMENTS, PAVING, CURBING, ETC. DURING CONSTRUCTION. UPON COMPLETION OF WORK, THE CONTRACTOR SHALL REPAIR ANY DAMAGE THAT MAY HAVE OCCURRED DUE TO CONSTRUCTION ON OR ABOUT THE PROPERTY.

13. THE CONTRACTOR SHALL KEEP THE GENERAL WORK AREA CLEAN AND HAZARD FREE DURING CONSTRUCTION AND DISPOSE OF ALL DIRT, DEBRIS, RUBBISH AND REMOVE EQUIPMENT NOT SPECIFIED AS REMAINING ON THE PROPERTY. PREMISES SHALL BE LEFT IN CLEAN CONDITION AND FREE FROM PAINT SPOTS, DUST, OR SMUDGES OF ANY NATURE.

14. THE CONTRACTOR SHALL COMPLY WITH ALL OSHA REQUIREMENTS AS THEY APPLY TO THIS PROJECT.

15. THE CONTRACTOR SHALL NOTIFY THE LESEE/LICENSEE REPRESENTATIVE WHERE A CONFLICT OCCURS ON ANY OF THE CONTRACT DOCUMENTS. THE CONTRACTOR IS NOT TO ORDER MATERIAL OR CONSTRUCT ANY PORTION OF THE WORK THAT IS IN CONFLICT UNTIL CONFLICT IS RESOLVED BY THE LESEE/LICENSEE REPRESENTATIVE.

16. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS, PROPERTY LINES, ETC. ON THE JOB.

17. ALL UNDERGROUND UTILITY INFORMATION WAS DETERMINED FROM SURFACE INVESTIGATIONS AND EXISTING PLANS OF RECORD. THE CONTRACTOR SHALL LOCATE ALL UNDERGROUND UTILITIES IN THE FIELD PRIOR TO ANY SITE WORK. CALL THE FOLLOWING FOR ALL PRE-CONSTRUCTION NOTIFICATION 72-HOURS PRIOR TO ANY EXCAVATION ACTIVITY: DIG SAFE SYSTEM (MA, ME, NH, RI, VT): 1-888-344-7233 CALL BEFORE YOU DIG (CT): 1-800-922-4455

18. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL NECESSARY CONSTRUCTION CONTROL SURVEYS AND MAINTAINING ALL LINES AND GRADES REQUIRED TO CONSTRUCT ALL IMPROVEMENTS SHOWN HEREIN.

19. ALL DIMENSIONS SHOWN THUS ± ARE APPROXIMATE. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND ELEVATIONS WHICH EFFECT THE CONTRACTORS WORK. CONTRACTOR TO VERIFY ALL DIMENSIONS WITH PROJECT OWNER PRIOR TO CONSTRUCTION.

20. NORTH ARROW SHOWN ON PLANS REFERS TO APPROXIMATE TRUE NORTH. PRIOR TO THE START OF CONSTRUCTION, ORDERING OR FABRICATING OF ANTENNA MOUNTS, CONTRACTOR SHALL CONSULT WITH PROJECT OWNER'S RF ENGINEER AND FIELD VERIFY ALL ANTENNA SECTOR LOCATIONS AND ANTENNA AZIMUTHS.

21. THE CONTRACTOR AND OR HIS SUB CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS WHICH MAY BE REQUIRED FOR THE WORK BY THE ARCHITECT/ENGINEER, THE STATE, COUNTY OR LOCAL GOVERNMENT AUTHORITY.

22. ANTENNA INSTALLATION SHALL BE CONDUCTED BY FIELD CREWS EXPERIENCED IN THE ASSEMBLY AND ERECTION OF RADIO ANTENNAS, TRANSMISSION LINES AND SUPPORT STRUCTURES.

23. COAXIAL CABLE CONNECTORS AND TRANSMITTER EQUIPMENT SHALL BE PROVIDED BY THE PROJECT OWNER AND IS NOT INCLUDED IN THESE CONSTRUCTION DOCUMENTS. A SCHEDULE OF PROJECT OWNER SUPPLIED MATERIALS IS ATTACHED TO THE BID DOCUMENTS (SEE EXHIBIT 3). ALL OTHER HARDWARE TO BE PROVIDED BY THE CONTRACTOR. CONNECTION HARDWARE SHALL BE STAINLESS STEEL.

24. WHEN "PAINT TO MATCH" IS SPECIFIED FOR ANTENNA CONCEALMENT, PAINT PRODUCT FOR ANTENNA RADOME SHALL BE SHERWIN WILLIAMS COROTHANE II. SURFACE PREPARATION AND APPLICATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND PROJECT OWNER'S GUIDELINE'S.

25. COORDINATION, LAYOUT, AND FURNISHING OF CONDUIT, CABLE AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.

26. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.

27. ALL (E)ACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES, AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY ENGINEERS. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR PIER DRILLING AROUND OR NEAR UTILITIES. CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW.

28. ALL (E)INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF UTILITY COMPANY ENGINEERING. THE AREAS OF THE PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE EQUIPMENT, DRIVEWAY OR

29. GRAVEL, SHALL BE GRADED TO A UNIFORM SLOPE, FERTILIZED, SEEDED AND COVERED WITH MULCH UNLESS OTHERWISE NOTED. THE CONTRACTOR SHALL ESTABLISH AND MAINTAIN SOIL EROSION AND SEDIMENTATION CONTROLS AT ALL TIMES

30. DURING CONSTRUCTION. PER FCC MANDATE, ENHANCED EMERGENCY (E911) SERVICE IS REQUIRED TO MEET NATIONWIDE STANDARDS

31. FOR WIRELESS COMMUNICATIONS SYSTEMS. PROJECT OWNER'S IMPLEMENTATION REQUIRES DEPLOYMENT OF EQUIPMENT AND ANTENNAS GENERALLY DEPICTED ON THIS PLAN, ATTACHED TO OR MOUNTED IN CLOSE PROXIMITY TO THE BTS RADIO CABINETS. PROJECT OWNER RESERVES THE RIGHT TO MAKE REASONABLE MODIFICATIONS TO E911 EQUIPMENT AND LOCATION AS TECHNOLOGY EVOLVES TO MEET REQUIRED SPECIFICATIONS.

32. 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:

2012 INTERNATIONAL BUILDING CODE
2016 CT STATE BUILDING CODE
ELECTRICAL CODE: NEC 2014
NFPA 780 2014

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, NINTH EDITION;

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

ANTENNA TOWER AND ANTENNA SUPPORTING STRUCTURES; REFER TO ELECTRICAL DRAWINGS FOR SPECIFIC ELECTRICAL STANDARDS.

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.

ELECTRICAL AND GROUNDING NOTES

1. ALL ELECTRICAL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC) AS WELL AS APPLICABLE STATE AND LOCAL CODES.

2. ALL ELECTRICAL ITEMS SHALL BE U.L. APPROVED OR LISTED AND PROCURED PER SPECIFICATION REQUIREMENTS.

3. THE ELECTRICAL WORK INCLUDES ALL LABOR AND MATERIAL DESCRIBED BY DRAWINGS AND SPECIFICATION INCLUDING INCIDENTAL WORK TO PROVIDE COMPLETE OPERATING AND APPROVED ELECTRICAL SYSTEM.

4. GENERAL CONTRACTOR SHALL PAY FEES FOR PERMITS, AND IS RESPONSIBLE FOR OBTAINING SAID PERMITS AND COORDINATION OF INSPECTIONS.

5. ELECTRICAL AND TELCO WIRING OUTSIDE A BUILDING AND EXPOSED TO WEATHER SHALL BE IN WATER TIGHT GALVANIZED RIGID STEEL CONDUITS OR SCHEDULE 80 PVC (AS PERMITTED BY CODE) AND WHERE REQUIRED IN LIQUID TIGHT FLEXIBLE METAL OR NONMETALLIC CONDUITS.

6. BURIED CONDUIT SHALL BE SCHEDULE 40 PVC.

7. ELECTRICAL WIRING SHALL BE COPPER WITH TYPE XHHW, THWN, OR THHN INSULATION.

8. RUN ELECTRICAL CONDUIT OR CABLE BETWEEN ELECTRICAL UTILITY DEMARCATION POINT AND PROJECT OWNER CELL SITE PPC AS INDICATED ON THIS DRAWING. PROVIDE FULL LENGTH PULL ROPE. COORDINATE INSTALLATION WITH UTILITY COMPANY.

9. RUN TELCO CONDUIT OR CABLE BETWEEN TELEPHONE UTILITY DEMARCATION POINT AND PROJECT OWNER CELL SITE TELCO CABINET AND BTS CABINET AS INDICATED ON THIS DRAWING. PROVIDE FULL LENGTH PULL ROPE AND GREENLEE CONDUIT MEASURING TAPE IN EACH INSTALLED TELCO CONDUIT.

10. WHERE CONDUIT BETWEEN BTS AND PROJECT OWNER CELL SITE PPC AND BETWEEN BTS AND PROJECT OWNER CELL SITE TELCO SERVICE CABINET ARE UNDERGROUND USE PVC, SCHEDULE 40 CONDUIT. ABOVE THE GROUND PORTION OF THESE CONDUITS SHALL BE PVC CONDUIT.

11. ALL EQUIPMENT LOCATED OUTSIDE SHALL HAVE NEMA 3R ENCLOSURE.

12. PPC SUPPLIED BY PROJECT OWNER.

13. GROUNDING SHALL COMPLY WITH NEC ART. 250.

14. GROUND COAXIAL CABLE SHIELDS MINIMUM AT BOTH ENDS USING MANUFACTURERS COAX CABLE GROUNDING KITS SUPPLIED BY PROJECT OWNER.

15. USE #6 COPPER STRANDED WIRE WITH GREEN COLOR INSULATION FOR ABOVE GRADE GROUNDING (UNLESS OTHERWISE SPECIFIED) AND #2 SOLID TINNED BARE COPPER WIRE FOR BELOW GRADE GROUNDING AS INDICATED ON THE DRAWING.

16. ALL GROUND CONNECTIONS TO BE BURNDY HYGROUND COMPRESSION TYPE CONNECTORS OR CADWELD EXOTHERMIC WELD. DO NOT ALLOW BARE COPPER WIRE TO BE IN CONTACT WITH GALVANIZED STEEL.

17. ROUTE GROUNDING CONDUCTORS ALONG THE SHORTEST AND STRAIGHTEST PATH POSSIBLE, EXCEPT AS OTHERWISE INDICATED. GROUNDING LEADS SHOULD NEVER BE BENT AT RIGHT ANGLE. ALWAYS MAKE AT LEAST 12" RADIUS BENDS. #6 WIRE CAN BE BENT AT 6" RADIUS WHEN NECESSARY. BOND ANY METAL OBJECTS WITHIN 6 FEET OF PROJECT OWNER EQUIPMENT OR CABINET TO MASTER GROUND BAR OR GROUNDING RING.

18. CONNECTIONS TO GROUND BARS SHALL BE MADE WITH TWO HOLE COMPRESSION TYPE COPPER LUGS. APPLY OXIDE INHIBITING COMPOUND TO ALL LOCATIONS.

19. BOND ANTENNA MOUNTING BRACKETS, COAXIAL CABLE GROUND KITS, AND ALNA TO EGB PLACED NEAR THE ANTENNA LOCATION.

20. APPLY OXIDE INHIBITING COMPOUND TO ALL COMPRESSION TYPE GROUND CONNECTIONS.

21. CONTRACTOR SHALL PROVIDE AND INSTALL OMNI DIRECTIONAL ELECTRONIC MARKER SYSTEM (EMS) BALLS OVER EACH GROUND ROD AND BONDING POINT BETWEEN EXISTING TOWER/ (E) MONOPOLE GROUNDING RING AND EQUIPMENT GROUNDING RING.

22. CONTRACTOR SHALL TEST COMPLETED GROUND SYSTEM AND RECORD RESULTS FOR PROJECT CLOSE-OUT DOCUMENTATION. 5 OHMS MAXIMUM RESISTANCE REQUIRED.

23.CONTRACTOR SHALL CONDUCT ANTENNA, COAX, AND LNA RETURN-LOSS AND DISTANCE- TO-FAULT MEASUREMENTS (SWEEP TESTS) AND RECORD RESULTS FOR PROJECT CLOSE OUT.

ABBREVIATIONS

AGL	ABOVE GRADE LEVEL	G.C.	GENERAL CONTRACTOR	RF	RADIO FREQUENCY
AWG	AMERICAN WIRE GAUGE	MGB	MASTER GROUND BUS		
BCW	BARE COPPER WIRE	MIN	MINIMUM	TBD	TO BE DETERMINED
BTS	BASE TRANSCEIVER STATION	(P)	PROPOSED/NEW	TBR	TO BE REMOVED
(E)	EXISTING	N.T.S.	NOT TO SCALE	TBRR	TO BE REMOVED AND REPLACED
EG	EQUIPMENT GROUND	REF	REFERENCE		
EGR	EQUIPMENT GROUND RING	REQ	REQUIRED	TYP	TYPICAL
(F)	FUTURE				

EG ADVANCED ENGINEERING GROUP, P.C.
Civil Engineering - Site Development - Surveying - Telecommunications
500 North Broadway, East Providence, RI 02914
Phone: (401) 354-2403
Fax: (401) 633-6354

SAI COMMUNICATIONS
12 INDUSTRIAL WAY
SALEM, NH 03079

SITE NUMBER: CT5457

SITE NAME: GRISWOLD WEST

181 A NORMAN ROAD
JEWETT CITY, CT 06351
NEW LONDON COUNTY

at&t
550 COCHITUATE ROAD, SUITE 13,
FRAMINGHAM, MA 01701-4681

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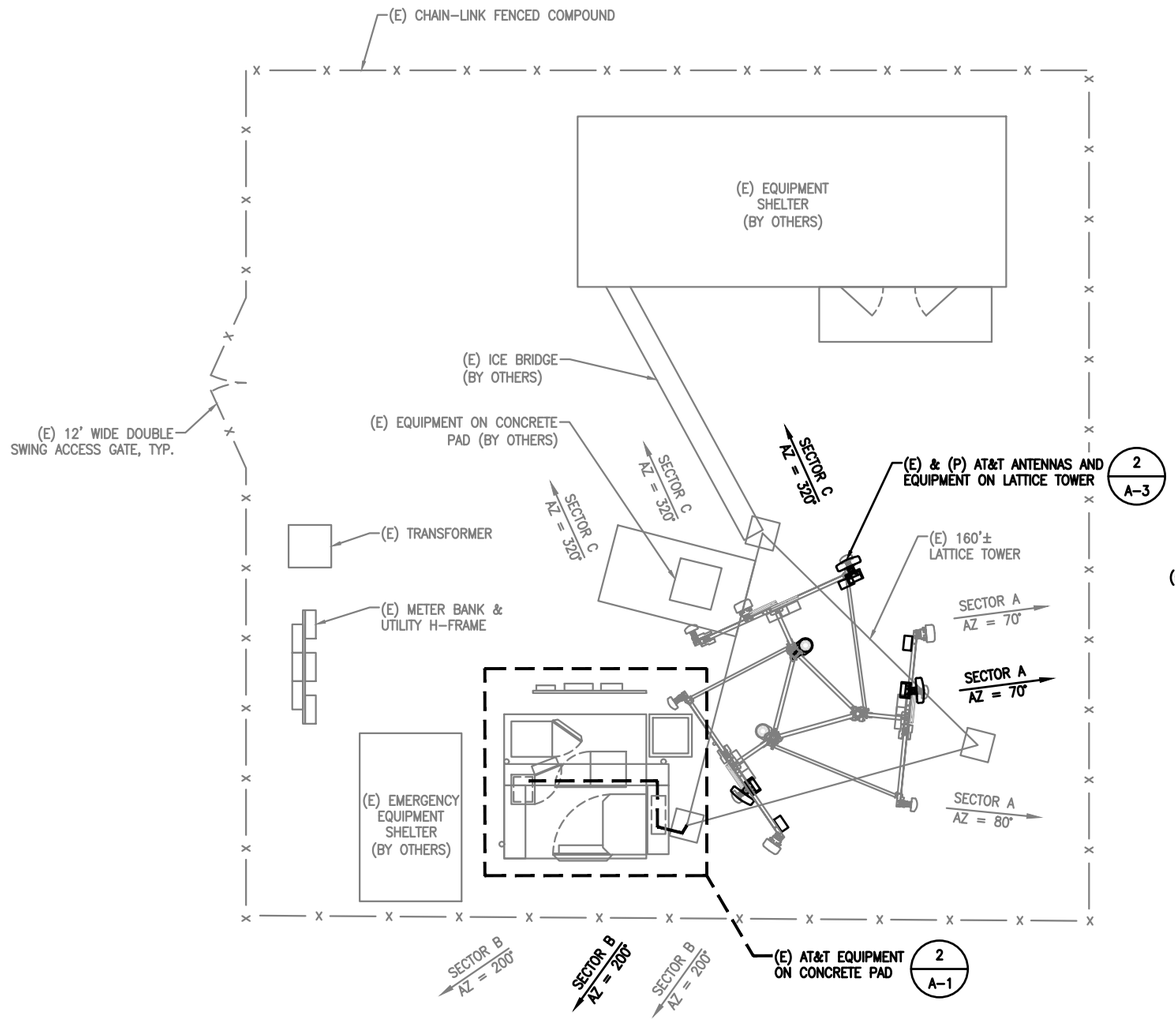
2	05/17/18	REVISED	AAB	MRC
3	05/21/18	REVISED	MER	MRC

GENERAL NOTES

SHEET NO. GN-1

HALF SIZE PRINT

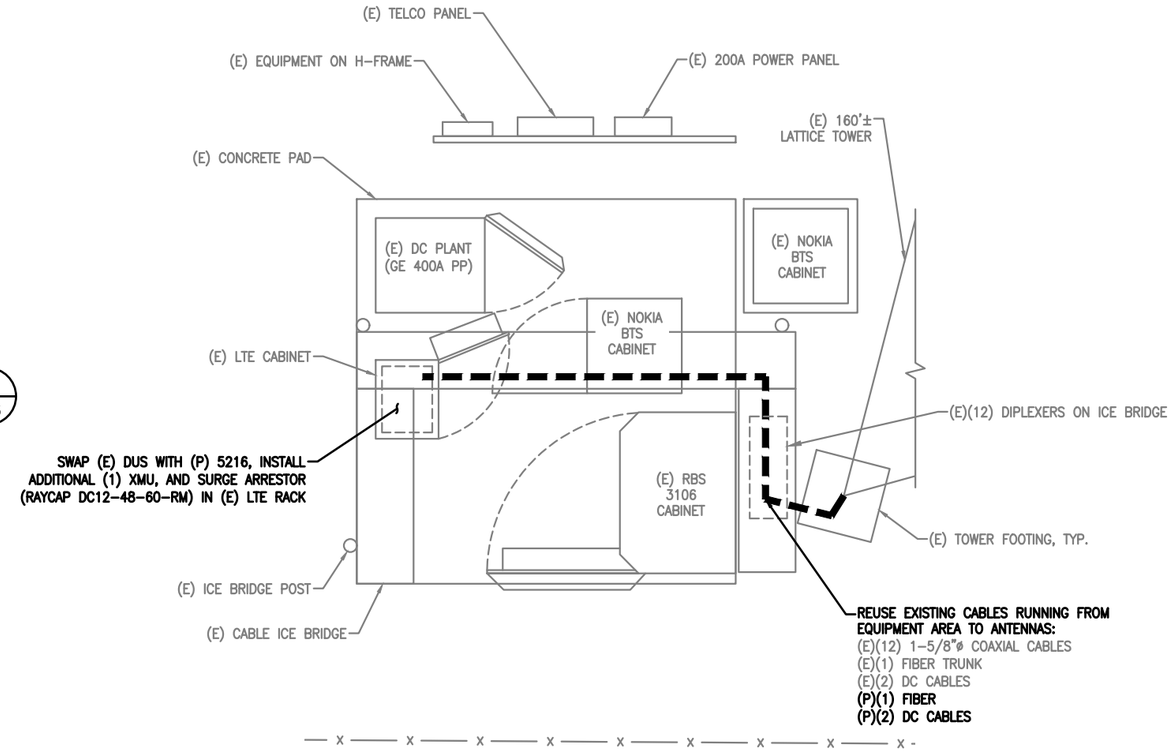
THIS DRAWING IS SCALEABLE AT HALF THE NOTED SCALE



NORTH

1 A-1 COMPOUND PLAN

SCALE: 3/16"=1'-0"



NORTH

2 A-1 EQUIPMENT PLAN

SCALE: 1/2"=1'-0"

ADVANCED ENGINEERING GROUP, P.C.
Civil Engineering - Site Development - Surveying - Telecommunications
500 North Broadway, East Providence, RI 02914
Phone: (401) 354-2403 Fax: (401) 633-6354

SAI COMMUNICATIONS
12 INDUSTRIAL WAY
SALEM, NH 03079

SITE NUMBER: CT5457

SITE NAME: GRISWOLD WEST

181 A NORMAN ROAD
JEWETT CITY, CT 06351
NEW LONDON COUNTY

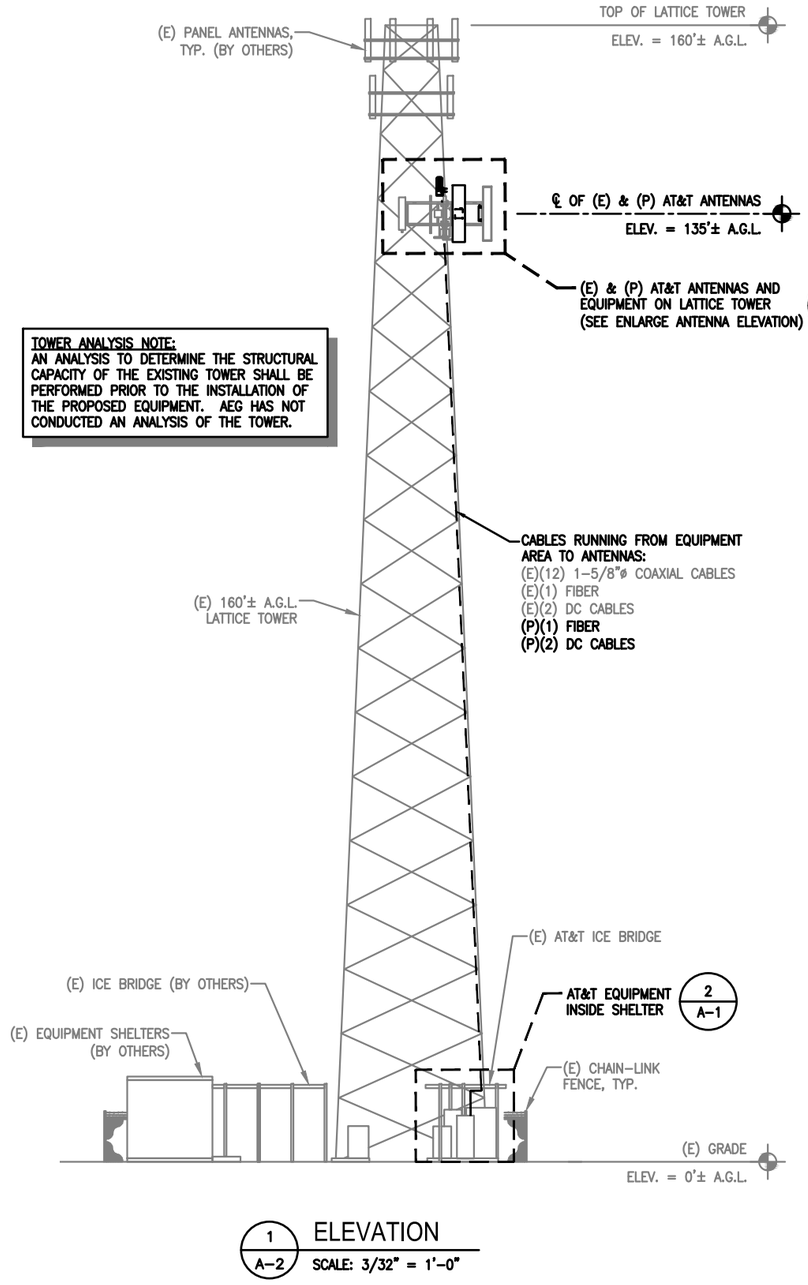
at&t
550 COCHITUATE ROAD, SUITE 13,
FRAMINGHAM, MA 01701-4681

NO.	DATE	REVISIONS	BY	CHK
0	02/12/18	ISSUED FOR REVIEW	AAB	MRC
1	03/01/18	ISSUED FOR CONSTRUCTION	AAB	MRC
2	05/17/18	REVISED	AAB	MRC
3	05/21/18	REVISED	MER	MRC

COMPOUND AND EQUIPMENT PLANS

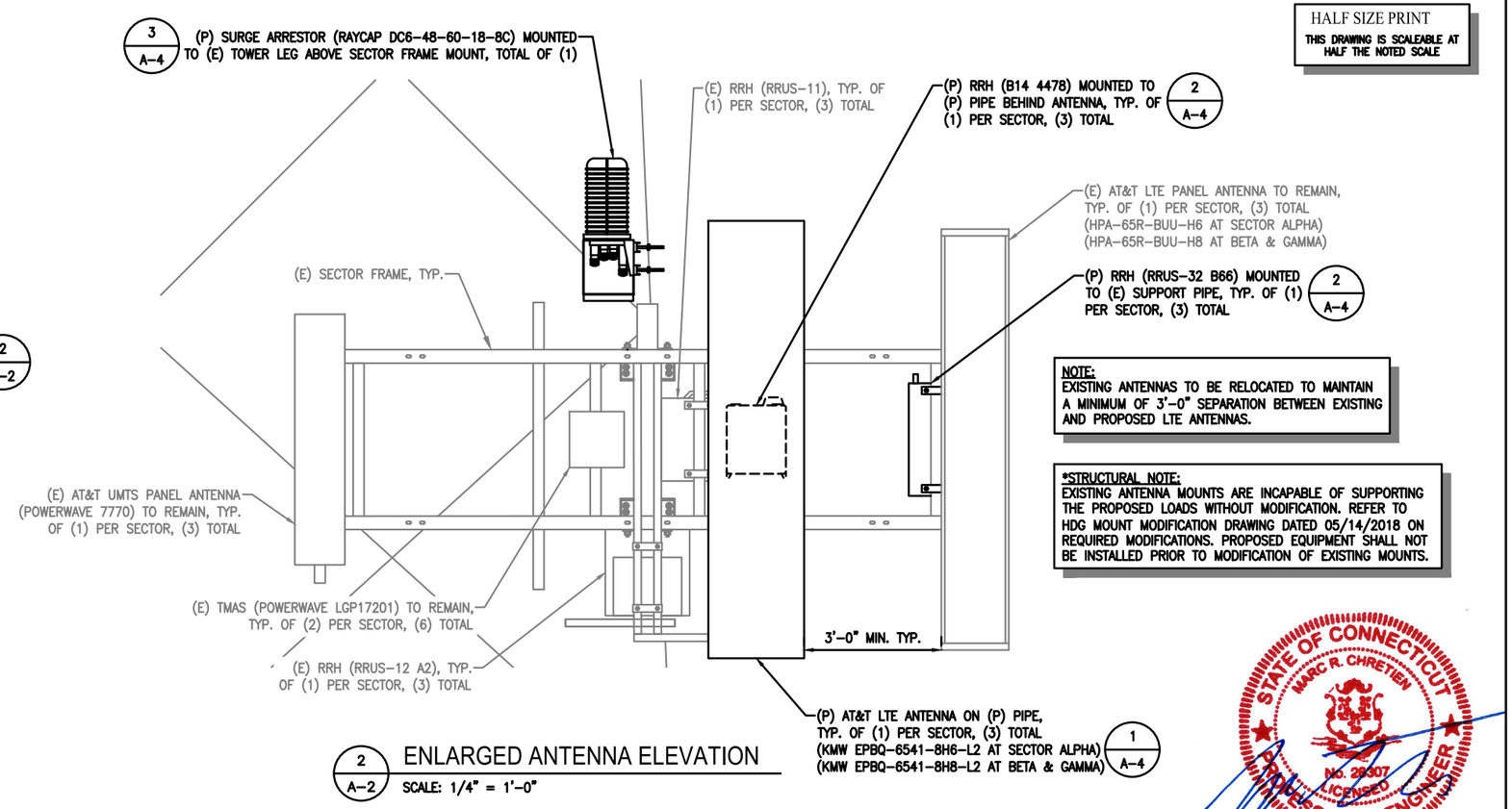
SHEET NO. A-1

HALF SIZE PRINT
THIS DRAWING IS SCALEABLE AT HALF THE NOTED SCALE



TOWER ANALYSIS NOTE:
AN ANALYSIS TO DETERMINE THE STRUCTURAL CAPACITY OF THE EXISTING TOWER SHALL BE PERFORMED PRIOR TO THE INSTALLATION OF THE PROPOSED EQUIPMENT. AEG HAS NOT CONDUCTED AN ANALYSIS OF THE TOWER.

1 A-2 ELEVATION
SCALE: 3/32" = 1'-0"



NOTE:
EXISTING ANTENNAS TO BE RELOCATED TO MAINTAIN A MINIMUM OF 3'-0" SEPARATION BETWEEN EXISTING AND PROPOSED LTE ANTENNAS.

***STRUCTURAL NOTE:**
EXISTING ANTENNA MOUNTS ARE INCAPABLE OF SUPPORTING THE PROPOSED LOADS WITHOUT MODIFICATION. REFER TO HDG MOUNT MODIFICATION DRAWING DATED 05/14/2018 ON REQUIRED MODIFICATIONS. PROPOSED EQUIPMENT SHALL NOT BE INSTALLED PRIOR TO MODIFICATION OF EXISTING MOUNTS.

2 A-2 ENLARGED ANTENNA ELEVATION
SCALE: 1/4" = 1'-0"

RF SYSTEM SCHEDULE

SECTOR	ANTENNA INFORMATION					RRH INFORMATION		TMA INFORMATION		JUMPER INFO.	
	POSITION	STATUS	MODEL	AZIMUTH	RAD CTR (A.G.L.)	STATUS	MODEL	STATUS	MODEL	COAX	FIBER
ALPHA	I-A	EXISTING	HPA-65R-BUU-H6	70°	135'	EXISTING, PROPOSED	RRUS-11, RRUS-32 B66	-	-	-	3
	II-A	PROPOSED	EPBQ-654L8H6-L2	70°	135'	EXISTING, PROPOSED	RRUS-12 A2, B14 4478	-	-	-	3
	III-A	EXISTING	7770	80°	135'	-	-	(2)EXISTING, (2)EXISTING	LGP17201, LGP 13519	2	-
	IV-A	-	-	-	-	-	-	-	-	2	-
BETA	I-B	EXISTING	HPA-65R-BUU-H6	200°	135'	EXISTING, PROPOSED	RRUS-11, RRUS-32 B66	-	-	-	3
	II-B	PROPOSED	EPBQ-654L8H6-L2	200°	135'	EXISTING, PROPOSED	RRUS-12 A2, B14 4478	-	-	-	3
	III-B	EXISTING	7770	220°	135'	-	-	(2)EXISTING, (2)EXISTING	LGP17201, LGP 13519	2	-
	IV-B	-	-	-	-	-	-	-	-	2	-
GAMMA	I-C	EXISTING	7770	320°	135'	EXISTING, PROPOSED	RRUS-11, RRUS-32 B66	(2)EXISTING, (2)EXISTING	LGP17201, LGP 13519	2	-
	II-C	EXISTING	HPA-65R-BUU-H6	320°	135'	EXISTING, PROPOSED	RRUS-12 A2, B14 4478	-	-	-	3
	III-C	PROPOSED	EPBQ-654L8H6-L2	320°	135'	-	-	-	-	-	3
	IV-C	-	-	-	-	-	-	-	-	2	-

* CONTRACTOR TO VERIFY FINAL RFDS PRIOR TO CONSTRUCTION

ADVANCED ENGINEERING GROUP, P.C.
Civil Engineering - Site Development - Surveying - Telecommunications
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ELEVATIONS AND RF SYSTEM SCHEDULE

SHEET NO. A-2

HALF SIZE PRINT

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NOTE:
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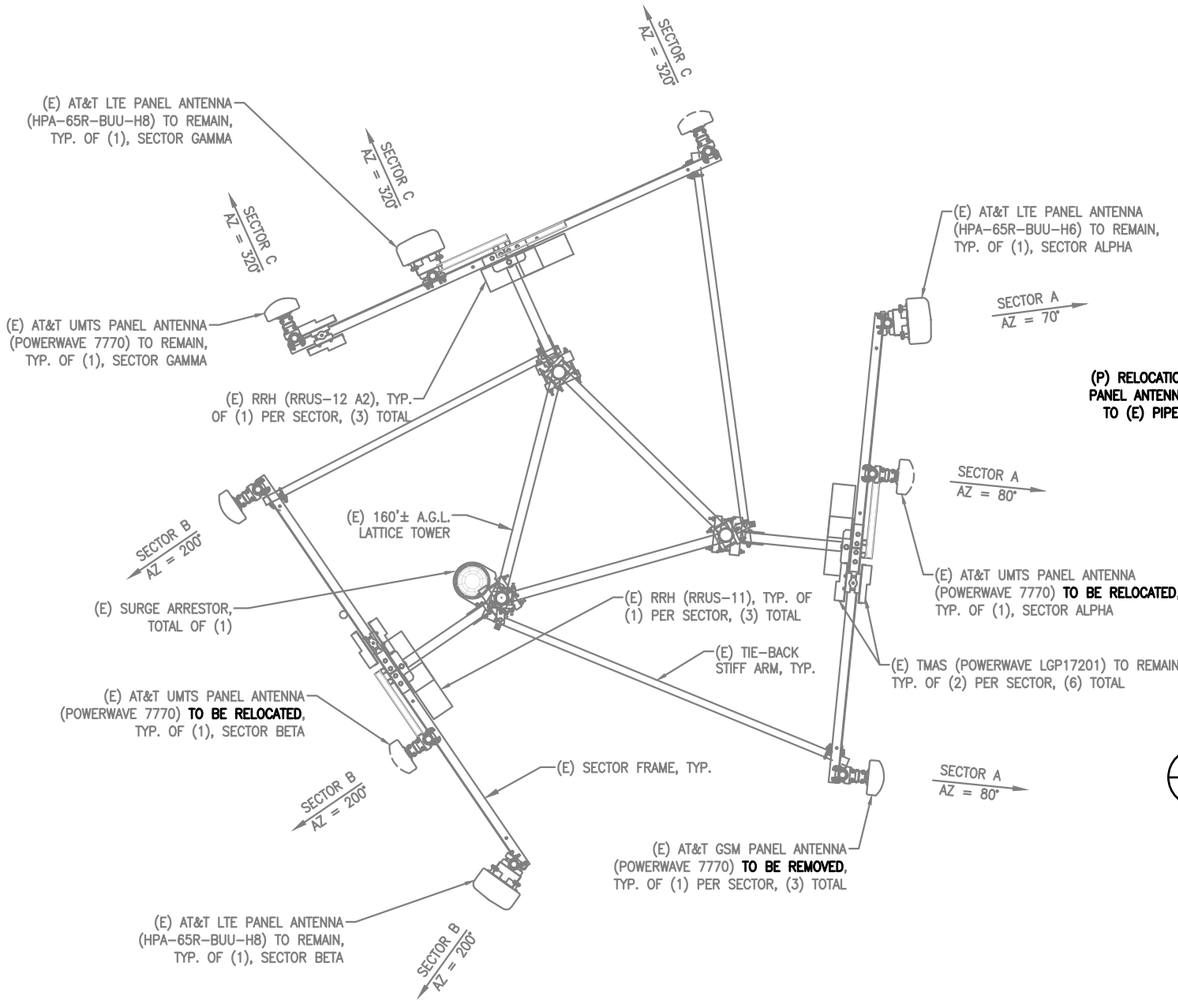
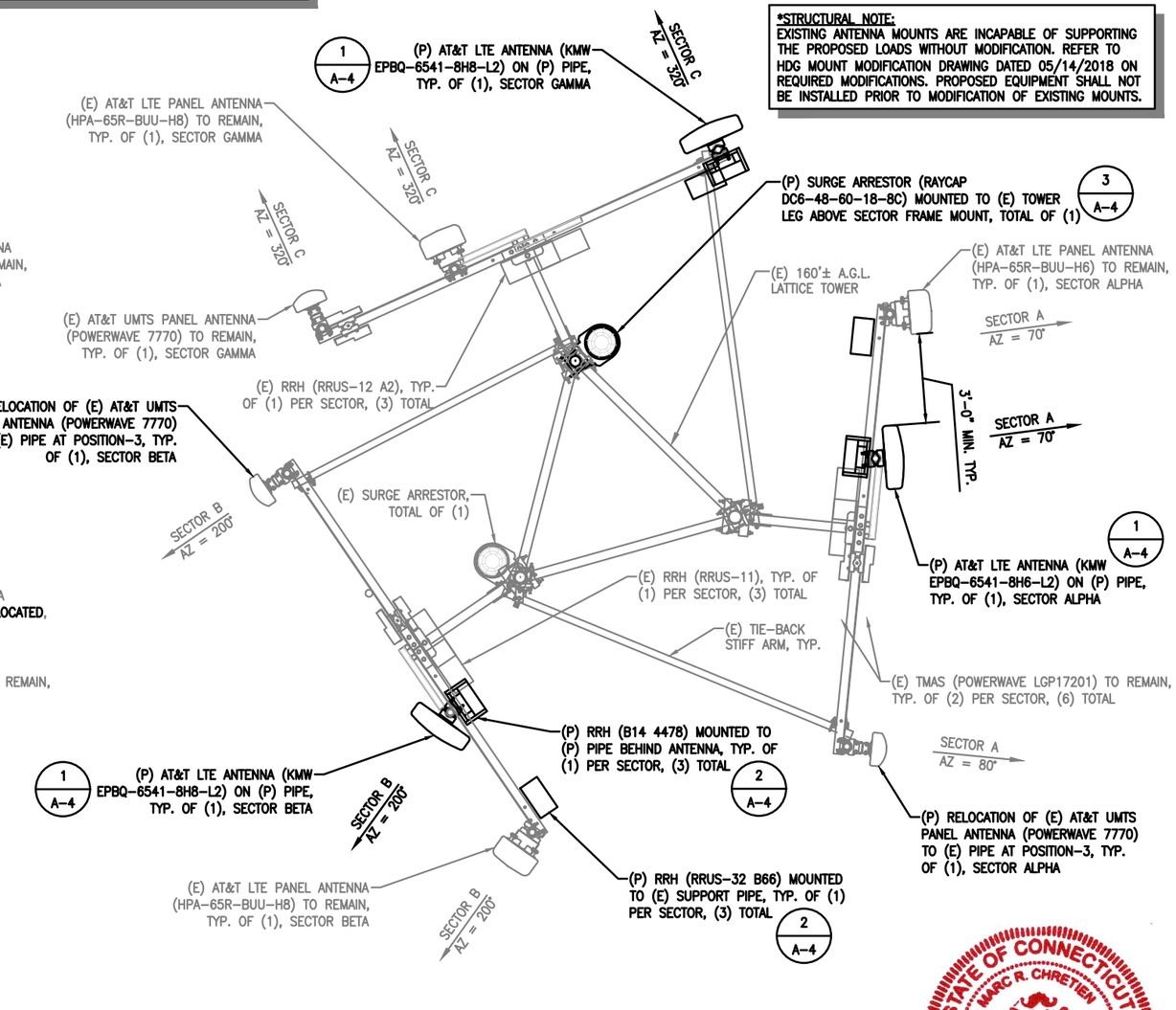


NORTH

1 / A-3 EXISTING ANTENNA PLAN

SCALE: 1/2" = 1'-0"



NORTH

2 / A-3 PROPOSED ANTENNA PLAN

SCALE: 1/2" = 1'-0"

STATE OF CONNECTICUT
MARC R. CHRETIEN
No. 28307
LICENSED
PROFESSIONAL ENGINEER

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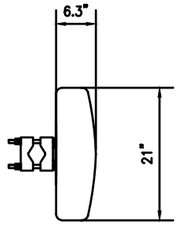
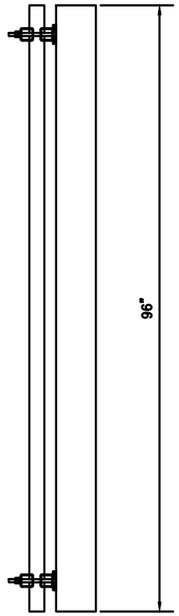
ANTENNA PLANS

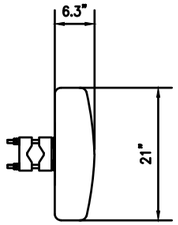
SHEET NO. A-3

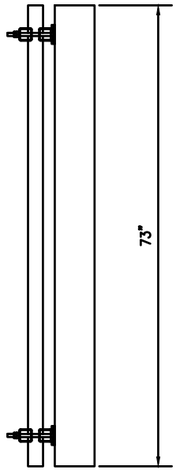




EPBQ-654L8H8-L2

MANUFACTURER: KMW
DIMENSIONS: (HxWxD) 96"x21"x6.3"
WEIGHT: 86.0 LBS.



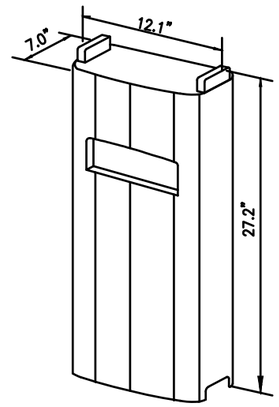


EPBQ-654L8H6-L2

MANUFACTURER: KMW
DIMENSIONS: (HxWxD) 73"x21"x6.3"
WEIGHT: 72.8 LBS.

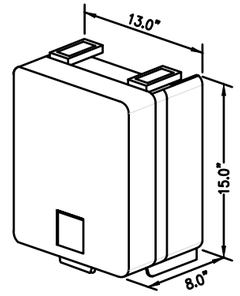
1 A-4 ANTENNA DETAILS

SCALE: N.T.S.



ERICSSON RRUS-32

-DIMENSIONS (H x W x D):
27.2" x 12.1" x 7.0"
-WEIGHT: 53 LBS



RRUS-4478 B14

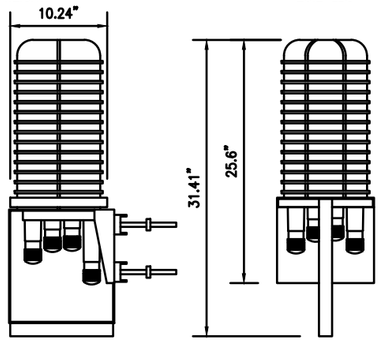
MANUFACTURER: ERICSSON
DIMENSIONS (HxWxD): 15.0"x13.0"x8.0"
WEIGHT: 60 LBS

2 A-4 RRH DETAILS

SCALE: N.T.S.

RAYCAP DC6-48-60-18-8c

NUMBER OF RADIOS PROTECTED: 6
SUPPRESSION CONNECTION METHOD: COMPRESSION LUG,
#2-#14 AWG COPPER, #2-#12 ALUMINUM
ENVIRONMENTAL RATING: IP 68, 7M 72HRS
WEIGHT: 26.2 LBS



3 A-4 SURGE ARRESTOR DETAIL

SCALE: N.T.S.

DC12-48-60-RM

MANUFACTURER: RAYCAP
WEIGHT: 15.0 LBS.
TYPE: INDOOR/RACK-MOUNTED

4 A-4 SURGE ARRESTOR DETAIL

SCALE: N.T.S.

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EQUIPMENT DETAILS

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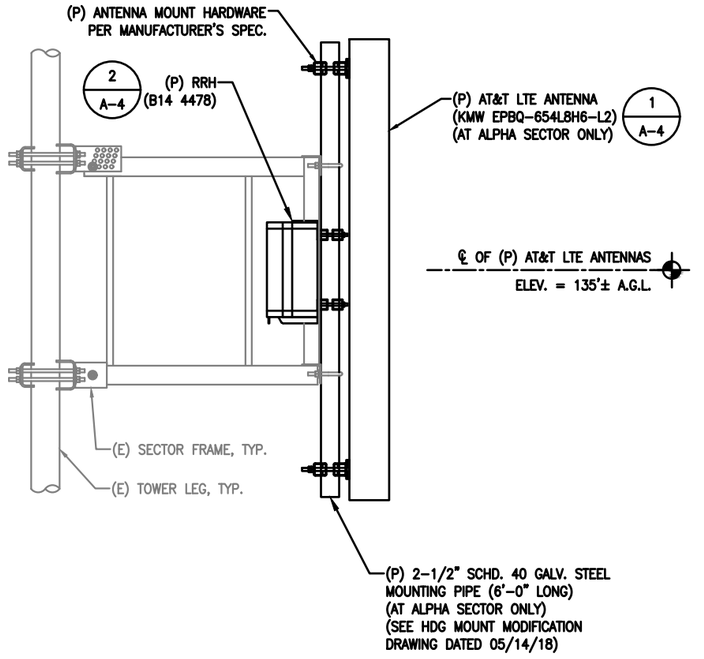
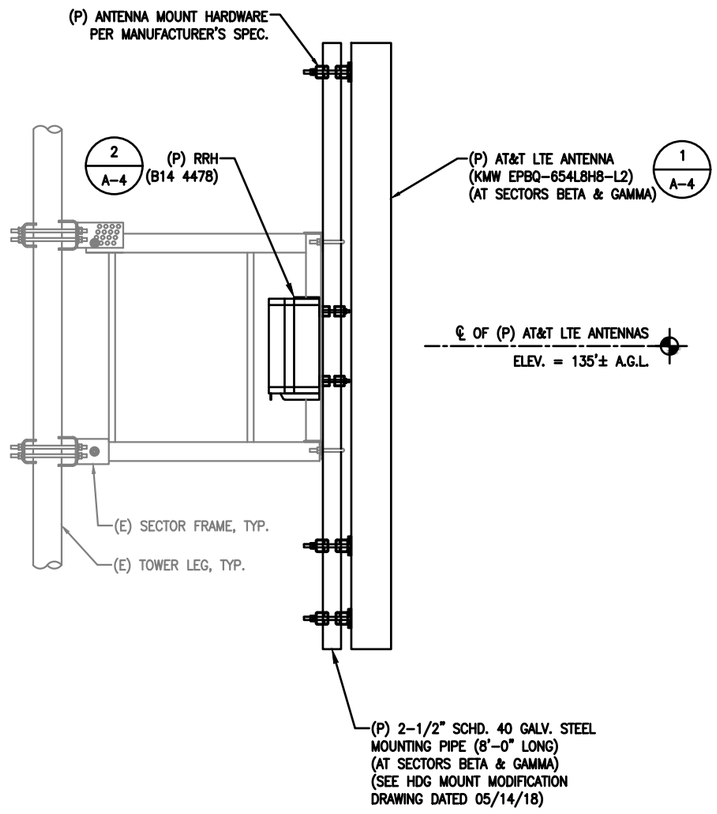
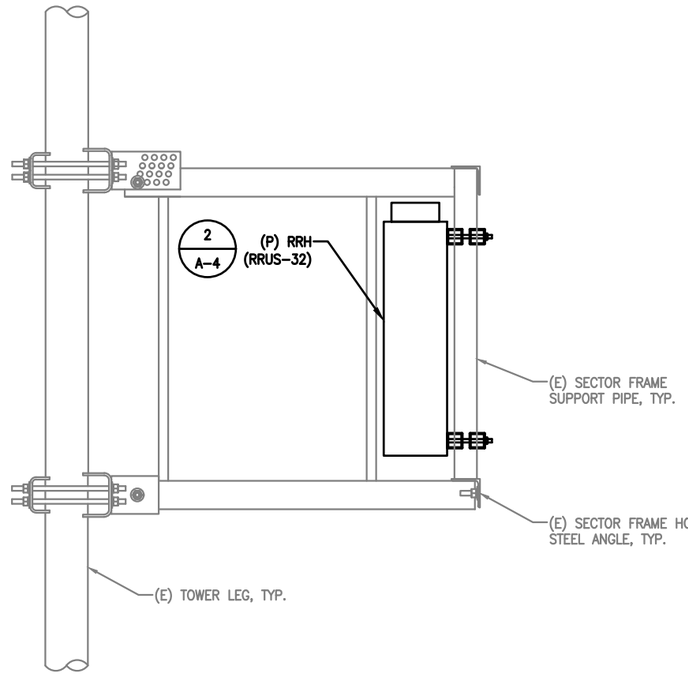


1 S-1 ANTENNA MOUNT DETAILS
SCALE: 1" = 1'-0"





2 S-1 RRH MOUNT DETAIL
SCALE: 1-1/2" = 1'-0"

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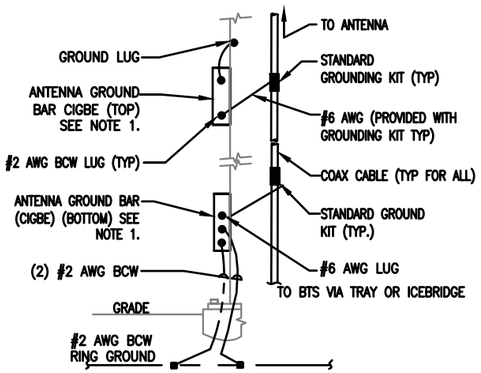
STRUCTURAL DETAILS

SHEET NO. S-1

	CIRCUIT BREAKER	ACCA	ANTENNA CABLE COVER ASSEMBLY
E	ELECTRIC BOX	AWG	AMERICAN WIRE GAUGE
	ELECTRICAL CONDUIT	BTCW	BARE TINNED COPPER WIRE
		C	CONDUIT
		CIGBE	COAX INSULATED GROUND BAR EXTERNAL
■	EXOTHERMIC CONNECTION (CADWELD) TO GROUND RING AND COMPRESSION TO GROUND HALO	CO	CONDUIT ONLY
		DWG	DRAWING
		EGB	EXTERNAL GROUND BAR
	DISCONNECT SWITH	EMT	ELECTRICAL METALLIC TUBING
		(E)	EXISTING
⊗	GROUND ROD	(F)	FUTURE
⊠	GROUND ROD WITH ACCESS	GEN	GENERATOR
		GFI	GROUND FAULT CIRCUIT INTERRUPTER
•	MECHANICAL GROUND CONN.	GND	GROUND
		GPS	GLOBAL POSITIONING SYSTEM
⊠	GROUND ACCESS WELL	GR	GROWTH
		IGR	INTERIOR GROUND RING (HALO)
G	GROUNDING WIRE	MIGB	MASTER ISOLATED GROUND BAR
		(P)	PROPOSED, NEW (PROVIDE AND INSTALL UNLESS NOTED OTHERWISE)
G	GENERATOR		
		PCS	PERSONAL COMMUNICATION SERVICE
	FUSE	PPC	POWER PROTECTION CABINET
	GROUND BUS BAR	PRC	PRIMARY RADIO CABINET
		PVC	POLYVINYL CHLORIDE CONDUIT
	REVISION	RGS	RIGID GALVANIZED STEEL
T	TELEPHONE BOX	RWY	RACEWAY
		S.L.D.	SINGLE LINE DIAGRAM
M	UTILITY METER	TEL	TELEPHONE
		TYP.	TYPICAL
	XIT GROUND ROD	WP	WEATHERPROOF EQUIPMENT

1 G-1 ELEC. / GROUNDING LEGEND

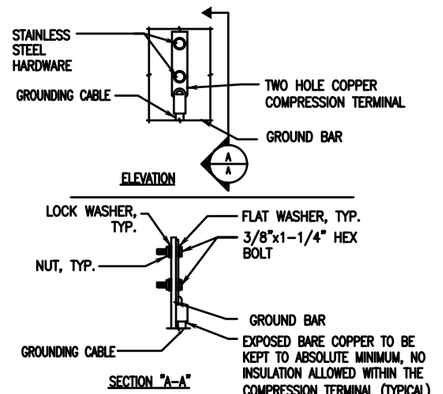
SCALE: N.T.S.



NOTE:
1. NUMBER OF GROUND BARS MAY VARY DEPENDING ON THE TYPE OF TOWER. ANTENNA LOCATION AND CONNECTION ANTENNA LOCATION AND CONNECTION ORIENTATION. PROVIDE AS REQUIRED.
2. A SEPARATE GROUND BAR TO BE USED FOR GPS ANTENNA IF REQUIRED.

2 G-1 TYP. ANTENNA CABLE GROUNDING

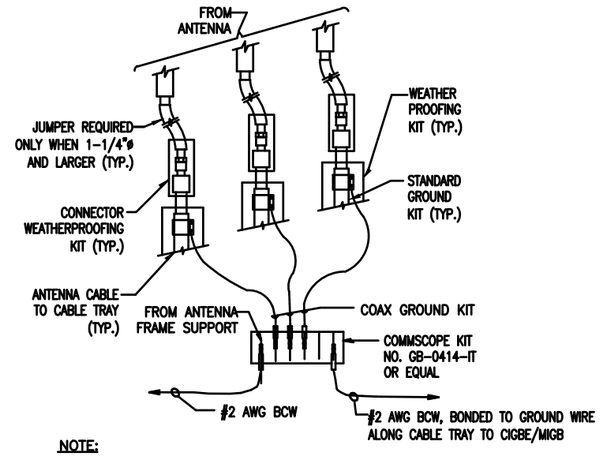
SCALE: N.T.S.



NOTES:
1. "DOUBLING UP" OR "STACKING " OF CONNECTION IS NOT PERMITTED.
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.
3. CADWELD DOWNLEADS FROM UPPER EGB, LOWER EGB, AND MGB.
4. ALL GROUND LUGS MUST BE HEAT SHRUNK AT WIRE/LUG CONNECTION

3 G-1 TYP. GROUND BAR CONNECTION

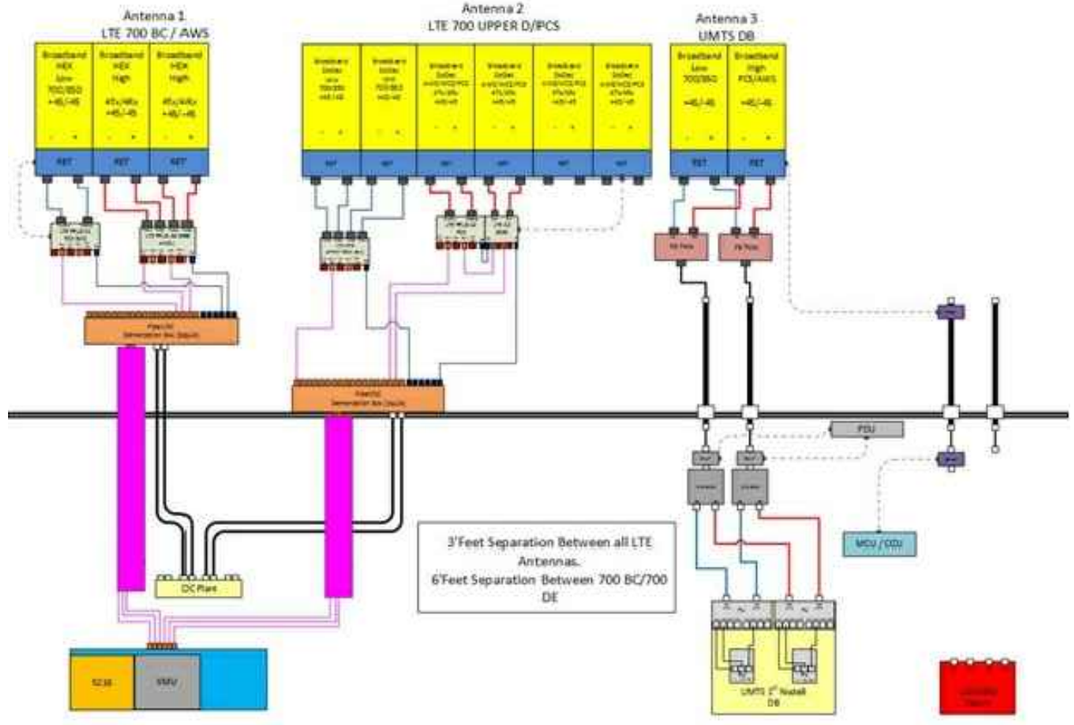
SCALE: N.T.S.



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

4 G-1 TYP. GROUND WIRE TO GROUND BAR CONN.

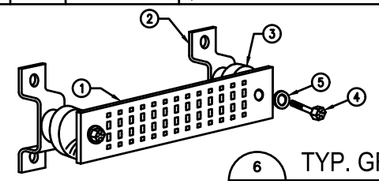
SCALE: N.T.S.



5 G-1 ONE LINE PLUMBING DIAGRAM

SCALE: N.T.S.

WIRELESS SOLUTIONS INC.			
NO.	REQ.	PART NO.	DESCRIPTION
1	1	HLGB-0420-IS	SOLID GND. BAR (20"x4"x1/4")
2	2	———	WALL MTG. BRKT.
3	2	———	INSULATORS
4	4	———	5/8"-11x1" H.H.C.S.
5	4	———	5/8 LOCKWASHER



6 G-1 TYP. GROUND BAR CONN.

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.

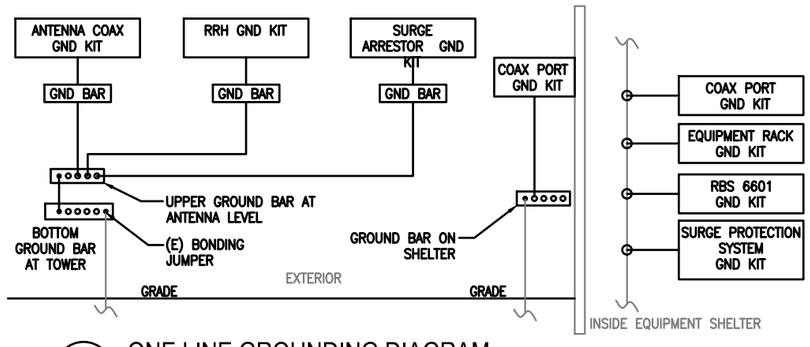
SECTION "P" – SURGE PRODUCERS

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

SECTION "A" – SURGE ABSORBERS

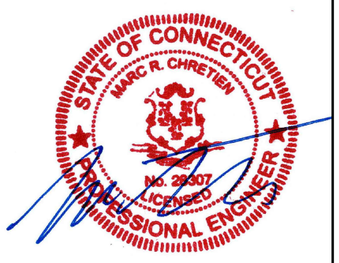
INTERIOR GROUND RING (#2)
EXTERNAL EARTH GROUND FIELD (BURIED GROUND RING) (#2)
METALLIC COLD WATER PIPE (IF AVAILABLE) (#2)
BUILDING STEEL (IF AVAILABLE) (#2)

GROUNDING NOTES:
ALL GROUNDING SHALL BE DONE IN ACCORDANCE WITH THE AT&T MOBILITY GROUNDING GUIDE.



7 G-1 ONE LINE GROUNDING DIAGRAM

SCALE: N.T.S.



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GROUNDING DETAILS AND ONE LINE DIAGRAM

SHEET NO. G-1

STRUCTURAL NOTES:

1. DESIGN REQUIREMENTS ARE PER STATE BUILDING CODE AND APPLICABLE SUPPLEMENTS, INTERNATIONAL BUILDING CODE, EIA/TIA–222–G STRUCTURAL STANDARDS FOR STEEL ANTENNA, TOWERS AND ANTENNA SUPPORTING STRUCTURES.
2. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS IN THE FIELD PRIOR TO FABRICATION AND ERECTION OF ANY MATERIAL. ANY UNUSUAL CONDITIONS SHALL BE REPORTED TO THE ATTENTION OF THE CONSTRUCTION MANAGER AND ENGINEER OF RECORD.
3. DESIGN AND CONSTRUCTION OF STRUCTURAL STEEL SHALL CONFORM TO THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION "SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS".
4. STRUCTURAL STEEL SHALL CONFORM TO ASTM A992 (Fy=50 ksi), MISCELLANEOUS STEEL SHALL CONFORM TO ASTM A36 UNLESS OTHERWISE INDICATED.
5. STEEL PIPE SHALL CONFORM TO ASTM A500 "COLD–FORMED WELDED & SEAMLESS CARBON STEEL STRUCTURAL TUBING", GRADE B, OR ASTM A53 PIPE STEEL BLACK AND HOT–DIPPED ZINC–COATED WELDED AND SEAMLESS TYPE E OR S, GRADE B. PIPE SIZES INDICATED ARE NOMINAL. ACTUAL OUTSIDE DIAMETER IS LARGER.
6. STRUCTURAL CONNECTION BOLTS SHALL BE HIGH STRENGTH BOLTS (BEARING TYPE) AND CONFORM TO ASTM A325 TYPE–X "HIGH STRENGTH BOLTS FOR STRUCTURAL JOINTS, INCLUDING SUITABLE NUTS AND PLAIN HARDENED WASHERS". ALL BOLTS SHALL BE 3/4" DIA UON.
7. ALL STEEL MATERIALS SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT–DIP GALVANIZED) COATINGS ON IRON AND STEEL PRODUCTS", UNLESS OTHERWISE NOTED.
8. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC–COATING (HOT–DIP) ON IRON AND STEEL HARDWARE", UNLESS OTHERWISE NOTED.
9. FIELD WELDS, DRILL HOLES, SAW CUTS AND ALL DAMAGED GALVANIZED SURFACES SHALL BE REPAIRED WITH AN ORGANIC ZINC REPAIR PAINT COMPLYING WITH REQUIREMENTS OF ASTM A780. GALVANIZING REPAIR PAINT SHALL HAVE 65 PERCENT ZINC BY WEIGHT, ZIRP BY DUNCAN GALVANIZING, GALVA BRIGHT PREMIUM BY CROWN OR EQUAL. THICKNESS OF APPLIED GALVANIZING REPAIR PAINT SHALL BE NOT NOT LESS THAN 4 COATS (ALLOW TIME TO DRY BETWEEN COATS) WITH A RESULTING COATING THICKNESS REQUIRED BY ASTM A123 OR A153 AS APPLICABLE.
10. CONTRACTOR SHALL COMPLY WITH AWS CODE FOR PROCEDURES, APPEARANCE AND QUALITY OF WELDS, AND FOR METHODS USED IN CORRECTING WELDING. ALL WELDERS AND WELDING PROCESSES SHALL BE QUALIFIED IN ACCORDANCE WITH AWS "STANDARD QUALIFICATION PROCEDURES". ALL WELDING SHALL BE DONE USING E70XX ELECTRODES AND WELDING SHALL CONFORM TO AISC AND DI.I. WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLE J2.4 IN THE AISC "STEEL CONSTRUCTION MANUAL". 14TH EDITION.
11. INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON–CONFORMING MATERIALS OR CONDITIONS SHALL BE REPORTED TO THE CONSTRUCTION MANAGER PRIOR TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE CONSTRUCTION MANAGER APPROVAL.
12. UNISTRUT SHALL BE FORMED STEEL CHANNEL STRUT FRAMING AS MANUFACTURED BY UNISTRUT CORP., WAYNE, MI OR EQUAL. STRUT MEMBERS SHALL BE 1 5/8"x1 5/8"x12GA, UNLESS OTHERWISE NOTED, AND SHALL BE HOT–DIP GALVANIZED AFTER FABRICATION.
13. EPOXY ANCHOR ASSEMBLY SHALL CONSIST OF STAINLESS STEEL ANCHOR ROD WITH NUTS & WASHERS. AN INTERNALLY THREADED INSERT, A SCREEN TUBE AND A EPOXY ADHESIVE. THE ANCHORING SYSTEM SHALL BE THE HILTI–HIT HY–70 AND OR HY–200 SYSTEMS (AS SPECIFIED IN DWG.) OR ENGINEERS APPROVED EQUAL.
14. EXPANSION BOLTS SHALL CONFORM TO FEDERAL SPECIFICATION FF–S–325, GROUP II, TYPE 4, CLASS I, HILTI KWIK BOLT III OR APPROVED EQUAL. INSTALLATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
15. LUMBER SHALL COMPLY WITH THE REQUIREMENTS OF THE AMERICAN INSTITUTE OF TIMBER CONSTRUCTION AND THE NATIONAL FOREST PRODUCTS ASSOCIATION'S NATIONAL DESIGN SPECIFICATION FOR WOOD CONSTRUCTION. ALL LUMBER SHALL BE PRESSURE TREATED AND SHALL BE STRUCTURAL GRADE NO. 2 OR BETTER.
16. WHERE ROOF PENETRATIONS ARE REQUIRED, THE CONTRACTOR SHALL CONTACT AND COORDINATE RELATED WORK WITH THE BUILDING OWNER AND THE EXISTING ROOF INSTALLER. WORK SHALL BE PERFORMED IN SUCH A MANNER AS TO NOT VOID THE EXISTING ROOF WARRANTY. ROOF SHALL BE WATERTIGHT.
17. ALL FIBERGLASS MEMBERS USED ARE AS MANUFACTURED BY STRONGWELL COMPANY OF BRISTOL, VA 24203. ALL DESIGN CRITERIA FOR THESE MEMBERS IS BASED ON INFORMATION PROVIDED IN THE DESIGN MANUAL. ALL REQUIREMENTS PUBLISHED IN SAID MANUAL MUST BE STRICTLY ADHERED TO.
18. NO MATERIALS TO BE ORDERED AND NO WORK TO BE COMPLETED UNTIL SHOP DRAWINGS HAVE BEEN REVIEWED AND APPROVED IN WRITING.
19. SUBCONTRACTOR SHALL FIREPROOF ALL STEEL TO PRE–EXISTING CONDITIONS.

SPECIAL INSPECTIONS (REFERENCE IBC CHAPTER 17):

GENERAL: WHERE APPLICATION IS MADE FOR CONSTRUCTION, THE OWNER OR THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE ACTING AS THE OWNER'S AGENT SHALL EMPLOY ONE OR MORE APPROVED AGENCIES TO PERFORM INSPECTIONS DURING CONSTRUCTION ON THE TYPES OF WORK LISTED IN THE INSPECTION CHECKLIST ABOVE.

THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE AND ENGINEERS OF RECORD INVOLVED IN THE DESIGN OF THE PROJECT ARE PERMITTED TO ACT AS THE APPROVED AGENCY AND THEIR PERSONNEL ARE PERMITTED TO ACT AS THE SPECIAL INSPECTOR FOR THE WORK DESIGNED BY THEM, PROVIDED THOSE PERSONNEL MEET THE QUALIFICATION REQUIREMENTS.

STATEMENT OF SPECIAL INSPECTIONS: THE APPLICANT SHALL SUBMIT A STATEMENT OF SPECIAL INSPECTIONS PREPARED BY THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE IN ACCORDANCE WITH SECTION 107.1 AS A CONDITION FOR ISSUANCE. THIS STATEMENT SHALL BE IN ACCORDANCE WITH SECTION 1705.

REPORT REQUIREMENT: SPECIAL INSPECTORS SHALL KEEP RECORDS OF INSPECTIONS. THE SPECIAL INSPECTOR SHALL FURNISH INSPECTION REPORTS TO THE BUILDING OFFICIAL, AND TO THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE. REPORTS SHALL INDICATE THAT WORK INSPECTED WAS OR WAS NOT COMPLETED IN CONFORMANCE TO APPROVED CONSTRUCTION DOCUMENTS. DISCREPANCIES SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE CONTRACTOR FOR CORRECTION. IF THEY ARE NOT CORRECTED, THE DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE BUILDING OFFICIAL AND TO THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE. A FINAL REPORT DOCUMENTING REQUIRED SPECIAL INSPECTIONS SHALL BE SUBMITTED.

SPECIAL INSPECTION CHECKLIST

BEFORE CONSTRUCTION	
CONSTRUCTION/INSTALLATION INSPECTIONS AND TESTING REQUIRED (COMPLETED BY ENGINEER OF RECORD)	REPORT ITEM
N/A	ENGINEER OF RECORD APPROVED SHOP DRAWINGS [1]
N/A	MATERIAL SPECIFICATIONS REPORT [2]
N/A	FABRICATOR NDE INSPECTION
N/A	PACKING SLIPS [3]
ADDITIONAL TESTING AND INSPECTIONS:	
DURING CONSTRUCTION	
CONSTRUCTION/INSTALLATION INSPECTIONS AND TESTING REQUIRED (COMPLETED BY ENGINEER OF RECORD)	REPORT ITEM
REQUIRED	STEEL INSPECTIONS
N/A	HIGH STRENGTH BOLT INSPECTIONS
N/A	HIGH WIND ZONE INSPECTIONS [4]
N/A	FOUNDATION INSPECTIONS
N/A	CONCRETE COMP. STRENGTH, SLUMP TESTS AND PLACEMENT
N/A	POST INSTALLED ANCHOR VERIFICATION [5]
N/A	GROUT VERIFICATION
N/A	CERTIFIED WELD INSPECTION
N/A	EARTHWORK: LIFT AND DENSITY
N/A	ON SITE COLD GALVANIZING VERIFICATION
N/A	GUY WIRE TENSION REPORT
ADDITIONAL TESTING AND INSPECTIONS:	
AFTER CONSTRUCTION	
CONSTRUCTION/INSTALLATION INSPECTIONS AND TESTING REQUIRED (COMPLETED BY ENGINEER OF RECORD)	REPORT ITEM
REQUIRED	MODIFICATION INSPECTOR REDLINE OR RECORD DRAWINGS [6]
N/A	POST INSTALLED ANCHOR PULL–OUT TESTING
REQUIRED	PHOTOGRAPHS
ADDITIONAL TESTING AND INSPECTIONS:	

NOTES:

1. REQUIRED FOR ANY NEW SHOP FABRICATED FRP OR STEEL.
2. PROVIDED BY MANUFACTURER, REQUIRED IF HIGH STRENGTH BOLTS OR STEEL.
3. PROVIDED BY GENERAL CONTRACTOR; PROOF OF MATERIALS.
4. HIGH WIND ZONE INSPECTION CATB 120MPH OR CAT C,D 110MPH INSPECT FRAMING OF WALLS, ANCHORING, FASTENING SCHEDULE.
5. ADHESIVE FOR REBAR AND ANCHORS SHALL HAVE BEEN TESTED IN ACCORDANCE WITH ACI 355.4 AND ICC–ES AC308 FOR CRACKED CONCRETE AND SEISMIC APPLICATIONS. DESIGN ADHESIVE BOND STRENGTH HAS BEEN BASED ON ACI 355.4 TEMPERATURE CATEGORY B WITH INSTALLATIONS INTO DRY HOLES DRILLED USING A CARBIDE BIT INTO CRACKED CONCRETE THAT HAS CURED FOR AT LEAST 21 DAYS. ADHESIVE ANCHORS REQUIRING CERTIFIED INSTALLATIONS SHALL BE INSTALLED BY A CERTIFIED ADHESIVE ANCHOR INSTALLER PER ACI 318–11 D.9.2.2. INSTALLATIONS REQUIRING CERTIFIED INSTALLERS SHALL BE INSPECTED PER ACI 318–11 D.8.2.4.
6. AS REQUIRED; FOR ANY FIELD CHANGES TO THE ITEMS IN THIS TABLE.

NOTES:

1. ALL CONNECTIONS TO BE SHOP WELDED & FIELD BOLTED USING 3/4"ø A325–X BOLTS, UNLESS OTHERWISE NOTIFIED.
2. SHOP DRAWING ENGINEER REVIEW & APPROVAL REQUIRED BEFORE ORDERING MATERIAL.
3. SHOP DRAWING ENGINEER REVIEW & APPROVAL REQUIRED PRIOR TO STEEL FABRICATION.
4. VERIFICATION OF EXISTING ROOF CONSTRUCTION IS REQUIRED PRIOR TO THE INSTALLATION OF THE ROOF PLATFORM. ENGINEER OF RECORD IS TO APPROVE EXISTING CONDITIONS IN ORDER TO MOVE FORWARD.
5. CENTERLINE OF PROPOSED STEEL PLATFORM SUPPORT COLUMNS TO BE CENTRALLY LOCATED OVER THE EXISTING BUILDING COLUMNS.
6. EXISTING BRICK MASONRY COLUMNS/BEARING TO BE REPAIRED/REPLACED AT ALL PROPOSED PLATFORM SUPPORT POINTS. ENGINEER OF RECORD TO REVIEW AND APPROVE.

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: CT5457
SITE NAME: GRISWOLD WEST

181 NORMAN ROAD
JEWETT CITY, CT 06002
NEW LONDON COUNTY

at&t
550 COCHITUATE ROAD
FRAMINGHAM, MA 01701

NO.	DATE	REVISIONS	BY	CHK	APP'D
1	05/14/18	ISSUED FOR CONSTRUCTION	MR	AT	DJC
0	05/01/18	ISSUED FOR CONSTRUCTION	MR	AT	DJC

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

STATE OF CONNECTICUT
DEREK J. CREASER
No. 25[illegible]
LICENSED PROFESSIONAL ENGINEER

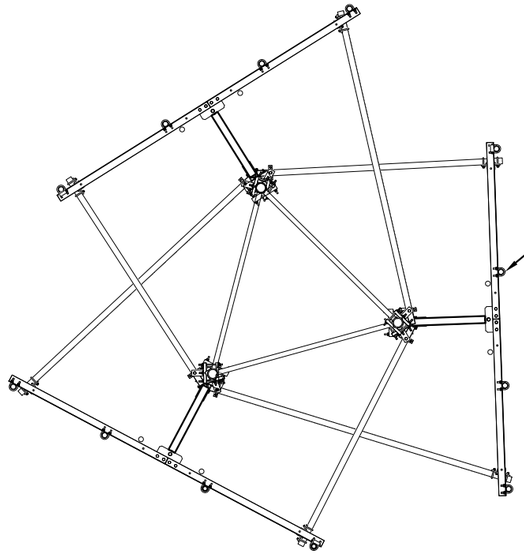
AT&T

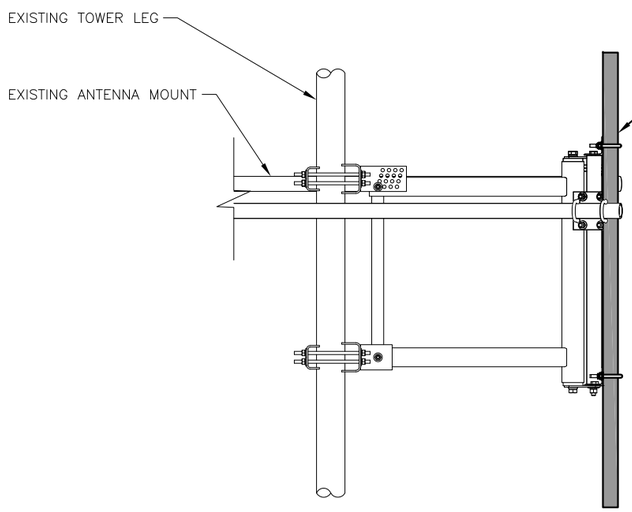
STRUCTURAL NOTES
(LTE 4C)

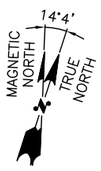
SITE NUMBER	DRAWING NUMBER	REV
CT5457	SN–1	1

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: MAY 09, 2018 (REV.4)







MOUNT REINFORCEMENT PLAN (1 / S–1)
SCALE: N.T.S

MOUNT REINFORCEMENT SECTION (2 / S–1)
22x34 SCALE: 1"=1'–0"
11x17 SCALE: 1/2"=1'–0"

0 0'–6" 1'–0" 2'–0" 3'–0"

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NO.	DATE	REVISIONS	BY	CHK	APP'D
1	05/14/18	ISSUED FOR CONSTRUCTION	MR	AT	DJC
0	05/01/18	ISSUED FOR CONSTRUCTION	MR	AT	DJC

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

STATE OF CONNECTICUT
DEREK J. CREASER
No. 23587
LICENSED PROFESSIONAL ENGINEER

AT&T

STRUCTURAL DETAILS
(LTE 4C)

SITE NUMBER	DRAWING NUMBER	REV
CT5457	S–1	1

ALLPRO
CONSULTING GROUP, INC.
9221 Lyndon B. Johnson Freeway, #204, Dallas, TX 75243 ★ PHONE 972-231-8893 ★ FAX 1-866-364-8375
www.allprocgi.com ★ e-mail: info@allprocgi.com

Tower Modification Design Report for
SBA Network Services, Inc.

Existing 160' Self-Support Tower
SBA Site Name: Griswold 2, CT
SBA Site ID: CT10012-A-01
Carrier Name: AT&T
Carrier Site Name: CT5457/Griswold West
App # 75698, v2

Site Location: 181 A Norman Road
Griswold, CT 06351
New London County

Latitude: 41.601097
Longitude: -71.954325

ACGI Job # 18-5030
(Refer to previous ACGI Job # 18-0513, dated 02/13/2018)

ANALYSIS RESULTS		
Tower Components	98.4%	**Pass w/ modifications**
Tower Foundation	97.0%	**Pass**
Change in maximum stress due to new mounts	+ 0.2%	**Change due to new pipe mounts**

Prepared By:
Brayan Andrade, EIT

07/24/2018
Approved By
Joji M. George, PE.
CT PE# 24444

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APPENDIX I

1. ANALYSIS SUMMARY

The existing 160' Self-support Tower located in Griswold, Connecticut was analyzed and designed for modifications by Allpro Consulting Group, Inc. (ACGI) for the existing and the proposed AT&T antennas, radios and coaxes as authorized by SBA Communication Corp. Based on the results of the analysis, the existing tower with below mentioned proposed and existing loading is found **to be in code compliance** with *TIA-222-G*, *Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and the* 2016 Connecticut State Building Code (IBC 2012), **after installation of the proposed tower modifications.**

2. SCOPE & SOURCE OF INFORMATION

The purpose of this structural analysis is to determine whether the existing structure is capable of supporting additional proposed loads.

SOURCE OF INFORMATION		
Tower Data:	Rohn Industries, Inc.	Original Tower Design by Rohn Industries, Inc., Rohn File No. 37696SP001, date April 6, 1999
	FDH Velocitel Inc.	Previous structural analysis by FDH Velocitel Inc., Project # 15BVKZ1400, dated July 10, 2015
	Allpro Consulting Group, Inc.	Previous structural analysis by Allpro Consulting Group, Inc., ACGI # 16-0261, dated 03/18/2016; ACGI # 16-2850, dated 08/10/2016, ACGI # 16-3553, dated 10/12/2016, ACGI # 17-0376, dated 02/14/2017, ACGI # 18-0513, dated 02/13/2018. Tower Modification by Allpro Consulting Group, Inc., ACGI #18-2070, dated 04/12/2018
Foundation Data:	FDH Velocitel Inc.	Dispersive Wave Propagation Testing and Rebar Investigation by FDH Velocitel, Inc., Project # 16BDGF1500, dated 03/03/2016
Geotechnical Report:	FDH Velocitel Inc.	Geotechnical Evaluation of Subsurface Conditions by FDH Velocitel Inc., Project # 16BDCN1600, dated 03/04/2016
Loading Data:	Allpro Consulting Group, Inc.	Existing loading as per previous structural analysis by Allpro Consulting Group, Inc., ACGI Job # 17-0376, dated 02/14/2017.
	SBA Communication Corp.	Proposed final loading for AT&T as per Application ID # 75698, v2 downloaded from SBA portal
Authorization:	SBA Communication Corp.	

3. ANALYSIS METHODS & DATA

The analysis was performed in accordance with Telecommunication Industry Association specification TIA-222-G-Addendum 2. The tower was modeled using TNX Tower, a 3-D finite element program. TNX Tower is a general-purpose modeling, analysis, and design program created specifically for communication towers using the EIA-222-C, EIA-222-D, TIA/EIA-222-F or TIA-222-G standards. The 3-D model included the tower, with existing appurtenances and all proposed loads.

SITE DATA	
SBA Site Name:	Griswold 2, CT
SBA Site Number:	CT10012-A-01
Carrier Site Name:	AT&T: CT5457/Griswold West
City, State:	Griswold, CT
County:	New London
Code Wind Load Requirement:	TIA-222-G (132 mph ultimate wind speed equal to 102 mph nominal wind speed) & 2016 Connecticut State Building Code (IBC 2012)
Wind Load Used:	TIA-222-G Code: • Nominal wind speed of 102 mph (3 second gust wind speed) • Structure Class II.* • Exposure Category C. • Topographic Category 1. • Crest Height 0.00 ft. • A wind speed of 50 mph is used in combination with ice. • Nominal ice thickness of 0.75 in.
Seismic Check:	Spectral Response Acceleration at Short Period (Ss) is 0.169 g which less than 1.000 g. Therefore, no seismic check is required as per TIA-222-G section 2.7.3

Note: This structural analysis is based upon the tower being classified as a class II; however, if a different classification is required subsequent to the date hereof, the tower classification will be changed to meet such requirement and a new structural analysis will be run.

TOWER DATA	
Tower Type:	3 Sided Self-support Tower
Height:	160'
Cross Section:	Triangular
Steel Strength:	Legs – 50 ksi, Braces – 36 ksi
Type of Foundation:	Individual concrete pad with square pedestal

TOWER HISTORY	
Tower Manufacturer / Model:	ROHN/ SSV TOWER
Date of Original Design:	04/06/1999
Previous Modifications:	By Allpro Consulting Group, Inc., ACGI #18-2070, dated 04/12/2018
Original Design Code Reqts:	TIA/EIA 222-F 1996, 90mph + 1/2" ice

4. CONCLUSIONS

RESULT SUMMARY		
MEMBER	*% Capacity*	*Pass/Fail*
Leg	**95.9%**	**Pass**
Diagonal	**98.4%**	**Pass w/ modifications**
Top Girt	**6.1%**	**Pass**
Bolt Checks	**90.8%**	**Pass**
Anchor Bolt Check	**66.5%**	**Pass**
Foundation (see attached MathCAD for details)	**Overturning: 27.1%**	**Pass**
	Uplift: 97.0%	**Pass**
	Bearing: 73.0%	**Pass**
	Shear: 18.5%	**Pass**
Tower Overall Rating = 98.4% (Pass w/ modifications)		

As per the results of the analysis, the existing tower is **in code compliance** for the new and existing antenna loads, **after proposed modifications are installed as indicated.**

Upon installation of proposed modifications, maximum tower member stress is **less than allowable,** making it **in code compliance** under the TIA-222-G code and 2016 Connecticut State Building Code (IBC 2012) requirements.

5. RECOMMENDATIONS

The existing tower is recommended for the final loading listed under Section 8 "Appurtenances Listing", after installing the proposed modifications.

Modifications Required:

1. **Reinforce existing diagonal L3 1/2x3 1/2x1/4 with L3 1/2x3 1/2x1/4making C section for 10'-0'.**

Modification should be installed by a contractor familiar with the work to be performed.

Cost estimate for the modifications is around $22,054.34 - $25,042.93. General Contractor bids are pending and will be provided shortly under a separate cover.

6. ASSUMPTIONS

This analysis was completed based on the following assumptions:

- Tower has been properly maintained
- Tower erection was in accordance to manufacturer drawings
- Leg flanges have been properly designed by manufacturer to not be a limiting reaction
- Welds have been properly designed and installed by manufacturer to not be a limiting reaction
- Foundation was constructed in accordance to manufacturer drawings
- Foundation does not have structural damage
- Bolts have been properly tightened according to manufacturer specifications
- Appurtenance, mount and transmission line sizes and weights are best estimates using the tnxTower database and manufacturer information

7. DISCLAIMER

Installation procedures and related loading are not within the scope of this analysis. A contractor experienced in similar work should perform all installation work. The engineering services provided by Allpro Consulting Group, Inc. (ACGI) are limited to the computer analysis and calculations of the structure with the proposed and existing loads. This analysis is considered void if the loading mentioned in this report is changed or is different as installed. It is assumed that the existing structure is properly maintained and is in good condition free of any defects. Scope of this analysis does not include existing connections, except as noted in this report.

ACGI does not make any warranties, expressed or implied in connection with this engineering analysis report and disclaims any liability arising from deficiencies or any existing conditions of the original structure. ACGI will not be responsible for consequential or incidental damages sustained by any parties as a result of any data or conclusions included in this Report. The maximum liability of ACGI pursuant to this report shall be limited to the consulting fee received for the preparation of the report.

8. APPURTENANCE LISTING

EXISTING LOAD DESCRIPTION					
ELEV (ft.)	***Qty.***	***Antenna Description***	***Mount Type & Qty.***	***TX. LINE (in)***	***TENANT***
169±	2	Decibel 20' x 2"Dipoles	Direct Mount (@ 160')	(2) 7/8 (1) 1/2	Quinebaug Comm 911
163±	1	Andrew DB201-C Omni			
158±	6	Commscope SBNHH-1D65B Antennas	(3) 15' T-Frames (1)Sabre Universal Pipe Mount	(12) 1-5/8 (Double Stacked) (2) 1-5/8 Hybrid Fiber	Verizon
	3	Antel BXA-70080-4CF-EDIN-0 Antennas			
	3	Alcatel Lucent RH4x45-AWS RRH			
	3	Alcatel Lucent RH 2x60-700U RRH			
	3	Alcatel-Lucent RH 2x60-PCS RRH			
	2	RFS DB-T1-6Z-8AB-0Z ODU			
148±	3	RFS APXV18-209015-C Antennas	(3) 10.5' T-Frames	(12) 1-5/8	T-Mobile
	3	Commscope LNX-6515DS-A1M Antennas			
	3	RFS ATMAA1412D-1A20 TMAs			
135±	9	Powerwave 7770 Antennas	(3) 12' T-Frames (@137')	(12) 1-1/4 (Triple Stacked) (2) 3/4 DC Cables (1) 1/2 Fiber	AT&T
	1	CCI HPA-65R-BUU-H6 Antenna			
	2	CCI HPA-65R-BUU-H8 Antennas			
	3	Ericsson RRUS-11 Radios			
	3	Ericsson RRUS-12 Radios			
	3	Ericsson RRU-A2 Module			
	6	Powerwave LGP21903 Diplexers			
	1	Raycap DC6-48-60-18-8F			
130±	6	Powerwave LGP21401 TMAs			
128±	6	Kathrein 742 351	(3) 12' T-Frames	(12) 1-5/8 (1) 3/8	Metro PCS
82±	1	Yagi	Direct Mount	(1) 1/2	Quinebaug Comm 911
76±	1	GPS	(1) 3' Standoff	(1) 1/2	Verizon
68±	1	6' Trombone	Direct Mount	(1) 1/2	Quinebaug Comm 911

AT&T FINAL LOAD DESCRIPTION					
ELEV (ft.)	***Qty.***	***Antenna Description***	***Mount Type & Qty.***	***TX. LINE (in)***	***TENANT***
135±	6	Powerwave 7770 Antennas	(3) T-Frames **(6) 2-1/2"x6' Mount Pipes**	(12) 1-1/4 Coax (1) 1/2 Fiber **(1) 7/16 Fiber** **(4) 3/4 DC Power**	AT&T
	1	Cci HPA-65R-BUU-H6 Antennas			
	2	Cci HPA-65R-BUU-H8 Antennas			
	1	**KMW EPBQ-654L8H6-L2 Antennas**			
	2	**KMW EPBQ-654L8H8-L2 Antennas**			
	6	Powerwave LGP21903 Diplexers			
	3	Ericsson RRUS-11 Radios			
	3	Ericsson RRUS-12 Radios			
	3	**Ericsson RRUS-32 Radios**			
	3	**Ericsson 4478 Radios**			
	3	Ericsson RRUS A2 Modules			
	1	Raycap DC6-48-60-0-8F DC Surge Suppressors			
	1	**Raycap DC6-48-60-18-8C DC Surge Suppressors**			
130±	6	Powerwave LGP21401 TMAs			

Notes:

1. ACGI should be notified of any discrepancies found in the data listed in this report.
2. Notify Allpro Consulting Group, Inc. of any potential physical & other interference with existing antennas for a redesign.

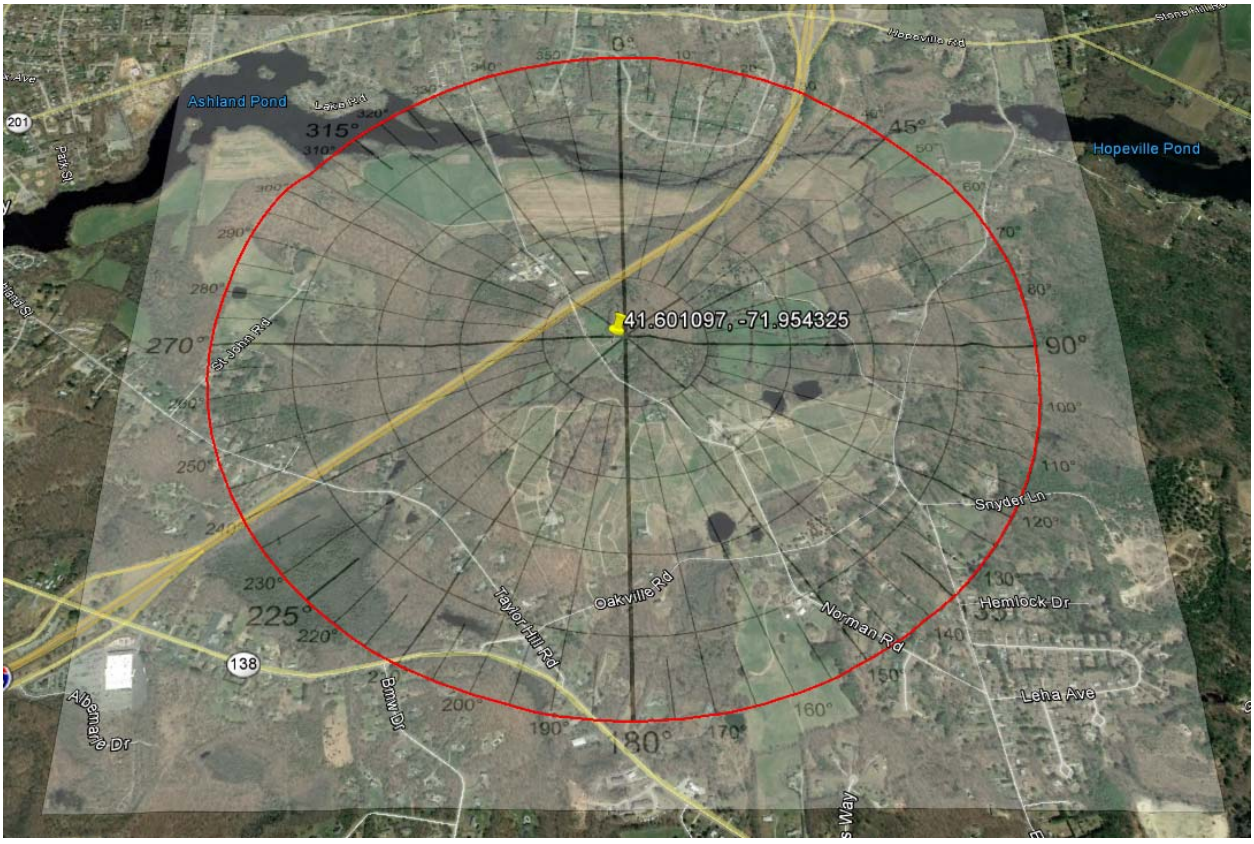
9. SUMMARY OF WORKING PERCENTAGE OF STRUCTURAL COMPONENTS

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T1	160 - 140	Leg	ROHN 2.5 STD	2	-22201.50	63560.30	34.9	Pass
T2	140 - 120	Leg	ROHN 3 STD	38	-62520.80	82509.00	75.8	Pass
T3	120 - 100	Leg	ROHN 3.5 EH	68	-103909.00	125723.00	82.6	Pass
T4	100 - 80	Leg	ROHN 4 EH	89	-143639.00	159903.00	89.8	Pass
T5	80 - 60	Leg	ROHN 5 EH	110	-182451.00	239378.00	76.2	Pass
T6	60 - 40	Leg	ROHN 6 EHS	131	-216954.00	244047.00	88.9	Pass
T7	40 - 20	Leg	ROHN 6 EH	146	-254899.00	303757.00	83.9	Pass
T8	20 - 10	Leg	ROHN 6 EH	161	-274112.00	303730.00	90.2	Pass
T9	10 - 0	Leg	ROHN 6 EH	170	-291260.00	303730.00	95.9	Pass
T1	160 - 140	Diagonal	L1 3/4x1 3/4x3/16	10	-3565.06	8788.95	40.6	Pass
							60.5 (b)	
T2	140 - 120	Diagonal	L2x2x3/16	45	-6139.73	7810.37	78.6	Pass
							89.8 (b)	
T3	120 - 100	Diagonal	L2 1/2x2 1/2x3/16	72	-6780.02	9552.75	71.0	Pass
							86.2 (b)	
T4	100 - 80	Diagonal	L2 1/2x2 1/2x3/16	93	-7165.40	7279.23	98.4	Pass
T5	80 - 60	Diagonal	L3x3x1/4	114	-7870.09	13051.40	60.3	Pass
							67.3 (b)	
T6	60 - 40	Diagonal	L3 1/2x3 1/2x1/4	135	-9339.81	14294.60	65.3	Pass
							65.6 (b)	
T7	40 - 20	Diagonal	L3 1/2x3 1/2x1/4	150	-10569.30	12044.30	87.8	Pass
T8	20 - 10	Diagonal	L3 1/2x3 1/2x1/4	165	-9936.05	11028.70	90.1	Pass
T9	10 - 0	Diagonal	L3.5x3.5x1/4 + L3.5x3.5x1/4 (C-shape - MOD)	174	-10922.80	43089.90	25.3	Pass
							61.0 (b)	
T1	160 - 140	Top Girt	L1 3/4x1 3/4x3/16	4	-104.51	3088.02	3.4	Pass
T2	140 - 120	Top Girt	L1 3/4x1 3/4x3/16	41	-189.50	3088.02	6.1	Pass
							Summary	
						Leg (T9)	95.9	Pass
						Diagonal (T4)	98.4	Pass
						Top Girt (T2)	6.1	Pass
						Bolt Checks	90.8	Pass
						RATING =	**98.4**	**Pass**

APPENDIX

SITE DATA



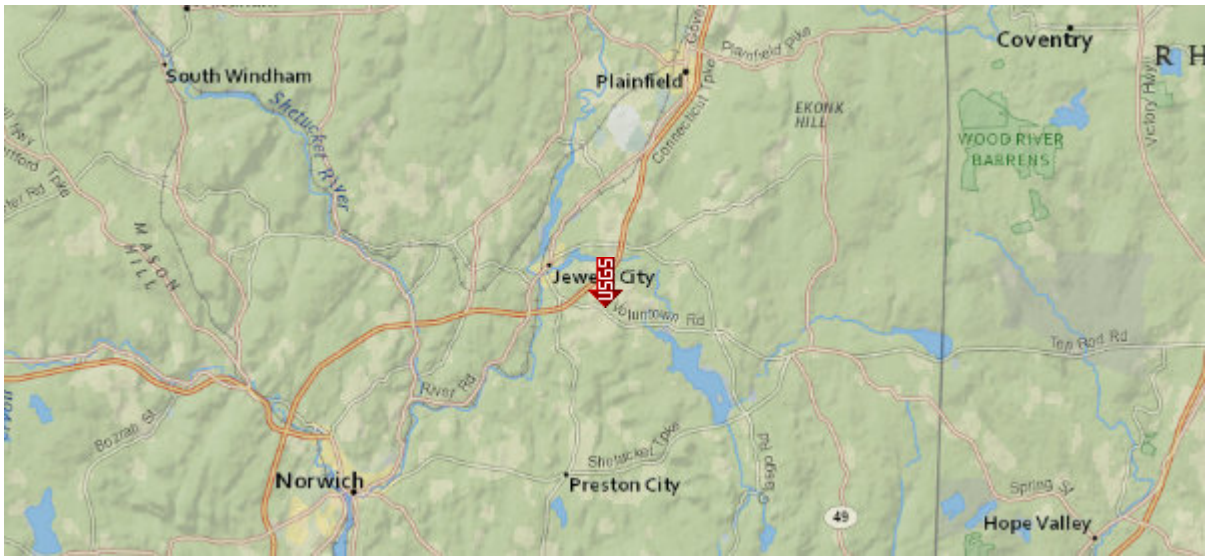
Topographic Category “1”

Exposure Category “C’’

USGS Design Maps Summary Report

User–Specified Input

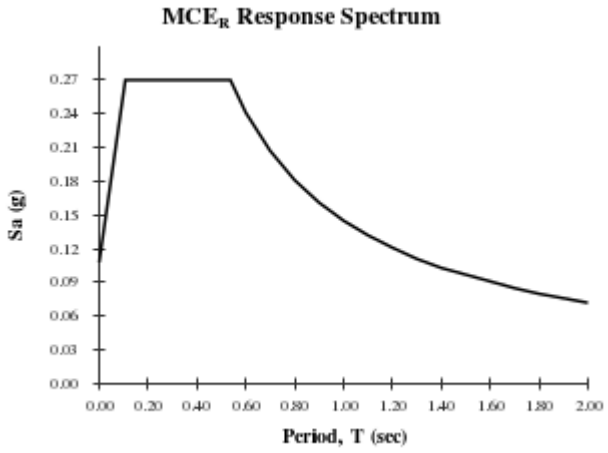
Building Code Reference Document	2012/2015 International Building Code (which utilizes USGS hazard data available in 2008)
Site Coordinates	41.6011°N, 71.95433°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category	I/II/III

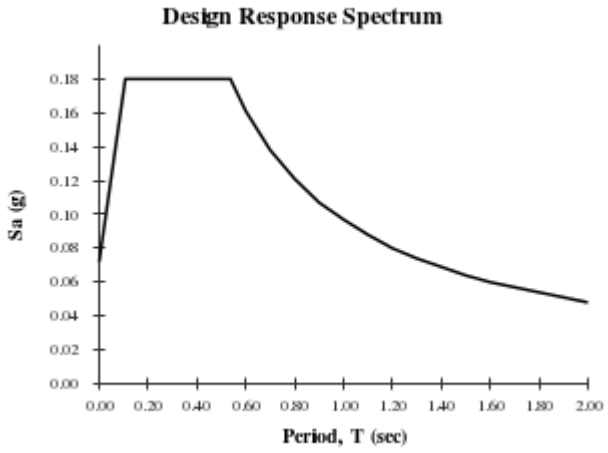


USGS–Provided Output

S_S =	0.169 g	S_{MS} =	0.270 g	S_{DS} =	0.180 g
S_1 =	0.060 g	S_{M1} =	0.145 g	S_{D1} =	0.097 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.





⚠ This is a beta release of the new ATC Hazards by Location website. Please contact us with feedback.

Hazards by Location

Search Information

Coordinates: 41.601097, -71.954325

Timestamp: 2018-07-23T19:19:32.277Z

Hazard Type: Wind

Map Results

Text Results

ASCE 7-16

MRI 10-Year	76 mph
MRI 25-Year	86 mph
MRI 50-Year	97 mph
MRI 100-Year	102 mph
Risk Category I	115 mph
Risk Category II	125 mph
Risk Category III	⚠ 134 mph

If the structure under consideration is a healthcare facility, you are in a wind-borne debris region. If other occupancy, use the Risk Category II basic wind speed contours to determine if you are in a wind-borne debris region.

Risk Category IV	⚠ 137 mph

You are in a wind-borne debris region if you are also within 1 mile of the coastal mean high water line.

ASCE 7-10

MRI 10-Year	80 mph
MRI 25-Year	90 mph
MRI 50-Year	98 mph
MRI 100-Year	107 mph
Risk Category I	122 mph

Risk Category II ⚠ 133 mph

You are in a wind-borne debris region if you are also within 1 mile of the coastal mean high water line.

Risk Category III-IV ⚠ 143 mph

If the structure under consideration is a healthcare facility, you are in a wind-borne debris region. If other occupancy, use the Risk Category II basic wind speed contours to determine if you are in a wind-borne debris region.

ASCE 7-05

ASCE 7-05 Wind Speed ⚠ 111 mph

You are in a wind-borne debris region if you are also within 1 mile of the coastal mean high water line.

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Disclaimer

Hazard loads are interpolated from data provided in ASCE 7 and rounded up to the nearest whole integer. Per ASCE 7, islands and coastal areas outside the last contour should use the last wind speed contour of the coastal area – in some cases, this website will extrapolate past the last wind speed contour and therefore, provide a wind speed that is slightly higher. NOTE: For queries near wind-borne debris region boundaries, the resulting determination is sensitive to rounding which may affect whether or not it is considered to be within a wind-borne debris region.

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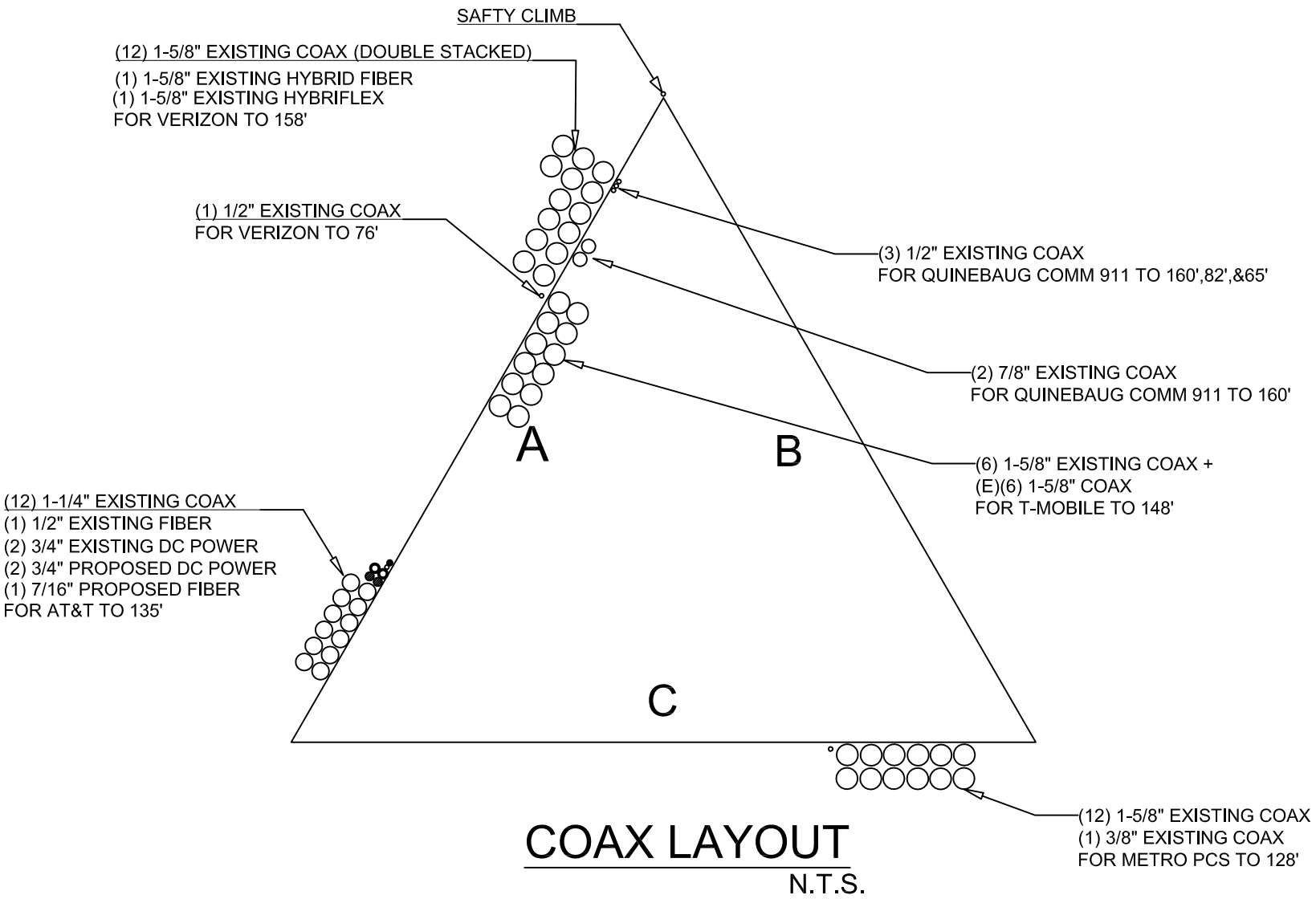
COAX LAYOUT



COAX LAYOUT

N.T.S.

TOWER ELEVATION DRAWING

SYMBOL LIST

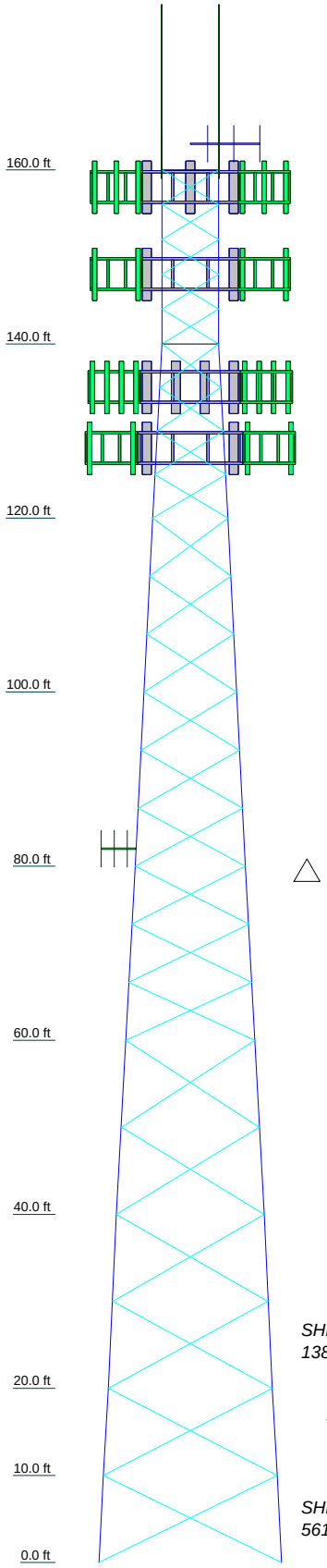
MARK	SIZE	MARK	SIZE
A	L3.5x3.5x1/4 + L3.5x3.5x1/4 (C-shape - MOD)		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in New London County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 102 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: 98.4%



Section	T1	T2	T3	T4	T5	T6	T7	T8	T9		
Legs	ROHN 2.5 STD	ROHN 3 STD	ROHN 3.5 EH	ROHN 4 EH	ROHN 5 EH	ROHN 6 EHS	ROHN 6 EH				
Leg Grade	A572-50										
Diagonals	L1 3/4x1 3/4x3/16	L2x2x3/16	L2 1/2x2 1/2x3/16		L3x3x1/4		L3 1/2x3 1/2x1/4		A		
Diagonal Grade	A36				A572-50						
Top Girts	L1 3/4x1 3/4x3/16				N.A.						
Face Width (ft)	6.58		8.59	10.65	12.74	14.83	16.92	18.88	19.92		20.96
# Panels @ (ft)	5 @ 4	4 @ 5		9 @ 6.66667			6 @ 10				17450.1
Weight (lb)	921.8	1079.8	1469.5	1728.0	2731.0	2801.6	3290.6	1693.3	1734.6		

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 300213 lb
SHEAR: 34330 lb

UPLIFT: -266210 lb
SHEAR: 30768 lb

AXIAL 112087 lb
SHEAR 13834 lb *MOMENT 1329 kip-ft*
TORQUE 8 kip-ft
50 mph WIND - 0.7500 in ICE

AXIAL 40732 lb
SHEAR 56177 lb *MOMENT 5207 kip-ft*
TORQUE 32 kip-ft
REACTIONS - 102 mph WIND

Allpro consulting Group, Inc.
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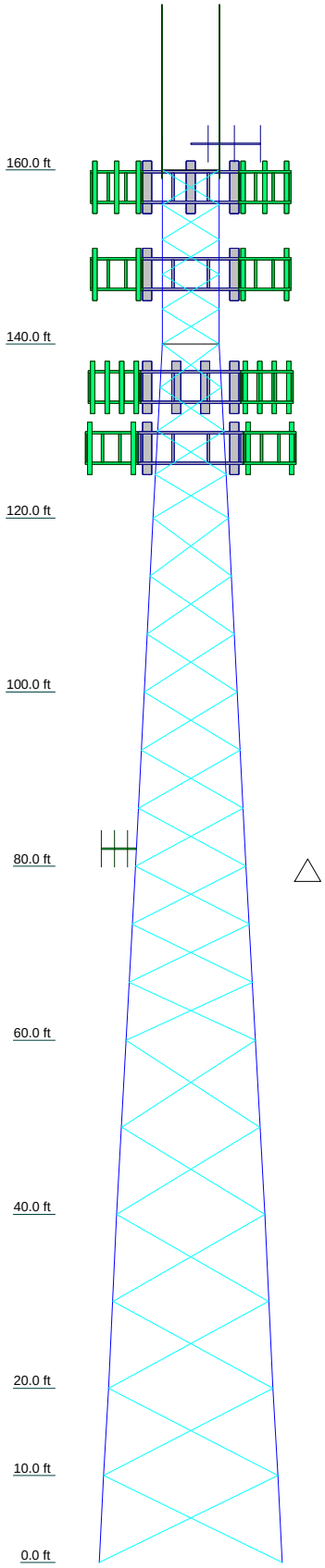
Dallas, TX 75243
Phone: 972-231-8893
FAX: 866-364-8375

Job: **CT10012-A-01**			
Project: **18-5030**			
Client: SBA	Drawn by: Bandrade	App'd:	
Code: TIA-222-G	Date: 07/24/18	Scale: NTS	
Path:		Dwg No. E-1	

Section	Legs	Leg Grade	Diagonals	Diagonal Grade	Top Girts	Face Width (ft)	# Panels @ (ft)	Weight (lb)
T1	ROHN 2.5 STD	A572-50	L1 3/4x1 3/4x3/16	A36	L1 3/4x1 3/4x3/16	6.58	5 @ 4	921.8
T2	ROHN 3 STD		L2x2x3/16				4 @ 5	1079.8
T3	ROHN 3.5 EH		L2 1/2x2 1/2x3/16			8.59		1469.5
T4	ROHN 4 EH					10.65	9 @ 6.66667	1728.0
T5	ROHN 5 EH		L3x3x1/4	A572-50	N.A.	12.74		2731.0
T6	ROHN 6 EHS					14.83		2801.6
T7	ROHN 6 EH		L3 1/2x3 1/2x1/4			16.92	6 @ 10	3290.6
T8						18.88		1693.3
T9			A			19.92		1734.6
						20.96		17450.1



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod	160	(2) 2-1/2"x6' (ATI)	137
Beacon	160	(2) 2-1/2"x6' (ATI)	137
Decibel 20' x 2" Dipoles (Quinebaug Comm 911)	160	RRUS 11 (ATI)	135
		RRUS 11 (ATI)	135
Decibel 20' x 2" Dipoles (Quinebaug Comm 911)	160	RRUS 11 (ATI)	135
		RRUS 12 AWS (ATI)	135
DB201 C (Quinebaug Comm 911)	160	RRUS 12 AWS (ATI)	135
BXA-70080-4CF-EDIN-0 (Verizon)	158	RRUS 12 AWS (ATI)	135
BXA-70080-4CF-EDIN-0 (Verizon)	158	RRUS A2 (ATI)	135
BXA-70080-4CF-EDIN-0 (Verizon)	158	RRUS A2 (ATI)	135
(2) SBNHH-1D65B (Verizon)	158	RRUS A2 (ATI)	135
(2) SBNHH-1D65B (Verizon)	158	(2) LGP21903 Diplexer (ATI)	135
(2) SBNHH-1D65B (Verizon)	158	(2) LGP21903 Diplexer (ATI)	135
B66A RRH4x45-4R (Verizon)	158	(2) LGP21903 Diplexer (ATI)	135
B66A RRH4x45-4R (Verizon)	158	DC6-48-60-18-8F (ATI)	135
B66A RRH4x45-4R (Verizon)	158	EPBQ-654L8-H6-L2 (ATI)	135
RRH2x60-700U (Verizon)	158	EPBQ-654L8-H8-L2 (ATI)	135
RRH2x60-700U (Verizon)	158	EPBQ-654L8-H8-L2 (ATI)	135
RRH2x60-700U (Verizon)	158	RRUS 32 (ATI)	135
RRH2x60-PCS (Verizon)	158	RRUS 32 (ATI)	135
RRH2x60-PCS (Verizon)	158	RRUS 32 (ATI)	135
RRH2x60-PCS (Verizon)	158	4478 (ATI)	135
DB-T1-6Z-8AB-0Z (Verizon)	158	4478 (ATI)	135
DB-T1-6Z-8AB-0Z (Verizon)	158	4478 (ATI)	135
15' T-Frames (Verizon)	158	DC6-48-60-18-8C (ATI)	135
15' T-Frames (Verizon)	158	(2) 7770 (ATI)	135
15' T-Frames (Verizon)	158	(2) 7770 (ATI)	135
Sabre Universal Pipe Mount (Verizon)	158	(2) 7770 (ATI)	135
APXV18-209015-C (T-Mobile)	148	HPA-65R-BUU-H6 (ATI)	135
APXV18-209015-C (T-Mobile)	148	HPA-65R-BUU-H8-K (ATI)	135
APXV18-209015-C (T-Mobile)	148	HPA-65R-BUU-H8-K (ATI)	135
LNX-6515DS-A1M (T-Mobile)	148	(2) LGP 21401 TMA (ATI)	130
LNX-6515DS-A1M (T-Mobile)	148	(2) LGP 21401 TMA (ATI)	130
LNX-6515DS-A1M (T-Mobile)	148	(2) LGP 21401 TMA (ATI)	130
ATMAA1412D-1A20 (T-Mobile)	148	(2) 742 351 (Metro PCS)	128
ATMAA1412D-1A20 (T-Mobile)	148	(2) 742 351 (Metro PCS)	128
ATMAA1412D-1A20 (T-Mobile)	148	(2) 742 351 (Metro PCS)	128
10.5' T-Frame (T-Mobile)	148	12' T-Frame (Metro PCS)	128
10.5' T-Frame (T-Mobile)	148	12' T-Frame (Metro PCS)	128
10.5' T-Frame (T-Mobile)	148	12' T-Frame (Metro PCS)	128
12' T-Frame (ATI)	137	Yagi (Quinebaug Comm 911)	82
12' T-Frame (ATI)	137	GPS (Verizon)	76
12' T-Frame (ATI)	137	6' Trombone (Quinebaug Comm 911)	68
(2) 2-1/2"x6' (ATI)	137		

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	L3.5x3.5x1/4 + L3.5x3.5x1/4 (C-shape - MOD)		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in New London County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 102 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

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Dallas, TX 75243
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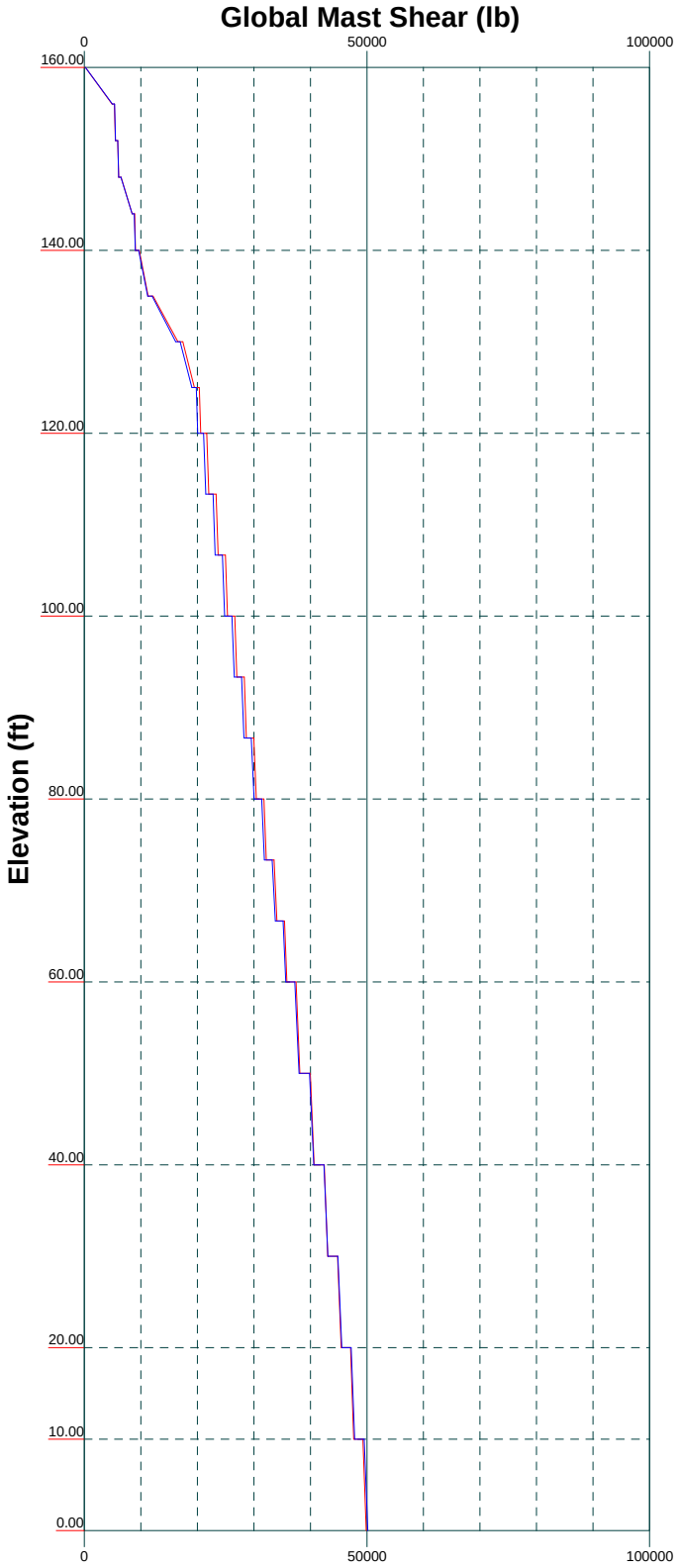
Job: ***CT10012-A-01***			
Project: ***18-5030***			
Client: SBA	Drawn by: Bandrade	App'd:	
Code: TIA-222-G	Date: 07/24/18	Scale: NTS	
Path:		Dwg No. E-1	

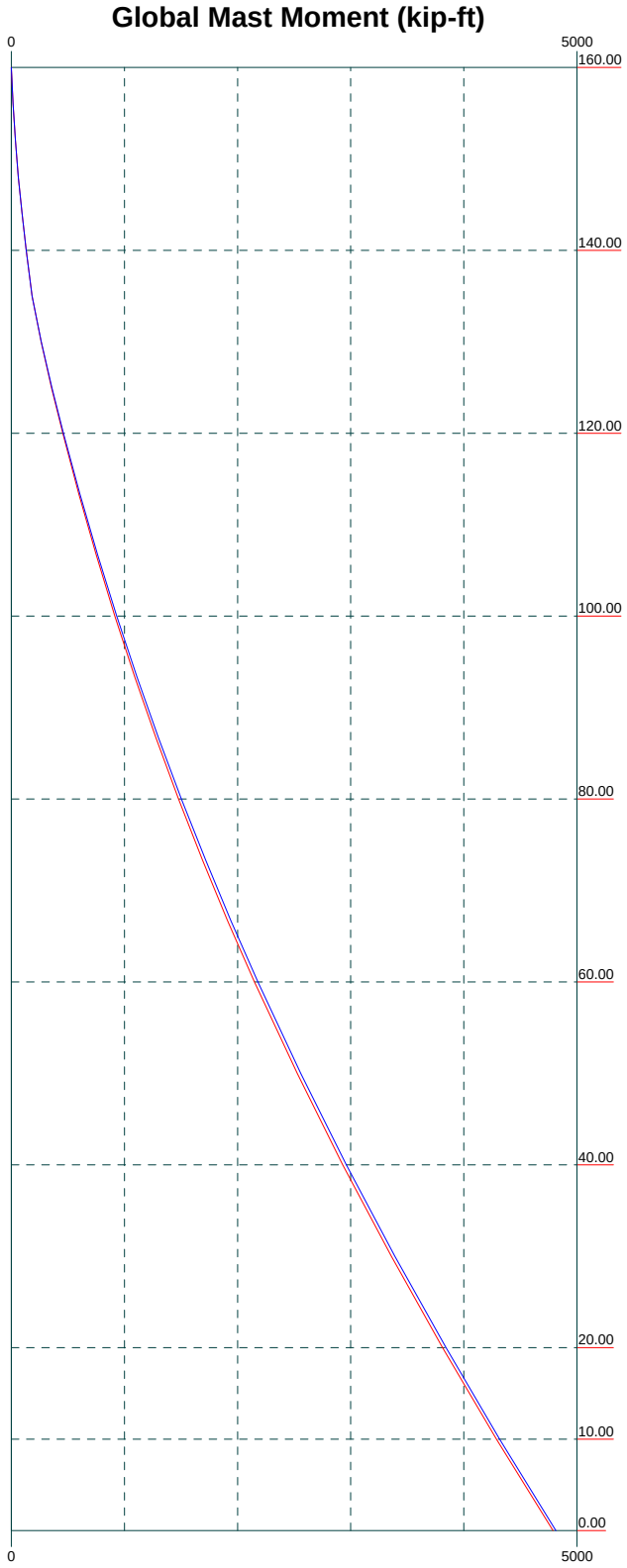
MISCELLANEOUS PLOTS

TIA-222-G - 102 mph/50 mph 0.7500 in Ice Exposure C

Maximum Values

Vx Vz Mx Mz





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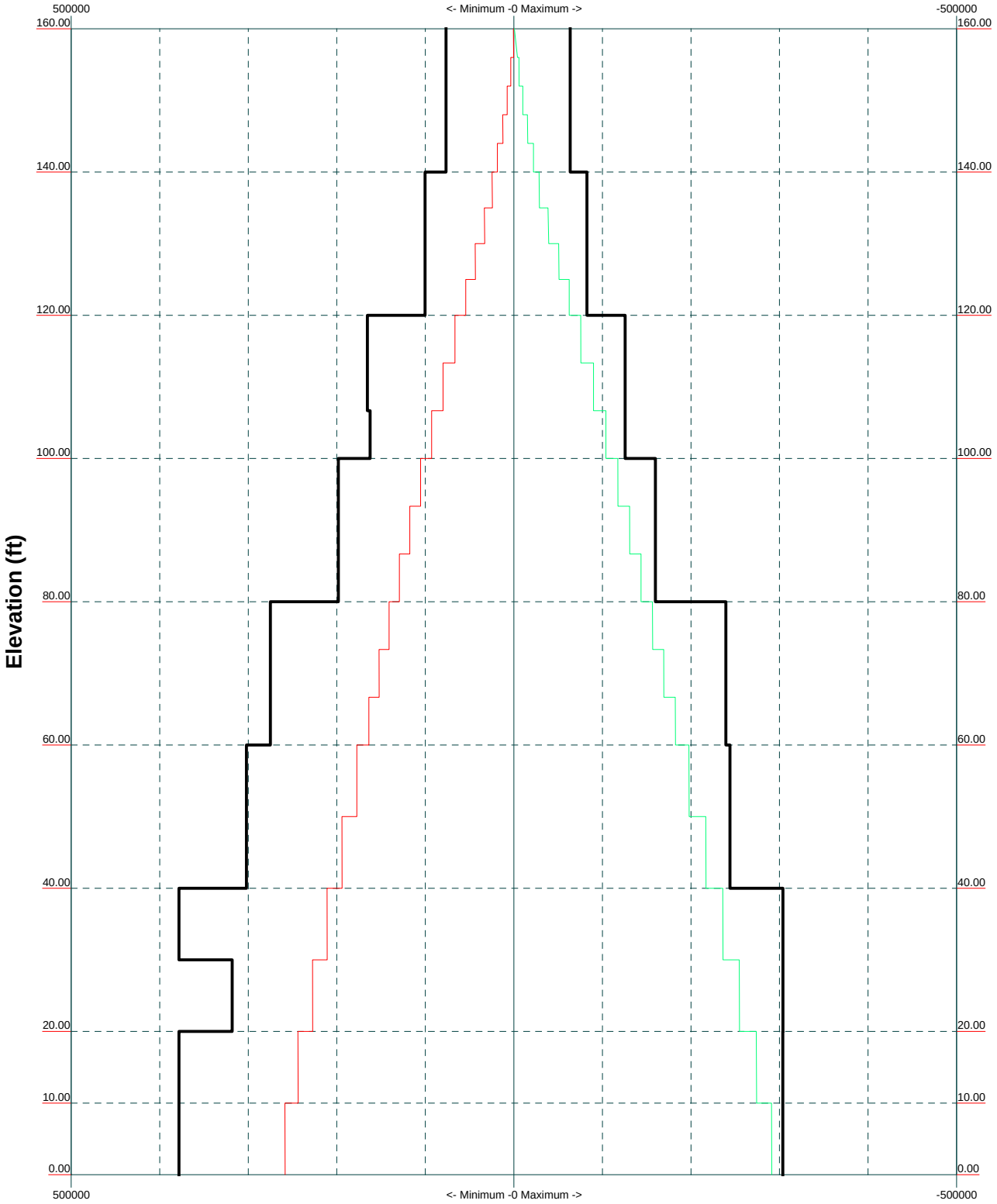
Project: ***18-5030***			
Client: SBA	Drawn by: Bandrade	App'd:	
Code: TIA-222-G	Date: 07/24/18	Scale: NTS	
Path:		Dwg No. E-4	

TIA-222-G - 102 mph/50 mph 0.7500 in Ice Exposure C

Leg Capacity ——— **Leg Compression (lb)**



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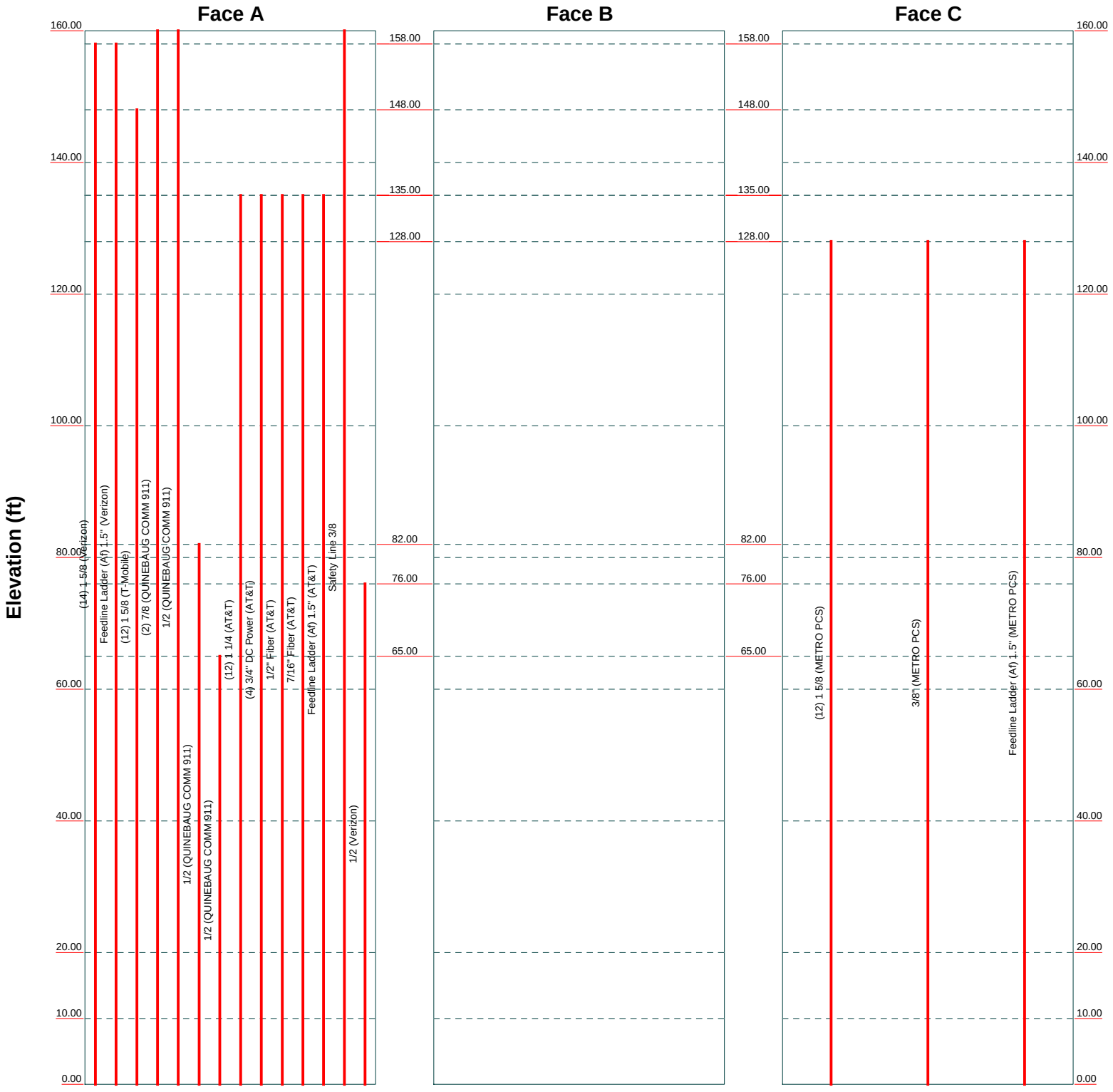
Job: ***CT10012-A-01***			
Project: ***18-5030***			
Client: SBA	Drawn by: Bandrade	App'd:	
Code: TIA-222-G	Date: 07/24/18	Scale: NTS	
Path:		Dwg No. E-3	

Feed Line Distribution Chart
0' - 160'

Round | Flat | App In Face | App Out Face | Truss Leg



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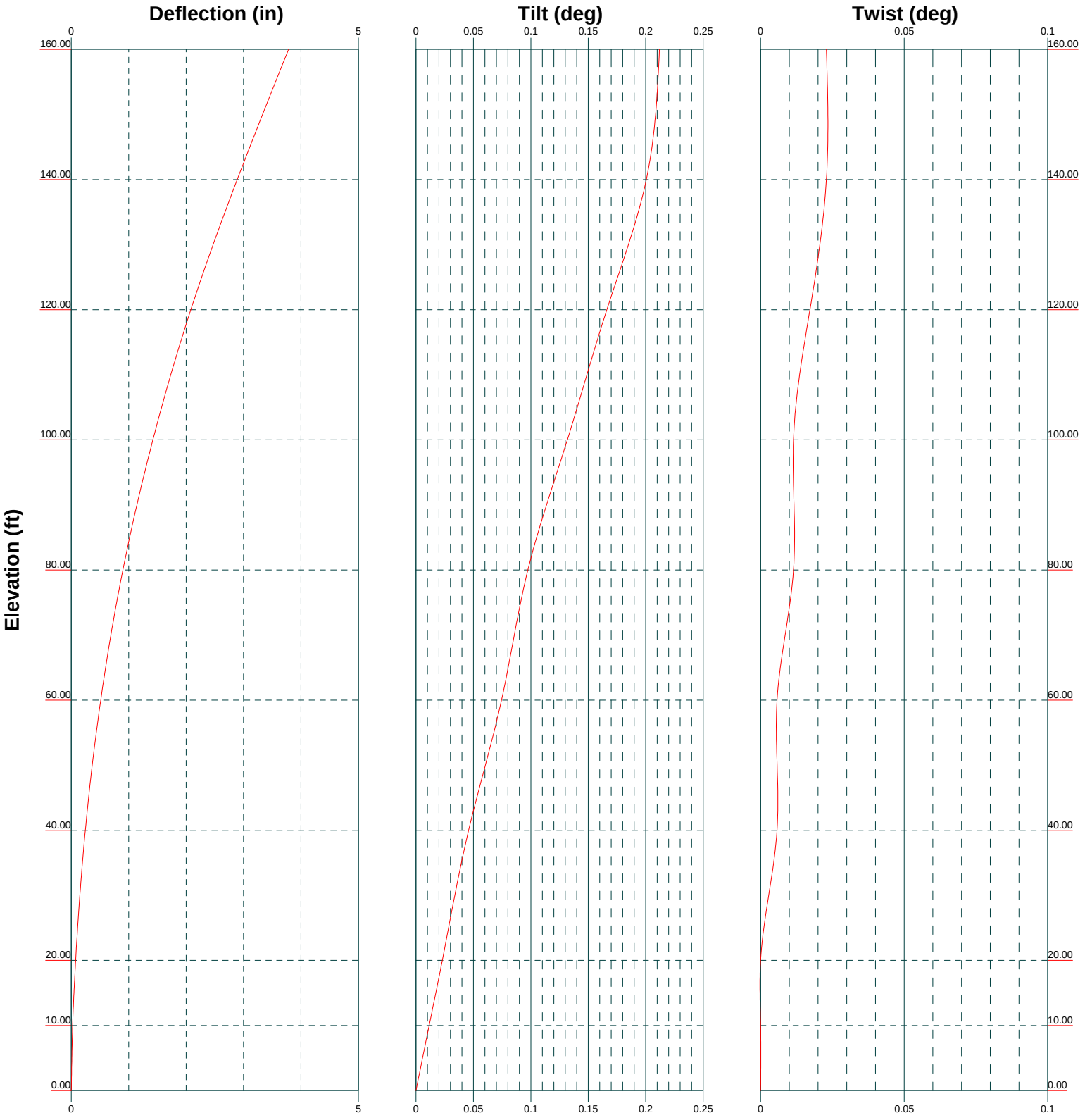
FAX: 866-364-8375

Job: ***CT10012-A-01***			
Project: ***18-5030***			
Client: SBA	Drawn by: Bandrade	App'd:	
Code: TIA-222-G	Date: 07/24/18	Scale: NTS	
Path:		Dwg No. E-7	

TIA-222-G - Service - 60 mph

Maximum Values



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Job: ***CT10012-A-01***			
Project: ***18-5030***			
Client: SBA	Drawn by: Bandrade	App'd:	
Code: TIA-222-G	Date: 07/24/18	Scale: NTS	
Path:		Dwg No. E-5	

CALCULATION PRINTOUT

Allpro consulting Group, Inc.
9221 Lyndon B Johnson Fwy
Dallas, TX 75243
Phone: 972-231-8893
FAX: 866-364-8375

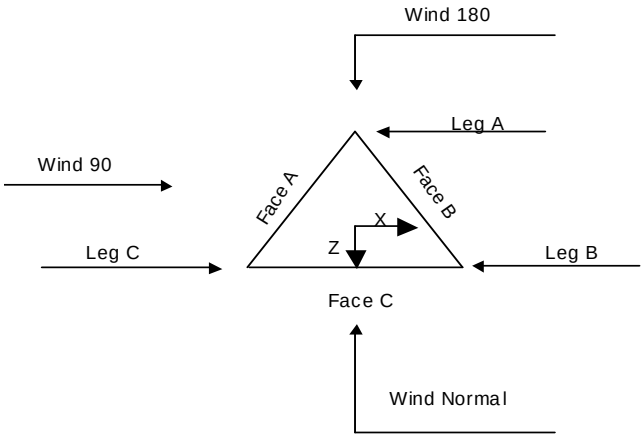
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 160.00 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 6.58 ft at the top and 20.96 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.
ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
Basic wind speed of 102 mph.
Structure Class II.
Exposure Category C.
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.
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.

Options

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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	160.00-140.00			6.58	1	20.00
T2	140.00-120.00			6.58	1	20.00
T3	120.00-100.00			8.59	1	20.00
T4	100.00-80.00			10.65	1	20.00
T5	80.00-60.00			12.74	1	20.00
T6	60.00-40.00			14.83	1	20.00
T7	40.00-20.00			16.92	1	20.00
T8	20.00-10.00			18.88	1	10.00
T9	10.00-0.00			19.92	1	10.00

Tower Section Geometry *(cont'd)*

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
T1	160.00-140.00	4.00	X Brace	No	No	0.0000	0.0000
T2	140.00-120.00	5.00	X Brace	No	No	0.0000	0.0000
T3	120.00-100.00	6.67	X Brace	No	No	0.0000	0.0000
T4	100.00-80.00	6.67	X Brace	No	No	0.0000	0.0000
T5	80.00-60.00	6.67	X Brace	No	No	0.0000	0.0000
T6	60.00-40.00	10.00	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
T7	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T8	20.00-10.00	10.00	X Brace	No	No	0.0000	0.0000
T9	10.00-0.00	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 160.00-140.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T2 140.00-120.00	Pipe	ROHN 3 STD	A572-50 (50 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)
T3 120.00-100.00	Pipe	ROHN 3.5 EH	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T4 100.00-80.00	Pipe	ROHN 4 EH	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 80.00-60.00	Pipe	ROHN 5 EH	A572-50 (50 ksi)	Equal Angle	L3x3x1/4	A572-50 (50 ksi)
T6 60.00-40.00	Pipe	ROHN 6 EHS	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A572-50 (50 ksi)
T7 40.00-20.00	Pipe	ROHN 6 EH	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A572-50 (50 ksi)
T8 20.00-10.00	Pipe	ROHN 6 EH	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A572-50 (50 ksi)
T9 10.00-0.00	Pipe	ROHN 6 EH	A572-50 (50 ksi)	Arbitrary Shape	L3.5x3.5x1/4 + L3.5x3.5x1/4 (C-shape - MOD)	A572-50 (50 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 160.00-140.00	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T2 140.00-120.00	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 160.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T2 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T3 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T4 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T5 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T6 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T7 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T8 20.00-10.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T9 10.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1	Yes	Yes	1	1	1	1	1	1	1	1
160.00-140.00				1	1	1	1	1	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1
140.00-120.00				1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1
120.00-100.00				1	1	1	1	1	1	1
T4	Yes	Yes	1	1	1	1	1	1	1	1
100.00-80.00				1	1	1	1	1	1	1
T5	Yes	Yes	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1
T6	Yes	Yes	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	1	1
T7	Yes	Yes	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1
T8	Yes	Yes	1	1	1	1	1	1	1	1
20.00-10.00				1	1	1	1	1	1	1
T9 10.00-0.00	Yes	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1

[1]*Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.*

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 160.00-140.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T2 140.00-120.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 120.00-100.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 100.00-80.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 80.00-60.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 60.00-40.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 40.00-20.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 20.00-10.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 10.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 160.00-140.00	Flange	0.7500 A325N	4	0.6250 A325N	1	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0
T2 140.00-120.00	Flange	0.8750 A325N	4	0.6250 A325N	1	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0
T3 120.00-100.00	Flange	0.8750 A325N	4	0.6250 A325N	1	0.0000 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0
T4 100.00-80.00	Flange	1.0000 A325N	4	0.6250 A325N	1	0.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0
T5 80.00-60.00	Flange	1.0000 A325N	6	0.6250 A325N	1	0.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0
T6 60.00-40.00	Flange	1.0000 A325N	6	0.7500 A325N	1	0.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0
T7 40.00-20.00	Flange	1.0000 A325N	6	0.7500 A325N	1	0.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0
T8 20.00-10.00	Flange	1.0000 A325N	8	0.7500 A325N	1	0.0000 A325N	1	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0
T9 10.00-0.00	Flange	1.0000 A325N	0	0.7500 A325N	1	0.6250 A325X	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight klf
1 5/8 (Verizon)	A	No	Ar (CaAa)	158.00 - 0.00	0.0000	0.27	14	6	0.5000	1.9800		0.00
Feedline	A	No	Af (CaAa)	158.00 - 0.00	0.0000	0.3	1	1	1.5000	1.5000		0.00

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight klf
Ladder (Af) 1.5" (Verizon)												
**********												
1 5/8 (T-Mobile)	A	No	Ar (CaAa)	148.00 - 0.00	-2.0000	0.27	12	6	0.5000	1.9800		0.00
**********												
7/8 (QUINEBAUG COMM 911)	A	No	Ar (CaAa)	160.00 - 0.00	-2.0000	0.3	2	2	0.1110	0.1110		0.00
1/2 (QUINEBAUG COMM 911)	A	No	Ar (CaAa)	160.00 - 0.00	-2.0000	0.34	1	1	0.5000	0.0580		0.00
1/2 (QUINEBAUG COMM 911)	A	No	Ar (CaAa)	82.00 - 0.00	-2.0000	0.34	1	1	0.5000	0.0580		0.00
1/2 (QUINEBAUG COMM 911)	A	No	Ar (CaAa)	65.00 - 0.00	-2.0000	0.34	1	1	0.5000	0.0580		0.00
**********												
1 1/4 (AT&T)	A	No	Ar (CaAa)	135.00 - 0.00	0.0000	-0.35	12	6	0.5000	1.5500		0.00
3/4" DC Power (AT&T)	A	No	Ar (CaAa)	135.00 - 0.00	0.0000	-0.33	4	2	0.5000	0.8650		0.00
1/2" Fiber (AT&T)	A	No	Ar (CaAa)	135.00 - 0.00	0.0000	-0.32	1	1	0.5000	0.5800		0.00
7/16" Fiber (AT&T)	A	No	Ar (CaAa)	135.00 - 0.00	0.0000	-0.35	1	1	0.4400	0.4400		0.00
Feedline Ladder (Af) 1.5" (AT&T)	A	No	Af (CaAa)	135.00 - 0.00	0.0000	-0.35	1	1	1.5000	1.5000		0.00
**********												
Safety Line 3/8	A	No	Ar (CaAa)	160.00 - 0.00	0.0000	0.5	1	1	0.3750	0.3750		0.00
**********												
1/2 (Verizon)	A	No	Ar (CaAa)	76.00 - 0.00	0.0000	0	1	1	0.5000	0.5800		0.00
**********												
1 5/8 (METRO PCS)	C	No	Ar (CaAa)	128.00 - 0.00	0.0000	-0.35	12	6	0.5000	1.9800		0.00
3/8" (METRO PCS)	C	No	Ar (CaAa)	128.00 - 0.00	0.0000	-0.32	1	1	0.4400	0.4400		0.00
Feedline Ladder (Af) 1.5" (METRO PCS)	C	No	Af (CaAa)	128.00 - 0.00	0.0000	-0.35	1	1	1.5000	1.5000		0.00
**********												

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T1	160.00-140.00	A	0.000	0.000	74.714	0.000	468.52
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T2	140.00-120.00	A	0.000	0.000	147.640	0.000	851.55
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	21.360	0.000	134.08
T3	120.00-100.00	A	0.000	0.000	160.430	0.000	916.80
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	53.400	0.000	335.20
T4	100.00-80.00	A	0.000	0.000	160.442	0.000	917.30
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	53.400	0.000	335.20
T5	80.00-60.00	A	0.000	0.000	161.503	0.000	927.05
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	53.400	0.000	335.20
T6	60.00-40.00	A	0.000	0.000	161.822	0.000	931.80
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	53.400	0.000	335.20
T7	40.00-20.00	A	0.000	0.000	161.822	0.000	931.80
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	53.400	0.000	335.20
T8	20.00-10.00	A	0.000	0.000	80.911	0.000	465.90
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	26.700	0.000	167.60
T9	10.00-0.00	A	0.000	0.000	80.911	0.000	465.90
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	26.700	0.000	167.60

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T1	160.00-140.00	A	1.745	0.000	0.000	104.857	0.000	1956.85
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T2	140.00-120.00	A	1.720	0.000	0.000	207.041	0.000	3754.06
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	27.351	0.000	540.85
T3	120.00-100.00	A	1.692	0.000	0.000	227.808	0.000	4056.40
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	67.962	0.000	1334.90
T4	100.00-80.00	A	1.658	0.000	0.000	226.527	0.000	3998.27
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	67.471	0.000	1314.74
T5	80.00-60.00	A	1.617	0.000	0.000	237.791	0.000	4073.80
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	66.871	0.000	1290.31
T6	60.00-40.00	A	1.564	0.000	0.000	240.501	0.000	4030.28
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	66.091	0.000	1258.93
T7	40.00-20.00	A	1.486	0.000	0.000	235.039	0.000	3866.11
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	64.956	0.000	1214.07
T8	20.00-10.00	A	1.386	0.000	0.000	114.032	0.000	1831.25

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	31.754	0.000	579.07
T9	10.00-0.00	A	1.242	0.000	0.000	108.980	0.000	1689.85
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	30.705	0.000	539.90

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	160.00-140.00	-2.9403	-12.0926	-2.8164	-12.8714
T2	140.00-120.00	-4.2783	-9.9134	-6.2677	-9.0356
T3	120.00-100.00	-1.1834	-8.5688	-4.5181	-7.0259
T4	100.00-80.00	-1.2795	-9.8009	-5.0961	-8.1942
T5	80.00-60.00	-1.4297	-10.3621	-5.9872	-10.1875
T6	60.00-40.00	-1.6416	-11.8867	-6.9209	-12.4552
T7	40.00-20.00	-1.7303	-12.8209	-7.3270	-13.5355
T8	20.00-10.00	-1.7834	-13.4079	-7.4636	-14.2428
T9	10.00-0.00	-1.7105	-13.0768	-6.8523	-14.0607

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	1	1 5/8	140.00 - 158.00	0.6000	0.6000
T1	3	Feedline Ladder (Af) 1.5"	140.00 - 158.00	0.6000	0.6000
T1	5	1 5/8	140.00 - 148.00	0.6000	0.6000
T1	7	7/8	140.00 - 160.00	0.6000	0.6000
T1	8	1/2	140.00 - 160.00	0.6000	0.6000
T1	18	Safety Line 3/8	140.00 - 160.00	0.6000	0.6000
T2	1	1 5/8	120.00 - 140.00	0.6000	0.6000
T2	3	Feedline Ladder (Af) 1.5"	120.00 - 140.00	0.6000	0.6000
T2	5	1 5/8	120.00 - 140.00	0.6000	0.6000
T2	7	7/8	120.00 - 140.00	0.6000	0.6000
T2	8	1/2	120.00 - 140.00	0.6000	0.6000
T2	12	1 1/4	120.00 - 135.00	0.6000	0.6000
T2	13	3/4" DC Power	120.00 - 135.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T2	14	1/2" Fiber	120.00 - 135.00	0.6000	0.6000
T2	15	7/16" Fiber	120.00 - 135.00	0.6000	0.6000
T2	16	Feedline Ladder (Af) 1.5"	120.00 - 135.00	0.6000	0.6000
T2	18	Safety Line 3/8	120.00 - 140.00	0.6000	0.6000
T2	22	1 5/8	120.00 - 128.00	0.6000	0.6000
T2	23	3/8"	120.00 - 128.00	0.6000	0.6000
T2	24	Feedline Ladder (Af) 1.5"	120.00 - 128.00	0.6000	0.6000
T3	1	1 5/8	100.00 - 120.00	0.6000	0.6000
T3	3	Feedline Ladder (Af) 1.5"	100.00 - 120.00	0.6000	0.6000
T3	5	1 5/8	100.00 - 120.00	0.6000	0.6000
T3	7	7/8	100.00 - 120.00	0.6000	0.6000
T3	8	1/2	100.00 - 120.00	0.6000	0.6000
T3	12	1 1/4	100.00 - 120.00	0.6000	0.6000
T3	13	3/4" DC Power	100.00 - 120.00	0.6000	0.6000
T3	14	1/2" Fiber	100.00 - 120.00	0.6000	0.6000
T3	15	7/16" Fiber	100.00 - 120.00	0.6000	0.6000
T3	16	Feedline Ladder (Af) 1.5"	100.00 - 120.00	0.6000	0.6000
T3	18	Safety Line 3/8	100.00 - 120.00	0.6000	0.6000
T3	22	1 5/8	100.00 - 120.00	0.6000	0.6000
T3	23	3/8"	100.00 - 120.00	0.6000	0.6000
T3	24	Feedline Ladder (Af) 1.5"	100.00 - 120.00	0.6000	0.6000
T4	1	1 5/8	80.00 - 100.00	0.6000	0.6000
T4	3	Feedline Ladder (Af) 1.5"	80.00 - 100.00	0.6000	0.6000
T4	5	1 5/8	80.00 - 100.00	0.6000	0.6000
T4	7	7/8	80.00 - 100.00	0.6000	0.6000
T4	8	1/2	80.00 - 100.00	0.6000	0.6000
T4	9	1/2	80.00 - 82.00	0.6000	0.6000
T4	12	1 1/4	80.00 - 100.00	0.6000	0.6000
T4	13	3/4" DC Power	80.00 - 100.00	0.6000	0.6000
T4	14	1/2" Fiber	80.00 - 100.00	0.6000	0.6000
T4	15	7/16" Fiber	80.00 - 100.00	0.6000	0.6000
T4	16	Feedline Ladder (Af) 1.5"	80.00 - 100.00	0.6000	0.6000
T4	18	Safety Line 3/8	80.00 - 100.00	0.6000	0.6000
T4	22	1 5/8	80.00 - 100.00	0.6000	0.6000
T4	23	3/8"	80.00 - 100.00	0.6000	0.6000
T4	24	Feedline Ladder (Af) 1.5"	80.00 - 100.00	0.6000	0.6000
T5	1	1 5/8	60.00 - 80.00	0.6000	0.6000
T5	3	Feedline Ladder (Af) 1.5"	60.00 - 80.00	0.6000	0.6000
T5	5	1 5/8	60.00 - 80.00	0.6000	0.6000
T5	7	7/8	60.00 - 80.00	0.6000	0.6000
T5	8	1/2	60.00 - 80.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T5	9	1/2	60.00 - 80.00	0.6000	0.6000
T5	10	1/2	60.00 - 65.00	0.6000	0.6000
T5	12	1 1/4	60.00 - 80.00	0.6000	0.6000
T5	13	3/4" DC Power	60.00 - 80.00	0.6000	0.6000
T5	14	1/2" Fiber	60.00 - 80.00	0.6000	0.6000
T5	15	7/16" Fiber	60.00 - 80.00	0.6000	0.6000
T5	16	Feedline Ladder (Af) 1.5"	60.00 - 80.00	0.6000	0.6000
T5	18	Safety Line 3/8	60.00 - 80.00	0.6000	0.6000
T5	20	1/2	60.00 - 76.00	0.6000	0.6000
T5	22	1 5/8	60.00 - 80.00	0.6000	0.6000
T5	23	3/8"	60.00 - 80.00	0.6000	0.6000
T5	24	Feedline Ladder (Af) 1.5"	60.00 - 80.00	0.6000	0.6000
T6	1	1 5/8	40.00 - 60.00	0.6000	0.6000
T6	3	Feedline Ladder (Af) 1.5"	40.00 - 60.00	0.6000	0.6000
T6	5	1 5/8	40.00 - 60.00	0.6000	0.6000
T6	7	7/8	40.00 - 60.00	0.6000	0.6000
T6	8	1/2	40.00 - 60.00	0.6000	0.6000
T6	9	1/2	40.00 - 60.00	0.6000	0.6000
T6	10	1/2	40.00 - 60.00	0.6000	0.6000
T6	12	1 1/4	40.00 - 60.00	0.6000	0.6000
T6	13	3/4" DC Power	40.00 - 60.00	0.6000	0.6000
T6	14	1/2" Fiber	40.00 - 60.00	0.6000	0.6000
T6	15	7/16" Fiber	40.00 - 60.00	0.6000	0.6000
T6	16	Feedline Ladder (Af) 1.5"	40.00 - 60.00	0.6000	0.6000
T6	18	Safety Line 3/8	40.00 - 60.00	0.6000	0.6000
T6	20	1/2	40.00 - 60.00	0.6000	0.6000
T6	22	1 5/8	40.00 - 60.00	0.6000	0.6000
T6	23	3/8"	40.00 - 60.00	0.6000	0.6000
T6	24	Feedline Ladder (Af) 1.5"	40.00 - 60.00	0.6000	0.6000
T7	1	1 5/8	20.00 - 40.00	0.6000	0.6000
T7	3	Feedline Ladder (Af) 1.5"	20.00 - 40.00	0.6000	0.6000
T7	5	1 5/8	20.00 - 40.00	0.6000	0.6000
T7	7	7/8	20.00 - 40.00	0.6000	0.6000
T7	8	1/2	20.00 - 40.00	0.6000	0.6000
T7	9	1/2	20.00 - 40.00	0.6000	0.6000
T7	10	1/2	20.00 - 40.00	0.6000	0.6000
T7	12	1 1/4	20.00 - 40.00	0.6000	0.6000
T7	13	3/4" DC Power	20.00 - 40.00	0.6000	0.6000
T7	14	1/2" Fiber	20.00 - 40.00	0.6000	0.6000
T7	15	7/16" Fiber	20.00 - 40.00	0.6000	0.6000
T7	16	Feedline Ladder (Af) 1.5"	20.00 - 40.00	0.6000	0.6000
T7	18	Safety Line 3/8	20.00 - 40.00	0.6000	0.6000
T7	20	1/2	20.00 - 40.00	0.6000	0.6000
T7	22	1 5/8	20.00 - 40.00	0.6000	0.6000
T7	23	3/8"	20.00 - 40.00	0.6000	0.6000
T7	24	Feedline Ladder (Af) 1.5"	20.00 - 40.00	0.6000	0.6000
T8	1	1 5/8	10.00 - 20.00	0.6000	0.6000
T8	3	Feedline Ladder (Af) 1.5"	10.00 - 20.00	0.6000	0.6000
T8	5	1 5/8	10.00 - 20.00	0.6000	0.6000
T8	7	7/8	10.00 - 20.00	0.6000	0.6000
T8	8	1/2	10.00 - 20.00	0.6000	0.6000
T8	9	1/2	10.00 - 20.00	0.6000	0.6000
T8	10	1/2	10.00 - 20.00	0.6000	0.6000
T8	12	1 1/4	10.00 - 20.00	0.6000	0.6000
T8	13	3/4" DC Power	10.00 - 20.00	0.6000	0.6000
T8	14	1/2" Fiber	10.00 - 20.00	0.6000	0.6000
T8	15	7/16" Fiber	10.00 - 20.00	0.6000	0.6000
T8	16	Feedline Ladder (Af) 1.5"	10.00 - 20.00	0.6000	0.6000
T8	18	Safety Line 3/8	10.00 - 20.00	0.6000	0.6000
T8	20	1/2	10.00 - 20.00	0.6000	0.6000
T8	22	1 5/8	10.00 - 20.00	0.6000	0.6000
T8	23	3/8"	10.00 - 20.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T8	24	Feedline Ladder (Af) 1.5"	10.00 - 20.00	0.6000	0.6000
T9	1	1 5/8	0.00 - 10.00	0.6000	0.6000
T9	3	Feedline Ladder (Af) 1.5"	0.00 - 10.00	0.6000	0.6000
T9	5	1 5/8	0.00 - 10.00	0.6000	0.6000
T9	7	7/8	0.00 - 10.00	0.6000	0.6000
T9	8	1/2	0.00 - 10.00	0.6000	0.6000
T9	9	1/2	0.00 - 10.00	0.6000	0.6000
T9	10	1/2	0.00 - 10.00	0.6000	0.6000
T9	12	1 1/4	0.00 - 10.00	0.6000	0.6000
T9	13	3/4" DC Power	0.00 - 10.00	0.6000	0.6000
T9	14	1/2" Fiber	0.00 - 10.00	0.6000	0.6000
T9	15	7/16" Fiber	0.00 - 10.00	0.6000	0.6000
T9	16	Feedline Ladder (Af) 1.5"	0.00 - 10.00	0.6000	0.6000
T9	18	Safety Line 3/8	0.00 - 10.00	0.6000	0.6000
T9	20	1/2	0.00 - 10.00	0.6000	0.6000
T9	22	1 5/8	0.00 - 10.00	0.6000	0.6000
T9	23	3/8"	0.00 - 10.00	0.6000	0.6000
T9	24	Feedline Ladder (Af) 1.5"	0.00 - 10.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
Lightning Rod	C	From Leg	0.00	0.0000	160.00	No Ice	0.25	0.25	30.00
			0.00			1/2" Ice	0.66	0.66	30.00
			2.00			1" Ice	0.97	0.97	40.00
Beacon	C	From Leg	0.00	0.0000	160.00	No Ice	2.00	2.00	20.00
			0.00			1/2" Ice	2.50	2.50	30.00
			4.00			1" Ice	3.00	3.00	40.00
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Decibel 20' x 2" Dipoles	C	From Leg	0.00	0.0000	160.00	No Ice	4.00	4.00	35.00
(Quinebaug Comm 911)			0.00			1/2" Ice	6.03	6.03	50.00
			9.00			1" Ice	8.05	8.05	65.00
Decibel 20' x 2" Dipoles	B	From Leg	0.00	0.0000	160.00	No Ice	4.00	4.00	35.00
(Quinebaug Comm 911)			0.00			1/2" Ice	6.03	6.03	50.00
			9.00			1" Ice	8.05	8.05	65.00
DB201 C	A	From Leg	0.00	0.0000	160.00	No Ice	2.00	2.00	25.00
(Quinebaug Comm 911)			0.00			1/2" Ice	2.83	2.83	40.00
			3.00			1" Ice	3.66	3.66	55.00
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BXA-70080-4CF-EDIN-0	A	From Leg	3.00	0.0000	158.00	No Ice	3.57	2.79	12.00
(Verizon)			0.00			1/2" Ice	3.87	3.10	36.95
			0.00			1" Ice	4.18	3.41	66.07
BXA-70080-4CF-EDIN-0	B	From Leg	3.00	0.0000	158.00	No Ice	3.57	2.79	12.00
(Verizon)			0.00			1/2" Ice	3.87	3.10	36.95
			0.00			1" Ice	4.18	3.41	66.07
BXA-70080-4CF-EDIN-0	C	From Leg	3.00	0.0000	158.00	No Ice	3.57	2.79	12.00
(Verizon)			0.00			1/2" Ice	3.87	3.10	36.95
			0.00			1" Ice	4.18	3.41	66.07
(2) SBNHH-1D65B	A	From Leg	3.00	0.0000	158.00	No Ice	8.05	5.34	50.71

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
(Verizon)			0.00				1/2" Ice	8.51	5.79	100.63
			0.00				1" Ice	8.97	6.26	156.65
(2) SBNHH-1D65B	B	From Leg	3.00		0.0000	158.00	No Ice	8.05	5.34	50.71
(Verizon)			0.00				1/2" Ice	8.51	5.79	100.63
			0.00				1" Ice	8.97	6.26	156.65
(2) SBNHH-1D65B	C	From Leg	3.00		0.0000	158.00	No Ice	8.05	5.34	50.71
(Verizon)			0.00				1/2" Ice	8.51	5.79	100.63
			0.00				1" Ice	8.97	6.26	156.65
B66A RRH4x45-4R	A	From Leg	3.00		0.0000	158.00	No Ice	2.39	1.40	56.80
(Verizon)			0.00				1/2" Ice	2.60	1.57	75.01
			0.00				1" Ice	2.82	1.75	96.19
B66A RRH4x45-4R	B	From Leg	3.00		0.0000	158.00	No Ice	2.39	1.40	56.80
(Verizon)			0.00				1/2" Ice	2.60	1.57	75.01
			0.00				1" Ice	2.82	1.75	96.19
B66A RRH4x45-4R	C	From Leg	3.00		0.0000	158.00	No Ice	2.39	1.40	56.80
(Verizon)			0.00				1/2" Ice	2.60	1.57	75.01
			0.00				1" Ice	2.82	1.75	96.19
RRH2x60-700U	A	From Leg	3.00		0.0000	158.00	No Ice	1.22	1.87	40.00
(Verizon)			0.00				1/2" Ice	1.36	2.05	58.87
			0.00				1" Ice	1.52	2.24	77.42
RRH2x60-700U	B	From Leg	3.00		0.0000	158.00	No Ice	1.22	1.87	40.00
(Verizon)			0.00				1/2" Ice	1.36	2.05	58.87
			0.00				1" Ice	1.52	2.24	77.42
RRH2x60-700U	C	From Leg	3.00		0.0000	158.00	No Ice	1.22	1.87	40.00
(Verizon)			0.00				1/2" Ice	1.36	2.05	58.87
			0.00				1" Ice	1.52	2.24	77.42
RRH2x60-PCS	A	From Leg	3.00		0.0000	158.00	No Ice	1.22	1.87	40.00
(Verizon)			0.00				1/2" Ice	1.36	2.05	58.87
			0.00				1" Ice	1.52	2.24	77.42
RRH2x60-PCS	B	From Leg	3.00		0.0000	158.00	No Ice	1.22	1.87	40.00
(Verizon)			0.00				1/2" Ice	1.36	2.05	58.87
			0.00				1" Ice	1.52	2.24	77.42
RRH2x60-PCS	C	From Leg	3.00		0.0000	158.00	No Ice	1.22	1.87	40.00
(Verizon)			0.00				1/2" Ice	1.36	2.05	58.87
			0.00				1" Ice	1.52	2.24	77.42
DB-T1-6Z-8AB-0Z	A	From Leg	3.00		0.0000	158.00	No Ice	5.60	2.33	44.00
(Verizon)			0.00				1/2" Ice	5.92	2.57	80.00
			0.00				1" Ice	6.24	2.81	116.00
DB-T1-6Z-8AB-0Z	B	From Leg	3.00		0.0000	158.00	No Ice	5.60	2.33	44.00
(Verizon)			0.00				1/2" Ice	5.92	2.57	80.00
			0.00				1" Ice	6.24	2.81	116.00
15' T-Frames	A	From Leg	1.50		0.0000	158.00	No Ice	14.03	7.50	639.00
(Verizon)			0.00				1/2" Ice	18.11	10.09	923.00
			0.00				1" Ice	22.18	12.67	1207.00
15' T-Frames	B	From Leg	1.50		0.0000	158.00	No Ice	14.03	7.50	639.00
(Verizon)			0.00				1/2" Ice	18.11	10.09	923.00
			0.00				1" Ice	22.18	12.67	1207.00
15' T-Frames	C	From Leg	1.50		0.0000	158.00	No Ice	14.03	7.50	639.00
(Verizon)			0.00				1/2" Ice	18.11	10.09	923.00
			0.00				1" Ice	22.18	12.67	1207.00
Sabre Universal Pipe Mount	C	From Leg	2.00		0.0000	158.00	No Ice	1.73	1.73	35.00
(Verizon)			0.00				1/2" Ice	2.09	2.09	50.00
			0.00				1" Ice	2.45	2.45	65.00
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APXV18-209015-C	A	From Leg	3.00		0.0000	148.00	No Ice	3.57	2.02	31.50
(T-Mobile)			0.00				1/2" Ice	3.91	2.35	51.46
			0.00				1" Ice	4.25	2.68	75.69

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
APXV18-209015-C	B	From Leg	3.00		0.0000	148.00	No Ice	3.57	2.02	31.50
(T-Mobile)			0.00				1/2" Ice	3.91	2.35	51.46
			0.00				1" Ice	4.25	2.68	75.69
APXV18-209015-C	C	From Leg	3.00		0.0000	148.00	No Ice	3.57	2.02	31.50
(T-Mobile)			0.00				1/2" Ice	3.91	2.35	51.46
			0.00				1" Ice	4.25	2.68	75.69
LNX-6515DS-A1M	A	From Leg	3.00		0.0000	148.00	No Ice	11.45	7.70	50.30
(T-Mobile)			0.00				1/2" Ice	12.06	8.29	116.17
			0.00				1" Ice	12.69	8.89	189.71
LNX-6515DS-A1M	B	From Leg	3.00		0.0000	148.00	No Ice	11.45	7.70	50.30
(T-Mobile)			0.00				1/2" Ice	12.06	8.29	116.17
			0.00				1" Ice	12.69	8.89	189.71
LNX-6515DS-A1M	C	From Leg	3.00		0.0000	148.00	No Ice	11.45	7.70	50.30
(T-Mobile)			0.00				1/2" Ice	12.06	8.29	116.17
			0.00				1" Ice	12.69	8.89	189.71
ATMAA1412D-1A20	A	From Leg	3.00		0.0000	148.00	No Ice	1.00	0.41	13.00
(T-Mobile)			0.00				1/2" Ice	1.13	0.50	20.62
			0.00				1" Ice	1.26	0.59	30.11
ATMAA1412D-1A20	B	From Leg	3.00		0.0000	148.00	No Ice	1.00	0.41	13.00
(T-Mobile)			0.00				1/2" Ice	1.13	0.50	20.62
			0.00				1" Ice	1.26	0.59	30.11
ATMAA1412D-1A20	C	From Leg	3.00		0.0000	148.00	No Ice	1.00	0.41	13.00
(T-Mobile)			0.00				1/2" Ice	1.13	0.50	20.62
			0.00				1" Ice	1.26	0.59	30.11
10.5' T-Frame	A	From Leg	0.00		0.0000	148.00	No Ice	6.04	1.68	200.00
(T-Mobile)			0.00				1/2" Ice	8.20	2.08	300.00
			0.00				1" Ice	10.37	2.49	400.00
10.5' T-Frame	B	From Leg	0.00		0.0000	148.00	No Ice	6.04	1.68	200.00
(T-Mobile)			0.00				1/2" Ice	8.20	2.08	300.00
			0.00				1" Ice	10.37	2.49	400.00
10.5' T-Frame	C	From Leg	0.00		0.0000	148.00	No Ice	6.04	1.68	200.00
(T-Mobile)			0.00				1/2" Ice	8.20	2.08	300.00
			0.00				1" Ice	10.37	2.49	400.00
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(2) 7770	A	From Leg	3.00		0.0000	135.00	No Ice	5.51	2.93	35.00
(AT&T)			0.00				1/2" Ice	5.87	3.27	67.63
			0.00				1" Ice	6.23	3.63	105.06
(2) 7770	B	From Leg	3.00		0.0000	135.00	No Ice	5.51	2.93	35.00
(AT&T)			0.00				1/2" Ice	5.87	3.27	67.63
			0.00				1" Ice	6.23	3.63	105.06
(2) 7770	C	From Leg	3.00		0.0000	135.00	No Ice	5.51	2.93	35.00
(AT&T)			0.00				1/2" Ice	5.87	3.27	67.63
			0.00				1" Ice	6.23	3.63	105.06
HPA-65R-BUU-H6	A	From Leg	3.00		0.0000	135.00	No Ice	9.49	5.49	43.00
(AT&T)			0.00				1/2" Ice	9.96	5.94	100.33
			0.00				1" Ice	10.43	6.41	163.95
HPA-65R-BUU-H8-K	B	From Leg	3.00		0.0000	135.00	No Ice	13.30	7.52	68.00
(AT&T)			0.00				1/2" Ice	13.99	8.09	141.77
			0.00				1" Ice	14.70	8.67	223.17
HPA-65R-BUU-H8-K	C	From Leg	3.00		0.0000	135.00	No Ice	13.30	7.52	68.00
(AT&T)			0.00				1/2" Ice	13.99	8.09	141.77
			0.00				1" Ice	14.70	8.67	223.17
(2) LGP 21401 TMA	A	From Leg	3.00		0.0000	130.00	No Ice	0.82	0.35	10.00
(AT&T)			0.00				1/2" Ice	0.94	0.44	15.81
			0.00				1" Ice	1.06	0.54	23.36
(2) LGP 21401 TMA	B	From Leg	3.00		0.0000	130.00	No Ice	0.82	0.35	10.00
(AT&T)			0.00				1/2" Ice	0.94	0.44	15.81

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
			0.00				1" Ice	1.06	0.54	23.36
(2) LGP 21401 TMA	C	From Leg	3.00		0.0000	130.00	No Ice	0.82	0.35	10.00
(AT&T)			0.00				1/2" Ice	0.94	0.44	15.81
			0.00				1" Ice	1.06	0.54	23.36
RRUS 11	A	From Leg	3.00		0.0000	135.00	No Ice	2.52	1.02	55.00
(AT&T)			0.00				1/2" Ice	2.72	1.16	74.32
			0.00				1" Ice	2.92	1.30	96.56
RRUS 11	B	From Leg	3.00		0.0000	135.00	No Ice	2.52	1.02	55.00
(AT&T)			0.00				1/2" Ice	2.72	1.16	74.32
			0.00				1" Ice	2.92	1.30	96.56
RRUS 11	C	From Leg	3.00		0.0000	135.00	No Ice	2.52	1.02	55.00
(AT&T)			0.00				1/2" Ice	2.72	1.16	74.32
			0.00				1" Ice	2.92	1.30	96.56
RRUS 12 AWS	A	From Leg	3.00		0.0000	135.00	No Ice	1.29	3.15	60.00
(AT&T)			0.00				1/2" Ice	1.43	3.36	81.22
			0.00				1" Ice	1.60	3.59	107.65
RRUS 12 AWS	B	From Leg	3.00		0.0000	135.00	No Ice	1.29	3.15	60.00
(AT&T)			0.00				1/2" Ice	1.43	3.36	81.22
			0.00				1" Ice	1.60	3.59	107.65
RRUS 12 AWS	C	From Leg	3.00		0.0000	135.00	No Ice	1.29	3.15	60.00
(AT&T)			0.00				1/2" Ice	1.43	3.36	81.22
			0.00				1" Ice	1.60	3.59	107.65
RRUS A2	A	From Leg	3.00		0.0000	135.00	No Ice	2.07	0.50	22.04
(AT&T)			0.00				1/2" Ice	2.25	0.61	34.65
			0.00				1" Ice	2.43	0.72	49.71
RRUS A2	B	From Leg	3.00		0.0000	135.00	No Ice	2.07	0.50	22.04
(AT&T)			0.00				1/2" Ice	2.25	0.61	34.65
			0.00				1" Ice	2.43	0.72	49.71
RRUS A2	C	From Leg	3.00		0.0000	135.00	No Ice	2.07	0.50	22.04
(AT&T)			0.00				1/2" Ice	2.25	0.61	34.65
			0.00				1" Ice	2.43	0.72	49.71
(2) LGP21903 Diplexer	A	From Leg	3.00		0.0000	135.00	No Ice	0.23	0.16	5.00
(AT&T)			0.00				1/2" Ice	0.29	0.21	7.42
			0.00				1" Ice	0.36	0.28	10.91
(2) LGP21903 Diplexer	B	From Leg	3.00		0.0000	135.00	No Ice	0.23	0.16	5.00
(AT&T)			0.00				1/2" Ice	0.29	0.21	7.42
			0.00				1" Ice	0.36	0.28	10.91
(2) LGP21903 Diplexer	C	From Leg	3.00		0.0000	135.00	No Ice	0.23	0.16	5.00
(AT&T)			0.00				1/2" Ice	0.29	0.21	7.42
			0.00				1" Ice	0.36	0.28	10.91
DC6-48-60-18-8F	A	From Leg	0.00		0.0000	135.00	No Ice	1.56	4.78	26.20
(AT&T)			0.00				1/2" Ice	1.72	5.06	63.26
			0.00				1" Ice	1.89	5.35	104.40
EPBQ-654L8-H6-L2	A	From Leg	3.00		0.0000	135.00	No Ice	13.24	4.96	72.80
(AT&T)			0.00				1/2" Ice	13.74	5.41	144.96
			0.00				1" Ice	14.26	5.88	223.81
EPBQ-654L8-H8-L2	B	From Leg	3.00		0.0000	135.00	No Ice	18.09	7.03	86.00
(AT&T)			0.00				1/2" Ice	18.72	7.62	179.25
			0.00				1" Ice	19.36	8.21	280.68
EPBQ-654L8-H8-L2	C	From Leg	3.00		0.0000	135.00	No Ice	18.09	7.03	86.00
(AT&T)			0.00				1/2" Ice	18.72	7.62	179.25
			0.00				1" Ice	19.36	8.21	280.68
RRUS 32	A	From Leg	3.00		0.0000	135.00	No Ice	2.32	1.65	77.00
(AT&T)			0.00				1/2" Ice	2.51	1.83	97.99
			0.00				1" Ice	2.71	2.01	122.00
RRUS 32	B	From Leg	3.00		0.0000	135.00	No Ice	2.32	1.65	77.00
(AT&T)			0.00				1/2" Ice	2.51	1.83	97.99

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
			0.00			1" Ice	2.71	2.01	122.00
RRUS 32	C	From Leg	3.00	0.0000	135.00	No Ice	2.32	1.65	77.00
(AT&T)			0.00			1/2" Ice	2.51	1.83	97.99
			0.00			1" Ice	2.71	2.01	122.00
4478	A	From Leg	3.00	0.0000	135.00	No Ice	1.63	1.00	60.00
(AT&T)			0.00			1/2" Ice	1.78	1.13	74.78
			0.00			1" Ice	1.95	1.27	92.08
4478	B	From Leg	3.00	0.0000	135.00	No Ice	1.63	1.00	60.00
(AT&T)			0.00			1/2" Ice	1.78	1.13	74.78
			0.00			1" Ice	1.95	1.27	92.08
4478	C	From Leg	3.00	0.0000	135.00	No Ice	1.63	1.00	60.00
(AT&T)			0.00			1/2" Ice	1.78	1.13	74.78
			0.00			1" Ice	1.95	1.27	92.08
DC6-48-60-18-8C	B	From Leg	3.00	0.0000	135.00	No Ice	1.56	4.78	26.20
(AT&T)			0.00			1/2" Ice	1.72	5.06	63.26
			0.00			1" Ice	1.89	5.35	104.40
12' T-Frame	A	From Leg	1.50	0.0000	137.00	No Ice	13.46	6.72	260.00
(AT&T)			0.00			1/2" Ice	17.79	8.03	360.00
			0.00			1" Ice	22.12	9.34	460.00
12' T-Frame	B	From Leg	1.50	0.0000	137.00	No Ice	13.46	6.72	260.00
(AT&T)			0.00			1/2" Ice	17.79	8.03	360.00
			0.00			1" Ice	22.12	9.34	460.00
12' T-Frame	C	From Leg	1.50	0.0000	137.00	No Ice	13.46	6.72	260.00
(AT&T)			0.00			1/2" Ice	17.79	8.03	360.00
			0.00			1" Ice	22.12	9.34	460.00
(2) 2-1/2"x6'	A	From Leg	1.50	0.0000	137.00	No Ice	0.35	0.35	34.80
(AT&T)			0.00			1/2" Ice	0.42	0.42	48.72
			0.00			1" Ice	0.49	0.49	62.64
(2) 2-1/2"x6'	B	From Leg	1.50	0.0000	137.00	No Ice	0.35	0.35	34.80
(AT&T)			0.00			1/2" Ice	0.42	0.42	48.72
			0.00			1" Ice	0.49	0.49	62.64
(2) 2-1/2"x6'	C	From Leg	1.50	0.0000	137.00	No Ice	0.35	0.35	34.80
(AT&T)			0.00			1/2" Ice	0.42	0.42	48.72
			0.00			1" Ice	0.49	0.49	62.64
(2) 742 351	A	From Leg	3.00	0.0000	128.00	No Ice	5.39	1.73	35.30
(Metro PCS)			0.00			1/2" Ice	5.73	2.04	62.60
			0.00			1" Ice	6.08	2.36	94.37
(2) 742 351	B	From Leg	3.00	0.0000	128.00	No Ice	5.39	1.73	35.30
(Metro PCS)			0.00			1/2" Ice	5.73	2.04	62.60
			0.00			1" Ice	6.08	2.36	94.37
(2) 742 351	C	From Leg	3.00	0.0000	128.00	No Ice	5.39	1.73	35.30
(Metro PCS)			0.00			1/2" Ice	5.73	2.04	62.60
			0.00			1" Ice	6.08	2.36	94.37
12' T-Frame	A	From Leg	1.50	0.0000	128.00	No Ice	10.00	6.46	260.00
(Metro PCS)			0.00			1/2" Ice	12.50	7.92	360.00
			0.00			1" Ice	15.00	9.38	460.00
12' T-Frame	B	From Leg	1.50	0.0000	128.00	No Ice	10.00	6.46	260.00
(Metro PCS)			0.00			1/2" Ice	12.50	7.92	360.00
			0.00			1" Ice	15.00	9.38	460.00
12' T-Frame	C	From Leg	1.50	0.0000	128.00	No Ice	10.00	6.46	260.00
(Metro PCS)			0.00			1/2" Ice	12.50	7.92	360.00
			0.00			1" Ice	15.00	9.38	460.00
**********									
Yagi	C	From Leg	0.00	0.0000	82.00	No Ice	2.08	2.08	30.00
(Quinebaug Comm 911)			0.00			1/2" Ice	3.78	3.78	52.87
			0.00			1" Ice	5.51	5.51	85.27
**********									

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
GPS	A	From Leg	3.00	0.0000	76.00	No Ice	0.16	0.16	2.00
(Verizon)			0.00			1/2" Ice	0.21	0.21	4.00
			0.00			1" Ice	0.28	0.28	6.00
**********									
6' Trombone	B	From Leg	0.00	0.0000	68.00	No Ice	2.00	2.00	40.00
(Quinebaug Comm 911)			0.00			1/2" Ice	2.83	2.83	55.00
			0.00			1" Ice	3.66	3.66	70.00
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Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp

Comb. No.	Description
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	160 - 140	3.783	43	0.2145	0.0226
T2	140 - 120	2.890	43	0.2013	0.0209
T3	120 - 100	2.082	43	0.1668	0.0168
T4	100 - 80	1.421	43	0.1332	0.0130
T5	80 - 60	0.899	43	0.0993	0.0089
T6	60 - 40	0.513	43	0.0719	0.0063
T7	40 - 20	0.245	43	0.0452	0.0042
T8	20 - 10	0.076	43	0.0230	0.0021
T9	10 - 0	0.024	43	0.0115	0.0011

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
160.00	Lightning Rod	43	3.783	0.2145	0.0226	206357
158.00	BXA-70080-4CF-EDIN-0	43	3.692	0.2137	0.0225	206357
148.00	APXV18-209015-C	43	3.242	0.2088	0.0218	85982
137.00	12' T-Frame	43	2.762	0.1972	0.0204	45972
135.00	(2) 7770	43	2.677	0.1940	0.0200	42831
130.00	(2) LGP 21401 TMA	43	2.470	0.1853	0.0190	36616
128.00	(2) 742 351	43	2.390	0.1816	0.0185	34553
82.00	Yagi	43	0.945	0.1024	0.0093	33803
76.00	GPS	43	0.811	0.0933	0.0083	34849
68.00	6' Trombone	43	0.652	0.0824	0.0072	38141

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	160 - 140	17.684	11	0.9987	0.1046
T2	140 - 120	13.499	11	0.9398	0.0964

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T3	120 - 100	9.715	11	0.7801	0.0778
T4	100 - 80	6.627	11	0.6228	0.0601
T5	80 - 60	4.190	11	0.4637	0.0414
T6	60 - 40	2.391	11	0.3358	0.0291
T7	40 - 20	1.139	11	0.2112	0.0195
T8	20 - 10	0.350	11	0.1074	0.0098
T9	10 - 0	0.109	10	0.0536	0.0049

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
160.00	Lightning Rod	11	17.684	0.9987	0.1046	46643
158.00	BXA-70080-4CF-EDIN-0	11	17.259	0.9955	0.1041	46643
148.00	APXV18-209015-C	11	15.147	0.9739	0.1008	19434
137.00	12' T-Frame	11	12.896	0.9210	0.0941	10322
135.00	(2) 7770	11	12.500	0.9068	0.0924	9573
130.00	(2) LGP 21401 TMA	11	11.533	0.8669	0.0877	8045
128.00	(2) 742 351	11	11.156	0.8498	0.0857	7562
82.00	Yagi	11	4.404	0.4784	0.0430	7234
76.00	GPS	11	3.781	0.4359	0.0383	7462
68.00	6' Trombone	11	3.039	0.3849	0.0333	8166

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load per Bolt lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	160	Leg	A325N	0.7500	4	4657.08	29820.60	0.156 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	3516.14	5811.33	0.605 ✔	1	Member Block Shear
		Top Girt	A325N	0.6250	1	102.84	5811.33	0.018 ✔	1	Member Block Shear
T2	140	Leg	A325N	0.8750	4	13580.20	40589.10	0.335 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	6131.89	6830.86	0.898 ✔	1	Member Block Shear
		Top Girt	A325N	0.6250	1	183.54	5811.33	0.032 ✔	1	Member Block Shear
T3	120	Leg	A325N	0.8750	4	23231.30	40589.10	0.572 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	6751.74	7830.00	0.862 ✔	1	Member Bearing
T4	100	Leg	A325N	1.0000	4	32330.60	53014.40	0.610 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	7111.87	7830.00	0.908 ✔	1	Member Bearing
T5	80	Leg	A325N	1.0000	6	27305.60	53014.40	0.515 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	7868.54	11700.00	0.673 ✔	1	Member Bearing
T6	60	Leg	A325N	1.0000	6	32374.20	53014.40	0.611 ✔	1	Bolt Tension

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load per Bolt lb	Ratio Load / Allowable	Allowable Ratio	Criteria
		Diagonal	A325N	0.7500	1	9277.95	14137.50	0.656 ✔	1	Member Bearing
T7	40	Leg	A325N	1.0000	6	37892.50	53014.40	0.715 ✔	1	Bolt Tension
		Diagonal	A325N	0.7500	1	10238.00	14137.50	0.724 ✔	1	Member Bearing
T8	20	Leg	A325N	1.0000	8	30482.40	53014.40	0.575 ✔	1	Bolt Tension
		Diagonal	A325N	0.7500	1	9964.02	14137.50	0.705 ✔	1	Member Bearing
T9	10	Diagonal	A325N	0.7500	1	10922.80	17892.40	0.610 ✔	1	Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 140	ROHN 2.5 STD	20.00	4.00	50.7 K=1.00	1.7040	-22201.50	63560.30	0.349 [1] ✔
T2	140 - 120	ROHN 3 STD	20.03	5.01	51.7 K=1.00	2.2285	-62520.80	82509.00	0.758 [1] ✔
T3	120 - 100	ROHN 3.5 EH	20.04	6.68	61.3 K=1.00	3.6784	-103909.00	125723.00	0.826 [1] ✔
T4	100 - 80	ROHN 4 EH	20.04	6.68	54.3 K=1.00	4.4074	-143639.00	159903.00	0.898 [1] ✔
T5	80 - 60	ROHN 5 EH	20.04	6.68	43.6 K=1.00	6.1120	-182451.00	239378.00	0.762 [1] ✔
T6	60 - 40	ROHN 6 EHS	20.04	10.02	54.0 K=1.00	6.7133	-216954.00	244047.00	0.889 [1] ✔
T7	40 - 20	ROHN 6 EH	20.03	10.02	54.8 K=1.00	8.4049	-254899.00	303757.00	0.839 [1] ✔
T8	20 - 10	ROHN 6 EH	10.02	10.02	54.8 K=1.00	8.4049	-274112.00	303730.00	0.902 [1] ✔
T9	10 - 0	ROHN 6 EH	10.02	10.02	54.8 K=1.00	8.4049	-291260.00	303730.00	0.959 [1] ✔

[1] $P_u / \phi P_n$ controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 140	L1 3/4x1 3/4x3/16	7.70	3.59	125.4	0.6211	-3565.06	8788.95	0.406 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	140 - 120	L2x2x3/16	9.72	4.72	143.8 K=1.00	0.7148	-6139.73	7810.37	0.786 [1] ✔
T3	120 - 100	L2 1/2x2 1/2x3/16	12.28	6.02	146.1 K=1.00	0.9023	-6780.02	9552.75	0.710 [1] ✔
T4	100 - 80	L2 1/2x2 1/2x3/16	14.07	6.90	167.3 K=1.00	0.9023	-7165.40	7279.23	0.984 [1] ✔
T5	80 - 60	L3x3x1/4	15.94	7.79	157.9 K=1.00	1.4400	-7870.09	13051.40	0.603 [1] ✔
T6	60 - 40	L3 1/2x3 1/2x1/4	19.21	9.45	163.4 K=1.00	1.6900	-9339.81	14294.60	0.653 [1] ✔
T7	40 - 20	L3 1/2x3 1/2x1/4	20.93	10.30	178.0 K=1.00	1.6900	-10569.30	12044.30	0.878 [1] ✔
T8	20 - 10	L3 1/2x3 1/2x1/4	21.83	10.76	186.1 K=1.00	1.6900	-9936.05	11028.70	0.901 [1] ✔
T9	10 - 0	L3.5x3.5x1/4 + L3.5x3.5x1/4 (C-shape - MOD)	22.76	11.36	88.9 K=1.00	1.7056	-10922.80	43089.90	0.253 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 140	L1 3/4x1 3/4x3/16	6.58	6.10	213.2 K=1.00	0.6211	-104.51	3088.02	0.034 [1] ✔
T2	140 - 120	KL/R > 200 (C) - 4 L1 3/4x1 3/4x3/16 KL/R > 200 (C) - 41	6.58	6.10	213.2 K=1.00	0.6211	-189.50	3088.02	0.061 [1] ✔

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 140	ROHN 2.5 STD	20.00	4.00	50.7	1.7040	18628.30	76682.30	0.243 [1] ✔
T2	140 - 120	ROHN 3 STD	20.03	5.01	51.7	2.2285	54320.80	100281.00	0.542 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T3	120 - 100	ROHN 3.5 EH	20.04	6.68	61.3	3.6784	92925.10	165529.00	0.561 [1]
T4	100 - 80	ROHN 4 EH	20.04	6.68	54.3	4.4074	129322.00	198335.00	0.652 [1]
T5	80 - 60	ROHN 5 EH	20.04	6.68	43.6	6.1120	163834.00	275039.00	0.596 [1]
T6	60 - 40	ROHN 6 EHS	20.04	10.02	54.0	6.7133	194245.00	302097.00	0.643 [1]
T7	40 - 20	ROHN 6 EH	20.03	10.02	54.8	8.4049	227355.00	378222.00	0.601 [1]
T8	20 - 10	ROHN 6 EH	10.02	10.02	54.8	8.4049	243859.00	378222.00	0.645 [1]
T9	10 - 0	ROHN 6 EH	10.02	10.02	54.8	8.4049	258604.00	378222.00	0.684 [1]

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 140	L1 3/4x1 3/4x3/16	7.70	3.59	82.9	0.3604	3516.14	15675.30	0.224 [1]
T2	140 - 120	L2x2x3/16	9.72	4.72	94.1	0.4307	6131.89	18733.90	0.327 [1]
T3	120 - 100	L2 1/2x2 1/2x3/16	12.28	6.02	94.7	0.5713	6751.74	24851.10	0.272 [1]
T4	100 - 80	L2 1/2x2 1/2x3/16	14.07	6.90	108.3	0.5713	7111.87	24851.10	0.286 [1]
T5	80 - 60	L3x3x1/4	15.94	7.79	102.0	0.9394	7868.54	45794.50	0.172 [1]
T6	60 - 40	L3 1/2x3 1/2x1/4	19.21	9.45	105.5	1.1034	9277.95	53792.60	0.172 [1]
T7	40 - 20	L3 1/2x3 1/2x1/4	20.93	10.30	114.8	1.1034	10238.00	53792.60	0.190 [1]
T8	20 - 10	L3 1/2x3 1/2x1/4	21.83	10.76	120.0	1.1034	9964.02	53792.60	0.185 [1]
T9	10 - 0	L3.5x3.5x1/4 + L3.5x3.5x1/4 (C-shape - MOD)	22.76	11.36	88.9	1.7056	10333.40	76752.00	0.135 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 140	L1 3/4x1 3/4x3/16	6.58	6.10	141.7	0.3604	102.84	15675.30	0.007 [1] ✔
T2	140 - 120	L1 3/4x1 3/4x3/16	6.58	6.10	141.7	0.3604	183.54	15675.30	0.012 [1] ✔

[1] $P_u / \phi P_n$ controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T1	160 - 140	Leg	ROHN 2.5 STD	2	-22201.50	63560.30	34.9	Pass
T2	140 - 120	Leg	ROHN 3 STD	38	-62520.80	82509.00	75.8	Pass
T3	120 - 100	Leg	ROHN 3.5 EH	68	-103909.00	125723.00	82.6	Pass
T4	100 - 80	Leg	ROHN 4 EH	89	-143639.00	159903.00	89.8	Pass
T5	80 - 60	Leg	ROHN 5 EH	110	-182451.00	239378.00	76.2	Pass
T6	60 - 40	Leg	ROHN 6 EHS	131	-216954.00	244047.00	88.9	Pass
T7	40 - 20	Leg	ROHN 6 EH	146	-254899.00	303757.00	83.9	Pass
T8	20 - 10	Leg	ROHN 6 EH	161	-274112.00	303730.00	90.2	Pass
T9	10 - 0	Leg	ROHN 6 EH	170	-291260.00	303730.00	95.9	Pass
T1	160 - 140	Diagonal	L1 3/4x1 3/4x3/16	10	-3565.06	8788.95	40.6 60.5 (b)	Pass
T2	140 - 120	Diagonal	L2x2x3/16	45	-6139.73	7810.37	78.6 89.8 (b)	Pass
T3	120 - 100	Diagonal	L2 1/2x2 1/2x3/16	72	-6780.02	9552.75	71.0 86.2 (b)	Pass
T4	100 - 80	Diagonal	L2 1/2x2 1/2x3/16	93	-7165.40	7279.23	98.4	Pass
T5	80 - 60	Diagonal	L3x3x1/4	114	-7870.09	13051.40	60.3 67.3 (b)	Pass
T6	60 - 40	Diagonal	L3 1/2x3 1/2x1/4	135	-9339.81	14294.60	65.3 65.6 (b)	Pass
T7	40 - 20	Diagonal	L3 1/2x3 1/2x1/4	150	-10569.30	12044.30	87.8	Pass
T8	20 - 10	Diagonal	L3 1/2x3 1/2x1/4	165	-9936.05	11028.70	90.1	Pass
T9	10 - 0	Diagonal	L3.5x3.5x1/4 + L3.5x3.5x1/4 (C-shape - MOD)	174	-10922.80	43089.90	25.3 61.0 (b)	Pass
T1	160 - 140	Top Girt	L1 3/4x1 3/4x3/16	4	-104.51	3088.02	3.4	Pass
T2	140 - 120	Top Girt	L1 3/4x1 3/4x3/16	41	-189.50	3088.02	6.1	Pass
							Summary	
							Leg (T9) 95.9	Pass
							Diagonal (T4) 98.4	Pass
							Top Girt (T2) 6.1	Pass
							Bolt Checks 90.8	Pass
							RATING = 98.4	**Pass**

MATHCAD CALCULATION PRINTOUT

EXISTING 160' SELF SUPPORT TOWER ANCHOR BOLT CHECK

REACTIONS ON THE FOUNDATION

As per Tnx output (see attached)

Down load; $Pv := 300.213 \cdot kips$ Shear; $V_u := 30.768 \cdot kips$

Uplift load; $P_{up} := 266.210 \cdot kips$ Moment; $M := 0 \cdot kips \cdot ft$

Anchor Rod Data is as per original tower drawing by ROHN, DWG # A991242, dated 4/6/1999

Number of Anchor Rods: $N_{anchors} := 8$

Diameter of Anchors: $D_{anchors} := 1in$ $n := 8in^{-1}$

Area of anchor bolts $A_b := \frac{\pi \cdot \left(D_{anchors}^{2}\right)}{4} = 0.785 \cdot in^2$

Net Tensile Area of Anchors: $A_{net} := \frac{\pi}{4} \cdot \left(D_{anchors} - \frac{0.9743}{n}\right)^2 = 0.606 \cdot in^2$

Ultimate Tensile Stress: $F_{Uanchors} := 125ksi$ (ASTM A354 GR BC)

Saftey Factor for Anchor: $\phi_t := 0.8$ (Section 4.9.9, TIA-222-G Addendum 2)

Allowable Axial Load per Anchor: $T_{cap} := \phi_t \cdot F_{Uanchors} \cdot A_{net}$

$T_{cap} = 60.574 \cdot kips$

Interaction Equation for Anchor Rods as per Section 4.9.9, TIA-222-G Addendum 1 and Figure 4.4

For detail type (C) as per Figure 4.4 $\eta := 0.55$

$P_u := if\left(\eta > 0.5, P_{up}, Pv\right) = 266.21 \cdot kips$

Maximum Load on Anchor: $T_{max} := \frac{P_u + \frac{V_u}{\eta}}{N_{anchors}}$

$T_{max} = 40.269 \cdot kips$

Anchor Rod Capacity: $\frac{T_{max}}{T_{cap}} = 66.479 \cdot \%$ OK!

$Anchor\_Rod\_Check := if\left(T_{max} < T_{cap}, "OK", "Not\ OK"\right)$

Anchor_Rod_Check = "OK"

Summary

-Foundation Reactions from Tower Base-

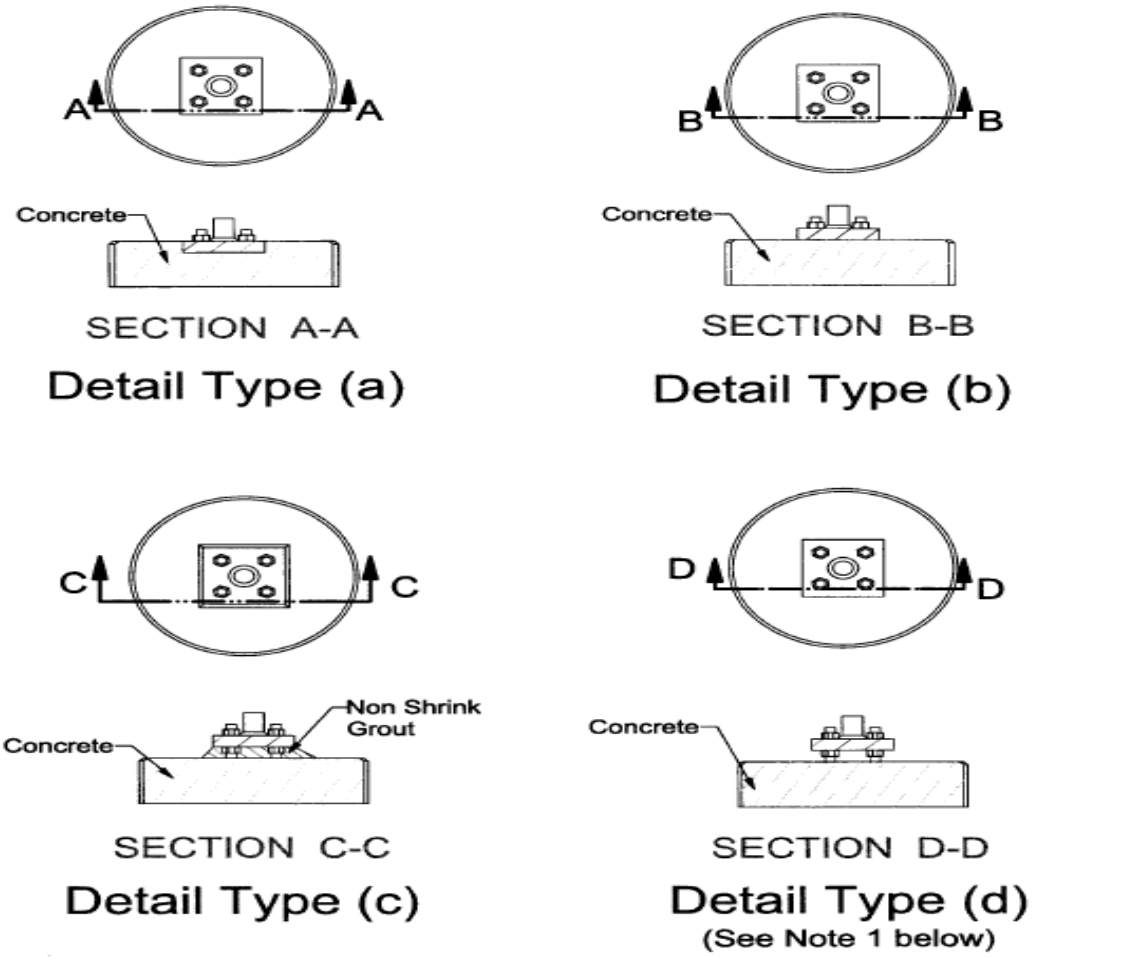
Shear	$V_u = 30.768 \cdot kips$
Down load	$Pv = 300.213 \cdot kips$
Uplift load	$P_{up} = 266.21 \cdot kips$
Moment	$M = 0 \cdot ft \cdot kip$

Anchor Rod Check $T_{max} = 40.269 \cdot kips$ < $T_{cap} = 60.574 \cdot kips$

Anchor_Rod_Check := if($T_{max} < T_{cap}$, "OK" , "Not OK")

Anchor_Rod_Check = "OK"

ANSI/TIA-222-G



Note:

1. When clear distance from top of concrete to the bottom face of the leveling nut exceeds 1.5 times the diameter of the anchor rod, bending of the anchor rod shall be considered (refer to 4.9.9).

Figure 4-4: Anchor Rod Detail Types

4.9.9 Anchor Rods

For anchor rods, the following interaction equation shall be satisfied:

$$\left(\frac{P_u + \frac{V_u}{\eta}}{\phi R_{nt}} \right) \leq 1$$

where:

$\phi = 0.80$

P_u = tension force for detail types (a), (b) & (c) and larger of compression or tension force for type (d) as depicted in Figure 4-4.

V_u = shear force (direct shear and torsion components) corresponding to P_u

R_{nt} = nominal tensile strength of anchor rod as per 4.9.6.1

η = 0.90 for detail type (a)
= 0.70 for detail type (b)
= 0.55 for detail type (c)
= 0.50 for detail type (d)

For detail type (d), when the clear distance from the top of concrete to the bottom leveling nut exceeds 1.0 times the diameter of the anchor rod, the following interaction equation shall also be satisfied:

$$\left(\frac{V_u}{\phi R_{nv}} \right)^2 + \left(\left| \frac{P_u}{\phi R_{nt}} \right| + \left| \frac{M_u}{\phi R_{nm}} \right| \right)^2 \leq 1$$

where:

M_u = bending moment corresponding to V_u
= 0.65 $l_{ar} V_u$

l_{ar} = length from top of concrete to bottom of anchor rod leveling nut

Addendum 1

ϕR_{nv} = design shear strength of anchor rod as per 4.9.6.3

ϕR_{nm} = design flexural strength of anchor rod in accordance with 4.7.1 using the tensile root diameter for the determination of z

d_{rt} = tensile root diameter of rod, in [mm]
= d – 0.9743/n inches
= d – 0.9382(p) mm

d = nominal rod diameter, in [mm]

n = number of threads per inch

p = pitch of threads, mm

4.9.6.3 Design Shear Strength

The design shear strength of a bolt, ϕR_{nv}, shall be taken as:

$\phi = 0.75$

(a) When threads are excluded from the shear plane:
$R_{nv} = 0.55\ F_{ub}\ A_b$

(b) When threads are included in the shear plane:
$R_{nv} = 0.45\ F_{ub}\ A_b$

where:

F_{ub} = Specified minimum tensile strength of bolt

A_b = nominal unthreaded area of bolt

4.7.1 Solid Round Members

For solid round members, M_n shall be determined as follows:

$M_n = F_y'Z$

where:

F_y' = effective yield stress as determined from 4.5.4.1

Z = plastic section modulus

4.5.4.1 Effective Yield Stress

For 60^O and 90^O angle members, the effective yield stress for axial compression, F'_y, shall be determined as follows:

$$w/t \le 0.47\sqrt{\frac{E}{F_y}} \qquad F'_y = F_y$$

$$0.47\sqrt{\frac{E}{F_y}} < w/t \le 0.85\sqrt{\frac{E}{F_y}} \qquad F'_y = \left[1.677-0.677\left(\frac{w/t}{0.47\sqrt{E/F_y}}\right)\right] F_y$$

$$0.85\sqrt{\frac{E}{F_y}} < w/t \le 25 \qquad F'_y = [0.0332\ \pi^2\ E/(w/t)^2]$$

The width to thickness ratio (w/t) shall not exceed 25 for angle members (refer to Figure 4-3).

For solid round members, the effective yield stress, F'_y, shall be equal to F_y.

For tubular round members, the diameter to thickness ratio (D/t) shall not exceed 400. The effective yield stress, F'_y, shall be determined as follows:

$$D/t \le 0.114\ E/F_y \qquad F'_y = F_y$$

$$0.114\ E/F_y < D/t \le 0.448\ E/F_y \qquad F'_y = \left(\frac{0.0379E}{(D/t)F_y}+\frac{2}{3}\right)F_y$$

$$0.448\ E/F_y < D/t \le 400 \qquad F'_y = \frac{0.337E}{(D/t)}$$

Existing 160 ft Self Supporting Tower Foundation Check

Customer Name: SBA Communications Corp
Customer Site Number: CT10012-A-01
APP# 75698, v2
Customer Site Name: Griswold 2, CT

Carrier Name: AT&T

Site Location: 181 A Norman Road,
Griswold, CT 06351

Latitude: 41.601097
Longitude:-71.954325

ACGI Job # 18-5030

By:

Allpro Consulting Group, Inc.
9221 Lyndon B. Johnson Freeway, #204
Dallas, TX 75243
Phone: 972-231-8893
Fax: 866-364-8375

INPUT DATA

-Foundation Reactions- G Code (factered)

(As per TNX Output)

Down load; $Pv := 300.213 \cdot kips$ Shear; $S := 34.330 \cdot kips$

Uplift load; $P_{up} := 266.210 \cdot kips$ Moment; $M := 0 \cdot ft\_K$

MATERIAL & SOIL PARAMETERS

Conforming to the design requirements as in ACI 318

Unit wt. of concrete, $\gamma_c := 0.150 kcf$

Concrete compressive strength, $f_c := 3000 \cdot psi$

Rebar yield strength, $f_y := 60000 \cdot psi$

Soil data as per Geotechnical report by FDH Engineering Inc. FDH Project No. 16BDCN1600 dated 03/04/2016.

For Leg A With smallest computed thickness, consider this as worst case

Unit wt. of soil, $\gamma_s := 0.130 \cdot kcf$ Average Soil Weight

Ultimate Bearing Capacity, $Br_{ult} := 20 ksf$ (as per geotechnical report)

Internal angle of friction for soil, $\phi := 40 \cdot deg$

Cohesion of soil, $c_u := 0 \cdot ksf$

Coefficient of Friction $C_f := 0.45$

PRELIMINARY DIMENSIONS

Type of pedestal Pe.t=0 for circular,=1 for rectangular/square $Pe_t := 1$

Footing Dimensions, LxB $L := 6 \cdot ft$ $B := L$ Thickness of footing, $T_f := 2.3 \cdot ft$

Depth of footing, $D_f := 11.8 ft$ Extension above the grade, $Ex_g := 1 \cdot ft$

Pedestal diameter/size $Ped_{size} := 3 \cdot ft$

Depth of soil neglected: $L_{neg} := 1 \cdot ft$

CALCULATIONS

Determine footing size

$P_{ave} := 6.16ksf$ average passive pressure on footing. As per Geotechnical Report Figure 2

Calculate safety against overturning and location of resultant on the base

$Area_{ped} := if\left(Pe_t = 1, Ped_{size}^2, \frac{\pi}{4}\cdot Ped_{size}^2\right)$ $Area_{ped} = 9\,ft^2$

Resisting Moments

$N := 1..5$

Component	Down load value, kips	Lever arm, ft
"Soil Weight"	$\left[L\cdot B\cdot\left(D_f - T_f\right) - Area_{ped}\cdot\left(D_f - T_f\right)\right]\cdot\gamma_s$	$\frac{L}{2}$
"Soil Wedge Weight"	$\left(D_f - T_f\right)\cdot\frac{1}{2}\cdot\left[\left(D_f - T_f\right)\cdot\tan(\phi)\right]\cdot B\cdot\gamma_s$	$L + \left(D_f - T_f\right)\cdot\frac{\tan(\phi)}{3}$
"Concrete Weight"	$L\cdot B\cdot T_f\cdot\gamma_c + Area_{ped}\cdot\gamma_c\cdot\left(D_f + Ex_g - T_f\right)$	$\frac{L}{2}$
"Passive Pressure"	$T_f\cdot B\cdot P_{ave}$	$\frac{T_f}{3}$
"Vertical load"	Pv	$\frac{L}{2}$

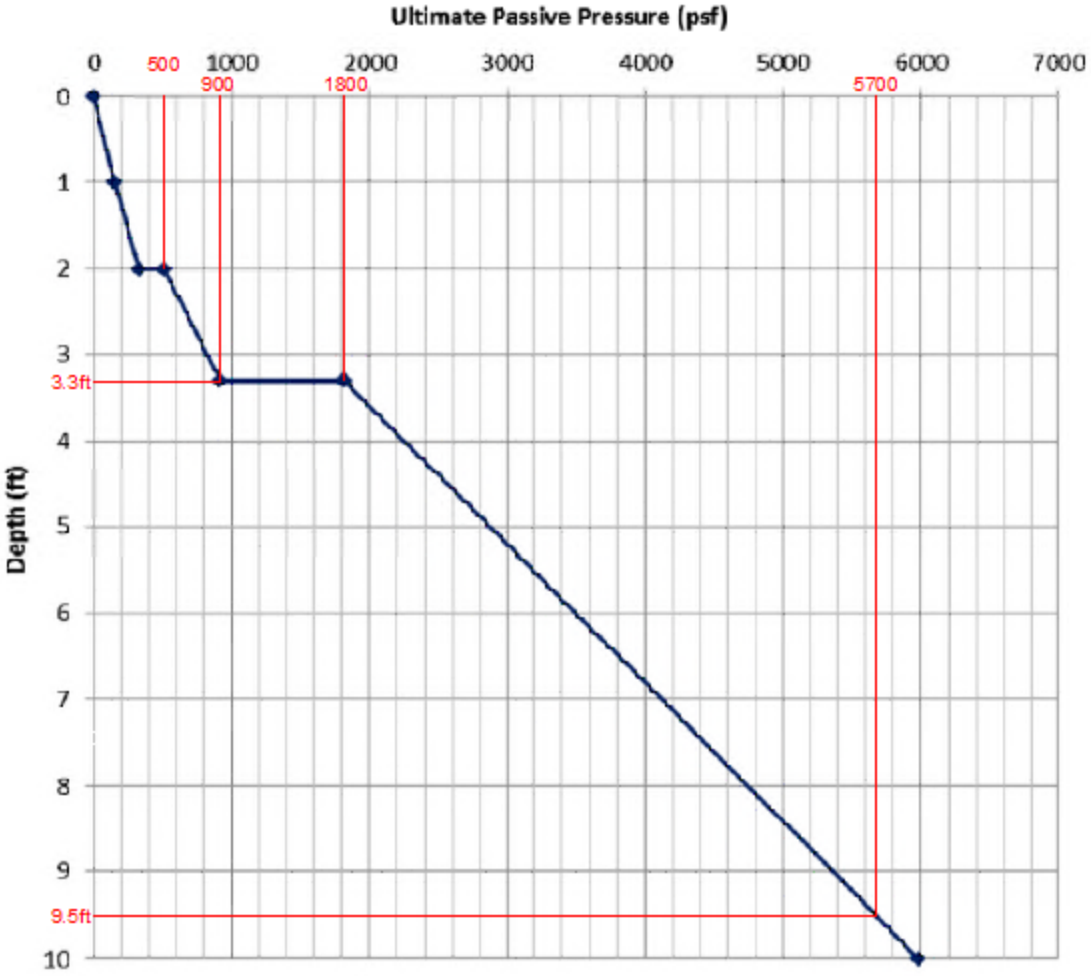
$RM_N := PDL_N\cdot LEV_N$

$TRM := \sum_N RM_N$ $TRM = 1401.314\cdot ft\cdot kips$

$TWT := PDL_1 + PDL_2 + PDL_3 + PDL_5$ $TWT = 389.687\cdot kips$ Total down load

Net soil weight removed $S_{w1} := L\cdot B\cdot D_f\cdot\gamma_s$ $S_{w1} = 55.224\cdot kips$

FIGURE 2: ULTIMATE PASSIVE RESISTANCE vs. DEPTH



2ft-3.3ft passive pressure on pedestal

As per Geotechnical Report Figure 2

resisting force $F_{pr1} := \frac{(0.5ksf + 0.9ksf)\cdot(3.3ft - 2ft)\cdot Ped_{size}}{2} = 2.73\cdot kips$

resisting moment arm $L_{pr1} := T_f + 9.5ft - \frac{(2ft + 3.3ft)}{2} = 9.15\,ft$

$M_{pr1} := F_{pr1}\cdot L_{pr1} = 24.98\cdot kips\cdot ft$

3.3ft-9.5ft passive pressure on pedestal

resisting force $F_{pr2} := \frac{(5.7ksf + 1.8ksf)\cdot(9.5ft - 3.3ft)\cdot Ped_{size}}{2} = 69.75\cdot kips$

resisting moment arm $L_{pr2} := T_f + 9.5ft - \frac{(9.5ft + 3.3ft)}{2} = 5.4\,ft$

$M_{pr2} := F_{pr2}\cdot L_{pr2} = 376.65\cdot kips\cdot ft$

$M_{pr} := M_{pr1} + M_{pr2} = 401.63\cdot kips\cdot ft$

Total resisting moment $M_r := TRM + M_{pr} = 1802.943 \cdot kip \cdot ft$

Overturning Moments

component	value, kips	lever arm, ft	Overturning Moment ft-kips
1) Moment on foundation	-	-	$M = 0 \cdot ft\_K$
2) Moment due to horizontal shear	$S = 34.33 \cdot kips$	$L_{hs} := D_f + Ex_g$	$O_{hs} := L_{hs} \cdot S$ $L_{hs} = 12.8\,ft$ $O_{hs} = 439.424 \cdot ft\_K$
Total Overturning Moment=	$M_o := M + O_{hs}$		$M_o = 439.424 \cdot ft\_K$

Check Safety Factor against Overturning

$SF := \frac{0.9 M_r}{M_o}$ $SF = 3.693$ > 1.0 OK!

$TWT_1 := TWT - PDL_2$ (exclude soil wedge weight for bearing check)

$M_{o\_red} := M_o - 0.75\left(M_{pr} + RM_4\right) = 89.322 \cdot kip \cdot ft$ (exclude overturning moment resist from lateral force)

Calculate eccentricity, ec $ec := \frac{M_{o\_red}}{TWT_1}$ $ec = 0.248 \cdot ft$ $\phi_{bearing} := 0.75$

Check location of eccentricity and determine pressure distribution under the footing

$L_{loc} := \frac{L}{6}$ $L_{loc} = 1\,ft$ For net bearing calcs $T_{w1} := S_{w1}$ $T_{w1} = 55.224 \cdot kips$

$P_{max1} := if\left[ec \le L_{loc}, \frac{TWT_1}{L \cdot B} \cdot \left[1 + \left(6 \cdot \frac{ec}{L}\right)\right], 4 \cdot \frac{TWT_1}{3 \cdot B \cdot (L - 2 \cdot ec)}\right]$ $P_{max1} = 12.485 \cdot ksf$ Gross soil pressure

$P_{max2} := \left(\frac{T_{w1}}{L \cdot B}\right)$ $P_{max2} = 1.534 \cdot ksf$ In-situ soil pressure $P_{net} := P_{max1} - P_{max2}$ $P_{max} := P_{net}$

Net soil pressure, $P_{net} = 10.951 \cdot ksf$ < $\phi_{bearing} Br_{ult} = 15 \cdot ksf$ $\frac{P_{net}}{\phi_{bearing} Br_{ult}} = 73.009 \cdot \%$ OK!

$P_{min} := if\left[ec \le L_{loc}, \frac{TWT}{L \cdot B} \cdot \left[1 - \left(6 \cdot \frac{ec}{L}\right)\right], 0 \cdot ksf\right]$ $P_{min} = 8.14 \cdot ksf$

Check for horizontal shear

$P_{tw} := \left(PDL_1 + PDL_3 + PDL_5\right) \cdot C_f$ $P_{shr} := 0.75\left(PDL_4 + P_{tw}\right)$

$P_{shr} = 185.308 \cdot kips$ > $S = 34.33 \cdot kips$ **OK!**

Check for uplift

Number of soil layers $NSL := 4$ $j := 1 .. NSL$

Neglected soil height $L_{ngl} := 3.3 \cdot ft$ $k := 1 .. NSL$

$\alpha := 0.4$ Estimated cohesion $i := 1 .. NSL$

Height $H_j :=$	PHI $\phi_j :=$	Soil Dens $\gamma s_j :=$
$1 \cdot ft$	$0 \cdot deg$	$105 \cdot pcf$
$1 \cdot ft$	$30 \cdot deg$	$115 \cdot pcf$
$7.5 \cdot ft$	$40 \cdot deg$	$135 \cdot pcf$
$2.3 ft$	$40 \cdot deg$	$135 pcf$

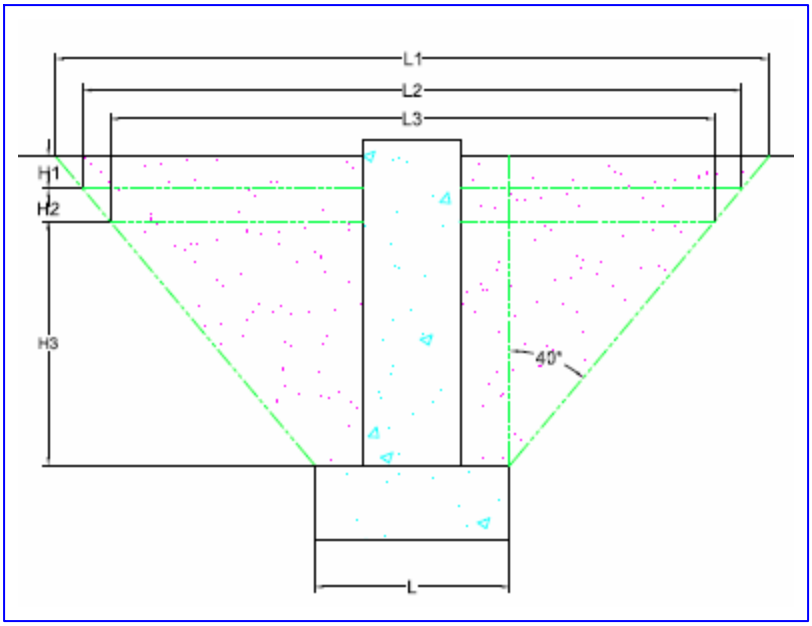
$K_s := 1$ For ϕ=40

$\sigma 1v_4 := \gamma s_1 \cdot H_1 + \gamma s_2 \cdot H_2 + \gamma s_3 \cdot H_3 + \gamma s_4 \cdot \frac{H_4}{2}$ $SK4 := K_s \cdot \sigma 1v_4 \cdot \tan\left(\phi_4 \cdot 0.8\right)$ $SK4 = 0.867 \cdot ksf$

Skin friction around Pad

$SKFUN_4 := 4 \cdot L \cdot H_4 \cdot (SK4)$

Soil & Soil Wedge Weight



$L_3 := L + 2 \cdot H_3 \cdot \tan\left(\phi_3\right) = 18.586 ft$

$L_2 := L_3 + 2 \cdot H_2 \cdot \tan\left(\phi_2\right) = 19.741 ft$

$L_1 := L_2 + 2 \cdot H_1 \cdot \tan\left(\phi_1\right) = 19.741 ft$

For Layer 0-1ft

$V_{soil1} := \frac{1}{6} \cdot H_1 \cdot \left[L_2^2 + \left(L_2 + L_1\right)^2 + L_1^2\right]$

$W_{soil1} := \gamma s_1 \cdot \left(V_{soil1} - Area_{ped} \cdot H_1\right)$

For Layer 1ft-2ft

$V_{soil2} := \frac{1}{6} \cdot H_2 \cdot \left[L_2^2 + \left(L_2 + L_3\right)^2 + L_3^2\right]$

$W_{soil2} := \gamma s_2 \cdot \left(V_{soil2} - Area_{ped} \cdot H_2\right)$

For Layer 2ft-9.5ft

$V_{soil3} := \frac{1}{6} \cdot H_3 \cdot \left[L^2 + \left(L + L_3\right)^2 + L_3^2\right]$

$W_{soil3} := \gamma s_3 \cdot \left(V_{soil3} - Area_{ped} \cdot H_3\right)$

Total uplift resisting force

$TWT1 := W_{soil1} + W_{soil2} + W_{soil3} + PDL_3$ PDL3 is concrete weight

$P_{ucap} := 0.75(SKFUN_4) + 0.9 \cdot TWT1$ $P_{ucap} = 274.445 \cdot kips$ < $P_{up} = 266.21 \cdot kips$ $\frac{P_{up}}{P_{ucap}} = 97 \cdot \%$

Concrete Design Calculations

General Input parameters

Concrete Cover, $cc := 3.0 \cdot in$

Reduction factors as per respective ACI sections

$\phi_{shear} := 0.85$ as per ACI 9.3.2.3

$\phi_{compr} := 0.75$ as per ACI 9.3.2.2

$\phi_{axten} := 0.9$ as per ACI 9.3.2.2 a

Reinforced concrete load factor as per EIA 3.1.13 $RC_{fac} := 1.0$

(Loads already factored under TIA/EIA-222-G Code)

Single shear in footing

Allowable shear stress in concrete for wide beam shear criteria=

$\nu_{wide} := 2 \cdot \phi_{shear} \cdot \sqrt{f_c \cdot psi}$ $\nu_{wide} = 93.113 \cdot psi$

Effective depth of steel= $d := T_f - cc$ $d = 24.6 \cdot in$

$L_{eff} := if(ec \le L_{loc}, L, L - 2 \cdot ec)$ $L_{eff} = 6\,ft$

Factor load $P_{maxf} := P_{max} \cdot RC_{fac}$ $P_{minf} := P_{min} \cdot RC_{fac}$

shear on the face of concrete=

$$Shear_{wide} := \left(\frac{L - Ped_{size}}{2} - d\right) \cdot B \cdot \left[\frac{P_{maxf} + \left[P_{maxf} - \frac{P_{maxf} - P_{minf}}{L_{eff}} \cdot \left(\frac{L - Ped_{size}}{2} - d\right)\right]}{2}\right] \quad Shear_{wide} = -36.565 \cdot kips$$

Area of concrete in shear= $A_{shear} := B \cdot d$ $A_{shear} = 1771.2 \cdot in^2$

Shear stress acting on concrete face= $\nu_{act1} := \frac{Shear_{wide}}{A_{shear}}$ $\nu_{act1} = -20.644 \cdot psi$ < $\nu_{wide} = 93.113 \cdot psi$ **O.K!**

Punching or two way shear in footing

Calculate allowable shear stress in concrete for punching/two way shear

$\beta := \frac{L}{B}$ $\beta = 1$ $\nu_{punch} := if\left[\left(2 + \frac{4}{\beta}\right)\cdot\phi_{shear}\cdot\sqrt{f_c\cdot psi} \le 4\cdot\phi_{shear}\cdot\sqrt{f_c\cdot psi}, \left(2 + \frac{4}{\beta}\right)\cdot\phi_{shear}\cdot\sqrt{f_c\cdot psi}, 4\cdot\phi_{shear}\cdot\sqrt{f_c\cdot psi}\right]$

$\nu_{punch} = 186.226\cdot psi$

$P_{avg} := \frac{P_{maxf} + P_{minf}}{2}$

$Area_{col} := if\left[Pe_t = 0, \frac{\pi}{4}\cdot\left(Ped_{size} + d\right)^2, \left(Ped_{size} + d\right)^2\right]$

$Peri_{col} := if\left[Pe_t = 0, 2\cdot\pi\cdot\frac{Ped_{size} + d}{2}, 4\cdot\left(Ped_{size} + d\right)\right]$

Factor vertical load $Pvf := RC_{fac}\cdot Pv$

Shear stress acting on the concrete face=

$\nu_{act} := \frac{Pvf - Area_{col}\cdot P_{avg}}{Peri_{col}\cdot d}$ $\nu_{act} = 9.521\cdot psi$ < $\nu_{punch} = 186.226\cdot psi$ **O.K!**

Design pedestal steel

Effective diameter/size= $D_{eff} := Ped_{size} - cc\cdot 2$ $D_{eff} = 30\cdot in$ $h := Ped_{size}$ $h = 36\cdot in$

$D_{pier} := Ped_{size}$

Effective pier diameter $D_{eff} := D_{pier} - cc\cdot 2$ $D_{eff} = 2.5\,ft$

-Minimum required area of steel per ACI-

$Area_{stlmin} := 0.005\cdot\frac{\pi}{4}\cdot D_{pier}^2$ -(ACI 10.8.4) & (ACI 10.9.1)

$Area_{stlmin} = 5.089\cdot in^2$

-Rebar details-

Selected rebar size $d_{bar} := 8$

-Rebar details-

$No := (0\ \ 1\ \ 2\ \ 3\ \ 4\ \ 5\ \ 6\ \ 7\ \ 8\ \ 9\ \ 10\ \ 11\ \ 12\ \ 13\ \ 14\ \ 15\ \ 16\ \ 17\ \ 18)^T$

$d_b := (0\ \ 0\ \ 0\ \ 0.375\ \ 0.5\ \ 0.625\ \ 0.75\ \ 0.875\ \ 1.00\ \ 1.125\ \ 1.25\ \ 1.41\ \ 0\ \ 0\ \ 1.693\ \ 0\ \ 0\ \ 0\ \ 2.257)^T\cdot in$

$A_b := (0\ \ 0\ \ 0\ \ 0.11\ \ 0.20\ \ 0.31\ \ 0.44\ \ 0.60\ \ 0.79\ \ 1.00\ \ 1.27\ \ 1.56\ \ 0\ \ 0\ \ 2.25\ \ 0\ \ 0\ \ 0\ \ 4.00)^T\cdot in^2$

$B := d_{bar}$ $d_{b_B} = 1\cdot in$ Bar area= $Area_{abar} := A_{b_B}$ $Area_{abar} = 0.79\cdot in^2$

-Number of vertical rebars required-

$NRB := ceil\left(\frac{Area_{stlmin}}{Area_{abar}}\right)$ $NRB = 7$ $Area_{stluse} := Area_{abar}\cdot NRB$ $Area_{stluse} = 5.53\cdot in^2$

Rebar used $NRB := 12$ $Area_{stluse1} := Area_{abar}\cdot NRB = 9.48\cdot in^2$ OK!

$Mn := 4397.098 \cdot in \cdot kips$

$0.9 \cdot Mn = 329.782 \cdot kips \cdot ft$ > $M_{o\_red} = 89.322 \cdot kips \cdot ft$ **OK**

Use ($NRB = 12$) $d_{bar} = 8$ vertical bars

Vertical bar spacing $S_{bar} := D_{eff} \cdot \frac{\pi}{NRB} - d_{b_B}$ $S_{bar} = 6.854 \cdot in$

Check pedestal in compression

Allowable compressive load on column ACI 10.15= $P_{comp} := \phi_{compr} \cdot 0.85 \cdot f_c \cdot Area_{ped}$

$P_{comp} = 2478.6 \cdot kips$ > $Pv = 300.213 \cdot kips$ **O.K!**

SPREAD FOOTING CHECK SUMMARY

Safety Factor against Overturning $SF = 3.693$ > 1.0 **O.K!** $\frac{1.0}{SF} = 27.081 \cdot \%$

Uplift $P_{ucap} = 274.445 \cdot kips$ > $P_{up} = 266.21 \cdot kips$ $\frac{P_{up}}{P_{ucap}} = 97 \cdot \%$ OK!

Net soil pressure, $P_{net} = 10.951 \cdot ksf$ < $\phi_{bearing} Br_{ult} = 15 \cdot ksf$ OK! $\frac{P_{net}}{\phi_{bearing} Br_{ult}} = 73.009 \cdot \%$

Check for horizontal shear $P_{shr} = 185.308 \cdot kips$ > $S = 34.33 \cdot kips$ OK! $\frac{S}{P_{shr}} = 18.526 \cdot \%$

Check pedestal in compression

Allowable compressive load on column ACI 10.15= $P_{comp} = 2478.6 \cdot kips$ > $Pv = 300.213 \cdot kips$

$\frac{Pv}{P_{comp}} = 12.112 \cdot \%$

```
================================================================================

                     LPile for Windows, Version 2018-10.006

                 Analysis of Individual Piles and Drilled Shafts
                Subjected to Lateral Loading Using the p-y Method
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================================================================================

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--------------------------------------------------------------------------------
                              Files Used for Analysis
--------------------------------------------------------------------------------

Path to file locations:
\\Helios2\p\2018\Structural\18-5030 CT10012-A-01 Griswold 2, CT SA SBA 162 SST AT&T\L-Pile\

Name of input data file:
CT10012-A-01 Foundation.lp10

Name of output report file:
CT10012-A-01 Foundation.lp10

Name of plot output file:
CT10012-A-01 Foundation.lp10

Name of runtime message file:
CT10012-A-01 Foundation.lp10



--------------------------------------------------------------------------------
                            Date and Time of Analysis
--------------------------------------------------------------------------------

               Date:  July 24, 2018              Time:  16:17:09



--------------------------------------------------------------------------------
                                  Problem Title
--------------------------------------------------------------------------------
```

```
Job Number:
Client:
Engineer:
Description:



--------------------------------------------------------------------------------
                          Program Options and Settings
--------------------------------------------------------------------------------

Computational Options:
 - Compute nonlinear bending properties of pile only
Engineering Units Used for Data Input and Computations:
 - US Customary System Units (pounds, feet, inches)

Output Options:
 - Output files use decimal points to denote decimal symbols.
 - Print using wide report formats




--------------------------------------------------------------------------------
                     Pile Structural Properties and Geometry
--------------------------------------------------------------------------------

Number of pile sections defined                        =           1
Total length of pile                                   =       0.000 ft
Depth of ground surface below top of pile              =      0.0000 ft

Pile diameters used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over
the length of the pile. A summary of values of pile diameter vs. depth follows.

            Depth Below           Pile
Point        Pile Head          Diameter
 No.            feet             inches
-----      -------------     -------------
  1             0.000           36.0000
  2             0.000           36.0000


Input Structural Properties for Pile Sections:
----------------------------------------------

Pile Section No. 1:

   Section 1 is a round drilled shaft, bored pile, or CIDH pile
   Length of section                                   =       0.0000 ft
   Shaft Diameter                                      =    36.000000 in
   Shear capacity of section                           =       0.0000 lbs




--------------------------------------------------------------------------------
```

```
     Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness
-------------------------------------------------------------------------------

Axial thrust force values were determined from input values

Number of Pile Sections Analyzed = 1

Pile Section No. 1:
-------------------

Dimensions and Properties of Drilled Shaft (Bored Pile):
--------------------------------------------------------

Length of Section                                    =       0.0000 ft
Shaft Diameter                                       =    36.000000 in
Concrete Cover Thickness (to edge of long. rebar)    =     3.498537 in
Number of Reinforcing Bars                           =           12 bars
Yield Stress of Reinforcing Bars                     =       60000. psi
Modulus of Elasticity of Reinforcing Bars            =    29000000. psi
Gross Area of Shaft                                  =        1018. sq. in.
Total Area of Reinforcing Steel                      =     9.480000 sq. in.
Area Ratio of Steel Reinforcement                    =         0.93 percent
Edge-to-Edge Bar Spacing                             =     6.247690 in
Maximum Concrete Aggregate Size                      =     0.750000 in
Ratio of Bar Spacing to Aggregate Size               =         8.33
Offset of Center of Rebar Cage from Center of Pile   =       0.0000 in

Axial Structural Capacities:
----------------------------

Nom. Axial Structural Capacity = 0.85 Fc Ac + Fy As  =     3140.210 kips
Tensile Load for Cracking of Concrete                =     -396.941 kips
Nominal Axial Tensile Capacity                       =     -568.800 kips


Reinforcing Bar Dimensions and Positions Used in Computations:

     Bar          Bar Diam.      Bar Area          X             Y
    Number         inches         sq. in.        inches        inches
  ----------     ----------     ----------     ----------     ----------
      1            1.000000       0.790000      14.001463       0.00000
      2            1.000000       0.790000      12.125622       7.000731
      3            1.000000       0.790000       7.000731      12.125622
      4            1.000000       0.790000       0.00000      14.001463
      5            1.000000       0.790000      -7.000731      12.125622
      6            1.000000       0.790000     -12.125622       7.000731
      7            1.000000       0.790000     -14.001463       0.00000
      8            1.000000       0.790000     -12.125622      -7.000731
      9            1.000000       0.790000      -7.000731     -12.125622
     10            1.000000       0.790000       0.00000     -14.001463
     11            1.000000       0.790000       7.000731     -12.125622
     12            1.000000       0.790000      12.125622      -7.000731


NOTE: The positions of the above rebars were computed by LPile

Minimum spacing between any two bars not equal to zero =  6.248 inches
between bars 7 and 8.

Ratio of bar spacing to maximum aggregate size = 8.33
```

```
Concrete Properties:
--------------------

Compressive Strength of Concrete                        =        3000. psi
Modulus of Elasticity of Concrete                       =     3122019. psi
Modulus of Rupture of Concrete                          =  -410.791918 psi
Compression Strain at Peak Stress                       =     0.001634
Tensile Strain at Fracture of Concrete                  =   -0.0001160
Maximum Coarse Aggregate Size                           =     0.750000 in


Input Axial Thrust Forces:
--------------------------

Number of Axial Thrust Force Values Determined from Input Data = 2

   Number     Axial Thrust Force
                    kips
   ------     ------------------
      1             -266.210
      2              300.213


Definitions of Run Messages and Notes:
--------------------------------------

  C = concrete in section has cracked in tension.
  Y = stress in reinforcing steel has reached yield stress.
  T = ACI 318 criteria for tension-controlled section met, tensile strain in
      reinforcement exceeds 0.005 while simultaneously compressive strain in
      concrete more than 0.003. See ACI 318, Section 10.3.4.
  Z = depth of tensile zone in concrete section is less than 10 percent of
      section depth.

Bending Stiffness (EI) = Computed Bending Moment / Curvature.
Position of neutral axis is measured from edge of compression side of pile.
Compressive stresses and strains are positive in sign.
Tensile stresses and strains are negative in sign.


Axial Thrust Force =   -266.210 kips

    Bending       Bending       Bending      Depth to      Max Comp      Max Tens      Max Conc
Max Steel  Run
   Curvature      Moment       Stiffness      N Axis        Strain        Strain        Stress
Stress    Msg
    rad/in.       in-kip        kip-in2         in           in/in         in/in          ksi
ksi
------------ ------------ ------------ ------------ ------------ ------------ ------------ --
----------- ---
  6.25000E-07   196.2061055
313929769.   -91.1910123   -0.00005699   -0.00007949    -0.2060852    -2.3020746
   0.00000125   392.3823028
313905842.   -36.6179318   -0.00004577   -0.00009077    -0.1665682    -2.6258750
   0.00000188   588.5456503
313891014.   -18.4368926   -0.00003457    -0.0001021    -0.1268411    -2.9502185
   0.00000250   588.5456503    235418260.  -369.3257927    -0.0009233    -0.0010133
    0.00000   -29.3730700 C
```

```
 0.00000313   588.5456503    188334608.  -291.8603482    -0.0009121    -0.0010246
  0.00000   -29.6960315 C
 0.00000375   588.5456503    156945507.  -240.2167186    -0.0009008    -0.0010358
  0.00000   -30.0189931 C
 0.00000438   588.5456503    134524720.  -203.3284117    -0.0008896    -0.0010471
  0.00000   -30.3419547 C
 0.00000500   588.5456503    117709130.  -175.6621815    -0.0008783    -0.0010583
  0.00000   -30.6649163 C
 0.00000563   588.5456503    104630338.  -154.1440025    -0.0008671    -0.0010696
  0.00000   -30.9878779 C
 0.00000625   588.5456503     94167304.  -136.9294592    -0.0008558    -0.0010808
  0.00000   -31.3108395 C
 0.00000688   588.5456503     85606640.  -122.8448330    -0.0008446    -0.0010921
  0.00000   -31.6338011 C
 0.00000750   588.5456503     78472753.  -111.1076444    -0.0008333    -0.0011033
  0.00000   -31.9567626 C
 0.00000813   588.5456503     72436388.  -101.1761772    -0.0008221    -0.0011146
  0.00000   -32.2797242 C
 0.00000875   588.5456503     67262360.   -92.6634910    -0.0008108    -0.0011258
  0.00000   -32.6026858 C
 0.00000938   588.5456503     62778203.   -85.2858296    -0.0007996    -0.0011371
  0.00000   -32.9256476 C
 0.00001000   588.5456503     58854565.   -78.8303759    -0.0007883    -0.0011483
  0.00000   -33.2486090 C
 0.00001063   588.5456503     55392532.   -73.1343873    -0.0007771    -0.0011596
  0.00000   -33.5715707 C
 0.00001125   588.5456503     52315169.   -68.0712864    -0.0007658    -0.0011708
  0.00000   -33.8945321 C
 0.00001188   588.5456503     49561739.   -63.5411434    -0.0007546    -0.0011821
  0.00000   -34.2174938 C
 0.00001250   588.5456503     47083652.   -59.4640147    -0.0007433    -0.0011933
  0.00000   -34.5404555 C
 0.00001313   588.5456503     44841573.   -55.7751841    -0.0007320    -0.0012045
  0.00000   -34.8634169 C
 0.00001375   588.5456503     42803320.   -52.4217016    -0.0007208    -0.0012158
  0.00000   -35.1863785 C
 0.00001438   588.5456503     40942306.   -49.3598263    -0.0007095    -0.0012270
  0.00000   -35.5093400 C
 0.00001500   588.5456503     39236377.   -46.5531073    -0.0006983    -0.0012383
  0.00000   -35.8323018 C
 0.00001563   588.5456503     37666922.   -43.9709258    -0.0006870    -0.0012495
  0.00000   -36.1552632 C
 0.00001625   588.5456503     36218194.   -41.5873737    -0.0006758    -0.0012608
  0.00000   -36.4782245 C
 0.00001688   588.5456503     34876779.   -39.3803810    -0.0006645    -0.0012720
  0.00000   -36.8011863 C
 0.00001750   588.5456503     33631180.   -37.3310306    -0.0006533    -0.0012833
  0.00000   -37.1241476 C
 0.00001813   588.5456503     32471484.   -35.4230147    -0.0006420    -0.0012945
  0.00000   -37.4471096 C
 0.00001875   588.5456503     31389101.   -33.6421999    -0.0006308    -0.0013058
  0.00000   -37.7700712 C
 0.00001938   588.5456503     30376550.   -31.9762764    -0.0006195    -0.0013170
  0.00000   -38.0930327 C
 0.00002000   588.5456503     29427283.   -30.4144731    -0.0006083    -0.0013283
  0.00000   -38.4159944 C
 0.00002063   588.5456503     28535547.   -28.9473245    -0.0005970    -0.0013395
  0.00000   -38.7389558 C
 0.00002125   588.5456503     27696266.   -27.5664788    -0.0005858    -0.0013508
  0.00000   -39.0619176 C
```

```
  0.00002188   589.9383294     26968609.   -26.2645385    -0.0005745    -0.0013620
   0.00000   -39.3848791 C
  0.00002250   606.7828356     26968126.   -25.0349283    -0.0005633    -0.0013733
   0.00000   -39.7078406 C
  0.00002313   623.6273417     26967669.   -23.8717835    -0.0005520    -0.0013845
   0.00000   -40.0308023 C
  0.00002375   640.4718479     26967236.   -22.7698568    -0.0005408    -0.0013958
   0.00000   -40.3537638 C
  0.00002438   657.3163540     26966825.   -21.7244392    -0.0005295    -0.0014070
   0.00000   -40.6767254 C
  0.00002563   691.0053664     26966063.   -19.7865920    -0.0005070    -0.0014295
   0.00000   -41.3226486 C
  0.00002688   724.6943787     26965372.   -18.0290095    -0.0004845    -0.0014520
   0.00000   -41.9685717 C
  0.00002813   758.3833910     26964743.   -16.4276567    -0.0004620    -0.0014745
   0.00000   -42.6144949 C
  0.00002938   792.0724033     26964167.   -14.9625892    -0.0004395    -0.0014970
   0.00000   -43.2604181 C
  0.00003063   825.7614156     26963638.   -13.6171190    -0.0004170    -0.0015195
   0.00000   -43.9063412 C
  0.00003188   859.4504279     26963151.   -12.3771759    -0.0003945    -0.0015420
   0.00000   -44.5522645 C
  0.00003313   893.1394402     26962700.   -11.2308135    -0.0003720    -0.0015645
   0.00000   -45.1981876 C
  0.00003438   926.8284526     26962282.   -10.1678228    -0.0003495    -0.0015870
   0.00000   -45.8441107 C
  0.00003563   960.5174649     26961894.    -9.1794280    -0.0003270    -0.0016095
   0.00000   -46.4900339 C
  0.00003688   994.2064772     26961532.    -8.2580430    -0.0003045    -0.0016320
   0.00000   -47.1359571 C
  0.00003813          1028.    26961193.    -7.3970766    -0.0002820    -0.0016545
   0.00000   -47.7818803 C
  0.00003938          1062.    26960876.    -6.5907749    -0.0002595    -0.0016770
   0.00000   -48.4278034 C
  0.00004063          1095.    26960579.    -5.8340916    -0.0002370    -0.0016995
   0.00000   -49.0737266 C
  0.00004188          1129.    26960299.    -5.1225835    -0.0002145    -0.0017220
   0.00000   -49.7196498 C
  0.00004313          1163.    26960036.    -4.4523223    -0.0001920    -0.0017445
   0.00000   -50.3655729 C
  0.00004438          1196.    26959787.    -3.8198222    -0.0001695    -0.0017670
   0.00000   -51.0114961 C
  0.00004563          1230.    26959552.    -3.2219797    -0.0001470    -0.0017895
   0.00000   -51.6574193 C
  0.00004688          1264.    26959330.    -2.6560221    -0.0001245    -0.0018120
   0.00000   -52.3033424 C
  0.00004813          1297.    26959119.    -2.1194649    -0.0001020    -0.0018345
   0.00000   -52.9492656 C
  0.00004938          1331.    26958918.    -1.6100752   -0.00007950    -0.0018570
   0.00000   -53.5951887 C
  0.00005063          1365.    26958728.    -1.1258405   -0.00005700    -0.0018795
   0.00000   -54.2411119 C
  0.00005188          1398.    26958547.    -0.6649424   -0.00003449    -0.0019020
   0.00000   -54.8870351 C
  0.00005313          1432.    26958374.    -0.2257337   -0.00001199    -0.0019245
   0.00000   -55.5329583 C
  0.00005438          1466.    26959673.     0.1929828    0.00001049    -0.0019470
 0.0025924   -56.1793525 C
  0.00005563          1503.    27011667.     0.5824859    0.00003240    -0.0019701
 0.0816678   -56.8425149 C
```

```
 0.00005688         1543.     27132489.     0.9400002    0.00005346    -0.0019940
0.1566634   -57.5301995 C
 0.00005813         1588.     27317171.     1.2674049    0.00007367    -0.0020188
0.2276600   -58.2427179 C
 0.00005938         1637.     27567579.     1.5649680    0.00009292    -0.0020446
0.2944347   -58.9828830 C
 0.00006063         1689.     27864273.     1.8375567     0.0001114    -0.0020711
0.3577411   -59.7453841 CY
 0.00006188         1744.     28189990.     2.0897335     0.0001293    -0.0020982
0.4183174   -60.0000000 CY
 0.00006313         1801.     28535438.     2.3243719     0.0001467    -0.0021258
0.4765857   -60.0000000 CY
 0.00006438         1862.     28918500.     2.5377335     0.0001634    -0.0021541
0.5315803   -60.0000000 CY
 0.00006563         1923.     29298701.     2.7400486     0.0001798    -0.0021827
0.5853383   -60.0000000 CY
 0.00006688         1986.     29701032.     2.9258193     0.0001957    -0.0022118
0.6365466   -60.0000000 CY
 0.00006813         2050.     30096875.     3.1025813     0.0002114    -0.0022411
0.6867246   -60.0000000 CY
 0.00006938         2116.     30507097.     3.2656101     0.0002266    -0.0022709
0.7347342   -60.0000000 CY
 0.00007063         2182.     30901108.     3.4232121     0.0002418    -0.0023007
0.7823170   -60.0000000 CY
 0.00007188         2250.     31307182.     3.5661968     0.0002563    -0.0023312
0.8273429   -60.0000000 CY
 0.00007313         2314.     31651152.     3.6998889     0.0002706    -0.0023619
0.8709105   -60.0000000 CY
 0.00007438         2374.     31920796.     3.8195695     0.0002841    -0.0023934
0.9118683   -60.0000000 CY
 0.00007938         2599.     32747867.     4.2186907     0.0003349    -0.0025226
1.0619142   -60.0000000 CY
 0.00008438         2745.     32536284.     4.4580634     0.0003761    -0.0026614
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2.9937215   -60.0000000 CY
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2.9971816   -60.0000000 CY
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60.0000000 CY
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60.0000000 CY
    0.0005444         4387.      8059499.     4.8651714     0.0026485    -0.0169490     2.9955460
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    0.0006644         4401.      6624860.     4.8078869     0.0031942    -0.0207233     2.9987446
60.0000000 CYT
    0.0006944         4404.      6342234.     4.8014124     0.0033340    -0.0216635     2.9843000
60.0000000 CYT
    0.0007244         4406.      6082728.     4.7967241     0.0034746    -0.0226029     2.9851983
60.0000000 CYT
    0.0007544         4408.      5843564.     4.7936913     0.0036162    -0.0235413     2.9967060
60.0000000 CYT
    0.0007844         4410.      5622363.     4.7923098     0.0037590    -0.0244785     2.9984221
60.0000000 CYT
    0.0008144         4412.      5417041.     4.7927864     0.0039031    -0.0254144     2.9853033
60.0000000 CYT


Axial Thrust Force =    300.213 kips

    Bending       Bending       Bending      Depth to      Max Comp      Max Tens      Max Conc
Max Steel  Run
   Curvature      Moment       Stiffness      N Axis        Strain        Strain        Stress
Stress    Msg
    rad/in.       in-kip        kip-in2         in           in/in         in/in          ksi
ksi
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  6.25000E-07   195.1345530    312215285.   141.4561340    0.00008841    0.00006591     0.3155488
2.5606299
   0.00000125   390.2891877    312231350.    79.7507027    0.00009969    0.00005469     0.3542034
2.8844380
   0.00000188   585.4308580    312229791.    59.1922663     0.0001110    0.00004349     0.3926422
3.2087920
   0.00000250   780.5530925    312221237.    48.9205792     0.0001223    0.00003230     0.4308637
3.5336920
   0.00000313   975.6494186    312207814.    42.7635926     0.0001336    0.00002114     0.4688665
3.8591381
   0.00000375         1171.    312190230.    38.6639570     0.0001450    0.00000999     0.5066492
4.1851303
   0.00000438         1366.    312168786.    35.7399512     0.0001564   -0.00000114     0.5442103
4.5116688
   0.00000500         1561.    312135672.    33.5505915     0.0001678   -0.00001225     0.5815465
4.8387358
   0.00000563         1755.    312060767.    31.8504564     0.0001792   -0.00002334     0.6186464
5.1662432
   0.00000625         1950.    311926790.    30.4922531     0.0001906   -0.00003442     0.6554982
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7.7945394
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7.6277716 C
   0.00001188         3289.    276987275.    23.0520836     0.0002737    -0.0001538     0.9146652
7.8765738 C
   0.00001250         3289.    263137911.    22.5853174     0.0002823    -0.0001677     0.9404930
8.1219276 C
   0.00001313         3289.    250607534.    22.1542772     0.0002908    -0.0001817     0.9658134
8.3639592 C
   0.00001375         3289.    239216283.    21.7539568     0.0002991    -0.0001959     0.9906273
8.6026153 C
   0.00001438         3289.    228815575.    21.3814019     0.0003074    -0.0002101     1.0149864
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   0.00001563         3289.    210510329.    20.7085516     0.0003236    -0.0002389     1.0624678
9.3020000 C
   0.00001625         3289.    202413778.    20.4026858     0.0003315    -0.0002535     1.0855992
9.5299407 C
   0.00001688         3289.    194916971.    20.1150390     0.0003394    -0.0002681     1.1083733
9.7557097 C
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9.9795774 C
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10.8574406 C
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    0.0002144        10271.     47910027.     10.8143116     0.0023183    -0.0053992     2.9973661
60.0000000 CY
    0.0002194        10300.     46949314.     10.7763388     0.0023641    -0.0055334     2.9995610
60.0000000 CY
    0.0002244        10328.     46029317.     10.7409164     0.0024100    -0.0056675     2.9981156
60.0000000 CY
    0.0002294        10356.     45147150.     10.7079519     0.0024561    -0.0058014     2.9977778
60.0000000 CY
    0.0002344        10383.     44301204.     10.6770397     0.0025024    -0.0059351     2.9996726
60.0000000 CY
    0.0002394        10410.     43488815.     10.6481864     0.0025489    -0.0060686     2.9978162
60.0000000 CY
    0.0002444        10437.     42707863.     10.6212906     0.0025956    -0.0062019     2.9972238
60.0000000 CY
    0.0002494        10463.     41955721.     10.5939777     0.0026419    -0.0063356     2.9993472
60.0000000 CY
    0.0002544        10488.     41231969.     10.5682166     0.0026883    -0.0064692     2.9996637
60.0000000 CY
    0.0002594        10513.     40533686.     10.5441200     0.0027349    -0.0066026     2.9951229
60.0000000 CY
    0.0002644        10537.     39855237.     10.5201036     0.0027813    -0.0067362     2.9980175
60.0000000 CY
    0.0002694        10560.     39200845.     10.4973592     0.0028277    -0.0068698     2.9996349
60.0000000 CY
    0.0002744        10575.     38541478.     10.4692296     0.0028725    -0.0070050     2.9991174
60.0000000 CY
    0.0003044        10621.     34894970.     10.2931666     0.0031330    -0.0078245     2.9958122
60.0000000 CYT
    0.0003344        10644.     31832484.     10.1381783     0.0033900    -0.0086475     2.9977240
60.0000000 CYT
    0.0003644        10657.     29246552.     10.0244969     0.0036527    -0.0094648     2.9997766
60.0000000 CYT
    0.0003944        10657.     27021775.      9.9759091     0.0039342    -0.0102633     2.9980266
60.0000000 CYT


-------------------------------------------------------------------------------
   Summary of Results for Nominal (Unfactored) Moment Capacity for Section 1
-------------------------------------------------------------------------------

Moment values interpolated at maximum compressive strain = 0.003
or maximum developed moment if pile fails at smaller strains.

 Load           Axial Thrust        Nominal Mom. Cap.      Max. Comp.
  No.              kips                 in-kip               Strain
 ----         ----------------     ------------------     ------------
   1              -266.210              4397.098          0.00300000
   2               300.213             10597.500          0.00300000

Note that the values of moment capacity in the table above are not
```

factored by a strength reduction factor (phi-factor).

In ACI 318, the value of the strength reduction factor depends on whether the transverse reinforcing steel bars are tied hoops (0.65) or spirals (0.70).

The above values should be multiplied by the appropriate strength reduction factor to compute ultimate moment capacity according to ACI 318, Section 9.3.2.2 or the value required by the design standard being followed.

The following table presents factored moment capacities and corresponding bending stiffnesses computed for common resistance factor values used for reinforced concrete sections.

Axial Load No.	Resist. Factor for Moment	Nominal Moment Cap in-kips	Ult. (Fac) Ax. Thrust kips	Ult. (Fac) Moment Cap in-kips	Bend. Stiff. at Ult Mom kip-in^2
1	0.65	4397.	-173.036500	2858.	32210484.
2	0.65	10598.	195.138450	6888.	94164771.
1	0.70	4397.	-186.347000	3078.	31653553.
2	0.70	10598.	210.149100	7418.	89804881.
1	0.75	4397.	-199.657500	3298.	30334471.
2	0.75	10598.	225.159750	7948.	86124009.

The analysis ended normally.

February 20, 2018 (Rev.1)
March 5, 2018 (Rev.2)
April 23, 2018 (Rev.3)
May 9, 2018 (Rev.4)

SAI Communications
12 Industrial Way
Salem NH, 03079

RE:		
	Site Number:	CT5457 (LTE 4C)
	FA Number:	10071049
	PACE Number:	MRCTB026977
	PTN Number:	2151A0EFP1
	Site Name:	GRISWOLD WEST
	Site Address:	181 Norman Road Jewett City, CT 06002

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 mount to determine its capability of supporting the following equipment loading:

- (3) Powerwave 7770 Antennas (55.0"x11.0"x5.0" – Wt. = 35 lbs/each)
- (2) HPA-65R-BUU-H8 Antennas (92.4"x14.8"x7.4" – Wt. = 68 lbs/each)
- (1) HPA-65R-BUU-H6 Antennas (72.0"x14.8"x9.0" – Wt. = 51 lbs/each)
- (3) RRUS-11 RRH's (19.7"x17.0"x7.2" – Wt. = 51 lbs/each)
- (3) RRUS-12 RRH (20.4"x18.5"x7.5" – Wt. = 58 lbs/each)
- (3) A2 Modules (16.4"x15.2"x3.4" – Wt. = 22 lbs/each)
- (6) LGP 17201 TMA's (14.0"x7.0"x2.7" – Wt. = 19 lbs/each)
- (1) Squid Surge Arrestor (24.0"x9.7"ø – Wt. = 33 lbs) (Tower Mounted)
- **(1) EPBQ-654L8H6-L2 Antenna (73.0"x21.0"x6.3" – Wt. = 73 lbs)**
- **(2) EPBQ-654L8H8-L2 Antennas (96.0"x21.0"x6.3" – Wt. = 86 lbs/each)**
- **(3) RRUS-32 B66 RRH (27.2"x12.1"x7.0" – Wt. = 60 lbs/each)**
- **(3) B14 4478 RRH (18.1"x13.4"x8.3" – Wt. = 60 lbs/each)**
- **(1) Squid Surge Arrestor (24.0"x9.7"ø – Wt. = 33 lbs) (Tower Mounted)**

**Proposed Loading Shown in Bold.*

Fabrication drawings prepared by SitePro1 (P/N FFD12-U) dated August 8, 2012 were available for the existing mounts.

Mount Analysis Methods:

- This analysis was conducted in accordance with EIA/TIA-222-G, Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and the International Building Code 2012 with 2005 Connecticut Supplement with 2016 Amendments, and AT&T Mount Technical Directive – R5.
- HDG considers this mount to be asymmetrical and has applied wind loads in 30 degree increments all around the mount. Per TIA-222-G Annex B, the max basic wind speed for this site is equal to 120 mph with a max basic wind speed with ice of 50 mph. Per the AT&T Mount Technical Directive and Appendix N of the Connecticut State Building Code, an ultimate wind speed of 135 mph converted to a nominal wind speed of 105 mph was used for this analysis.
- HDG considers this site to be exposure category C; tower is located near large, flat, open, terrain/grasslands.
- HDG considers this site to be topographic category 1; tower is located in flat terrain or the bottom of a hill or ridge.
- The mount has been analyzed with load combinations consisting of 500 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 3.
- The mount has been analyzed with load combinations consisting of a 250 lbs live load in a worst case location on the mount.

Based on our analysis, we have determined that the existing antenna mounts **ARE NOT CAPABLE** of supporting the proposed antenna installation. HDG recommends the following modifications:

- **Remove existing pipe mast and install new 2-1/2" std. (2.88" O.D.) pipe mast secured to the existing mount (typ. of 1 per sector, total of 3).**

	Member	Controlling Load Case	Stress Ratio	Pass/Fail
Existing LTE 4C Mount Rating	28	LC1	133%	**FAIL**
Proposed LTE 4C Mount Rating	14	LC7	96%	**PASS**

Reference Documents:

- Fabrication drawings prepared by SitePro1 dated August 8, 2012.

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.

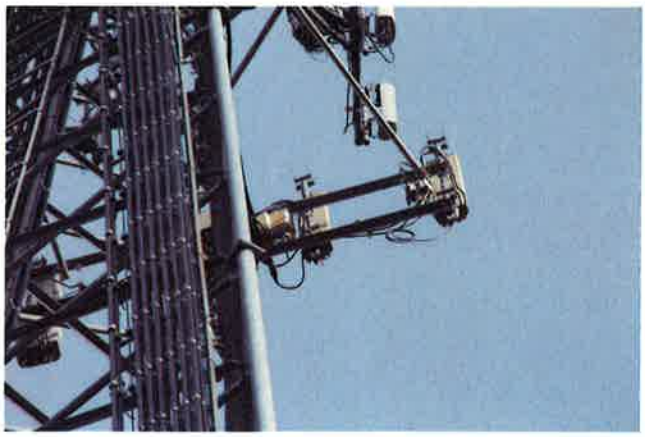
Please feel free to contact our office should you have any questions.

Respectfully Submitted,
Hudson Design Group LLC

Michael Cabral
Structural Dept. Head

Daniel P. Hamm, PE
Principal

FIELD PHOTOS:



p: 978.557.5553 f: 978.336.5586 a: 45 Beechwood Drive, N. Andover, MA 01845
p: 413.588.8139 f: 413.517.0590 a: 116 Pleasant Street, Ste 302, Easthampton, MA 01027

HUDSON
Design Group LLC

Wind & Ice
Calculations

Date: 5/9/2018
Project Name: GRISWOLD WEST
Project Number: CT5457
Designed By: BD **Checked By:** MSC

HUDSON Design Group LLC

2.6.5.2 Velocity Pressure Coeff:

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

	z=	135 (ft)
	z_g=	900 (ft)
K_z= 1.348	α=	9.5

Kzmin ≤ Kz ≤ 2.01

Table 2-4

Exposure	Z_g	α	K_{zmin}	K_e
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

2.6.6.4 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

$K_{zt} = [1+(K_e K_t/K_h)]^2$ $K_h = e^{(f*z/H)}$

K_{zt}= #DIV/0!

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

Category= **1**

K_h=	#DIV/0!	
K_e=	0	(from Table 2-4)
K_t=	0	(from Table 2-5)
f=	0	(from Table 2-5)
z=	135	
H=	0	(Ht. of the crest above surrounding terrain)
K_{zt}=	1.00	
K_{iz} =	1.15	(from Sec. 2.6.8)

2.6.8 Design Ice Thickness

Max Ice Thickness = t_i = 0.75 in

$t_{iz} = 2.0*t_i*I*K_{iz}*(Kzt)^{0.35}$ t_{iz} = 1.73 in

Date: 5/9/2018
Project Name: GRISWOLD WEST
Project Number: CT5457
Designed By: BD Checked By: MSC

HUDSON Design Group LLC

2.6.7 Gust Effect Factor

2.6.7.1 Self Supporting Lattice Structures

Gh = 1.0 Latticed Structures > 600 ft

Gh = 0.85 Latticed Structures 450 ft or less

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

h=	160	Gh=	0.85
2.6.7.2 Guyed Masts		Gh=	0.85
2.6.7.3 Pole Structures		Gh=	1.1
2.6.9 Appurtenances		Gh=	1.0

2.6.7.4 Structures Supported on Other Structures
(Cantilivered tubular or latticed spines, pole, structures on buildings (ht. : width ratio > 5)

Gh=	1.35	**Gh=**	**1.00**

2.6.9.2 Design Wind Force on Appurtenances

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

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

		K_z=	1.348
		K_{zt}=	1.0
q_z=	**32.34**	K_d=	0.85
$q_{z\,(ice)}$=	**7.33**	V_{max}=	105 mph
$q_{z\,(30)}$=	**2.64**	$V_{max\,(ice)}$=	50 mph
		V_{30}=	30 mph
		I=	1.0

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

Date: 5/9/2018
Project Name: GRISWOLD WEST
Project Number: CT5457
Designed By: BD Checked By: MSC

HUDSON Design Group LLC

Determine Ca:

Table 2-8

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
Round	C < 32 (Subcritical)	0.7	0.8	1.2
	32 ≤ C ≤ 64 (Transitional)	$3.76/(C^{0.485})$	$3.37/(C^{0.415})$	$38.4/(C^{-1.0})$
	C > 64 (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 = **1.73 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	**178**	**56**	**15**
HPA-65R-BUU-H8	92.4	14.8	7.4	9.50	6.24	1.37	**420**	**122**	**34**
EPBQ-654L8H6-L2	73.0	21.0	6.3	10.65	3.48	1.24	**428**	**118**	**35**
EPBQ-654L8H8-L2	96.0	21.0	6.3	14.00	4.57	1.29	**585**	**160**	**48**
RRUS-11 RRH	19.7	17.0	7.2	2.33	1.16	1.20	**90**	**29**	**7**
RRUS-11 (Shielded)	19.7	6.0	7.2	0.82	3.28	1.23	**33**	**14**	**3**
RRUS-12	20.4	18.5	7.5	2.62	1.10	1.20	**102**	**32**	**8**
RRUS-12 (Shielded)	20.4	3.7	7.5	0.52	5.51	1.33	**23**	**12**	**2**
RRUS-32 RRH	27.2	12.1	7.0	2.29	2.25	1.20	**89**	**29**	**7**
RRUS-32 (Shielded)	27.2	-8.9	7.0	-1.68	-3.06	1.20	**-65**	**-10**	**-5**
B14 4478 RRH	18.1	13.4	8.3	1.68	1.35	1.20	**65**	**22**	**5**
B14 4478 (Shielded)	18.1	-7.6	8.3	-0.96	-2.38	1.20	**-37**	**-5**	**-3**
LGP 17201 TMA	14.0	7.0	2.7	0.68	2.00	1.20	**26**	**11**	**2**
Surge Arrestor	24.0	9.7	9.7	1.62	2.47	0.70	**37**	**13**	**3**

Date: 5/9/2018
Project Name: GRISWOLD WEST
Project Number: CT5457
Designed By: BD Checked By: MSC

HUDSON Design Group LLC

WIND LOADS

Angle = 30 (deg) | Ice Thickness = 1.73 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)	Force (lbs)	Force (lbs)
7770 Antenna	55.0	11.0	5.0	4.20	1.91	5.00	11.00	1.31	1.53	178	95	157
HPA-65R-BUU-H8	92.4	14.8	7.4	9.50	4.75	6.24	12.49	1.37	1.58	420	243	376
EPBQ-654L8H6-L2	73.0	21.0	6.3	10.65	3.19	3.48	11.59	1.24	1.55	428	160	361
EPBQ-654L8H8-L2	96.0	21.0	6.3	14.00	4.20	4.57	15.24	1.29	1.67	585	227	496
RRUS-11 RRH	19.7	17.0	7.2	2.33	0.99	1.16	2.74	1.20	1.21	90	39	77
RRUS-11 (Shielded)	19.7	8.5	7.2	1.16	0.99	2.32	2.74	1.20	1.21	45	39	43
RRUS-12	20.4	18.5	7.5	2.62	1.06	1.10	2.72	1.20	1.21	102	42	87
RRUS-12 (Shielded)	20.4	9.3	7.5	1.31	1.06	2.21	2.72	1.20	1.21	51	42	49
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	89	54	80
RRUS-32 (Shielded)	27.2	6.1	7.0	1.14	1.32	4.50	3.89	1.29	1.26	48	54	49
B14 4478 RRH	18.1	13.4	8.3	1.68	1.04	1.35	2.18	1.20	1.20	65	40	59
B14 4478 (Shielded)	18.1	6.7	8.3	0.84	1.04	2.70	2.18	1.21	1.20	33	40	35
LGP 17201 TMA	14.0	7.0	2.7	0.68	0.26	2.00	5.19	1.20	1.32	26	11	23

WIND LOADS WITH ICE:

7770 Antenna	58.5	14.5	8.5	5.87	3.43	4.04	6.91	1.27	1.40	55	35	50
HPA-65R-BUU-H8	95.9	18.3	10.9	12.15	7.22	5.25	8.83	1.32	1.46	118	77	108
EPBQ-654L8H6-L2	76.5	24.5	9.8	12.98	5.18	3.13	7.84	1.23	1.43	117	54	101
EPBQ-654L8H8-L2	99.5	24.5	9.8	16.89	6.74	4.07	10.20	1.27	1.51	157	74	137
RRUS-11 RRH	23.2	20.5	10.7	3.29	1.71	1.13	2.17	1.20	1.20	29	15	25
RRUS-11 (Shielded)	23.2	10.2	10.7	1.64	1.71	2.26	2.17	1.20	1.20	14	15	15
RRUS-12	23.9	22.0	11.0	3.64	1.81	1.09	2.18	1.20	1.20	32	16	28
RRUS-12 (Shielded)	23.9	11.0	11.0	1.82	1.81	2.17	2.18	1.20	1.20	16	16	16
RRUS-32 RRH	30.7	15.6	10.5	3.31	2.23	1.97	2.93	1.20	1.22	29	20	27
RRUS-32 (Shielded)	30.7	7.8	10.5	1.66	2.23	3.94	2.93	1.26	1.22	15	20	16
B14 4478 RRH	21.6	16.9	11.8	2.52	1.76	1.28	1.83	1.20	1.20	22	15	21
B14 4478 (Shielded)	21.6	8.4	11.8	1.26	1.76	2.56	1.83	1.20	1.20	11	15	12
LGP 17201 TMA	17.5	10.5	6.2	1.27	0.75	1.67	2.84	1.20	1.21	11	7	10
Surge Arrestor	27.5	13.2	13.2	2.51	2.51	2.09	2.09	1.20	1.20	22	22	22

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	15	8	13
HPA-65R-BUU-H8	92.4	14.8	7.4	9.50	4.75	6.24	12.49	1.37	1.58	34	20	31
EPBQ-654L8H6-L2	73.0	21.0	6.3	10.65	3.19	3.48	11.59	1.24	1.55	35	13	29
EPBQ-654L8H8-L2	96.0	21.0	6.3	14.00	4.20	4.57	15.24	1.29	1.67	48	19	40
RRUS-11 RRH	19.7	17.0	7.2	2.33	0.99	1.16	2.74	1.20	1.21	7	3	6
RRUS-11 (Shielded)	19.7	8.5	7.2	1.16	0.99	2.32	2.74	1.20	1.21	4	3	4
RRUS-12	20.4	18.5	7.5	2.62	1.06	1.10	2.72	1.20	1.21	8	3	7
RRUS-12 (Shielded)	20.4	9.3	7.5	1.31	1.06	2.21	2.72	1.20	1.21	4	3	4
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	7	4	7
RRUS-32 (Shielded)	27.2	6.1	7.0	1.14	1.32	4.50	3.89	1.29	1.26	4	4	4
B14 4478 RRH	18.1	13.4	8.3	1.68	1.04	1.35	2.18	1.20	1.20	5	3	5
B14 4478 (Shielded)	18.1	6.7	8.3	0.84	1.04	2.70	2.18	1.21	1.20	3	3	3
LGP 17201 TMA	14.0	7.0	2.7	0.68	0.26	2.00	5.19	1.20	1.32	2	1	2

Date: 5/9/2018
Project Name: GRISWOLD WEST
Project Number: CT5457
Designed By: BD Checked By: MSC

HUDSON Design Group LLC

WIND LOADS

Angle = 60 (deg) | Ice Thickness = 1.73 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)	Force (lbs)	Force (lbs)
7770 Antenna	55.0	11.0	5.0	4.20	1.91	5.00	11.00	1.31	1.53	178	95	116
HPA-65R-BUU-H8	92.4	14.8	7.4	9.50	4.75	6.24	12.49	1.37	1.58	420	243	287
EPBQ-654L8H6-L2	73.0	21.0	6.3	10.65	3.19	3.48	11.59	1.24	1.55	428	160	227
EPBQ-654L8H8-L2	96.0	21.0	6.3	14.00	4.20	4.57	15.24	1.29	1.67	585	227	317
RRUS-11 RRH	19.7	17.0	7.2	2.33	0.99	1.16	2.74	1.20	1.21	90	39	51
RRUS-11 (Shielded)	19.7	12.8	7.2	1.74	0.99	1.55	2.74	1.20	1.21	68	39	46
RRUS-12	20.4	18.5	7.5	2.62	1.06	1.10	2.72	1.20	1.21	102	42	57
RRUS-12 (Shielded)	20.4	13.9	7.5	1.97	1.06	1.47	2.72	1.20	1.21	76	42	50
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	89	54	63
RRUS-32 (Shielded)	27.2	9.1	7.0	1.71	1.32	3.00	3.89	1.22	1.26	68	54	57
B14 4478 RRH	18.1	13.4	8.3	1.68	1.04	1.35	2.18	1.20	1.20	65	40	47
B14 4478 (Shielded)	18.1	10.1	8.3	1.26	1.04	1.80	2.18	1.20	1.20	49	40	43
LGP 17201 TMA	14.0	7.0	2.7	0.68	0.26	2.00	5.19	1.20	1.32	26	11	15

WIND LOADS WITH ICE:

7770 Antenna	58.5	14.5	8.5	5.87	3.43	4.04	6.91	1.27	1.40	55	35	40
HPA-65R-BUU-H8	95.9	18.3	10.9	12.15	7.22	5.25	8.83	1.32	1.46	118	77	88
EPBQ-654L8H6-L2	76.5	24.5	9.8	12.98	5.18	3.13	7.84	1.23	1.43	117	54	70
EPBQ-654L8H8-L2	99.5	24.5	9.8	16.89	6.74	4.07	10.20	1.27	1.51	157	74	95
RRUS-11 RRH	23.2	20.5	10.7	3.29	1.71	1.13	2.17	1.20	1.20	29	15	19
RRUS-11 (Shielded)	23.2	15.3	10.7	2.47	1.71	1.51	2.17	1.20	1.20	22	15	17
RRUS-12	23.9	22.0	11.0	3.64	1.81	1.09	2.18	1.20	1.20	32	16	20
RRUS-12 (Shielded)	23.9	16.5	11.0	2.73	1.81	1.45	2.18	1.20	1.20	24	16	18
RRUS-32 RRH	30.7	15.6	10.5	3.31	2.23	1.97	2.93	1.20	1.22	29	20	22
RRUS-32 (Shielded)	30.7	11.7	10.5	2.48	2.23	2.63	2.93	1.21	1.22	22	20	20
B14 4478 RRH	21.6	16.9	11.8	2.52	1.76	1.28	1.83	1.20	1.20	22	15	17
B14 4478 (Shielded)	21.6	12.6	11.8	1.89	1.76	1.71	1.83	1.20	1.20	17	15	16
LGP 17201 TMA	17.5	10.5	6.2	1.27	0.75	1.67	2.84	1.20	1.21	11	7	8
Surge Arrestor	27.5	13.2	13.2	2.51	2.51	2.09	2.09	1.20	1.20	22	22	22

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	15	8	9
HPA-65R-BUU-H8	92.4	14.8	7.4	9.50	4.75	6.24	12.49	1.37	1.58	34	20	23
EPBQ-654L8H6-L2	73.0	21.0	6.3	10.65	3.19	3.48	11.59	1.24	1.55	35	13	19
EPBQ-654L8H8-L2	96.0	21.0	6.3	14.00	4.20	4.57	15.24	1.29	1.67	48	19	26
RRUS-11 RRH	19.7	17.0	7.2	2.33	0.99	1.16	2.74	1.20	1.21	7	3	4
RRUS-11 (Shielded)	19.7	12.8	7.2	1.74	0.99	1.55	2.74	1.20	1.21	6	3	4
RRUS-12	20.4	18.5	7.5	2.62	1.06	1.10	2.72	1.20	1.21	8	3	5
RRUS-12 (Shielded)	20.4	13.9	7.5	1.97	1.06	1.47	2.72	1.20	1.21	6	3	4
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	7	4	5
RRUS-32 (Shielded)	27.2	9.1	7.0	1.71	1.32	3.00	3.89	1.22	1.26	6	4	5
B14 4478 RRH	18.1	13.4	8.3	1.68	1.04	1.35	2.18	1.20	1.20	5	3	4
B14 4478 (Shielded)	18.1	10.1	8.3	1.26	1.04	1.80	2.18	1.20	1.20	4	3	3
LGP 17201 TMA	14.0	7.0	2.7	0.68	0.26	2.00	5.19	1.20	1.32	2	1	1

Date: 5/9/2018
Project Name: GRISWOLD WEST
Project Number: CT5457
Designed By: BD Checked By: MSC

HUDSON Design Group LLC

WIND LOADS

Angle = 90 (deg) | Ice Thickness = 1.73 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)	Force (lbs)	Force (lbs)
7770 Antenna	55.0	11.0	5.0	4.20	1.91	5.00	11.00	1.31	1.53	178	95	95
HPA-65R-BUU-H8	92.4	14.8	7.4	9.50	4.75	6.24	12.49	1.37	1.58	420	243	243
EPBQ-654L8H6-L2	73.0	21.0	6.3	10.65	3.19	3.48	11.59	1.24	1.55	428	160	160
EPBQ-654L8H8-L2	96.0	21.0	6.3	14.00	4.20	4.57	15.24	1.29	1.67	585	227	227
RRUS-11 RRH	19.7	17.0	7.2	2.33	0.99	1.16	2.74	1.20	1.21	90	39	39
RRUS-11 (Shielded)	19.7	6.0	7.2	0.82	0.99	3.28	2.74	1.23	1.21	33	39	39
RRUS-12	20.4	18.5	7.5	2.62	1.06	1.10	2.72	1.20	1.21	102	42	42
RRUS-12 (Shielded)	20.4	3.7	7.5	0.52	1.06	5.51	2.72	1.33	1.21	23	42	42
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	89	54	54
RRUS-32 (Shielded)	27.2	-8.9	7.0	-1.68	1.32	-3.06	3.89	1.20	1.26	-65	54	54
B14 4478 RRH	18.1	13.4	8.3	1.68	1.04	1.35	2.18	1.20	1.20	65	40	40
B14 4478 (Shielded)	18.1	-7.6	8.3	-0.96	1.04	-2.38	2.18	1.20	1.20	-37	40	40
LGP 17201 TMA	14.0	7.0	2.7	0.68	0.26	2.00	5.19	1.20	1.32	26	11	11

WIND LOADS WITH ICE:

7770 Antenna	58.5	14.5	8.5	5.87	3.43	4.04	6.91	1.27	1.40	55	35	35
HPA-65R-BUU-H8	95.9	18.3	10.9	12.15	7.22	5.25	8.83	1.32	1.46	118	77	77
EPBQ-654L8H6-L2	76.5	24.5	9.8	12.98	5.18	3.13	7.84	1.23	1.43	117	54	54
EPBQ-654L8H8-L2	99.5	24.5	9.8	16.89	6.74	4.07	10.20	1.27	1.51	157	74	74
RRUS-11 RRH	23.2	20.5	10.7	3.29	1.71	1.13	2.17	1.20	1.20	29	15	15
RRUS-11 (Shielded)	23.2	9.5	10.7	1.52	1.71	2.45	2.17	1.20	1.20	13	15	15
RRUS-12	23.9	22.0	11.0	3.64	1.81	1.09	2.18	1.20	1.20	32	16	16
RRUS-12 (Shielded)	23.9	7.2	11.0	1.19	1.81	3.33	2.18	1.24	1.20	11	16	16
RRUS-32 RRH	30.7	15.6	10.5	3.31	2.23	1.97	2.93	1.20	1.22	29	20	20
RRUS-32 (Shielded)	30.7	-5.4	10.5	-1.16	2.23	-5.63	2.93	1.20	1.22	-10	20	20
B14 4478 RRH	21.6	16.9	11.8	2.52	1.76	1.28	1.83	1.20	1.20	22	15	15
B14 4478 (Shielded)	21.6	-4.1	11.8	-0.62	1.76	-5.20	1.83	1.20	1.20	-5	15	15
LGP 17201 TMA	17.5	10.5	6.2	1.27	0.75	1.67	2.84	1.20	1.21	11	7	7
Surge Arrestor	27.5	13.2	13.2	2.51	2.51	2.09	2.09	1.20	1.20	22	22	22

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	15	8	8
HPA-65R-BUU-H8	92.4	14.8	7.4	9.50	4.75	6.24	12.49	1.37	1.58	34	20	20
EPBQ-654L8H6-L2	73.0	21.0	6.3	10.65	3.19	3.48	11.59	1.24	1.55	35	13	13
EPBQ-654L8H8-L2	96.0	21.0	6.3	14.00	4.20	4.57	15.24	1.29	1.67	48	19	19
RRUS-11 RRH	19.7	17.0	7.2	2.33	0.99	1.16	2.74	1.20	1.21	7	3	3
RRUS-11 (Shielded)	19.7	6.0	7.2	0.82	0.99	3.28	2.74	1.23	1.21	3	3	3
RRUS-12	20.4	18.5	7.5	2.62	1.06	1.10	2.72	1.20	1.21	8	3	3
RRUS-12 (Shielded)	20.4	3.7	7.5	0.52	1.06	5.51	2.72	1.33	1.21	2	3	3
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	7	4	4
RRUS-32 (Shielded)	27.2	-8.9	7.0	-1.68	1.32	-3.06	3.89	1.20	1.26	-5	4	4
B14 4478 RRH	18.1	13.4	8.3	1.68	1.04	1.35	2.18	1.20	1.20	5	3	3
B14 4478 (Shielded)	18.1	-7.6	8.3	-0.96	1.04	-2.38	2.18	1.20	1.20	-3	3	3
LGP 17201 TMA	14.0	7.0	2.7	0.68	0.26	2.00	5.19	1.20	1.32	2	1	1

Date: 5/9/2018
Project Name: GRISWOLD WEST
Project Number: CT5457
Designed By: BD Checked By: MSC

HUDSON Design Group LLC

WIND LOADS

Angle = 120 (deg) | Ice Thickness = 1.73 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)	Force (lbs)	Force (lbs)
7770 Antenna	55.0	11.0	5.0	4.20	1.91	5.00	11.00	1.31	1.53	178	95	116
HPA-65R-BUU-H8	92.4	14.8	7.4	9.50	4.75	6.24	12.49	1.37	1.58	420	243	287
EPBQ-654L8H6-L2	73.0	21.0	6.3	10.65	3.19	3.48	11.59	1.24	1.55	428	160	227
EPBQ-654L8H8-L2	96.0	21.0	6.3	14.00	4.20	4.57	15.24	1.29	1.67	585	227	317
RRUS-11 RRH	19.7	17.0	7.2	2.33	0.99	1.16	2.74	1.20	1.21	90	39	51
RRUS-11 (Shielded)	19.7	12.8	7.2	1.74	0.99	1.55	2.74	1.20	1.21	68	39	46
RRUS-12	20.4	18.5	7.5	2.62	1.06	1.10	2.72	1.20	1.21	102	42	57
RRUS-12 (Shielded)	20.4	13.9	7.5	1.97	1.06	1.47	2.72	1.20	1.21	76	42	50
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	89	54	63
RRUS-32 (Shielded)	27.2	9.1	7.0	1.71	1.32	3.00	3.89	1.22	1.26	68	54	57
B14 4478 RRH	18.1	13.4	8.3	1.68	1.04	1.35	2.18	1.20	1.20	65	40	47
B14 4478 (Shielded)	18.1	10.1	8.3	1.26	1.04	1.80	2.18	1.20	1.20	49	40	43
LGP 17201 TMA	14.0	7.0	2.7	0.68	0.26	2.00	5.19	1.20	1.32	26	11	15

WIND LOADS WITH ICE:

7770 Antenna	58.5	14.5	8.5	5.87	3.43	4.04	6.91	1.27	1.40	55	35	40
HPA-65R-BUU-H8	95.9	18.3	10.9	12.15	7.22	5.25	8.83	1.32	1.46	118	77	88
EPBQ-654L8H6-L2	76.5	24.5	9.8	12.98	5.18	3.13	7.84	1.23	1.43	117	54	70
EPBQ-654L8H8-L2	99.5	24.5	9.8	16.89	6.74	4.07	10.20	1.27	1.51	157	74	95
RRUS-11 RRH	23.2	20.5	10.7	3.29	1.71	1.13	2.17	1.20	1.20	29	15	19
RRUS-11 (Shielded)	23.2	15.3	10.7	2.47	1.71	1.51	2.17	1.20	1.20	22	15	17
RRUS-12	23.9	22.0	11.0	3.64	1.81	1.09	2.18	1.20	1.20	32	16	20
RRUS-12 (Shielded)	23.9	16.5	11.0	2.73	1.81	1.45	2.18	1.20	1.20	24	16	18
RRUS-32 RRH	30.7	15.6	10.5	3.31	2.23	1.97	2.93	1.20	1.22	29	20	22
RRUS-32 (Shielded)	30.7	11.7	10.5	2.48	2.23	2.63	2.93	1.21	1.22	22	20	20
B14 4478 RRH	21.6	16.9	11.8	2.52	1.76	1.28	1.83	1.20	1.20	22	15	17
B14 4478 (Shielded)	21.6	12.6	11.8	1.89	1.76	1.71	1.83	1.20	1.20	17	15	16
LGP 17201 TMA	17.5	10.5	6.2	1.27	0.75	1.67	2.84	1.20	1.21	11	7	8
Surge Arrestor	27.5	13.2	13.2	2.51	2.51	2.09	2.09	1.20	1.20	22	22	22

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	15	8	9
HPA-65R-BUU-H8	92.4	14.8	7.4	9.50	4.75	6.24	12.49	1.37	1.58	34	20	23
EPBQ-654L8H6-L2	73.0	21.0	6.3	10.65	3.19	3.48	11.59	1.24	1.55	35	13	19
EPBQ-654L8H8-L2	96.0	21.0	6.3	14.00	4.20	4.57	15.24	1.29	1.67	48	19	26
RRUS-11 RRH	19.7	17.0	7.2	2.33	0.99	1.16	2.74	1.20	1.21	7	3	4
RRUS-11 (Shielded)	19.7	12.8	7.2	1.74	0.99	1.55	2.74	1.20	1.21	6	3	4
RRUS-12	20.4	18.5	7.5	2.62	1.06	1.10	2.72	1.20	1.21	8	3	5
RRUS-12 (Shielded)	20.4	13.9	7.5	1.97	1.06	1.47	2.72	1.20	1.21	6	3	4
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	7	4	5
RRUS-32 (Shielded)	27.2	9.1	7.0	1.71	1.32	3.00	3.89	1.22	1.26	6	4	5
B14 4478 RRH	18.1	13.4	8.3	1.68	1.04	1.35	2.18	1.20	1.20	5	3	4
B14 4478 (Shielded)	18.1	10.1	8.3	1.26	1.04	1.80	2.18	1.20	1.20	4	3	3
LGP 17201 TMA	14.0	7.0	2.7	0.68	0.26	2.00	5.19	1.20	1.32	2	1	1

Date: 5/9/2018
Project Name: GRISWOLD WEST
Project Number: CT5457
Designed By: BD Checked By: MSC

HUDSON Design Group LLC

WIND LOADS

Angle = 150 (deg) | Ice Thickness = 1.73 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)	Force (lbs)	Force (lbs)
7770 Antenna	55.0	11.0	5.0	4.20	1.91	5.00	11.00	1.31	1.53	178	95	157
HPA-65R-BUU-H8	92.4	14.8	7.4	9.50	4.75	6.24	12.49	1.37	1.58	420	243	376
EPBQ-654L8H6-L2	73.0	21.0	6.3	10.65	3.19	3.48	11.59	1.24	1.55	428	160	361
EPBQ-654L8H8-L2	96.0	21.0	6.3	14.00	4.20	4.57	15.24	1.29	1.67	585	227	496
RRUS-11 RRH	19.7	17.0	7.2	2.33	0.99	1.16	2.74	1.20	1.21	90	39	77
RRUS-11 (Shielded)	19.7	8.5	7.2	1.16	0.99	2.32	2.74	1.20	1.21	45	39	43
RRUS-12	20.4	18.5	7.5	2.62	1.06	1.10	2.72	1.20	1.21	102	42	87
RRUS-12 (Shielded)	20.4	9.3	7.5	1.31	1.06	2.21	2.72	1.20	1.21	51	42	49
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	89	54	80
RRUS-32 (Shielded)	27.2	6.1	7.0	1.14	1.32	4.50	3.89	1.29	1.26	48	54	49
B14 4478 RRH	18.1	13.4	8.3	1.68	1.04	1.35	2.18	1.20	1.20	65	40	59
B14 4478 (Shielded)	18.1	6.7	8.3	0.84	1.04	2.70	2.18	1.21	1.20	33	40	35
LGP 17201 TMA	14.0	7.0	2.7	0.68	0.26	2.00	5.19	1.20	1.32	26	11	23

WIND LOADS WITH ICE:

7770 Antenna	58.5	14.5	8.5	5.87	3.43	4.04	6.91	1.27	1.40	55	35	50
HPA-65R-BUU-H8	95.9	18.3	10.9	12.15	7.22	5.25	8.83	1.32	1.46	118	77	108
EPBQ-654L8H6-L2	76.5	24.5	9.8	12.98	5.18	3.13	7.84	1.23	1.43	117	54	101
EPBQ-654L8H8-L2	99.5	24.5	9.8	16.89	6.74	4.07	10.20	1.27	1.51	157	74	137
RRUS-11 RRH	23.2	20.5	10.7	3.29	1.71	1.13	2.17	1.20	1.20	29	15	25
RRUS-11 (Shielded)	23.2	10.2	10.7	1.64	1.71	2.26	2.17	1.20	1.20	14	15	15
RRUS-12	23.9	22.0	11.0	3.64	1.81	1.09	2.18	1.20	1.20	32	16	28
RRUS-12 (Shielded)	23.9	11.0	11.0	1.82	1.81	2.17	2.18	1.20	1.20	16	16	16
RRUS-32 RRH	30.7	15.6	10.5	3.31	2.23	1.97	2.93	1.20	1.22	29	20	27
RRUS-32 (Shielded)	30.7	7.8	10.5	1.66	2.23	3.94	2.93	1.26	1.22	15	20	16
B14 4478 RRH	21.6	16.9	11.8	2.52	1.76	1.28	1.83	1.20	1.20	22	15	21
B14 4478 (Shielded)	21.6	8.4	11.8	1.26	1.76	2.56	1.83	1.20	1.20	11	15	12
LGP 17201 TMA	17.5	10.5	6.2	1.27	0.75	1.67	2.84	1.20	1.21	11	7	10
Surge Arrestor	27.5	13.2	13.2	2.51	2.51	2.09	2.09	1.20	1.20	22	22	22

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	15	8	13
HPA-65R-BUU-H8	92.4	14.8	7.4	9.50	4.75	6.24	12.49	1.37	1.58	34	20	31
EPBQ-654L8H6-L2	73.0	21.0	6.3	10.65	3.19	3.48	11.59	1.24	1.55	35	13	29
EPBQ-654L8H8-L2	96.0	21.0	6.3	14.00	4.20	4.57	15.24	1.29	1.67	48	19	40
RRUS-11 RRH	19.7	17.0	7.2	2.33	0.99	1.16	2.74	1.20	1.21	7	3	6
RRUS-11 (Shielded)	19.7	8.5	7.2	1.16	0.99	2.32	2.74	1.20	1.21	4	3	4
RRUS-12	20.4	18.5	7.5	2.62	1.06	1.10	2.72	1.20	1.21	8	3	7
RRUS-12 (Shielded)	20.4	9.3	7.5	1.31	1.06	2.21	2.72	1.20	1.21	4	3	4
RRUS-32 RRH	27.2	12.1	7.0	2.29	1.32	2.25	3.89	1.20	1.26	7	4	7
RRUS-32 (Shielded)	27.2	6.1	7.0	1.14	1.32	4.50	3.89	1.29	1.26	4	4	4
B14 4478 RRH	18.1	13.4	8.3	1.68	1.04	1.35	2.18	1.20	1.20	5	3	5
B14 4478 (Shielded)	18.1	6.7	8.3	0.84	1.04	2.70	2.18	1.21	1.20	3	3	3
LGP 17201 TMA	14.0	7.0	2.7	0.68	0.26	2.00	5.19	1.20	1.32	2	1	2

Date: 3/5/2018
Project Name: GRISWOLD WEST
Project Number: CT5457
Designed By: BD **Checked By:** MSC

HUDSON Design Group LLC

ICE WEIGHT CALCULATIONS

Thickness of ice (in): 0.75
* Density of ice used = 56 PCF

Powerwave 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:		45 lbs
Weight of object:	35 lbs	
Combined weight of ice and object:		80 lbs

HPA-65R-BUU-H8 Antenna

Weight of ice based on total radial SF area:

Height (in):	92.4	
Width (in):	14.8	
Depth (in):	7.4	
Total weight of ice on object:		105 lbs
Weight of object:	68 lbs	
Combined weight of ice and object:		173 lbs

EPBQ-654L8H6-L2 Antenna

Weight of ice based on total radial SF area:

Height (in):	73.0	
Width (in):	21.0	
Depth (in):	6.3	
Total weight of ice on object:		103 lbs
Weight of object:	73 lbs	
Combined weight of ice and object:		176 lbs

EPBQ-654L8H8-L2 Antenna

Weight of ice based on total radial SF area:

Height (in):	96.0	
Width (in):	21.0	
Depth (in):	6.3	
Total weight of ice on object:		134 lbs
Weight of object:	86 lbs	
Combined weight of ice and object:		220 lbs

RRUS-11 RRH

Weight of ice based on total radial SF area:

Height (in):	19.7	
Width (in):	17.0	
Depth (in):	7.2	
Total weight of ice on object:		29 lbs
Weight of object:	51 lbs	
Combined weight of ice and object:		80 lbs

RRUS-12 RRH

Weight of ice based on total radial SF area:

Height (in):	20.4	
Width (in):	18.5	
Depth (in):	7.5	
Total weight of ice on object:		33 lbs
Weight of object:	58 lbs	
Combined weight of ice and object:		91 lbs

RRUS-32 B66 RRH

Weight of ice based on total radial SF area:

Height (in):	27.2	
Width (in):	12.1	
Depth (in):	7.0	
Total weight of ice on object:		29 lbs
Weight of object:	60 lbs	
Combined weight of ice and object:		89 lbs

A2 Modules

Weight of ice based on total radial SF area:

Height (in):	16.4	
Width (in):	15.2	
Depth (in):	3.4	
Total weight of ice on object:		17 lbs
Weight of object:	22 lbs	
Combined weight of ice and object:		39 lbs

B14 4478 RRH

Weight of ice based on total radial SF area:

Height (in):	18.1	
Width (in):	13.4	
Depth (in):	8.3	
Total weight of ice on object:		25 lbs
Weight of object:	60 lbs	
Combined weight of ice and object:		85 lbs

LGP 17201 TMA

Weight of ice based on total radial SF area:

Height (in):	14.0	
Width (in):	7.0	
Depth (in):	2.7	
Total weight of ice on object:		8 lbs
Weight of object:	19 lbs	
Combined weight of ice and object:		27 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:		25 lbs
Weight of object:	33 lbs	
Combined weight of ice and object:		58 lbs

2" Pipe

Per foot weight of ice:

diameter (in):	2.38	
Per foot weight of ice on object:		2 lbs/ft

HSS 3x3

Weight of ice based on total radial SF area:

Depth (in):	3	
height (in):	12	
Width (in):	3	
Per foot weight of ice on object:		4 lbs/ft

L 3x3x1/4

Weight of ice based on total radial SF area:

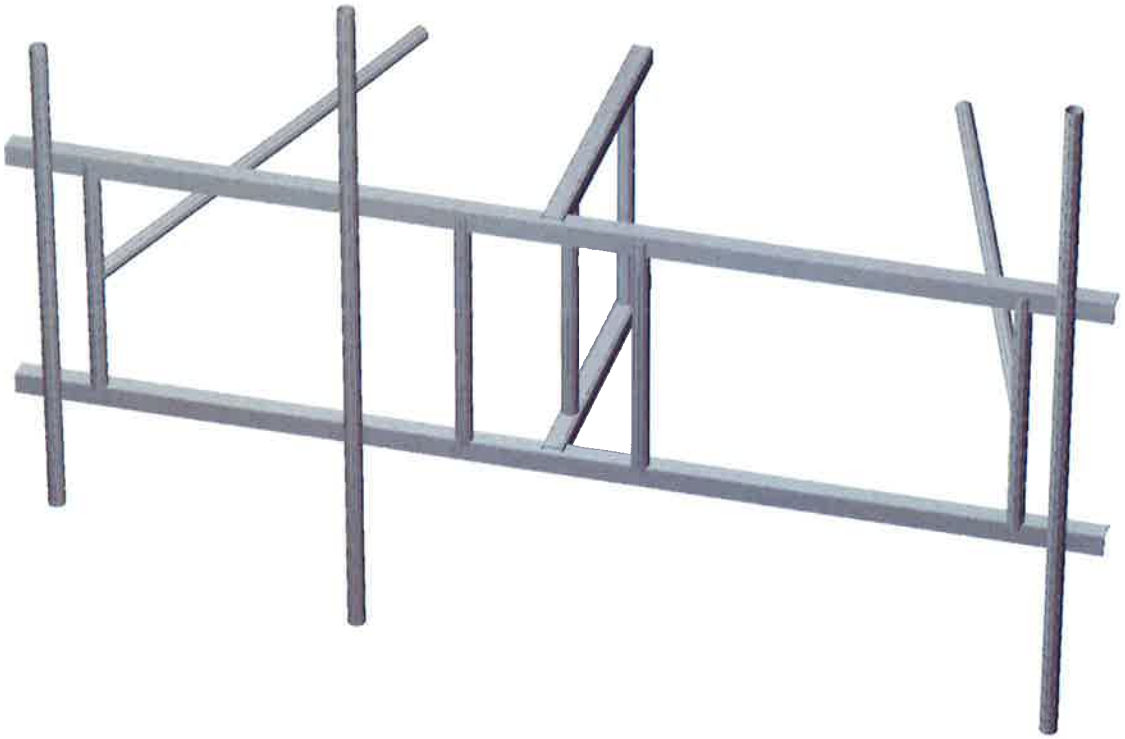
Depth (in):	3	
height (in):	12	
Width (in):	3	
Per foot weight of ice on object:		4 lbs/ft

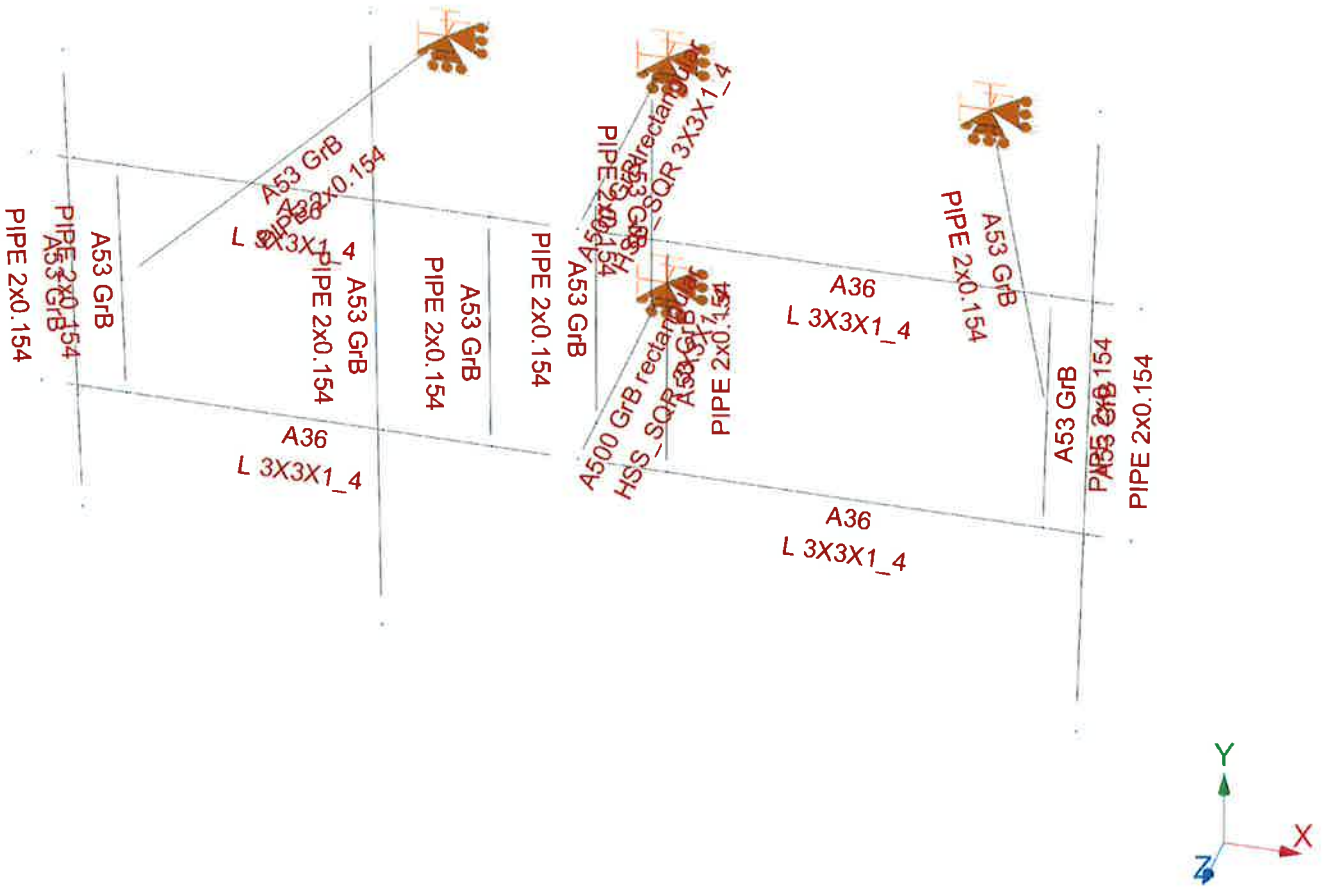
HUDSON
Design Group LLC

Mount Calculations
(Existing Conditions)

Bentley

Current Date: 5/9/2018 6:51 PM
Units system: English
File name: W:\STRUCTURAL DEPARTMENT\ANALYSIS SOFTWARE\RAM Elements\RAM Projects\AT&T\CT\CT5457\Rev4\CT5457 (LTE 4C) rev4.etz\




A53 GrB
PIPE 2x0.154
A36
L 3X3X1_4
A500 GrB rectangular
HSS_SQR 3X3X1_4
Y
X
Z

Bentley

Current Date: 5/9/2018 6:51 PM
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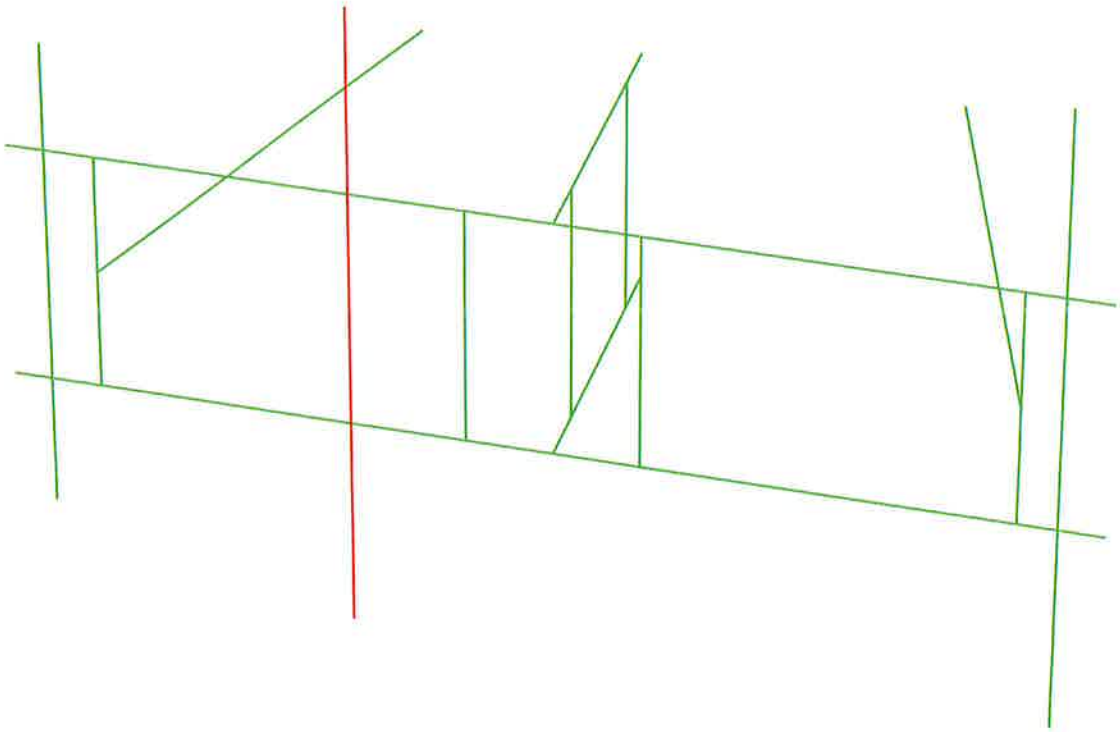
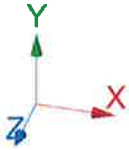
Design status

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





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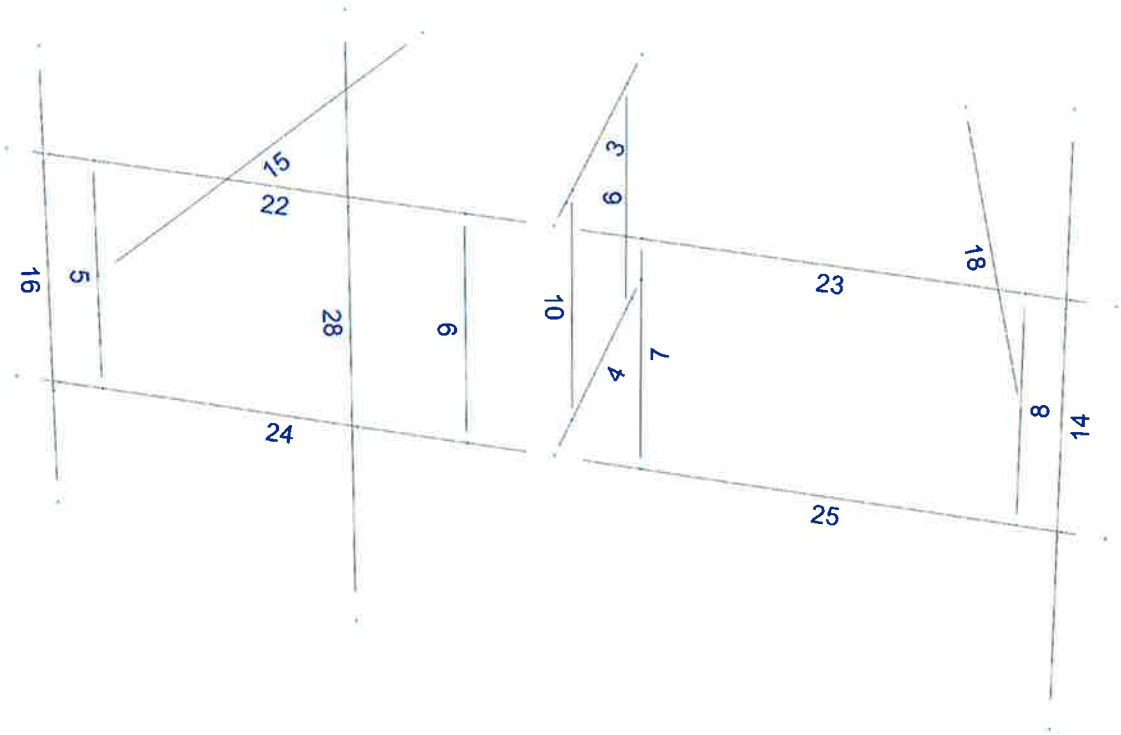

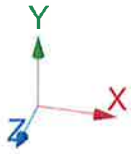

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Load data

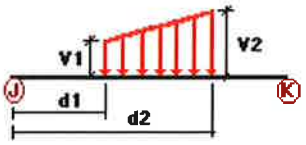
GLOSSARY

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	No	LL
LL2	500 lb Live Load	No	LL
W180	-Wo	Yes	
W210	-W30	Yes	
W240	-W60	Yes	
W270	-W90	Yes	
W300	-W120	Yes	
W330	-W150	Yes	
WI180	-WI0	Yes	
WI210	-WI30	Yes	
WI240	-WI60	Yes	
WI270	-WI90	Yes	
WI300	-WI120	Yes	
WI330	-WI150	Yes	
WL180	-WL0	Yes	
WL210	-WL30	Yes	
WL240	-WL60	Yes	
WL270	-WL90	Yes	
WL300	-WL120	Yes	
WL330	-WL150	Yes	

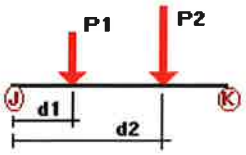
Distributed force on members



Condition	Member	Dir1	Val1 [Kip/ft]	Val2 [Kip/ft]	Dist1 [ft]	%	Dist2 [ft]	%
Wo	5	Z	-0.008	-0.008	0.00	Yes	100.00	Yes
	6	Z	-0.008	-0.008	0.00	Yes	100.00	Yes
	7	Z	-0.008	-0.008	0.00	Yes	100.00	Yes
	8	Z	-0.008	-0.008	0.00	Yes	100.00	Yes
	10	Z	-0.008	-0.008	0.00	Yes	100.00	Yes
	22	Z	-0.016	-0.016	0.00	Yes	100.00	Yes
	23	Z	-0.016	-0.016	0.00	Yes	100.00	Yes
	24	Z	-0.016	-0.016	0.00	Yes	100.00	Yes
	25	Z	-0.016	-0.016	0.00	Yes	100.00	Yes
W30	5	Z	-0.008	-0.008	0.00	Yes	100.00	Yes
	6	Z	-0.008	-0.008	0.00	Yes	100.00	Yes
	7	Z	-0.008	-0.008	0.00	Yes	100.00	Yes
	8	Z	-0.008	-0.008	0.00	Yes	100.00	Yes
	10	Z	-0.008	-0.008	0.00	Yes	100.00	Yes
	22	Z	-0.016	-0.016	0.00	Yes	100.00	Yes
	23	Z	-0.016	-0.016	0.00	Yes	100.00	Yes
	24	Z	-0.016	-0.016	0.00	Yes	100.00	Yes
	25	Z	-0.016	-0.016	0.00	Yes	100.00	Yes
W60	3	X	-0.013	-0.013	0.00	Yes	100.00	Yes
	4	X	-0.013	-0.013	0.00	Yes	100.00	Yes
	5	X	-0.006	-0.006	0.00	Yes	100.00	Yes
	6	X	-0.006	-0.006	0.00	Yes	100.00	Yes
	7	X	-0.006	-0.006	0.00	Yes	100.00	Yes
	8	X	-0.006	-0.006	0.00	Yes	100.00	Yes
	9	X	-0.006	-0.006	0.00	Yes	100.00	Yes
	10	X	-0.006	-0.006	0.00	Yes	100.00	Yes
	14	X	-0.008	-0.008	0.00	Yes	100.00	Yes
	15	x	-0.006	-0.006	0.00	Yes	100.00	Yes
	16	X	-0.008	-0.008	0.00	Yes	100.00	Yes
	18	x	-0.006	-0.006	0.00	Yes	100.00	Yes
	28	X	-0.008	-0.008	0.00	Yes	100.00	Yes
W90	3	X	-0.013	-0.013	0.00	Yes	100.00	Yes
	4	X	-0.013	-0.013	0.00	Yes	100.00	Yes
	5	X	-0.006	-0.006	0.00	Yes	100.00	Yes
	6	X	-0.006	-0.006	0.00	Yes	100.00	Yes
	7	X	-0.006	-0.006	0.00	Yes	100.00	Yes
	8	X	-0.006	-0.006	0.00	Yes	100.00	Yes
	9	X	-0.006	-0.006	0.00	Yes	100.00	Yes
	10	X	-0.006	-0.006	0.00	Yes	100.00	Yes
	14	X	-0.008	-0.008	0.00	Yes	100.00	Yes
	15	x	-0.006	-0.006	0.00	Yes	100.00	Yes
	16	X	-0.008	-0.008	0.00	Yes	100.00	Yes
	18	x	-0.006	-0.006	0.00	Yes	100.00	Yes
	28	X	-0.008	-0.008	0.00	Yes	100.00	Yes
W120	3	X	-0.013	-0.013	0.00	Yes	100.00	Yes
	4	X	-0.013	-0.013	0.00	Yes	100.00	Yes
	5	X	-0.006	-0.006	0.00	Yes	100.00	Yes
	6	X	-0.006	-0.006	0.00	Yes	100.00	Yes
	7	X	-0.006	-0.006	0.00	Yes	100.00	Yes
	8	X	-0.006	-0.006	0.00	Yes	100.00	Yes
	9	X	-0.006	-0.006	0.00	Yes	100.00	Yes
	10	X	-0.006	-0.006	0.00	Yes	100.00	Yes
	14	X	-0.008	-0.008	0.00	Yes	100.00	Yes
	15	x	-0.006	-0.006	0.00	Yes	100.00	Yes

	16	X	-0.008	-0.008	0.00	Yes	100.00	Yes
	18	x	-0.006	-0.006	0.00	Yes	100.00	Yes
	28	X	-0.008	-0.008	0.00	Yes	100.00	Yes
W150	5	Z	0.008	0.008	0.00	Yes	100.00	Yes
	6	Z	0.008	0.008	0.00	Yes	100.00	Yes
	7	Z	0.008	0.008	0.00	Yes	100.00	Yes
	8	Z	0.008	0.008	0.00	Yes	100.00	Yes
	10	Z	0.008	0.008	0.00	Yes	100.00	Yes
	22	Z	0.016	0.016	0.00	Yes	100.00	Yes
	23	Z	0.016	0.016	0.00	Yes	100.00	Yes
	24	Z	0.016	0.016	0.00	Yes	100.00	Yes
	25	Z	0.016	0.016	0.00	Yes	100.00	Yes
Di	3	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
	4	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
	5	Y	-0.002	-0.002	0.00	Yes	100.00	Yes
	6	Y	-0.002	-0.002	0.00	Yes	100.00	Yes
	7	Y	-0.002	-0.002	0.00	Yes	100.00	Yes
	8	Y	-0.002	-0.002	0.00	Yes	100.00	Yes
	9	Y	-0.002	-0.002	0.00	Yes	100.00	Yes
	10	Y	-0.002	-0.002	0.00	Yes	100.00	Yes
	14	Y	-0.002	-0.002	0.00	Yes	100.00	Yes
	15	Y	-0.002	-0.002	0.00	Yes	100.00	Yes
	16	Y	-0.002	-0.002	0.00	Yes	100.00	Yes
	18	Y	-0.002	-0.002	0.00	Yes	100.00	Yes
	22	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
	23	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
	24	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
	25	Y	-0.004	-0.004	0.00	Yes	100.00	Yes
	28	Y	-0.002	-0.002	0.00	Yes	100.00	Yes
WI0	5	Z	-0.002	-0.002	0.00	Yes	100.00	Yes
	6	Z	-0.002	-0.002	0.00	Yes	100.00	Yes
	7	Z	-0.002	-0.002	0.00	Yes	100.00	Yes
	8	Z	-0.002	-0.002	0.00	Yes	100.00	Yes
	10	Z	-0.002	-0.002	0.00	Yes	100.00	Yes
	22	Z	-0.004	-0.004	0.00	Yes	100.00	Yes
	23	Z	-0.004	-0.004	0.00	Yes	100.00	Yes
	24	Z	-0.004	-0.004	0.00	Yes	100.00	Yes
	25	Z	-0.004	-0.004	0.00	Yes	100.00	Yes
WI90	3	X	-0.004	-0.004	0.00	Yes	100.00	Yes
	4	X	-0.004	-0.004	0.00	Yes	100.00	Yes
	5	X	-0.002	-0.002	0.00	Yes	100.00	Yes
	6	X	-0.002	-0.002	0.00	Yes	100.00	Yes
	7	X	-0.002	-0.002	0.00	Yes	100.00	Yes
	8	X	-0.002	-0.002	0.00	Yes	100.00	Yes
	9	X	-0.002	-0.002	0.00	Yes	100.00	Yes
	10	X	-0.002	-0.002	0.00	Yes	100.00	Yes
	14	X	-0.002	-0.002	0.00	Yes	100.00	Yes
	15	x	-0.002	-0.002	0.00	Yes	100.00	Yes
	16	X	-0.002	-0.002	0.00	Yes	100.00	Yes
	18	x	-0.002	-0.002	0.00	Yes	100.00	Yes
	28	X	-0.002	-0.002	0.00	Yes	100.00	Yes

Concentrated forces on members



Condition	Member	Dir1	Value1 [Kip]	Dist1 [ft]	%
D	14	y	-0.034	0.00	No
		y	-0.034	8.00	No
		y	-0.06	1.50	No
		y	-0.051	4.00	No
	16	y	-0.018	0.708	No
		y	-0.018	5.292	No
		y	-0.038	3.50	No
	28	y	-0.043	0.00	No
		y	-0.043	8.00	No
		y	-0.06	1.50	No
		y	-0.08	4.00	No
Wo	14	z	-0.21	0.00	No
		z	-0.21	8.00	No
		z	-0.026	4.00	No
	16	z	-0.09	0.708	No
		z	-0.09	5.292	No
	28	z	-0.293	0.00	No
		z	-0.293	8.00	No
W30	14	2	-0.188	0.00	No
		2	-0.188	8.00	No
		2	-0.08	1.50	No
		2	-0.043	4.00	No
	16	2	-0.079	0.708	No
		2	-0.079	5.292	No
		2	-0.023	3.50	No
	28	2	-0.248	0.00	No
		2	-0.248	8.00	No
		2	-0.059	1.50	No
		2	-0.087	4.00	No
W60	14	2	-0.144	0.00	No
		2	-0.144	8.00	No
		2	-0.063	1.50	No
		2	-0.047	4.00	No
	16	2	-0.058	0.708	No
		2	-0.058	5.292	No
		2	-0.015	3.50	No
	28	2	-0.159	0.00	No
		2	-0.159	8.00	No
		2	-0.047	1.50	No
		2	-0.057	4.00	No
W90	14	x	-0.122	0.00	No
		x	-0.122	8.00	No
		x	-0.054	1.50	No
		x	-0.039	4.00	No
	16	x	-0.048	0.708	No
		x	-0.048	5.292	No
		x	-0.011	3.50	No
	28	x	-0.114	0.00	No
		x	-0.114	8.00	No
		x	-0.04	1.50	No
		x	-0.054	4.00	No
W120	14	3	0.144	0.00	No
		3	0.144	8.00	No
		3	0.063	1.50	No

		3	0.047	4.00	No
	16	3	0.058	0.708	No
		3	0.058	5.292	No
		3	0.015	3.50	No
	28	3	0.159	0.00	No
		3	0.159	8.00	No
		3	0.047	1.50	No
		3	0.057	4.00	No
W150	14	3	0.188	0.00	No
		3	0.188	8.00	No
		3	0.08	1.50	No
		3	0.043	4.00	No
	16	3	0.079	0.708	No
		3	0.079	5.292	No
		3	0.023	3.50	No
	28	3	0.248	0.00	No
		3	0.248	8.00	No
		3	0.059	1.50	No
		3	0.087	4.00	No
Di	14	y	-0.053	0.00	No
		y	-0.053	8.00	No
		y	-0.029	1.50	No
		y	-0.029	4.00	No
	16	y	-0.023	0.708	No
		y	-0.023	5.292	No
		y	-0.016	3.50	No
	28	y	-0.067	0.00	No
		y	-0.067	8.00	No
		y	-0.025	1.50	No
		y	-0.05	4.00	No
WI0	14	z	-0.054	0.00	No
		z	-0.054	8.00	No
		z	-0.006	4.00	No
	16	z	-0.024	0.708	No
		z	-0.024	5.292	No
	28	z	-0.072	0.00	No
		z	-0.072	8.00	No
WI30	14	2	-0.043	0.00	No
		2	-0.043	8.00	No
		2	-0.018	1.50	No
		2	-0.01	4.00	No
	16	2	-0.018	0.708	No
		2	-0.018	5.292	No
		2	-0.005	3.50	No
	28	2	-0.056	0.00	No
		2	-0.056	8.00	No
		2	-0.018	1.50	No
		2	-0.02	4.00	No
WI60	14	2	-0.033	0.00	No
		2	-0.033	8.00	No
		2	-0.014	1.50	No
		2	-0.01	4.00	No
	16	2	-0.013	0.708	No
		2	-0.013	5.292	No
		2	-0.003	3.50	No
	28	2	-0.036	0.00	No
		2	-0.036	8.00	No
		2	-0.011	1.50	No
		2	-0.013	4.00	No
WI90	14	x	-0.028	0.00	No

		x	-0.028	8.00	No
		x	-0.012	1.50	No
		x	-0.009	4.00	No
	16	x	-0.011	0.708	No
		x	-0.011	5.292	No
		x	-0.003	3.50	No
	28	x	-0.026	0.00	No
		x	-0.026	8.00	No
		x	-0.012	1.50	No
		x	-0.009	4.00	No
WI120	14	3	0.033	0.00	No
		3	0.033	8.00	No
		3	0.014	1.50	No
		3	0.009	4.00	No
	16	3	0.013	0.708	No
		3	0.013	5.292	No
		3	0.003	3.50	No
	28	3	0.036	0.00	No
		3	0.036	8.00	No
		3	0.011	1.50	No
		3	0.013	4.00	No
WI150	14	3	0.043	0.00	No
		3	0.043	8.00	No
		3	0.018	1.50	No
		3	0.014	4.00	No
	16	3	0.018	0.708	No
		3	0.018	5.292	No
		3	0.005	3.50	No
	28	3	0.056	0.00	No
		3	0.056	8.00	No
		3	0.013	1.50	No
		3	0.02	4.00	No
WL0	14	z	-0.017	0.00	No
		z	-0.017	8.00	No
		z	-0.003	4.00	No
	16	z	-0.008	0.708	No
		z	-0.008	5.292	No
	28	z	-0.024	0.00	No
		z	-0.024	8.00	No
		z	-0.002	0.00	No
WL30	14	2	-0.016	0.00	No
		2	-0.016	8.00	No
		2	-0.004	1.50	No
		2	-0.004	4.00	No
	16	2	-0.007	0.708	No
		2	-0.007	5.292	No
		2	-0.002	3.50	No
	28	2	-0.021	0.00	No
		2	-0.021	8.00	No
		2	-0.003	1.50	No
		2	-0.004	4.00	No
WL60	14	2	-0.012	0.00	No
		2	-0.012	8.00	No
		2	-0.005	1.50	No
		2	-0.004	4.00	No
	16	2	-0.005	0.708	No
		2	-0.005	5.292	No
		2	-0.001	3.50	No
	28	2	-0.013	0.00	No
		2	-0.013	8.00	No

		2	-0.003	1.50	No
		2	-0.004	4.00	No
WL90	14	x	-0.01	0.00	No
		x	-0.01	8.00	No
		x	-0.004	1.50	No
		x	-0.003	4.00	No
	16	x	-0.004	0.708	No
		x	-0.004	5.292	No
		x	-0.001	3.50	No
	28	x	-0.01	0.00	No
		x	-0.01	8.00	No
		x	-0.003	1.50	No
		x	-0.003	4.00	No
WL120	14	3	0.012	0.00	No
		3	0.012	8.00	No
		3	0.005	1.50	No
		3	0.004	4.00	No
	16	3	0.005	0.708	No
		3	0.005	5.292	No
		3	0.001	3.50	No
	28	3	0.013	0.00	No
		3	0.013	8.00	No
		3	0.003	1.50	No
		3	0.004	4.00	No
WL150	14	3	0.016	0.00	No
		3	0.016	8.00	No
		3	0.004	1.50	No
		3	0.004	4.00	No
	16	3	0.007	0.708	No
		3	0.007	5.292	No
		3	0.002	3.50	No
	28	3	0.021	0.00	No
		3	0.021	8.00	No
		3	0.003	1.50	No
		3	0.004	4.00	No
LL1	24	y	-0.25	0.00	No
LL2	28	y	-0.50	4.00	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	No	0.00	0.00	0.00
LL2	500 lb Live Load	No	0.00	0.00	0.00
W180	-Wo	Yes	0.00	0.00	0.00
W210	-W30	Yes	0.00	0.00	0.00
W240	-W60	Yes	0.00	0.00	0.00
W270	-W90	Yes	0.00	0.00	0.00
W300	-W120	Yes	0.00	0.00	0.00
W330	-W150	Yes	0.00	0.00	0.00
WI180	-WI0	Yes	0.00	0.00	0.00
WI210	-WI30	Yes	0.00	0.00	0.00
WI240	-WI60	Yes	0.00	0.00	0.00
WI270	-WI90	Yes	0.00	0.00	0.00
WI300	-WI120	Yes	0.00	0.00	0.00
WI330	-WI150	Yes	0.00	0.00	0.00
WL180	-WL0	Yes	0.00	0.00	0.00
WL210	-WL30	Yes	0.00	0.00	0.00
WL240	-WL60	Yes	0.00	0.00	0.00
WL270	-WL90	Yes	0.00	0.00	0.00
WL300	-WL120	Yes	0.00	0.00	0.00
WL330	-WL150	Yes	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
W180	0.00	0.00	0.00

W210	0.00	0.00	0.00
W240	0.00	0.00	0.00
W270	0.00	0.00	0.00
W300	0.00	0.00	0.00
W330	0.00	0.00	0.00
WI180	0.00	0.00	0.00
WI210	0.00	0.00	0.00
WI240	0.00	0.00	0.00
WI270	0.00	0.00	0.00
WI300	0.00	0.00	0.00
WI330	0.00	0.00	0.00
WL180	0.00	0.00	0.00
WL210	0.00	0.00	0.00
WL240	0.00	0.00	0.00
WL270	0.00	0.00	0.00
WL300	0.00	0.00	0.00
WL330	0.00	0.00	0.00

Bentley

Current Date: 5/9/2018 6:52 PM
Units system: English
File name: W:\STRUCTURAL DEPARTMENT\ANALYSIS SOFTWARE\RAM Elements\RAM Projects\AT&T\CT\CT5457\Rev4\CT5457 (LTE 4C) rev4.et

Steel Code Check

Report: Summary - For all selected load conditions

Load conditions to be included in design :

LC1=1.2D+1.6Wo
LC2=1.2D+1.6W30
LC3=1.2D+1.6W60
LC4=1.2D+1.6W90
LC5=1.2D+1.6W120
LC6=1.2D+1.6W150
LC7=1.2D-1.6Wo
LC8=1.2D-1.6W30
LC9=1.2D-1.6W60
LC10=1.2D-1.6W90
LC11=1.2D-1.6W120
LC12=1.2D-1.6W150
LC13=0.9D+1.6Wo
LC14=0.9D+1.6W30
LC15=0.9D+1.6W60
LC16=0.9D+1.6W90
LC17=0.9D+1.6W120
LC18=0.9D+1.6W150
LC19=0.9D-1.6Wo
LC20=0.9D-1.6W30
LC21=0.9D-1.6W60
LC22=0.9D-1.6W90
LC23=0.9D-1.6W120
LC24=0.9D-1.6W150
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
LC37=0.9D
LC38=1.2D+1.6LL1
LC39=1.2D+1.6WL0+LL2
LC40=1.2D+1.6WL30+LL2
LC41=1.2D+1.6WL60+LL2
LC42=1.2D+1.6WL90+LL2
LC43=1.2D+1.6WL120+LL2
LC44=1.2D+1.6WL150+LL2
LC45=1.2D-1.6WL0+LL2
LC46=1.2D-1.6WL30+LL2
LC47=1.2D-1.6WL60+LL2
LC48=1.2D-1.6WL90+LL2
LC49=1.2D-1.6WL120+LL2
LC50=1.2D-1.6WL150+LL2

Description	Section	Member	Ctrl Eq.	Ratio	Status	Reference
	HSS_SQR 3X3X1_4	**3**	LC1 at 100.00%	0.17	OK	
			LC10 at 100.00%	**0.62**	**OK**	Eq. H1-1b
			LC11 at 100.00%	0.57	OK	
			LC12 at 100.00%	0.53	OK	
			LC13 at 100.00%	0.13	OK	
			LC14 at 100.00%	0.51	OK	
			LC15 at 100.00%	0.53	OK	
			LC16 at 100.00%	0.57	OK	
			LC17 at 100.00%	0.54	OK	
			LC18 at 100.00%	0.50	OK	
			LC19 at 100.00%	0.14	OK	
			LC2 at 100.00%	0.55	OK	
			LC20 at 100.00%	0.53	OK	
			LC21 at 100.00%	0.54	OK	
			LC22 at 100.00%	0.58	OK	
			LC23 at 100.00%	0.53	OK	
			LC24 at 100.00%	0.49	OK	
			LC25 at 100.00%	0.27	OK	
			LC26 at 100.00%	0.33	OK	
			LC27 at 100.00%	0.31	OK	
			LC28 at 100.00%	0.34	OK	
			LC29 at 100.00%	0.31	OK	
			LC3 at 100.00%	0.57	OK	
			LC30 at 100.00%	0.32	OK	
			LC31 at 100.00%	0.28	OK	
			LC32 at 100.00%	0.33	OK	
			LC33 at 100.00%	0.32	OK	
			LC34 at 100.00%	0.35	OK	
			LC35 at 100.00%	0.31	OK	
			LC36 at 100.00%	0.33	OK	
			LC37 at 100.00%	0.12	OK	
			LC38 at 100.00%	0.37	OK	
			LC39 at 100.00%	0.32	OK	
			LC4 at 100.00%	0.61	OK	
			LC40 at 100.00%	0.35	OK	
			LC41 at 100.00%	0.34	OK	
			LC42 at 100.00%	0.34	OK	
			LC43 at 100.00%	0.34	OK	
			LC44 at 100.00%	0.35	OK	
			LC45 at 100.00%	0.32	OK	
			LC46 at 100.00%	0.29	OK	
			LC47 at 100.00%	0.30	OK	
			LC48 at 100.00%	0.29	OK	
			LC49 at 100.00%	0.30	OK	
			LC5 at 100.00%	0.58	OK	
			LC50 at 100.00%	0.29	OK	
			LC6 at 100.00%	0.54	OK	
			LC7 at 100.00%	0.18	OK	
			LC8 at 100.00%	0.57	OK	
			LC9 at 100.00%	0.58	OK	
		4	LC1 at 100.00%	0.19	OK	
			LC10 at 100.00%	0.57	OK	
			LC11 at 100.00%	0.54	OK	
			LC12 at 100.00%	0.49	OK	
			LC13 at 100.00%	0.15	OK	
			LC14 at 100.00%	0.46	OK	
			LC15 at 100.00%	0.50	OK	
			LC16 at 100.00%	0.54	OK	
			LC17 at 100.00%	0.52	OK	
			LC18 at 100.00%	0.47	OK	
			LC19 at 100.00%	0.13	OK	
			LC2 at 100.00%	0.51	OK	

		LC20 at 100.00%	0.46	OK	
		LC21 at 100.00%	0.49	OK	
		LC22 at 100.00%	0.53	OK	
		LC23 at 100.00%	0.50	OK	
		LC24 at 100.00%	0.45	OK	
		LC25 at 100.00%	0.29	OK	
		LC26 at 100.00%	0.34	OK	
		LC27 at 100.00%	0.32	OK	
		LC28 at 100.00%	0.35	OK	
		LC29 at 100.00%	0.32	OK	
		LC3 at 100.00%	0.54	OK	
		LC30 at 100.00%	0.34	OK	
		LC31 at 100.00%	0.29	OK	
		LC32 at 100.00%	0.31	OK	
		LC33 at 100.00%	0.29	OK	
		LC34 at 100.00%	0.32	OK	
		LC35 at 100.00%	0.29	OK	
		LC36 at 100.00%	0.30	OK	
		LC37 at 100.00%	0.13	OK	
		LC38 at 100.00%	0.38	OK	
		LC39 at 100.00%	0.31	OK	
		LC4 at 100.00%	**0.58**	**OK**	Eq. H1-1b
		LC40 at 100.00%	0.28	OK	
		LC41 at 100.00%	0.29	OK	
		LC42 at 100.00%	0.29	OK	
		LC43 at 100.00%	0.29	OK	
		LC44 at 100.00%	0.28	OK	
		LC45 at 100.00%	0.31	OK	
		LC46 at 100.00%	0.34	OK	
		LC47 at 100.00%	0.33	OK	
		LC48 at 100.00%	0.33	OK	
		LC49 at 100.00%	0.33	OK	
		LC5 at 100.00%	0.56	OK	
		LC50 at 100.00%	0.34	OK	
		LC6 at 100.00%	0.51	OK	
		LC7 at 100.00%	0.17	OK	
		LC8 at 100.00%	0.50	OK	
		LC9 at 100.00%	0.53	OK	
L 3X3X1_4	**22**	LC1 at 83.75%	0.66	OK	Eq. H2-1
		LC10 at 100.00%	0.31	OK	
		LC11 at 100.00%	0.48	OK	
		LC12 at 65.00%	0.65	OK	Eq. H2-1
		LC13 at 83.75%	0.61	OK	
		LC14 at 63.75%	0.59	OK	
		LC15 at 63.75%	0.46	OK	
		LC16 at 100.00%	0.50	OK	
		LC17 at 100.00%	0.67	OK	
		LC18 at 100.00%	0.83	OK	
		LC19 at 100.00%	0.50	OK	
		LC2 at 63.75%	0.61	OK	Eq. H2-1
		LC20 at 63.75%	0.51	OK	
		LC21 at 63.75%	0.37	OK	
		LC22 at 100.00%	0.34	OK	
		LC23 at 100.00%	0.50	OK	
		LC24 at 100.00%	0.67	OK	
		LC25 at 100.00%	0.46	OK	
		LC26 at 100.00%	0.47	OK	
		LC27 at 100.00%	0.47	OK	
		LC28 at 100.00%	0.49	OK	
		LC29 at 100.00%	0.49	OK	
		LC3 at 63.75%	0.47	OK	
		LC30 at 100.00%	0.49	OK	
		LC31 at 100.00%	0.48	OK	

	LC32 at 100.00%	0.47	OK	
	LC33 at 100.00%	0.47	OK	
	LC34 at 100.00%	0.45	OK	
	LC35 at 100.00%	0.45	OK	
	LC36 at 100.00%	0.45	OK	
	LC37 at 100.00%	0.21	OK	
	LC38 at 100.00%	0.54	OK	Sec. F1
	LC39 at 100.00%	0.47	OK	
	LC4 at 100.00%	0.54	OK	
	LC40 at 100.00%	0.48	OK	
	LC41 at 100.00%	0.48	OK	
	LC42 at 100.00%	0.48	OK	
	LC43 at 100.00%	0.49	OK	
	LC44 at 100.00%	0.49	OK	
	LC45 at 100.00%	0.48	OK	
	LC46 at 100.00%	0.47	OK	
	LC47 at 100.00%	0.48	OK	
	LC48 at 100.00%	0.47	OK	
	LC49 at 100.00%	0.47	OK	
	LC5 at 100.00%	0.71	OK	
	LC50 at 100.00%	0.47	OK	
	LC6 at 100.00%	**0.87**	**OK**	Sec. F1
	LC7 at 100.00%	0.54	OK	
	LC8 at 63.75%	0.49	OK	
	LC9 at 63.75%	0.36	OK	
23	LC1 at 84.38%	0.41	OK	
	LC10 at 0.00%	0.57	OK	
	LC11 at 0.00%	0.41	OK	
	LC12 at 84.38%	0.46	OK	
	LC13 at 84.38%	0.43	OK	
	LC14 at 0.00%	0.50	OK	
	LC15 at 90.63%	0.37	OK	
	LC16 at 90.63%	0.40	OK	
	LC17 at 84.38%	0.44	OK	
	LC18 at 84.38%	0.55	OK	
	LC19 at 84.38%	0.50	OK	
	LC2 at 0.00%	0.47	OK	
	LC20 at 0.00%	0.74	OK	
	LC21 at 0.00%	0.61	OK	
	LC22 at 0.00%	0.52	OK	
	LC23 at 84.38%	0.36	OK	
	LC24 at 84.38%	0.47	OK	
	LC25 at 17.19%	0.49	OK	
	LC26 at 17.19%	0.48	OK	
	LC27 at 17.19%	0.49	OK	
	LC28 at 17.19%	0.51	OK	
	LC29 at 17.19%	0.53	OK	
	LC3 at 90.63%	0.39	OK	
	LC30 at 17.19%	0.53	OK	
	LC31 at 17.19%	0.53	OK	
	LC32 at 17.19%	0.54	OK	Sec. F1
	LC33 at 17.19%	0.53	OK	
	LC34 at 17.19%	0.52	OK	
	LC35 at 17.19%	0.50	OK	
	LC36 at 17.19%	0.49	OK	
	LC37 at 17.19%	0.23	OK	
	LC38 at 0.00%	0.29	OK	
	LC39 at 0.00%	0.31	OK	
	LC4 at 90.63%	0.42	OK	
	LC40 at 0.00%	0.30	OK	
	LC41 at 0.00%	0.30	OK	
	LC42 at 0.00%	0.31	OK	
	LC43 at 0.00%	0.31	OK	

	LC44 at 0.00%	0.31	OK	
	LC45 at 0.00%	0.31	OK	
	LC46 at 0.00%	0.32	OK	
	LC47 at 0.00%	0.32	OK	
	LC48 at 0.00%	0.32	OK	
	LC49 at 0.00%	0.31	OK	
	LC5 at 82.81%	0.47	OK	
	LC50 at 0.00%	0.31	OK	
	LC6 at 84.38%	0.56	OK	Eq. H2-1
	LC7 at 84.38%	0.51	OK	
	LC8 at 0.00%	**0.79**	**OK**	Sec. F1
	LC9 at 0.00%	0.66	OK	
24	LC1 at 100.00%	0.52	OK	
	LC10 at 100.00%	0.48	OK	
	LC11 at 100.00%	0.60	OK	
	LC12 at 100.00%	**0.74**	**OK**	Eq. H2-1
	LC13 at 100.00%	0.50	OK	
	LC14 at 63.75%	0.45	OK	
	LC15 at 63.75%	0.32	OK	
	LC16 at 100.00%	0.36	OK	
	LC17 at 100.00%	0.47	OK	
	LC18 at 100.00%	0.61	OK	
	LC19 at 83.75%	0.50	OK	
	LC2 at 63.75%	0.47	OK	Sec. F1
	LC20 at 63.75%	0.42	OK	
	LC21 at 63.75%	0.33	OK	
	LC22 at 100.00%	0.46	OK	
	LC23 at 100.00%	0.57	OK	
	LC24 at 100.00%	0.72	OK	
	LC25 at 100.00%	0.39	OK	
	LC26 at 100.00%	0.39	OK	
	LC27 at 100.00%	0.39	OK	
	LC28 at 100.00%	0.38	OK	
	LC29 at 100.00%	0.38	OK	
	LC3 at 63.75%	0.34	OK	
	LC30 at 100.00%	0.38	OK	
	LC31 at 100.00%	0.38	OK	
	LC32 at 100.00%	0.39	OK	
	LC33 at 100.00%	0.39	OK	
	LC34 at 100.00%	0.40	OK	
	LC35 at 100.00%	0.40	OK	
	LC36 at 100.00%	0.40	OK	
	LC37 at 100.00%	0.17	OK	
	LC38 at 100.00%	0.52	OK	
	LC39 at 100.00%	0.44	OK	
	LC4 at 100.00%	0.36	OK	
	LC40 at 100.00%	0.44	OK	
	LC41 at 100.00%	0.44	OK	
	LC42 at 100.00%	0.44	OK	
	LC43 at 100.00%	0.43	OK	
	LC44 at 100.00%	0.43	OK	
	LC45 at 100.00%	0.44	OK	
	LC46 at 100.00%	0.44	OK	
	LC47 at 100.00%	0.44	OK	
	LC48 at 100.00%	0.44	OK	
	LC49 at 100.00%	0.44	OK	
	LC5 at 100.00%	0.47	OK	
	LC50 at 100.00%	0.44	OK	
	LC6 at 100.00%	0.61	OK	
	LC7 at 83.75%	0.53	OK	Eq. H2-1
	LC8 at 63.75%	0.42	OK	Sec. F1
	LC9 at 83.75%	0.34	OK	

	25	LC1 at 84.38%	0.50	OK	
		LC10 at 0.00%	0.37	OK	
		LC11 at 0.00%	0.34	OK	
		LC12 at 84.38%	0.39	OK	
		LC13 at 84.38%	0.51	OK	
		LC14 at 0.00%	0.48	OK	
		LC15 at 0.00%	0.41	OK	
		LC16 at 0.00%	0.46	OK	
		LC17 at 0.00%	0.45	OK	
		LC18 at 84.38%	0.39	OK	
		LC19 at 84.38%	0.51	OK	
		LC2 at 0.00%	0.50	OK	Eq. H2-1
		LC20 at 0.00%	0.42	OK	
		LC21 at 0.00%	0.33	OK	
		LC22 at 0.00%	0.37	OK	
		LC23 at 0.00%	0.34	OK	
		LC24 at 84.38%	0.39	OK	
		LC25 at 17.19%	0.42	OK	Eq. H2-1
		LC26 at 17.19%	0.42	OK	
		LC27 at 17.19%	0.41	OK	
		LC28 at 17.19%	0.41	OK	
		LC29 at 17.19%	0.41	OK	
		LC3 at 0.00%	0.43	OK	
		LC30 at 17.19%	0.41	OK	
		LC31 at 17.19%	0.40	OK	
		LC32 at 17.19%	0.40	OK	
		LC33 at 17.19%	0.40	OK	
		LC34 at 17.19%	0.40	OK	
		LC35 at 17.19%	0.41	OK	
		LC36 at 17.19%	0.41	OK	
		LC37 at 17.19%	0.18	OK	
		LC38 at 17.19%	0.32	OK	
		LC39 at 17.19%	0.27	OK	
		LC4 at 0.00%	0.48	OK	
		LC40 at 17.19%	0.27	OK	
		LC41 at 17.19%	0.27	OK	
		LC42 at 17.19%	0.27	OK	
		LC43 at 17.19%	0.27	OK	
		LC44 at 17.19%	0.27	OK	
		LC45 at 17.19%	0.26	OK	
		LC46 at 17.19%	0.26	OK	
		LC47 at 17.19%	0.27	OK	
		LC48 at 17.19%	0.27	OK	
		LC49 at 17.19%	0.27	OK	
		LC5 at 0.00%	0.47	OK	
		LC50 at 17.19%	0.27	OK	
		LC6 at 84.38%	0.38	OK	
		LC7 at 84.38%	**0.52**	**OK**	Eq. H3-8
		LC8 at 0.00%	0.42	OK	
		LC9 at 0.00%	0.33	OK	
PIPE 2x0.154	**5**	LC1 at 46.88%	0.58	OK	
		LC10 at 50.00%	0.18	OK	
		LC11 at 46.88%	0.12	OK	
		LC12 at 46.88%	0.34	OK	
		LC13 at 46.88%	0.57	OK	
		LC14 at 46.88%	0.59	OK	
		LC15 at 46.88%	0.39	OK	
		LC16 at 46.88%	0.19	OK	
		LC17 at 0.00%	0.08	OK	
		LC18 at 50.00%	0.31	OK	
		LC19 at 50.00%	0.59	OK	
		LC2 at 46.88%	**0.61**	**OK**	Eq. H1-1b
		LC20 at 50.00%	0.59	OK	

	LC21 at 50.00%	0.38	OK	
	LC22 at 50.00%	0.17	OK	
	LC23 at 46.88%	0.11	OK	
	LC24 at 46.88%	0.33	OK	
	LC25 at 46.88%	0.17	OK	
	LC26 at 0.00%	0.16	OK	
	LC27 at 0.00%	0.16	OK	
	LC28 at 0.00%	0.16	OK	
	LC29 at 0.00%	0.16	OK	
	LC3 at 46.88%	0.40	OK	
	LC30 at 0.00%	0.16	OK	
	LC31 at 100.00%	0.17	OK	
	LC32 at 0.00%	0.17	OK	
	LC33 at 0.00%	0.17	OK	
	LC34 at 0.00%	0.17	OK	
	LC35 at 0.00%	0.16	OK	
	LC36 at 0.00%	0.16	OK	
	LC37 at 0.00%	0.07	OK	
	LC38 at 100.00%	0.35	OK	Eq. H1-1b
	LC39 at 46.88%	0.13	OK	
	LC4 at 46.88%	0.20	OK	
	LC40 at 46.88%	0.13	OK	
	LC41 at 46.88%	0.12	OK	
	LC42 at 46.88%	0.11	OK	
	LC43 at 0.00%	0.10	OK	
	LC44 at 0.00%	0.10	OK	
	LC45 at 0.00%	0.10	OK	
	LC46 at 0.00%	0.10	OK	
	LC47 at 0.00%	0.10	OK	
	LC48 at 0.00%	0.10	OK	
	LC49 at 46.88%	0.11	OK	
	LC5 at 100.00%	0.09	OK	
	LC50 at 46.88%	0.11	OK	
	LC6 at 50.00%	0.31	OK	
	LC7 at 50.00%	0.59	OK	
	LC8 at 50.00%	0.60	OK	Eq. H1-1b
	LC9 at 50.00%	0.38	OK	
6	LC1 at 0.00%	**0.35**	**OK**	Eq. H1-1b
	LC10 at 0.00%	0.15	OK	
	LC11 at 0.00%	0.23	OK	
	LC12 at 0.00%	0.31	OK	
	LC13 at 0.00%	0.32	OK	
	LC14 at 0.00%	0.24	OK	
	LC15 at 0.00%	0.19	OK	
	LC16 at 100.00%	0.12	OK	
	LC17 at 100.00%	0.11	OK	
	LC18 at 100.00%	0.10	OK	
	LC19 at 0.00%	0.12	OK	
	LC2 at 0.00%	0.28	OK	
	LC20 at 100.00%	0.07	OK	
	LC21 at 100.00%	0.09	OK	
	LC22 at 0.00%	0.11	OK	
	LC23 at 0.00%	0.20	OK	
	LC24 at 0.00%	0.28	OK	
	LC25 at 0.00%	0.28	OK	
	LC26 at 0.00%	0.27	OK	
	LC27 at 0.00%	0.26	OK	
	LC28 at 100.00%	0.26	OK	
	LC29 at 100.00%	0.25	OK	
	LC3 at 0.00%	0.23	OK	
	LC30 at 100.00%	0.25	OK	
	LC31 at 100.00%	0.25	OK	
	LC32 at 100.00%	0.25	OK	

	LC33 at 100.00%	0.25	OK	
	LC34 at 100.00%	0.25	OK	
	LC35 at 0.00%	0.26	OK	
	LC36 at 0.00%	0.27	OK	
	LC37 at 100.00%	0.11	OK	
	LC38 at 100.00%	0.25	OK	
	LC39 at 0.00%	0.29	OK	
	LC4 at 100.00%	0.16	OK	
	LC40 at 100.00%	0.29	OK	Eq. H1-1b
	LC41 at 100.00%	0.29	OK	
	LC42 at 100.00%	0.28	OK	
	LC43 at 100.00%	0.28	OK	
	LC44 at 100.00%	0.28	OK	
	LC45 at 100.00%	0.28	OK	
	LC46 at 100.00%	0.28	OK	
	LC47 at 100.00%	0.28	OK	
	LC48 at 100.00%	0.28	OK	
	LC49 at 100.00%	0.29	OK	
	LC5 at 100.00%	0.15	OK	
	LC50 at 0.00%	0.29	OK	
	LC6 at 100.00%	0.13	OK	
	LC7 at 100.00%	0.14	OK	
	LC8 at 100.00%	0.10	OK	
	LC9 at 100.00%	0.13	OK	
7	LC1 at 100.00%	0.20	OK	
	LC10 at 0.00%	0.14	OK	
	LC11 at 100.00%	0.13	OK	
	LC12 at 100.00%	0.16	OK	
	LC13 at 100.00%	0.16	OK	
	LC14 at 100.00%	0.15	OK	
	LC15 at 100.00%	0.13	OK	
	LC16 at 100.00%	0.15	OK	
	LC17 at 100.00%	0.16	OK	
	LC18 at 0.00%	0.14	OK	
	LC19 at 0.00%	0.10	OK	
	LC2 at 100.00%	0.19	OK	
	LC20 at 100.00%	0.09	OK	
	LC21 at 0.00%	0.12	OK	
	LC22 at 0.00%	0.10	OK	
	LC23 at 100.00%	0.09	OK	
	LC24 at 100.00%	0.12	OK	
	LC25 at 100.00%	**0.28**	**OK**	Eq. H1-1b
	LC26 at 100.00%	0.27	OK	
	LC27 at 100.00%	0.27	OK	
	LC28 at 100.00%	0.28	OK	
	LC29 at 100.00%	0.28	OK	
	LC3 at 100.00%	0.17	OK	
	LC30 at 100.00%	0.28	OK	
	LC31 at 100.00%	0.27	OK	
	LC32 at 100.00%	0.27	OK	
	LC33 at 100.00%	0.27	OK	
	LC34 at 100.00%	0.27	OK	
	LC35 at 100.00%	0.27	OK	
	LC36 at 100.00%	0.27	OK	
	LC37 at 100.00%	0.12	OK	
	LC38 at 0.00%	0.22	OK	
	LC39 at 0.00%	0.16	OK	
	LC4 at 100.00%	0.19	OK	
	LC40 at 0.00%	0.16	OK	
	LC41 at 0.00%	0.16	OK	
	LC42 at 0.00%	0.16	OK	
	LC43 at 0.00%	0.16	OK	
	LC44 at 0.00%	0.16	OK	

	LC45 at 0.00%	0.16	OK	
	LC46 at 0.00%	0.16	OK	
	LC47 at 0.00%	0.16	OK	
	LC48 at 0.00%	0.16	OK	
	LC49 at 0.00%	0.16	OK	
	LC5 at 100.00%	0.20	OK	
	LC50 at 0.00%	0.16	OK	
	LC6 at 0.00%	0.18	OK	
	LC7 at 0.00%	0.14	OK	
	LC8 at 100.00%	0.13	OK	
	LC9 at 0.00%	0.16	OK	
8	LC1 at 46.88%	0.61	OK	
	LC10 at 0.00%	0.21	OK	
	LC11 at 46.88%	0.47	OK	
	LC12 at 46.88%	**0.64**	**OK**	Eq. H1-1b
	LC13 at 50.00%	0.61	OK	
	LC14 at 46.88%	0.47	OK	
	LC15 at 0.00%	0.27	OK	
	LC16 at 100.00%	0.20	OK	
	LC17 at 46.88%	0.38	OK	
	LC18 at 46.88%	0.55	OK	
	LC19 at 50.00%	0.59	OK	
	LC2 at 46.88%	0.49	OK	
	LC20 at 46.88%	0.38	OK	
	LC21 at 100.00%	0.19	OK	
	LC22 at 46.88%	0.19	OK	
	LC23 at 46.88%	0.46	OK	
	LC24 at 46.88%	0.63	OK	
	LC25 at 0.00%	0.35	OK	
	LC26 at 0.00%	0.33	OK	
	LC27 at 0.00%	0.32	OK	
	LC28 at 0.00%	0.30	OK	
	LC29 at 100.00%	0.30	OK	
	LC3 at 0.00%	0.32	OK	
	LC30 at 100.00%	0.31	OK	
	LC31 at 100.00%	0.32	OK	
	LC32 at 100.00%	0.30	OK	
	LC33 at 0.00%	0.29	OK	
	LC34 at 0.00%	0.31	OK	
	LC35 at 0.00%	0.32	OK	
	LC36 at 0.00%	0.33	OK	
	LC37 at 0.00%	0.14	OK	
	LC38 at 0.00%	0.21	OK	
	LC39 at 0.00%	0.20	OK	
	LC4 at 100.00%	0.24	OK	
	LC40 at 0.00%	0.20	OK	
	LC41 at 0.00%	0.20	OK	
	LC42 at 0.00%	0.18	OK	
	LC43 at 100.00%	0.18	OK	
	LC44 at 100.00%	0.19	OK	
	LC45 at 100.00%	0.19	OK	
	LC46 at 100.00%	0.18	OK	
	LC47 at 100.00%	0.18	OK	
	LC48 at 0.00%	0.19	OK	
	LC49 at 0.00%	0.20	OK	
	LC5 at 50.00%	0.38	OK	
	LC50 at 0.00%	0.20	OK	
	LC6 at 46.88%	0.53	OK	
	LC7 at 50.00%	0.59	OK	Eq. H1-1b
	LC8 at 46.88%	0.36	OK	
	LC9 at 100.00%	0.23	OK	
9	LC1 at 0.00%	0.17	OK	

	LC10 at 0.00%	0.19	OK	
	LC11 at 0.00%	0.19	OK	
	LC12 at 0.00%	0.18	OK	
	LC13 at 0.00%	0.13	OK	
	LC14 at 0.00%	0.14	OK	
	LC15 at 0.00%	0.14	OK	
	LC16 at 0.00%	0.15	OK	
	LC17 at 0.00%	0.15	OK	
	LC18 at 100.00%	0.15	OK	
	LC19 at 100.00%	0.13	OK	
	LC2 at 0.00%	0.18	OK	
	LC20 at 100.00%	0.15	OK	
	LC21 at 0.00%	0.15	OK	
	LC22 at 0.00%	0.15	OK	
	LC23 at 0.00%	0.15	OK	
	LC24 at 0.00%	0.14	OK	
	LC25 at 0.00%	0.28	OK	
	LC26 at 100.00%	0.28	OK	
	LC27 at 100.00%	0.28	OK	
	LC28 at 0.00%	0.28	OK	
	LC29 at 100.00%	0.28	OK	
	LC3 at 0.00%	0.18	OK	
	LC30 at 100.00%	0.28	OK	
	LC31 at 100.00%	0.28	OK	
	LC32 at 0.00%	0.28	OK	
	LC33 at 0.00%	0.28	OK	
	LC34 at 0.00%	0.28	OK	
	LC35 at 0.00%	0.28	OK	
	LC36 at 0.00%	0.28	OK	
	LC37 at 0.00%	0.12	OK	
	LC38 at 0.00%	0.28	OK	
	LC39 at 0.00%	0.28	OK	
	LC4 at 0.00%	0.19	OK	
	LC40 at 0.00%	0.28	OK	
	LC41 at 0.00%	0.28	OK	
	LC42 at 0.00%	0.28	OK	
	LC43 at 0.00%	0.28	OK	
	LC44 at 0.00%	**0.28**	**OK**	Eq. H1-1b
	LC45 at 0.00%	0.28	OK	
	LC46 at 0.00%	0.28	OK	
	LC47 at 0.00%	0.28	OK	
	LC48 at 0.00%	0.28	OK	
	LC49 at 0.00%	0.28	OK	
	LC5 at 0.00%	0.19	OK	
	LC50 at 0.00%	0.28	OK	
	LC6 at 100.00%	0.19	OK	
	LC7 at 100.00%	0.17	OK	
	LC8 at 100.00%	0.19	OK	
	LC9 at 0.00%	0.19	OK	
10	LC1 at 100.00%	0.44	OK	
	LC10 at 0.00%	0.48	OK	
	LC11 at 0.00%	0.47	OK	
	LC12 at 100.00%	0.46	OK	
	LC13 at 100.00%	0.34	OK	
	LC14 at 100.00%	0.38	OK	
	LC15 at 0.00%	0.37	OK	
	LC16 at 0.00%	0.39	OK	
	LC17 at 0.00%	0.40	OK	
	LC18 at 0.00%	0.41	OK	
	LC19 at 0.00%	0.33	OK	
	LC2 at 100.00%	0.48	OK	
	LC20 at 0.00%	0.40	OK	
	LC21 at 0.00%	0.40	OK	

	LC22 at 0.00%	0.39	OK	
	LC23 at 0.00%	0.37	OK	
	LC24 at 100.00%	0.36	OK	
	LC25 at 100.00%	0.68	OK	
	LC26 at 100.00%	0.69	OK	
	LC27 at 100.00%	0.68	OK	
	LC28 at 0.00%	**0.69**	**OK**	Eq. H1-1b
	LC29 at 0.00%	0.69	OK	
	LC3 at 0.00%	0.47	OK	
	LC30 at 0.00%	0.69	OK	
	LC31 at 0.00%	0.68	OK	
	LC32 at 0.00%	0.67	OK	
	LC33 at 0.00%	0.67	OK	
	LC34 at 0.00%	0.67	OK	
	LC35 at 100.00%	0.67	OK	
	LC36 at 100.00%	0.67	OK	
	LC37 at 0.00%	0.30	OK	
	LC38 at 100.00%	0.60	OK	
	LC39 at 0.00%	0.64	OK	
	LC4 at 0.00%	0.49	OK	
	LC40 at 0.00%	0.65	OK	
	LC41 at 0.00%	0.65	OK	
	LC42 at 0.00%	0.65	OK	
	LC43 at 0.00%	0.65	OK	
	LC44 at 0.00%	0.65	OK	
	LC45 at 0.00%	0.64	OK	
	LC46 at 0.00%	0.64	OK	
	LC47 at 0.00%	0.64	OK	
	LC48 at 0.00%	0.64	OK	
	LC49 at 0.00%	0.64	OK	
	LC5 at 0.00%	0.50	OK	
	LC50 at 0.00%	0.64	OK	
	LC6 at 0.00%	0.51	OK	
	LC7 at 0.00%	0.43	OK	
	LC8 at 0.00%	0.50	OK	
	LC9 at 0.00%	0.49	OK	
14	LC1 at 68.75%	0.96	OK	
	LC10 at 29.17%	0.64	OK	
	LC11 at 29.17%	0.54	OK	
	LC12 at 29.17%	0.66	OK	
	LC13 at 68.75%	0.95	OK	
	LC14 at 29.17%	0.65	OK	
	LC15 at 29.17%	0.54	OK	
	LC16 at 29.17%	0.64	OK	
	LC17 at 29.17%	0.54	OK	
	LC18 at 29.17%	0.65	OK	
	LC19 at 68.75%	0.95	OK	
	LC2 at 29.17%	0.66	OK	
	LC20 at 29.17%	0.65	OK	
	LC21 at 29.17%	0.54	OK	
	LC22 at 29.17%	0.64	OK	
	LC23 at 29.17%	0.54	OK	
	LC24 at 29.17%	0.65	OK	
	LC25 at 31.25%	0.24	OK	
	LC26 at 31.25%	0.19	OK	
	LC27 at 31.25%	0.19	OK	
	LC28 at 66.67%	0.20	OK	
	LC29 at 66.67%	0.21	OK	
	LC3 at 29.17%	0.54	OK	
	LC30 at 66.67%	0.22	OK	
	LC31 at 66.67%	0.21	OK	
	LC32 at 31.25%	0.24	OK	
	LC33 at 31.25%	0.23	OK	

	LC34 at 31.25%	0.25	OK	
	LC35 at 31.25%	0.25	OK	
	LC36 at 31.25%	0.26	OK	
	LC37 at 31.25%	0.09	OK	
	LC38 at 31.25%	0.13	OK	
	LC39 at 31.25%	0.14	OK	
	LC4 at 29.17%	0.64	OK	
	LC40 at 31.25%	0.11	OK	
	LC41 at 31.25%	0.11	OK	
	LC42 at 66.67%	0.11	OK	
	LC43 at 66.67%	0.12	OK	
	LC44 at 66.67%	0.13	OK	
	LC45 at 66.67%	0.12	OK	
	LC46 at 31.25%	0.13	OK	
	LC47 at 31.25%	0.13	OK	
	LC48 at 31.25%	0.14	OK	
	LC49 at 31.25%	0.15	OK	
	LC5 at 29.17%	0.54	OK	
	LC50 at 31.25%	0.15	OK	
	LC6 at 29.17%	0.66	OK	
	LC7 at 68.75%	**0.96**	**OK**	Eq. H1-1b
	LC8 at 29.17%	0.66	OK	
	LC9 at 29.17%	0.54	OK	
15	LC1 at 100.00%	0.20	OK	
	LC10 at 100.00%	0.34	OK	
	LC11 at 100.00%	0.32	OK	
	LC12 at 100.00%	0.26	OK	
	LC13 at 100.00%	0.17	OK	
	LC14 at 100.00%	0.34	OK	
	LC15 at 100.00%	0.35	OK	
	LC16 at 100.00%	0.34	OK	
	LC17 at 100.00%	0.30	OK	
	LC18 at 100.00%	0.26	OK	
	LC19 at 100.00%	0.15	OK	
	LC2 at 100.00%	0.38	OK	
	LC20 at 100.00%	0.29	OK	
	LC21 at 100.00%	0.32	OK	
	LC22 at 100.00%	0.31	OK	
	LC23 at 100.00%	0.29	OK	
	LC24 at 100.00%	0.24	OK	
	LC25 at 100.00%	0.23	OK	
	LC26 at 100.00%	0.26	OK	
	LC27 at 100.00%	0.25	OK	
	LC28 at 100.00%	0.27	OK	
	LC29 at 100.00%	0.24	OK	
	LC3 at 100.00%	0.38	OK	Eq. H1-1b
	LC30 at 100.00%	0.25	OK	
	LC31 at 100.00%	0.22	OK	
	LC32 at 100.00%	0.21	OK	
	LC33 at 100.00%	0.21	OK	
	LC34 at 100.00%	0.22	OK	
	LC35 at 100.00%	0.21	OK	
	LC36 at 100.00%	0.21	OK	
	LC37 at 100.00%	0.10	OK	
	LC38 at 100.00%	**0.44**	**OK**	Eq. H1-1b
	LC39 at 100.00%	0.28	OK	
	LC4 at 100.00%	0.38	OK	
	LC40 at 100.00%	0.29	OK	
	LC41 at 100.00%	0.29	OK	
	LC42 at 100.00%	0.29	OK	
	LC43 at 100.00%	0.28	OK	
	LC44 at 100.00%	0.29	OK	
	LC45 at 100.00%	0.27	OK	

	LC46 at 100.00%	0.26	OK	
	LC47 at 100.00%	0.26	OK	
	LC48 at 100.00%	0.26	OK	
	LC49 at 100.00%	0.27	OK	
	LC5 at 100.00%	0.33	OK	
	LC50 at 100.00%	0.26	OK	
	LC6 at 100.00%	0.29	OK	
	LC7 at 100.00%	0.18	OK	
	LC8 at 100.00%	0.32	OK	
	LC9 at 100.00%	0.34	OK	
16	LC1 at 75.00%	0.13	OK	Eq. H1-1b
	LC10 at 72.92%	0.09	OK	
	LC11 at 72.92%	0.08	OK	
	LC12 at 75.00%	0.08	OK	
	LC13 at 75.00%	0.13	OK	
	LC14 at 75.00%	0.08	OK	
	LC15 at 75.00%	0.08	OK	
	LC16 at 75.00%	0.09	OK	
	LC17 at 75.00%	0.08	OK	
	LC18 at 25.00%	0.08	OK	
	LC19 at 75.00%	0.13	OK	
	LC2 at 75.00%	0.08	OK	
	LC20 at 75.00%	0.08	OK	
	LC21 at 75.00%	0.08	OK	
	LC22 at 75.00%	0.09	OK	
	LC23 at 75.00%	0.08	OK	
	LC24 at 75.00%	0.08	OK	
	LC25 at 25.00%	0.06	OK	
	LC26 at 25.00%	0.07	OK	
	LC27 at 25.00%	0.06	OK	
	LC28 at 25.00%	0.07	OK	
	LC29 at 25.00%	0.07	OK	
	LC3 at 75.00%	0.08	OK	
	LC30 at 25.00%	0.07	OK	
	LC31 at 25.00%	0.07	OK	
	LC32 at 72.92%	0.06	OK	
	LC33 at 25.00%	0.06	OK	
	LC34 at 72.92%	0.06	OK	
	LC35 at 25.00%	0.06	OK	
	LC36 at 72.92%	0.06	OK	
	LC37 at 25.00%	0.03	OK	
	LC38 at 72.92%	**0.16**	**OK**	Eq. H1-1b
	LC39 at 25.00%	0.04	OK	
	LC4 at 75.00%	0.09	OK	
	LC40 at 25.00%	0.04	OK	
	LC41 at 25.00%	0.04	OK	
	LC42 at 25.00%	0.04	OK	
	LC43 at 25.00%	0.04	OK	
	LC44 at 25.00%	0.05	OK	
	LC45 at 25.00%	0.04	OK	
	LC46 at 25.00%	0.04	OK	
	LC47 at 25.00%	0.04	OK	
	LC48 at 25.00%	0.04	OK	
	LC49 at 25.00%	0.04	OK	
	LC5 at 25.00%	0.08	OK	
	LC50 at 25.00%	0.04	OK	
	LC6 at 25.00%	0.09	OK	
	LC7 at 75.00%	0.13	OK	
	LC8 at 72.92%	0.08	OK	
	LC9 at 72.92%	0.08	OK	
18	LC1 at 100.00%	0.26	OK	
	LC10 at 100.00%	0.39	OK	

	LC11 at 100.00%	0.38	OK	
	LC12 at 100.00%	0.36	OK	
	LC13 at 100.00%	0.22	OK	
	LC14 at 100.00%	0.39	OK	
	LC15 at 100.00%	0.40	OK	
	LC16 at 100.00%	0.34	OK	
	LC17 at 100.00%	0.28	OK	
	LC18 at 100.00%	0.21	OK	
	LC19 at 100.00%	0.22	OK	
	LC2 at 100.00%	0.43	OK	
	LC20 at 100.00%	0.30	OK	
	LC21 at 100.00%	0.33	OK	
	LC22 at 100.00%	0.34	OK	
	LC23 at 100.00%	0.34	OK	
	LC24 at 100.00%	0.31	OK	
	LC25 at 100.00%	0.29	OK	
	LC26 at 100.00%	0.30	OK	
	LC27 at 100.00%	0.29	OK	
	LC28 at 100.00%	0.30	OK	
	LC29 at 100.00%	0.28	OK	
	LC3 at 100.00%	**0.44**	**OK**	Eq. H1-1b
	LC30 at 100.00%	0.28	OK	
	LC31 at 100.00%	0.31	OK	
	LC32 at 100.00%	0.32	OK	
	LC33 at 100.00%	0.32	OK	
	LC34 at 100.00%	0.34	OK	
	LC35 at 100.00%	0.31	OK	
	LC36 at 100.00%	0.32	OK	
	LC37 at 100.00%	0.13	OK	
	LC38 at 0.00%	0.06	OK	
	LC39 at 100.00%	0.13	OK	
	LC4 at 100.00%	0.38	OK	
	LC40 at 100.00%	0.13	OK	
	LC41 at 100.00%	0.13	OK	
	LC42 at 100.00%	0.13	OK	
	LC43 at 100.00%	0.13	OK	
	LC44 at 100.00%	0.13	OK	
	LC45 at 100.00%	0.14	OK	
	LC46 at 100.00%	0.15	OK	
	LC47 at 100.00%	0.15	OK	
	LC48 at 100.00%	0.15	OK	
	LC49 at 100.00%	0.15	OK	
	LC5 at 100.00%	0.32	OK	
	LC50 at 100.00%	0.15	OK	
	LC6 at 100.00%	0.25	OK	
	LC7 at 100.00%	0.26	OK	
	LC8 at 100.00%	0.35	OK	
	LC9 at 100.00%	0.38	OK	
28	LC1 at 68.75%	**1.33**	**N.G.**	Eq. H1-1b
	LC10 at 29.17%	0.59	OK	
	LC11 at 29.17%	0.57	OK	
	LC12 at 29.17%	0.81	OK	
	LC13 at 68.75%	1.33	N.G.	
	LC14 at 29.17%	0.81	OK	
	LC15 at 29.17%	0.57	OK	
	LC16 at 29.17%	0.59	OK	
	LC17 at 29.17%	0.57	OK	
	LC18 at 29.17%	0.81	OK	
	LC19 at 68.75%	1.33	N.G.	
	LC2 at 29.17%	0.81	OK	
	LC20 at 31.25%	0.82	OK	
	LC21 at 29.17%	0.57	OK	
	LC22 at 29.17%	0.59	OK	

LC23 at 29.17%	0.57	OK
LC24 at 29.17%	0.81	OK
LC25 at 31.25%	0.33	OK
LC26 at 31.25%	0.35	OK
LC27 at 31.25%	0.33	OK
LC28 at 31.25%	0.33	OK
LC29 at 31.25%	0.32	OK
LC3 at 29.17%	0.57	OK
LC30 at 31.25%	0.33	OK
LC31 at 31.25%	0.29	OK
LC32 at 66.67%	0.32	OK
LC33 at 66.67%	0.30	OK
LC34 at 66.67%	0.30	OK
LC35 at 31.25%	0.29	OK
LC36 at 66.67%	0.30	OK
LC37 at 31.25%	0.14	OK
LC38 at 31.25%	0.41	OK
LC39 at 31.25%	0.30	OK
LC4 at 29.17%	0.59	OK
LC40 at 31.25%	0.31	OK
LC41 at 31.25%	0.31	OK
LC42 at 31.25%	0.30	OK
LC43 at 31.25%	0.30	OK
LC44 at 31.25%	0.30	OK
LC45 at 31.25%	0.28	OK
LC46 at 66.67%	0.29	OK
LC47 at 66.67%	0.28	OK
LC48 at 31.25%	0.28	OK
LC49 at 31.25%	0.28	OK
LC5 at 29.17%	0.57	OK
LC50 at 31.25%	0.28	OK
LC6 at 29.17%	0.81	OK
LC7 at 68.75%	1.33	N.G.
LC8 at 31.25%	0.83	OK
LC9 at 29.17%	0.57	OK

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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
1	0.00	0.00	0.00	0
2	12.50	0.00	0.00	0
3	1.00	0.00	0.00	0
4	11.50	0.00	0.00	0
5	6.25	0.00	0.00	0
6	5.25	0.00	0.00	0
7	7.25	0.00	0.00	0
8	6.25	0.00	-3.75	0
9	6.25	0.00	-0.75	0
10	6.25	0.00	-3.0833	0
11	0.00	-3.00	0.00	0
12	12.50	-3.00	0.00	0
13	1.00	-3.00	0.00	0
14	11.50	-3.00	0.00	0
15	6.25	-3.00	0.00	0
16	5.25	-3.00	0.00	0
17	7.25	-3.00	0.00	0
18	6.25	-3.00	-3.75	0
19	6.25	-3.00	-0.75	0
20	6.25	-3.00	-3.0833	0
27	12.00	2.50	0.20	0
28	12.00	-5.50	0.20	0

29	1.00	-1.50	0.00	0
30	3.00	-1.50	-6.00	0
31	0.50	1.50	0.20	0
32	0.50	-4.50	0.20	0
33	6.25	0.00	-0.50	0
34	6.25	-3.00	-3.3333	0
35	11.50	-1.50	0.00	0
36	9.50	-1.50	-6.00	0
43	4.00	2.50	0.20	0
44	4.00	-5.50	0.20	0
42	0.50	-3.00	0.20	0

Restraints

Node	TX	TY	TZ	RX	RY	RZ
8	1	1	1	1	1	1
18	1	1	1	1	1	1
30	1	1	1	1	1	1
36	1	1	1	1	1	1

Members

Member	NJ	NK	Description	Section	Material	d0 [in]	dL [in]	lg factor
3	5	8		HSS_SQR 3X3X1_4	A500 GrB rectangular	0.00	0.00	0.00
4	15	18		HSS_SQR 3X3X1_4	A500 GrB rectangular	0.00	0.00	0.00
5	3	13		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
6	6	16		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
7	7	17		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
8	4	14		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
9	10	20		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
10	9	19		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
14	27	28		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
15	29	30		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
16	31	32		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
18	35	36		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
22	1	5		L 3X3X1_4	A36	0.00	0.00	0.00
23	5	2		L 3X3X1_4	A36	0.00	0.00	0.00
24	11	15		L 3X3X1_4	A36	0.00	0.00	0.00
25	15	12		L 3X3X1_4	A36	0.00	0.00	0.00
28	43	44		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00

Orientation of local axes

Member	Rotation [Deg]	Axes23	NX	NY	NZ
3	90.00	0	0.00	0.00	0.00
4	90.00	0	0.00	0.00	0.00
14	45.00	0	0.00	0.00	0.00
16	45.00	0	0.00	0.00	0.00
22	180.00	0	0.00	0.00	0.00
23	180.00	0	0.00	0.00	0.00
24	180.00	0	0.00	0.00	0.00
25	180.00	0	0.00	0.00	0.00
28	45.00	0	0.00	0.00	0.00

HUDSON
Design Group LLC

Mount Calculations
(Modified Conditions)

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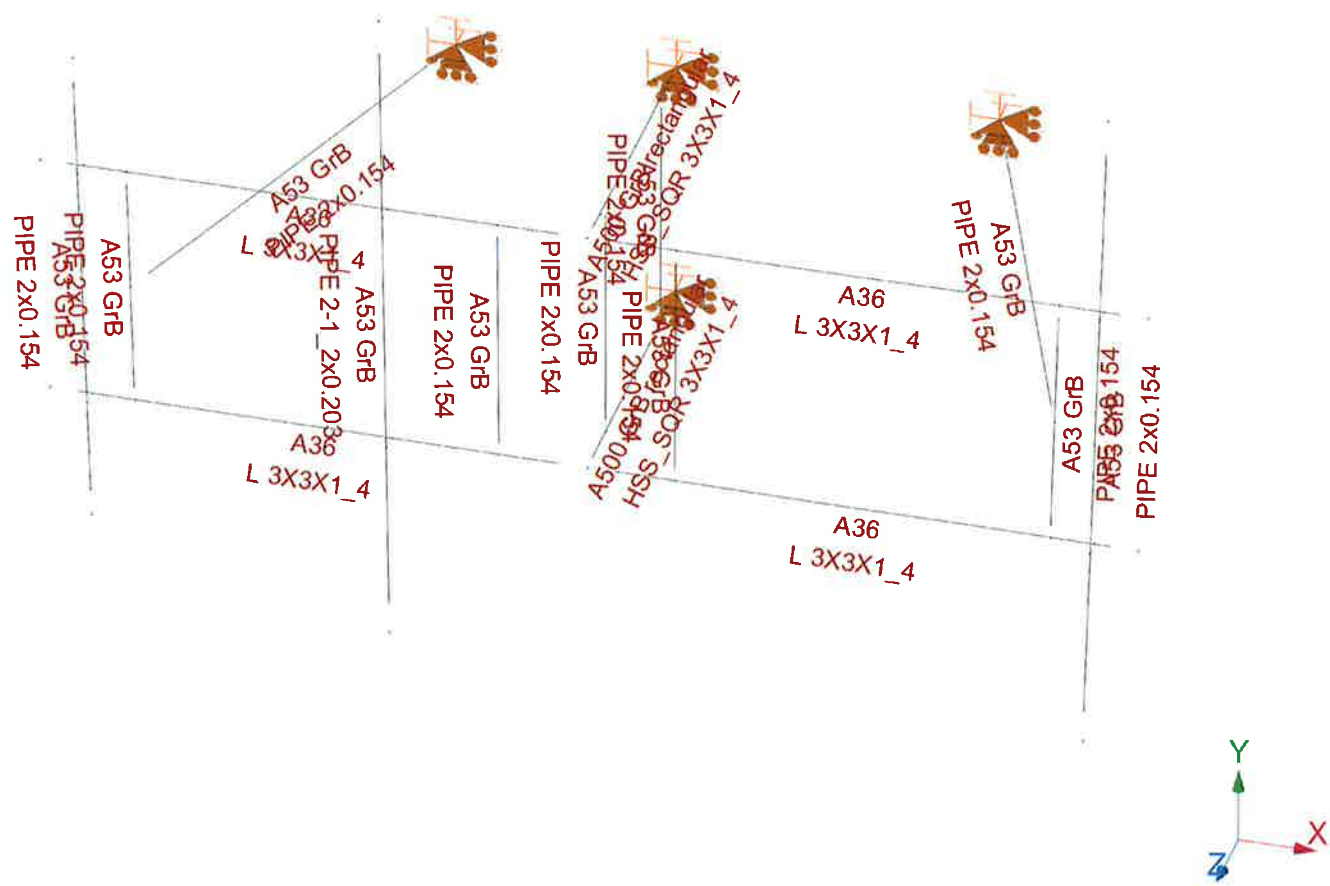

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Units system: English
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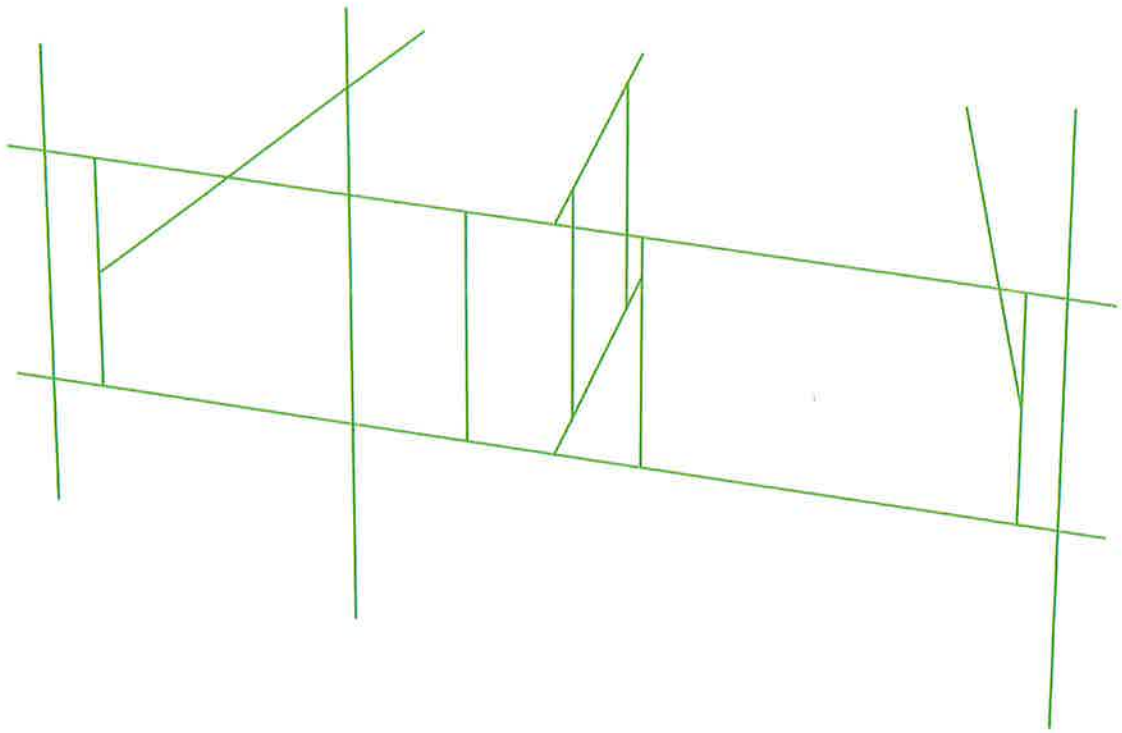
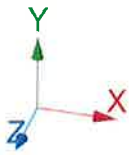
Design status

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





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Units system: English
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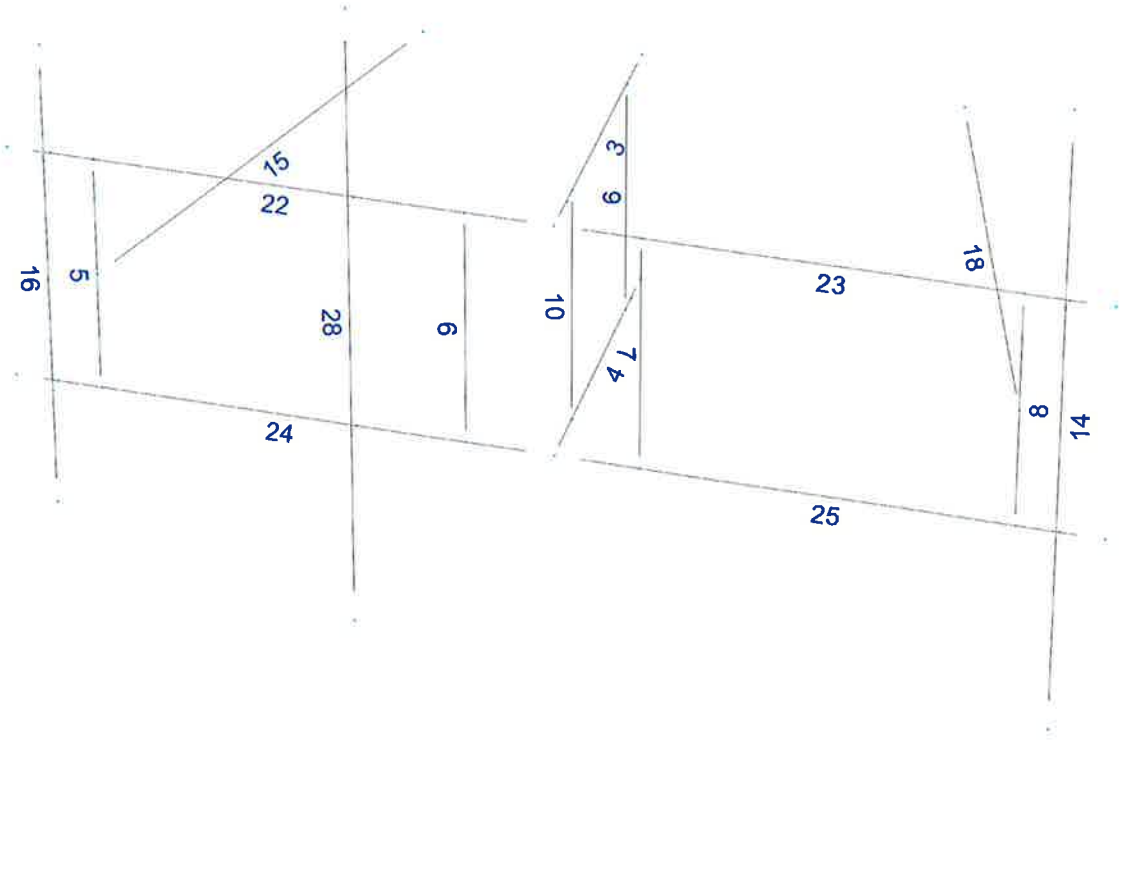

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Steel Code Check

Report: Summary - For all selected load conditions

Load conditions to be included in design :

LC1=1.2D+1.6Wo
LC2=1.2D+1.6W30
LC3=1.2D+1.6W60
LC4=1.2D+1.6W90
LC5=1.2D+1.6W120
LC6=1.2D+1.6W150
LC7=1.2D-1.6Wo
LC8=1.2D-1.6W30
LC9=1.2D-1.6W60
LC10=1.2D-1.6W90
LC11=1.2D-1.6W120
LC12=1.2D-1.6W150
LC13=0.9D+1.6Wo
LC14=0.9D+1.6W30
LC15=0.9D+1.6W60
LC16=0.9D+1.6W90
LC17=0.9D+1.6W120
LC18=0.9D+1.6W150
LC19=0.9D-1.6Wo
LC20=0.9D-1.6W30
LC21=0.9D-1.6W60
LC22=0.9D-1.6W90
LC23=0.9D-1.6W120
LC24=0.9D-1.6W150
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
LC37=0.9D
LC38=1.2D+1.6LL1
LC39=1.2D+1.6WL0+LL2
LC40=1.2D+1.6WL30+LL2
LC41=1.2D+1.6WL60+LL2
LC42=1.2D+1.6WL90+LL2
LC43=1.2D+1.6WL120+LL2
LC44=1.2D+1.6WL150+LL2
LC45=1.2D-1.6WL0+LL2
LC46=1.2D-1.6WL30+LL2
LC47=1.2D-1.6WL60+LL2
LC48=1.2D-1.6WL90+LL2
LC49=1.2D-1.6WL120+LL2
LC50=1.2D-1.6WL150+LL2

Description	Section	Member	Ctrl Eq.	Ratio	Status	Reference
	HSS_SQR 3X3X1_4	**3**	LC1 at 100.00%	0.18	OK	
			LC10 at 100.00%	0.62	OK	
			LC11 at 100.00%	0.57	OK	
			LC12 at 100.00%	0.53	OK	
			LC13 at 100.00%	0.14	OK	
			LC14 at 100.00%	0.52	OK	
			LC15 at 100.00%	0.54	OK	
			LC16 at 100.00%	0.58	OK	
			LC17 at 100.00%	0.54	OK	
			LC18 at 100.00%	0.51	OK	
			LC19 at 100.00%	0.14	OK	
			LC2 at 100.00%	0.56	OK	
			LC20 at 100.00%	0.53	OK	
			LC21 at 100.00%	0.54	OK	
			LC22 at 100.00%	0.58	OK	
			LC23 at 100.00%	0.53	OK	
			LC24 at 100.00%	0.49	OK	
			LC25 at 100.00%	0.28	OK	
			LC26 at 100.00%	0.33	OK	
			LC27 at 100.00%	0.32	OK	
			LC28 at 100.00%	0.35	OK	
			LC29 at 100.00%	0.32	OK	
			LC3 at 100.00%	0.58	OK	
			LC30 at 100.00%	0.33	OK	
			LC31 at 100.00%	0.28	OK	
			LC32 at 100.00%	0.33	OK	
			LC33 at 100.00%	0.32	OK	
			LC34 at 100.00%	0.34	OK	
			LC35 at 100.00%	0.31	OK	
			LC36 at 100.00%	0.33	OK	
			LC37 at 100.00%	0.13	OK	
			LC38 at 100.00%	0.38	OK	
			LC39 at 100.00%	0.33	OK	
			LC4 at 100.00%	**0.62**	**OK**	Eq. H1-1b
			LC40 at 100.00%	0.36	OK	
			LC41 at 100.00%	0.35	OK	
			LC42 at 100.00%	0.35	OK	
			LC43 at 100.00%	0.35	OK	
			LC44 at 100.00%	0.35	OK	
			LC45 at 100.00%	0.32	OK	
			LC46 at 100.00%	0.29	OK	
			LC47 at 100.00%	0.30	OK	
			LC48 at 100.00%	0.30	OK	
			LC49 at 100.00%	0.30	OK	
			LC5 at 100.00%	0.58	OK	
			LC50 at 100.00%	0.30	OK	
			LC6 at 100.00%	0.55	OK	
			LC7 at 100.00%	0.18	OK	
			LC8 at 100.00%	0.57	OK	
			LC9 at 100.00%	0.58	OK	
		4	LC1 at 100.00%	0.19	OK	
			LC10 at 100.00%	0.57	OK	
			LC11 at 100.00%	0.54	OK	
			LC12 at 100.00%	0.50	OK	
			LC13 at 100.00%	0.15	OK	
			LC14 at 100.00%	0.46	OK	
			LC15 at 100.00%	0.50	OK	
			LC16 at 100.00%	0.54	OK	
			LC17 at 100.00%	0.52	OK	
			LC18 at 100.00%	0.47	OK	
			LC19 at 100.00%	0.13	OK	
			LC2 at 100.00%	0.51	OK	

		LC20 at 100.00%	0.46	OK	
		LC21 at 100.00%	0.50	OK	
		LC22 at 100.00%	0.53	OK	
		LC23 at 100.00%	0.50	OK	
		LC24 at 100.00%	0.46	OK	
		LC25 at 100.00%	0.29	OK	
		LC26 at 100.00%	0.34	OK	
		LC27 at 100.00%	0.32	OK	
		LC28 at 100.00%	0.35	OK	
		LC29 at 100.00%	0.33	OK	
		LC3 at 100.00%	0.54	OK	
		LC30 at 100.00%	0.34	OK	
		LC31 at 100.00%	0.29	OK	
		LC32 at 100.00%	0.31	OK	
		LC33 at 100.00%	0.30	OK	
		LC34 at 100.00%	0.33	OK	
		LC35 at 100.00%	0.30	OK	
		LC36 at 100.00%	0.31	OK	
		LC37 at 100.00%	0.13	OK	
		LC38 at 100.00%	0.39	OK	
		LC39 at 100.00%	0.32	OK	
		LC4 at 100.00%	**0.58**	**OK**	Eq. H1-1b
		LC40 at 100.00%	0.29	OK	
		LC41 at 100.00%	0.30	OK	
		LC42 at 100.00%	0.30	OK	
		LC43 at 100.00%	0.30	OK	
		LC44 at 100.00%	0.29	OK	
		LC45 at 100.00%	0.32	OK	
		LC46 at 100.00%	0.35	OK	
		LC47 at 100.00%	0.34	OK	
		LC48 at 100.00%	0.34	OK	
		LC49 at 100.00%	0.34	OK	
		LC5 at 100.00%	0.56	OK	
		LC50 at 100.00%	0.35	OK	
		LC6 at 100.00%	0.51	OK	
		LC7 at 100.00%	0.17	OK	
		LC8 at 100.00%	0.50	OK	
		LC9 at 100.00%	0.54	OK	
L 3X3X1_4	**22**	LC1 at 83.75%	0.44	OK	
		LC10 at 100.00%	0.32	OK	
		LC11 at 100.00%	0.48	OK	
		LC12 at 100.00%	0.66	OK	
		LC13 at 65.00%	0.41	OK	
		LC14 at 63.75%	0.55	OK	
		LC15 at 63.75%	0.43	OK	
		LC16 at 100.00%	0.50	OK	
		LC17 at 100.00%	0.67	OK	
		LC18 at 100.00%	0.84	OK	
		LC19 at 100.00%	0.51	OK	
		LC2 at 63.75%	0.56	OK	Eq. H2-1
		LC20 at 63.75%	0.46	OK	
		LC21 at 63.75%	0.34	OK	
		LC22 at 100.00%	0.34	OK	
		LC23 at 100.00%	0.51	OK	
		LC24 at 100.00%	0.68	OK	
		LC25 at 100.00%	0.45	OK	
		LC26 at 100.00%	0.47	OK	
		LC27 at 100.00%	0.46	OK	
		LC28 at 100.00%	0.48	OK	
		LC29 at 100.00%	0.48	OK	
		LC3 at 63.75%	0.44	OK	
		LC30 at 100.00%	0.49	OK	
		LC31 at 100.00%	0.47	OK	

	LC32 at 100.00%	0.46	OK	
	LC33 at 100.00%	0.46	OK	
	LC34 at 100.00%	0.45	OK	
	LC35 at 100.00%	0.45	OK	
	LC36 at 100.00%	0.44	OK	
	LC37 at 100.00%	0.21	OK	
	LC38 at 100.00%	0.53	OK	Sec. F1
	LC39 at 100.00%	0.47	OK	
	LC4 at 100.00%	0.54	OK	
	LC40 at 100.00%	0.47	OK	
	LÇ41 at 100.00%	0.47	OK	
	LC42 at 100.00%	0.48	OK	
	LC43 at 100.00%	0.48	OK	
	LC44 at 100.00%	0.48	OK	
	LC45 at 100.00%	0.48	OK	
	LC46 at 100.00%	0.47	OK	
	LC47 at 100.00%	0.47	OK	
	LC48 at 100.00%	0.46	OK	
	LC49 at 100.00%	0.46	OK	
	LC5 at 100.00%	0.71	OK	
	LC50 at 100.00%	0.46	OK	
	LC6 at 100.00%	**0.88**	**OK**	Sec. F1
	LC7 at 100.00%	0.55	OK	
	LC8 at 63.75%	0.45	OK	
	LC9 at 63.75%	0.32	OK	
23	LC1 at 84.38%	0.41	OK	
	LC10 at 0.00%	0.56	OK	
	LC11 at 0.00%	0.40	OK	
	LC12 at 84.38%	0.46	OK	
	LC13 at 84.38%	0.42	OK	
	LC14 at 0.00%	0.50	OK	
	LC15 at 90.63%	0.37	OK	
	LC16 at 90.63%	0.40	OK	
	LC17 at 84.38%	0.44	OK	
	LC18 at 84.38%	0.55	OK	
	LC19 at 84.38%	0.49	OK	
	LC2 at 0.00%	0.47	OK	
	LC20 at 0.00%	0.74	OK	
	LC21 at 0.00%	0.61	OK	
	LC22 at 0.00%	0.52	OK	
	LC23 at 84.38%	0.36	OK	
	LC24 at 84.38%	0.47	OK	
	LC25 at 17.19%	0.49	OK	
	LC26 at 17.19%	0.48	OK	
	LC27 at 17.19%	0.49	OK	
	LC28 at 17.19%	0.50	OK	
	LC29 at 17.19%	0.52	OK	
	LC3 at 90.63%	0.39	OK	
	LC30 at 17.19%	0.53	OK	
	LC31 at 17.19%	0.53	OK	
	LC32 at 17.19%	0.54	OK	Sec. F1
	LC33 at 17.19%	0.53	OK	
	LC34 at 17.19%	0.52	OK	
	LC35 at 17.19%	0.50	OK	
	LC36 at 17.19%	0.49	OK	
	LC37 at 17.19%	0.22	OK	
	LC38 at 0.00%	0.29	OK	
	LC39 at 0.00%	0.30	OK	
	LC4 at 90.63%	0.42	OK	
	LC40 at 0.00%	0.29	OK	
	LC41 at 0.00%	0.30	OK	
	LC42 at 0.00%	0.30	OK	
	LC43 at 0.00%	0.31	OK	

	LC44 at 0.00%	0.30	OK	
	LC45 at 0.00%	0.31	OK	
	LC46 at 0.00%	0.32	OK	
	LC47 at 0.00%	0.31	OK	
	LC48 at 0.00%	0.31	OK	
	LC49 at 0.00%	0.30	OK	
	LC5 at 82.81%	0.47	OK	
	LC50 at 0.00%	0.31	OK	
	LC6 at 84.38%	0.56	OK	Eq. H2-1
	LC7 at 84.38%	0.51	OK	
	LC8 at 0.00%	**0.79**	**OK**	Sec. F1
	LC9 at 0.00%	0.66	OK	
24	LC1 at 100.00%	0.52	OK	
	LC10 at 100.00%	0.49	OK	
	LC11 at 100.00%	0.60	OK	
	LC12 at 100.00%	**0.74**	**OK**	Eq. H2-1
	LC13 at 100.00%	0.49	OK	
	LC14 at 63.75%	0.40	OK	
	LC15 at 65.00%	0.31	OK	
	LC16 at 100.00%	0.35	OK	
	LC17 at 100.00%	0.46	OK	
	LC18 at 100.00%	0.60	OK	
	LC19 at 100.00%	0.41	OK	
	LC2 at 65.00%	0.41	OK	Eq. H2-1
	LC20 at 63.75%	0.43	OK	
	LC21 at 63.75%	0.34	OK	
	LC22 at 100.00%	0.47	OK	
	LC23 at 100.00%	0.58	OK	
	LC24 at 100.00%	0.72	OK	
	LC25 at 100.00%	0.40	OK	
	LC26 at 100.00%	0.39	OK	
	LC27 at 100.00%	0.39	OK	
	LC28 at 100.00%	0.38	OK	
	LC29 at 100.00%	0.38	OK	
	LC3 at 65.00%	0.33	OK	
	LC30 at 100.00%	0.38	OK	
	LC31 at 100.00%	0.38	OK	
	LC32 at 100.00%	0.39	OK	
	LC33 at 100.00%	0.39	OK	
	LC34 at 100.00%	0.40	OK	
	LC35 at 100.00%	0.40	OK	
	LC36 at 100.00%	0.40	OK	
	LC37 at 100.00%	0.18	OK	
	LC38 at 100.00%	0.52	OK	
	LC39 at 100.00%	0.44	OK	
	LC4 at 100.00%	0.35	OK	
	LC40 at 100.00%	0.44	OK	
	LC41 at 100.00%	0.44	OK	
	LC42 at 100.00%	0.44	OK	
	LC43 at 100.00%	0.44	OK	
	LC44 at 100.00%	0.43	OK	
	LC45 at 100.00%	0.44	OK	
	LC46 at 100.00%	0.44	OK	
	LC47 at 100.00%	0.44	OK	
	LC48 at 100.00%	0.44	OK	
	LC49 at 100.00%	0.44	OK	
	LC5 at 100.00%	0.46	OK	
	LC50 at 100.00%	0.45	OK	
	LC6 at 100.00%	0.59	OK	
	LC7 at 100.00%	0.41	OK	
	LC8 at 63.75%	0.43	OK	Sec. F1
	LC9 at 63.75%	0.34	OK	

	25	LC1 at 84.38%	0.50	OK	
		LC10 at 0.00%	0.37	OK	
		LC11 at 0.00%	0.35	OK	
		LC12 at 84.38%	0.39	OK	
		LC13 at 84.38%	0.50	OK	
		LC14 at 0.00%	0.48	OK	
		LC15 at 0.00%	0.41	OK	
		LC16 at 0.00%	0.46	OK	
		LC17 at 0.00%	0.45	OK	
		LC18 at 84.38%	0.39	OK	
		LC19 at 84.38%	0.51	OK	
		LC2 at 0.00%	0.50	OK	Eq. H2-1
		LC20 at 0.00%	0.42	OK	
		LC21 at 0.00%	0.33	OK	
		LC22 at 0.00%	0.37	OK	
		LC23 at 0.00%	0.34	OK	
		LC24 at 84.38%	0.39	OK	
		LC25 at 17.19%	0.42	OK	Eq. H2-1
		LC26 at 17.19%	0.42	OK	
		LC27 at 17.19%	0.42	OK	
		LC28 at 17.19%	0.42	OK	
		LC29 at 17.19%	0.41	OK	
		LC3 at 0.00%	0.43	OK	
		LC30 at 17.19%	0.41	OK	
		LC31 at 17.19%	0.40	OK	
		LC32 at 17.19%	0.40	OK	
		LC33 at 17.19%	0.40	OK	
		LC34 at 17.19%	0.40	OK	
		LC35 at 17.19%	0.41	OK	
		LC36 at 17.19%	0.41	OK	
		LC37 at 17.19%	0.18	OK	
		LC38 at 17.19%	0.32	OK	
		LC39 at 17.19%	0.27	OK	
		LC4 at 0.00%	0.48	OK	
		LC40 at 17.19%	0.27	OK	
		LC41 at 17.19%	0.27	OK	
		LC42 at 17.19%	0.27	OK	
		LC43 at 17.19%	0.27	OK	
		LC44 at 17.19%	0.27	OK	
		LC45 at 17.19%	0.27	OK	
		LC46 at 17.19%	0.27	OK	
		LC47 at 17.19%	0.27	OK	
		LC48 at 17.19%	0.27	OK	
		LC49 at 17.19%	0.27	OK	
		LC5 at 0.00%	0.47	OK	
		LC50 at 17.19%	0.27	OK	
		LC6 at 84.38%	0.38	OK	
		LC7 at 84.38%	**0.52**	**OK**	Eq. H3-8
		LC8 at 0.00%	0.42	OK	Sec. F1
		LC9 at 0.00%	0.33	OK	
PIPE 2-1_2x0.203	**28**	LC1 at 68.75%	0.69	OK	
		LC10 at 29.17%	0.31	OK	
		LC11 at 29.17%	0.30	OK	
		LC12 at 29.17%	0.42	OK	
		LC13 at 68.75%	0.69	OK	
		LC14 at 31.25%	0.43	OK	
		LC15 at 29.17%	0.30	OK	
		LC16 at 29.17%	0.31	OK	
		LC17 at 29.17%	0.30	OK	
		LC18 at 31.25%	0.42	OK	
		LC19 at 68.75%	0.69	OK	
		LC2 at 29.17%	0.42	OK	
		LC20 at 31.25%	0.45	OK	

		LC21 at 31.25%	0.30	OK	
		LC22 at 29.17%	0.31	OK	
		LC23 at 29.17%	0.30	OK	
		LC24 at 29.17%	0.42	OK	
		LC25 at 31.25%	0.20	OK	
		LC26 at 31.25%	0.23	OK	
		LC27 at 31.25%	0.22	OK	
		LC28 at 31.25%	0.21	OK	
		LC29 at 31.25%	0.21	OK	
		LC3 at 29.17%	0.30	OK	
		LC30 at 31.25%	0.22	OK	
		LC31 at 31.25%	0.19	OK	
		LC32 at 66.67%	0.20	OK	
		LC33 at 66.67%	0.19	OK	
		LC34 at 66.67%	0.19	OK	
		LC35 at 66.67%	0.18	OK	
		LC36 at 66.67%	0.19	OK	
		LC37 at 31.25%	0.09	OK	
		LC38 at 31.25%	0.26	OK	
		LC39 at 31.25%	0.19	OK	
		LC4 at 29.17%	0.31	OK	
		LC40 at 31.25%	0.20	OK	
		LC41 at 31.25%	0.20	OK	
		LC42 at 31.25%	0.20	OK	
		LC43 at 31.25%	0.19	OK	
		LC44 at 31.25%	0.20	OK	
		LC45 at 31.25%	0.18	OK	
		LC46 at 66.67%	0.18	OK	
		LC47 at 31.25%	0.18	OK	
		LC48 at 31.25%	0.18	OK	
		LC49 at 31.25%	0.18	OK	
		LC5 at 29.17%	0.30	OK	
		LC50 at 66.67%	0.18	OK	
		LC6 at 31.25%	0.43	OK	
		LC7 at 68.75%	**0.69**	**OK**	Eq. H1-1b
		LC8 at 31.25%	0.46	OK	
		LC9 at 31.25%	0.31	OK	
PIPE 2x0.154	**5**	LC1 at 46.88%	0.55	OK	
		LC10 at 50.00%	0.18	OK	
		LC11 at 0.00%	0.12	OK	
		LC12 at 46.88%	0.33	OK	
		LC13 at 46.88%	0.54	OK	
		LC14 at 46.88%	0.57	OK	
		LC15 at 46.88%	0.37	OK	
		LC16 at 46.88%	0.19	OK	
		LC17 at 0.00%	0.08	OK	
		LC18 at 50.00%	0.30	OK	
		LC19 at 50.00%	0.56	OK	
		LC2 at 46.88%	**0.58**	**OK**	Eq. H1-1b
		LC20 at 50.00%	0.58	OK	
		LC21 at 50.00%	0.37	OK	
		LC22 at 50.00%	0.18	OK	
		LC23 at 46.88%	0.10	OK	
		LC24 at 46.88%	0.32	OK	
		LC25 at 46.88%	0.17	OK	
		LC26 at 46.88%	0.15	OK	
		LC27 at 0.00%	0.15	OK	
		LC28 at 0.00%	0.15	OK	
		LC29 at 0.00%	0.15	OK	
		LC3 at 46.88%	0.39	OK	
		LC30 at 0.00%	0.15	OK	
		LC31 at 100.00%	0.16	OK	
		LC32 at 0.00%	0.16	OK	

	LC33 at 0.00%	0.15	OK	
	LC34 at 0.00%	0.15	OK	
	LC35 at 0.00%	0.15	OK	
	LC36 at 0.00%	0.16	OK	
	LC37 at 0.00%	0.07	OK	
	LC38 at 100.00%	0.33	OK	Eq. H1-1b
	LC39 at 46.88%	0.14	OK	
	LC4 at 46.88%	0.20	OK	
	LC40 at 46.88%	0.13	OK	
	LC41 at 46.88%	0.12	OK	
	LC42 at 46.88%	0.11	OK	
	LC43 at 46.88%	0.09	OK	
	LC44 at 46.88%	0.09	OK	
	LC45 at 50.00%	0.10	OK	
	LC46 at 50.00%	0.10	OK	
	LC47 at 0.00%	0.09	OK	
	LC48 at 46.88%	0.09	OK	
	LC49 at 46.88%	0.11	OK	
	LC5 at 100.00%	0.09	OK	
	LC50 at 46.88%	0.12	OK	
	LC6 at 50.00%	0.31	OK	
	LC7 at 50.00%	0.57	OK	
	LC8 at 50.00%	0.58	OK	Eq. H1-1b
	LC9 at 50.00%	0.37	OK	
6	LC1 at 0.00%	**0.29**	**OK**	Eq. H1-1b
	LC10 at 100.00%	0.14	OK	
	LC11 at 0.00%	0.20	OK	
	LC12 at 0.00%	0.27	OK	
	LC13 at 0.00%	0.26	OK	
	LC14 at 0.00%	0.21	OK	
	LC15 at 0.00%	0.17	OK	
	LC16 at 100.00%	0.12	OK	
	LC17 at 100.00%	0.09	OK	
	LC18 at 100.00%	0.06	OK	
	LC19 at 0.00%	0.06	OK	
	LC2 at 0.00%	0.24	OK	
	LC20 at 100.00%	0.03	OK	
	LC21 at 100.00%	0.07	OK	
	LC22 at 100.00%	0.10	OK	
	LC23 at 0.00%	0.17	OK	
	LC24 at 0.00%	0.23	OK	
	LC25 at 0.00%	0.26	OK	
	LC26 at 0.00%	0.25	OK	
	LC27 at 100.00%	0.25	OK	
	LC28 at 100.00%	0.24	OK	
	LC29 at 100.00%	0.24	OK	
	LC3 at 0.00%	0.20	OK	
	LC30 at 100.00%	0.24	OK	
	LC31 at 100.00%	0.23	OK	
	LC32 at 100.00%	0.23	OK	
	LC33 at 100.00%	0.24	OK	
	LC34 at 100.00%	0.24	OK	
	LC35 at 0.00%	0.25	OK	
	LC36 at 0.00%	0.25	OK	
	LC37 at 100.00%	0.11	OK	
	LC38 at 100.00%	0.23	OK	
	LC39 at 100.00%	0.28	OK	
	LC4 at 100.00%	0.15	OK	
	LC40 at 100.00%	0.28	OK	Eq. H1-1b
	LC41 at 100.00%	0.27	OK	
	LC42 at 100.00%	0.27	OK	
	LC43 at 100.00%	0.27	OK	
	LC44 at 100.00%	0.27	OK	

	LC45 at 100.00%	0.27	OK	
	LC46 at 100.00%	0.27	OK	
	LC47 at 100.00%	0.27	OK	
	LC48 at 100.00%	0.27	OK	
	LC49 at 100.00%	0.27	OK	
	LC5 at 100.00%	0.12	OK	
	LC50 at 100.00%	0.27	OK	
	LC6 at 100.00%	0.10	OK	
	LC7 at 100.00%	0.08	OK	
	LC8 at 100.00%	0.06	OK	
	LC9 at 100.00%	0.10	OK	
7	LC1 at 100.00%	0.21	OK	
	LC10 at 0.00%	0.14	OK	
	LC11 at 100.00%	0.14	OK	
	LC12 at 100.00%	0.16	OK	
	LC13 at 100.00%	0.17	OK	
	LC14 at 100.00%	0.16	OK	
	LC15 at 100.00%	0.14	OK	
	LC16 at 100.00%	0.15	OK	
	LC17 at 0.00%	0.16	OK	
	LC18 at 0.00%	0.15	OK	
	LC19 at 0.00%	0.10	OK	
	LC2 at 100.00%	0.20	OK	
	LC20 at 0.00%	0.10	OK	
	LC21 at 0.00%	0.13	OK	
	LC22 at 0.00%	0.10	OK	
	LC23 at 100.00%	0.10	OK	
	LC24 at 100.00%	0.12	OK	
	LC25 at 100.00%	**0.28**	**OK**	Eq. H1-1b
	LC26 at 100.00%	0.28	OK	
	LC27 at 100.00%	0.28	OK	
	LC28 at 100.00%	0.28	OK	
	LC29 at 0.00%	0.28	OK	
	LC3 at 100.00%	0.18	OK	
	LC30 at 0.00%	0.28	OK	Eq. H1-1b
	LC31 at 0.00%	0.27	OK	
	LC32 at 100.00%	0.27	OK	
	LC33 at 100.00%	0.28	OK	
	LC34 at 100.00%	0.27	OK	
	LC35 at 100.00%	0.27	OK	
	LC36 at 100.00%	0.27	OK	
	LC37 at 100.00%	0.12	OK	
	LC38 at 0.00%	0.23	OK	
	LC39 at 0.00%	0.17	OK	
	LC4 at 100.00%	0.19	OK	
	LC40 at 0.00%	0.17	OK	
	LC41 at 0.00%	0.17	OK	
	LC42 at 0.00%	0.17	OK	
	LC43 at 0.00%	0.17	OK	
	LC44 at 0.00%	0.17	OK	
	LC45 at 0.00%	0.17	OK	
	LC46 at 0.00%	0.17	OK	
	LC47 at 0.00%	0.17	OK	
	LC48 at 0.00%	0.16	OK	
	LC49 at 0.00%	0.16	OK	
	LC5 at 0.00%	0.20	OK	
	LC50 at 0.00%	0.16	OK	
	LC6 at 0.00%	0.19	OK	
	LC7 at 0.00%	0.14	OK	
	LC8 at 0.00%	0.14	OK	
	LC9 at 0.00%	0.17	OK	
8	LC1 at 50.00%	0.61	OK	Eq. H1-1b

	LC10 at 0.00%	0.21	OK	
	LC11 at 46.88%	0.47	OK	
	LC12 at 46.88%	**0.64**	**OK**	Eq. H1-1b
	LC13 at 50.00%	0.61	OK	
	LC14 at 46.88%	0.47	OK	
	LC15 at 0.00%	0.27	OK	
	LC16 at 100.00%	0.20	OK	
	LC17 at 46.88%	0.38	OK	
	LC18 at 46.88%	0.55	OK	
	LC19 at 50.00%	0.59	OK	
	LC2 at 46.88%	0.49	OK	
	LC20 at 46.88%	0.38	OK	
	LC21 at 100.00%	0.19	OK	
	LC22 at 46.88%	0.19	OK	
	LC23 at 46.88%	0.46	OK	
	LC24 at 46.88%	0.63	OK	
	LC25 at 0.00%	0.35	OK	
	LC26 at 0.00%	0.33	OK	
	LC27 at 0.00%	0.32	OK	
	LC28 at 0.00%	0.30	OK	
	LC29 at 100.00%	0.30	OK	
	LC3 at 0.00%	0.32	OK	
	LC30 at 100.00%	0.31	OK	
	LC31 at 100.00%	0.32	OK	
	LC32 at 100.00%	0.30	OK	
	LC33 at 0.00%	0.30	OK	
	LC34 at 0.00%	0.31	OK	
	LC35 at 0.00%	0.32	OK	
	LC36 at 0.00%	0.33	OK	
	LC37 at 0.00%	0.14	OK	
	LC38 at 0.00%	0.21	OK	
	LC39 at 0.00%	0.21	OK	
	LC4 at 100.00%	0.24	OK	
	LC40 at 0.00%	0.20	OK	
	LC41 at 0.00%	0.20	OK	
	LC42 at 0.00%	0.19	OK	
	LC43 at 100.00%	0.19	OK	
	LC44 at 100.00%	0.19	OK	
	LC45 at 100.00%	0.19	OK	
	LC46 at 100.00%	0.18	OK	
	LC47 at 100.00%	0.18	OK	
	LC48 at 0.00%	0.19	OK	
	LC49 at 0.00%	0.20	OK	
	LC5 at 50.00%	0.38	OK	
	LC50 at 0.00%	0.20	OK	
	LC6 at 46.88%	0.54	OK	
	LC7 at 50.00%	0.59	OK	Eq. H1-1b
	LC8 at 46.88%	0.36	OK	
	LC9 at 100.00%	0.23	OK	
9	LC1 at 100.00%	0.17	OK	
	LC10 at 0.00%	0.19	OK	
	LC11 at 0.00%	0.19	OK	
	LC12 at 0.00%	0.18	OK	
	LC13 at 0.00%	0.13	OK	
	LC14 at 0.00%	0.14	OK	
	LC15 at 0.00%	0.15	OK	
	LC16 at 0.00%	0.15	OK	
	LC17 at 0.00%	0.15	OK	
	LC18 at 0.00%	0.15	OK	
	LC19 at 0.00%	0.13	OK	
	LC2 at 100.00%	0.18	OK	
	LC20 at 100.00%	0.15	OK	
	LC21 at 0.00%	0.15	OK	

	LC22 at 0.00%	0.15	OK	
	LC23 at 0.00%	0.15	OK	
	LC24 at 0.00%	0.14	OK	
	LC25 at 0.00%	0.28	OK	
	LC26 at 100.00%	0.28	OK	
	LC27 at 100.00%	0.28	OK	
	LC28 at 0.00%	0.28	OK	
	LC29 at 100.00%	0.28	OK	
	LC3 at 0.00%	0.19	OK	
	LC30 at 100.00%	0.28	OK	
	LC31 at 100.00%	0.28	OK	
	LC32 at 0.00%	0.28	OK	
	LC33 at 0.00%	0.28	OK	
	LC34 at 0.00%	0.28	OK	
	LC35 at 0.00%	0.28	OK	
	LC36 at 0.00%	0.28	OK	
	LC37 at 100.00%	0.13	OK	
	LC38 at 0.00%	0.28	OK	
	LC39 at 0.00%	0.28	OK	
	LC4 at 0.00%	0.19	OK	
	LC40 at 0.00%	0.29	OK	
	LC41 at 0.00%	0.29	OK	
	LC42 at 0.00%	0.29	OK	
	LC43 at 0.00%	0.29	OK	
	LC44 at 0.00%	**0.29**	**OK**	Eq. H1-1b
	LC45 at 0.00%	0.28	OK	
	LC46 at 0.00%	0.28	OK	
	LC47 at 0.00%	0.28	OK	
	LC48 at 0.00%	0.28	OK	
	LC49 at 0.00%	0.28	OK	
	LC5 at 0.00%	0.19	OK	
	LC50 at 0.00%	0.28	OK	
	LC6 at 0.00%	0.19	OK	
	LC7 at 0.00%	0.17	OK	
	LC8 at 100.00%	0.19	OK	
	LC9 at 0.00%	0.20	OK	
10	LC1 at 100.00%	0.43	OK	
	LC10 at 0.00%	0.50	OK	
	LC11 at 0.00%	0.48	OK	
	LC12 at 100.00%	0.47	OK	
	LC13 at 100.00%	0.33	OK	
	LC14 at 100.00%	0.38	OK	
	LC15 at 0.00%	0.38	OK	
	LC16 at 0.00%	0.40	OK	
	LC17 at 0.00%	0.40	OK	
	LC18 at 0.00%	0.40	OK	
	LC19 at 0.00%	0.32	OK	
	LC2 at 100.00%	0.48	OK	
	LC20 at 0.00%	0.40	OK	
	LC21 at 0.00%	0.40	OK	
	LC22 at 0.00%	0.40	OK	
	LC23 at 0.00%	0.38	OK	
	LC24 at 100.00%	0.37	OK	
	LC25 at 100.00%	0.68	OK	
	LC26 at 100.00%	0.69	OK	
	LC27 at 0.00%	0.69	OK	
	LC28 at 0.00%	**0.70**	**OK**	Eq. H1-1b
	LC29 at 0.00%	0.69	OK	
	LC3 at 0.00%	0.48	OK	
	LC30 at 0.00%	0.69	OK	
	LC31 at 0.00%	0.68	OK	
	LC32 at 0.00%	0.68	OK	
	LC33 at 0.00%	0.68	OK	

	LC34 at 0.00%	0.68	OK
	LC35 at 100.00%	0.67	OK
	LC36 at 0.00%	0.67	OK
	LC37 at 0.00%	0.31	OK
	LC38 at 100.00%	0.62	OK
	LC39 at 0.00%	0.65	OK
	LC4 at 0.00%	0.50	OK
	LC40 at 0.00%	0.65	OK
	LC41 at 0.00%	0.65	OK
	LC42 at 0.00%	0.65	OK
	LC43 at 0.00%	0.65	OK
	LC44 at 0.00%	0.65	OK
	LC45 at 0.00%	0.65	OK
	LC46 at 0.00%	0.64	OK
	LC47 at 0.00%	0.64	OK
	LC48 at 0.00%	0.64	OK
	LC49 at 0.00%	0.64	OK
	LC5 at 0.00%	0.51	OK
	LC50 at 0.00%	0.64	OK
	LC6 at 0.00%	0.50	OK
	LC7 at 0.00%	0.42	OK
	LC8 at 0.00%	0.50	OK
	LC9 at 0.00%	0.50	OK
14	LC1 at 68.75%	0.96	OK
	LC10 at 29.17%	0.64	OK
	LC11 at 29.17%	0.54	OK
	LC12 at 29.17%	0.66	OK
	LC13 at 68.75%	0.95	OK
	LC14 at 29.17%	0.65	OK
	LC15 at 29.17%	0.54	OK
	LC16 at 29.17%	0.64	OK
	LC17 at 29.17%	0.54	OK
	LC18 at 29.17%	0.65	OK
	LC19 at 68.75%	0.95	OK
	LC2 at 29.17%	0.66	OK
	LC20 at 29.17%	0.65	OK
	LC21 at 29.17%	0.54	OK
	LC22 at 29.17%	0.64	OK
	LC23 at 29.17%	0.54	OK
	LC24 at 29.17%	0.65	OK
	LC25 at 31.25%	0.24	OK
	LC26 at 31.25%	0.19	OK
	LC27 at 31.25%	0.19	OK
	LC28 at 66.67%	0.20	OK
	LC29 at 66.67%	0.21	OK
	LC3 at 29.17%	0.54	OK
	LC30 at 66.67%	0.22	OK
	LC31 at 66.67%	0.21	OK
	LC32 at 31.25%	0.24	OK
	LC33 at 31.25%	0.23	OK
	LC34 at 31.25%	0.25	OK
	LC35 at 31.25%	0.25	OK
	LC36 at 31.25%	0.26	OK
	LC37 at 31.25%	0.09	OK
	LC38 at 31.25%	0.13	OK
	LC39 at 31.25%	0.14	OK
	LC4 at 29.17%	0.64	OK
	LC40 at 31.25%	0.12	OK
	LC41 at 31.25%	0.11	OK
	LC42 at 66.67%	0.11	OK
	LC43 at 66.67%	0.12	OK
	LC44 at 66.67%	0.13	OK
	LC45 at 66.67%	0.12	OK

	LC46 at 31.25%	0.13	OK	
	LC47 at 31.25%	0.13	OK	
	LC48 at 31.25%	0.14	OK	
	LC49 at 31.25%	0.15	OK	
	LC5 at 29.17%	0.54	OK	
	LC50 at 31.25%	0.15	OK	
	LC6 at 29.17%	0.66	OK	
	LC7 at 68.75%	**0.96**	**OK**	Eq. H1-1b
	LC8 at 29.17%	0.66	OK	
	LC9 at 29.17%	0.54	OK	
15	LC1 at 100.00%	0.20	OK	
	LC10 at 100.00%	0.34	OK	
	LC11 at 100.00%	0.32	OK	
	LC12 at 100.00%	0.27	OK	
	LC13 at 100.00%	0.16	OK	
	LC14 at 100.00%	0.34	OK	
	LC15 at 100.00%	0.35	OK	
	LC16 at 100.00%	0.34	OK	
	LC17 at 100.00%	0.30	OK	
	LC18 at 100.00%	0.26	OK	
	LC19 at 100.00%	0.15	OK	
	LC2 at 100.00%	0.38	OK	
	LC20 at 100.00%	0.29	OK	
	LC21 at 100.00%	0.32	OK	
	LC22 at 100.00%	0.31	OK	
	LC23 at 100.00%	0.29	OK	
	LC24 at 100.00%	0.24	OK	
	LC25 at 100.00%	0.23	OK	
	LC26 at 100.00%	0.26	OK	
	LC27 at 100.00%	0.25	OK	
	LC28 at 100.00%	0.27	OK	
	LC29 at 100.00%	0.24	OK	
	LC3 at 100.00%	0.38	OK	Eq. H1-1b
	LC30 at 100.00%	0.25	OK	
	LC31 at 100.00%	0.22	OK	
	LC32 at 100.00%	0.21	OK	
	LC33 at 100.00%	0.21	OK	
	LC34 at 100.00%	0.22	OK	
	LC35 at 100.00%	0.21	OK	
	LC36 at 100.00%	0.21	OK	
	LC37 at 100.00%	0.11	OK	
	LC38 at 100.00%	**0.44**	**OK**	Eq. H1-1b
	LC39 at 100.00%	0.28	OK	
	LC4 at 100.00%	0.38	OK	
	LC40 at 100.00%	0.29	OK	
	LC41 at 100.00%	0.29	OK	
	LC42 at 100.00%	0.29	OK	
	LC43 at 100.00%	0.29	OK	
	LC44 at 100.00%	0.29	OK	
	LC45 at 100.00%	0.27	OK	
	LC46 at 100.00%	0.26	OK	
	LC47 at 100.00%	0.27	OK	
	LC48 at 100.00%	0.26	OK	
	LC49 at 100.00%	0.27	OK	
	LC5 at 100.00%	0.34	OK	
	LC50 at 100.00%	0.27	OK	
	LC6 at 100.00%	0.29	OK	
	LC7 at 100.00%	0.18	OK	
	LC8 at 100.00%	0.32	OK	
	LC9 at 100.00%	0.35	OK	
16	LC1 at 75.00%	0.13	OK	Eq. H1-1b
	LC10 at 75.00%	0.09	OK	

	LC11 at 75.00%	0.08	OK	
	LC12 at 75.00%	0.08	OK	
	LC13 at 75.00%	0.13	OK	
	LC14 at 75.00%	0.08	OK	
	LC15 at 75.00%	0.08	OK	
	LC16 at 75.00%	0.09	OK	
	LC17 at 75.00%	0.08	OK	
	LC18 at 75.00%	0.08	OK	
	LC19 at 75.00%	0.13	OK	
	LC2 at 75.00%	0.08	OK	
	LC20 at 75.00%	0.08	OK	
	LC21 at 75.00%	0.08	OK	
	LC22 at 75.00%	0.09	OK	
	LC23 at 75.00%	0.08	OK	
	LC24 at 75.00%	0.08	OK	
	LC25 at 25.00%	0.06	OK	
	LC26 at 25.00%	0.06	OK	
	LC27 at 25.00%	0.06	OK	
	LC28 at 25.00%	0.06	OK	
	LC29 at 25.00%	0.06	OK	
	LC3 at 25.00%	0.08	OK	
	LC30 at 25.00%	0.06	OK	
	LC31 at 25.00%	0.06	OK	
	LC32 at 72.92%	0.06	OK	
	LC33 at 72.92%	0.06	OK	
	LC34 at 72.92%	0.06	OK	
	LC35 at 25.00%	0.05	OK	
	LC36 at 72.92%	0.05	OK	
	LC37 at 25.00%	0.03	OK	
	LC38 at 72.92%	**0.15**	**OK**	Eq. H1-1b
	LC39 at 25.00%	0.04	OK	
	LC4 at 75.00%	0.09	OK	
	LC40 at 25.00%	0.04	OK	
	LC41 at 25.00%	0.04	OK	
	LC42 at 25.00%	0.04	OK	
	LC43 at 25.00%	0.04	OK	
	LC44 at 25.00%	0.04	OK	
	LC45 at 25.00%	0.04	OK	
	LC46 at 25.00%	0.03	OK	
	LC47 at 25.00%	0.04	OK	
	LC48 at 25.00%	0.03	OK	
	LC49 at 25.00%	0.03	OK	
	LC5 at 25.00%	0.08	OK	
	LC50 at 25.00%	0.03	OK	
	LC6 at 25.00%	0.09	OK	
	LC7 at 75.00%	0.13	OK	
	LC8 at 72.92%	0.09	OK	
	LC9 at 72.92%	0.08	OK	
18	LC1 at 100.00%	0.26	OK	
	LC10 at 100.00%	0.39	OK	
	LC11 at 100.00%	0.38	OK	
	LC12 at 100.00%	0.35	OK	
	LC13 at 100.00%	0.22	OK	
	LC14 at 100.00%	0.39	OK	
	LC15 at 100.00%	0.40	OK	
	LC16 at 100.00%	0.34	OK	
	LC17 at 100.00%	0.28	OK	
	LC18 at 100.00%	0.21	OK	
	LC19 at 100.00%	0.22	OK	
	LC2 at 100.00%	0.42	OK	
	LC20 at 100.00%	0.30	OK	
	LC21 at 100.00%	0.33	OK	
	LC22 at 100.00%	0.34	OK	

LC23 at 100.00%	0.34	OK	
LC24 at 100.00%	0.31	OK	
LC25 at 100.00%	0.29	OK	
LC26 at 100.00%	0.29	OK	
LC27 at 100.00%	0.29	OK	
LC28 at 100.00%	0.30	OK	
LC29 at 100.00%	0.28	OK	
LC3 at 100.00%	**0.44**	**OK**	Eq. H1-1b
LC30 at 100.00%	0.28	OK	
LC31 at 100.00%	0.31	OK	
LC32 at 100.00%	0.32	OK	
LC33 at 100.00%	0.31	OK	
LC34 at 100.00%	0.33	OK	
LC35 at 100.00%	0.31	OK	
LC36 at 100.00%	0.31	OK	
LC37 at 100.00%	0.13	OK	
LC38 at 0.00%	0.07	OK	
LC39 at 100.00%	0.13	OK	
LC4 at 100.00%	0.38	OK	
LC40 at 100.00%	0.13	OK	
LC41 at 100.00%	0.13	OK	
LC42 at 100.00%	0.12	OK	
LC43 at 100.00%	0.13	OK	
LC44 at 100.00%	0.13	OK	
LC45 at 100.00%	0.14	OK	
LC46 at 100.00%	0.15	OK	
LC47 at 100.00%	0.14	OK	
LC48 at 100.00%	0.14	OK	
LC49 at 100.00%	0.14	OK	
LC5 at 100.00%	0.32	OK	
LC50 at 100.00%	0.14	OK	
LC6 at 100.00%	0.25	OK	
LC7 at 100.00%	0.26	OK	
LC8 at 100.00%	0.34	OK	
LC9 at 100.00%	0.37	OK	

Bentley

Current Date: 5/9/2018 6:59 PM
Units system: English
File name: W:\STRUCTURAL DEPARTMENT\ANALYSIS SOFTWARE\RAM Elements\RAM Projects\AT&T\CT\CT5457\Rev4\CT5457 (LTE 4C Mod) rev4.etz\

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
1	0.00	0.00	0.00	0
2	12.50	0.00	0.00	0
3	1.00	0.00	0.00	0
4	11.50	0.00	0.00	0
5	6.25	0.00	0.00	0
6	5.25	0.00	0.00	0
7	7.25	0.00	0.00	0
8	6.25	0.00	-3.75	0
9	6.25	0.00	-0.75	0
10	6.25	0.00	-3.0833	0
11	0.00	-3.00	0.00	0
12	12.50	-3.00	0.00	0
13	1.00	-3.00	0.00	0
14	11.50	-3.00	0.00	0
15	6.25	-3.00	0.00	0
16	5.25	-3.00	0.00	0
17	7.25	-3.00	0.00	0
18	6.25	-3.00	-3.75	0
19	6.25	-3.00	-0.75	0
20	6.25	-3.00	-3.0833	0
27	12.00	2.50	0.20	0

28	12.00	-5.50	0.20	0
29	1.00	-1.50	0.00	0
30	3.00	-1.50	-6.00	0
31	0.50	1.50	0.20	0
32	0.50	-4.50	0.20	0
33	6.25	0.00	-0.50	0
34	6.25	-3.00	-3.3333	0
35	11.50	-1.50	0.00	0
36	9.50	-1.50	-6.00	0
43	4.00	2.50	0.20	0
44	4.00	-5.50	0.20	0
39	0.50	0.00	0.00	0

Restraints

Node	TX	TY	TZ	RX	RY	RZ
8	1	1	1	1	1	1
18	1	1	1	1	1	1
30	1	1	1	1	1	1
36	1	1	1	1	1	1

Members

Member	NJ	NK	Description	Section	Material	d0 [in]	dL [in]	lg factor
3	5	8		HSS_SQR 3X3X1_4	A500 GrB rectangular	0.00	0.00	0.00
4	15	18		HSS_SQR 3X3X1_4	A500 GrB rectangular	0.00	0.00	0.00
5	3	13		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
6	6	16		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
7	7	17		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
8	4	14		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
9	10	20		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
10	9	19		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
14	27	28		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
15	29	30		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
16	31	32		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
18	35	36		PIPE 2x0.154	A53 GrB	0.00	0.00	0.00
22	1	5		L 3X3X1_4	A36	0.00	0.00	0.00
23	5	2		L 3X3X1_4	A36	0.00	0.00	0.00
24	11	15		L 3X3X1_4	A36	0.00	0.00	0.00
25	15	12		L 3X3X1_4	A36	0.00	0.00	0.00
28	43	44		PIPE 2-1_2x0.203	A53 GrB	0.00	0.00	0.00

Orientation of local axes

Member	Rotation [Deg]	Axes23	NX	NY	NZ
3	90.00	0	0.00	0.00	0.00
4	90.00	0	0.00	0.00	0.00
14	45.00	0	0.00	0.00	0.00
16	45.00	0	0.00	0.00	0.00
22	180.00	0	0.00	0.00	0.00
23	180.00	0	0.00	0.00	0.00
24	180.00	0	0.00	0.00	0.00
25	180.00	0	0.00	0.00	0.00
28	45.00	0	0.00	0.00	0.00

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Owner and Parcel Information

Owner Name	NORMAN ERNEST R & STUART R & FORSCHLER PRISCILLA M	**Today's Date**	May 28, 2018
Mailing Address	257 NORMAN RD	**Parcel ID**	10810 (Account #: 04129801)
	GRISWOLD, CT 06351	**Subdivison**	TOWER COMPOUND
Location Address	181 A NORMAN RD	**Census Tract**	7091
Map / Block / Lot	38 / 69 / 6A	**Acreage**	0.08
Use Class / Description	4310 TEL REL TW	**Parcel Map**	
Assessing Neighborhood	0050A	**Utilities**	Well,Septic

Current Appraised Value Information

Building Value	XF Value	OB Value	Land Value	Special Land Value	Total Appraised Value	Net Appraised Value	Current Assessment
$ 0	$ 0	$ 126,900	$ 150,000		$ 276,900	$ 276,900	$ 193,830

Assessment History

Year	Building	OB/Misc	Land	Total Assessment
Current	0	$ 88,830	$ 105,000	$ 193,830
2016	0	$ 88,830	$ 105,000	$ 193,830
2015	0	$ 85,050	$ 105,000	$ 190,050

Land Information

Use	Class	Zoning	Area	Value
TEL REL TW	I		3600 SF	$ 150,000

Building Information

No Building Information available for this parcel.

Out Buildings / Extra Features

Description	Sub Description	Area	Year Built	Value
CELL TOWER		160 HEIGHT	1999	$ 86,400
FENCE-6' CHAIN		240 L.F.	1999	$ 2,700
CELL EQUIP SHELTER		72 S.F.	1999	$ 5,400
CELL EQUIP SHELTER		432 S.F.	1999	$ 32,400

Sale Information

Sale Date	Sale Price	Deed Book/Page	Sale Qualification	Reason	Vacant or Improved	Owner
03/27/1992		144/ 50	Unqualified	Probate Certificate		NORMAN ERNEST R & STUART R & FORSCHLER PRISCILLA M

Permit Information

Permit ID	Issue Date	Type	Description	Amount	Inspection Date	% Complete	Date Complete	Comments
224-17	04/12/2017	CM	COMMERCIAL	$ 20,000		0		SWAP 3 EXISTING CELL ANTENNAS WITH 3 NEWER TECHNOLOGY CELL ANTENNAS AND ASSOCIATED EQUPMT AT EXISTING CELL SITE
125-13	01/23/2013	AD	3ANT/6REMOTE RADIO	$ 25,000		0		
47-99	08/27/1999	CM	8X11 OB	$ 500		100	10/01/1999	8 X 11 QUINN VALLEY OB
8-99	07/12/1999	CM	24X36 OB	$ 45,000	09/01/1999	100	09/10/1999	8-99 COMP CO
242-98	04/15/1999	CM	TOWER/FENCE	$ 170,100	07/12/1999	100	07/12/1999	5-99 CO

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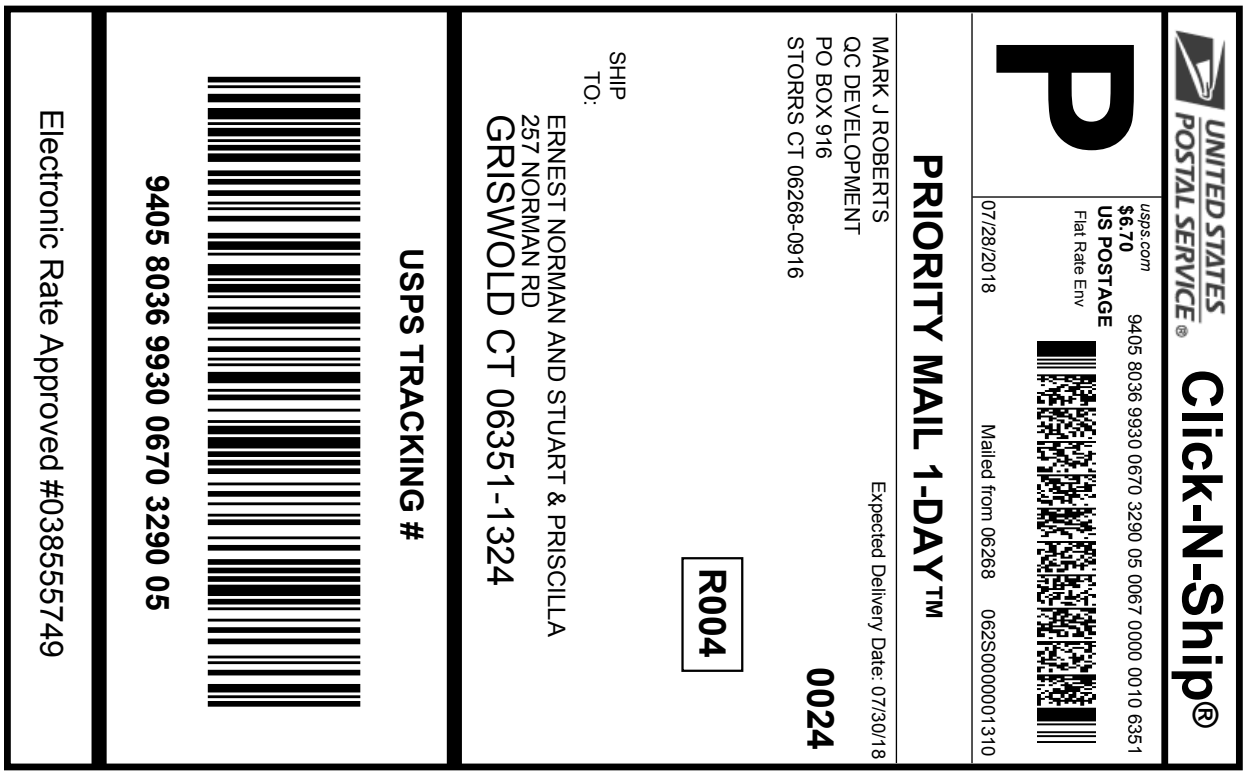
Google Maps 181A Norman Rd



Cut on dotted line.

Instructions

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

Click-N-Ship® Label Record

USPS TRACKING # / Insurance Number:
9405 8036 9930 0670 3290 05

Trans. #:	440343692
Print Date:	07/26/2018
Ship Date:	07/28/2018
Expected Delivery Date:	07/30/2018
Insured Value:	$50.00

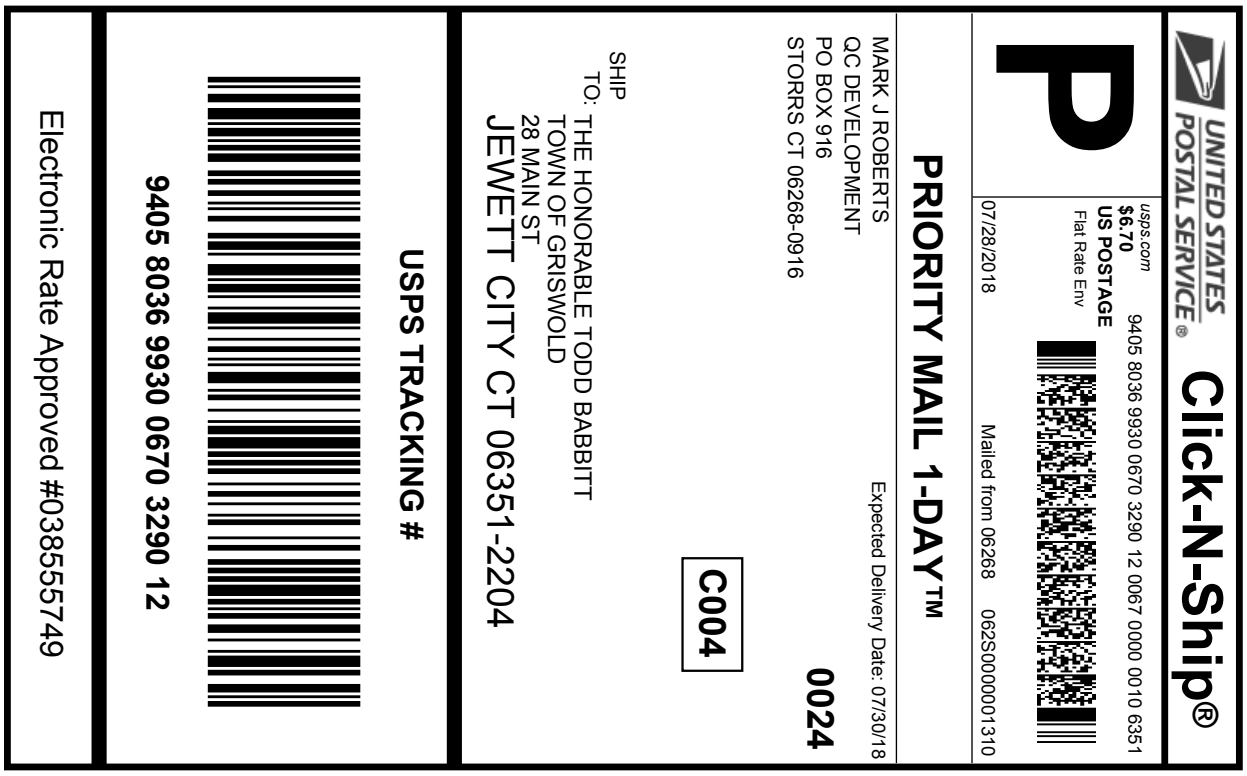
Priority Mail® Postage:	**$6.70**
Insurance Fee	**$0.00**
Total	**$6.70**

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

To: ERNEST NORMAN AND STUART & PRISCILLA FORSCHLER
257 NORMAN RD
GRISWOLD CT 06351-1324

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

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



Cut on dotted line.

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Click-N-Ship® Label Record

USPS TRACKING # / Insurance Number:
9405 8036 9930 0670 3290 12

Trans. #:	440343692
Print Date:	07/26/2018
Ship Date:	07/28/2018
Expected Delivery Date:	07/30/2018
Insured Value:	$50.00

Priority Mail® Postage:	**$6.70**
Insurance Fee	**$0.00**
Total	**$6.70**

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

To: THE HONORABLE TODD BABBITT
TOWN OF GRISWOLD
28 MAIN ST
JEWETT CITY CT 06351-2204

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

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

From:	Mark Roberts
To:	"Mike Villa"
Subject:	FW: AT&T EXEMPT MODIFICATION NOTIFICATION - 181A NORMAN ROAD, GRISWOLD (CT5457)
Date:	Friday, July 27, 2018 4:37:00 PM
Attachments:	CT5457_AT&T_EM_181A NORMAN ROAD, GRISWOLD_07.27.2018.pdf
Importance:	High

Mike – the attached copy of AT&T's CSC Exempt Mod filling is provided to you as Tower Owner per CSC regulations.

Thanks

Mark Roberts
QC Development
860-670-9068

From: Mark Roberts
Sent: Friday, July 27, 2018 4:32 PM
To: CSC-DL Siting Council <Siting.Council@ct.gov>
Cc: Mark Roberts <mark.roberts@qcdevelopment.net>
Subject: AT&T EXEMPT MODIFICATION NOTIFICATION - 181A NORMAN ROAD, GRISWOLD (CT5457)
Importance: High

Hello – Please find attached a copy of an AT&T Exempt Modification Notification at the above-referenced address, which was mailed today. The attached file includes the full Structural Analysis calculations, which were omitted from the hard-copy filing.

Thanks,

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