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

September 16, 2016

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

Notice of Exempt Modification – New Cingular Wireless PCS, LLC (AT&T)
231 Kettletown Road, Southbury, CT 06488 – AT&T SITE # CT2086
N 41-28-28
W 73-12-30

Dear Ms. Bachman:

AT&T currently maintains nine (9) antennas at the 185-foot level of the existing 195-foot Monopole at 231 Kettletown Road, Southbury, CT. The tower is owned by Phoenix Tower and the property is owned by The Town of Southbury. AT&T also intends to remove and replace three (3) existing Ericsson RRUS-11 radio heads and install three (3) Ericsson RRUS-12 radio heads, also at the 185-foot level.

This facility was approved by the Town of Southbury Zoning Commission on May 3, 2000. There were no conditions 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 Jeff Manville, First Selectman of the Town of Southbury, as well as the property and tower owner.

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

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

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

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

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

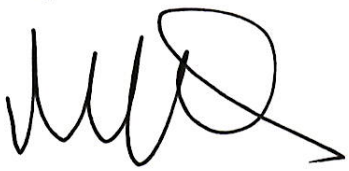
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

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

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

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

Sincerely,



Mark Roberts
QC Development
Consultant for AT&T

Attachments

cc: Mr. Jeff Manville - as elected official and property owner (via e-mail)
Phoenix Tower - as tower owner (via e-mail)

Power Density

Existing Loading on Tower

Carrier	# of Channels	ERP/Ch (W)	Antenna Centerline Height (ft)	Power Density (mW/cm^2)	Freq. Band (MHz**)	Limit S (mW /cm^2)	%MPE
Other Carriers*							2.67%
AT&T GSM	2	565	185	0.0127	880	0.5867	0.22%
AT&T GSM	2	875	185	0.0196	1900	1.0000	0.20%
AT&T UMTS	1	283	185	0.0032	880	0.5867	0.05%
AT&T UMTS	4	525	185	0.0236	1900	1.0000	0.24%
AT&T LTE	1	1615	185	0.0181	700	0.4893	0.37%
Site Total							3.75%

*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

Proposed Loading on Tower

Carrier	# of Channels	ERP/Ch (W)	Antenna Centerline Height (ft)	Power Density (mW/cm^2)	Freq. Band (MHz**)	Limit S (mW /cm^2)	%MPE
Other Carriers*							2.67%
AT&T GSM	2	565	185	0.0127	880	0.5867	0.22%
AT&T UMTS	1	232	185	0.0026	880	0.5867	0.04%
AT&T UMTS	4	453	185	0.0203	1900	1.0000	0.20%
AT&T LTE	2	1119	185	0.0251	700	0.4893	0.51%
AT&T LTE	2	3304	185	0.0742	1900	1.0000	0.74%
AT&T LTE	2	1285	185	0.0288	2300	1.0000	0.29%
Site Total							4.68%

*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

Note: Proposed Loading may also include corrections to certain Existing Loading values

PROJECT INFORMATION

SCOPE OF WORK	UNMANNED COMMUNICATIONS FACILITY MODIFICATIONS INCLUDING THE REPLACEMENT OF (3) EXISTING ERICSSON RRUS-11 UNITS FOR (3) NEW ERICSSON RRUS-12 RE-USING EXISTING TWO SURGE ARRESTORS WITH NEW 4 DC TRUNKS, 2 FIBER TRUNKS
SITE NUMBER:	CT2086
SITE NAME:	SOUTHBURY – KETTLETOWN ROAD
SITE ADDRESS:	231 KETTLETOWN ROAD SOUTHBURY, CT 06488
PROPERTY OWNER:	TOWN OF SOUTHBURY TOWN RECYCLING TRANSFER STATION 231 KETTLETOWN ROAD SOUTHBURY, CT 06488
APPLICANT:	AT&T WIRELESS 550 COCHITUATE RD SUITES 13 & 14 FRAMINGHAM, MA 01701
CONTACT:	TEL 866-915-5600
COORDINATES	LAT. N41° 28' 16.3" LONG. W73° 12' 19.9"
GROUND LEVEL:	±419'
DEED REFERENCE:	N/A
SITE PARCEL NO.:	N/A
CURRENT ZONING:	N/A
HORIZONTAL DATUM:	(NAD) 1983

AT&T SITE NUMBER: CT2086
AT&T SITE NAME: SOUTHBURY KETTLETOWN RD
AT&T PROJECT: LTE 3C BWE
PTI SITE NAME & #: KETTLETON / US-CT-1002

DRAWING INDEX

		REV
01	TITLE SHEET	1
02	NOTES	1
03	SITE PLAN & EQUIPMENT PLAN	1
04	ELEVATION VIEW & ANTENNA LAYOUT	1
05	GROUNDING DETAILS	1

DIG SAFE 1-888-DIG-SAFE

AT LEAST 72 HOURS PRIOR TO DIGGING, THE CONTRACTOR IS REQUIRED TO CALL DIG SAFE AT 1-888-DIG-SAFE

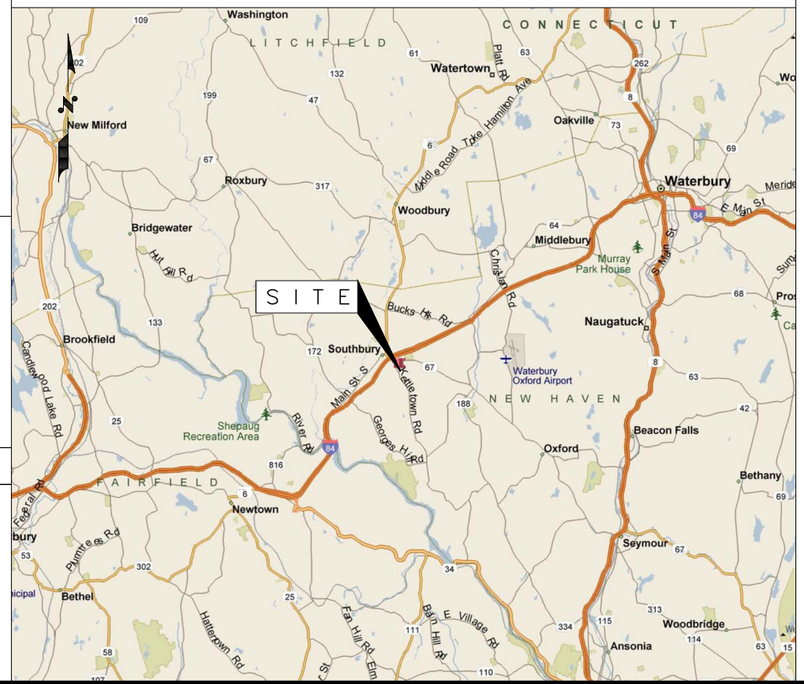
CONTACT & UTILITY INFORMATION

CONTACT	CONTACT	COMPANY	PHONE NO.
ENGINEERING:	MIGUEL NOBRE	VRG	(508) 981-9590
SITE ACQUISITION:	TIM BURKS	SAI	(603) 421-0470
CONSTRUCTION:	T.B.D.	SAI	(603) 421-0470
UTILITIES			
POWER:	WORK REQUEST GROUP	NATIONAL GRID	(800) 375-7405
TELCO:	.	VERIZON	(800) 941-9900

LOCATION MAP

DIRECTIONS: FROM FRAMINGHAM PROCEED WEST ON I-90 TO EXIT 9. PROCEED SOUTHWEST ON I-84. TAKE I-84 WEST TO EXIT 15. LEFT AT END OF RAMP. RIGHT AT 2nd LIGHT, KETTLETOWN ROAD GO UPHILL TO SOUTHBURY RECYCLING CENTER LANDFILL ON LEFT OMNI POINT LOCK 6664 FOLLOW AROUND TO TOWER SAME COMBO ON THE GATE.

SITE ACCESS: LOCKED GATE



APPLICABLE BUILDING CODES AND STANDARDS

SUBCONTRACTOR'S WORK SHALL COMPLY WITH PROJECT STANDARDS AND SPECIFICATIONS. SUBCONTRACTOR 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:
CONNECTICUT BUILDING CODE LATEST EDITION

ELECTRICAL CODE:
NATIONAL ELECTRICAL CODE LATEST EDITION
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
AMERICAN NATIONAL STANDARDS INSTITUTE/TELECOMMUNICATIONS INDUSTRY ASSOCIATION (ANSI/TIA) 222-F OR G AS APPLICABLE, STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWER AND ANTENNA SUPPORTING STRUCTURES:
TIA 607, COMMERCIAL BUILDING GROUNDING AND BONDING REQUIREMENTS FOR TELECOMMUNICATIONS

INSTITUTE FOR ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE) 81, GUIDE FOR MEASURING EARTH RESISTIVITY, GROUND IMPEDANCE, AND EARTH SURFACE POTENTIALS OF A GROUND SYSTEM
IEEE 1100 (1999) RECOMMENDED PRACTICE FOR POWERING AND GROUNDING OF ELECTRONIC EQUIPMENT

IEEE C62.41, RECOMMENDED PRACTICES ON SURGE VOLTAGES IN LOW VOLTAGE AC POWER CIRCUITS (FOR LOCATION CATEGORY "C3" AND "HIGH SYSTEM EXPOSURE")

TELCORDIA GR-1503, COAXIAL CABLE CONNECTIONS

ANSI T1.311, FOR TELECOM – DC POWER SYSTEMS – TELECOM, ENVIRONMENTAL PROTECTION

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.

VRG
VERTICAL RESOURCES GRP.
489 Washington Street
Auburn, MA 01501
Tel. (508) 981- 9590
Fax (508) 519 – 8939
mnobre@verticalresourcesgrp.com

SAI communications
27 NORTHWESTERN DRIVE
SALEM, NH 03079
Tel. (603) 421- 0470
Fax (603) 421 - 0471

SITE NUMBER: CT2086
SITE NAME: SOUTHBURY KETTLETOWN RD.
231 KETTLETOWN ROAD
SOUTHBURY, MA 06488
NEW HAVEN COUNTY

at&t Mobility
550 COCHITUATE RD
SUITES 13 & 14
FRAMINGHAM, MA 01701

NO.	DATE	REVISION	BY	CHK	APP'D
1	08/15/16	FOR CONSTRUCTION	G.A.M.		
0	07/25/16	FOR REVIEW	G.A.M.		

SCALE | DESIGNED BY: M.N. | DRAWN BY: G.A.M.

JAMES P. STROHE No. 8657 REGISTERED PROFESSIONAL ENGINEER STATE OF CONNECTICUT

AT&T MOBILITY

TITLE SHEET

JOB NUMBER	DRAWING NUMBER	REV
50-145	01	1

GENERAL NOTES

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:
CONTRACTOR – PRIME CONTRACTOR
SUBCONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
OWNER – AT&T WIRELESS
OEM – ORIGINAL EQUIPMENT MANUFACTURER

2. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING SUBCONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CONTRACTOR.

3. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. SUBCONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK.

ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.

4. DRAWINGS PROVIDED HERE ARE NOT TO SCALE UNLESS OTHERWISE NOTED AND ARE INTENDED TO SHOW OUTLINE ONLY.

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

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

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

8. SUBCONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER AND T1 CABLES, GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. ROUTING OF CONDUIT FOR POWER AND TELCO SHALL BE APPROVED BY OWNER OF SITE.

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

10. SUBCONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.

11. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.

SITE WORK GENERAL NOTES

1. THE SUBCONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES PRIOR TO THE START OF CONSTRUCTION.

2. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES, AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY CONTRACTOR. EXTREME CAUTION SHOULD BE USED BY THE SUBCONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. SUBCONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT BE LIMITED TO A) FALL PROTECTION B) CONFINED SPACE C) ELECTRICAL SAFETY D) TRENCHING & EXCAVATION.

3. ALL SITE WORK SHALL BE AS INDICATED ON THE DRAWINGS AND PROJECT SPECIFICATIONS.

4. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES, TOP SOIL AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.

5. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF CONTRACTOR, OWNER AND/OR LOCAL UTILITIES.

6. SUBCONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION.

7. THE SUBCONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE OWNER SPECIFICATION FOR SITE SIGNAGE.

8. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE TRANSMISSION EQUIPMENT AND TOWER AREAS.

9. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.

10. THE SUB GRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION, SEE DETAIL 303.

11. THE AREAS OF THE OWNERS PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY, SHALL BE GRADED TO A UNIFORM SLOPE, AND STABILIZED TO PREVENT EROSION.

12. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL JURISDICTION'S GUIDELINES FOR EROSION AND SEDIMENT CONTROL.

13. ALL EARTH WORK SHALL BE PERFORMED IN ACCORDANCE WITH TECHNICAL SPECIFICATION FOR CONSTRUCTION OF RADIO ACCESS NETWORK SITES.

STRUCTURAL STEEL NOTES:

1. ALL STEEL WORK SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A123 (HOT–DIP) UNLESS NOTED OTHERWISE. STRUCTURAL STEEL SHALL BE ASTM–A–36 UNLESS OTHERWISE NOTED ON THE SITE SPECIFIC DRAWINGS. STEEL DESIGN, INSTALLATION AND BOLTING SHALL BE PERFORMED IN ACCORDANCE WITH THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) "MANUAL OF STEEL CONSTRUCTION".

2. ALL WELDING SHALL BE PERFORMED USING E70XX ELECTRODES AND WELDING SHALL CONFORM TO AISC. WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLE J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION". PAINTED SURFACES SHALL BE TOUCHED UP.

3. BOLTED CONNECTIONS SHALL BE ASTM A325 BEARING TYPE (3/4"ø) CONNECTIONS AND SHALL HAVE MINIMUM OF TWO BOLTS UNLESS NOTED OTHERWISE. STEEL FASTENER HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 (HOT–DIP)

4. NON–STRUCTURAL CONNECTIONS FOR STEEL GRATING MAY USE 5/8" DIA. ASTM A 307 BOLTS UNLESS NOTED OTHERWISE.

5. INSTALLATION OF CONCRETE EXPANSION/WEDGE ANCHOR, SHALL BE PER MANUFACTURER'S WRITTEN RECOMMENDED PROCEDURE. THE ANCHOR BOLT, DOWEL OR ROD SHALL CONFORM TO MANUFACTURER'S RECOMMENDATION FOR EMBEDMENT DEPTH OR AS SHOWN ON THE DRAWINGS. NO REBAR SHALL BE CUT WITHOUT PRIOR CONTRACTOR APPROVAL WHEN DRILLING HOLES IN CONCRETE. SPECIAL INSPECTIONS, REQUIRED BY GOVERNING CODES, SHALL BE PERFORMED IN ORDER TO MAINTAIN MANUFACTURER'S MAXIMUM ALLOWABLE LOADS. ALL EXPANSION/WEDGE ANCHORS SHALL BE STAINLESS STEEL OR HOT DIPPED GALVANIZED. EXPANSION BOLTS SHALL BE PROVIDED BY RAMSET/REDHEAD, HILTI OR APPROVED EQUAL.

6. ALL STRUCTURAL STEEL SHALL BE SUPPLIED IN ACCORDANCE WITH TECHNICAL SPECIFICATION FOR CONSTRUCTION OF RADIO ACCESS NETWORK SITES.

CONCRETE AND REINFORCING STEEL NOTES:

1. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 301, ACI 318, ACI 336, ASTM A184, ASTM A185 AND THE DESIGN AND CONSTRUCTION SPECIFICATION FOR CAST–IN–PLACE CONCRETE.

2. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS, UNLESS NOTED OTHERWISE. A HIGHER STRENGTH (4000 PSI) MAY BE USED.

3. REINFORCING STEEL SHALL CONFORM TO ASTM A 615, GRADE 60, DEFORMED UNLESS NOTED OTHERWISE. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A 185 WELDED STEEL WIRE FABRIC UNLESS NOTED OTHERWISE. SPLICES SHALL BE CLASS "B" AND ALL HOOKS SHALL BE STANDARD, UNO.

4. THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCING STEEL UNLESS SHOWN OTHERWISE ON DRAWINGS:

CONCRETE CAST AGAINST EARTH.....3 IN.
CONCRETE EXPOSED TO EARTH OR WEATHER:

#6 AND LARGER .....2 INCH
#5 AND SMALLER & WWF.....1 1/2 INCH

CONCRETE NOT EXPOSED TO EARTH OR WEATHER OR NOT CAST AGAINST THE GROUND:

SLAB AND WALL .....3/4 INCH
BEAMS AND COLUMNS.....1 1/2 INCH

5. A 3/4" CHAMFER SHALL BE PROVIDED AT ALL EXPOSED EDGES OF CONCRETE, UNO, IN ACCORDANCE WITH ACI 301 SECTION 4.2.4.

6. INSTALLATION OF CONCRETE EXPANSION/WEDGE ANCHOR, SHALL BE PER MANUFACTURER'S WRITTEN RECOMMENDED PROCEDURE. THE ANCHOR BOLT, DOWEL OR ROD SHALL CONFORM TO MANUFACTURER'S RECOMMENDATION FOR EMBEDMENT DEPTH OR AS SHOWN ON THE DRAWINGS. NO REBAR SHALL BE CUT WITHOUT PRIOR CONTRACTOR APPROVAL WHEN DRILLING HOLES IN CONCRETE. SPECIAL INSPECTIONS, REQUIRED BY GOVERNING CODES, SHALL BE PERFORMED IN ORDER TO MAINTAIN MANUFACTURER'S MAXIMUM ALLOWABLE LOADS. ALL EXPANSION/WEDGE ANCHORS SHALL BE STAINLESS STEEL OR HOT DIPPED GALVANIZED. EXPANSION BOLTS SHALL BE PROVIDED BY RAMSET/REDHEAD HILTI OR APPROVED EQUAL.

7. CONCRETE CYLINDER TEST IS NOT REQUIRED FOR SLAB ON GRADE WHEN CONCRETE IS LESS THAN 50 CUBIC YARDS (IBC 1905.6.2.3) IN THAT EVENT THE FOLLOWING RECORDS SHALL BE PROVIDED BY THE CONCRETE SUPPLIER;
(A) RESULTS OF CONCRETE CYLINDER TESTS PERFORMED AT THE SUPPLIER'S PLANT,

(B) CERTIFICATION OF MINIMUM COMPRESSIVE STRENGTH FOR THE CONCRETE GRADE SUPPLIED.

FOR GREATER THAN 50 CUBIC YARDS THE GC SHALL PERFORM THE CONCRETE CYLINDER TEST.

8. AS AN ALTERNATIVE TO ITEM 7, TEST CYLINDERS SHALL BE TAKEN INITIALLY AND THEREAFTER FOR EVERY 50 YARDS OF CONCRETE FROM EACH DIFFERENT BATCH PLANT.

9. EQUIPMENT SHALL NOT BE PLACED ON NEW PADS FOR SEVEN DAYS AFTER PAD IS POURED, UNLESS IT IS VERIFIED BY TESTS THAT COMPRESSIVE STRENGTH HAS BEEN ATTAINED.

10. ALL CONCRETE SHALL BE SUPPLIED IN ACCORDANCE WITH TECHNICAL SPECIFICATION FOR CONSTRUCTION OF RADIO ACCESS NETWORK SITES.

SOIL COMPACTION NOTES FOR SLAB ON GRADE:

1. EXCAVATE AS REQUIRED TO REMOVE VEGETATION AND TOPSOIL, EXPOSE UNDISTURBED NATURAL SUBGRADE AND PLACE CRUSHED STONE AS REQUIRED.

2. COMPACTION CERTIFICATION: AN INSPECTION AND WRITTEN CERTIFICATION BY A QUALIFIED GEOTECHNICAL TECHNICIAN OR ENGINEER IS ACCEPTABLE.

3. AS AN ALTERNATIVE TO INSPECTION AND WRITTEN CERTIFICATION, THE "UNDISTURBED SOIL" BASE SHALL BE COMPACTED WITH "COMPACTION EQUIPMENT", LISTED BELOW, TO AT LEAST 90% MODIFIED PROCTOR MAXIMUM DENSITY PER ASTM D 1557 METHOD C.

4. COMPACTED SUBBASE SHALL BE UNIFORM AND LEVELED. PROVIDE 6" MINIMUM CRUSHED STONE OR GRAVEL COMPACTED IN 3" LIFTS ABOVE COMPACTED SOIL. GRAVEL SHALL BE NATURAL OR CRUSHED WITH 100% PASSING 1" SIEVE.

5. AS AN ALTERNATIVE TO ITEMS 2 AND 3 PROOF ROLL THE SUBGRADE SOILS WITH 5 PASSES OF A MEDIUM SIZED VIBRATORY PLATE COMPACTOR (SUCH AS BOMAG BPR 30/38) OR HAND–OPERATED SINGLE DRUM VIBRATORY ROLLER (SUCH AS BOMAG BW 55E). ANY SOFT AREAS THAT ARE ENCOUNTERED SHOULD BE REMOVED AND REPLACED WITH A WELL–GRADED GRANULAR FILL, AND COMPACTED AS STATED ABOVE.

6. COMPACTION CRITERIA FOR OTHER FILL AREAS ON SITE SHALL MEET THE SAME REQUIREMENTS AS NOTED ABOVE.

7. SOIL COMPACTION SHALL BE PERFORMED IN ACCORDANCE WITH TECHNICAL SPECIFICATION FOR CONSTRUCTION OF RADIO ACCESS NETWORK SITES.

COMPACTION EQUIPMENT:

HAND OPERATED DOUBLE DRUM, VIBRATORY ROLLER, VIBRATORY PLATE COMPACTOR OR JUMPING JACK COMPACTOR.

ELECTRICAL INSTALLATION NOTES

1. ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE LOCAL CODES.

2. CONDUIT ROUTINGS ARE SCHEMATIC. SUBCONTRACTOR SHALL INSTALL CONDUITS SO THAT ACCESS TO EQUIPMENT IS NOT BLOCKED.

3. WIRING, RACEWAY AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC AND TELCORDIA.

4. ALL CIRCUITS SHALL BE SEGREGATED AND MAINTAIN MINIMUM CABLE SEPARATION AS REQUIRED BY THE NEC AND TELCORDIA.

5. CABLES SHALL NOT BE ROUTED THROUGH LADDER–STYLE CABLE TRAY RUNGS.

6. EACH END OF EVERY POWER, POWER PHASE CONDUCTOR (I.E., HOTS), GROUNDING, AND T1 CONDUCTOR AND CABLE SHALL BE LABELED WITH COLOR–CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2 INCH PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). THE IDENTIFICATION METHOD SHALL CONFORM WITH NEC & OSHA.

7. ALL ELECTRICAL COMPONENTS SHALL BE CLEARLY LABELED WITH PERMANENT LABELS. ALL EQUIPMENT SHALL BE LABELED WITH THEIR VOLTAGE RATING, PHASE CONFIGURATION, WIRE CONFIGURATION, POWER OR AMPACITY RATING, AND BRANCH CIRCUIT ID NUMBERS (I.E., PANELBOARD AND CIRCUIT ID'S). NO HAND WRITTEN LABELS ALLOWED.

8. PANELBOARDS (ID NUMBERS) AND INTERNAL CIRCUIT BREAKERS (CIRCUIT ID NUMBERS) SHALL BE CLEARLY LABELED. NO HAND WRITTEN LABELS ALLOWED.

9. ALL TIE WRAPS SHALL BE CUT FLUSH WITH APPROVED CUTTING TOOL TO REMOVE SHARP EDGES.

10. POWER, CONTROL, AND EQUIPMENT GROUND WIRING IN TUBING OR CONDUIT SHALL BE SINGLE CONDUCTOR (SIZE 14 AWG OR LARGER), 600V, OIL RESISTANT THHN OR THWN–2, CLASS B STRANDED COPPER CABLE RATED FOR 90 °C (WET AND DRY) OPERATION; LISTED OR LABELED FOR THE LOCATION AND RACEWAY SYSTEM USED, UNLESS OTHERWISE SPECIFIED.

11. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED INDOORS SHALL BE SINGLE CONDUCTOR (SIZE 6 AWG OR LARGER), 600V, OIL RESISTANT THHN OR THWN–2 GREEN INSULATION, CLASS B STRANDED COPPER CABLE RATED FOR 90 °C (WET AND DRY) OPERATION; LISTED OR LABELED FOR THE LOCATION AND RACEWAY SYSTEM USED, UNLESS OTHERWISE SPECIFIED.

12. POWER AND CONTROL WIRING, NOT IN TUBING OR CONDUIT, SHALL BE MULTI–CONDUCTOR, TYPE TC CABLE (SIZE 14 AWG OR LARGER), 600V, OIL RESISTANT THHN OR THWN–2, CLASS B STRANDED COPPER CABLE RATED FOR 90 °C (WET AND DRY) OPERATION; WITH OUTER JACKET; LISTED OR LABELED FOR THE LOCATION USED, UNLESS OTHERWISE SPECIFIED.

13. ALL POWER AND POWER GROUNDING CONNECTIONS SHALL BE CRIMP–STYLE, COMPRESSION WIRE LUGS AND WIRENUTS BY THOMAS AND BETTS (OR EQUAL). LUGS AND WIRENUTS SHALL BE RATED FOR OPERATION AT NO LESS THAN 75°C (90°C IF AVAILABLE).

14. RACEWAY AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE, AND NEC.

ELECTRICAL INSTALLATION NOTES (cont.)

15. ELECTRICAL METALLIC TUBING (EMT) OR RIGID NONMETALLIC CONDUIT (I.E., RIGID PVC SCHEDULE 40, OR RIGID PVC SCHEDULE 80 FOR LOCATIONS SUBJECT TO PHYSICAL DAMAGE) SHALL BE USED FOR EXPOSED INDOOR LOCATIONS.

16. ELECTRICAL METALLIC TUBING (EMT), ELECTRICAL NONMETALLIC TUBING (ENT), OR RIGID NONMETALLIC CONDUIT (RIGID PVC, SCHEDULE 40) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.

17. GALVANIZED STEEL INTERMEDIATE METALLIC CONDUIT (IMC) SHALL BE USED FOR OUTDOOR LOCATIONS ABOVE GRADE.

18. RIGID NONMETALLIC CONDUIT (I.E., RIGID PVC SCHEDULE 40 OR RIGID PVC SCHEDULE 80) SHALL BE USED UNDERGROUND; DIRECT BURIED, IN AREAS OF OCCASIONAL LIGHT VEHICLE TRAFFIC OR ENCASED IN REINFORCED CONCRETE IN AREAS OF HEAVY VEHICLE TRAFFIC.

19. LIQUID–TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID–TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.

20. CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION–TYPE AND APPROVED FOR THE LOCATION USED. SETSCREW FITTINGS ARE NOT ACCEPTABLE.

21. CABINETS, BOXES, AND WIREWAYS SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE, AND NEC.

22. WIREWAYS SHALL BE EPOXY–COATED (GRAY) AND INCLUDE A HINGED COVER, DESIGNED TO SWING OPEN DOWNWARD; SHALL BE PANDUIT TYPE E (OR EQUAL); AND RATED NEMA 1 (OR BETTER) INDOORS, OR NEMA 3R (OR BETTER) OUTDOORS.

23. EQUIPMENT CABINETS, TERMINAL BOXES, JUNCTION BOXES, AND PULL BOXES SHALL BE GALVANIZED OR EPOXY–COATED SHEET STEEL, SHALL MEET OR EXCEED UL 50, AND RATED NEMA 1 (OR BETTER) INDOORS, OR NEMA 3R (OR BETTER) OUTDOORS

24. METAL RECEPTACLE, SWITCH, AND DEVICE BOXES SHALL BE GALVANIZED, EPOXY–COATED, OR NON–CORRODING; SHALL MEET OR EXCEED UL 514A AND NEMA OS 1; AND RATED NEMA 1 (OR BETTER) INDOORS, OR WEATHER PROTECTED (WP OR BETTER) OUTDOORS.

25. NONMETALLIC RECEPTACLE, SWITCH, AND DEVICE BOXES SHALL MEET OR EXCEED NEMA OS 2; AND RATED NEMA 1 (OR BETTER) INDOORS, OR WEATHER PROTECTED (WP OR BETTER) OUTDOORS.

26. THE SUBCONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM THE CONTRACTOR BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.

27. THE SUBCONTRACTOR SHALL PROVIDE NECESSARY TAGGING ON THE BREAKERS, CABLES AND DISTRIBUTION PANELS IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS TO SAFEGUARD AGAINST LIFE AND PROPERTY.

VRG
VERTICAL RESOURCES GRP.
489 Washington Street
Auburn, MA 01501
Tel. (508) 981– 9590
Fax (508) 519 – 8939
mnobre@verticalresourcesgrp.com

SAI communications
27 NORTHWESTERN DRIVE
SALEM, NH 03079
Tel. (603) 421- 0470
Fax (603) 421 - 0471

SITE NUMBER: CT2086
SITE NAME: SOUTHBURY KETTLETOWN RD.
231 KETTLETOWN ROAD
SOUTHBURY, MA 06488
NEW HAVEN COUNTY

at&t Mobility
550 COCHITUATE RD
SUITES 13 & 14
FRAMINGHAM, MA 01701

NO.	DATE	REVISION	BY	CHK	APP'D
1	08/15/16	FOR CONSTRUCTION	G.A.M.		
0	07/25/16	FOR REVIEW	G.A.M.		

SCALE | DESIGNED BY: M.N. | DRAWN BY: G.A.M.

JAMES P. STROHE No. 8657 REGISTERED PROFESSIONAL ENGINEER

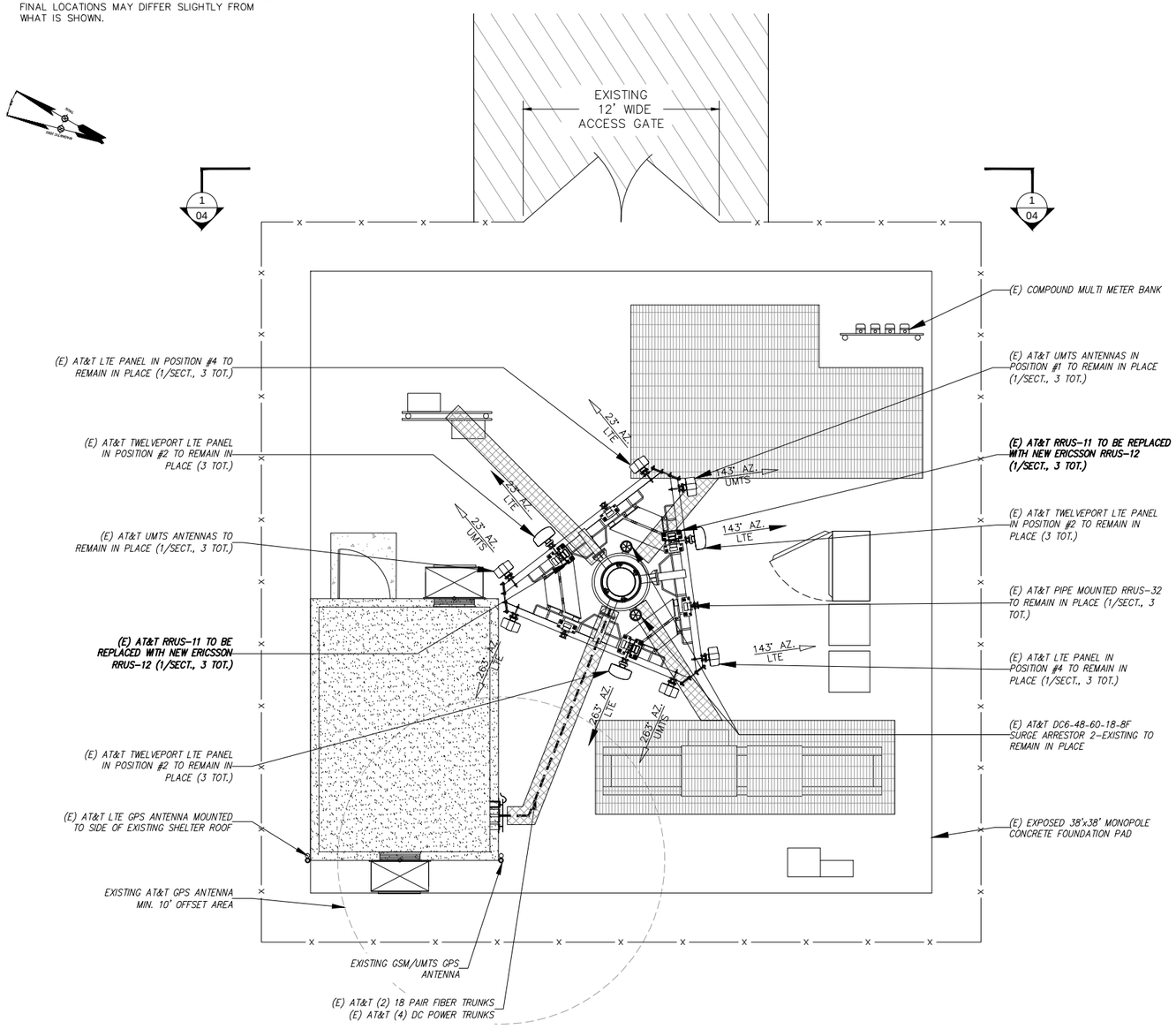
AT&T MOBILITY

NOTES

JOB NUMBER	DRAWING NUMBER	REV.
50–145	02	1

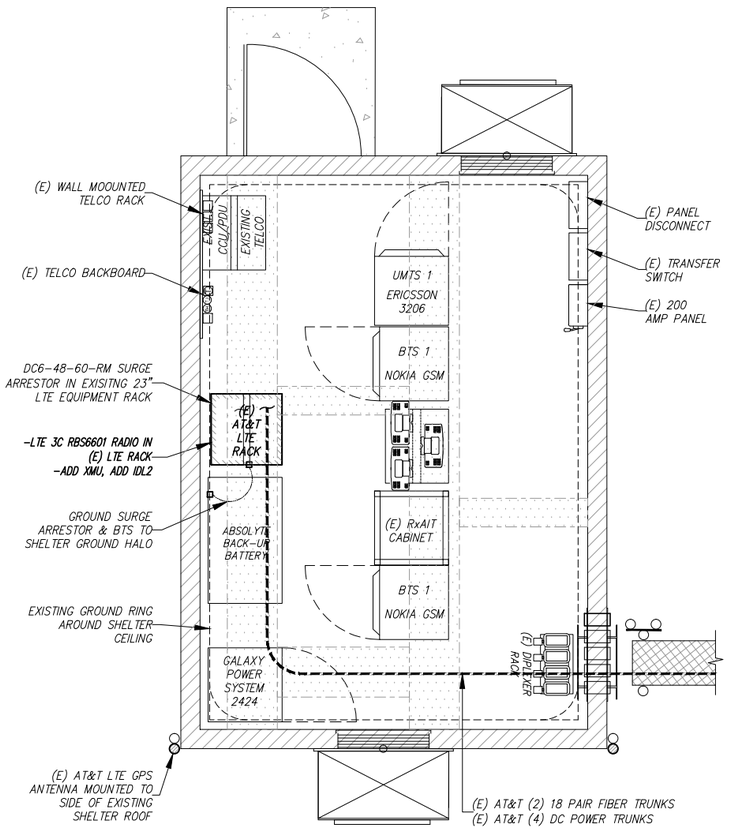
GENERAL NOTES

1. THE TYPE, DIMENSIONS, MOUNTING HARDWARE, AND THE POSITIONS OF ALL EQUIPMENT IN THE COMPOUND ARE SHOWN IN ILLUSTRATIVE FASHION. THESE DRAWINGS ARE NOT INTENDED FOR CONSTRUCTION. ACTUAL HARDWARE DETAILS AND FINAL LOCATIONS MAY DIFFER SLIGHTLY FROM WHAT IS SHOWN.
2. THE CELLULAR INSTALLATION IS AN UNMANNED PRIVATE AND SECURED COMPOUND. 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. CONSTRUCTION, MAINTENANCE & OPERATION OF PROPOSED TOWER FACILITY WILL BE HELD IN ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE & FEDERAL REGULATIONS AND GUIDELINES.



COUMPOUND PLAN 1/03
SCALE: 1" = 4'

GRAPHIC SCALE
4 0 2 4 8 16
(IN FEET)
1 inch = 4 ft.



EQUIPMENT PLAN 2/03
SCALE: 1" = 2'

VRG
VERTICAL RESOURCES GRP.
489 Washington Street
Auburn, MA 01501
Tel. (508) 981- 9590
Fax (508) 519 - 8939
mnobre@verticalresourcesgrp.com

SAI communications
27 NORTHWESTERN DRIVE
SALEM, NH 03079
Tel. (603) 421- 0470
Fax (603) 421 - 0471

SITE NUMBER: CT2086
SITE NAME: SOUTHBURY KETTLETOWN RD.
231 KETTLETOWN ROAD
SOUTHBURY, MA 06488
NEW HAVEN COUNTY

at&t Mobility
550 COCHITUATE RD
SUITES 13 & 14
FRAMINGHAM, MA 01701

NO.	DATE	REVISION	BY	CHK	APP'D
1	08/15/16	FOR CONSTRUCTION	G.A.M.		
0	07/25/16	FOR REVIEW	G.A.M.		

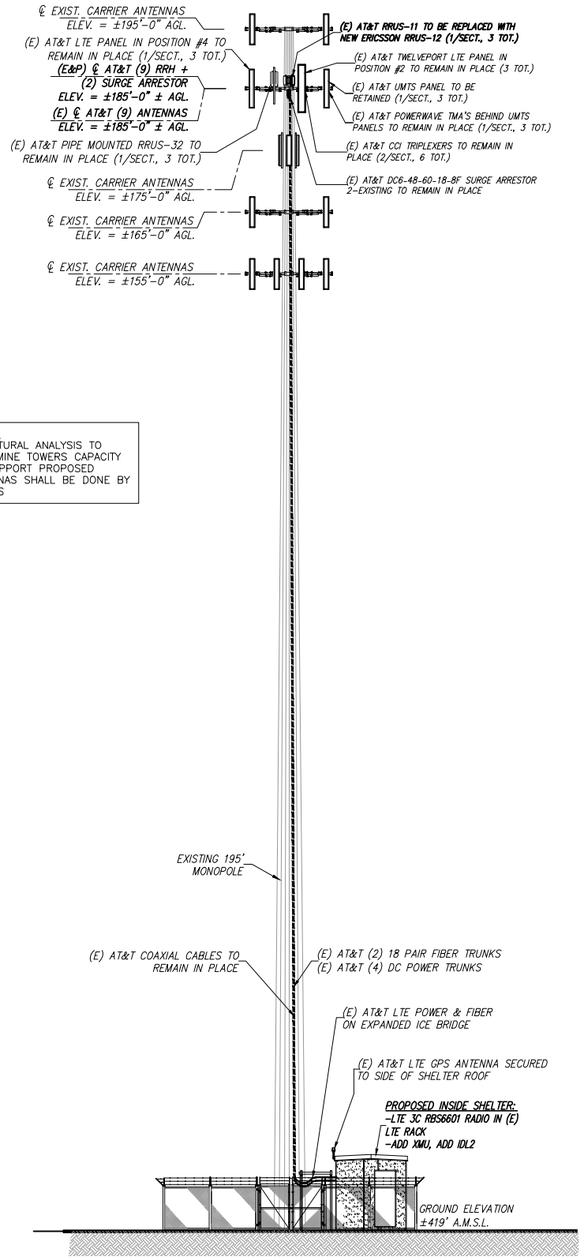
SCALE | DESIGNED BY: M.N. | DRAWN BY: G.A.M.

JAMES P. STEVENS No. 8657 REGISTERED PROFESSIONAL ENGINEER

AT&T MOBILITY

SITE PLAN & EQUIPMENT PLAN

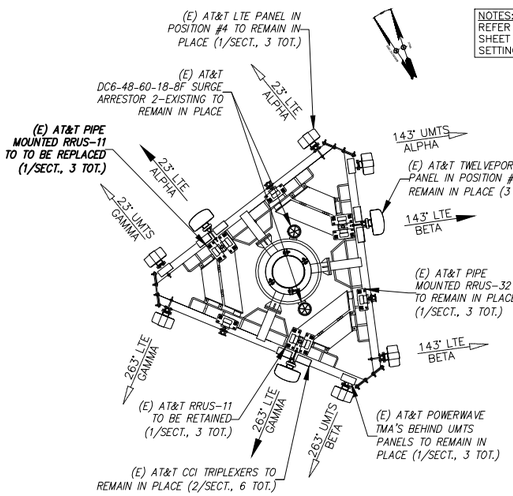
JOB NUMBER	DRAWING NUMBER	REV.
50-145	03	1



NOTES:
STRUCTURAL ANALYSIS TO DETERMINE TOWERS CAPACITY TO SUPPORT PROPOSED ANTENNAS SHALL BE DONE BY OTHERS

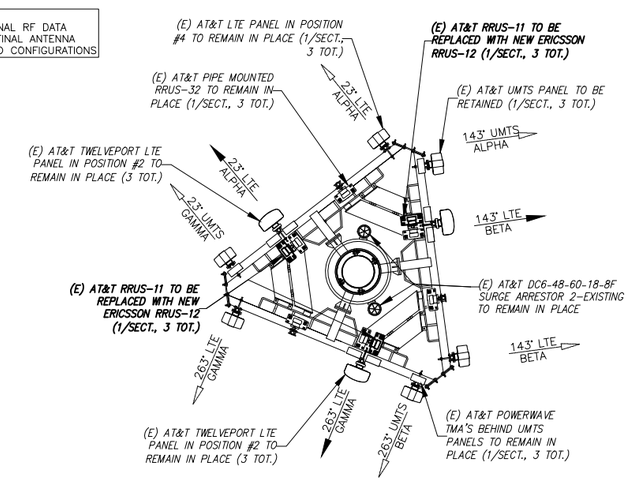
ELEVATION VIEW
SCALE: 1" = 12'
1 / 04

GRAPHIC SCALE
12 0 6 12 24 48
(IN FEET)
1 inch = 12 ft.



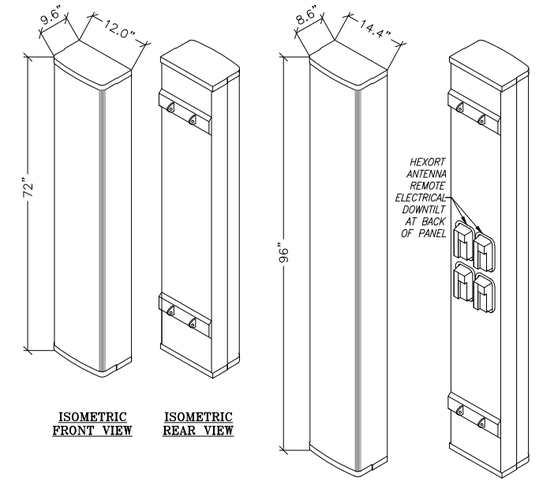
EXISTING

NOTES:
REFER TO FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS AND CONFIGURATIONS

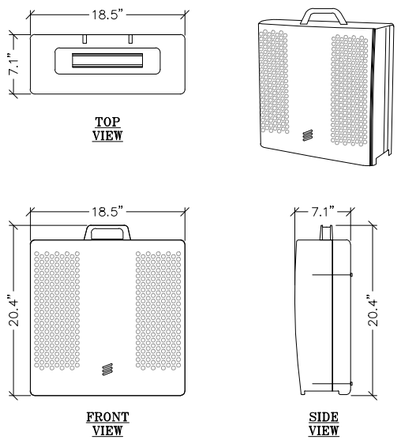


PROPOSED

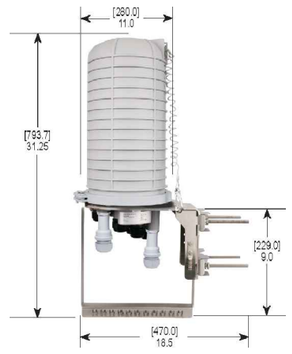
ANTENNA MOUNTING PLAN VIEW
SCALE: N.T.S.
2 / 04



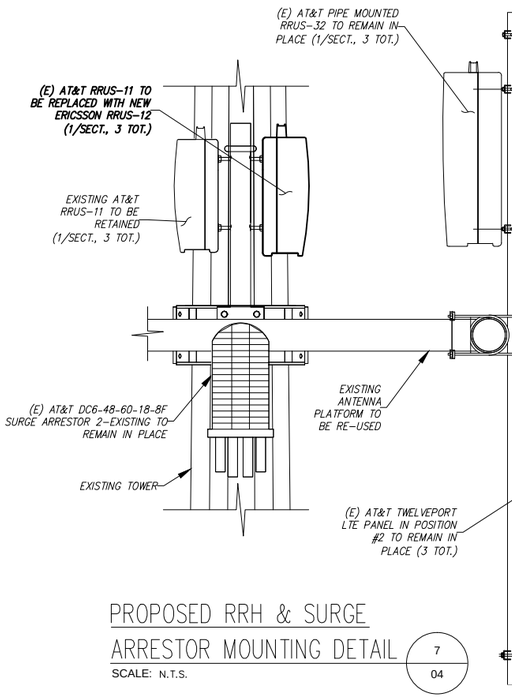
(E) TWELVEPORT ANTENNA & RET DETAIL
SCALE: N.T.S.
3 / 04



PROPOSED ERICSSON DUAL PA RRH
SCALE: N.T.S.
6 / 04



RAYCAP SURGE SUPPRESSOR DC64860188F
SCALE: N.T.S.
4 / 04



PROPOSED RRH & SURGE ARRESTOR MOUNTING DETAIL
SCALE: N.T.S.
7 / 04

VRG
VERTICAL RESOURCES GRP.
489 Washington Street
Auburn, MA 01501
Tel. (508) 981- 9590
Fax (508) 519 - 8939
mnobre@verticalresourcesgrp.com

SAI communications
27 NORTHWESTERN DRIVE
SALEM, NH 03079
Tel. (603) 421- 0470
Fax (603) 421 - 0471

SITE NUMBER: CT2086
SITE NAME: SOUTHBURY KETTLETOWN RD.
231 KETTLETOWN ROAD
SOUTHBURY, MA 06488
NEW HAVEN COUNTY

at&t Mobility
550 COCHITUATE RD
SUITES 13 & 14
FRAMINGHAM, MA 01701

NO.	DATE	REVISION	BY	CHK	APP'D
1	08/15/16	FOR CONSTRUCTION	G.A.M.		
0	07/25/16	FOR REVIEW	G.A.M.		

SCALE | DESIGNED BY: M.N. | DRAWN BY: G.A.M.

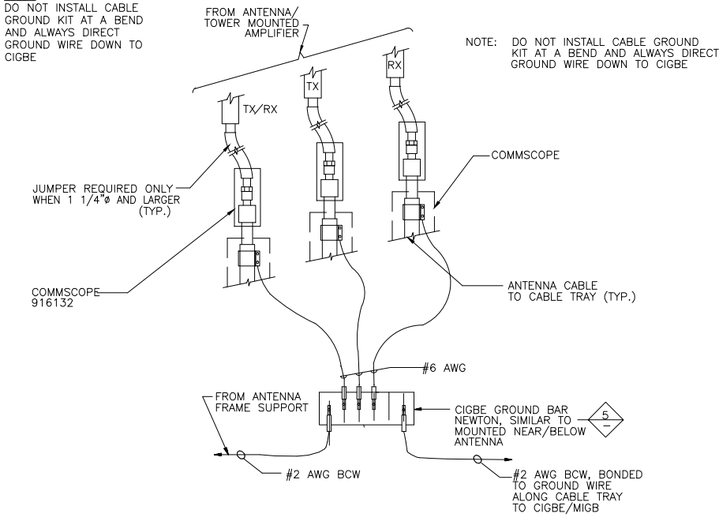
JAMES P. STROPHE No. 8657 REGISTERED PROFESSIONAL ENGINEER STATE OF CONNECTICUT

AT&T MOBILITY

ELEVATION VIEW & ANTENNA LAYOUT

JOB NUMBER	DRAWING NUMBER	REV.
50-145	04	1

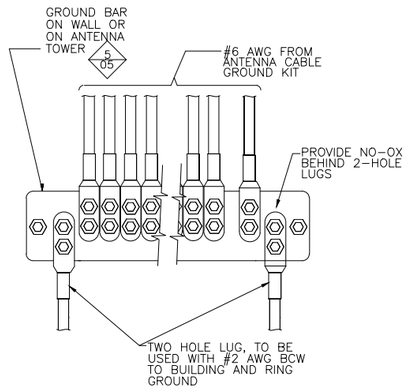
NOTE:
DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO CIGBE



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

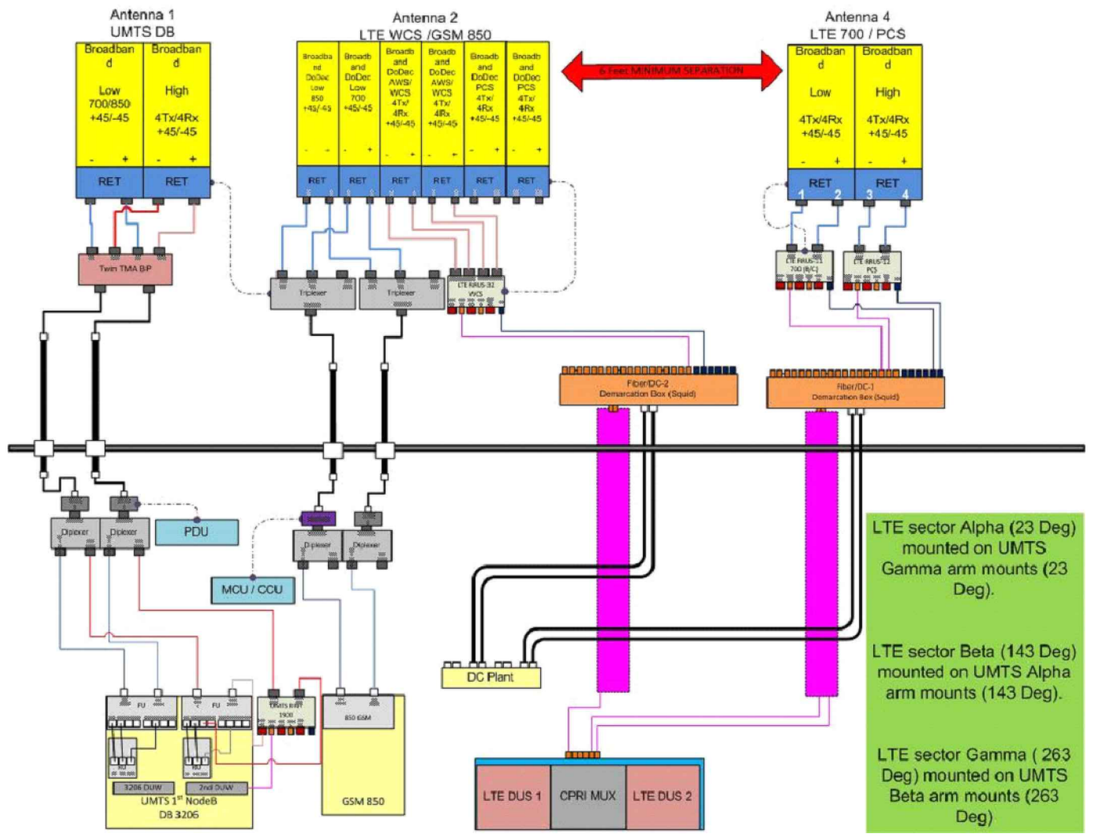
CONNECTION OF GROUND WIRES TO GROUNDING BAR (CIGBE) 1/05

SCALE: N.T.S.



INSTALLATION OF GROUND WIRE TO GROUND BAR 2/05

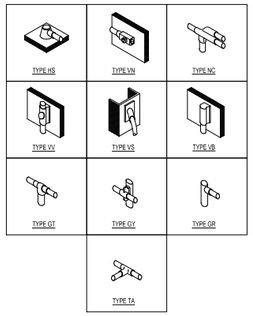
SCALE: N.T.S.



NOTE:
1. CONTRACTOR TO CONFIRM ALL PARTS
2. INSTALL ALL EQUIPMENT PER MANUFACTURERS RECOMMENDATIONS

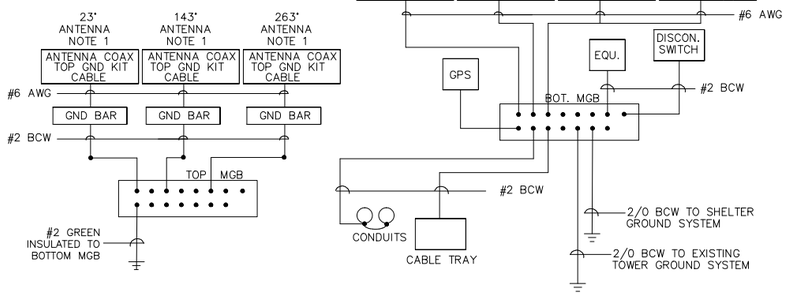
PLUMBING DIAGRAM FACE 3/05

SCALE: N.T.S.



GROUNDING CONNECTION DETAIL 5/05

SCALE: N.T.S.

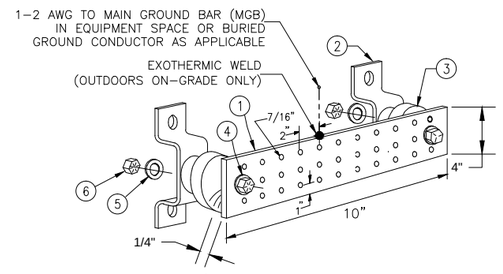


NOTE:
1. BOND ANTENNA GROUNDING KIT CABLE TO TOP CIGBE
2. BOND ANTENNA GROUNDING KIT CABLE TO BOTTOM CIGBE

SCHEMATIC GROUNDING DIAGRAM 4/05

SCALE: N.T.S.

NEWTON INSTRUMENT COMPANY, INC. BUTNER, N.C. OR APPROVED EQUAL			
ITEM	REQ.	PART NO.	DESCRIPTION
1	1	1/4"x4"x12"	PRE DRILLED GND. BAR
2	2	A-6056	WALL MTG. BRKT.
3	2	3061-4	INSULATORS
4	2	3012-13	5/8"-11x4" H.H.C.S.
5	4	3015-8	5/8 LOCKWASHER
6	2	3014-8	5/8"-11 HEX NUT



GROUND BAR DETAIL 6/05

SCALE: N.T.S.

VRG
VERTICAL RESOURCES GRP.
489 Washington Street
Auburn, MA 01501
Tel. (508) 981- 9590
Fax (508) 519 - 8939
mnobre@verticalresourcesgrp.com

SAI communications
27 NORTHWESTERN DRIVE
SALEM, NH 03079
Tel. (603) 421- 0470
Fax (603) 421 - 0471

SITE NUMBER: CT2086
SITE NAME: SOUTHBURY KETTLETOWN RD.

231 KETTLETOWN ROAD
SOUTHBURY, MA 06488
NEW HAVEN COUNTY

at&t Mobility
550 COCHITUATE RD
SUITES 13 & 14
FRAMINGHAM, MA 01701

NO.	DATE	REVISION	BY	CHK	APP'D
1	08/15/16	FOR CONSTRUCTION	G.A.M.		
0	07/25/16	FOR REVIEW	G.A.M.		

SCALE | DESIGNED BY: M.N. | DRAWN BY: G.A.M.

STATE OF CONNECTICUT JAMES P. STROHE No. 8657 REGISTERED PROFESSIONAL ENGINEER

AT&T MOBILITY

GROUNDING DETAILS

JOB NUMBER	DRAWING NUMBER	REV
50-145	05	1

Phoenix Tower International
1001 Yamato Road, Suite 311
Boca Raton, FL. 33431
(561) 843-8416

GPD Engineering and Architecture
Professional Corporation
Christopher Scheks
520 South Main Street, Suite 2531
Akron, OH 44311
(614) 588-8973
cscheks@gpdgroup.com

GPD# 2016791.1002.01
September 16, 2016

RIGOROUS STRUCTURAL ANALYSIS REPORT

SITE DESIGNATION:	**PTI Site #:**	**US-CT-1002**
	PTI Site Name:	**Kettleto**
	AT&T Site #:	**CT2086**
ANALYSIS CRITERIA:	**Codes:**	**TIA-222-G, 2012 IBC & 2016 CSBC** **119-mph Ultimate (3-second gust) with 0" ice** **92-mph Nominal (3-second gust) with 0" ice** **50-mph Nominal (3-second gust) with 3/4" ice**
SITE DATA:		**231 Kettleton Road, Southbury, CT 6488, New Haven County** **Latitude 41° 28' 16.270" N, Longitude 73° 12' 19.998" W** **196' Modified PiROD Monopole**

Mr. David Rodriguez,

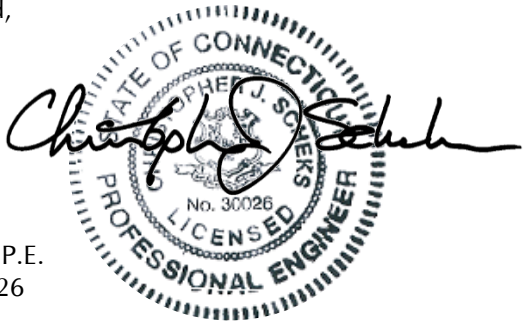
GPD is pleased to submit this Rigorous Structural Analysis Report to determine the structural integrity of the aforementioned tower. The purpose of the analysis is to determine the suitability of the tower with the existing and proposed loading configuration detailed in the analysis report.

Analysis Results

Tower Stress Level with Proposed Equipment:	87.2%	Pass
Foundation Ratio with Proposed Equipment:	63.7%	Pass

We at GPD appreciate the opportunity of providing our continuing professional services to you and Phoenix Tower International. If you have any questions or need further assistance on this or any other projects please do not hesitate to call.

Respectfully submitted,



Christopher J. Scheks, P.E.
Connecticut #: 0030026

SUMMARY & RESULTS

The purpose of this analysis was to verify whether the existing structure is capable of carrying the proposed loading configuration as specified by AT&T to Phoenix Tower International. This report was commissioned by Mr. David Rodriguez of Phoenix Tower International.

This analysis has been performed in accordance with the 2012 IBC based upon an ultimate 3-second gust wind speed of 119 mph converted to a nominal 3-second gust wind speed of 92 mph per section 1609.3.1 as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. Exposure Category B and Risk Category II were used in this analysis.

Modifications designed by GPD (Project #: 2010293.91, dated 9/14/10) have been considered in this analysis.

Modifications designed by GPD (Project #: 2013792.15, dated 7/29/13) have been considered in this analysis.

TOWER SUMMARY AND RESULTS

Member	Capacity	Results
Monopole	87.2%	Pass
Flanges	70.0%	Pass
Baseplate	63.6%	Pass
Anchor Rods	55.3%	Pass
Foundation	63.7%	Pass

ANALYSIS METHOD

tnxTower (Version 7.0.5.1), a commercially available software program, was used to create a three-dimensional model of the tower and calculate primary member stresses for various dead, live, wind, and ice load cases. Selected output from the analysis is included in Appendices B & F. The following table details the information provided to complete this structural analysis. This analysis is solely based on this information and is being completed without the benefit of a detailed site visit.

DOCUMENTS PROVIDED

Document	Remarks	Source
Collocation Application	AT&T CT2086 Collocation Application, dated 9/8/2016	PTI
Tower Design	PiROD, File #: A-115080, dated 3/26/1999	GPD
Foundation Design	PiROD, File #: A-115080, dated 3/26/1999	GPD
Geotechnical Report	Dr. Clarence Welti, dated 10/7/1998	GPD
Previous Structural Analysis	GPD Project #: 2014790.88, dated 8/12/2014	GPD
Modification Drawings	GPD Project #: 2010293.91, dated 9/14/2010	GPD
Modification Drawings	GPD Project #: 2013792.15 Rev. 1, dated 10/1/2013	GPD

ASSUMPTIONS

This rigorous structural analysis is based on the theoretical capacity of the members and is not a condition assessment of the tower. This analysis is from information supplied, and therefore, its results are based on and are as accurate as that supplied data. GPD has made no independent determination, nor is it required to, of its accuracy. The following assumptions were made for this structural analysis.

1. The tower member sizes and shapes are considered accurate as supplied. The material grade is as per data supplied and/or as assumed and as stated in the materials section.
2. The antenna configuration is as supplied and/or as modeled in the analysis. It is assumed to be complete and accurate. All antennas, mounts, coax and waveguides are assumed to be properly installed and supported as per manufacturer requirements.
3. Some assumptions are made regarding antennas and mount sizes and their projected areas based on best interpretation of data supplied and of best knowledge of antenna type and industry practice.
4. All mounts, if applicable, are considered adequate to support the loading. No actual analysis of the mount(s) is performed. This analysis is limited to analyzing the tower only.
5. The soil parameters are as per data supplied or as assumed and stated in the calculations.
6. Foundations are properly designed and constructed to resist the original design loads indicated in the documents provided.
7. The tower and structures have been properly maintained in accordance with TIA Standards and/or with manufacturer's specifications.
8. All welds and connections are assumed to develop at least the member capacity unless determined otherwise and explicitly stated in this report.
9. All prior structural modifications are assumed to be as per data supplied/available and to have been properly installed.
10. Loading interpreted from photos is accurate to $\pm 5'$ AGL, antenna size accurate to ± 3.3 sf, and coax equal to the number of existing antennas without reserve.
11. All existing loading was obtained from the provided collocation application, the previous structural analysis by GPD (Project #: 2014790.88, dated 8/12/2014) and site photos and is assumed to be accurate.

If any of these assumptions are not valid or have been made in error, this analysis may be affected, and GPD should be allowed to review any new information to determine its effect on the structural integrity of the tower.

DISCLAIMER OF WARRANTIES

GPD has not performed a site visit to the tower to verify the member sizes or antenna/coax loading. If the existing conditions are not as represented on the tower elevation contained in this report, we should be contacted immediately to evaluate the significance of the discrepancy. This is not a condition assessment of the tower or foundation. This report does not replace a full tower inspection. The tower and foundations are assumed to have been properly fabricated, erected, maintained, in good condition, twist free, and plumb.

The engineering services rendered by GPD in connection with this Rigorous Structural Analysis are limited to a computer analysis of the tower structure and theoretical capacity of its main structural members. No allowance was made for any damaged, bent, missing, loose, or rusted members (above and below ground). No allowance was made for loose bolts or cracked welds.

This analysis is limited to the designated maximum wind and seismic conditions per the governing tower standards and code. Wind forces resulting in tower vibrations near the structure's resonant frequencies were not considered in this analysis and are outside the scope of this analysis. Lateral loading from any dynamic response was not evaluated under a time-domain based fatigue analysis.

GPD does not analyze the fabrication of the structure (including welding). It is not possible to have all the very detailed information needed to perform a thorough analysis of every structural sub-component and connection of an existing tower. GPD provides a limited scope of service in that we cannot verify the adequacy of every weld, plate connection detail, etc. The purpose of this report is to assess the capability of adding appurtenances usually accompanied by transmission lines to the structure.

It is the owner's responsibility to determine the amount of ice accumulation in excess of the code specified amount, if any, that should be considered in the structural analysis.

The attached sketches are a schematic representation of the analyzed tower. If any material is fabricated from these sketches, the contractor shall be responsible for field verifying the existing conditions, proper fit, and clearance in the field. Any mentions of structural modifications are reasonable estimates and should not be used as a precise construction document. Precise modification drawings are obtainable from GPD, but are beyond the scope of this report.

Miscellaneous items such as antenna mounts, etc., have not been designed or detailed as a part of our work. We recommend that material of adequate size and strength be purchased from a reputable tower manufacturer.

Towers are designed to carry gravity, wind, and ice loads. All members, legs, diagonals, struts, and redundant members provide structural stability to the tower with little redundancy. Absence or removal of a member can trigger catastrophic failure unless a substitute is provided before any removal. Legs carry axial loads and derive their strength from shorter unbraced lengths by the presence of redundant members and their connection to the diagonals with bolts or welds. If the bolts or welds are removed without providing any substitute to the frame, the leg is subjected to a higher unbraced length that immediately reduces its load carrying capacity. If a diagonal is also removed in addition to the connection, the unbraced length of the leg is greatly increased, jeopardizing its load carrying capacity. Failure of one leg can result in a tower collapse because there is no redundancy. Redundant members and diagonals are critical to the stability of the tower.

GPD makes no warranties, expressed and/or implied, in connection with this report and disclaims any liability arising from material, fabrication, and erection of this tower. GPD will not be responsible whatsoever for, or on account of, consequential or incidental damages sustained by any person, firm, or organization as a result of any data or conclusions contained in this report. The maximum liability of GPD pursuant to this report will be limited to the total fee received for preparation of this report.

APPENDIX A

Tower Analysis Summary Form

Tower Analysis Summary Form

General Info

Site Name	Kettleto
Site Number	US-CT-1002
Proposed Carrier	AT&T
Date of Analysis	September 16, 2016
Company Performing Analysis	GPD

The information contained in this summary report is not to be used independently from the PE stamped tower analysis.

Tower Info	Description	Date
Tower Type (G, SST, MP)	MP	
Tower Height (top of steel AGL)	196'	
Tower Manufacturer	PiROD	
Tower Model	n/a	
Tower Design	PiROD, File #: A-115080	3/26/1999
Foundation Design	PiROD, File #: A-115080	3/26/1999
Geotech Report	Dr. Clarence Welti	10/7/1998
Previous Structural Analysis	GPD Project #: 2014790.88	8/12/2014
Modification Drawings	GPD Project #: 2010293.91	9/14/2010
Modification Drawings	GPD Project #: 2013792.15 Rev. 1	10/1/2013

Design Parameters

Design Code Used	TIA-222-G 2012 IBC & 2016 CTBC
Location of Tower (County, State)	New Haven, CT
Nominal Wind Speed (mph)	92 Nominal (3-sec gust)
Ice Thickness (in)	0.75
Risk Category (I, II, III)	II
Exposure Category (B, C, D)	C
Topographic Category (1 to 5)	1

Analysis Results (% Maximum Usage)

Existing + Proposed Condition	
Tower (%)	87.2%
Tower Base (%)	63.6%
Foundation (%)	63.7%
Foundation Adequate?	Yes

Steel Yield Strength (ksi)

Pole	42
Flange Plates	36
Flange Bolts	A325
Base Plate	36
Anchor Rods	A354-BD

Modifications designed by GPD (Project #: 2010293.91, dated 9/14/10) have been considered in this analysis.
Modifications designed by GPD (Project #: 2013792.15, dated 7/29/13) have been considered in this analysis.

Existing Loading

Antenna								Mount			Transmission Line			
Antenna Owner	Mount Height (ft)	Antenna CL (ft)	Quantity	Type	Manufacturer	Model	Azimuth	Quantity	Manufacturer	Type	Quantity	Model	Size	Attachment Int./Ext.
T-Mobile	195	195	3	Panel	Andrew	RR90-17-02DP	110/230/350	1	Unknown	LP Platform	12	Unknown	1-5/8"	Internal
T-Mobile	195	195	3	Panel	Commscope	LNX-6515DS-VTM	110/230/350			on the same mount	1	Hybrid Cables	1-5/8"	Internal
T-Mobile	195	195	3	Panel	Ericsson	AIR 33	110/230/350			on the same mount				
T-Mobile	195	195	3	TMA	Ericsson	KRY 112 71				on the same mount				
T-Mobile	195	195	1	Surge	Raycap	DC4-48-60-8-20F				on the same mount				
AT&T Mobility	185	185	3	Panel	Powerwave	7770	23/143/263	1	Unknown	LP Platform	12	Unknown	1-1/4"	Internal
AT&T Mobility	185	185	2	Panel	KMW	AM-X-CD-16-65-00T RET	23/143			on the same mount	4	DC Power	3/4"	Internal
AT&T Mobility	185	185	2	Panel	Quintel	QS66512-3	23/143			on the same mount	2	Fiber Cable	1.496"	Internal
AT&T Mobility	185	185	1	Panel	Powerwave	P65-17-XLH-RR	263			on the same mount				
AT&T Mobility	185	185	1	Panel	CCI	TPA-65R-LCUUUU-H8	263			on the same mount				
AT&T Mobility	185	185	3	TMA	Powerwave	TT19-08B9111-001				on the same mount				
AT&T Mobility	185	185	6	Diplexer	CCI	TPX070821				on the same mount				
AT&T Mobility	185	185	6	RRU	Ericsson	RRUS 11				Flush mounted				
AT&T Mobility	185	185	3	RRU	Ericsson	RRUS 32								
AT&T Mobility	185	185	2	Surge	Raycap	DC6-48-60-18-8F				on the same mount				
Pocket	175	175	3	Panel	RFS	APXV18-206517S-C	110/230/350			Flush mounted	6	Unknown	1-5/8"	External
Sprint	165	165	9	Panel	Decibel	DB980E (90E-M)	50/170/290	1	Unknown	LP Platform	12	Unknown	1-5/8"	Internal
Verizon Wireless	155	155	6	Panel	Commscope	HBXX 6516DS	60/180/300	1	Unknown	LP Platform	12	Unknown	1-5/8"	External
Verizon Wireless	155	155	2	Panel	Swedcom	SLCP2X6014	300			on the existing mount				
Verizon Wireless	155	155	4	Panel	Amphenol	BXA 70063/4CF	60/180			on the existing mount				
Verizon Wireless	155	155	6	Diplexers	Amphenol	DPX 021				on the existing mount				
Verizon Wireless	155	155	6	Diplexers	RFS	FD9R6004/2C-3L				on the existing mount				
T-Mobile	91	91	1	Dish	Unknown	2' MW Dish	240			Collar mount	1	Unknown	1-5/8"	Internal
T-Mobile	75	75	1	Panel	Pctel	TMG-HR-26N GPS	240			Pipe mounted	1	Unknown	7/8"	External

Note: (3) RRUS 11s at 185' shall be removed prior to the installation of the proposed loading. All remaining equipment shall be reused.

Proposed Loading

Antenna								Mount			Transmission Line			
Antenna Owner	Mount Height (ft)	Antenna CL (ft)	Quantity	Type	Manufacturer	Model	Azimuth	Quantity	Manufacturer	Type	Quantity	Model	Size	Attachment Int./Ext.
AT&T Mobility	185	185	3	RRU	Ericsson	RRUS 12				on the existing mount				

Note: The proposed loading shall be installed in addition to the remaining existing loading at the same elevation.

Future/Reserved Loading

Antenna						Mount			Transmission Line			
Antenna Owner	Mount Height (ft)	Antenna CL (ft)	Quantity	Type	Azimuth	Quantity	Manufacturer	Type	Quantity	Model	Size	Attachment Int./Ext.
T-Mobile	195	195	1	10,308.1 in² Remaining Reserved Loading				on the existing mount				

APPENDIX B

tnxTower Output

Tower Input Data

There is a pole section.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Tower is located in New Haven County, Connecticut.
Basic wind speed of 92 mph.
Structure Class II.
Exposure Category B.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 0.7500 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	*Sector*	*Component Type*	*Placement*	*Total Number*	*Number Per Row*	*Start/End Position*	*Width or Diameter*	*Perimeter*	*Weight*
			ft				*in*	*in*	*plf*
PiROD Climbing Rungs	C	Surface Ar (CaAa)	196.00 - 8.00	1	1	0.000 0.000	0.6250		3.80
LDF7-50A (1-5/8 FOAM)	A	Surface Ar (CaAa)	175.00 - 8.00	1	1	0.000 0.000	1.9800		0.82
LDF7-50A (1-5/8 FOAM)	A	Surface Ar (CaAa)	175.00 - 8.00	5	5	0.000 0.000	0.0000		0.82
LDF7-50A (1-5/8 FOAM)	B	Surface Ar (CaAa)	155.00 - 8.00	2	2	0.000 0.000	1.9800		0.82
LDF7-50A (1-5/8 FOAM)	B	Surface Ar (CaAa)	155.00 - 8.00	10	10	0.000 0.000	1.9800		0.82
LDF5-50A (7/8 FOAM)	C	Surface Ar (CaAa)	75.00 - 8.00	1	1	0.000 0.000	1.0900		0.33
4" x 1-1/4" Mod Plate	A	Surface Af (CaAa)	22.00 - 18.00	2	2	0.000 0.000	1.2500	10.5000	17.01
4" x 1-1/4" Mod Plate	B	Surface Af (CaAa)	22.00 - 18.00	2	2	0.000 0.000	1.2500	10.5000	17.01
4" x 1-1/4" Mod Plate	C	Surface Af (CaAa)	22.00 - 18.00	2	2	0.000 0.000	1.2500	10.5000	17.01
4" x 1-1/4" Mod Plate	A	Surface Af (CaAa)	42.00 - 38.00	2	2	0.000 0.000	1.2500	10.5000	17.01
4" x 1-1/4" Mod Plate	B	Surface Af (CaAa)	42.00 - 38.00	2	2	0.000 0.000	1.2500	10.5000	17.01
4" x 1-1/4" Mod Plate	C	Surface Af (CaAa)	42.00 - 38.00	2	2	0.000 0.000	1.2500	10.5000	17.01
6" x 1-1/2" Mod Plate	A	Surface Af (CaAa)	24.00 - 16.00	2	2	0.000 0.000	0.0000	0.0000	30.63
6" x 1-1/2" Mod Plate	B	Surface Af (CaAa)	24.00 - 16.00	2	1	0.000 0.000	0.0000	0.0000	30.63

Description	Sector	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
6" x 1-1/2" Mod Plate	C	Surface Af (CaAa)	24.00 - 16.00	2	1	0.000 0.000	0.0000	0.0000	30.63
6" x 1-1/2" Mod Plate	A	Surface Af (CaAa)	44.00 - 36.00	2	1	0.000 0.000	0.0000	0.0000	30.63
6" x 1-1/2" Mod Plate	B	Surface Af (CaAa)	44.00 - 36.00	2	1	0.000 0.000	0.0000	0.0000	30.63
6" x 1-1/2" Mod Plate	C	Surface Af (CaAa)	44.00 - 36.00	2	1	0.000 0.000	0.0000	0.0000	30.63
6" x 1-1/2" Mod Plate	A	Surface Af (CaAa)	64.00 - 56.00	2	1	0.000 0.000	0.0000	0.0000	30.63
6" x 1-1/2" Mod Plate	B	Surface Af (CaAa)	64.00 - 56.00	2	1	0.000 0.000	0.0000	0.0000	30.63
6" x 1-1/2" Mod Plate	C	Surface Af (CaAa)	64.00 - 56.00	2	1	0.000 0.000	0.0000	0.0000	30.63

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
Safety Line 3/8	C	No	CaAa (Out Of Face)	196.00 - 8.00	1	No Ice 1/2" Ice 1" Ice	0.04 0.14 0.24	0.22 0.75 1.28
LDF7-50A (1-5/8 FOAM)	C	No	Inside Pole	195.00 - 8.00	12	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.82 0.82 0.82
1-5/8" Hybrid Cable	C	No	Inside Pole	195.00 - 8.00	1	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.82 0.82 0.82
LDF6-50A (1-1/4 FOAM)	A	No	Inside Pole	185.00 - 8.00	12	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.66 0.66 0.66
1.496" Fiber Cable	A	No	Inside Pole	185.00 - 8.00	2	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.75 0.75 0.75
3/4" DC Power Line	A	No	Inside Pole	185.00 - 8.00	4	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.33 0.33 0.33
LDF7-50A (1-5/8 FOAM)	A	No	Inside Pole	165.00 - 8.00	12	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.82 0.82 0.82
LDF7-50A (1-5/8 FOAM)	C	No	Inside Pole	91.00 - 8.00	1	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.00	0.82 0.82 0.82

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
Pirod 16.5' LP Platform	C	None		0.0000	195.00	No Ice 1/2" Ice 1" Ice	20.80 28.10 35.40	20.80 28.10 35.40	1800.00 2066.00 2332.00

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
AIR 33 w/ Mount Pipe	A	From Centroid-Leg	4.00 0.00 0.00	-10.0000	195.00	No Ice 1/2" Ice 1" Ice	6.63 7.35 8.01	6.31 7.48 8.50	137.70 200.64 270.70
AIR 33 w/ Mount Pipe	B	From Centroid-Leg	4.00 0.00 0.00	-10.0000	195.00	No Ice 1/2" Ice 1" Ice	6.63 7.35 8.01	6.31 7.48 8.50	137.70 200.64 270.70
AIR 33 w/ Mount Pipe	C	From Centroid-Leg	4.00 0.00 0.00	-10.0000	195.00	No Ice 1/2" Ice 1" Ice	6.63 7.35 8.01	6.31 7.48 8.50	137.70 200.64 270.70
RR90-17-02DP w/ Mount Pipe	A	From Centroid-Leg	4.00 0.00 0.00	-10.0000	195.00	No Ice 1/2" Ice 1" Ice	4.59 5.09 5.58	3.34 4.11 4.81	0.03 0.07 0.12
RR90-17-02DP w/ Mount Pipe	B	From Centroid-Leg	4.00 0.00 0.00	-10.0000	195.00	No Ice 1/2" Ice 1" Ice	4.59 5.09 5.58	3.34 4.11 4.81	0.03 0.07 0.12
RR90-17-02DP w/ Mount Pipe	C	From Centroid-Leg	4.00 0.00 0.00	-10.0000	195.00	No Ice 1/2" Ice 1" Ice	4.59 5.09 5.58	3.34 4.11 4.81	0.03 0.07 0.12
LNX-6515DS-VTM w/ mount pipe	A	From Centroid-Leg	4.00 0.00 0.00	-10.0000	195.00	No Ice 1/2" Ice 1" Ice	11.43 12.05 12.67	9.35 10.67 11.70	75.82 160.12 253.96
LNX-6515DS-VTM w/ mount pipe	B	From Centroid-Leg	4.00 0.00 0.00	-10.0000	195.00	No Ice 1/2" Ice 1" Ice	11.43 12.05 12.67	9.35 10.67 11.70	75.82 160.12 253.96
LNX-6515DS-VTM w/ mount pipe	C	From Centroid-Leg	4.00 0.00 0.00	-10.0000	195.00	No Ice 1/2" Ice 1" Ice	11.43 12.05 12.67	9.35 10.67 11.70	75.82 160.12 253.96
KRY 112 71	A	From Centroid-Leg	4.00 0.00 0.00	-10.0000	195.00	No Ice 1/2" Ice 1" Ice	0.58 0.69 0.80	0.40 0.49 0.59	13.20 18.38 25.16
KRY 112 71	B	From Centroid-Leg	4.00 0.00 0.00	-10.0000	195.00	No Ice 1/2" Ice 1" Ice	0.58 0.69 0.80	0.40 0.49 0.59	13.20 18.38 25.16
KRY 112 71	C	From Centroid-Leg	4.00 0.00 0.00	-10.0000	195.00	No Ice 1/2" Ice 1" Ice	0.58 0.69 0.80	0.40 0.49 0.59	13.20 18.38 25.16
DC4-48-60-8-20F	A	From Centroid-Leg	4.00 0.00 0.00	-10.0000	195.00	No Ice 1/2" Ice 1" Ice	1.43 1.58 1.74	0.59 0.70 0.81	9.00 20.06 33.36
PiROD 13' Low Profile Platform (Monopole)	C	None		0.0000	185.00	No Ice 1/2" Ice 1" Ice	15.70 20.10 24.50	15.70 20.10 24.50	1300.00 1765.00 2230.00
7770.00 w/Mount Pipe	A	From Centroid-Leg	4.00 0.00 0.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice	5.51 5.87 6.23	4.10 4.73 5.37	61.54 108.55 162.39
7770.00 w/Mount Pipe	B	From Centroid-Leg	4.00 0.00 0.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice	5.51 5.87 6.23	4.10 4.73 5.37	61.54 108.55 162.39
7770.00 w/Mount Pipe	C	From Centroid-Leg	4.00 0.00 0.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice	5.51 5.87 6.23	4.10 4.73 5.37	61.54 108.55 162.39
AM-X-CD-16-65-00T-RET w/ 2" x 54" mount pipe	A	From Centroid-Leg	4.00 0.00 0.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice	8.02 8.48 8.94	5.67 6.39 7.12	64.93 123.40 189.26
AM-X-CD-16-65-00T-RET w/ 2" x 54" mount pipe	B	From Centroid-Leg	4.00 0.00 0.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice	8.02 8.48 8.94	5.67 6.39 7.12	64.93 123.40 189.26

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
QS66512-3 w/ Mount Pipe	A	From Centroid-Leg	4.00 0.00 0.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice	8.13 8.59 9.05	8.17 9.13 9.96	126.90 199.71 280.45
QS66512-3 w/ Mount Pipe	B	From Centroid-Leg	4.00 0.00 0.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice	8.13 8.59 9.05	8.17 9.13 9.96	126.90 199.71 280.45
P65-17-XLH-RR w/ Mount Pipe	C	From Centroid-Leg	4.00 0.00 0.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice	11.47 12.08 12.71	8.70 10.11 11.38	88.20 171.36 264.18
TPA-65R-LCUUUU-H8 w/ Mount Pipe	C	From Centroid-Leg	4.00 0.00 0.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice	13.54 14.24 14.95	10.96 12.49 14.04	114.45 217.61 330.97
TT19-08BP111-001	A	From Centroid-Leg	4.00 0.00 0.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice	0.55 0.65 0.75	0.45 0.53 0.63	16.00 21.80 29.22
TT19-08BP111-001	B	From Centroid-Leg	4.00 0.00 0.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice	0.55 0.65 0.75	0.45 0.53 0.63	16.00 21.80 29.22
TT19-08BP111-001	C	From Centroid-Leg	4.00 0.00 0.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice	0.55 0.65 0.75	0.45 0.53 0.63	16.00 21.80 29.22
(2) TPX-070821	A	From Centroid-Leg	4.00 0.00 0.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice	0.47 0.56 0.66	0.10 0.15 0.20	7.50 10.95 15.73
(2) TPX-070821	B	From Centroid-Leg	4.00 0.00 0.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice	0.47 0.56 0.66	0.10 0.15 0.20	7.50 10.95 15.73
(2) TPX-070821	C	From Centroid-Leg	4.00 0.00 0.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice	0.47 0.56 0.66	0.10 0.15 0.20	7.50 10.95 15.73
RRUS 11	A	From Centroid-Leg	4.00 0.00 0.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice	2.78 2.99 3.21	1.19 1.33 1.49	50.70 71.50 95.33
RRUS 11	B	From Centroid-Leg	4.00 0.00 0.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice	2.78 2.99 3.21	1.19 1.33 1.49	50.70 71.50 95.33
RRUS 11	C	From Centroid-Leg	4.00 0.00 0.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice	2.78 2.99 3.21	1.19 1.33 1.49	50.70 71.50 95.33
RRUS 12	A	From Centroid-Leg	4.00 0.00 0.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice	3.15 3.36 3.59	1.29 1.44 1.60	58.00 81.22 107.64
RRUS 12	B	From Centroid-Leg	4.00 0.00 0.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice	3.15 3.36 3.59	1.29 1.44 1.60	58.00 81.22 107.64
RRUS 12	C	From Centroid-Leg	4.00 0.00 0.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice	3.15 3.36 3.59	1.29 1.44 1.60	58.00 81.22 107.64
RRUS 32	A	From Centroid-Leg	4.00 0.00 0.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice	3.31 3.56 3.81	2.42 2.64 2.86	77.00 104.93 136.47
RRUS 32	B	From Centroid-Leg	4.00 0.00 0.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice	3.31 3.56 3.81	2.42 2.64 2.86	77.00 104.93 136.47
RRUS 32	C	From Centroid-Leg	4.00 0.00 0.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice	3.31 3.56 3.81	2.42 2.64 2.86	77.00 104.93 136.47

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
DC6-48-60-18-8F Surge Suppression Unit	B	From Centroid-Leg	4.00 0.00 0.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice	0.92 1.46 1.64	0.92 1.46 1.64	18.90 36.62 56.82
DC6-48-60-18-8F Surge Suppression Unit	C	From Centroid-Leg	4.00 0.00 0.00	23.0000	185.00	No Ice 1/2" Ice 1" Ice	0.92 1.46 1.64	0.92 1.46 1.64	18.90 36.62 56.82
Valmont Light Duty Tri-Bracket (1)	C	None		0.0000	175.00	No Ice 1/2" Ice 1" Ice	1.76 2.08 2.40	1.76 2.08 2.40	54.00 70.00 86.00
APXV18-206517S-C w/ Mount Pipe	A	From Leg	0.50 0.00 0.00	-10.0000	175.00	No Ice 1/2" Ice 1" Ice	5.17 5.62 6.08	4.46 5.39 6.20	48.30 90.79 140.46
APXV18-206517S-C w/ Mount Pipe	B	From Leg	0.50 0.00 0.00	-10.0000	175.00	No Ice 1/2" Ice 1" Ice	5.17 5.62 6.08	4.46 5.39 6.20	48.30 90.79 140.46
APXV18-206517S-C w/ Mount Pipe	C	From Leg	0.50 0.00 0.00	-10.0000	175.00	No Ice 1/2" Ice 1" Ice	5.17 5.62 6.08	4.46 5.39 6.20	48.30 90.79 140.46
MTS 12.5' LP Platform	C	None		0.0000	165.00	No Ice 1/2" Ice 1" Ice	14.66 18.87 23.08	14.66 18.87 23.08	1250.00 1481.33 1712.66
(3) DB980E (90E-M) w/ Mount Pipe	A	From Centroid-Face	4.00 0.00 0.00	-10.0000	165.00	No Ice 1/2" Ice 1" Ice	4.04 4.50 4.95	3.62 4.48 5.22	0.03 0.07 0.11
(3) DB980E (90E-M) w/ Mount Pipe	B	From Centroid-Face	4.00 0.00 0.00	-10.0000	165.00	No Ice 1/2" Ice 1" Ice	4.04 4.50 4.95	3.62 4.48 5.22	0.03 0.07 0.11
(3) DB980E (90E-M) w/ Mount Pipe	C	From Centroid-Face	4.00 0.00 0.00	-10.0000	165.00	No Ice 1/2" Ice 1" Ice	4.04 4.50 4.95	3.62 4.48 5.22	0.03 0.07 0.11
PiROD 15' Low Profile Platform (Monopole)	C	None		0.0000	155.00	No Ice 1/2" Ice 1" Ice	17.30 22.10 26.90	17.30 22.10 26.90	1500.00 2030.00 2560.00
(2) HBXX-6516DS w/Mount Pipe	A	From Centroid-Face	4.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice 1" Ice	6.24 6.74 7.24	4.59 5.31 6.02	0.05 0.10 0.16
(2) HBXX-6516DS w/Mount Pipe	B	From Centroid-Face	4.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice 1" Ice	6.24 6.74 7.24	4.59 5.31 6.02	0.05 0.10 0.16
(2) HBXX-6516DS w/Mount Pipe	C	From Centroid-Face	4.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice 1" Ice	6.24 6.74 7.24	4.59 5.31 6.02	0.05 0.10 0.16
(2) BXA-70063-4CF-EDIN-6 w/ Mount Pipe	B	From Centroid-Face	4.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice 1" Ice	4.95 5.32 5.71	3.69 4.29 4.91	27.97 70.30 118.42
(2) BXA-70063-4CF-EDIN-6 w/ Mount Pipe	C	From Centroid-Face	4.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice 1" Ice	4.95 5.32 5.71	3.69 4.29 4.91	27.97 70.30 118.42
(2) SLCP2x6014 w/ Mount Pipe	A	From Centroid-Face	4.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice 1" Ice	6.48 6.84 7.21	6.27 6.89 7.52	36.12 98.37 167.23
(2) FD9R6004/2C-3L	B	From Centroid-Face	4.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice 1" Ice	0.31 0.39 0.47	0.08 0.12 0.17	3.10 5.40 8.79
(2) FD9R6004/2C-3L	B	From Centroid-Face	4.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice 1" Ice	0.31 0.39 0.47	0.08 0.12 0.17	3.10 5.40 8.79

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
(2) FD9R6004/2C-3L	C	From Centroid-Face	4.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice 1" Ice	0.31 0.39 0.47	0.08 0.12 0.17	3.10 5.40 8.79
(2) DPX 021 Diplexer	A	From Centroid-Face	4.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice 1" Ice	0.41 0.50 0.59	0.17 0.24 0.31	0.01 0.01 0.02
(2) DPX 021 Diplexer	B	From Centroid-Face	4.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice 1" Ice	0.41 0.50 0.59	0.17 0.24 0.31	0.01 0.01 0.02
(2) DPX 021 Diplexer	C	From Centroid-Face	4.00 0.00 0.00	0.0000	155.00	No Ice 1/2" Ice 1" Ice	0.41 0.50 0.59	0.17 0.24 0.31	0.01 0.01 0.02
Pipe Mount 3'x4.5"	C	From Leg	0.50 0.00 0.00	0.0000	91.00	No Ice 1/2" Ice 1" Ice	0.90 1.12 1.33	0.90 1.12 1.33	32.40 42.33 54.71
GPS-TMG-HR-26N	C	From Leg	0.50 0.00 0.00	0.0000	75.00	No Ice 1/2" Ice 1" Ice	0.13 0.18 0.24	0.13 0.18 0.24	0.60 2.37 5.07
Pipe Mount 3'x4.5"	C	From Leg	0.50 0.00 0.00	0.0000	75.00	No Ice 1/2" Ice 1" Ice	0.91 1.12 1.33	0.91 1.12 1.33	32.40 42.33 54.71
Bridge Stiffener (3.25 sq ft)	A	From Leg	0.50 0.00 0.00	0.0000	120.00	No Ice 1/2" Ice 1" Ice	3.25 3.60 3.94	0.74 1.25 1.73	0.13 0.15 0.17
Bridge Stiffener (3.25 sq ft)	B	From Leg	0.50 0.00 0.00	0.0000	120.00	No Ice 1/2" Ice 1" Ice	3.25 3.60 3.94	0.74 1.25 1.73	0.13 0.15 0.17
Bridge Stiffener (3.25 sq ft)	C	From Leg	0.50 0.00 0.00	0.0000	120.00	No Ice 1/2" Ice 1" Ice	3.25 3.60 3.94	0.74 1.25 1.73	0.13 0.15 0.17
Bridge Stiffener (3.25 sq ft)	A	From Leg	0.50 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice	3.25 3.60 3.94	0.74 1.25 1.73	0.13 0.15 0.17
Bridge Stiffener (3.25 sq ft)	B	From Leg	0.50 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice	3.25 3.60 3.94	0.74 1.25 1.73	0.13 0.15 0.17
Bridge Stiffener (3.25 sq ft)	C	From Leg	0.50 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice	3.25 3.60 3.94	0.74 1.25 1.73	0.13 0.15 0.17
Bridge Stiffener (3.25 sq ft)	A	From Leg	0.50 0.00 0.00	0.0000	80.00	No Ice 1/2" Ice 1" Ice	3.25 3.60 3.94	0.74 1.25 1.73	0.13 0.15 0.17
Bridge Stiffener (3.25 sq ft)	B	From Leg	0.50 0.00 0.00	0.0000	80.00	No Ice 1/2" Ice 1" Ice	3.25 3.60 3.94	0.74 1.25 1.73	0.13 0.15 0.17
Bridge Stiffener (3.25 sq ft)	C	From Leg	0.50 0.00 0.00	0.0000	80.00	No Ice 1/2" Ice 1" Ice	3.25 3.60 3.94	0.74 1.25 1.73	0.13 0.15 0.17
TMO Reserved Loading	A	From Centroid-Leg	4.00 0.00 0.00	-10.0000	195.00	No Ice 1/2" Ice 1" Ice	47.72 50.18 52.64	0.00 0.00 0.00	0.44 0.62 0.81
TMO Reserved Loading	B	From Centroid-Leg	4.00 0.00 0.00	-10.0000	195.00	No Ice 1/2" Ice 1" Ice	47.72 50.18 52.64	0.00 0.00 0.00	0.44 0.62 0.81
TMO Reserved Loading	C	From Centroid-Leg	4.00 0.00 0.00	-10.0000	195.00	No Ice 1/2" Ice 1" Ice	47.72 50.18 52.64	0.00 0.00 0.00	0.44 0.62 0.81

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight lb
2' MW	C	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	0.0000		91.00	2.00	No Ice 1/2" Ice 1" Ice	3.14 3.41 3.68	40.00 67.13 97.32

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
195.00	Pirod 16.5' LP Platform	41	20.587	0.9654	0.0015	62693
185.00	PiROD 13' Low Profile Platform (Monopole)	41	18.573	0.9538	0.0015	22961
175.00	Valmont Light Duty Tri-Bracket (1)	41	16.607	0.9237	0.0012	17683
165.00	MTS 12.5' LP Platform	41	14.714	0.8804	0.0010	10375
155.00	PiROD 15' Low Profile Platform (Monopole)	41	12.929	0.8282	0.0009	12071
120.00	Bridge Stiffener (3.25 sq ft)	41	7.611	0.6170	0.0005	9591
100.00	Bridge Stiffener (3.25 sq ft)	41	5.254	0.5021	0.0003	10109
91.00	2' MW	41	4.350	0.4570	0.0003	10765
80.00	Bridge Stiffener (3.25 sq ft)	41	3.367	0.3941	0.0002	10857
75.00	GPS-TMG-HR-26N	41	2.967	0.3712	0.0002	12099

Additional Calculations

CCIpole

per TIA-222- G

Site BU: US-CT-1002

Work Order: 2016791.1002.01

CROWN CASTLE

Pole Geometry

	Pole Height Above Base (ft)	Section Length (ft)	Lap Splice Length (ft)	Number of Sides	Top Diameter (in)	Bottom Diameter (in)	Wall Thickness (in)	Bend Radius (in)	Pole Material
1	196	1		0	18	18	0.375	n/a	A53-B-42
2	195	15		0	24.00	24	0.375	n/a	A53-B-42
3	180	20		0	30.00	30	0.375	n/a	A53-B-42
4	160	20		0	36.00	36	0.375	n/a	A53-B-42
5	140	20		0	42.00	42	0.375	n/a	A53-B-42
6	120	20		0	48.00	48	0.375	n/a	A53-B-42
7	100	20		0	54.00	54	0.375	n/a	A53-B-42
8	80	20		0	60.00	60	0.375	n/a	A53-B-42
9	60	20		0	60.00	60	0.5	n/a	A53-B-42
10	40	40		0	60.00	60	0.625	n/a	A53-B-42

Reinforcement Configuration

	Bottom Effective Elevation (ft)	Top Effective Elevation (ft)	Type	Model	Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	0	20	plate	6-1/2"x1-1/2" FP	3	1						1						1					
2	20	40	plate	6-1/2"x1-1/2" FP	3	1						1						1					
3	40	60	plate	6-1/2"x1-1/2" FP	3	1						1						1					
4	60	80	plate	6-1/2"x1-1/2" FP	3	1						1						1					
5	80	100	plate	6-1/2"x1-1/2" FP	3	1						1						1					
6	100	120	plate	6-1/2"x1-1/2" FP	3	1						1						1					
7	120	136	plate	6-1/2"x1-1/2" FP	3	1						1						1					
8																							
9																							
10																							

Reinforcement Details

	B (in)	H (in)	Gross Area (in^2)	Pole Face to Centroid (in)	Bottom Termination Length (in)	Top Termination Length (in)	L_u (in)	Net Area (in^2)	Bolt Hole Size (in)	Reinforcement Material
1	6.5	1.5	9.75	0.75	33.000	33.000	18.000	7.875	1.1875	A572-65
2	6.5	1.5	9.75	0.75	33.000	33.000	18.000	7.875	1.1875	A572-65
3	6.5	1.5	9.75	0.75	33.000	33.000	18.000	7.875	1.1875	A572-65
4	6.5	1.5	9.75	0.75	33.000	33.000	18.000	7.875	1.1875	A572-65
5	6.5	1.5	9.75	0.75	33.000	33.000	18.000	7.875	1.1875	A572-65
6	6.5	1.5	9.75	0.75	33.000	33.000	18.000	7.875	1.1875	A572-65
7	6.5	1.5	9.75	0.75	33.000	33.000	18.000	7.875	1.1875	A572-65

TNX Geometry Input

Increment (ft): 5

	Section Height (ft)	Section Length (ft)	Lap Splice Length (ft)	Number of Sides	Top Diameter (in)	Bottom Diameter (in)	Wall Thickness (in)	Tapered Pole Grade	Weight Multiplier
1	196 - 195	1	0	0	18.000	18.000	0.375	A53-B-42	1.000
2	195 - 190	5		0	24.000	24.000	0.375	A53-B-42	1.000
3	190 - 185	5		0	24.000	24.000	0.375	A53-B-42	1.000
4	185 - 180	5	0	0	24.000	24.000	0.375	A53-B-42	1.000
5	180 - 175	5		0	30.000	30.000	0.375	A53-B-42	1.000
6	175 - 170	5		0	30.000	30.000	0.375	A53-B-42	1.000
7	170 - 165	5		0	30.000	30.000	0.375	A53-B-42	1.000
8	165 - 160	5	0	0	30.000	30.000	0.375	A53-B-42	1.000
9	160 - 155	5		0	36.000	36.000	0.375	A53-B-42	1.000
10	155 - 150	5		0	36.000	36.000	0.375	A53-B-42	1.000
11	150 - 145	5		0	36.000	36.000	0.375	A53-B-42	1.000
12	145 - 140	5	0	0	36.000	36.000	0.375	A53-B-42	1.000
13	140 - 136	4		0	42.000	42.000	0.375	A53-B-42	1.000
14	136 - 135.75	0.25		0	42.000	42.000	0.3875	A53-B-42	1.545
15	135.75 - 130.75	5		0	42.000	42.000	0.3875	A53-B-42	1.545
16	130.75 - 125.75	5		0	42.000	42.000	0.3875	A53-B-42	1.545
17	125.75 - 120.75	5		0	42.000	42.000	0.3875	A53-B-42	1.545
18	120.75 - 120	0.75	0	0	42.000	42.000	0.3875	A53-B-42	1.545
19	120 - 119.75	0.25		0	48.000	48.000	0.3875	A53-B-42	1.473
20	119.75 - 114.75	5		0	48.000	48.000	0.3875	A53-B-42	1.473
21	114.75 - 109.75	5		0	48.000	48.000	0.3875	A53-B-42	1.473
22	109.75 - 104.75	5		0	48.000	48.000	0.3875	A53-B-42	1.473
23	104.75 - 100	4.75	0	0	48.000	48.000	0.3875	A53-B-42	1.473
24	100 - 99.75	0.25		0	54.000	54.000	0.3875	A53-B-42	1.416
25	99.75 - 94.75	5		0	54.000	54.000	0.3875	A53-B-42	1.416
26	94.75 - 89.75	5		0	54.000	54.000	0.3875	A53-B-42	1.416
27	89.75 - 84.75	5		0	54.000	54.000	0.3875	A53-B-42	1.416
28	84.75 - 80	4.75	0	0	54.000	54.000	0.3875	A53-B-42	1.416
29	80 - 79.75	0.25		0	60.000	60.000	0.3875	A53-B-42	1.371
30	79.75 - 74.75	5		0	60.000	60.000	0.3875	A53-B-42	1.371
31	74.75 - 69.75	5		0	60.000	60.000	0.3875	A53-B-42	1.371
32	69.75 - 64.75	5		0	60.000	60.000	0.3875	A53-B-42	1.371
33	64.75 - 60	4.75	0	0	60.000	60.000	0.3875	A53-B-42	1.371
34	60 - 59.75	0.25		0	60.000	60.000	0.5125	A53-B-42	1.281
35	59.75 - 54.75	5		0	60.000	60.000	0.5125	A53-B-42	1.281
36	54.75 - 49.75	5		0	60.000	60.000	0.5125	A53-B-42	1.281
37	49.75 - 44.75	5		0	60.000	60.000	0.5125	A53-B-42	1.281
38	44.75 - 40	4.75	0	0	60.000	60.000	0.5125	A53-B-42	1.281
39	40 - 39.75	0.25		0	60.000	60.000	0.6375	A53-B-42	1.227
40	39.75 - 34.75	5		0	60.000	60.000	0.6375	A53-B-42	1.227
41	34.75 - 29.75	5		0	60.000	60.000	0.6375	A53-B-42	1.227
42	29.75 - 24.75	5		0	60.000	60.000	0.6375	A53-B-42	1.227
43	24.75 - 20	4.75		0	60.000	60.000	0.6375	A53-B-42	1.227
44	20 - 19.75	0.25		0	60.000	60.000	0.6375	A53-B-42	1.227
45	19.75 - 14.75	5		0	60.000	60.000	0.6375	A53-B-42	1.227
46	14.75 - 9.75	5		0	60.000	60.000	0.6375	A53-B-42	1.227
47	9.75 - 4.75	5		0	60.000	60.000	0.6375	A53-B-42	1.227
48	4.75 - 0	4.75		0	60.000	60.000	0.6375	A53-B-42	1.227

TNX Section Forces

Increment (ft):	5	TNX Output		
	Section Height (ft)	P_u (K)	M_{ux} (kip-ft)	V_u (K)
1	196 - 195	0.0865	0.0271	0.0469
2	195 - 190	3.259	33.381	6.8245
3	190 - 185	3.8993	68.267	7.1331
4	185 - 180	7.6417	124.96	11.519
5	180 - 175	8.4944	183.51	11.904
6	175 - 170	9.5783	247.16	12.908
7	170 - 165	10.473	312.62	13.268
8	165 - 160	12.822	389.05	15.455
9	160 - 155	13.921	467.4	15.875
10	155 - 150	16.957	562.41	19.213
11	150 - 145	18.131	659.49	19.643
12	145 - 140	19.317	758.58	20.022
13	140 - 136	20.371	839.32	20.382
14	136 - 135.75	20.469	844.42	20.408
15	135.75 - 130.75	22.382	947.55	20.877
16	130.75 - 125.75	24.305	1053.1	21.33
17	125.75 - 120.75	26.235	1160.9	21.763
18	120.75 - 120	26.527	1177.2	21.824
19	120 - 119.75	26.623	1182.7	22.076
20	119.75 - 114.75	28.682	1294.4	22.571
21	114.75 - 109.75	30.75	1408.5	23.049
22	109.75 - 104.75	32.824	1524.9	23.507
23	104.75 - 100	34.8	1637.6	23.924
24	100 - 99.75	34.909	1643.6	24.159
25	99.75 - 94.75	37.117	1765.7	24.66
26	94.75 - 89.75	39.418	1890.2	25.27
27	89.75 - 84.75	41.646	2017.7	25.728
28	84.75 - 80	43.767	2140.9	26.145
29	80 - 79.75	43.886	2147.5	26.364
30	79.75 - 74.75	46.288	2280.5	26.897
31	74.75 - 69.75	48.661	2416.2	27.37
32	69.75 - 64.75	51.039	2554.2	27.818
33	64.75 - 60	54.184	2687.4	28.242
34	60 - 59.75	54.387	2694.5	28.256
35	59.75 - 54.75	58.058	2836.9	28.71
36	54.75 - 49.75	60.911	2981.5	29.115
37	49.75 - 44.75	63.767	3128.1	29.492
38	44.75 - 40	67.61	3269	29.842
39	40 - 39.75	67.9	3276.5	29.8
40	39.75 - 34.75	72.2	3426.7	30.2
41	34.75 - 29.75	75.6	3578.6	30.5
42	29.75 - 24.75	78.9	3732.0	30.8
43	24.75 - 20	83.2	3879.0	31.1
44	20 - 19.75	83.4	3886.8	31.1
45	19.75 - 14.75	87.8	4042.9	31.4
46	14.75 - 9.75	91.2	4200.2	31.6
47	9.75 - 4.75	94.3	4358.6	31.8
48	4.75 - 0	97.2	4509.9	32.0

Analysis Results

Elevation (ft)	Component Type	Size	Critical Element	% Capacity	Pass / Fail
196 - 195	Pole	TP18x18x0.375	Pole	0.0%	Pass
195 - 190	Pole	TP24x24x0.375	Pole	5.7%	Pass
190 - 185	Pole	TP24x24x0.375	Pole	11.3%	Pass
185 - 180	Pole	TP24x24x0.375	Pole	20.8%	Pass
180 - 175	Pole	TP30x30x0.375	Pole	20.0%	Pass
175 - 170	Pole	TP30x30x0.375	Pole	26.8%	Pass
170 - 165	Pole	TP30x30x0.375	Pole	33.8%	Pass
165 - 160	Pole	TP30x30x0.375	Pole	42.1%	Pass
160 - 155	Pole	TP36x36x0.375	Pole	35.9%	Pass
155 - 150	Pole	TP36x36x0.375	Pole	43.2%	Pass
150 - 145	Pole	TP36x36x0.375	Pole	50.5%	Pass
145 - 140	Pole	TP36x36x0.375	Pole	58.0%	Pass
140 - 136	Pole	TP42x42x0.375	Pole	48.0%	Pass
136 - 135.75	Pole + Reinf.	TP42x42x0.3875	Pole	55.5%	Pass
135.75 - 130.75	Pole + Reinf.	TP42x42x0.3875	Pole	62.3%	Pass
130.75 - 125.75	Pole + Reinf.	TP42x42x0.3875	Pole	69.2%	Pass
125.75 - 120.75	Pole + Reinf.	TP42x42x0.3875	Pole	76.2%	Pass
120.75 - 120	Pole + Reinf.	TP42x42x0.3875	Pole	77.3%	Pass
120 - 119.75	Pole + Reinf.	TP48x48x0.3875	Pole	59.4%	Pass
119.75 - 114.75	Pole + Reinf.	TP48x48x0.3875	Pole	65.0%	Pass
114.75 - 109.75	Pole + Reinf.	TP48x48x0.3875	Pole	70.7%	Pass
109.75 - 104.75	Pole + Reinf.	TP48x48x0.3875	Pole	76.5%	Pass
104.75 - 100	Pole + Reinf.	TP48x48x0.3875	Pole	82.2%	Pass
100 - 99.75	Pole + Reinf.	TP54x54x0.3875	Pole	65.1%	Pass
99.75 - 94.75	Pole + Reinf.	TP54x54x0.3875	Pole	69.9%	Pass
94.75 - 89.75	Pole + Reinf.	TP54x54x0.3875	Pole	74.8%	Pass
89.75 - 84.75	Pole + Reinf.	TP54x54x0.3875	Pole	79.9%	Pass
84.75 - 80	Pole + Reinf.	TP54x54x0.3875	Pole	84.7%	Pass
80 - 79.75	Pole + Reinf.	TP60x60x0.3875	Pole	68.8%	Pass
79.75 - 74.75	Pole + Reinf.	TP60x60x0.3875	Pole	73.0%	Pass
74.75 - 69.75	Pole + Reinf.	TP60x60x0.3875	Pole	77.4%	Pass
69.75 - 64.75	Pole + Reinf.	TP60x60x0.3875	Pole	81.8%	Pass
64.75 - 60	Pole + Reinf.	TP60x60x0.3875	Pole	86.1%	Pass
60 - 59.75	Pole + Reinf.	TP60x60x0.5125	Pole	64.8%	Pass
59.75 - 54.75	Pole + Reinf.	TP60x60x0.5125	Pole	68.3%	Pass
54.75 - 49.75	Pole + Reinf.	TP60x60x0.5125	Pole	71.8%	Pass
49.75 - 44.75	Pole + Reinf.	TP60x60x0.5125	Pole	75.3%	Pass
44.75 - 40	Pole + Reinf.	TP60x60x0.5125	Pole	78.7%	Pass
40 - 39.75	Pole + Reinf.	TP60x60x0.6375	Pole	63.3%	Pass
39.75 - 34.75	Pole + Reinf.	TP60x60x0.6375	Pole	66.2%	Pass
34.75 - 29.75	Pole + Reinf.	TP60x60x0.6375	Pole	69.1%	Pass
29.75 - 24.75	Pole + Reinf.	TP60x60x0.6375	Pole	72.1%	Pass
24.75 - 20	Pole + Reinf.	TP60x60x0.6375	Pole	75.0%	Pass
20 - 19.75	Pole + Reinf.	TP60x60x0.6375	Pole	75.1%	Pass
19.75 - 14.75	Pole + Reinf.	TP60x60x0.6375	Pole	78.1%	Pass
14.75 - 9.75	Pole + Reinf.	TP60x60x0.6375	Pole	81.2%	Pass
9.75 - 4.75	Pole + Reinf.	TP60x60x0.6375	Pole	84.2%	Pass
4.75 - 0	Pole + Reinf.	TP60x60x0.6375	Pole	87.2%	Pass
				Summary	
			Pole	87.2%	Pass
			Reinforcement	44.9%	Pass
			Overall	87.2%	Pass

Additional Calculations

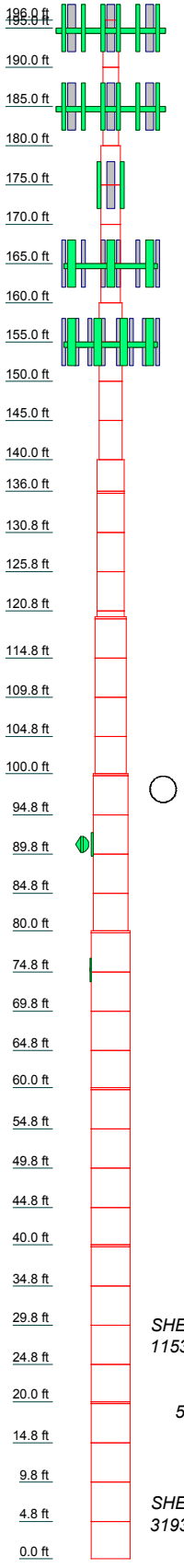
Section Elevation (ft)	Moment of Inertia (in^4)			Area (in^2)			% Capacity							
	Pole	Reinf.	Total	Pole	Reinf.	Total	Pole	R1	R2	R3	R4	R5	R6	R7
196 - 195	807	n/a	807	20.76	n/a	20.76	0.0%							
195 - 190	1942	n/a	1942	27.83	n/a	27.83	5.7%							
190 - 185	1942	n/a	1942	27.83	n/a	27.83	11.3%							
185 - 180	1942	n/a	1942	27.83	n/a	27.83	20.8%							
180 - 175	3829	n/a	3829	34.90	n/a	34.90	20.0%							
175 - 170	3829	n/a	3829	34.90	n/a	34.90	26.8%							
170 - 165	3829	n/a	3829	34.90	n/a	34.90	33.8%							
165 - 160	3829	n/a	3829	34.90	n/a	34.90	42.1%							
160 - 155	6659	n/a	6659	41.97	n/a	41.97	35.9%							
155 - 150	6659	n/a	6659	41.97	n/a	41.97	43.2%							
150 - 145	6659	n/a	6659	41.97	n/a	41.97	50.5%							
145 - 140	6659	n/a	6659	41.97	n/a	41.97	58.0%							
140 - 136	10622	n/a	10622	49.04	n/a	49.04	48.0%							
136 - 135.75	10811	415	11226	49.04	29.25	78.29	55.5%							17.7%
135.75 - 130.75	10811	415	11226	49.04	29.25	78.29	62.3%							17.3%
130.75 - 125.75	10811	415	11226	49.04	29.25	78.29	69.2%							19.2%
125.75 - 120.75	10811	415	11226	49.04	29.25	78.29	76.2%							21.1%
120.75 - 120	10811	415	11226	49.04	29.25	78.29	77.3%							24.7%
120 - 119.75	16144	550	16695	56.11	29.25	85.36	59.4%						20.7%	
119.75 - 114.75	16144	550	16695	56.11	29.25	85.36	65.0%						19.7%	
114.75 - 109.75	16144	550	16695	56.11	29.25	85.36	70.7%						21.4%	
109.75 - 104.75	16144	550	16695	56.11	29.25	85.36	76.5%						23.2%	
104.75 - 100	16144	550	16695	56.11	29.25	85.36	82.2%						28.6%	
100 - 99.75	22995	713	23708	63.18	29.25	92.43	65.1%					24.4%		
99.75 - 94.75	22995	713	23708	63.18	29.25	92.43	69.9%					22.8%		
94.75 - 89.75	22995	713	23708	63.18	29.25	92.43	74.8%					24.4%		
89.75 - 84.75	22995	713	23708	63.18	29.25	92.43	79.9%					26.1%		
84.75 - 80	22995	713	23708	63.18	29.25	92.43	84.7%					31.8%		
80 - 79.75	31553	904	32457	70.24	29.25	99.49	68.8%				27.5%			
79.75 - 74.75	31553	904	32457	70.24	29.25	99.49	73.0%				25.4%			
74.75 - 69.75	31553	904	32457	70.24	29.25	99.49	77.4%				26.9%			
69.75 - 64.75	31553	904	32457	70.24	29.25	99.49	81.8%				28.4%			
64.75 - 60	31553	904	32457	70.24	29.25	99.49	86.1%				34.4%			
60 - 59.75	41657	1036	42693	93.46	29.25	122.71	64.8%			30.1%				
59.75 - 54.75	41657	1036	42693	93.46	29.25	122.71	68.3%			27.6%				
54.75 - 49.75	41657	1036	42693	93.46	29.25	122.71	71.8%			29.0%				
49.75 - 44.75	41657	1036	42693	93.46	29.25	122.71	75.3%			30.4%				
44.75 - 40	41657	1036	42693	93.46	29.25	122.71	78.7%			36.6%				
40 - 39.75	51640	1132	52772	116.58	29.25	145.83	63.3%		32.6%					
39.75 - 34.75	51640	1132	52772	116.58	29.25	145.83	66.2%		29.7%					
34.75 - 29.75	51640	1132	52772	116.58	29.25	145.83	69.1%		31.0%					
29.75 - 24.75	51640	1132	52772	116.58	29.25	145.83	72.1%		32.3%					
24.75 - 20	51640	1132	52772	116.58	29.25	145.83	75.0%		38.7%					
20 - 19.75	51640	1132	52772	116.58	29.25	145.83	75.1%	38.7%						
19.75 - 14.75	51640	1132	52772	116.58	29.25	145.83	78.1%	35.0%						
14.75 - 9.75	51640	1132	52772	116.58	29.25	145.83	81.2%	36.4%						
9.75 - 4.75	51640	1132	52772	116.58	29.25	145.83	84.2%	37.8%						
4.75 - 0	51640	1132	52772	116.58	29.25	145.83	87.2%	44.9%						

Note: Section capacity checked in 5 degree increments.

APPENDIX C

Tower Elevation Drawing & Feedline Plan

Section	Size	Length (ft)	Grade	Weight (lb)
1	P60x0.375	5.00	A53-B-42	473.7
2	P60x0.375	5.00		473.5
3	P60x0.375	5.00		473.5
4	P60x0.375	5.00		593.8
5	P60x0.375	5.00		593.8
6	P60x0.375	5.00		593.8
7	P60x0.375	5.00		593.8
8	P60x0.375	5.00		714.1
9	P60x0.375	5.00		714.1
10	P60x0.375	5.00		714.1
11	P60x0.375	5.00		714.1
12	P60x0.375	5.00		667.5
13	P60x0.375	5.00		1332.0
14	P60x0.375	5.00		1332.0
15	P60x0.375	5.00		1332.0
16	P60x0.375	5.00		1332.0
17	P60x0.375	5.00		1332.0
18	P60x0.375	5.00		1332.0
19	P60x0.375	5.00		1452.3
20	P60x0.375	5.00		1452.3
21	P60x0.375	5.00		1452.3
22	P60x0.375	5.00		1452.3
23	P60x0.375	5.00		1452.3
24	P60x0.375	5.00		1452.3
25	P60x0.375	5.00		1572.5
26	P60x0.375	5.00		1572.5
27	P60x0.375	5.00		1572.5
28	P60x0.375	4.75		1493.9
29	P60x0.375	5.00		1692.8
30	P60x0.375	5.00		1692.8
31	P60x0.375	5.00		1692.8
32	P60x0.375	5.00		1692.8
33	P60x0.375	4.75		1608.1
34	P60x0.375	5.00		2087.8
35	P60x0.375	5.00		2087.8
36	P60x0.375	5.00		2087.8
37	P60x0.375	5.00		2087.8
38	P60x0.375	4.75		1983.4
39	P60x0.375	5.00		2481.2
40	P60x0.375	5.00		2481.2
41	P60x0.375	5.00		2481.2
42	P60x0.375	5.00		2481.2
43	P60x0.375	4.75		2357.1
44	P60x0.375	5.00		2481.2
45	P60x0.375	5.00		2481.2
46	P60x0.375	5.00		2481.2
47	P60x0.375	5.00		2481.2
48	P60x0.375	4.75		2357.1
				58723.7



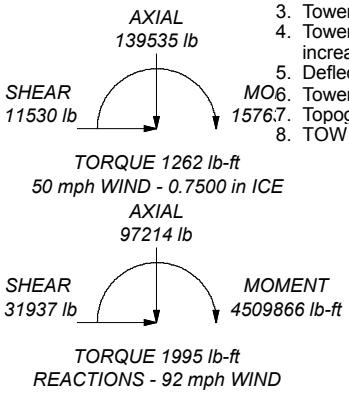
DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Pirod 16.5' LP Platform	195	RRUS 32	185
(3) AIR 21 w/ Mount Pipe	195	DC6-48-60-18-8F Surge Suppression Unit	185
(3) AIR 21 w/ Mount Pipe	195	DC6-48-60-18-8F Surge Suppression Unit	185
(3) AIR 21 w/ Mount Pipe	195	PiROD 13' Low Profile Platform (Monopole)	185
AIR 33 w/ Mount Pipe	195	7770.00 w/Mount Pipe	185
AIR 33 w/ Mount Pipe	195	7770.00 w/Mount Pipe	185
AIR 33 w/ Mount Pipe	195	APXV18-206517S-C w/ Mount Pipe	175
ATMAA1412D	195	Valmont Light Duty Tri-Bracket (1)	175
ATMAA1412D	195	APXV18-206517S-C w/ Mount Pipe	175
ATMAA1412D	195	APXV18-206517S-C w/ Mount Pipe	175
RR90-17-02DP w/ Mount Pipe	195	(3) DB980E (90E-M) w/ Mount Pipe	165
RR90-17-02DP w/ Mount Pipe	195	MTS 12.5' LP Platform	165
RR90-17-02DP w/ Mount Pipe	195	(3) DB980E (90E-M) w/ Mount Pipe	165
LNX-6515DS-VTM w/ mount pipe	195	(3) DB980E (90E-M) w/ Mount Pipe	165
LNX-6515DS-VTM w/ mount pipe	195	(2) HBXX-6516DS w/Mount Pipe	155
LNX-6515DS-VTM w/ mount pipe	195	(2) BXA-70063-4CF-EDIN-6 w/ Mount Pipe	155
KRY 112 71	195	(2) BXA-70063-4CF-EDIN-6 w/ Mount Pipe	155
KRY 112 71	195	(2) SLCP2x6014 w/ Mount Pipe	155
KRY 112 71	195	(2) FD9R6004/2C-3L	155
DC4-48-60-8-20F	195	(2) FD9R6004/2C-3L	155
TMO Reserved Loading	195	(2) FD9R6004/2C-3L	155
TMO Reserved Loading	195	(2) DPX 021 Diplexer	155
TMO Reserved Loading	195	(2) DPX 021 Diplexer	155
7770.00 w/Mount Pipe	185	(2) DPX 021 Diplexer	155
AM-X-CD-16-65-00T-RET w/ 2" x 54" mount pipe	185	PiROD 15' Low Profile Platform (Monopole)	155
AM-X-CD-16-65-00T-RET w/ 2" x 54" mount pipe	185	(2) HBXX-6516DS w/Mount Pipe	155
QS66512-3 w/ Mount Pipe	185	(2) HBXX-6516DS w/Mount Pipe	155
QS66512-3 w/ Mount Pipe	185	Bridge Stiffener (3.25 sq ft)	120
P65-17-XLH-RR w/ Mount Pipe	185	Bridge Stiffener (3.25 sq ft)	120
TPA-65R-LCUUUU-H8 w/ Mount Pipe	185	Bridge Stiffener (3.25 sq ft)	120
TT19-08BP111-001	185	Bridge Stiffener (3.25 sq ft)	100
TT19-08BP111-001	185	Bridge Stiffener (3.25 sq ft)	100
TT19-08BP111-001	185	Bridge Stiffener (3.25 sq ft)	100
(2) TPX-070821	185	Pipe Mount 3'x4.5"	91
(2) TPX-070821	185	2' MW	91
(2) TPX-070821	185	Bridge Stiffener (3.25 sq ft)	80
RRUS 11	185	Bridge Stiffener (3.25 sq ft)	80
RRUS 11	185	Bridge Stiffener (3.25 sq ft)	80
RRUS 11	185	Pipe Mount 3'x4.5"	75
RRUS 12	185	GPS-TMG-HR-26N	75
RRUS 12	185		
RRUS 12	185		
RRUS 32	185		
RRUS 32	185		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-42	42 ksi	63 ksi			

ALL REACTIONS ARE FACTORED



TOWER DESIGN NOTES

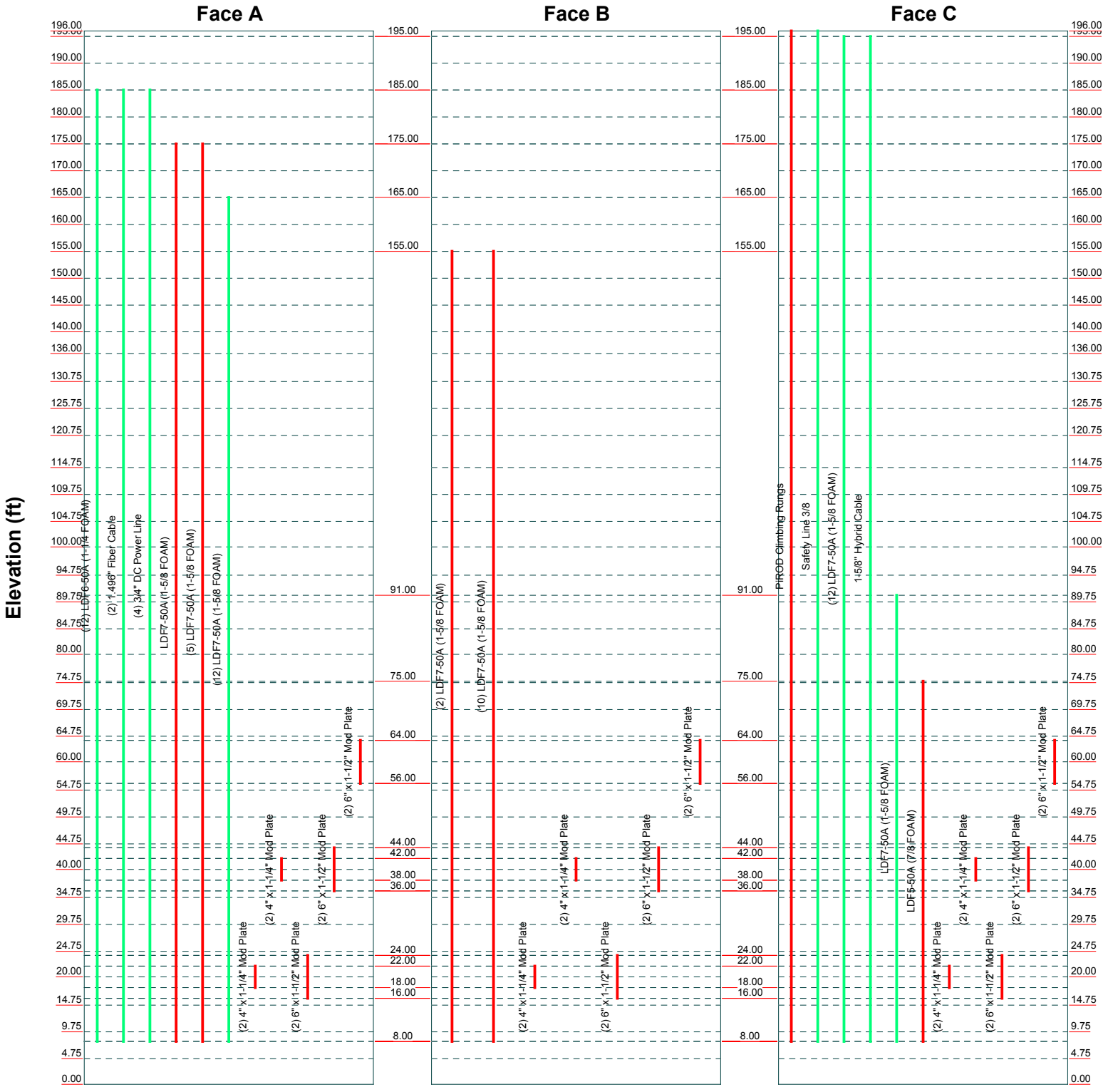
1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 92 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness 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: 87.2%

GPD GROUP
520 South Main Street Suite 2531
Akron, Ohio 44311
Phone: (330) 572-2100
FAX: (330) 572-2101

Job: **US-CT-1002 Kettleto**			
Project: **2016791.1002.01**			
Client: PTI	Drawn by: mrisley	App'd:	
Code: TIA-222-G	Date: 09/15/16	Scale: NTS	
Path: T:\PTI\US-CT-1002 (CT11126F)\01 2016791.1002.01 PTI SA\tnx\US-CT-1002 Modified.eri		Dwg No. E-1	

Feed Line Distribution Chart
0' - 196'

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



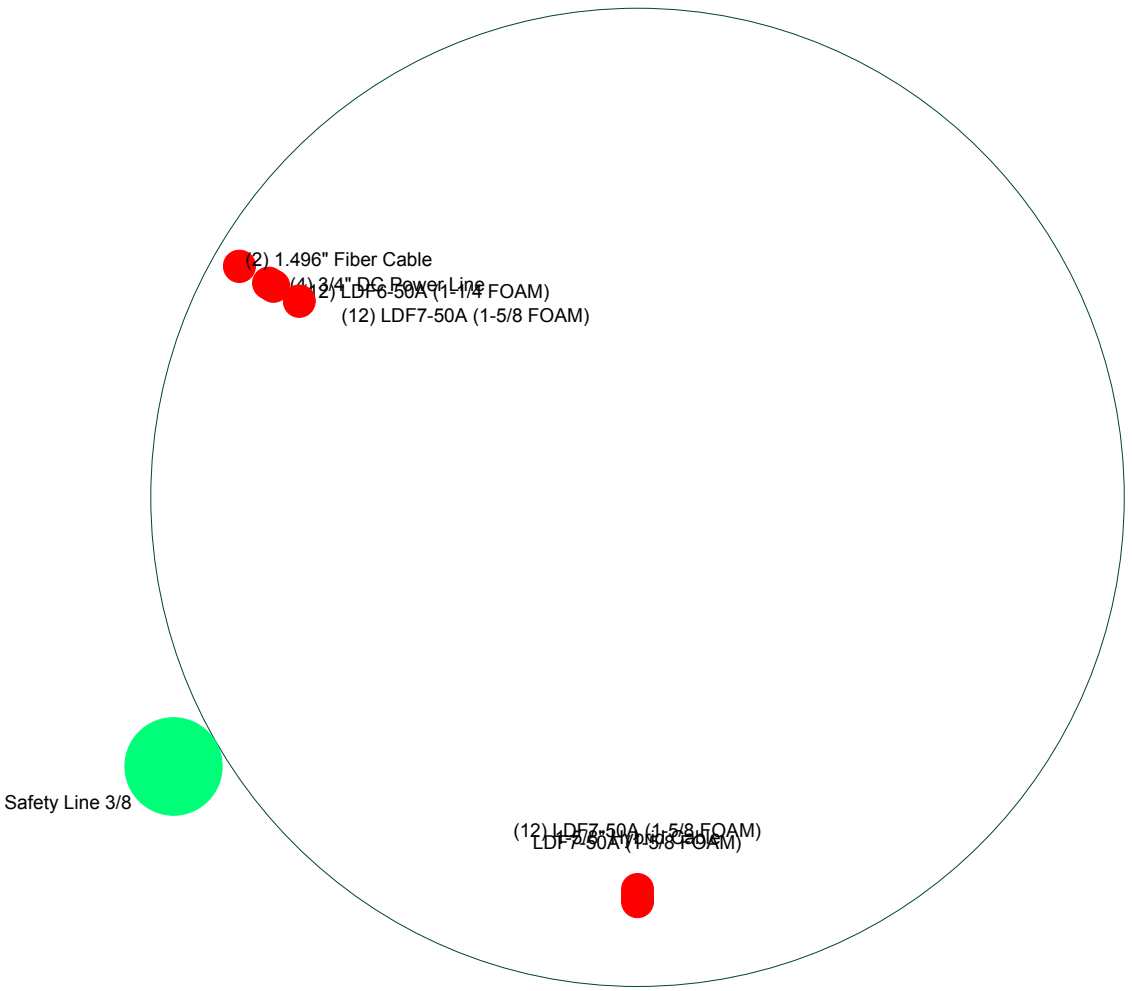
GPD GROUP

GPD
520 South Main Street Suite 2531
Akron, Ohio 44311
Phone: (330) 572-2100
FAX: (330) 572-2101

Job: ***US-CT-1002 Kettleto***			
Project: ***2016791.1002.01***			
Client: PTI	Drawn by: mrisley	App'd:	
Code: TIA-222-G	Date: 09/15/16	Scale: NTS	
Path: T:\PTI\US-CT-1002 (CT11126F)\01 2016791.1002.01 PTI SA\tnx\US-CT-1002 Modified.dri		Dwg No. E-7	

Feed Line Plan

Round Flat App In Face App Out Face



GPD GROUP

GPD
520 South Main Street Suite 2531
Akron, Ohio 44311
Phone: (330) 572-2100
FAX: (330) 572-2101

Job: ***US-CT-1002 Kettleto***		
Project: ***2016791.1002.01***		
Client: PTI	Drawn by: mrisley	App'd:
Code: TIA-222-G	Date: 09/15/16	Scale: NTS
Path: T:\PTI\US-CT-1002 (CT11126F)\01 2016791.1002.01 PTI SA\tnx\US-CT-1002 Modified.dri		Dwg No. E-7

APPENDIX D

Flange Bolt & Flange Plate Analysis

GPD GROUP

Existing Flange Connection @ 180'
US-CT-1002 Kettleto
2016791.1002.01

O.T. Moment =	124.97	k*ft
Axial =	7.65	kips
Shear =	11.52	kips

Acceptable Stress Ratio =	105.0%

Flange Bolts		
# Bolts =	20	
Bolt Type =	A325	
Threads Included? =	Yes	
Bolt Diameter =	1	in
Bolt Circle =	27	in
ϕ_t =	0.75	
ϕ_v =	0.75	
Tension & Shear (TIA-222-G-1, Section 4.9.6)		
F_{ub} =	120	ksi
A_b =	0.785398	in^2
A_n =	0.606	in^2
ϕR_{nv} =	31.81	kips
ϕR_{nt} =	54.54	kips
ϕR_{nt} (adjusted)=	54.53	kips
V_{ub} =	0.58	kips
T_{ub} =	10.72	kips
Prying Action Check		
N/A, top flange thickness > tc		
Max Comp. on Bolt =	11.48	kips
Shear Capacity =	1.8%	
Tensile Capacity =	19.7%	
Interaction Capacity =	19.7%	
Bolt Capacity =	**19.7% OK**	

Pole Information		
Shaft Diam. (Upper) =	24	in
Thickness (Upper)=	0.375	in
# of Sides (Upper) =	Round	
F_y (Upper) =	42	ksi
Shaft Diam. (Lower) =	30	in
Thickness (Lower)=	0.375	in
# of Sides (Lower) =	Round	
F_y (Lower) =	42	ksi

Upper Flange Plate		
Location =	External	
Plate Strength (F_y) =	36	ksi
Plate Tensile (F_u) =	58	ksi
Plate Thickness =	1.25	in
Outer Diameter =	30.375	in
ϕ_f =	0.9	
wcalc =	12.37	in
wmax =	20.84	in
w =	12.37	in
Z =	4.83	in^3
M_u =	35.59	k-in
ϕM_n =	156.5492	k-in
UP Capacity =	**22.7% OK**	

Lower Flange Plate		
Location =	Internal	
Plate Strength (F_y) =	36	ksi
Plate Thickness =	1.25	in
Hole Diameter =	24.25	in
Pole Inner Diameter =	29.25	in
e =	1.13	in
w =	4.59	in
Z =	1.79	in^3
M_u =	12.92	k-in
ϕM_n =	58.15014	k-in
LP Capacity =	**22.2% OK**	

UpperStiffeners		
Configuration =	Every Other	
Thickness =	0.625	in
Width =	3	in
Notch =	0.5	in
Height =	5	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	Yes	
Vertical Weld Size =	0.3125	in
Horiz. Weld Type =	Fillet	
Fillet Size =	0.3125	in
Weld Strength =	70	ksi

Stiffeners ineffective - check plate unstiffened

Lower Stiffeners		
Configuration =	Every Other	
Thickness =	0.625	in
Width =	2	in
Notch =	0.5	in
Height =	3.5	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	Yes	
Vertical Weld Size =	0.3125	in
Horiz. Weld Type =	Fillet	
Fillet Size =	0.3125	in
Weld Strength =	70	ksi

Stiffeners ineffective - check plate unstiffened

GPD GROUP

Existing Flange Connection @ 160'
US-CT-1002 Kettleto
2016791.1002.01

O.T. Moment =	389.06	k*ft
Axial =	12.83	kips
Shear =	15.46	kips

Acceptable Stress Ratio =	105.0%

Flange Bolts		
# Bolts =	24	
Bolt Type =	A325	
Threads Included? =	Yes	
Bolt Diameter =	1	in
Bolt Circle =	33	in
ϕ_t =	0.75	
ϕ_v =	0.75	
Tension & Shear (TIA-222-G-1, Section 4.9.6)		
F_{ub} =	120	ksi
A_b =	0.785398	in^2
A_n =	0.606	in^2
ϕR_{nv} =	31.81	kips
ϕR_{nt} =	54.54	kips
ϕR_{nt} (adjusted)=	54.53	kips
V_{ub} =	0.64	kips
T_{ub} =	23.03	kips
Prying Action Check		
N/A, top flange thickness > tc		
Max Comp. on Bolt =	24.10	kips
Shear Capacity =	2.0%	
Tensile Capacity =	42.2%	
Interaction Capacity =	42.2%	
Bolt Capacity =	**42.2% OK**	

Pole Information		
Shaft Diam. (Upper) =	30	in
Thickness (Upper)=	0.375	in
# of Sides (Upper) =	Round	
F_y (Upper) =	42	ksi
Shaft Diam. (Lower) =	36	in
Thickness (Lower)=	0.375	in
# of Sides (Lower) =	Round	
F_y (Lower) =	42	ksi

Upper Flange Plate		
Location =	External	
Plate Strength (F_y) =	36	ksi
Plate Tensile (F_u) =	58	ksi
Plate Thickness =	1.25	in
Outer Diameter =	36.375	in
ϕ_f =	0.9	
wcalc =	13.75	in
wmax =	21.04	in
w =	13.75	in
Z =	5.37	in^3
M_u =	79.86	k-in
ϕM_n =	173.9947	k-in
UP Capacity =	**45.9% OK**	

Lower Flange Plate		
Location =	Internal	
Plate Strength (F_y) =	36	ksi
Plate Thickness =	1.25	in
Hole Diameter =	27.375	in
Pole Inner Diameter =	35.25	in
e =	1.13	in
w =	4.61	in
Z =	1.80	in^3
M_u =	27.12	k-in
ϕM_n =	58.39865	k-in
LP Capacity =	**46.4% OK**	

UpperStiffeners		
Configuration =	Every Other	
Thickness =	0.625	in
Width =	3	in
Notch =	0.5	in
Height =	5	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	Yes	
Vertical Weld Size =	0.3125	in
Horiz. Weld Type =	Fillet	
Fillet Size =	0.3125	in
Weld Strength =	70	ksi

Stiffeners ineffective - check plate unstiffened

Lower Stiffeners		
Configuration =	Every Other	
Thickness =	0.625	in
Width =	2	in
Notch =	0.5	in
Height =	3.5	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	Yes	
Vertical Weld Size =	0.3125	in
Horiz. Weld Type =	Fillet	
Fillet Size =	0.3125	in
Weld Strength =	70	ksi

Stiffeners ineffective - check plate unstiffened

GPD GROUP

Existing Flange Connection @ 140'
US-CT-1002 Kettleto
2016791.1002.01

O.T. Moment =	758.58	k*ft
Axial =	19.32	kips
Shear =	20.03	kips

Acceptable Stress Ratio =	105.0%

Flange Bolts		
# Bolts =	28	
Bolt Type =	A325	
Threads Included? =	Yes	
Bolt Diameter =	1	in
Bolt Circle =	39	in
ϕ_t =	0.75	
ϕ_v =	0.75	
Tension & Shear (TIA-222-G-1, Section 4.9.6)		
F_{ub} =	120	ksi
A_b =	0.785398	in^2
A_n =	0.606	in^2
ϕR_{nv} =	31.81	kips
ϕR_{nt} =	54.54	kips
ϕR_{nt} (adjusted)=	54.53	kips
V_{ub} =	0.72	kips
T_{ub} =	32.64	kips
Prying Action Check		
N/A, top flange thickness > tc		
Max Comp. on Bolt =	34.02	kips
Shear Capacity =	2.2%	
Tensile Capacity =	59.9%	
Interaction Capacity =	59.9%	
Bolt Capacity =	**59.9% OK**	

Pole Information		
Shaft Diam. (Upper) =	36	in
Thickness (Upper)=	0.375	in
# of Sides (Upper) =	Round	
F_y (Upper) =	42	ksi
Shaft Diam. (Lower) =	42	in
Thickness (Lower)=	0.375	in
# of Sides (Lower) =	Round	
F_y (Lower) =	42	ksi

Upper Flange Plate		
Location =	External	
Plate Strength (F_y) =	36	ksi
Plate Tensile (F_u) =	58	ksi
Plate Thickness =	1.25	in
Outer Diameter =	42.375	in
ϕ_f =	0.9	
wcalc =	15.00	in
wmax =	25.38	in
w =	15.00	in
Z =	5.86	in^3
M_u =	119.24	k-in
ϕM_n =	189.8438	k-in
UP Capacity =	**62.8% OK**	

Lower Flange Plate		
Location =	Internal	
Plate Strength (F_y) =	36	ksi
Plate Thickness =	1.25	in
Hole Diameter =	33.375	in
Pole Inner Diameter =	41.25	in
e =	1.13	in
w =	4.63	in
Z =	1.81	in^3
M_u =	38.28	k-in
ϕM_n =	58.57615	k-in
LP Capacity =	**65.3% OK**	

UpperStiffeners		
Configuration =	Every Other	
Thickness =	0.5	in
Width =	3	in
Notch =	0.5	in
Height =	5	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	Yes	
Vertical Weld Size =	0.3125	in
Horiz. Weld Type =	Fillet	
Fillet Size =	0.3125	in
Weld Strength =	70	ksi

Stiffeners ineffective - check plate unstiffened

Lower Stiffeners		
Configuration =	Every Other	
Thickness =	0.5	in
Width =	2	in
Notch =	0.5	in
Height =	3.5	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	Yes	
Vertical Weld Size =	0.3125	in
Horiz. Weld Type =	Fillet	
Fillet Size =	0.3125	in
Weld Strength =	70	ksi

Stiffeners ineffective - check plate unstiffened

GPD GROUP

Existing Flange Connection @ 120'
US-CT-1002 Kettleto
2016791.1002.01

O.T. Moment =	505.14	k*ft
Axial =	26.53	kips
Shear =	21.81	kips

Acceptable Stress Ratio =	105.0%

*Above reactions have been adjusted due to consideration of modifications. See attached hand calculations for determination of flange bolt forces used in the analysis.

Flange Bolts		
# Bolts =	32	
Bolt Type =	A325	
Threads Included? =	Yes	
Bolt Diameter =	1	in
Bolt Circle =	45	in
ϕ_t =	0.75	
ϕ_v =	0.75	
Tension & Shear (TIA-222-G-1, Section 4.9.6)		
F_{ub} =	120	ksi
A_b =	0.785398	in^2
A_n =	0.606	in^2
ϕR_{nv} =	31.81	kips
ϕR_{nt} =	54.54	kips
ϕR_{nt} (adjusted)=	54.53	kips
V_{ub} =	0.68	kips
T_{ub} =	16.00	kips
Prying Action Check		
N/A, top flange thickness > tc		
Max Comp. on Bolt =	17.66	kips
Shear Capacity =	2.1%	
Tensile Capacity =	29.3%	
Interaction Capacity =	29.4%	
Bolt Capacity =	**29.4% OK**	

Pole Information		
Shaft Diam. (Upper) =	42	in
Thickness (Upper)=	0.375	in
# of Sides (Upper) =	Round	
F_y (Upper) =	42	ksi
Shaft Diam. (Lower) =	48	in
Thickness (Lower)=	0.375	in
# of Sides (Lower) =	Round	
F_y (Lower) =	42	ksi

Upper Flange Plate		
Location =	External	
Plate Strength (F_y) =	36	ksi
Plate Tensile (F_u) =	58	ksi
Plate Thickness =	1.25	in
Outer Diameter =	48.375	in
ϕ_f =	0.9	
wcalc =	16.16	in
wmax =	25.56	in
w =	16.16	in
Z =	6.31	in^3
M_u =	66.93	k-in
ϕM_n =	204.468	k-in
UP Capacity =	**32.7% OK**	

Lower Flange Plate		
Location =	Internal	
Plate Strength (F_y) =	36	ksi
Plate Thickness =	1.25	in
Hole Diameter =	39.375	in
Pole Inner Diameter =	47.25	in
e =	1.13	in
w =	4.64	in
Z =	1.81	in^3
M_u =	19.87	k-in
ϕM_n =	58.70928	k-in
LP Capacity =	**33.8% OK**	

UpperStiffeners		
Configuration =	Every Other	
Thickness =	0.625	in
Width =	3	in
Notch =	0.5	in
Height =	5	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	Yes	
Vertical Weld Size =	0.3125	in
Horiz. Weld Type =	Fillet	
Fillet Size =	0.3125	in
Weld Strength =	70	ksi

Stiffeners ineffective - check plate unstiffened

Lower Stiffeners		
Configuration =	Every Other	
Thickness =	0.625	in
Width =	2	in
Notch =	0.5	in
Height =	3.5	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	Yes	
Vertical Weld Size =	0.3125	in
Horiz. Weld Type =	Fillet	
Fillet Size =	0.3125	in
Weld Strength =	70	ksi

Stiffeners ineffective - check plate unstiffened

520 South Main Street • Suite 2531 • Akron, Ohio 44311• PHONE 330-572-2100 • FAX 330-572-2101

GPD GROUP
Glaus, Pyle, Schomer, Burns & DeHaven, Inc.

GPD GROUP
Engineers • Architects • Planners

Project #: 2016791.1002.01
Sheet No 1 Of 1

Calculated By: MR Date: 9/15/2016
Checked By: Date: 9/15/2016

BOLT AND BRIDGE STIFFENER CALCULATIONS @ 120'

Moment from TNX (M) =	1177.22	kip-ft	ASIF =	1.00			
Axial from TNX (P) =	26.53	kip					
Inner Bolt Diameter =	1	in					
Inner Bolt Area (A_{inner}) =	0.79	in^2	Inner Bolt Circle (BC_{inner}) =	45	in		
Inner Bolt MOI ($I_{o.inner}$) =	0.05	in^4	Total Area ($A_{tot.in}$) =	25.13	in^2		
Number Inner Bolts (N_{inner}) =	32		Percent Total Area (η_{in}) =	48.2%		Axial, Inner Bolts ($P*\eta_{in}$) =	12.79 kips
Bridge Stiffener Width =	6.00	in					
Bridge Stiffener Thickness =	1.50	in	Connection Bolt Hole Size =	0	in		
Bridge Stiffener Unbraced Length =	12.00	in	Net Bridge Stiffener Area ($A_{e.pl}$)	9	in2		
Bridge Stiffener Area (A_{pl}) =	9.00	in^2	Bridge Stiffener Circle (BC_{pl}) =	51	in		
Bridge Stiffener MOI (I_o) =	27.00	in^4	Total Area ($A_{tot.pl}$) =	27.00	in^2		
Number Bridge Stiffeners (N_{pl})	3		Percent Total Area (η_{pl}) =	51.8%		Axial, Bridge Stiffener ($P*\eta_{pl}$) =	13.74 kips

I_{inner} =	6363.30	$in.^4$	$(N_{inner}*A_{inner}*BC_{inner}^2/8 + N_{inner}*I_{o.inner})$
I_{pl} =	8859.38	$in.^4$	$(N_{pl}*A_{pl}*BC_{pl}^2/8 + N_{pl}*I_{o.pl})$
I_{tot} =	15222.67	$in.^4$	$(I_{inner} + I_{outer} + I_{pl})$
$P_{u.t.inner}$ =	16.0	kips	$(M*(BC_{inner}/2)*A_{inner})/I_{total} - P*\eta_{in}/N_{inner})$
$P_{u.t.pl}$ =	208.4	kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total} - P*\eta_{pl}/N_{pl})$
$P_{u.c.pl}$ =	217.6	kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total} + P*\eta_{pl}/N_{pl})$
$ØP_{nt.bolt}$ =	61.85	kips	
Bolt Rating =	25.9%	OK	

Bridge Stiffener Check

f_y =	50	ksi
f_u =	65	ksi
E =	29000	ksi
K =	0.85	
KL/r =	23.556	
F_e =	515.82	ksi
F_{cr} =	48.01	ksi
$ØP_{nc}$ =	388.90	kips
$ØP_{nt}$ =	438.75	kips
Bridge Stiffener Rating =	55.9%	OK

GPD GROUP

Existing Flange Connection @ 100'
US-CT-1002 Kettleto
2016791.1002.01

O.T. Moment =	790.46	k*ft
Axial =	34.8	kips
Shear =	23.93	kips

*Above reactions have been adjusted due to consideration of modifications. See attached hand calculations for determination of flange bolt forces used in the analysis.

Acceptable Stress Ratio	
=	105.0%

Flange Bolts

# Bolts =	36	
Bolt Type =	A325	
Threads Included? =	Yes	
Bolt Diameter =	1	in
Bolt Circle =	51	in
ϕ_t =	0.75	
ϕ_v =	0.75	

Tension & Shear (TIA-222-G-1, Section 4.9.6)

F_{ub} =	120	ksi
A_b =	0.785398	in^2
A_n =	0.606	in^2
ϕR_{nv} =	31.81	kips
ϕR_{nt} =	54.54	kips
ϕR_{nt} (adjusted)=	54.53	kips
V_{ub} =	0.66	kips
T_{ub} =	19.69	kips

Prying Action Check

N/A, top flange thickness > tc

Max Comp. on Bolt =	21.63	kips
Shear Capacity =	2.1%	
Tensile Capacity =	36.1%	
Interaction Capacity =	36.1%	
Bolt Capacity =	**36.1% OK**	

Pole Information

Shaft Diam. (Upper) =	48	in
Thickness (Upper)=	0.375	in
# of Sides (Upper) =	Round	
F_y (Upper) =	42	ksi
Shaft Diam. (Lower) =	54	in
Thickness (Lower)=	0.375	in
# of Sides (Lower) =	Round	
F_y (Lower) =	42	ksi

Upper Flange Plate

Location =	External	
Plate Strength (F_y) =	36	ksi
Plate Tensile (F_u) =	58	ksi
Plate Thickness =	1.25	in
Outer Diameter =	54.375	in
ϕ_f =	0.9	
wcalc =	17.23	in
wmax =	25.70	in
w =	17.23	in
Z =	6.73	in^3
M_u =	86.88	k-in
ϕM_n =	218.1139	k-in
UP Capacity =	**39.8% OK**	

Lower Flange Plate

Location =	Internal	
Plate Strength (F_y) =	36	ksi
Plate Thickness =	1.25	in
Hole Diameter =	45.375	in
Pole Inner Diameter =	53.25	in
e =	1.13	in
w =	4.65	in
Z =	1.82	in^3
M_u =	24.33	k-in
ϕM_n =	58.81282	k-in
LP Capacity =	**41.4% OK**	

UpperStiffeners

Configuration =	Every Other	
Thickness =	0.625	in
Width =	3	in
Notch =	0.5	in
Height =	5	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	Yes	
Vertical Weld Size =	0.3125	in
Horiz. Weld Type =	Fillet	
Fillet Size =	0.3125	in
Weld Strength =	70	ksi

Stiffeners ineffective - check plate unstiffened

Lower Stiffeners

Configuration =	Every Other	
Thickness =	0.625	in
Width =	2	in
Notch =	0.5	in
Height =	3.5	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	Yes	
Vertical Weld Size =	0.3125	in
Horiz. Weld Type =	Fillet	
Fillet Size =	0.3125	in
Weld Strength =	70	ksi

Stiffeners ineffective - check plate unstiffened

520 South Main Street • Suite 2531 • Akron, Ohio 44311• PHONE 330-572-2100 • FAX 330-572-2101

GPD GROUP
Glaus, Pyle, Schomer, Burns & DeHaven, Inc.

GPD GROUP
Engineers • Architects • Planners

Project #: 2016791.1002.01
Sheet No 1 Of 1

Calculated By: MR Date: 9/15/2016
Checked By: Date: 9/15/2016

BOLT AND BRIDGE STIFFENER CALCULATIONS @ 100'

Moment from TNX (M) =	1637.59	kip-ft	ASIF =	1.00			
Axial from TNX (P) =	34.80	kip					
Inner Bolt Diameter =	1	in					
Inner Bolt Area (A_{inner}) =	0.79	in^2	Inner Bolt Circle (BC_{inner}) =	51	in		
Inner Bolt MOI ($I_{o.inner}$) =	0.05	in^4	Total Area ($A_{tot.in}$) =	25.92	in^2		
Number Inner Bolts (N_{inner}) =	33		Percent Total Area (η_{in}) =	49.0%		Axial, Inner Bolts ($P*\eta_{in}$) =	17.04 kips
Bridge Stiffener Width =	6.00	in					
Bridge Stiffener Thickness =	1.50	in	Connection Bolt Hole Size =	0	in		
Bridge Stiffener Unbraced Length =	12.00	in	Net Bridge Stiffener Area ($A_{e.pl}$)	9	in2		
Bridge Stiffener Area (A_{pl}) =	9.00	in^2	Bridge Stiffener Circle (BC_{pl}) =	57	in		
Bridge Stiffener MOI (I_o) =	27.00	in^4	Total Area ($A_{tot.pl}$) =	27.00	in^2		
Number Bridge Stiffeners (N_{pl})	3		Percent Total Area (η_{pl}) =	51.0%		Axial, Bridge Stiffener ($P*\eta_{pl}$) =	17.76 kips

I_{inner} =	8428.25	$in.^4$	$(N_{inner}*A_{inner}*BC_{inner}^2/8 + N_{inner}*I_{o.inner})$
I_{pl} =	11046.38	$in.^4$	$(N_{pl}*A_{pl}*BC_{pl}^2/8 + N_{pl}*I_{o.pl})$
I_{tot} =	19474.63	$in.^4$	$(I_{inner} + I_{outer} + I_{pl})$
$P_{u.t.inner}$ =	19.7	kips	$(M*(BC_{inner}/2)*A_{inner})/I_{total} - P*\eta_{in}/N_{inner})$
$P_{u.t.pl}$ =	252.9	kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total} - P*\eta_{pl}/N_{pl})$
$P_{u.c.pl}$ =	264.7	kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total} + P*\eta_{pl}/N_{pl})$
$ØP_{nt.bolt}$ =	61.85	kips	
Bolt Rating =	31.8%	OK	

Bridge Stiffener Check

f_y =	50	ksi
f_u =	65	ksi
E =	29000	ksi
K =	0.85	
KL/r =	23.556	
F_e =	515.82	ksi
F_{cr} =	48.01	ksi
$ØP_{nc}$ =	388.90	kips
$ØP_{nt}$ =	438.75	kips
Bridge Stiffener Rating =	68.1%	OK

GPD GROUP

Existing Flange Connection @ 80'
US-CT-1002 Kettleto
2016791.1002.01

O.T. Moment =	1160.52	k*ft
Axial =	43.77	kips
Shear =	26.15	kips

*Above reactions have been adjusted due to consideration of modifications. See attached hand calculations for determination of flange bolt forces used in the analysis.

Acceptable Stress Ratio	
=	105.0%

Flange Bolts

# Bolts =	48	
Bolt Type =	A325	
Threads Included? =	Yes	
Bolt Diameter =	1	in
Bolt Circle =	57	in
ϕ_t =	0.75	
ϕ_v =	0.75	

Tension & Shear (TIA-222-G-1, Section 4.9.6)

F_{ub} =	120	ksi
A_b =	0.785398	in^2
A_n =	0.606	in^2
ϕR_{nv} =	31.81	kips
ϕR_{nt} =	54.54	kips
ϕR_{nt} (adjusted)=	54.53	kips
V_{ub} =	0.54	kips
T_{ub} =	19.44	kips

Prying Action Check

N/A, top flange thickness > tc

Max Comp. on Bolt =	21.27	kips
Shear Capacity =	1.7%	
Tensile Capacity =	35.7%	
Interaction Capacity =	35.7%	
Bolt Capacity =	**35.7%**	**OK**

Pole Information

Shaft Diam. (Upper) =	54	in
Thickness (Upper)=	0.375	in
# of Sides (Upper) =	Round	
F_y (Upper) =	42	ksi
Shaft Diam. (Lower) =	60	in
Thickness (Lower)=	0.375	in
# of Sides (Lower) =	Round	
F_y (Lower) =	42	ksi

Upper Flange Plate

Location =	External	
Plate Strength (F_y) =	36	ksi
Plate Tensile (F_u) =	58	ksi
Plate Thickness =	1.25	in
Outer Diameter =	60.375	in
ϕ_f =	0.9	
b =	3.11	in
Le =	3.00	in
Z =	2.34	in^3
M_u =	27.02	k-in
ϕM_n =	75.9375	k-in
UP Capacity =	**35.6%**	**OK**

UpperStiffeners

Configuration =	Every Bolt	
Thickness =	0.625	in
Width =	3	in
Notch =	0.5	in
Height =	5	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	Yes	
Vertical Weld Size =	0.3125	in
Horiz. Weld Type =	Fillet	
Fillet Size =	0.3125	in
Weld Strength =	70	ksi
Stiffener Vertical Force =	12.14	kips
Vert. Weld Capacity =	26.7%	kips
Horiz. Weld Capacity =	38.0%	kips
Stiffener Capacity =	42.2%	kips
Controlling Capacity =	**42.2%**	**OK**

Lower Flange Plate

Location =	Internal	
Plate Strength (F_y) =	36	ksi
Plate Thickness =	1.25	in
Hole Diameter =	51.375	in
b =	3.11	in
Le =	2.00	in
Z =	2.34	in^3
M_u =	32.27	k-in
ϕM_n =	75.9375	k-in
LP Capacity =	**42.5%**	**OK**

Lower Stiffeners

Configuration =	Every Bolt	
Thickness =	0.625	in
Width =	2	in
Notch =	0.5	in
Height =	3.5	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	Yes	
Vertical Weld Size =	0.3125	in
Horiz. Weld Type =	Fillet	
Fillet Size =	0.3125	in
Weld Strength =	70	ksi
Stiffener Vertical Force =	7.87	kips
Vert. Weld Capacity =	25.6%	kips
Horiz. Weld Capacity =	41.1%	kips
Stiffener Capacity =	38.8%	kips
Controlling Capacity =	**41.1%**	**OK**

- Welds Control

520 South Main Street • Suite 2531 • Akron, Ohio 44311• PHONE 330-572-2100 • FAX 330-572-2101

GPD GROUP
Glaus, Pyle, Schomer, Burns & DeHaven, Inc.

GPD GROUP
Engineers • Architects • Planners

Project #: 2016791.1002.01
Sheet No 1 Of 1

Calculated By: MR Date: 9/15/2016
Checked By: Date: 9/15/2016

BOLT AND BRIDGE STIFFENER CALCULATIONS @ 80'

Moment from TNX (M) =	2140.93	kip-ft	ASIF =	1.00			
Axial from TNX (P) =	43.77	kip					
Inner Bolt Diameter =	1	in					
Inner Bolt Area (A_{inner}) =	0.79	in^2	Inner Bolt Circle (BC_{inner}) =	57	in		
Inner Bolt MOI ($I_{o.inner}$) =	0.05	in^4	Total Area ($A_{tot.in}$) =	37.70	in^2		
Number Inner Bolts (N_{inner}) =	48		Percent Total Area (η_{in}) =	58.3%		Axial, Inner Bolts ($P*\eta_{in}$) =	25.50 kips
Bridge Stiffener Width =	6.00	in					
Bridge Stiffener Thickness =	1.50	in	Connection Bolt Hole Size =	0	in		
Bridge Stiffener Unbraced Length =	12.00	in	Net Bridge Stiffener Area ($A_{e.pl}$)	9	in		
Bridge Stiffener Area (A_{pl}) =	9.00	in^2	Bridge Stiffener Circle (BC_{pl}) =	63	in		
Bridge Stiffener MOI (I_o) =	27.00	in^4	Total Area ($A_{tot.pl}$) =	27.00	in^2		
Number Bridge Stiffeners (N_{pl})	3		Percent Total Area (η_{pl}) =	41.7%		Axial, Bridge Stiffener ($P*\eta_{pl}$) =	18.27 kips

I_{inner} =	15312.91	$in.^4$	$(N_{inner}*A_{inner}*BC_{inner}^2/8 + N_{inner}*I_{o.inner})$
I_{pl} =	13476.38	$in.^4$	$(N_{pl}*A_{pl}*BC_{pl}^2/8 + N_{pl}*I_{o.pl})$
I_{tot} =	28789.28	$in.^4$	$(I_{inner} + I_{outer} + I_{pl})$
$P_{u.t.inner}$ =	19.4	kips	$(M*(BC_{inner}/2)*A_{inner})/I_{total} - P*\eta_{in}/N_{inner})$
$P_{u.t.pl}$ =	246.9	kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total} - P*\eta_{pl}/N_{pl})$
$P_{u.c.pl}$ =	259.1	kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total} + P*\eta_{pl}/N_{pl})$
$ØP_{nt.bolt}$ =	61.85	kips	
Bolt Rating =	31.4%	OK	

Bridge Stiffener Check

f_y =	50	ksi
f_u =	65	ksi
E =	29000	ksi
K =	0.85	
KL/r =	23.556	
F_e =	515.82	ksi
F_{cr} =	48.01	ksi
$ØP_{nc}$ =	388.90	kips
$ØP_{nt}$ =	438.75	kips
Bridge Stiffener Rating =	66.6%	OK

GPD GROUP

Existing Flange Connection @ 60'
US-CT-1002 Kettleto
2016791.1002.01

O.T. Moment =	1146.32	k*ft
Axial =	54.19	kips
Shear =	28.25	kips

Acceptable Stress Ratio =	105.0%

*Above reactions have been adjusted due to consideration of modifications. See attached hand calculations for determination of flange bolt forces used in the analysis.

Flange Bolts

# Bolts =	32	
Bolt Type =	A325	
Threads Included? =	Yes	
Bolt Diameter =	1.75	in
Bolt Circle =	44	in
ϕ_t =	0.75	
ϕ_v =	0.75	

Tension & Shear (TIA-222-G-1, Section 4.9.6)

F_{ub} =	105	ksi
A_b =	2.405282	in^2
A_n =	1.9	in^2
ϕR_{nv} =	85.24	kips
ϕR_{nt} =	149.63	kips
ϕR_{nt} (adjusted)=	149.62	kips
V_{ub} =	0.88	kips
T_{ub} =	37.35	kips

Prying Action Check

N/A for stiffened flange

Max Comp. on Bolt =	40.74	kips
Shear Capacity =	1.0%	
Tensile Capacity =	25.0%	
Interaction Capacity =	25.0%	
Bolt Capacity =	**25.0%**	**OK**

Pole Information

Shaft Diam. (Upper) =	60	in
Thickness (Upper)=	0.375	in
# of Sides (Upper) =	Round	
F_y (Upper) =	42	ksi
Shaft Diam. (Lower) =	60	in
Thickness (Lower)=	0.5	in
# of Sides (Lower) =	Round	
F_y (Lower) =	42	ksi

Upper Flange Plate

Location =	Internal	
Plate Strength (F_y) =	36	ksi
Plate Tensile (F_u) =	58	ksi
Plate Thickness =	1.25	in
Hole Diameter =	43	in
ϕ_f =	0.9	
b =	3.69	in
Le =	7.00	in
Z =	2.34	in^3
M_u =	24.04	k-in
ϕM_n =	75.9375	k-in
UP Capacity =	**31.7%**	**OK**

Lower Flange Plate

Location =	Internal	
Plate Strength (F_y) =	36	ksi
Plate Thickness =	1.25	in
Hole Diameter =	43	in
b =	3.69	in
Le =	7.00	in
Z =	2.34	in^3
M_u =	24.04	k-in
ϕM_n =	75.9375	k-in
LP Capacity =	**31.7%**	**OK**

UpperStiffeners

Configuration =	Every Bolt	
Thickness =	0.625	in
Width =	7	in
Notch =	0.5	in
Height =	10	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	No	
Stiffener Vertical Force =	20.39	kips
Vert. Weld Capacity =	*Not Verified*	kips
Horiz. Weld Capacity =	*Not Verified*	kips
Stiffener Capacity =	37.2%	kips
Controlling Capacity =	**37.2%**	**OK**

Lower Stiffeners

Configuration =	Every Bolt	
Thickness =	0.625	in
Width =	7	in
Notch =	0.5	in
Height =	10	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	No	
Stiffener Vertical Force =	17.98	kips
Vert. Weld Capacity =	*Not Verified*	kips
Horiz. Weld Capacity =	*Not Verified*	kips
Stiffener Capacity =	32.8%	kips
Controlling Capacity =	**32.8%**	**OK**

520 South Main Street • Suite 2531 • Akron, Ohio 44311• PHONE 330-572-2100 • FAX 330-572-2101

GPD GROUP
Glaus, Pyle, Schomer, Burns & DeHaven, Inc.

GPD GROUP
Engineers • Architects • Planners

Project #: 2016791.1002.01
Sheet No 1 Of 1

Calculated By: MR Date: 9/15/2016
Checked By: Date: 9/15/2016

BOLT AND BRIDGE STIFFENER CALCULATIONS @ 60'

Moment from TNX (M) =	2687.42 kip-ft	ASIF =	1.00				
Axial from TNX (P) =	54.19 kip						
Inner Bolt Diameter =	1.25 in						
Inner Bolt Area (A_{inner}) =	1.23 in^2	Inner Bolt Circle (BC_{inner}) =	47 in				
Inner Bolt MOI ($I_{o.inner}$) =	0.12 in^4	Total Area ($A_{tot.in}$) =	39.27 in^2				
Number Inner Bolts (N_{inner}) =	32	Percent Total Area (η_{in}) =	29.6%	Axial, Inner Bolts ($P*\eta_{in}$) =	16.06 kips		
Outer Bolt Diameter =	1.25 in						
Outer Bolt Area (A_{outer}) =	1.23 in^2	Outer Bolt Circle (BC_{outer}) =	53 in				
Outer Bolt MOI ($I_{o.outer}$) =	0.12 in^4	Total Area ($A_{tot.out}$) =	39.27 in^2				
Number Outer Bolts (N_{outer}) =	32	Percent Total Area (η_{out}) =	29.6%	Axial, Outer Bolts ($P*\eta_{out}$) =	16.06 kips		
Bridge Stiffener Width =	6.00 in						
Bridge Stiffener Thickness =	1.50 in	Connection Bolt Hole Size =	1.21875 in				
Bridge Stiffener Unbraced Length =	30.00 in	Net Bridge Stiffener Area ($A_{e.pl}$)	7.17188 in				
Bridge Stiffener Area (A_{pl}) =	9.00 in^2	Bridge Stiffener Circle (BC_{pl}) =	63 in				
Bridge Stiffener MOI (I_o) =	27.00 in^4	Total Area ($A_{tot.pl}$) =	54.00 in^2				
Number Bridge Stiffeners (N_{pl})	6	Percent Total Area (η_{pl}) =	40.7%	Axial, Bridge Stiffener ($P*\eta_{pl}$) =	22.08 kips		

I_{inner} =	10847.24 $in.^4$	$(N_{inner}*A_{inner}*BC_{inner}^2/8 + N_{inner}*I_{o.inner})$	
I_{outer} =	13792.48 $in.^4$	$(N_{outer}*A_{outer}*BC_{outer}^2/8 + N_{outer}*I_{o.outer})$	
I_{pl} =	26952.75 $in.^4$	$(N_{pl}*A_{pl}*BC_{pl}^2/8 + N_{pl}*I_{o.pl})$	
I_{tot} =	51592.47 $in.^4$	$(I_{inner} + I_{outer} + I_{pl})$	
$P_{u.t.inner}$ =	17.5 kips	$(M*(BC_{inner}/2)*A_{inner})/I_{total} - P*\eta_{in}/N_{inner})$	
$P_{u.t.outer}$ =	19.8 kips	$(M*(BC_{outer}/2)*A_{outer})/I_{total} - P*\eta_{out}/N_{outer})$	
$P_{u.t.pl}$ =	173.5 kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total} - P*\eta_{pl}/N_{pl})$	
$P_{u.c.pl}$ =	180.9 kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total} + P*\eta_{pl}/N_{pl})$	
$ØP_{nt.bolt}$ =	96.64 kips		
Bolt Rating =	20.5% OK		

Bridge Stiffener Check

f_y =	50	ksi
f_u =	65	ksi
E =	29000	ksi
K =	0.85	
KL/r =	58.890	
F_e =	82.53	ksi
F_{cr} =	38.80	ksi
$ØP_{nc}$ =	314.29	kips
$ØP_{nt}$ =	349.63	kips
Bridge Stiffener Rating =	57.6%	OK

GPD GROUP

Existing Flange Connection @ 40'
US-CT-1002 Kettleto
2016791.1002.01

O.T. Moment =	1584.89	k*ft
Axial =	67.61	kips
Shear =	29.85	kips

Acceptable Stress Ratio =	105.0%

*Above reactions have been adjusted due to consideration of modifications. See attached hand calculations for determination of flange bolt forces used in the analysis.

Flange Bolts

# Bolts =	32	
Bolt Type =	A325	
Threads Included? =	Yes	
Bolt Diameter =	1.75	in
Bolt Circle =	50	in
ϕ_t =	0.75	
ϕ_v =	0.75	

Tension & Shear (TIA-222-G-1, Section 4.9.6)

F_{ub} =	105	ksi
A_b =	2.405282	in^2
A_n =	1.9	in^2
ϕR_{nv} =	85.24	kips
ϕR_{nt} =	149.63	kips
ϕR_{nt} (adjusted)=	149.62	kips
V_{ub} =	0.93	kips
T_{ub} =	45.40	kips

Prying Action Check

N/A for stiffened flange

Max Comp. on Bolt =	49.63	kips
Shear Capacity =	1.1%	
Tensile Capacity =	30.3%	
Interaction Capacity =	30.3%	
Bolt Capacity =	**30.3%**	**OK**

Pole Information

Shaft Diam. (Upper) =	60	in
Thickness (Upper)=	0.5	in
# of Sides (Upper) =	Round	
F_y (Upper) =	42	ksi
Shaft Diam. (Lower) =	60	in
Thickness (Lower)=	0.625	in
# of Sides (Lower) =	Round	
F_y (Lower) =	42	ksi

Upper Flange Plate

Location =	Internal	
Plate Strength (F_y) =	36	ksi
Plate Tensile (F_u) =	58	ksi
Plate Thickness =	1.25	in
Hole Diameter =	43	in
ϕ_f =	0.9	
b =	4.28	in
Le =	7.00	in
Z =	2.34	in^3
M_u =	31.58	k-in
ϕM_n =	75.9375	k-in
UP Capacity =	**41.6%**	**OK**

Lower Flange Plate

Location =	Internal	
Plate Strength (F_y) =	36	ksi
Plate Thickness =	1.25	in
Hole Diameter =	43	in
b =	4.28	in
Le =	7.00	in
Z =	2.34	in^3
M_u =	31.58	k-in
ϕM_n =	75.9375	k-in
LP Capacity =	**41.6%**	**OK**

UpperStiffeners

Configuration =	Every Bolt	
Thickness =	0.625	in
Width =	7	in
Notch =	0.5	in
Height =	10	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	No	
Stiffener Vertical Force =	24.72	kips
Vert. Weld Capacity =	*Not Verified*	kips
Horiz. Weld Capacity =	*Not Verified*	kips
Stiffener Capacity =	45.1%	kips
Controlling Capacity =	**45.1%**	**OK**

Lower Stiffeners

Configuration =	Every Bolt	
Thickness =	0.625	in
Width =	7	in
Notch =	0.5	in
Height =	10	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	No	
Stiffener Vertical Force =	22.11	kips
Vert. Weld Capacity =	*Not Verified*	kips
Horiz. Weld Capacity =	*Not Verified*	kips
Stiffener Capacity =	40.4%	kips
Controlling Capacity =	**40.4%**	**OK**

520 South Main Street • Suite 2531 • Akron, Ohio 44311• PHONE 330-572-2100 • FAX 330-572-2101

GPD GROUP
Glaus, Pyle, Schomer, Burns & DeHaven, Inc.

GPD GROUP
Engineers • Architects • Planners

Project #: 2016791.1002.01
Sheet No 1 Of 1

Calculated By: MR Date: 9/15/2016
Checked By: Date: 9/15/2016

BOLT AND BRIDGE STIFFENER CALCULATIONS @ 40'

Moment from TNX (M) =	3269.04 kip-ft	ASIF =	1.00				
Axial from TNX (P) =	67.61 kip						
Inner Bolt Diameter =	1.25 in						
Inner Bolt Area (A_{inner}) =	1.23 in^2	Inner Bolt Circle (BC_{inner}) =	47 in				
Inner Bolt MOI ($I_{o.inner}$) =	0.12 in^4	Total Area ($A_{tot.in}$) =	39.27 in^2				
Number Inner Bolts (N_{inner}) =	32	Percent Total Area (η_{in}) =	29.6%	Axial, Inner Bolts ($P*\eta_{in}$) =	20.03 kips		
Outer Bolt Diameter =	1.25 in						
Outer Bolt Area (A_{outer}) =	1.23 in^2	Outer Bolt Circle (BC_{outer}) =	53 in				
Outer Bolt MOI ($I_{o.outer}$) =	0.12 in^4	Total Area ($A_{tot.out}$) =	39.27 in^2				
Number Outer Bolts (N_{outer}) =	32	Percent Total Area (η_{out}) =	29.6%	Axial, Outer Bolts ($P*\eta_{out}$) =	20.03 kips		
Bridge Stiffener Width =	6.00 in						
Bridge Stiffener Thickness =	1.50 in	Connection Bolt Hole Size =	1.18 in				
Bridge Stiffener Unbraced Length =	30.00 in	Net Bridge Stiffener Area ($A_{e.pl}$)	7.23 in				
Bridge Stiffener Area (A_{pl}) =	9.00 in^2	Bridge Stiffener Circle (BC_{pl}) =	63 in				
Bridge Stiffener MOI (I_o) =	27.00 in^4	Total Area ($A_{tot.pl}$) =	54.00 in^2				
Number Bridge Stiffeners (N_{pl})	6	Percent Total Area (η_{pl}) =	40.7%	Axial, Bridge Stiffener ($P*\eta_{pl}$) =	27.55 kips		

I_{inner} =	10847.24 $in.^4$	$(N_{inner}*A_{inner}*BC_{inner}^2/8 + N_{inner}*I_{o.inner})$	
I_{outer} =	13792.48 $in.^4$	$(N_{outer}*A_{outer}*BC_{outer}^2/8 + N_{outer}*I_{o.outer})$	
I_{pl} =	26952.75 $in.^4$	$(N_{pl}*A_{pl}*BC_{pl}^2/8 + N_{pl}*I_{o.pl})$	
I_{tot} =	51592.47 $in.^4$	$(I_{inner} + I_{outer} + I_{pl})$	
$P_{u.t.inner}$ =	21.3 kips	$(M*(BC_{inner}/2)*A_{inner})/I_{total} - P*\eta_{in}/N_{inner})$	
$P_{u.t.outer}$ =	24.1 kips	$(M*(BC_{outer}/2)*A_{outer})/I_{total} - P*\eta_{out}/N_{outer})$	
$P_{u.t.pl}$ =	211.0 kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total} - P*\eta_{pl}/N_{pl})$	
$P_{u.c.pl}$ =	220.2 kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total} + P*\eta_{pl}/N_{pl})$	
$ØP_{nt.bolt}$ =	96.64 kips		
Bolt Rating =	24.9% OK		

Bridge Stiffener Check

f_y =	50	ksi
f_u =	65	ksi
E =	29000	ksi
K =	0.85	
KL/r =	58.890	
F_e =	82.53	ksi
F_{cr} =	38.80	ksi
$ØP_{nc}$ =	314.29	kips
$ØP_{nt}$ =	352.46	kips
Bridge Stiffener Rating =	70.0%	OK

GPD GROUP

Existing Flange Connection @ 20'
US-CT-1002 Kettleto
2016791.1002.01

O.T. Moment =	1551.1	k*ft
Axial =	83.19	kips
Shear =	31.09	kips

Acceptable Stress Ratio =	105.0%

*Above reactions have been adjusted due to consideration of modifications. See attached hand calculations for determination of flange bolt forces used in the analysis.

Flange Bolts

# Bolts =	32	
Bolt Type =	A325	
Threads Included? =	Yes	
Bolt Diameter =	1.75	in
Bolt Circle =	50	in
ϕ_t =	0.75	
ϕ_v =	0.75	

Tension & Shear (TIA-222-G-1, Section 4.9.6)

F_{ub} =	105	ksi
A_b =	2.405282	in^2
A_n =	1.9	in^2
ϕR_{nv} =	85.24	kips
ϕR_{nt} =	149.63	kips
ϕR_{nt} (adjusted)=	149.62	kips
V_{ub} =	0.97	kips
T_{ub} =	43.90	kips

Prying Action Check

N/A for stiffened flange

Max Comp. on Bolt =	49.10	kips
Shear Capacity =	1.1%	
Tensile Capacity =	29.3%	
Interaction Capacity =	29.3%	
Bolt Capacity =	**29.3%**	**OK**

Pole Information

Shaft Diam. (Upper) =	60	in
Thickness (Upper)=	0.625	in
# of Sides (Upper) =	Round	
F_y (Upper) =	42	ksi
Shaft Diam. (Lower) =	60	in
Thickness (Lower)=	0.625	in
# of Sides (Lower) =	Round	
F_y (Lower) =	42	ksi

Upper Flange Plate

Location =	Internal	
Plate Strength (F_y) =	36	ksi
Plate Tensile (F_u) =	58	ksi
Plate Thickness =	1.25	in
Hole Diameter =	43	in
ϕ_f =	0.9	
b =	4.28	in
Le =	7.00	in
Z =	2.34	in^3
M_u =	31.25	k-in
ϕM_n =	75.9375	k-in
UP Capacity =	**41.2%**	**OK**

Lower Flange Plate

Location =	Internal	
Plate Strength (F_y) =	36	ksi
Plate Thickness =	1.25	in
Hole Diameter =	43	in
b =	4.28	in
Le =	7.00	in
Z =	2.34	in^3
M_u =	31.25	k-in
ϕM_n =	75.9375	k-in
LP Capacity =	**41.2%**	**OK**

UpperStiffeners

Configuration =	Every Bolt	
Thickness =	0.625	in
Width =	7	in
Notch =	0.5	in
Height =	10	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	No	
Stiffener Vertical Force =	21.92	kips
Vert. Weld Capacity =	*Not Verified*	kips
Horiz. Weld Capacity =	*Not Verified*	kips
Stiffener Capacity =	40.0%	kips
Controlling Capacity =	**40.0%**	**OK**

Lower Stiffeners

Configuration =	Every Bolt	
Thickness =	0.625	in
Width =	7	in
Notch =	0.5	in
Height =	10	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	No	
Stiffener Vertical Force =	21.92	kips
Vert. Weld Capacity =	*Not Verified*	kips
Horiz. Weld Capacity =	*Not Verified*	kips
Stiffener Capacity =	40.0%	kips
Controlling Capacity =	**40.0%**	**OK**

520 South Main Street • Suite 2531 • Akron, Ohio 44311• PHONE 330-572-2100 • FAX 330-572-2101

GPD GROUP
Glaus, Pyle, Schomer, Burns & DeHaven, Inc.

GPD GROUP
Engineers • Architects • Planners

Project #: 2016791.1002.01
Sheet No 1 Of 1

Calculated By: MR Date: 9/15/2016
Checked By: Date: 9/15/2016

BOLT AND BRIDGE STIFFENER CALCULATIONS @ 20'

Moment from TNX (M) =	3879.00 kip-ft	ASIF =	1.00				
Axial from TNX (P) =	83.19 kip						
Inner Bolt Diameter =	1.25 in						
Inner Bolt Area (A_{inner}) =	1.23 in^2	Inner Bolt Circle (BC_{inner}) =	47 in				
Inner Bolt MOI ($I_{o.inner}$) =	0.12 in^4	Total Area ($A_{tot.in}$) =	39.27 in^2				
Number Inner Bolts (N_{inner}) =	32	Percent Total Area (η_{in}) =	24.2%	Axial, Inner Bolts ($P*\eta_{in}$) =	20.10 kips		
Outer Bolt Diameter =	1.25 in						
Outer Bolt Area (A_{outer}) =	1.23 in^2	Outer Bolt Circle (BC_{outer}) =	53 in				
Outer Bolt MOI ($I_{o.outer}$) =	0.12 in^4	Total Area ($A_{tot.out}$) =	39.27 in^2				
Number Outer Bolts (N_{outer}) =	32	Percent Total Area (η_{out}) =	24.2%	Axial, Outer Bolts ($P*\eta_{out}$) =	20.10 kips		
Bridge Stiffener Width =	6.00 in						
Bridge Stiffener Thickness =	1.50 in	Connection Bolt Hole Size =	1.21875 in				
Bridge Stiffener Unbraced Length =	30.00 in	Net Bridge Stiffener Area ($A_{e.pl}$) =	7.17188 in				
Bridge Stiffener Area (A_{pl}) =	9.00 in^2	Bridge Stiffener Circle (BC_{pl}) =	60.75 in				
Bridge Stiffener MOI (I_o) =	27.00 in^4	Total Area ($A_{tot.pl}$) =	54.00 in^2				
Number Bridge Stiffeners (N_{pl})	6	Percent Total Area (η_{pl}) =	33.2%	Axial, Bridge Stiffener ($P*\eta_{pl}$) =	27.64 kips		
Bridge Stiffener Width =	4.00 in						
Bridge Stiffener Thickness =	1.25 in	Connection Bolt Hole Size =	1.21875 in				
Bridge Stiffener Unbraced Length =	12.00 in	Net Bridge Stiffener Area ($A_{e.pl}$) =	3.47656 in				
Bridge Stiffener Area (A_{pl}) =	5.00 in^2	Bridge Stiffener Circle (BC_{pl}) =	60.625 in				
Bridge Stiffener MOI (I_o) =	6.67 in^4	Total Area ($A_{tot.pl}$) =	30.00 in^2				
Number Bridge Stiffeners (N_{pl})	6	Percent Total Area (η_{pl}) =	18.5%	Axial, Bridge Stiffener ($P*\eta_{pl}$) =	15.35 kips		

I_{inner} =	10847.24 $in.^4$	$(N_{inner}*A_{inner}*BC_{inner}^2/8 + N_{inner}*I_{o.inner})$	
I_{outer} =	13792.48 $in.^4$	$(N_{outer}*A_{outer}*BC_{outer}^2/8 + N_{outer}*I_{o.outer})$	
I_{pl} =	25073.30 $in.^4$	$(N_{pl}*A_{pl}*BC_{pl}^2/8 + N_{pl}*I_{o.pl})$	
I_{pl} =	13822.71 $in.^4$	$(N_{pl}*A_{pl}*BC_{pl}^2/8 + N_{pl}*I_{o.pl})$	
I_{tot} =	63535.73 $in.^4$	$(I_{inner} + I_{outer} + I_{pl})$	
$P_{u.t.inner}$ =	20.5 kips	$(M*(BC_{inner}/2)*A_{inner})/I_{total} - P*\eta_{in}/N_{inner})$	
$P_{u.t.outer}$ =	23.2 kips	$(M*(BC_{outer}/2)*A_{outer})/I_{total} - P*\eta_{out}/N_{outer})$	
$P_{u.t.pl}$ =	195.7 kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total} - P*\eta_{pl}/N_{pl})$	
$P_{u.c.pl}$ =	204.9 kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total} + P*\eta_{pl}/N_{pl})$	
$P_{u.t.pl}$ =	108.5 kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total} - P*\eta_{pl}/N_{pl})$	

Bridge Stiffener Check

f_y =	50	ksi
f_u =	65	ksi
E =	29000	ksi
K =	0.85	
KL/r =	58.890	
F_e =	82.53	ksi
F_{cr} =	38.80	ksi
$ØP_{nc}$ =	314.29	kips
$ØP_{nt}$ =	349.63	kips
Bridge Stiffener Rating =	65.2%	OK

$P_{u.c.pl}$ =	113.6	kips	$(M*(BC_{pl}/2)*A_{pl})/I_{total} + P*\eta_{pl}/N_{pl})$
$\varnothing P_{nt.bolt}$ =	96.64	kips	
Bolt Rating =	24.0%	OK	

APPENDIX E

Anchor Rod & Base Plate Analysis

Anchor Rod and Base Plate Stresses, TIA-222-G-1
US-CT-1002 Kettleto
2016791.1002.01

Overturning Moment =	3519.21	k*ft
Axial Force =	97.22	k
Shear Force =	31.94	k

Acceptable Stress Ratio =	105.0%

*Above reactions have been adjusted due to consideration of modifications. See attached hand calculations for determination of anchor rod forces used in the analysis below.

Anchor Rods (Section 4.9.9, TIA-222-G-1)		
Number of Rods =	52	
ϕ =	0.8	
Rod Ultimate Strength (F_u) =	150	ksi
Base Plate Detail Type* =	d	
Rod Circle =	67	in
Rod Diameter =	1.25	in
Net Tensile Area =	0.97	in^2
Max Tension on Rod =	46.61	kips
Max Compression on Rod =	50.35	kips
P_u =	50.35	kips
V_u =	0.61	kips
η =	0.50	
$P_u + V_u / η$ =	51.57	
$φR_{nt}$ =	116.28	kips
Anchor Rod Capacity =	**44.4%**	**OK**

Base Plate		
Location =	External	
Plate Strength (Fy) =	36	ksi
ϕ =	0.9	
Outside Diameter =	69.75	in
Plate Thickness =	1.25	in
b =	3.42	in
Le =	4.50	in
Z =	2.34	in^3
M_u =	44.38	k-in
$φM_n$ =	75.94	k-in
BP Capacity =	**58.4%**	**OK**

Pole		
Pole Diameter =	60	in
Number of Sides =	Round	
Thickness =	0.625	in
Pole Yield Strength =	42	ksi

***This analysis assumes the clear distance from the top of the concrete to the bottom of the leveling nut is less than the diameter of the anchor rod. Notify GPD Group immediately if existing field conditions do not meet this assumption.**

Stiffeners		
Configuration =	Every Rod	
Thickness =	0.625	in
Width =	4.5	in
Notch =	0.5	in
Height =	8	in
Stiffener Strength (F_y) =	36	ksi
Weld Info. Known? =	Yes	
Vertical Weld Size =	0.375	in
Horiz. Weld Type =	Fillet	
Fillet Size =	0.375	in
Weld Strength =	70	ksi
Stiffener Vertical Force =	29.56	kips
Vert. Weld Capacity =	31.4%	kips
Horiz. Weld Capacity =	47.5%	kips
Stiffener Capacity =	63.6%	kips
Controlling Capacity =	**63.6%**	**OK**

Anchor Rod Interaction, TIA-222-G
US-CT-1002 Kettleto
2016791.1002.01

tnx Reactions		
Overturning Moment=	4509.87	k*ft
Axial Force =	97.22	k
Shear Force =	31.94	k

Existing Anchor Rods		
Number of Rods =	52	
Rod Circle =	67	in
Rod Diameter =	1.25	in
Est. Dist. b/w ea. Rod =		in
Plate Type =	Round	
Plate Diameter =	69.75	in

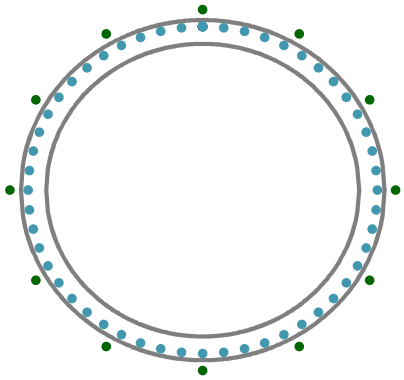
Pole		
Pole Diameter =	60	in
Number of Sides =	Round	
Thickness =	0.625	in

First Added Anchor Rods		
Number of Rods =	12	
Rod Circle =	74.00	in
Rod Diameter =	1.25	in
Anchor Rod Grade =	F1554 GR 105	

Rod Number	Initial Angle
1	0
2	30
3	60
4	90
5	120
6	150
7	180
8	210
9	240
10	270
11	300
12	330

First Added Anchor Rods		
Max Rod Compression =	53.54	k
ϕRnt =	96.90	k
Anchor Rod Capacity =	55.25%	**OK**

Reactions in Existing Rods		
Overturning Moment=	**3519.21**	k*ft
Axial Force =	**97.22**	k
Shear Force =	**31.94**	k
Centroid Offset =	**0.00**	in



Second Added Anchor Rods		
Number of Rods =		
Rod Circle =		in
Rod Diameter =		in
Anchor Rod Grade =		

APPENDIX F

Foundation Analysis

Pile Analysis

US-CT-1002 Kettleto

2016791.1002.01

M	4509.87	k-ft
P	97.22	k
V	31.94	k
M tot	4685.54	k-ft
M tot 45	3313.177	k-ft
d	5.5	ft
h	46	ft
Vconc	11638	ft^3
wconc	1745.7	k

Pile Ultimate Capacities

Existing

Compression	150	k
Tension	100	k

Modification

Compression	100	k
Tension	100	k

Wequip 75 k (weight of the equipment above the pad)

n existing	24
n mod	48

Total force on piles

				X			45	
	n	x (ft)	y (ft)	Pc (k)	Pt (k)	Mu (k-ft)	Pc (k)	Pt (k)
Existing	4	0	0	25.60	25.60	0.00	25.60	25.60
	10	6	6	27.36	23.83	820.72	28.09	23.11
	10	12	12	29.12	22.07	1747.13	30.58	20.61
	24							
Mod	2	0	0	25.60	25.60	0.00	25.60	25.60
	4	3.5	3.5	26.62	24.57	186.37	27.05	24.14
	4	7	7	27.65	23.54	387.11	28.50	22.69
	4	10.5	10.5	28.68	22.51	602.25	29.96	21.24
	4	14	14	29.71	21.49	831.77	31.41	19.78
	4	17.5	17.5	30.73	20.46	1075.67	32.86	18.33
	26	21	21	31.76	19.43	8670.73	34.31	16.88
	48							

Pile Capacities

Existing

Compression	38.8%
Tension	51.2%

Modification

Compression	63.5%
Tension	51.2%

Reinforcement Capacity

Mu	14321.75	k-ft
a	4.262575	in
d	60.885	in
Phi Mn	22473.3	k-ft

Capacity 63.7%

TOWN OF SOUTHBURY

ZONING COMMISSION

501 Main Street South

Southbury, Connecticut 06488-2295

(203) 262-0665

FAX: (203) 264-3719

Zoning Permit

Permit Number	3324	*Issue Date*	5/03/00
Permission is granted to	SOUTHBURY, TOWN OF		
To build	ACCESSORY BLDGS./ANTENNAS		
Address	231 Kettletown Road	*Lot*	23

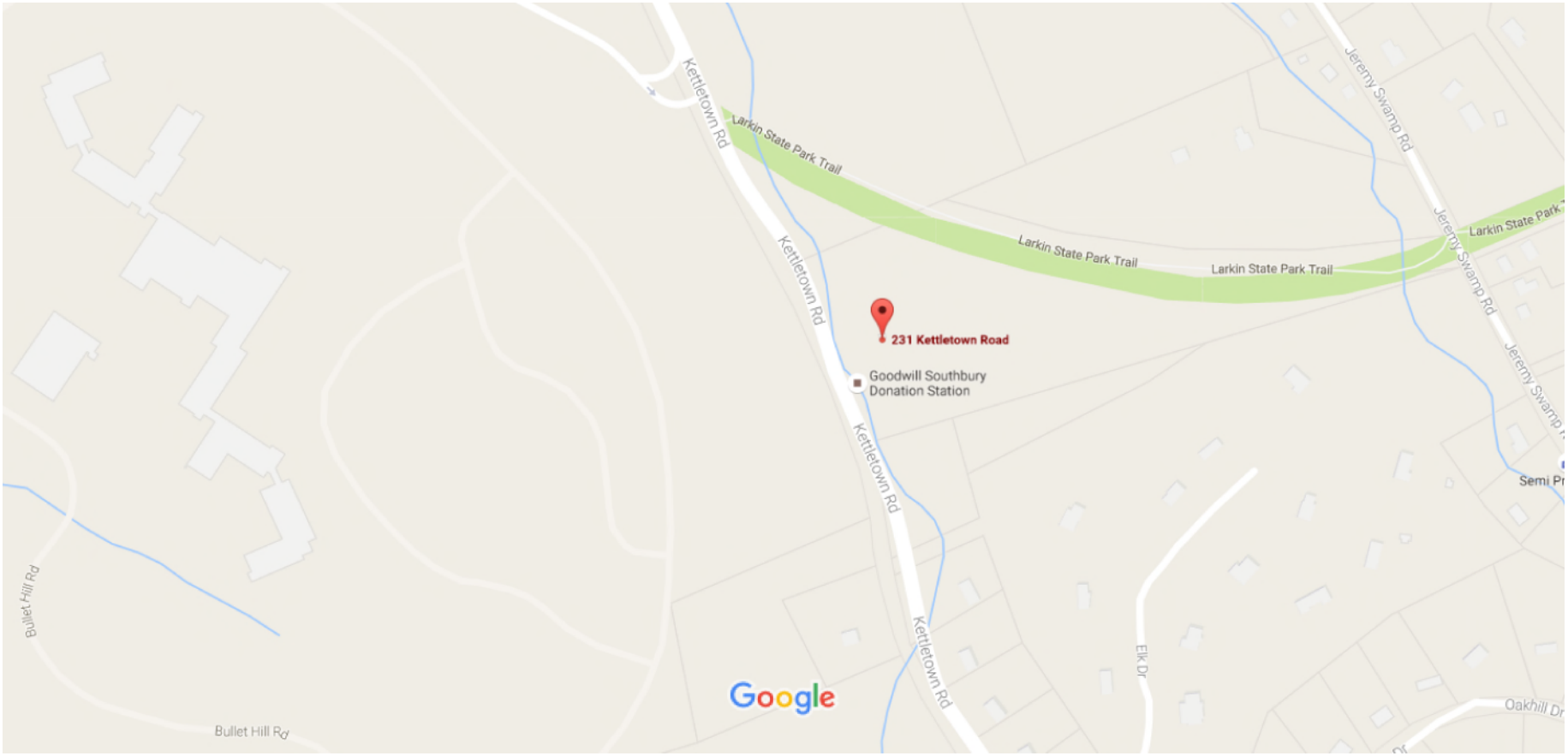
This permit is granted subject to compliance with the state law of Connecticut and zoning and building ordinances of the Town of Southbury.

Zoning Enforcement Officer

NOTE: As of March 11, 1985, on completion of the foundations, a certified plot plan will be required and filed in the zoning department (as built).

Z/B/A

Google Maps 231 Kettletown Rd



Map data ©2016 Google 200 ft

231 KETTLETOWN ROAD

Location	231 KETTLETOWN ROAD	**Mblu**	35/ 43/ 23/ /
Acct#	00369500	**Owner**	SOUTHBURY TOWN OF
Assessment	$264,210	**Appraisal**	$377,430
PID	4358	**Building Count**	1

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$85,880	$291,550	$377,430
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$60,120	$204,090	$264,210

Owner of Record

Owner	SOUTHBURY TOWN OF	**Sale Price**	$0
Co-Owner		**Certificate**	
Address	501 MAIN ST SO SOUTHBURY, CT 06488	**Book & Page**	112/ 334
		Sale Date	03/15/1973
		Instrument	25

Ownership History

Ownership History					
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Instrument**	**Sale Date**
SOUTHBURY TOWN OF	$0		112/ 334	25	03/15/1973

Building Information

Building 1 : Section 1

Year Built:
Living Area: 0
Replacement Cost: $0
Building Percent Good:
Replacement Cost Less Depreciation: $0

Building Photo

Building Attributes	
Field	**Description**
Style	Outbuildings
Model	

Grade:	
Stories	
Occupancy	
Exterior Wall 1	
Exterior Wall 2	
Roof Structure	
Roof Cover	
Interior Wall 1	
Interior Wall 2	
Interior Flr 1	
Interior Flr 2	
Heat Fuel	
Heat Type:	
AC Percent	
Total Bedrooms:	
Full Bthrms:	
Half Baths:	
Extra Fixtures	
Total Rooms:	
Bath Style:	
Kitchen Style:	
Num Kitchens	
Pln FPL:	
Det FPL:	
Gas Fireplace(s)	
% Attic Fin	
LF Dormer	
Foundation	
Bsmt Gar(s)	
Bsmt %	
SF FBM	
Fin Bsmt Qual	
Bsmt Access	

(http://images.vgsi.com/photos/SouthburyCTPhotos//default.jpg)

Building Layout

Building Layout

Building Sub-Areas (sq ft)	Legend
No Data for Building Sub-Areas	

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use	Land Line Valuation

Use Code	929	**Size (Acres)**	9.95
Description	Exempt Comm Vac OB	**Frontage**	0
Zone	R-60	**Depth**	0
Neighborhood	C200	**Assessed Value**	$204,090
Alt Land Appr	No	**Appraised Value**	$291,550
Category			

Outbuildings

Outbuildings						Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**
SHD1	Shed	FR	Frame	180 S.F.	$1,350	1
SHD1	Shed	FR	Frame	128 S.F.	$960	1
SHD1	Shed	FR	Frame	208 S.F.	$1,560	1
SHD1	Shed	FR	Frame	168 S.F.	$1,260	1
PAV1	Paving	AS	Asphalt	64600 S.F.	$80,750	1

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2011	$146,440	$256,410	$402,860

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2011	$102,510	$179,490	$282,000