STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

Phone: (860) 827-2935 Fax: (860) 827-2950

E-Mail: siting.council@ct.gov

Internet: ct.gov/csc

Daniel F. Caruso

Chairman

March 15, 2011

Douglas L. Culp
Real Estate Consultant
New Cingular Wireless PCS, LLC
500 Enterprise Drive
Rocky Hill, CT 06067-3900

RE: **EM-CING-023-110210** - New Cingular Wireless PCS, LLC notice of intent to modify an existing telecommunications facility located at 650 Albany Turnpike, Canton, Connecticut.

Dear Mr. Culp:

The Connecticut Siting Council (Council) hereby acknowledges your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies with the following conditions:

- Any deviation from the proposed modification as specified in this notice and supporting materials with Council shall render this acknowledgement invalid;
- Any material changes to this modification as proposed shall require the filing of a new notice with the Council;
- Not less than 45 days after completion of construction, the Council shall be notified in writing that construction has been completed;
- The validity of this action shall expire one year from the date of this letter; and
- The applicant may file a request for an extension of time beyond the one year deadline provided that such request is submitted to the Council not less than 60 days prior to the expiration;

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated February 10, 2011. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Please be advised that the validity of this action shall expire one year from the date of this letter. Any additional change to this facility will require explicit notice to this agency pursuant to Regulations of Connecticut State Agencies Section 16-50j-73. Such notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Thank you for your attention and cooperation.

Very truly yours,

Linda Roberts
Executive Director

LR/CDM/laf

c: The Honorable Richard J. Barlow, First Selectman, Town of Canton
Robert H. Skinner, Chief Administrative Officer, Town of Canton
Neil Pade, Town Planner, Town of Canton
Kenneth C. Baldwin, Esq., Robinson & Cole LLP

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Daniel F. Caruso
Chairman

February 22, 2011

The Honorable Richard J. Barlow
First Selectman
Town of Canton
4 Market Street
P. O. Box 168
Collinsville, CT 06022-0168

RE: **EM-CING-023-110210** - New Cingular Wireless PCS, LLC notice of intent to modify an existing telecommunications facility located at 650 Albany Turnpike, Canton, Connecticut.

Dear First Selectman Barlow:

The Connecticut Siting Council (Council) received this request to modify an existing telecommunications facility, pursuant to Regulations of Connecticut State Agencies Section 16-50j-72.

If you have any questions or comments regarding this proposal, please call me or inform the Council by March 8, 2011.

Thank you for your cooperation and consideration.

Very truly yours,

Linda Roberts

Linda Roberts
Executive Director

LR/jbw

Enclosure: Notice of Intent

c: Robert H. Skinner, Chief Administrative Officer, Town of Canton
Neil Pade, Town Planner, Town of Canton

EM-CING-023-110210

New Cingular Wireless PCS, LLC
500 Enterprise Drive
Rocky Hill, Connecticut 06067-3900
Phone: (860) 463-5511
Fax: (860) 513-7190

Douglas L. Culp
Real Estate Consultant

HAND DELIVERED

February 10, 2011

RECEIVED
FEB 10 2011
CONNECTICUT
SITING COUNCIL

Honorable Daniel F. Caruso, Chairman,
and Members of the Connecticut Siting Council
Connecticut Siting Council
10 Franklin Square
New Britain, Connecticut 06051

Re: New Cingular Wireless PCS, LLC notice of intent to modify an existing tele-communications facility located at 650 Albany Turnpike, Canton, CT (owner Verizon Wireless)

Dear Chairman Caruso and Members of the Council:

In order to accommodate technological changes, implement Uniform Mobile Telecommunications System ("UMTS") capability, and enhance system performance in the State of Connecticut, New Cingular Wireless PCS, LLC ("AT&T") plans to modify the equipment configurations at many of its existing cell sites. Please accept this letter and attachments as notification, pursuant to R.C.S.A. Section 16-50j-73, of construction which constitutes an exempt modification pursuant to R.C.S.A. Section 16-50j-72(b)(2). In compliance with R.C.S.A. Section 16-50j-73, a copy of this letter and attachments is being sent to the chief elected official of the municipality in which the affected cell site is located.

UMTS technology offers services to mobile computer and phone users anywhere in the world. Based on the Global System for Mobile (GSM) communication standard, UMTS is the planned worldwide standard for mobile users. UMTS, fully implemented, gives computer and phone users high-speed access to the Internet as they travel. They have the same capabilities even when they roam, through both terrestrial wireless and satellite transmissions.

Attached is a summary of the planned modifications, including power density calculations reflecting the change in AT&T's operations at the site. Also included is documentation of the structural sufficiency of the tower to accommodate the revised antenna configuration.

The changes to the facility do not constitute modifications as defined in Connecticut General Statutes ("C.G.S.") Section 16-50i(d) because the general physical characteristics of the facility will not be significantly changed or altered. Rather, the planned changes to the facility fall squarely within those activities explicitly provided for in R.C.S.A. Section 16-50j-72(b)(2).

1. The height of the overall structure will be unaffected.

2. The proposed changes will not extend the site boundaries. There will be no effect on the site compound other than some enlarged equipment pads as may be noted in the attachments.

3. The proposed changes will not increase the noise level at the existing facility by six decibels or more.

4. Radio frequency power density may increase due to use of one or more GSM channel for UMTS transmissions. However, the changes will not increase the calculated "worst case" power density for the combined operations at the site to a level at or above the applicable standard for uncontrolled environments as calculated for a mixed frequency site.

For the foregoing reasons, New Cingular Wireless respectfully submits that the proposed changes at the referenced site constitute exempt modifications under R.C.S.A. Section 16-50j-72(b)(2).

Please feel free to call me at (860) 463-5511 with questions concerning this matter. Thank you for your consideration.

Sincerely,

Douglas L. Culp
Real Estate Consultant

Attachments

NEW CINGULAR WIRELESS PCS, LLC
Equipment Modification

650 Albany Turnpike, Canton, CT
Site Number 1230
Exempt Mod, 1/05

Tower Owner/Manager: Verizon Wireless

Equipment configuration: Monopole

Current and/or approved:

Six CSS panel antennas @ 110 ft
Six TMA's @ 110 ft
Twelve runs (12) 1 5/8" Coax
Equipment Shelter

Planned Modifications:

Remove existing antennas and TMA's
Install six Powerwave P65-15XLH antennas (or equiv.) @ 110 ft
Install six Powerwave TMA's (TT19-08BP111-001) @ 110 ft

Power Density:

Calculations for current operations at the site indicate a cumulative radio frequency electromagnetic radiation power density, measured at the tower base, of approximately 30.3 % of the standard adopted by the FCC. As depicted in the second table below, the total radio frequency electromagnetic radiation power density following AT&T's planned modifications would be approximately 37.3 % of the standard.

Existing

Company	Centerline Ht (feet)	Frequency (MHz)	Number of Channels	Power Per Channel (Watts)	Power Density (mW/cm^2)	Standard Limits (mW/cm^2)	Percent of Limit
Other Users *							24.72
AT&T GSM *	110	1900 Band	2	427	0.0254	1.0000	2.54
AT&T GSM *	110	880 - 894	2	296	0.0176	0.5867	3.00
Total							**30.3%**

* Per CSC records.

Proposed

Company	Centerline Ht (feet)	Frequency (MHz)	Number of Channels	Power Per Channel (Watts)	Power Density (mW/cm^2)	Standard Limits (mW/cm^2)	Percent of Limit
Other Users *							24.72
AT&T GSM	110	880 - 894	4	296	0.0352	0.5867	6.00
AT&T GSM	110	1900 Band	2	427	0.0254	1.0000	2.54
AT&T UMTS	110	1900 Band	1	500	0.0149	1.0000	1.49
AT&T UMTS	110	880 - 894	1	500	0.0149	0.5867	2.53
Total							**37.3%**

* Per CSC records.

Structural information:

The attached structural analysis (CENTEK, 1/11) demonstrates that the tower and foundation have sufficient structural capacity to accommodate the proposed equipment modifications.

PROJECT INFORMATION

SCOPE OF WORK:	UNMANNED TELECOMMUNICATIONS FACILITY MODIFICATIONS
SITE ADDRESS:	650 ALBANY TURNPIKE CANTON, CT 06022
LATITUDE:	41.850556° N 41° 51' 2" N
LONGITUDE:	-72.948724° W -72° 56' 55.41" W
JURISDICTION:	NATIONAL, STATE & LOCAL CODES OR ORDINANCES
CURRENT USE:	TELECOMMUNICATIONS FACILITY
PROPOSED USE:	TELECOMMUNICATIONS FACILITY
NOC#	866-915-5600

at&t

SITE NUMBER: CT1230
SITE NAME: CANTON-ALBANY TURNPIKE

DRAWING INDEX

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T-1	TITLE SHEET	1
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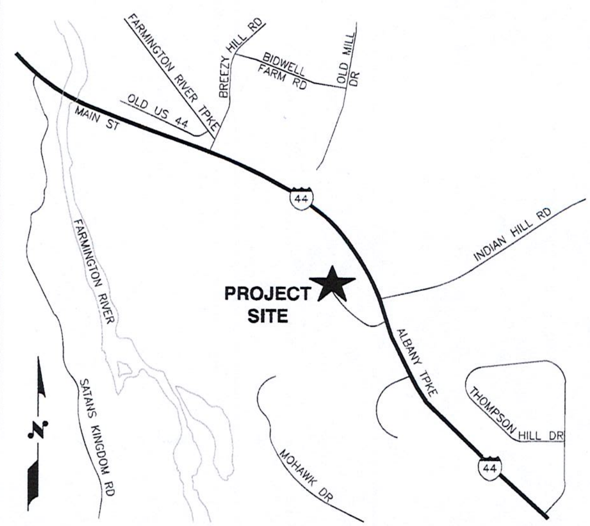
A-1	COMPOUND & EQUIPMENT PLAN	1
A-2	ANTENNA LAYOUT AND ELEVATION	1
G-1	PLUMBING DIAGRAM & DETAILS	1

VICINITY MAP

DIRECTIONS TO SITE:
FROM 500 ENTERPRISE DR, ROCKY HILL, CT DRIVE TOWARD CAPITOL BLVD 0.4 MI. TURN LEFT ONTO CAPITOL BLVD 0.2 MI. TURN LEFT ONTO WEST ST 0.3 MI. TAKE RAMP LEFT FOR I-91 SOUTH 1.7 MI. AT EXIT 22N, TAKE RAMP RIGHT FOR SR-9 NORTH TOWARD NEW BRITAIN 11.1 MI. AT EXIT 32, TAKE RAMP LEFT FOR I-84 WEST / US-6 WEST TOWARD WATERBURY 1.2 MI. AT EXIT 39, TAKE RAMP RIGHT FOR SR-4 TOWARD FARMINGTON 1.0 MI. KEEP STRAIGHT ONTO SR-4 WEST / FARMINGTON AVE 0.9 MI. BEAR RIGHT ONTO SR-10 / WATERVILLE RD 5.6 MI. TURN LEFT ONTO US-44 / SR-10 / E MAIN ST 0.7 MI. KEEP STRAIGHT ONTO US-44 / US-202 / ALBANY TPKE / W MAIN ST 5.3 MI. PASS MOBIL IN 1.9 MI. KEEP STRAIGHT ONTO US-44 WEST / ALBANY TPKE 1.8 MI. THE SITE WILL BE ON THE LEFT SIDE. (THE LAST INTERSECTION IS INDIAN HILL RD. IF YOU REACH BREEZY HILL RD, YOU'VE GONE TOO FAR)



GENERAL NOTES

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

72 HOURS

BEFORE YOU DIG

CALL TOLL FREE 800-922-4455

UNDERGROUND SERVICE ALERT

Hudson Design Group LLC
1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 2-101
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

SAI communications
22 KEEWAYDIN DRIVE
SALEM, NH 03079

SITE NUMBER: CT1230
SITE NAME:
CANTON-ALBANY TURNPIKE
650 ALBANY TURNPIKE
CANTON, CT 06022
HARTFORD COUNTY

at&t
500 ENTERPRISE DRIVE, SUITE 3A
ROCKY HILL, CT 06067

NO.	DATE	REVISIONS	BY	CHK	APP'D
1	01/28/11	CONSTRUCTION FINAL			
0	12/21/10	ISSUED FOR REVIEW	BR	DC	DPH

SCALE: AS SHOWN | DESIGNED BY: DC | DRAWN BY: BR

AT&T
TITLE SHEET
(2ND CARRIER-FULL SWAP)

JOB NUMBER	DRAWING NUMBER	REV
1230.01	T-1	1

GROUNDING NOTES

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

2. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION, AND AC POWER GES'S) SHALL BE BONDED TOGETHER, AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.

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

4. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO BTS EQUIPMENT.

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

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

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

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

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

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

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

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

GENERAL NOTES

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:
   CONTRACTOR – SAI
   SUBCONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
   OWNER – AT&T MOBILITY

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

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

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

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

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

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

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

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

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

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

12. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.

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

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

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

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

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

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

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

20. APPLICABLE BUILDING CODES:
SUBCONTRACTOR'S WORK SHALL COMPLY WITH ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES AS ADOPTED BY THE LOCAL AUTHORITY HAVING JURISDICTION (AHJ) FOR THE LOCATION. THE EDITION OF THE AHJ ADOPTED CODES AND STANDARDS IN EFFECT ON THE DATE OF CONTRACT AWARD SHALL GOVERN THE DESIGN.
   BUILDING CODE: 2003 IBC WITH 2005 CT SUPPLEMENT & 2009 CT AMENDMENTS
   ELECTRICAL CODE: REFER TO ELECTRICAL DRAWINGS
   LIGHTENING CODE: REFER TO ELECTRICAL DRAWINGS

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

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

   AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

   MANUAL OF STEEL CONSTRUCTION, ASD, NINTH EDITION;

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

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

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

ABBREVIATIONS

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

Hudson Design Group LLC
1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 2-101
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

SAI communications
22 KEEWAYDIN DRIVE
SALEM, NH 03079

SITE NUMBER: CT1230
SITE NAME:
CANTON-ALBANY TURNPIKE
650 ALBANY TURNPIKE
CANTON, CT 06022
HARTFORD COUNTY

at&t
500 ENTERPRISE DRIVE, SUITE 3A
ROCKY HILL, CT 06067

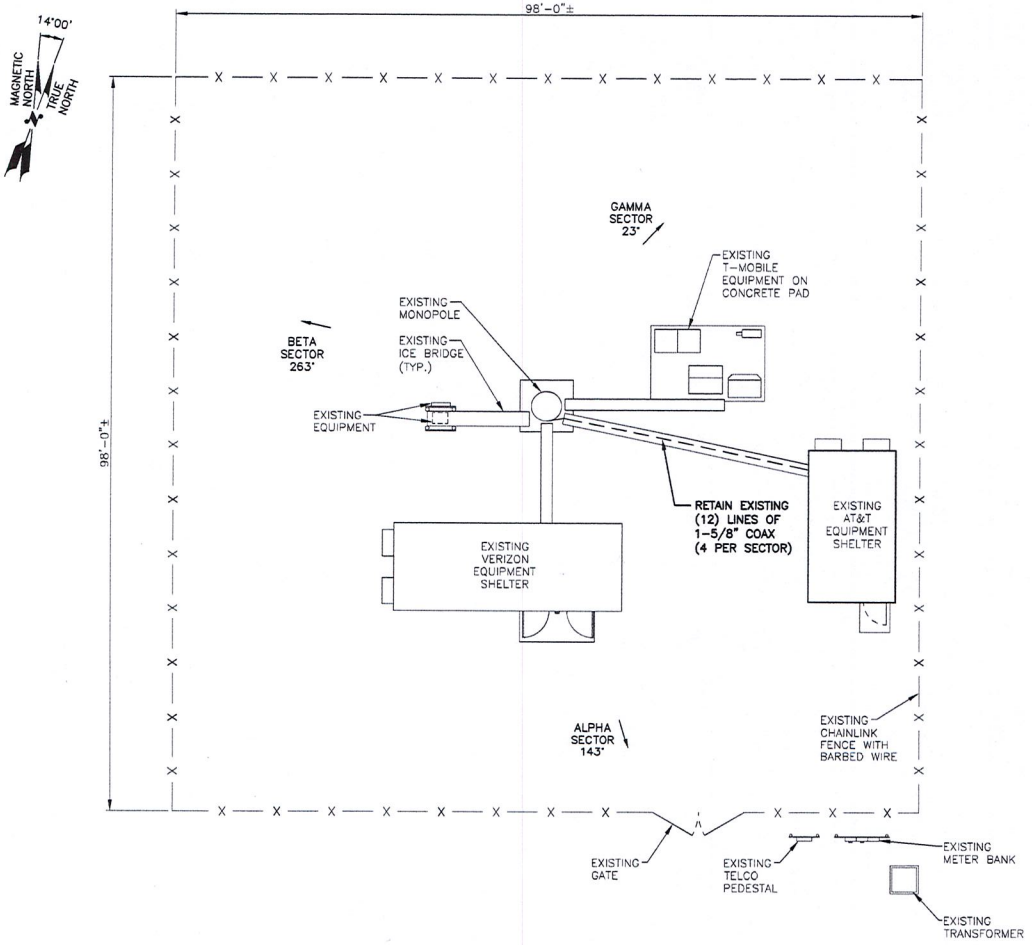
NO.	DATE	REVISIONS	BY	CHK	APP'D
1	01/28/11	CONSTRUCTION FINAL	BR	DC	DPH
0	12/21/10	ISSUED FOR REVIEW			

SCALE: AS SHOWN | DESIGNED BY: DC | DRAWN BY: BR

AT&T

GENERAL NOTES
(2ND CARRIER-FULL SWAP)

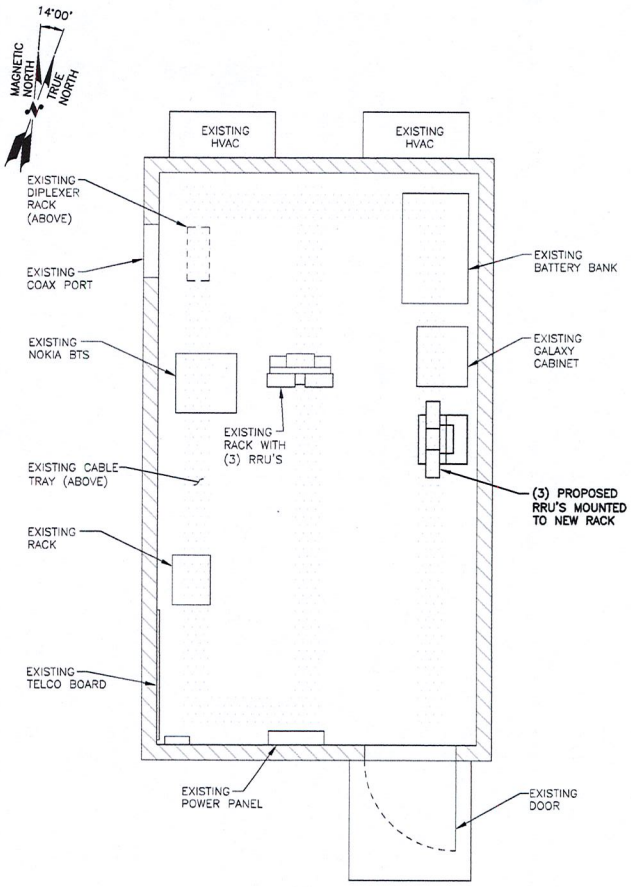
JOB NUMBER	DRAWING NUMBER	REV
1230.01	GN-1	1



COMPOUND PLAN

SCALE: 1/8"=1'-0"

0 4'-0" 8'-0" 16'-0" 24'-0"



EQUIPMENT PLAN

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

0 1'-0" 2'-0" 4'-0" 6'-0"

Hudson Design Group LLC
1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 2-101
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

SAI communications
22 KEEWAYDIN DRIVE
SALEM, NH 03079

SITE NUMBER: CT1230
SITE NAME:
CANTON-ALBANY TURNPIKE
650 ALBANY TURNPIKE
CANTON, CT 06022
HARTFORD COUNTY

at&t
500 ENTERPRISE DRIVE, SUITE 3A
ROCKY HILL, CT 06067

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0	12/21/10	ISSUED FOR REVIEW	BR	DC	DPH

SCALE: AS SHOWN | DESIGNED BY: DC | DRAWN BY: BR

STATE OF CONNECTICUT · DANIEL P. HAMM · No. 21782 · LICENSED PROFESSIONAL ENGINEER

AT&T

COMPOUND & EQUIPMENT PLAN
(2ND CARRIER–FULL SWAP)

JOB NUMBER	DRAWING NUMBER	REV
1230.01	A-1	1

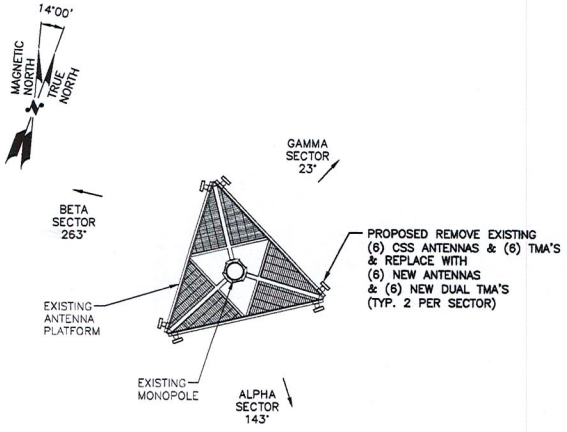
RF TABLE									
SECTOR	SECTOR NAME	ANTENNA MAKE & MODEL	ANTENNA COUNT	AZIMUTH	RAD CENTER	MECHANICAL DOWNTILT	DUAL TMA COUNT	DIPLEXER COUNT	COAX COUNT
1	ALPHA	POWERWAVE P65-15-XLH-RR	2	143°	110'±	0*	0 EXIST. 2 PROP.	0 EXIST. 0 PROP.	4 EXIST. 0 PROP.
2	BETA	POWERWAVE P65-15-XLH-RR	2	263°	110'±	0*	0 EXIST. 2 PROP.	0 EXIST. 0 PROP.	4 EXIST. 0 PROP.
3	GAMMA	POWERWAVE P65-15-XLH-RR	2	23°	110'±	0*	0 EXIST. 2 PROP.	0 EXIST. 0 PROP.	4 EXIST. 0 PROP.

NOTE:

AN ANALYSIS FOR THE CAPACITY OF THE EXISTING STRUCTURES TO SUPPORT THE PROPOSED EQUIPMENT SHALL BE DETERMINED PRIOR TO CONSTRUCTION.

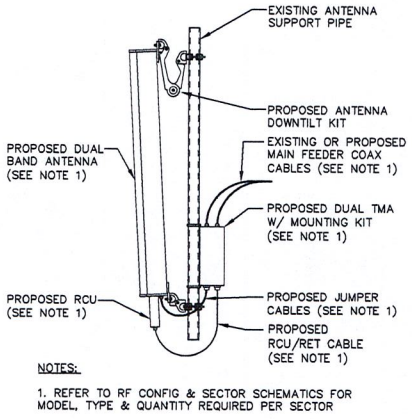
NOTE:

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



ANTENNA PLAN

SCALE: N.T.S.

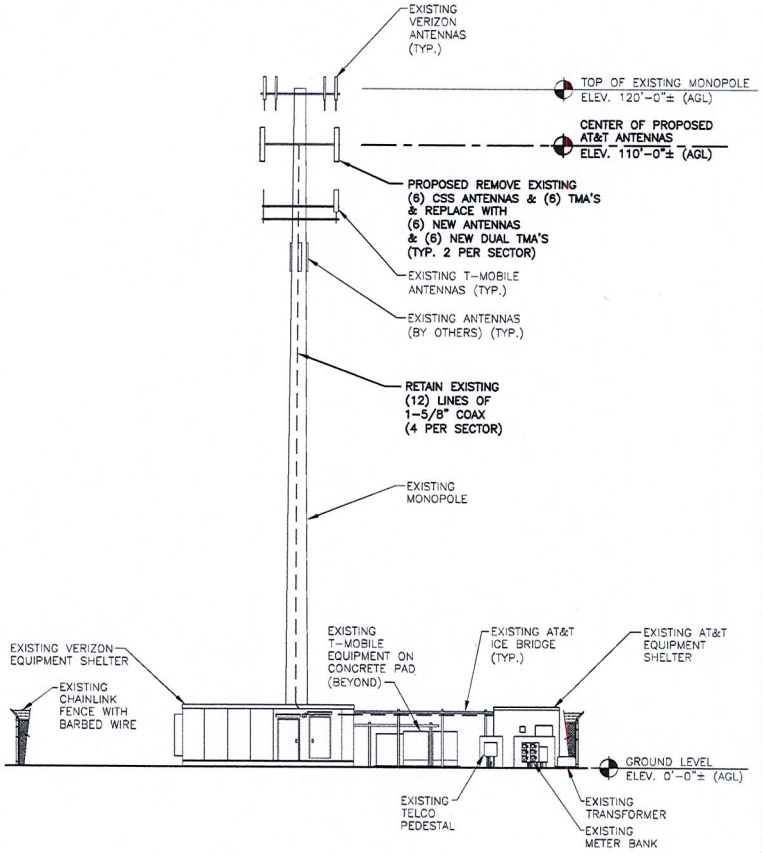


NOTES:

1. REFER TO RF CONFIG & SECTOR SCHEMATICS FOR MODEL, TYPE & QUANTITY REQUIRED PER SECTOR

PROPOSED ANTENNA DETAIL

SCALE: N.T.S.



SOUTH ELEVATION

SCALE: 3/32"=1'-0"

0 5'-4" 10'-8" 21'-4" 32'-0"

Hudson Design Group LLC
1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 2-101
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

SAI communications
22 KEEWAYDIN DRIVE
SALEM, NH 03079

SITE NUMBER: CT1230
SITE NAME:
CANTON-ALBANY TURNPIKE
650 ALBANY TURNPIKE
CANTON, CT 06022
HARTFORD COUNTY

at&t
500 ENTERPRISE DRIVE, SUITE 3A
ROCKY HILL, CT 06067

NO.	DATE	REVISIONS	BY	CHK	APP'D
1	01/28/11	CONSTRUCTION FINAL	BR	DC	DPH
0	12/21/10	ISSUED FOR REVIEW	BR	DC	DPH

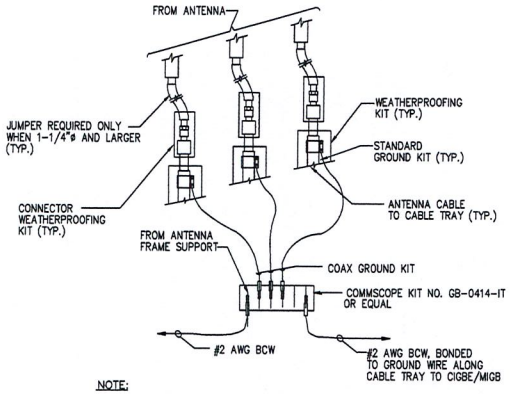
SCALE: AS SHOWN | DESIGNED BY: DC | DRAWN BY: BR

STATE OF CONNECTICUT · DANIEL P. HAMM · No. 21715 · LICENSED PROFESSIONAL ENGINEER

AT&T

ANTENNA LAYOUT AND ELEVATION (2ND CARRIER-FULL SWAP)

JOB NUMBER	DRAWING NUMBER	REV
1230.01	A-2	1

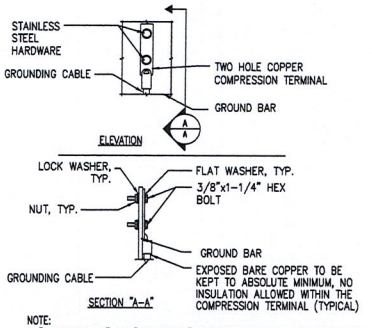


NOTE:

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

GROUND WIRE TO GROUND BAR CONNECTION DETAIL

1 — N.T.S.

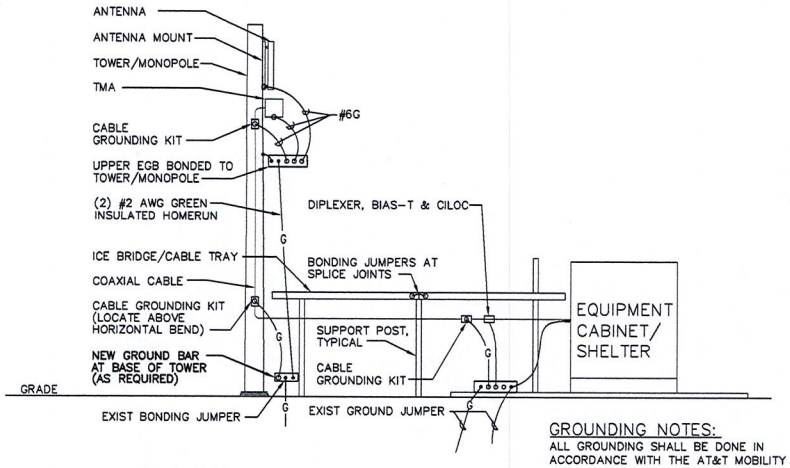


NOTE:

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

TYPICAL GROUND BAR CONNECTION DETAIL

3 — N.T.S.



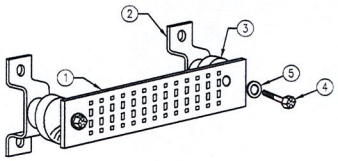
GROUNDING ONE LINE DIAGRAM

2 — N.T.S.

GROUNDING NOTES:

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

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



GROUND BAR - DETAIL

4 — N.T.S.

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

SECTION "P" – SURGE PRODUCERS

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

SECTION "A" – SURGE ABSORBERS

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

Hudson Design Group LLC
1600 OSGOOD STREET
BUILDING 20 NORTH, SUITE 2-101
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

SAI communications
22 KEEWAYDIN DRIVE
SALEM, NH 03079

SITE NUMBER: CT1230
SITE NAME:
CANTON-ALBANY TURNPIKE
650 ALBANY TURNPIKE
CANTON, CT 06022
HARTFORD COUNTY

at&t
500 ENTERPRISE DRIVE, SUITE 3A
ROCKY HILL, CT 06067

NO.	DATE	REVISIONS	BY	CHK	APP'D
1	01/28/11	CONSTRUCTION FINAL	BR	DC	DPH
0	12/21/10	ISSUED FOR REVIEW			

SCALE: AS SHOWN | DESIGNED BY: DC | DRAWN BY: BR

STATE OF CONNECTICUT — DANIEL P. HAMM — No. 21715 — LICENSED PROFESSIONAL ENGINEER

AT&T

PLUMBING DIAGRAM & DETAILS (2ND CARRIER–FULL SWAP)

JOB NUMBER	DRAWING NUMBER	REV
1230.01	G-1	1

P65-15-XLH-RR | Dual Broadband Antennas

POLARIZATION Dual linear ±45°
FREQUENCY (MHz) 698-894, 1710-2170
HORIZONTAL BEAM WIDTH (°) 65, 65
GAIN (dBi/dBd) 14.7/12.6, 17.0/14.9
TILT 0-13, 0-9
LENGTH 51"

ELECTRICAL SPECIFICATIONS*

Frequency range (MHz)	698-894		1710-2170		
Frequency band (MHz)	698-806	806-894	1710-1880	1850-1990	1900-2170
Gain (dBi/dBd)	14/11.9	14.7/12.6	16.4/14.3	16.7/14.6	17.0/14,9
Polarization	Dual Linear +/- 45			Dual Linear +/- 45	
Nominal Impedance (Ω)	50			50	
VSWR	< 1.5:1			< 1.5:1	
Horizontal beam width, -3 dB (°)	73	63	65	61	60
Vertical beam width, -3 dB (°)	17			7.5	
Electrical down tilt (°)	0-13			0-9	
Side lobe suppression, vertical 1st upper (dB)	> 14			>20	
Isolation between inputs (dB)	>30			> 30	
Inter band Isolation (dB)	> 40			> 40	
Tracking, horizontal plane ±60° (dB)	< 2			< 2	
Vertical beam squint (°)	<1.25			< 0.5	
Front to back ratio (dB) 180°±30° copolar	> 25			> 28	
Front to back ratio (dB) 180°±30° total power	> 25			> 25	
Cross polar discrimination (XPD) 0° (dB)	> 15			> 15	
Cross polar discrimination (XPD) ±60° (dB)	> 10			> 10	
IM3, 2xTx@43dBm (dBc)	<-153			<-153	
Power handling, average per input (W)	500			300	
Power handling, average total (W)	1000			600	

MECHANICAL SPECIFICATIONS*

Connector	4 X 7/16 DIN Female, IP67
Connector position	Bottom
Dimensions, HxWxD, in (mm)	51" x 12" x 6" (1295 x 305 x 152)
Mounting	Pre-mounted Tilt Brackets
Weight, with brackets, lbs (kg)	41 (19)
Weight, without brackets, lbs (kg)	30 (14)
Wind load frontal/lateral/rear side 42 m/s Cd=1.0 (N)	920
Maximum operational wind speed, mph (m/s)	100 (45)
Survival wind speed, mph (m/s)	150 (67)
Lightning protection	DC Ground
Operating Temperature	-40°C to +60°C
Radome material	PVC, IP55
Packet size, HxWxD, in (mm)	60" x 16" x 10" (1524 x 400 x 255)
Radome colour	Light Grey
Shipping weight, lbs (kg)	52 (24)
RET	iRET AISGv1.1, MET and AISGv2.0
Brackets	7256.00, 7454.00

*All specifications subject to change without notice. Please contact your Powerwave representative for complete performance data.

ANTENNA PATTERNS*

For detailed patterns visit http://www.powerwave.com/rpa/.

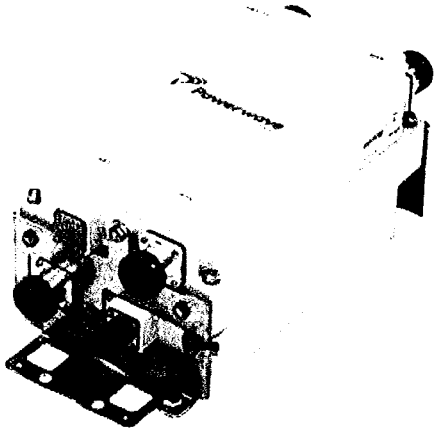
TT19-08BP111-001 | TMA Twin 1900 with 850 Bypass 12 dB AISG 1.1

ELECTRICAL SPECIFICATIONS	
UL Frequency Range (MHz)	1850-1910 with 824-894 bypass
UL Rejection	>77 dB
UL Gain(dB)	12
UL Return Loss	>18
UL Noise Figure	<1.7 dB, Typical
UL Output 3rd Order Intercept Point(dBm)	>+23
UL Bypass Loss(dB)	2.5, Typical
UL Max Input Power (dBm)	+14 dBm
DL Frequency Range (MHz)	1930-1990 with 824-894 bypass
DL Return Loss	>18
DL Insertion Loss (dB)	850 MHz, <0.3; 1900 MHz, <0.5
Intermodulation	@ 2 x +43 dBm TX carriers, in receive band, <160 dBc, reffered to antenna port
Input Voltage (V)	AISG Mode: 10-30; Current alarm mode: 8 -17
Alarm Functionality	AISG compatible or in case of no AISG command received, current alarm mode 170-190 mA
Power Consumption	<1.1W @12V
Power Handling, RMS	850: >57 dBm, 1900: >55 dBm
AISG Compatibility	AISG 1.1 fully upgreadable to AISG 2.0 (AISG version only dependent on loaded SW version) TT19-08BP112-001 has AISG 2.0 loaded from factory

MECHANICAL SPECIFICATIONS	
Dimension HxWxD mm(ft)	250x169x137 mm (9.9"x6.7"x5.4")
Weight(lbs)	<16
Colors	Off white (NCS 1502-R)
RF Connectors	DIN 7/16 female, long neck
Mounting Kit	Mounting kit for pole and wall is included

ENVIRONMENTAL SPECIFICATIONS	
Temperature Range	-40° C to +65° C (-40° F to +149° F)
Operational	ETS 300 019-1-4
Transportation	ETS 300 019-1-2
Storage	ETS 300 019-1-1
Lightning Protection	3 kA 10/350 µs; 20 kA (Shield)
Housing	Aluminum
MTBF	>1 million hours per TMA
Ingress Protection	IP65 and IP68

APPROVAL AND TESTS	
Safety	EN60950
EMC	3GPP: TS 25.113



*All specifications subject to change without notice. Contact your Powerwave representative for complete performance data.

New Cingular Wireless PCS, LLC
500 Enterprise Drive
Rocky Hill, Connecticut 06067-3900
Phone: (860) 463-5511
Fax: (860) 513-7190

Douglas L. Culp
Real Estate Consultant

February 10, 2011

Richard Barlow
1st Selectman, Town of Canton
Canton Town Hall
4 Market Street
Collinsville, CT 06019-3184

Re: Telecommunications Facility – 650 Albany Turnpike, Canton, CT

Dear Mr. Barlow:

In order to accommodate technological changes, implement Uniform Mobile Telecommunications System ("UMTS") capability, and enhance system performance in the State of Connecticut, New Cingular Wireless PCS, LLC ("AT&T") will be changing its equipment configuration at certain cell sites.

As required by Regulations of Connecticut State Agencies ("R.C.S.A.") Section 16-50j-73, the Connecticut Siting Council has been notified of the changes and will review AT&T's proposal. Please accept this letter as notification under Section 16-50j-73 of construction which constitutes an exempt modification pursuant to R.C.S.A. Section 16-50j-72(b)(2).

The accompanying letter to the Siting Council fully describes AT&T's proposal for the referenced cell site. However, if you have any questions or require any further information on our plans or the Siting Council's procedures, please call me at (860) 463-5511 or Linda Roberts, Executive Director, Connecticut Siting Council at (860) 827-2935.

Sincerely,

Douglas L. Culp
Real Estate Consultant

Enclosure

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

120-ft Existing EEI Monopole-
Extendable to 150-ft

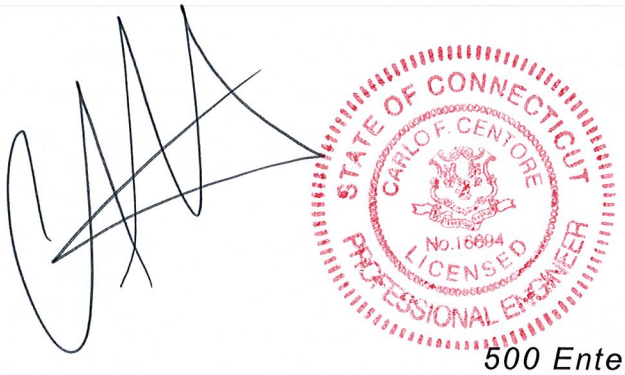
Proposed AT&T UMTS Antenna Upgrade

AT&T Site Ref: CT1230

650 Albany Turnpike
Canton, CT

CENTEK Project No. 11009.CO1

Date: January 26, 2011



Prepared for:

AT&T Mobility
500 Enterprise Drive, Suite 3A
Rocky Hill, CT 06067

63-2 North Branford Road, Branford, CT 06405 203.488.0580 Fax 203.488.8587 www.CentekEng.com

Table of Contents

Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna installation proposed by AT&T Mobility on the existing monopole (tower), owned and operated by Verizon Wireless, located in Canton, CT.

The host tower is a 120-ft, three-section, eighteen sided, tapered monopole extendable to 150ft originally designed and manufactured by Engineered Endeavors Inc (EEI)—job no: 11936-E01, dated September 11, 2003. The tower geometry, structure member sizes and foundation system information were taken from EEI's design report. Antenna and appurtenance information were obtained from a previous structural analysis report prepared by Natcomm Inc., job no. 08136.CO7, Revision #1, signed and sealed January 09, 2009.

The tower is made up of three (3) tapered vertical sections consisting of A572-65 pole sections. The vertical tower sections are slip joint connected. The diameter of the pole (flat-flat) is 26.9-in at the top and 49.00-in at the base.

AT&T Mobility proposes the replacement of six (6) existing panel antennas and six (6) existing TMAs with six (6) panel antennas and six (6) TMA's on an existing low profile platform. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

Antenna and Appurtenance Summary

The existing tower was designed to support several communication antennas. The existing, proposed and future loads considered in this analysis consist of the following:

- VERIZON WIRELESS (Reserved):
  Antennas: Six (6) Antel LPA 80080/6CF, six (6) Andrew DB950F85E-M and three (3) Antel BXA70063/6CF panel antennas mounted to an existing 14' Low Profile Platform with a RAD center elevation of 120-ft above the existing tower base plate.
  Coax Cables: Eighteen (18) 1-5/8" ∅ coax cables running on the inside of the existing tower.
- T-MOBILE (Existing):
  Antennas: Nine (9) RFS APX16DWV-16WV-S-E-ACU panel antennas and six (6) CCI DTMA-1819-DD-12 TMA's mounted to an existing 13' Low Profile Platform with a RAD center elevation of 100-ft above the existing tower base plate.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on the inside of the existing tower.
- POCKET WIRELESS (Existing):
  Antennas: Three (3) Kathrein 742-213 panel antennas flush mounted on a universal tri-bracket assembly at a RAD center elevation of 90-ft above the existing tower base plate.
  Coax Cables: Six (6) 1-5/8" ∅ coax cables running on the inside of the existing tower.

- AT&T (Existing to Remove):
  Antennas: Six (6) existing CSS XDUO1416 panel antennas and six (6) ADC 1900W850BP TMA's mounted to an existing 12'-6" Low Profile Platform with a RAD center elevation of 110-ft above the existing tower base plate.
- AT&T (Existing To Remain):
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on the inside of the existing tower.
- **AT&T (PROPOSED):**
  Antennas: Six (6) Powerwave P65-15-XLH-RR panel antennas and six (6) Powerwave TT19-08BP111-001 TMA's mounted to an existing 12'-6" Low Profile Platform with a RAD center elevation of 110-ft above the existing tower base plate.
  Coax Cables: No change.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents or reinforcement drawings.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- All coax cables to be installed as indicated in this report.
- Three coaxial cable exit port holes previously installed on the monopole structure at 90' (AGL) to accommodate the Pocket Wireless antenna installation detailed within a structural analysis report prepared by Natcomm Inc., job no. 08136.CO7, Revision #1, signed and sealed January 09, 2009.

Analysis

The existing tower was analyzed using a comprehensive computer program entitled RISATower. The program analyzes the tower, considering the worst case loading condition. The tower is considered as loaded by concentric forces along the tower shaft, and the model assumes that the shaft members are subjected to bending, axial, and shear forces.

The existing tower was analyzed for 80 mph basic wind speed (fastest mile) with no ice and 75% reduction of wind force with ½ inch accumulative ice to determine stresses in members as per guidelines of TIA/EIA-222-F-96 entitled "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Allowable Stress Design (ASD).

Tower Loading

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA/EIA-222-F, gravity loads of the tower structure and its components, and the application of ½" radial ice tower structure and its components.

Basic Wind Speed:	Hartford; v = 80 mph (fastest mile)	*[Section 16 of TIA/EIA-222-F-96]*
	Canton; v = 95 mph (3 second gust) equivalent to v = 77.5 mph (fastest mile)	*[Appendix K of the 2005 CT Building Code Supplement]*
	TIA/EIA wind speed controls	
Load Cases:	Load Case 1; 80 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation. This load case typically controls the design of monopole towers.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 2; 69 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. The 69 mph wind speed velocity represents 75% of the wind pressure generated by the 80 mph wind speed. This load case typically controls the design of lattice towers.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 3; Seismic – not checked	*[Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type*

Tower Capacity

Tower stresses were calculated utilizing the structural analysis software RISATower. Allowable stresses were determined based on Table 5 of the TIA/EIA code with a 1/3 increase per Section 3.1.1.1 of the same code.

Calculated stresses were found to be within allowable limits. In Load Case 1, per RISATower "Section Capacity Table", this tower was found to be at **38.5%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L3)	0'-46.16'	38.5%	**PASS**

Foundation and Anchors

The existing foundation consists of a 7-ft ∅ x 5-ft long reinforced concrete pier on a 24.0-ft square x 3.0-ft thick reinforced concrete pad. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned EEI design report; job no. 11936-E01, dated September 11, 2003. The base of the tower is connected to the foundation by means of (18) 2.25"∅, ASTM A615-75 anchor bolts embedded approximately 7-ft into the concrete foundation structure.

Review of the foundation and anchor design consisted of verification of applied loads obtained from the tower design calculations and code checks of allowable stresses:

- The tower base reactions developed from the governing Load Case 1 were used in the verification of the foundation and its anchors:

Base Reactions	Vector	Proposed Load (kips/ft-kips)
Base	Shear	**15**
	Axial	**29**
	Moment	**1317**

- The foundation was found to be within allowable limits.

Foundation	Design Limit	IBC 2003/2005 CT State Building Code Section 3108.4.2 FS[1]	Proposed Loading FS[1]	Result
Reinf. Conc. Pad and Pier	OTM[2]	2.0	6.08	**PASS**

Note: 1. FS denote Factor of Safety
2. OTM denotes Overturning Moment

- The anchor bolts and base plate were found to be within allowable limits.

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Compression	31.9%	**PASS**
Base Plate	Bending	42.9%	**PASS**

Conclusion

This analysis shows that the subject tower is adequate to support the proposed modified antenna configuration.

The analysis is based, in part, on the information provided to this office by AT&T Mobility. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:

Carlo F. Centore, PE
Principal ~ Structural Engineer

STATE OF CONNECTICUT
CARLO F. CENTORE
No. 16604
LICENSED
PROFESSIONAL ENGINEER

Prepared by:

Jason R. Mead
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessarily limited to:

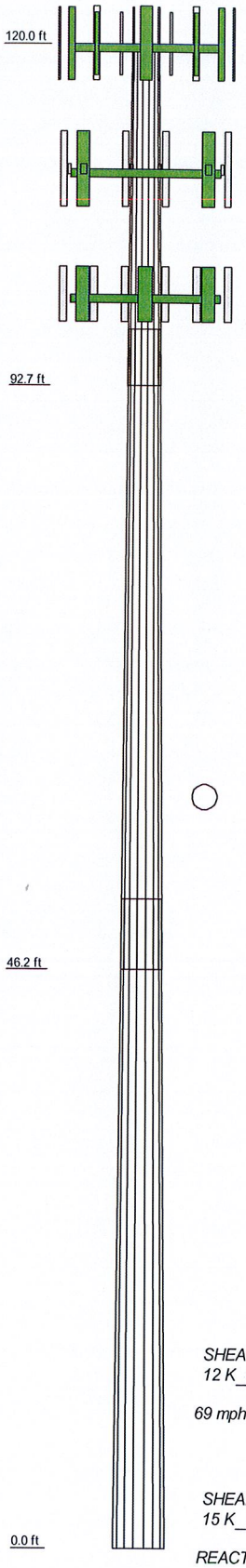
- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of CENTEK engineering, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provide to CENTEK engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the "as new" condition.
- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222
- All services performed, results obtained, and recommendations made are in accordance with generally accepted engineering principles and practices. CENTEK engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

General Description of Structural Analysis Program

RISATower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, RISATower, formerly ERITower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

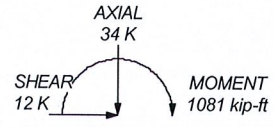
RISATower Features:

- RISATower can analyze and design 3- and 4-sided guyed towers, 3- and 4-sided self-supporting towers and either round or tapered ground mounted poles with or without guys.
- The program analyzes towers using the TIA-222-G (2005) standard or any of the previous TIA/EIA standards back to RS-222 (1959). Steel design is checked using the AISC ASD 9th Edition or the AISC LRFD specifications.
- Linear and non-linear (P-delta) analyses can be used in determining displacements and forces in the structure. Wind pressures and forces are automatically calculated.
- Extensive graphics plots include material take-off, shear-moment, leg compression, displacement, twist, feed line, guy anchor and stress plots.
- RISATower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.

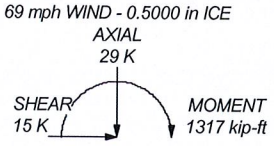


Section	1	2	3
Length (ft)	27.29	51.13	51.83
Number of Sides	18	18	18
Thickness (in)	0.2500	0.3750	0.4375
Socket Length (ft)	4.58	5.67	
Top Dia (in)	26.9000	30.8688	38.9487
Bot Dia (in)	32.2700	40.8000	49.0000
Grade	A572-65		
Weight (K)	2.2	7.3	10.7

20.2



69 mph WIND - 0.5000 in ICE



REACTIONS - 80 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
LPA-80080-6CF (Verizon - reserved)	120	(2) TT19-08BP111-001 TMA (ATI - proposed)	110
DB950F85E-M (Verizon - reserved)	120	(2) TT19-08BP111-001 TMA (ATI - proposed)	110
BXA-70063/6CF (Verizon - reserved)	120	Andrew 12'-6" Low Profile Platform (ATI)	110
DB950F85E-M (Verizon - reserved)	120	(3) APX16DWV-16DWV-S-E-ACU (T-Mobile)	100
LPA-80080-6CF (Verizon - reserved)	120	(3) APX16DWV-16DWV-S-E-ACU (T-Mobile)	100
LPA-80080-6CF (Verizon - reserved)	120	(3) APX16DWV-16DWV-S-E-ACU (T-Mobile)	100
DB950F85E-M (Verizon - reserved)	120	(2) DTMA-1819-DD-12 (T-Mobile)	100
BXA-70063/6CF (Verizon - reserved)	120	(2) DTMA-1819-DD-12 (T-Mobile)	100
DB950F85E-M (Verizon - reserved)	120	(2) DTMA-1819-DD-12 (T-Mobile)	100
LPA-80080-6CF (Verizon - reserved)	120	Valmont 13' Low Profile Platform (T-Mobile)	100
LPA-80080-6CF (Verizon - reserved)	120		
DB950F85E-M (Verizon - reserved)	120		
BXA-70063/6CF (Verizon - reserved)	120		
DB950F85E-M (Verizon - reserved)	120		
LPA-80080-6CF (Verizon - reserved)	120		
14' Low Profile Platform (Verizon - existing)	120	Uni-Tri Bracket (Pocket)	90
(2) P65-15-XLH-RR (ATI - proposed)	110	742-213 (Pocket)	90
(2) P65-15-XLH-RR (ATI - proposed)	110	742-213 (Pocket)	90
(2) P65-15-XLH-RR (ATI - proposed)	110	742-213 (Pocket)	90
(2) TT19-08BP111-001 TMA (ATI - proposed)	110		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. TOWER RATING: 38.5%

CENTEK Engineering, Inc.
63-2 N Branford Rd
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job: ***120' EEI Monopole - extendable to 150-ft***		
Project: ***650 Albany Turnpike - Canton, CT***		
Client: AT&T/Verizon	Drawn by: Staff	App'd:
Code: TIA/EIA-222-F	Date: 01/26/11	Scale: NTS
Path: J:\Jobs\1100900 WICO1 - 650 Albany Avenue, Canton, CT\ER Rev\120' EEI Monopole Extendable to 150 Canton, CT.eri		Dwg No. E-1

Tower Input Data

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

Basic wind speed of 80 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 69 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Treat Feedline Bundles As Cylinder
	Consider Moments - Horizontals		Assume Legs Pinned		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Calculate Redundant Bracing Forces
	Use Moment Magnification		Use Clear Spans For Wind Area		Ignore Redundant Members in FEA
√	Use Code Stress Ratios		Use Clear Spans For KL/r		SR Leg Bolts Resist Compression
	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		All Leg Panels Have Same Allowable
	Escalate Ice	√	Bypass Mast Stability Checks		Offset Girt At Foundation
	Always Use Max Kz		Use Azimuth Dish Coefficients		Consider Feedline Torque
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Include Angle Block Shear Check
	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Poles
	Leg Bolts Are At Top Of Section		SR Members Have Cut Ends	√	Include Shear-Torsion Interaction
	Secondary Horizontal Braces Leg	√	Sort Capacity Reports By Component		Always Use Sub-Critical Flow
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Use Top Mounted Sockets
	Add IBC .6D+W Combination				

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	120.00-92.71	27.29	4.58	18	26.9000	32.2700	0.2500	1.0000	A572-65 (65 ksi)
L2	92.71-46.16	51.13	5.67	18	30.8688	40.8000	0.3750	1.5000	A572-65 (65 ksi)
L3	46.16-0.00	51.83		18	38.9487	49.0000	0.4375	1.7500	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	27.3150	21.1468	1897.4748	9.4608	13.6652	138.8545	3797.4464	10.5754	4.2944	17.178
	32.7678	25.4079	3291.1552	11.3671	16.3932	200.7639	6586.6410	12.7063	5.2395	20.958
L2	32.2483	36.2952	4263.9191	10.8253	15.6813	271.9105	8533.4488	18.1511	4.7729	12.728
	41.4294	48.1159	9934.0359	14.3509	20.7264	479.2938	19881.1433	24.0625	6.5208	17.389
L3	40.6661	53.4776	10020.3566	13.6715	19.7859	506.4384	20053.8983	26.7439	6.0850	13.909
	49.7559	67.4351	20092.1096	17.2397	24.8920	807.1714	40210.6569	33.7240	7.8540	17.952

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 120.00-92.71				1	1	1		
L2 92.71-46.16				1	1	1		
L3 46.16-0.00				1	1	1		

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
1 5/8 (Verizon)	C	No	Inside Pole	120.00 - 3.00	18	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (AT&T)	C	No	Inside Pole	110.00 - 3.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (T-Mobile)	C	No	Inside Pole	100.00 - 3.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
CR 50 1873 (1-5/8 FOAM) (Pocket)	C	No	Inside Pole	90.00 - 3.00	6	No Ice	0.00	0.83
						1/2" Ice	0.00	0.83

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	120.00-92.71	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.82
L2	92.71-46.16	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	2.25
L3	46.16-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	2.10

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	120.00-92.71	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.82
L2	92.71-46.16	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	2.25
L3	46.16-0.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	2.10

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
LPA-80080-6CF	A	From Face	3.50	0.0000	120.00	No Ice	4.33	9.09	0.02
(Verizon - reserved)			6.00			1/2" Ice	4.76	9.64	0.07
			0.00						
DB950F85E-M	A	From Face	3.50	0.0000	120.00	No Ice	2.53	4.19	0.01
(Verizon - reserved)			4.00			1/2" Ice	2.90	4.57	0.03
			0.00						
BXA-70063/6CF	A	From Face	3.50	0.0000	120.00	No Ice	7.73	3.76	0.02
(Verizon - reserved)			0.00			1/2" Ice	8.27	4.19	0.06
			0.00						
DB950F85E-M	A	From Face	3.50	0.0000	120.00	No Ice	2.53	4.19	0.01
(Verizon - reserved)			-4.00			1/2" Ice	2.90	4.57	0.03
			0.00						
LPA-80080-6CF	A	From Face	3.50	0.0000	120.00	No Ice	4.33	9.09	0.02
(Verizon - reserved)			-6.00			1/2" Ice	4.76	9.64	0.07
			0.00						
LPA-80080-6CF	B	From Face	3.50	0.0000	120.00	No Ice	4.33	9.09	0.02
(Verizon - reserved)			6.00			1/2" Ice	4.76	9.64	0.07
			0.00						
DB950F85E-M	B	From Face	3.50	0.0000	120.00	No Ice	2.53	4.19	0.01
(Verizon - reserved)			4.00			1/2" Ice	2.90	4.57	0.03
			0.00						
BXA-70063/6CF	B	From Face	3.50	0.0000	120.00	No Ice	7.73	3.76	0.02
(Verizon - reserved)			0.00			1/2" Ice	8.27	4.19	0.06
			0.00						
DB950F85E-M	B	From Face	3.50	0.0000	120.00	No Ice	2.53	4.19	0.01
(Verizon - reserved)			-4.00			1/2" Ice	2.90	4.57	0.03
			0.00						
LPA-80080-6CF	B	From Face	3.50	0.0000	120.00	No Ice	4.33	9.09	0.02
(Verizon - reserved)			-6.00			1/2" Ice	4.76	9.64	0.07
			0.00						
LPA-80080-6CF	C	From Face	3.50	0.0000	120.00	No Ice	4.33	9.09	0.02
(Verizon - reserved)			6.00			1/2" Ice	4.76	9.64	0.07
			0.00						
DB950F85E-M	C	From Face	3.50	0.0000	120.00	No Ice	2.53	4.19	0.01
(Verizon - reserved)			4.00			1/2" Ice	2.90	4.57	0.03
			0.00						
BXA-70063/6CF	C	From Face	3.50	0.0000	120.00	No Ice	7.73	3.76	0.02
(Verizon - reserved)			0.00			1/2" Ice	8.27	4.19	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00						
DB950F85E-M	C	From Face	3.50	0.0000	120.00	No Ice	2.53	4.19	0.01
(Verizon - reserved)			-4.00			1/2" Ice	2.90	4.57	0.03
			0.00						
LPA-80080-6CF	C	From Face	3.50	0.0000	120.00	No Ice	4.33	9.09	0.02
(Verizon - reserved)			-6.00			1/2" Ice	4.76	9.64	0.07
			0.00						
14' Low Profile Platform	C	None		0.0000	120.00	No Ice	0.00	0.00	0.00
(Verizon - existing)						1/2" Ice	0.00	0.00	0.00
(3) APX16DWV-16DWV-S-	A	From Face	3.50	0.0000	100.00	No Ice	6.70	2.00	0.04
E-ACU			0.00			1/2" Ice	7.13	2.33	0.07
(T-Mobile)			0.00						
(3) APX16DWV-16DWV-S-	B	From Face	3.50	0.0000	100.00	No Ice	6.70	2.00	0.04
E-ACU			0.00			1/2" Ice	7.13	2.33	0.07
(T-Mobile)			0.00						
(3) APX16DWV-16DWV-S-	C	From Face	3.50	0.0000	100.00	No Ice	6.70	2.00	0.04
E-ACU			0.00			1/2" Ice	7.13	2.33	0.07
(T-Mobile)			0.00						
(2) DTMA-1819-DD-12	A	From Face	3.00	0.0000	100.00	No Ice	0.71	0.41	0.01
(T-Mobile)			0.00			1/2" Ice	0.83	0.52	0.02
			0.00						
(2) DTMA-1819-DD-12	B	From Face	3.00	0.0000	100.00	No Ice	0.71	0.41	0.01
(T-Mobile)			0.00			1/2" Ice	0.83	0.52	0.02
			0.00						
(2) DTMA-1819-DD-12	C	From Face	3.00	0.0000	100.00	No Ice	0.71	0.41	0.01
(T-Mobile)			0.00			1/2" Ice	0.83	0.52	0.02
			0.00						
Valmont 13' Low Profile	C	None		0.0000	100.00	No Ice	15.70	15.70	1.30
Platform						1/2" Ice	20.10	20.10	1.76
(T-Mobile)									
742-213	A	From Face	1.00	0.0000	90.00	No Ice	5.14	2.87	0.02
(Pocket)			0.00			1/2" Ice	5.61	3.48	0.05
			0.00						
742-213	B	From Face	1.00	0.0000	90.00	No Ice	5.14	2.87	0.02
(Pocket)			0.00			1/2" Ice	5.61	3.48	0.05
			0.00						
742-213	C	From Face	1.00	0.0000	90.00	No Ice	5.14	2.87	0.02
(Pocket)			0.00			1/2" Ice	5.61	3.48	0.05
			0.00						
Uni-Tri Bracket	C	None		0.0000	90.00	No Ice	1.75	1.75	0.29
(Pocket)						1/2" Ice	1.94	1.94	0.31
(2) P65-15-XLH-RR	A	From Face	3.50	0.0000	110.00	No Ice	5.95	3.08	0.04
(AT&T - proposed)			0.00			1/2" Ice	6.36	3.41	0.08
			0.00						
(2) P65-15-XLH-RR	B	From Face	3.50	0.0000	110.00	No Ice	5.95	3.08	0.04
(AT&T - proposed)			0.00			1/2" Ice	6.36	3.41	0.08
			0.00						
(2) P65-15-XLH-RR	C	From Face	3.50	0.0000	110.00	No Ice	5.95	3.08	0.04
(AT&T - proposed)			0.00			1/2" Ice	6.36	3.41	0.08
			0.00						
(2) TT19-08BP111-001 TMA	A	From Face	3.00	0.0000	110.00	No Ice	0.64	0.52	0.02
(AT&T - proposed)			0.00			1/2" Ice	0.76	0.62	0.02
			0.00						
(2) TT19-08BP111-001 TMA	B	From Face	3.00	0.0000	110.00	No Ice	0.64	0.52	0.02
(AT&T - proposed)			0.00			1/2" Ice	0.76	0.62	0.02
			0.00						
(2) TT19-08BP111-001 TMA	C	From Face	3.00	0.0000	110.00	No Ice	0.64	0.52	0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(AT&T - proposed)			0.00 0.00			1/2" Ice	0.76	0.62	0.02
Andrew 12'-6" Low Profile Platform (AT&T)	C	None		0.0000	110.00	No Ice 1/2" Ice	14.45 19.00	14.45 19.00	1.30 1.69

Tower Pressures - No Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 120.00-92.71	105.94	1.396	23	67.281	A	0.000	67.281	67.281	100.00	0.000	0.000
					B	0.000	67.281		100.00	0.000	0.000
					C	0.000	67.281		100.00	0.000	0.000
L2 92.71-46.16	69.03	1.235	20	140.733	A	0.000	140.733	140.733	100.00	0.000	0.000
					B	0.000	140.733		100.00	0.000	0.000
					C	0.000	140.733		100.00	0.000	0.000
L3 46.16-0.00	22.38	1	16	171.269	A	0.000	171.269	171.269	100.00	0.000	0.000
					B	0.000	171.269		100.00	0.000	0.000
					C	0.000	171.269		100.00	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 120.00-92.71	105.94	1.396	17	0.5000	69.555	A	0.000	69.555	69.555	100.00	0.000	0.000
						B	0.000	69.555		100.00	0.000	0.000
						C	0.000	69.555		100.00	0.000	0.000
L2 92.71-46.16	69.03	1.235	15	0.5000	144.612	A	0.000	144.612	144.612	100.00	0.000	0.000
						B	0.000	144.612		100.00	0.000	0.000
						C	0.000	144.612		100.00	0.000	0.000
L3 46.16-0.00	22.38	1	12	0.5000	175.116	A	0.000	175.116	175.116	100.00	0.000	0.000
						B	0.000	175.116		100.00	0.000	0.000
						C	0.000	175.116		100.00	0.000	0.000

Tower Pressure - Service

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 120.00-92.71	105.94	1.396	9	67.281	A	0.000	67.281	67.281	100.00	0.000	0.000
					B	0.000	67.281		100.00	0.000	0.000
					C	0.000	67.281		100.00	0.000	0.000
L2 92.71-46.16	69.03	1.235	8	140.733	A	0.000	140.733	140.733	100.00	0.000	0.000
					B	0.000	140.733		100.00	0.000	0.000
					C	0.000	140.733		100.00	0.000	0.000
L3 46.16-0.00	22.38	1	6	171.269	A	0.000	171.269	171.269	100.00	0.000	0.000
					B	0.000	171.269		100.00	0.000	0.000
					C	0.000	171.269		100.00	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1 120.00-92.71	0.82	2.16	A	1	0.65	1	1	1	67.281	1.69	61.92	C
			B	1	0.65	1	1	1	67.281			
			C	1	0.65	1	1	1	67.281			
L2 92.71-46.16	2.25	7.34	A	1	0.65	1	1	1	140.733	3.11	66.83	C
			B	1	0.65	1	1	1	140.733			
			C	1	0.65	1	1	1	140.733			
L3 46.16-0.00	2.10	10.66	A	1	0.65	1	1	1	171.269	3.10	67.16	C
			B	1	0.65	1	1	1	171.269			
			C	1	0.65	1	1	1	171.269			
Sum Weight:	5.17	20.17						OTM	463.15 kip-ft	7.90		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1 120.00-92.71	0.82	2.16	A	1	0.65	1	1	1	67.281	1.69	61.92	C
			B	1	0.65	1	1	1	67.281			
			C	1	0.65	1	1	1	67.281			
L2 92.71-46.16	2.25	7.34	A	1	0.65	1	1	1	140.733	3.11	66.83	C
			B	1	0.65	1	1	1	140.733			
			C	1	0.65	1	1	1	140.733			
L3 46.16-0.00	2.10	10.66	A	1	0.65	1	1	1	171.269	3.10	67.16	C
			B	1	0.65	1	1	1	171.269			
			C	1	0.65	1	1	1	171.269			
Sum Weight:	5.17	20.17						OTM	463.15 kip-ft	7.90		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1 120.00-92.71	0.82	2.16	A	1	0.65	1	1	1	67.281	1.69	61.92	C
			B	1	0.65	1	1	1	67.281			
			C	1	0.65	1	1	1	67.281			
L2 92.71-46.16	2.25	7.34	A	1	0.65	1	1	1	140.733	3.11	66.83	C
			B	1	0.65	1	1	1	140.733			
			C	1	0.65	1	1	1	140.733			
L3 46.16-0.00	2.10	10.66	A	1	0.65	1	1	1	171.269	3.10	67.16	C
			B	1	0.65	1	1	1	171.269			
			C	1	0.65	1	1	1	171.269			
Sum Weight:	5.17	20.17						OTM	463.15 kip-ft	7.90		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1 120.00-92.71	0.82	2.16	A	1	0.65	1	1	1	67.281	1.69	61.92	C
			B	1	0.65	1	1	1	67.281			
			C	1	0.65	1	1	1	67.281			
L2 92.71-46.16	2.25	7.34	A	1	0.65	1	1	1	140.733	3.11	66.83	C
			B	1	0.65	1	1	1	140.733			
			C	1	0.65	1	1	1	140.733			
L3 46.16-0.00	2.10	10.66	A	1	0.65	1	1	1	171.269	3.10	67.16	C
			B	1	0.65	1	1	1	171.269			
			C	1	0.65	1	1	1	171.269			
Sum Weight:	5.17	20.17						OTM	463.15 kip-ft	7.90		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1 120.00-92.71	0.82	2.67	A	1	0.65	1	1	1	69.555	1.31	48.01	C
			B	1	0.65	1	1	1	69.555			
			C	1	0.65	1	1	1	69.555			
L2 92.71-46.16	2.25	8.40	A	1	0.65	1	1	1	144.612	2.40	51.51	C
			B	1	0.65	1	1	1	144.612			
			C	1	0.65	1	1	1	144.612			
L3 46.16-0.00	2.10	11.95	A	1	0.65	1	1	1	175.116	2.38	51.50	C
			B	1	0.65	1	1	1	175.116			
			C	1	0.65	1	1	1	175.116			
Sum Weight:	5.17	23.01						OTM	357.51 kip-ft	6.09		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1 120.00-92.71	0.82	2.67	A	1	0.65	1	1	1	69.555	1.31	48.01	C
			B	1	0.65	1	1	1	69.555			
			C	1	0.65	1	1	1	69.555			
L2 92.71-46.16	2.25	8.40	A	1	0.65	1	1	1	144.612	2.40	51.51	C
			B	1	0.65	1	1	1	144.612			
			C	1	0.65	1	1	1	144.612			
L3 46.16-0.00	2.10	11.95	A	1	0.65	1	1	1	175.116	2.38	51.50	C
			B	1	0.65	1	1	1	175.116			
			C	1	0.65	1	1	1	175.116			
Sum Weight:	5.17	23.01						OTM	357.51 kip-ft	6.09		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1 120.00-92.71	0.82	2.67	A	1	0.65	1	1	1	69.555	1.31	48.01	C
			B	1	0.65	1	1	1	69.555			
			C	1	0.65	1	1	1	69.555			
L2 92.71-46.16	2.25	8.40	A	1	0.65	1	1	1	144.612	2.40	51.51	C
			B	1	0.65	1	1	1	144.612			
			C	1	0.65	1	1	1	144.612			
L3 46.16-0.00	2.10	11.95	A	1	0.65	1	1	1	175.116	2.38	51.50	C
			B	1	0.65	1	1	1	175.116			
			C	1	0.65	1	1	1	175.116			
Sum Weight:	5.17	23.01						OTM	357.51 kip-ft	6.09		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1 120.00-92.71	0.82	2.67	A	1	0.65	1	1	1	69.555	1.31	48.01	C
			B	1	0.65	1	1	1	69.555			
			C	1	0.65	1	1	1	69.555			
L2 92.71-46.16	2.25	8.40	A	1	0.65	1	1	1	144.612	2.40	51.51	C
			B	1	0.65	1	1	1	144.612			
			C	1	0.65	1	1	1	144.612			
L3 46.16-0.00	2.10	11.95	A	1	0.65	1	1	1	175.116	2.38	51.50	C
			B	1	0.65	1	1	1	175.116			
			C	1	0.65	1	1	1	175.116			
Sum Weight:	5.17	23.01						OTM	357.51	6.09		

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
									kip-ft			

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1 120.00-92.71	0.82	2.16	A	1	0.65	1	1	1	67.281	0.66	24.19	C
			B	1	0.65	1	1	1	67.281			
			C	1	0.65	1	1	1	67.281			
L2 92.71-46.16	2.25	7.34	A	1	0.65	1	1	1	140.733	1.22	26.11	C
			B	1	0.65	1	1	1	140.733			
			C	1	0.65	1	1	1	140.733			
L3 46.16-0.00	2.10	10.66	A	1	0.65	1	1	1	171.269	1.21	26.23	C
			B	1	0.65	1	1	1	171.269			
			C	1	0.65	1	1	1	171.269			
Sum Weight:	5.17	20.17						OTM	180.92 kip-ft	3.09		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1 120.00-92.71	0.82	2.16	A	1	0.65	1	1	1	67.281	0.66	24.19	C
			B	1	0.65	1	1	1	67.281			
			C	1	0.65	1	1	1	67.281			
L2 92.71-46.16	2.25	7.34	A	1	0.65	1	1	1	140.733	1.22	26.11	C
			B	1	0.65	1	1	1	140.733			
			C	1	0.65	1	1	1	140.733			
L3 46.16-0.00	2.10	10.66	A	1	0.65	1	1	1	171.269	1.21	26.23	C
			B	1	0.65	1	1	1	171.269			
			C	1	0.65	1	1	1	171.269			
Sum Weight:	5.17	20.17						OTM	180.92 kip-ft	3.09		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1 120.00-92.71	0.82	2.16	A	1	0.65	1	1	1	67.281	0.66	24.19	C
			B	1	0.65	1	1	1	67.281			
			C	1	0.65	1	1	1	67.281			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L2 92.71-46.16	2.25	7.34	A	1	0.65	1	1	1	140.733	1.22	26.11	C
			B	1	0.65	1	1	1	140.733			
			C	1	0.65	1	1	1	140.733			
L3 46.16-0.00	2.10	10.66	A	1	0.65	1	1	1	171.269	1.21	26.23	C
			B	1	0.65	1	1	1	171.269			
			C	1	0.65	1	1	1	171.269			
Sum Weight:	5.17	20.17						OTM	180.92 kip-ft	3.09		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1 120.00-92.71	0.82	2.16	A	1	0.65	1	1	1	67.281	0.66	24.19	C
			B	1	0.65	1	1	1	67.281			
			C	1	0.65	1	1	1	67.281			
L2 92.71-46.16	2.25	7.34	A	1	0.65	1	1	1	140.733	1.22	26.11	C
			B	1	0.65	1	1	1	140.733			
			C	1	0.65	1	1	1	140.733			
L3 46.16-0.00	2.10	10.66	A	1	0.65	1	1	1	171.269	1.21	26.23	C
			B	1	0.65	1	1	1	171.269			
			C	1	0.65	1	1	1	171.269			
Sum Weight:	5.17	20.17						OTM	180.92 kip-ft	3.09		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	20.17					
Bracing Weight	0.00					
Total Member Self-Weight	20.17			0.00	0.00	
Total Weight	29.31			0.00	0.00	
Wind 0 deg - No Ice		0.00	-15.49	-1296.58	0.00	0.00
Wind 30 deg - No Ice		7.74	-13.41	-1122.87	-648.29	0.00
Wind 45 deg - No Ice		10.95	-10.95	-916.82	-916.82	0.00
Wind 60 deg - No Ice		13.41	-7.74	-648.29	-1122.87	0.00
Wind 90 deg - No Ice		15.49	0.00	0.00	-1296.58	0.00
Wind 120 deg - No Ice		13.41	7.74	648.29	-1122.87	0.00
Wind 135 deg - No Ice		10.95	10.95	916.82	-916.82	0.00
Wind 150 deg - No Ice		7.74	13.41	1122.87	-648.29	0.00
Wind 180 deg - No Ice		0.00	15.49	1296.58	0.00	0.00
Wind 210 deg - No Ice		-7.74	13.41	1122.87	648.29	0.00
Wind 225 deg - No Ice		-10.95	10.95	916.82	916.82	0.00
Wind 240 deg - No Ice		-13.41	7.74	648.29	1122.87	0.00
Wind 270 deg - No Ice		-15.49	0.00	0.00	1296.58	0.00
Wind 300 deg - No Ice		-13.41	-7.74	-648.29	1122.87	0.00

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 315 deg - No Ice		-10.95	-10.95	-916.82	916.82	0.00
Wind 330 deg - No Ice		-7.74	-13.41	-1122.87	648.29	0.00
Member Ice	2.85					
Total Weight Ice	34.21			0.00	0.00	
Wind 0 deg - Ice		0.00	-12.49	-1059.28	0.00	0.00
Wind 30 deg - Ice		6.24	-10.81	-917.36	-529.64	0.00
Wind 45 deg - Ice		8.83	-8.83	-749.02	-749.02	0.00
Wind 60 deg - Ice		10.81	-6.24	-529.64	-917.36	0.00
Wind 90 deg - Ice		12.49	0.00	0.00	-1059.28	0.00
Wind 120 deg - Ice		10.81	6.24	529.64	-917.36	0.00
Wind 135 deg - Ice		8.83	8.83	749.02	-749.02	0.00
Wind 150 deg - Ice		6.24	10.81	917.36	-529.64	0.00
Wind 180 deg - Ice		0.00	12.49	1059.28	0.00	0.00
Wind 210 deg - Ice		-6.24	10.81	917.36	529.64	0.00
Wind 225 deg - Ice		-8.83	8.83	749.02	749.02	0.00
Wind 240 deg - Ice		-10.81	6.24	529.64	917.36	0.00
Wind 270 deg - Ice		-12.49	0.00	0.00	1059.28	0.00
Wind 300 deg - Ice		-10.81	-6.24	-529.64	917.36	0.00
Wind 315 deg - Ice		-8.83	-8.83	-749.02	749.02	0.00
Wind 330 deg - Ice		-6.24	-10.81	-917.36	529.64	0.00
Total Weight	29.31			0.00	0.00	
Wind 0 deg - Service		0.00	-6.05	-506.48	0.00	0.00
Wind 30 deg - Service		3.03	-5.24	-438.62	-253.24	0.00
Wind 45 deg - Service		4.28	-4.28	-358.13	-358.13	0.00
Wind 60 deg - Service		5.24	-3.03	-253.24	-438.62	0.00
Wind 90 deg - Service		6.05	0.00	0.00	-506.48	0.00
Wind 120 deg - Service		5.24	3.03	253.24	-438.62	0.00
Wind 135 deg - Service		4.28	4.28	358.13	-358.13	0.00
Wind 150 deg - Service		3.03	5.24	438.62	-253.24	0.00
Wind 180 deg - Service		0.00	6.05	506.48	0.00	0.00
Wind 210 deg - Service		-3.03	5.24	438.62	253.24	0.00
Wind 225 deg - Service		-4.28	4.28	358.13	358.13	0.00
Wind 240 deg - Service		-5.24	3.03	253.24	438.62	0.00
Wind 270 deg - Service		-6.05	0.00	0.00	506.48	0.00
Wind 300 deg - Service		-5.24	-3.03	-253.24	438.62	0.00
Wind 315 deg - Service		-4.28	-4.28	-358.13	358.13	0.00
Wind 330 deg - Service		-3.03	-5.24	-438.62	253.24	0.00

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 45 deg - No Ice
5	Dead+Wind 60 deg - No Ice
6	Dead+Wind 90 deg - No Ice
7	Dead+Wind 120 deg - No Ice
8	Dead+Wind 135 deg - No Ice
9	Dead+Wind 150 deg - No Ice
10	Dead+Wind 180 deg - No Ice
11	Dead+Wind 210 deg - No Ice
12	Dead+Wind 225 deg - No Ice
13	Dead+Wind 240 deg - No Ice
14	Dead+Wind 270 deg - No Ice

Comb. No.	Description
15	Dead+Wind 300 deg - No Ice
16	Dead+Wind 315 deg - No Ice
17	Dead+Wind 330 deg - No Ice
18	Dead+Ice+Temp
19	Dead+Wind 0 deg+Ice+Temp
20	Dead+Wind 30 deg+Ice+Temp
21	Dead+Wind 45 deg+Ice+Temp
22	Dead+Wind 60 deg+Ice+Temp
23	Dead+Wind 90 deg+Ice+Temp
24	Dead+Wind 120 deg+Ice+Temp
25	Dead+Wind 135 deg+Ice+Temp
26	Dead+Wind 150 deg+Ice+Temp
27	Dead+Wind 180 deg+Ice+Temp
28	Dead+Wind 210 deg+Ice+Temp
29	Dead+Wind 225 deg+Ice+Temp
30	Dead+Wind 240 deg+Ice+Temp
31	Dead+Wind 270 deg+Ice+Temp
32	Dead+Wind 300 deg+Ice+Temp
33	Dead+Wind 315 deg+Ice+Temp
34	Dead+Wind 330 deg+Ice+Temp
35	Dead+Wind 0 deg - Service
36	Dead+Wind 30 deg - Service
37	Dead+Wind 45 deg - Service
38	Dead+Wind 60 deg - Service
39	Dead+Wind 90 deg - Service
40	Dead+Wind 120 deg - Service
41	Dead+Wind 135 deg - Service
42	Dead+Wind 150 deg - Service
43	Dead+Wind 180 deg - Service
44	Dead+Wind 210 deg - Service
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	120 - 92.71	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-8.45	0.00	0.00
			Max. Mx	6	-5.84	-115.85	0.00
			Max. My	10	-5.84	0.00	-115.85
			Max. Vy	6	8.63	-115.85	0.00
			Max. Vx	10	8.63	0.00	-115.85
			Max. Torque	15			-0.00
L2	92.71 - 46.16	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-18.84	0.00	0.00
			Max. Mx	6	-15.16	-598.20	0.00
			Max. My	10	-15.16	0.00	-598.20
			Max. Vy	6	12.24	-598.20	0.00
			Max. Vx	10	12.24	0.00	-598.20
			Max. Torque	15			-0.00
L3	46.16 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-34.21	0.00	0.00
			Max. Mx	6	-29.30	-1317.27	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. My	2	-29.30	0.00	1317.27
			Max. Vy	6	15.50	-1317.27	0.00
			Max. Vx	2	-15.50	0.00	1317.27
			Max. Torque	15			-0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	19	34.21	0.00	12.49
	Max. H_x	14	29.31	15.49	0.00
	Max. H_z	2	29.31	0.00	15.49
	Max. M_x	2	1317.27	0.00	15.49
	Max. M_z	6	1317.27	-15.49	0.00
	Max. Torsion	9	0.00	-7.74	-13.41
	Min. Vert	1	29.31	0.00	0.00
	Min. H_x	6	29.31	-15.49	0.00
	Min. H_z	10	29.31	0.00	-15.49
	Min. M_x	10	-1317.27	0.00	-15.49
	Min. M_z	14	-1317.27	15.49	0.00
	Min. Torsion	15	-0.00	13.41	7.74

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	29.31	0.00	0.00	0.00	0.00	0.00
Dead+Wind 0 deg - No Ice	29.31	0.00	-15.49	-1317.27	0.00	0.00
Dead+Wind 30 deg - No Ice	29.31	7.74	-13.41	-1140.79	-658.64	0.00
Dead+Wind 45 deg - No Ice	29.31	10.95	-10.95	-931.45	-931.45	0.00
Dead+Wind 60 deg - No Ice	29.31	13.41	-7.74	-658.64	-1140.79	-0.00
Dead+Wind 90 deg - No Ice	29.31	15.49	0.00	0.00	-1317.27	0.00
Dead+Wind 120 deg - No Ice	29.31	13.41	7.74	658.64	-1140.79	0.00
Dead+Wind 135 deg - No Ice	29.31	10.95	10.95	931.45	-931.45	0.00
Dead+Wind 150 deg - No Ice	29.31	7.74	13.41	1140.79	-658.64	-0.00
Dead+Wind 180 deg - No Ice	29.31	0.00	15.49	1317.27	0.00	0.00
Dead+Wind 210 deg - No Ice	29.31	-7.74	13.41	1140.79	658.64	0.00
Dead+Wind 225 deg - No Ice	29.31	-10.95	10.95	931.45	931.45	0.00
Dead+Wind 240 deg - No Ice	29.31	-13.41	7.74	658.64	1140.79	-0.00
Dead+Wind 270 deg - No Ice	29.31	-15.49	0.00	0.00	1317.27	0.00
Dead+Wind 300 deg - No Ice	29.31	-13.41	-7.74	-658.64	1140.79	0.00
Dead+Wind 315 deg - No Ice	29.31	-10.95	-10.95	-931.45	931.45	0.00
Dead+Wind 330 deg - No Ice	29.31	-7.74	-13.41	-1140.79	658.64	-0.00
Dead+Ice+Temp	34.21	0.00	0.00	0.00	0.00	0.00
Dead+Wind 0 deg+Ice+Temp	34.21	0.00	-12.49	-1080.82	0.00	0.00
Dead+Wind 30 deg+Ice+Temp	34.21	6.24	-10.81	-936.02	-540.41	0.00
Dead+Wind 45 deg+Ice+Temp	34.21	8.83	-8.83	-764.26	-764.26	0.00
Dead+Wind 60 deg+Ice+Temp	34.21	10.81	-6.24	-540.41	-936.02	-0.00
Dead+Wind 90 deg+Ice+Temp	34.21	12.49	0.00	0.00	-1080.82	0.00
Dead+Wind 120 deg+Ice+Temp	34.21	10.81	6.24	540.41	-936.02	0.00
Dead+Wind 135 deg+Ice+Temp	34.21	8.83	8.83	764.26	-764.26	0.00

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead+Wind 150 deg+Ice+Temp	34.21	6.24	10.81	936.02	-540.41	-0.00
Dead+Wind 180 deg+Ice+Temp	34.21	0.00	12.49	1080.82	0.00	0.00
Dead+Wind 210 deg+Ice+Temp	34.21	-6.24	10.81	936.02	540.41	0.00
Dead+Wind 225 deg+Ice+Temp	34.21	-8.83	8.83	764.26	764.26	0.00
Dead+Wind 240 deg+Ice+Temp	34.21	-10.81	6.24	540.41	936.02	-0.00
Dead+Wind 270 deg+Ice+Temp	34.21	-12.49	0.00	0.00	1080.82	0.00
Dead+Wind 300 deg+Ice+Temp	34.21	-10.81	-6.24	-540.41	936.02	0.00
Dead+Wind 315 deg+Ice+Temp	34.21	-8.83	-8.83	-764.26	764.26	0.00
Dead+Wind 330 deg+Ice+Temp	34.21	-6.24	-10.81	-936.02	540.41	-0.00
Dead+Wind 0 deg - Service	29.31	0.00	-6.05	-514.62	0.00	0.00
Dead+Wind 30 deg - Service	29.31	3.03	-5.24	-445.68	-257.31	0.00
Dead+Wind 45 deg - Service	29.31	4.28	-4.28	-363.89	-363.89	0.00
Dead+Wind 60 deg - Service	29.31	5.24	-3.03	-257.31	-445.68	-0.00
Dead+Wind 90 deg - Service	29.31	6.05	0.00	0.00	-514.62	0.00
Dead+Wind 120 deg - Service	29.31	5.24	3.03	257.31	-445.68	0.00
Dead+Wind 135 deg - Service	29.31	4.28	4.28	363.89	-363.89	0.00
Dead+Wind 150 deg - Service	29.31	3.03	5.24	445.68	-257.31	-0.00
Dead+Wind 180 deg - Service	29.31	0.00	6.05	514.62	0.00	0.00
Dead+Wind 210 deg - Service	29.31	-3.03	5.24	445.68	257.31	0.00
Dead+Wind 225 deg - Service	29.31	-4.28	4.28	363.89	363.89	0.00
Dead+Wind 240 deg - Service	29.31	-5.24	3.03	257.31	445.68	-0.00
Dead+Wind 270 deg - Service	29.31	-6.05	0.00	0.00	514.62	0.00
Dead+Wind 300 deg - Service	29.31	-5.24	-3.03	-257.31	445.68	0.00
Dead+Wind 315 deg - Service	29.31	-4.28	-4.28	-363.89	363.89	0.00
Dead+Wind 330 deg - Service	29.31	-3.03	-5.24	-445.68	257.31	-0.00

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-29.31	0.00	0.00	29.31	0.00	0.000%
2	0.00	-29.31	-15.49	0.00	29.31	15.49	0.000%
3	7.74	-29.31	-13.41	-7.74	29.31	13.41	0.000%
4	10.95	-29.31	-10.95	-10.95	29.31	10.95	0.000%
5	13.41	-29.31	-7.74	-13.41	29.31	7.74	0.000%
6	15.49	-29.31	0.00	-15.49	29.31	0.00	0.000%
7	13.41	-29.31	7.74	-13.41	29.31	-7.74	0.000%
8	10.95	-29.31	10.95	-10.95	29.31	-10.95	0.000%
9	7.74	-29.31	13.41	-7.74	29.31	-13.41	0.000%
10	0.00	-29.31	15.49	0.00	29.31	-15.49	0.000%
11	-7.74	-29.31	13.41	7.74	29.31	-13.41	0.000%
12	-10.95	-29.31	10.95	10.95	29.31	-10.95	0.000%
13	-13.41	-29.31	7.74	13.41	29.31	-7.74	0.000%
14	-15.49	-29.31	0.00	15.49	29.31	0.00	0.000%
15	-13.41	-29.31	-7.74	13.41	29.31	7.74	0.000%
16	-10.95	-29.31	-10.95	10.95	29.31	10.95	0.000%
17	-7.74	-29.31	-13.41	7.74	29.31	13.41	0.000%
18	0.00	-34.21	0.00	0.00	34.21	0.00	0.000%
19	0.00	-34.21	-12.49	0.00	34.21	12.49	0.000%
20	6.24	-34.21	-10.81	-6.24	34.21	10.81	0.000%
21	8.83	-34.21	-8.83	-8.83	34.21	8.83	0.000%
22	10.81	-34.21	-6.24	-10.81	34.21	6.24	0.000%
23	12.49	-34.21	0.00	-12.49	34.21	0.00	0.000%
24	10.81	-34.21	6.24	-10.81	34.21	-6.24	0.000%
25	8.83	-34.21	8.83	-8.83	34.21	-8.83	0.000%
26	6.24	-34.21	10.81	-6.24	34.21	-10.81	0.000%
27	0.00	-34.21	12.49	0.00	34.21	-12.49	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
28	-6.24	-34.21	10.81	6.24	34.21	-10.81	0.000%
29	-8.83	-34.21	8.83	8.83	34.21	-8.83	0.000%
30	-10.81	-34.21	6.24	10.81	34.21	-6.24	0.000%
31	-12.49	-34.21	0.00	12.49	34.21	0.00	0.000%
32	-10.81	-34.21	-6.24	10.81	34.21	6.24	0.000%
33	-8.83	-34.21	-8.83	8.83	34.21	8.83	0.000%
34	-6.24	-34.21	-10.81	6.24	34.21	10.81	0.000%
35	0.00	-29.31	-6.05	0.00	29.31	6.05	0.000%
36	3.03	-29.31	-5.24	-3.03	29.31	5.24	0.000%
37	4.28	-29.31	-4.28	-4.28	29.31	4.28	0.000%
38	5.24	-29.31	-3.03	-5.24	29.31	3.03	0.000%
39	6.05	-29.31	0.00	-6.05	29.31	0.00	0.000%
40	5.24	-29.31	3.03	-5.24	29.31	-3.03	0.000%
41	4.28	-29.31	4.28	-4.28	29.31	-4.28	0.000%
42	3.03	-29.31	5.24	-3.03	29.31	-5.24	0.000%
43	0.00	-29.31	6.05	0.00	29.31	-6.05	0.000%
44	-3.03	-29.31	5.24	3.03	29.31	-5.24	0.000%
45	-4.28	-29.31	4.28	4.28	29.31	-4.28	0.000%
46	-5.24	-29.31	3.03	5.24	29.31	-3.03	0.000%
47	-6.05	-29.31	0.00	6.05	29.31	0.00	0.000%
48	-5.24	-29.31	-3.03	5.24	29.31	3.03	0.000%
49	-4.28	-29.31	-4.28	4.28	29.31	4.28	0.000%
50	-3.03	-29.31	-5.24	3.03	29.31	5.24	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000745
3	Yes	4	0.00000001	0.00042483
4	Yes	4	0.00000001	0.00048759
5	Yes	4	0.00000001	0.00042483
6	Yes	4	0.00000001	0.00000745
7	Yes	4	0.00000001	0.00042483
8	Yes	4	0.00000001	0.00048759
9	Yes	4	0.00000001	0.00042483
10	Yes	4	0.00000001	0.00000745
11	Yes	4	0.00000001	0.00042483
12	Yes	4	0.00000001	0.00048759
13	Yes	4	0.00000001	0.00042483
14	Yes	4	0.00000001	0.00000745
15	Yes	4	0.00000001	0.00042483
16	Yes	4	0.00000001	0.00048759
17	Yes	4	0.00000001	0.00042483
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00058973
20	Yes	4	0.00000001	0.00090353
21	Yes	4	0.00000001	0.00098563
22	Yes	4	0.00000001	0.00090353
23	Yes	4	0.00000001	0.00058973
24	Yes	4	0.00000001	0.00090353
25	Yes	4	0.00000001	0.00098563
26	Yes	4	0.00000001	0.00090353
27	Yes	4	0.00000001	0.00058973
28	Yes	4	0.00000001	0.00090353

29	Yes	4	0.00000001	0.00098563
30	Yes	4	0.00000001	0.00090353
31	Yes	4	0.00000001	0.00058973
32	Yes	4	0.00000001	0.00090353
33	Yes	4	0.00000001	0.00098563
34	Yes	4	0.00000001	0.00090353
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00003293
37	Yes	4	0.00000001	0.00003794
38	Yes	4	0.00000001	0.00003293
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00003293
41	Yes	4	0.00000001	0.00003794
42	Yes	4	0.00000001	0.00003293
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00003293
45	Yes	4	0.00000001	0.00003794
46	Yes	4	0.00000001	0.00003293
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00003293
49	Yes	4	0.00000001	0.00003794
50	Yes	4	0.00000001	0.00003293

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 92.71	9.723	39	0.6456	0.0000
L2	97.29 - 46.16	6.724	39	0.5999	0.0000
L3	51.83 - 0	2.020	39	0.3507	0.0000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
120.00	LPA-80080-6CF	39	9.723	0.6456	0.0000	84251
110.00	(2) P65-15-XLH-RR	39	8.383	0.6301	0.0000	42125
100.00	(3) APX16DWV-16DWV-S-E-ACU	39	7.071	0.6079	0.0000	21069
90.00	742-213	39	5.815	0.5731	0.0000	14324

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	120 - 92.71	24.885	6	1.6522	0.0000
L2	97.29 - 46.16	17.209	6	1.5355	0.0000
L3	51.83 - 0	5.171	6	0.8976	0.0000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
120.00	LPA-80080-6CF	6	24.885	1.6522	0.0000	32971
110.00	(2) P65-15-XLH-RR	6	21.455	1.6127	0.0000	16485
100.00	(3) APX16DWV-16DWV-S-E-ACU	6	18.097	1.5560	0.0000	8245
90.00	742-213	6	14.884	1.4669	0.0000	5604

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	120 - 92.71 (1)	TP32.27x26.9x0.25	27.29	0.00	0.0	39.000	24.6927	-5.84	963.02	0.006
L2	92.71 - 46.16 (2)	TP40.8x30.8688x0.375	51.13	0.00	0.0	39.000	46.8050	-15.16	1825.40	0.008
L3	46.16 - 0 (3)	TP49x38.9487x0.4375	51.83	0.00	0.0	39.000	67.4351	-29.30	2629.97	0.011

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	120 - 92.71 (1)	TP32.27x26.9x0.25	115.86	7.333	39.000	0.188	0.00	0.000	39.000	0.000
L2	92.71 - 46.16 (2)	TP40.8x30.8688x0.375	598.20	15.832	39.000	0.406	0.00	0.000	39.000	0.000
L3	46.16 - 0 (3)	TP49x38.9487x0.4375	1317.28	19.584	39.000	0.502	0.00	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	120 - 92.71 (1)	TP32.27x26.9x0.25	8.63	0.349	26.000	0.027	0.00	0.000	26.000	0.000
L2	92.71 - 46.16 (2)	TP40.8x30.8688x0.375	12.24	0.261	26.000	0.020	0.00	0.000	26.000	0.000
L3	46.16 - 0 (3)	TP49x38.9487x0.4375	15.50	0.230	26.000	0.018	0.00	0.000	26.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio P / P_a	Ratio f_{bx} / F_{bx}	Ratio f_{by} / F_{by}	Ratio f_v / F_v	Ratio f_{vt} / F_{vt}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	120 - 92.71 (1)	0.006	0.188	0.000	0.027	0.000	0.194 ✔	1.333	H1-3+VT ✔
L2	92.71 - 46.16 (2)	0.008	0.406	0.000	0.020	0.000	0.414 ✔	1.333	H1-3+VT ✔
L3	46.16 - 0 (3)	0.011	0.502	0.000	0.018	0.000	0.513 ✔	1.333	H1-3+VT ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	120 - 92.71	Pole	TP32.27x26.9x0.25	1	-5.84	1283.70	14.6	Pass
L2	92.71 - 46.16	Pole	TP40.8x30.8688x0.375	2	-15.16	2433.26	31.1	Pass
L3	46.16 - 0	Pole	TP49x38.9487x0.4375	3	-29.30	3505.75	38.5	Pass
							Summary	
						Pole (L3)	38.5	Pass
						RATING =	**38.5**	**Pass**

Program Version 5.4.2.0 - 6/17/2010 File:J:/Jobs/1100900.WI/CO1 - 650 Albany Avenue, Canton, CT/ERI Files/120' EEI Monopole_Extendable_to_150_Canton_CT.eri

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Subject:		Anchor Bolt and Base Plate Analysis
Location:		120-ft EEI Monpole Monopole Canton, CT
Rev. 0: 01/26/11		Prepared by: J.R.M. Checked by: C.F.C.

Anchor Bolt and Base Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	OM := 1317·ft·kips	(Input From RisaTower)
Shear Force =	Shear := 15·kips	(Input From RisaTower)
Axial Force =	Axial := 29·kips	(Input From RisaTower)

Anchor Bolt Data:

Use ASTM A615 Grade 75

Number of Anchor Bolts =	N := 18	(User Input)
Diameter of Bolt Circle =	D_{bc} := 58.0·in	(User Input)
Bolt "Column" Distance =	l := 3.0·in	(User Input)
Bolt Ultimate Strenght =	F_u := 100·ksi	(User Input)
Bolt Yeild Strenght =	F_y := 75·ksi	(User Input)
Bolt Modulus =	E := 29000·ksi	(User Input)
Diameter of Anchor Bolts =	D := 2.25·in	(User Input)
Threads per Inch =	n := 4.5	(User Input)

Base Plate Data:

Use ASTM A572 Mod 60

Plate Yield Strength =	Fy_{bp} := 60·ksi	(User Input)
Base Plate Thickness =	t_{bp} := 2.0·in	(User Input)
Base Plate Diameter =	D_{bp} := 64.00·in	(User Input)
Outer Pole Diameter =	D_{pole} := 49.00·in	(User Input)

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

Radius of Bolt Circle =: $R_{bc} := \frac{D_{bc}}{2} = 29 \cdot in$

Distance to Bolts = $i := 1 .. N$

$$d_i := \left| \begin{array}{l} \theta \leftarrow 2 \cdot \pi \cdot \left(\frac{i}{N}\right) \\ d \leftarrow R_{bc} \cdot \sin(\theta) \end{array} \right.$$

$d_1 = 9.92 \cdot in$ $d_9 = 0.00 \cdot in$

$d_2 = 18.64 \cdot in$ $d_{10} = -9.92 \cdot in$

$d_3 = 25.11 \cdot in$ $d_{11} = -18.64 \cdot in$

$d_4 = 28.56 \cdot in$ $d_{12} = -25.11 \cdot in$

$d_5 = 28.56 \cdot in$ $d_{13} = -28.56 \cdot in$

$d_6 = 25.11 \cdot in$ $d_{14} = -28.56 \cdot in$

$d_7 = 18.64 \cdot in$ $d_{15} = -25.11 \cdot in$

$d_8 = 9.92 \cdot in$ $d_{16} = -18.64 \cdot in$

Critical Distances For Bending in Plate:

Outer Pole Radius = $R_{pole} := \frac{D_{pole}}{2} = 24.5 \cdot in$

Moment Arms of Bolts about Neutral Axis = $MA_i := if\left(d_i \geq R_{pole}, d_i - R_{pole}, 0in\right)$

$MA_1 = 0.00 \cdot in$ $MA_9 = 0.00 \cdot in$

$MA_2 = 0.00 \cdot in$ $MA_{10} = 0.00 \cdot in$

$MA_3 = 0.61 \cdot in$ $MA_{11} = 0.00 \cdot in$

$MA_4 = 4.06 \cdot in$ $MA_{12} = 0.00 \cdot in$

$MA_5 = 4.06 \cdot in$ $MA_{13} = 0.00 \cdot in$

$MA_6 = 0.61 \cdot in$ $MA_{14} = 0.00 \cdot in$

$MA_7 = 0.00 \cdot in$ $MA_{15} = 0.00 \cdot in$

$MA_8 = 0.00 \cdot in$ $MA_{16} = 0.00 \cdot in$

Effective Width of Baseplate for Bending = $B_{eff} := .8 \cdot 2 \cdot \sqrt{\left(\frac{D_{bp}}{2}\right)^2 - \left(\frac{D_{pole}}{2}\right)^2} = 32.9 \cdot in$

Anchor Bolt Analysis:

Calculated Anchor Bolt Properties:

Polar Moment of Inertia = $I_p := \sum_i \left(d_i\right)^2 = 7.569 \times 10^3 \cdot in^2$

Gross Area of Bolt = $A_g := \frac{\pi}{4} \cdot D^2 = 3.976 \cdot in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 = 3.248 \cdot in^2$

Net Diameter = $D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} = 2.033 \cdot in$

Radius of Gyration of Bolt = $r := \frac{D_n}{4} = 0.508 \cdot in$

Section Modulus of Bolt = $S_x := \frac{\pi \cdot D_n^3}{32} = 0.826 \cdot in^3$

Check Anchor Bolt Tension Force:

Maximum Tensile Force = $T_{Max} := OM \cdot \frac{R_{bc}}{I_p} - \frac{Axial}{N} = 58.9 \cdot kips$

Allowable Tensile Force = $T_{ALL.Gross} := 1.333 \cdot \left(0.33 \cdot A_g \cdot F_u\right) = 174.9 \cdot kips$ (1.333 increase allowed per TIA/EIA)

$T_{ALL.Net} := 1.333 \cdot \left(0.60 \cdot A_n \cdot F_y\right) = 194.812 \cdot kips$ (1.333 increase allowed per TIA/EIA)

Bolt Tension % of Capacity = $\frac{T_{Max}}{T_{ALL.Net}} = 30.3 \cdot \%$ Bolts are "upset bolts". Use net area per AISC

Condition1 = $Condition1 := if\left(\frac{T_{Max}}{T_{ALL.Net}} \le 1.00, "OK", "Overstressed"\right)$

Condition1 = "OK"

Check Anchor Bolt Bending Stress:

Maximum Bending Moment = $M_x := \left(\frac{Shear}{N}\right) \cdot l = 0.208 \cdot ft \cdot kips$

Maximum Bending Stress = $f_{bx} := \frac{M_x}{S_x} = 3 \cdot ksi$

Allowable Bending Stress = $F_{bx} := 1.333 \cdot 0.6 \cdot F_y = 60 \cdot ksi$ (1.333 increase allowed per TIA/EIA)

Check Combined Stress Requirement:

Per ASCE Manual 72: "If the clearance between the base plate and concrete does not exceed two times the bolt diameter a bending stress analysis of the bolts is NOT normally required.

$$l := \begin{cases} l & \text{if } l > 2 \cdot D_n \\ 0 & \text{otherwise} \end{cases} = 0 \cdot in$$

$$f_{bx} := \begin{cases} f_{bx} & \text{if } l > 2 \cdot D_n \\ 0 & \text{otherwise} \end{cases} = 0 \cdot ksi$$

Check Anchor Bolt Compression/Combined Stress:

Maximum Compressive Force =

$$C_{Max} := OM \cdot \frac{R_{bc}}{I_p} + \frac{Axial}{N} = 62.2 \cdot kips$$

Maximum Compressive Stress =

$$f_a := \frac{C_{Max}}{A_n} = 19.1 \cdot ksi$$

$$K := 0.65$$

$$C_c := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{F_y}} = 87.364$$

$$F_a := \begin{cases} \dfrac{\left[1 - \dfrac{\left(\frac{K \cdot l}{r}\right)^2}{2 \cdot C_c^2}\right] \cdot F_y}{\dfrac{5}{3} + \dfrac{3 \cdot \left(\frac{K \cdot l}{r}\right)}{8 \cdot C_c} - \dfrac{\left(\frac{K \cdot l}{r}\right)^3}{8 \cdot C_c^3}} & \text{if } \dfrac{K \cdot l}{r} \le C_c \\ \dfrac{12 \cdot \pi^2 \cdot E}{23 \cdot \left(\frac{K \cdot l}{r}\right)^2} & \text{if } \dfrac{K \cdot l}{r} > C_c \end{cases} = 45 \cdot ksi$$

Allowable Compressive Stress =

$$F_a := 1.333 \cdot F_a = 60 \cdot ksi$$

(1.333 increase allowed per TIA/EIA)

Combined Stress % of Capacity =

$$\left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}}\right) = 31.9 \cdot \%$$

Condition 2 =

$$Condition2 := if\left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} \le 1.00, "OK", "Overstressed"\right)$$

Condition2 = "OK"

Base Plate Analysis:

Force from Bolts = $C_i := \frac{OM \cdot d_i}{I_p} + \frac{Axial}{N}$

$C_1 = 22.3 \cdot kips$ $C_9 = 1.6 \cdot kips$

$C_2 = 40.5 \cdot kips$ $C_{10} = -19.1 \cdot kips$

$C_3 = 54.1 \cdot kips$ $C_{11} = -37.3 \cdot kips$

$C_4 = 61.2 \cdot kips$ $C_{12} = -50.8 \cdot kips$

$C_5 = 61.2 \cdot kips$ $C_{13} = -58.0 \cdot kips$

$C_6 = 54.1 \cdot kips$ $C_{14} = -58.0 \cdot kips$

$C_7 = 40.5 \cdot kips$ $C_{15} = -50.8 \cdot kips$

$C_8 = 22.3 \cdot kips$ $C_{16} = -37.3 \cdot kips$

Maximum Bending Stress in Plate = $f_{bp} := \sum_i \frac{6 \cdot C_i \cdot MA_i}{\left(B_{eff} \, t_{bp}^{\,2}\right)} = 25.7 \cdot ksi$

Allowable Bending Stress in Plate = $F_{bp} := 1.33 \cdot 0.75 \cdot Fy_{bp} = 59.9 \cdot ksi$

Plate Bending Stress % of Capacity = $\frac{f_{bp}}{F_{bp}} = 42.9 \cdot \%$

Condition3 = $Condition3 := if\left(\frac{f_{bp}}{F_{bp}} < 1.00, "Ok", "Overstressed"\right)$

Condition3 = "Ok"

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Subject:		FOUNDATION ANALYSIS
Location:		120-ft EEI Monopole Canton, CT
Rev. 0: 01/26/11		Prepared by: J.R.M. Checked by: C.F.C.

Standard Monopole Foundation:

Input Data:

Tower Data

Overturning Moment =	$OM := 1317 \cdot ft \cdot kips$	(User Input from RISATower)	
Shear Force =	$Shear := 15 \cdot kip$	(User Input from RISATower)	
Axial Force =	$Axial := 29 \cdot kip$	(User Input from RISATower)	
Tower Height =	$H_t := 120 \cdot ft$	(User Input)	

Footing Data:

Overall Depth of Footing =	$D_f := 8.0 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 5.0 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 1.0 \cdot ft$	(User Input)	
Diameter of Pier =	$d_p := 7.0 \cdot ft$	(User Input)	
Thickness of Footing =	$T_f := 3.0 \cdot ft$	(User Input)	
Width of Footing =	$W_f := 24.0 \cdot ft$	(User Input)	

Anchor Bolt Data:

Length of Anchor Bolts =	$L_{st} := 96 \cdot in$	(User Input)	
Projection of Anchor Bolts Above Pier =	$A_{BP} := 12.0 \cdot in$	(User Input)	
Anchor Bolt Diameter =	$d_{anchor} := 2.25 \cdot in$	(User Input)	
Base Plate Bolt Circle =	$MP := 58.0 \cdot in$	(User Input)	

Material Properties:

Concrete Compressive Strength =	$f_c := 4000 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Anchor Bolt Yield Strength =	$f_{ya} := 75000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 33 \cdot deg$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 5000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 125 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 1.0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 9$	(User Input)	
Bar Diameter =	$d_{bpier} := 1.128 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 30$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 3 \cdot in$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 9$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 1.128 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 20$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 9$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 1.128 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 36$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area =

$$A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 0.999 \cdot in^2$$

Pad Top Reinforcement Bar Area =

$$A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 0.999 \cdot in^2$$

Pad Bottom Reinforcement Bar Area =

$$A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 0.999 \cdot in^2$$

Coefficient of Lateral Soil Pressure =

$$K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3.392$$

Load Factor =

$$LF := \begin{cases} 1.333 & \text{if } H_t \le 700 \cdot ft \\ 1.7 & \text{if } H_t \ge 1200 \cdot ft \\ 1.333 + \left(\frac{H_t - 700ft}{1200ft - 700ft} \right) \cdot 0.4 & \text{otherwise} \end{cases} = 1.333$$

Stability of Footing:

Adjusted Concrete Unit Weight = $\gamma_c := if(Bouyancy = 1, \gamma_{conc} - 62.4pcf, \gamma_{conc}) = 150 \cdot pcf$

Adjusted Soil Unit Weight = $\gamma_s := if(Bouyancy = 1, \gamma_{soil} - 62.4pcf, \gamma_{soil}) = 125 \cdot pcf$

Passive Pressure = $P_{pn} := K_p \cdot \gamma_s \cdot n + c \cdot 2 \cdot \sqrt{K_p} = 0.424 \cdot ksf$

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 2.12 \cdot ksf$

$P_{top} := if[n < (D_f - T_f), P_{pt}, P_{pn}] = 2.12 \cdot ksf$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 3.392 \cdot ksf$

$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 2.756 \cdot ksf$

$T_p := if[n < (D_f - T_f), T_f, (D_f - n)] = 3$

$A_p := W_f \cdot T_p = 72$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 198.439 \cdot kip$

Weight of Concrete Pad = $WT_c := \left[\left(W_f^2 \cdot T_f\right) + \frac{d_p^2 \cdot \pi}{4} L_p\right] \cdot \gamma_c = 288.063 \cdot kip$

Weight of Soil Above Footing = $WT_{s1} := \left[\left(W_f^2 - \frac{d_p^2 \cdot \pi}{4}\right) \cdot \left(\left|L_p - L_{pag} - n\right|\right)\right] \cdot \gamma_s = 201.57 \cdot kip$

Weight of Soil Wedge at Back Face = $WT_{s2} := \left(\frac{D_f^2 \cdot \tan(\Phi_s)}{2} \cdot W_f\right) \cdot \gamma_s = 62.343 \cdot kip$

Weight of Soil Wedge at back face Corners = $WT_{s3} := 2 \cdot \left[(D_f)^3 \cdot \frac{\tan(\Phi_s)}{3}\right] \cdot \gamma_s = 27.708 \cdot kips$

Total Weight = $WT_{tot} := WT_c + WT_{s1} + Axial = 518.632 \cdot kip$

Resisting Moment = $M_r := (WT_{tot}) \cdot \frac{W_f}{2} + S_u \cdot \frac{T_f}{3} + \left[(WT_{s2} + WT_{s3}) \cdot \left(W_f + \frac{D_f \cdot \tan(\Phi_s)}{3}\right)\right] = 8739 \cdot kip \cdot ft$

Overturning Moment = $M_{ot} := OM + Shear \cdot (L_p + T_f) = 1437 \cdot kip \cdot ft$

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 6.08$

Factor of Safety Required = $FS_{req} := 2$

$OverTurning\_Moment\_Check := if(FS \geq FS_{req}, "Okay", "No Good")$

$OverTurning\_Moment\_Check = "Okay"$

Shear Capacity in Pier:

Shear Resistance of Pier = $S_p := \frac{P_{ave} \cdot A_p + \mu \cdot WT_{tot}}{FS_{req}} = 215.912 \cdot kips$

$Shear\_Check := if(S_p > Shear, "Okay", "No Good")$

Shear_Check = "Okay"

Bearing Pressure Caused by Footing:

Area of the Mat = $A_{mat} := W_f^{\,2} = 576$

Section Modulus of Mat = $S := \frac{W_f^{\,3}}{6} = 2304 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{WT_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 1.524 \cdot ksf$

$Max\_Pressure\_Check := if(P_{max} < q_s, "Okay", "No Good")$

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat = $P_{min} := \frac{WT_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = 0.277 \cdot ksf$

$Min\_Pressure\_Check := if[(P_{min} \geq 0) \cdot (P_{min} < q_s), "Okay", "No Good"]$

Min_Pressure_Check = "Okay"

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 9.775$

Distance to Kern = $X_k := \frac{W_f}{6} = 4$

Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity = $e := \frac{M_{ot}}{WT_{tot}} = 2.771$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot WT_{tot}}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)} = 1.561 \cdot ksf$

$q_{adj} := if(P_{min} < 0, P_a, P_{max}) = 1.524 \cdot ksf$

$Pressure\_Check := if(q_{adj} < q_s, "Okay", "No Good")$

Pressure_Check = "Okay"

Concrete Bearing Capacity:

Strength Reduction Factor = $\Phi_c := 0.65$ (ACI-2008 9.3.2.2)

Bearing Strength Between Pier and Pad = $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 1.225 \times 10^4 \cdot kips$ (ACI-2008 10.14)

$Bearing\_Check := if(P_b > LF \cdot Axial, "Okay", "No Good")$

Bearing_Check = "Okay"

Shear Strength of Concrete:

Beam Shear: (Critical section located at a distance d from the face of Pier) (ACI 11.3.1.1)

$\phi_c := 0.85$ (ACI 9.3.2.5)

$d := T_f - Cvr_{pad} - d_{bbot}$

$d_1 := \frac{W_f}{2} - \frac{d_p}{2}$

$d_2 := d_1 - d$

$L := \left(\frac{W_f}{2} - e\right) \cdot 3$

$Slope := if\left(L > W_f, \frac{P_{max} - P_{min}}{W_f}, \frac{q_{adj}}{L}\right)$

$V_{req} := LF \cdot \left[\left(q_{adj} - Slope \cdot d_1\right) + \left(\frac{Slope \cdot d_1}{2}\right)\right] \cdot W_f \cdot d_1$

$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot psi} \cdot W_f \cdot d$ (ACI-2008 11.2.1.1)

$Beam\_Shear\_Check := if(V_{req} < V_{Avail}, "Okay", "No Good")$

Beam_Shear_Check = "Okay"

Punching Shear: (Critical Section Located at a distance of d/2 from the face of pier) (ACI 11.11.1.2)

Critical Perimeter of Punching Shear = $b_o := (d_p + d) \cdot \pi = 30.3$

Area Included Inside Perimeter = $A_{bo} := \frac{\pi \cdot (d_p + d)^2}{4} = 73.2$

Area Outside of Perimeter = $A_{out} := A_{mat} - A_{bo} = 502.8$

Guess Value = $v_u := 1ksf$ (From "Foundation Analysis and design", By Joseph Bowles, Eq. 8-9)

Given $d^2 + d_p \cdot d = \frac{WT_{tot}}{\pi \cdot v_u}$

$v_u := \text{Find}(v_u) = 6.4 \cdot ksf$

$V_u := v_u \cdot d \cdot W_f = 410.3 \cdot kips$

Required Shear Strength = $V_{req} := LF \cdot V_u = 547 \cdot kips$

Available Shear Strength = $V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 2494.9 \cdot kip$ (ACI-2008 11.11.2.1)

$Punching\_Shear\_Check := if(V_{req} < V_{Avail}, "Okay", "No Good")$

Punching_Shear_Check = "Okay"

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

Strength Reduction Factor = $\phi_m := .90$ (ACI-2008 9.3.2.1)

$q_b := q_{adj} - d_1 \cdot Slope = 1.082 \cdot ksf$

Maximum Bending at Face of Pier = $M_n := \frac{1}{LF \cdot \phi_m} \cdot \left[(q_{adj} - q_b) \cdot \frac{d_1^2}{3} + q_b \cdot \frac{d_1^2}{2} \right] \cdot W_f = 995 \cdot kip \cdot ft$

$$\beta := \begin{cases} 0.85 & \text{if } 2500 \cdot psi \le f_c \le 4000 \cdot psi \\ 0.65 & \text{if } f_c > 8000 \cdot psi \\ \left[0.85 - \left[\frac{\left(\frac{f_c}{psi} - 4000 \right)}{1000} \right] \cdot 0.5 \right] & \text{otherwise} \end{cases} = 0.85$$

(ACI-200810.2.7.3)

$R_u := \frac{M_n}{\phi_m \cdot W_f \cdot d^2} = 45.3 \cdot psi$

$\rho := \frac{0.85 \cdot f_c}{f_y} \left(1 - \sqrt{1 - \frac{2 \cdot R_u}{0.85 \cdot f_c}} \right) = 0.0008$

$\rho_{min} := 1.333 \cdot \rho = 0.00101$

Required Reinforcement for Temperature and Shrinkage:

$$\rho_{sh} := \begin{cases} .0018 & \text{if } f_y \geq 60000 \cdot psi \\ .0020 & \text{otherwise} \end{cases}$$ (ACI -2008 7.12.2.1)

Check Bottom Bars:

$As := \max(\rho, \rho_{min}, \rho_{sh}) \cdot W_f \cdot d = 16.5 \cdot in^2$

$As_{prov} := A_{bbot} \cdot NB_{bot} = 36 \cdot in^2$

$Pad\_Reinforcement\_Bot := if(As_{prov} > As, "Okay", "No Good")$

Pad_Reinforcement_Bot = "Okay"

Check top Bars:

$As := \rho_{sh} \cdot (W_f \cdot d) = 16.5 \cdot in^2$

$As_{prov} := A_{btop} \cdot NB_{top} = 20 \cdot in^2$

$Pad\_Reinforcement\_Top := if(As_{prov} > As, "Okay", "No Good")$

Pad_Reinforcement_Top = "Okay"

Developement Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 6.9 \cdot in$$

Spacing or Cover Dimension =

$$c := if\left(Cvr_{pad} < \frac{B_{sPad}}{2}, Cvr_{pad}, \frac{B_{sPad}}{2}\right) = 3 \cdot in$$

Transverse Reinforcement Index =

$k_{tr} := 0$ (ACI-2008 12.2.3)

$$L_{dbt} := \frac{3 \cdot f_y \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 30.2 \cdot in$$

Minimum Development Length =

$L_{dbmin} := 12 \cdot in$ (ACI-2008 12.2.1)

$L_{dbtCheck} := if(L_{dbt} \geq L_{dbmin}, "Use L.dbt", "Use L.dbmin")$

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{d_p}{2} - Cvr_{pad} = 99 \cdot in$$

$Lpad\_Check := if(L_{Pad} > L_{dbt}, "Okay", "No Good")$

Lpad_Check = "Okay"

Steel Reinforcement in Pier:

Area of Pier = $A_p := \frac{\pi \cdot d_p^2}{4} = 5541.77 \cdot in^2$

$A_{smin} := 0.01 \cdot 0.05 \cdot A_p = 2.77 \cdot in^2$ (ACI-2008 10.8.4 & 10.9.1)

$A_{sprov} := NB_{pier} \cdot A_{bpier} = 29.98 \cdot in^2$

$Steel\_Area\_Check := if(A_{sprov} > A_{smin}, "Okay", "No Good")$

Steel_Area_Check = "Okay"

Bar Spacing In Pier = $B_{sPier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} = 7.668 \cdot in$

Diameter of Reinforcement Cage = $Diam_{cage} := d_p - 2 \cdot Cvr_{pier} = 78 \cdot in$

Maximum Moment in Pier = $M_p := \left[OM + Shear \cdot \left(L_p + \frac{A_{BP}}{2} \right) \right] \cdot LF = 22386.4 \cdot in \cdot kips$

Pier Check evaluated from outside program and results are listed below;

$(D\ N\ n\ P_u\ M_{xu}) := \left(d_p \cdot 12\ \ NB_{pier}\ \ BS_{pier}\ \ \frac{Axial \cdot 1.333}{kips}\ \ \frac{M_p}{in \cdot kips} \right)$

$(D\ N\ n\ P_u\ M_{xu}) = (84\ \ 30\ \ 9\ \ 38.7\ \ 22386.4)$

$(\phi P_n\ \ \phi M_{xn}\ \ f_{sp}\ \ \rho) := (0\ \ 0\ \ 0\ \ 0)$

$(\phi P_n\ \ \phi M_{xn}\ \ f_{sp}\ \ \rho) := \phi P'_n(D, N, n, P_u, M_{xu})^T$

$(\phi P_n\ \ \phi M_{xn}\ \ f_{sp}\ \ \rho) = (103.2\ \ 59747.9\ \ -60\ \ 0)$

$Axial\_Load\_Check := if(\phi P_n \geq P_u, "Okay", "No Good")$

Axial_Load_Check = "Okay"

$Bending\_Check := if(\phi M_{xn} \geq M_{xu}, "Okay", "No Good")$

Bending_Check = "Okay"

Development Length Pier Reinforcement:

Available Length in Foundation:

$L_{pier} := L_p - Cvr_{pier} = 57 \cdot in$

$L_{pad} := T_f - Cvr_{pad} = 33 \cdot in$

Tension: (ACI-2008 12.2.3)

Spacing or Cover Dimension =

$c := if\left(Cvr_{pier} < \frac{B_{sPier}}{2}, Cvr_{pier}, \frac{B_{sPier}}{2}\right) = 3 \cdot in$

Transverse Reinforcement =

$k_{tr} := 0$ (ACI-2008 12.2.3)

$L_{dbt} := \frac{3 \cdot f_y \cdot \alpha_{pier} \cdot \beta_{pier} \cdot \gamma_{pier} \cdot \lambda_{pier}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \left(\frac{c + k_{tr}}{d_{bpier}}\right)} \cdot d_{bpier} = 30.18 \cdot in$

Minimum Development Length =

$L_{dh} := \frac{1200 \cdot d_{bpier}}{\sqrt{\frac{f_c}{psi}}} \cdot .7 = 14.982 \cdot in$ (ACI 12.2.1)

Pier reinforcement bars are standard 90 degree hooks and therefore developement in the pad is computed as follows:

$L_{db} := \max\left(L_{dbt}, L_{dbmin}\right)$

$L_{tension\_Check} := if\left(L_{pier} + L_{pad} > L_{dbt}, "Okay", "No Good"\right)$

$L_{tension\_Check} = "Okay"$

Compression: (ACI-2008 12.3.2)

$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot f_y}{\sqrt{f_c \cdot psi}} = 21.402 \cdot in$

$L_{dbmin} := 0.0003 \cdot \frac{in^2}{lb} \cdot \left(d_{bpier} \cdot f_y\right) = 20.304 \cdot in$

$L_{dbc} := if\left(L_{dbc1} \geq L_{dbmin}, L_{dbc1}, L_{dbmin}\right) = 21.402 \cdot in$

$L_{compression\_Check} := if\left(L_{pier} + L_{pad} > L_{dbc}, "Okay", "No Good"\right)$

$L_{compression\_Check} = "Okay"$

Tie Size and Spacing in Column:

Minimum Tie Size = $Tie_{min} := if(BS_{pier} \le 10, 3, 4) = 3$

Used #3 Ties

Seismic Factor = $z := if(Z \le 2, 1, 0.5) = 1$ (ACI-2008 21.10.5)

$s_{lim1} := 16 \cdot d_{bpier} \cdot z = 18.048 \cdot in$

$s_{lim2} := \frac{48 \cdot d_{Tie}}{8} \cdot z = 18 \cdot in$

$s_{lim3} := D_f \cdot z = 96 \cdot in$

$s_{lim4} := 18in$

Maximum Spacing = $s_{tie} := \min\left(\begin{pmatrix} s_{lim1} \\ s_{lim2} \\ s_{lim3} \\ s_{lim4} \end{pmatrix}\right) = 18 \cdot in$

Number of Ties Required = $n_{tie} := \frac{L_{pier} - 3 \cdot in}{s_{tie}} + 1 = 4$

Check Anchor Steel Embedment:

Depth Available = $D_{ab} := L_{st} - A_{BP} = 7 \cdot ft$

Length of Anchor Bolt = $L_{anchor} := \frac{(0.11 \cdot f_{ya}) \cdot in}{\sqrt{f_c \cdot psi}} = 10.87 \cdot ft$

$Depth\_Check := if(D_{ab} \ge L_{anchor}, "Okay", "No Good")$

Depth_Check = "No Good"

Note: Anchor plate is provided

Section 1 - RFDS GENERAL INFORMATION

RFDS NAME:	CT1230	DATE:	9/25/2010 22:03	RF DESIGN ENG:	Francis Malabanan	RF PERF ENG:	TBD
ISSUE:	Final	Approved? (Y/N)	Y	RF DESIGN PHONE:	(860) 315-2291	RF PERF PHONE:	TBD
REVISION:	V02	RF MANAGER:	Walter C. Saddig Jr.	RF DESIGN EMAIL:	fm4830@att.com	RF PERF EMAIL:	TBD
INITIATIVE / PROJECT:	2nd carrier add					TRIDENT:	N/A
						GSM FREQUENCY:	850
						UMTS FREQUENCY:	850
						LTE FREQUENCY:	N/A
						i-PLAN JOB NUMBER:	TBD

Section 2 - LOCATION INFORMATION

USID:	59441	FA LOCATION CODE:	10050765	LOCATION NAME:	Canton-Albany Turnpike	ORACLE PROJECT #:	TBD
REGION:	North East	MARKET CLUSTER:	New England	MARKET:	CT	SEARCH RING NAME:	N/A
ADDRESS:	650 ALBANY TURNPIKE	CITY:	Canton	STATE:	CT	SEARCH RING ID:	N/A
ZIP CODE:	06022	COUNTY:	Hartford	MSA/RSA:	TBD	BTA:	TBD
LATITUDE (D-M-S):	41° 51' 2"	LONGITUDE (D-M-S):	72° 56' 55.41"	LAT (DEC. DEG.):	41.850556	LONG (DEC. DEG.):	-72.948724
DIRECTIONS, ACCESS AND EQUIPMENT LOCATION:	TBD					BORDER CELL WITH CONTOUR COORD:	TBD
						AM STUDY REQ D (Y/N):	TBD
						FREQ COORD:	TBD

Section 3 - LICENSE COVERAGE/FILING INFORMATION

CGSA - NO FILING TRIGGERED:	TBD	CGSA LOSS:	TBD	PCS REDUCED - UPS ZIP:	TBD
CGSA - MINOR FILING NEEDED:	TBD	CGSA EXT AGMT NEEDED:	TBD	PCS POPS REDUCED:	TBD
CGSA - MAJOR FILING NEEDED:	TBD	CGSA SCORECARD UPDATED:	TBD		

Section 4 - TOWER/REGULATORY INFORMATION

STRUCTURE AT&T OWNED?:	TBD	GROUND ELEVATION:	TBD	STRUCTURE TYPE:	Monopole	MARKET LOCATION 850 MHZ CALL SIGN(S):	TBD
ADDTIONAL REGULATORY?:	TBD	HEIGHT OVERALL:	TBD	FCC ASR NUMBER:	TBD	MARKET LOCATION 1900 MHZ CALL SIGN(S):	TBD
SUB-LEASE RIGHTS?:	TBD	STRUCTURE HEIGHT:	TBD			MARKET LOCATION 700 MHZ CALL SIGN(S):	TBD
LIGHTING TYPE:	TBD					MARKET LOCATION AWS MHZ CALL SIGN(S):	TBD

Section 5 - E-911 INFORMATION

	PSAP NAME:	PSAP ID:	E911 PHASE:	MPC SVC PROVIDER:	LMU REQUIRED:	ESRN:	DATE LIVE PH1:	DATE LIVE PH2:
ALPHA	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
BETA	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
GAMMA	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
DELTA								
EPSILON								
PSI								

Section 6 - RBS GENERAL INFORMATION

4 DIGIT SITE ID:	1230	COW OR TOY?:	NO	CELLULAR NETWORK:	GOLD	DISASTER PRIORITY:	TBD
CELL SITE TYPE:	SECTORIZED	SITE TYPE:	MACRO	OPS DISTRICT:	CT-North	OPS ZONE:	NE_CT_N_HRFR_SW_CS
BTS LOCATION ID:	TBD	ORIGINATING CO:	ATT	RF DISTRICT:	Middletown	RF ZONE:	BCT04

Section 7 - RBS SPECIFIC INFORMATION

	GSM RBSs	UMTS 1ST CARRIER RBSs	UMTS 2ND CARRIER RBSs	UMTS 3RD CARRIER RBSs	UMTS 4TH CARRIER RBSs	LTE RBSs
MSC	MCT01	TBD	TBD	N/A	N/A	N/A
BSC/RNC	BCT04	MDTWCGTNCR0R03	TBD	N/A	N/A	N/A
LAC	05004	TBD	TBD	N/A	N/A	N/A
RAC	TBD	TBD	TBD	N/A	N/A	N/A
EQUIPMENT VENDOR	NOKIA	ERICSSON	ERICSSON	N/A	N/A	N/A
EQUIPMENT TYPE	TBD	RBS3418	RRU22 1900 carrier kit	N/A	N/A	N/A
LOCATION	TBD	TBD	TBD	N/A	N/A	N/A
CABINET LOCATION	TBD	TBD	TBD	N/A	N/A	N/A

Section 8 - RBS INDIVIDUAL INFORMATION

	GSM 850 RBS	GSM 1900 RBS	UMTS 850 RBS	UMTS 1900 RBS	UMTS 2ND 850 RBS	UMTS 2ND 1900 RBS	UMTS 3RD 850 RBS	UMTS 3RD 1900 RBS	UMTS 4TH 850 RBS	UMTS 4TH 1900 RBS	LTE 700 RBS	LTE AWS RBS
CELL ID/BCF	184G1230	N/A	CTV1230	N/A	N/A	CTV1230	N/A	N/A	N/A	N/A	N/A	N/A
CTS COMMON ID	184G1230	N/A	CTV1230	N/A	N/A	CTU1230	N/A	N/A	N/A	N/A	N/A	N/A

Section 9 - SOFT SECTOR ID

	GSM 850 RBS	GSM 1900 RBS	UMTS 850 RBS	UMTS 1900 RBS	UMTS 2ND 850 RBS	UMTS 2ND 1900 RBS	UMTS 3RD 850 RBS	UMTS 3RD 1900 RBS	UMTS 4TH 850 RBS	UMTS 4TH 1900 RBS	LTE 700 RBS	LTE AWS RBS
ALPHA (OR OMNI)	184G12301	N/A	CTV12301	N/A	N/A	CTU12307	N/A	N/A	N/A	N/A	N/A	N/A
BETA	184G12302	N/A	CTV12302	N/A	N/A	CTU12308	N/A	N/A	N/A	N/A	N/A	N/A
GAMMA	184G12303	N/A	CTV12303	N/A	N/A	CTU12309	N/A	N/A	N/A	N/A	N/A	N/A
DELTA												
EPSILON												
PSI												

Section 10 - CID/SAC

	GSM 850 RBS	GSM 1900 RBS	UMTS 850 RBS	UMTS 1900 RBS	UMTS 2ND 850 RBS	UMTS 2ND 1900 RBS	UMTS 3RD 850 RBS	UMTS 3RD 1900 RBS	UMTS 4TH 850 RBS	UMTS 4TH 1900 RBS	LTE 700 RBS	LTE AWS RBS
ALPHA (OR OMNI)	12301	N/A	12301	N/A	N/A	12307	N/A	N/A	N/A	N/A	N/A	N/A
BETA	12302	N/A	12302	N/A	N/A	12308	N/A	N/A	N/A	N/A	N/A	N/A
GAMMA	12303	N/A	12303	N/A	N/A	12309	N/A	N/A	N/A	N/A	N/A	N/A
DELTA												
EPSILON												
PSI												

Section 11 - CURRENT RADIO COUNTS (Existing)

	GSM 850 RBS	GSM 1900 RBS	UMTS 850 RBS	UMTS 1900 RBS	UMTS 2ND 850 RBS	UMTS 2ND 1900 RBS	UMTS 3RD 850 RBS	UMTS 3RD 1900 RBS	UMTS 4TH 850 RBS	UMTS 4TH 1900 RBS	LTE 700 RBS	LTE AWS RBS
ALPHA (OR OMNI)	2	N/A	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BETA	2	N/A	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GAMMA	2	N/A	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DELTA												
EPSILON												
PSI												

Section 12 - CURRENT BASE BAND CONFIGURATION (Existing)

	GSM 1st Cabinet	GSM 2nd Cabinet	UMTS 1st Cabinet	UMTS 2nd Cabinet	LTE 1st Cabinet	LTE 2nd Cabinet
# T1s	TBD	TBD	TBD	TBD		
LINK PROFILE	TBD	TBD	TBD	TBD		
RF Combining						
Fiber or Ethernet?	TBD	TBD	TBD	TBD		
Tx Board Model	TBD	TBD	TBD	TBD		
Tx Board QTY	TBD	TBD	TBD	TBD		
RAX/ECU Board Model	TBD	TBD	TBD	TBD		
RAX/ECU Board QTY	TBD	TBD	TBD	TBD		
BBU Board Model						
BBU Board QTY						
RRU - location						
Fiber Jumper						
DC Cable						
DC/Fiber Dem. Box						
Bundled Fiber Cable						
Bundled DC Cable						

Section 13 - NEW/PROPOSED RADIO COUNTS

	GSM 850 RBS	GSM 1900 RBS	UMTS 850 RBS	UMTS 1900 RBS	UMTS 2ND 850 RBS	UMTS 2ND 1900 RBS	UMTS 3RD 850 RBS	UMTS 3RD 1900 RBS	UMTS 4TH 850 RBS	UMTS 4TH 1900 RBS	LTE 700 RBS	LTE AWS RBS
ALPHA (OR OMNI)	2	N/A	1	N/A	N/A	1	N/A	N/A	N/A	N/A	N/A	N/A
BETA	2	N/A	1	N/A	N/A	1	N/A	N/A	N/A	N/A	N/A	N/A
GAMMA	2	N/A	1	N/A	N/A	1	N/A	N/A	N/A	N/A	N/A	N/A
DELTA												
EPSILON												
PSI												

Section 14 - NEW/PROPOSED BASE BAND CONFIGURATION

	GSM 1st Cabinet	GSM 2nd Cabinet	UMTS 1st Cabinet	UMTS 2nd Cabinet	LTE 1st Cabinet	LTE 2nd Cabinet
# T1s						
LINK PROFILE						
RF Combining						
Fiber or Ethernet?						
Tx Board Model						
Tx Board QTY						
RAX/ECU Board Model						
RAX/ECU Board QTY						
BBU Board Model						
BBU Board QTY						
RRU - location						
Fiber Jumper						
DC Cable						
DC/Fiber Dem. Box						
Bundled Fiber Cable						
Bundled DC Cable						

Section 15A - CURRENT SECTOR/CELL INFORMATION - ALPHA (OR OMNI)

ANTENNA CONFIG (FROM BACK):	ANTENNA 1 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 2 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 3 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 4 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 5 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	
TX/RX?	TxRx / TxRx	N/A					TxRx / Rx	N/A		
TECHNOLOGY	GSM / 850	N/A					UMTS / 850	N/A		
FEEDERS (# /TYPE/LENGTH)	2 / 1 5/8" - RFS / 160						2 / 1 5/8" - RFS / 160			
ANTENNA MAKE - MODEL	XDUO1416						XDUO1416			
ANTENNA VENDOR	CSS ANTENNA INC, (410)344-1010						CSS ANTENNA INC, (410)344-1010			
ANTENNA SIZE H"xW"xD"	50.5 x 14.6 x 7.1						50.5 x 14.6 x 7.1			
ANTENNA WEIGHT	23						23			
ANTENNA GAIN										
AZIMUTH	143 °						143 °			
RADIATION CENTER	110 '						110 '			
ANTENNA TIP HEIGHT	112 '						112 '			
MAGNETIC DECLINATION	-14 °						-14 °			
ELECTRICAL TILT (700/850/1900/AWS)	4 °	0 °					4 °	0 °		
MECHANICAL DOWNTILT	0 °						0 °			
SCPA/MCPA?	N/A						N/A			
MCPA MODULES	N/A						N/A			
HATCHPLATE POWER (Watts)	TBD	TBD					TBD	TBD		
ERP (Watts)	TBD	TBD					TBD	TBD		
NARROW BAND LLC (QTY/MODEL)	N/A						N/A			
HYBRID COMBINER (QTY/MODEL)	N/A						N/A			
TMA/LNA (TYPE/MODEL)	2 / ADC / 1900W850BP						N/A			
CURRENT INJECTORS FOR TMA	ADC BiasT						N/A			
CURRENT INJCTR POWER CABLE	ADC						N/A			
ANTENNA SHARING KIT?	N/A						N/A			
BAS Filter	N/A						N/A			
DUPLEXER (QTY/MODEL)	N/A + 2 / Powerwave / LGP 21901						2 + 2 / Powerwave / LGP 21901			
DUPLEXER (QTY/MODEL)	N/A						N/A			
SURGE ARRESTOR (QTY/MODEL)	N/A						2 / ADC BiasT			
DC BLOCK (QTY/MODEL)	N/A						N/A			
RET EQUIPMENT (QTY/MODEL)	N/A						N/A			
RET CABLING	N/A						N/A			
1900 PDU FOR TMAS	ADC / CG-PDU-SmPWR						N/A			

Section 15B - CURRENT SECTOR/CELL INFORMATION - BETA

ANTENNA CONFIG (FROM BACK):	ANTENNA 1 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 2 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 3 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 4 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 5 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	
TX/RX?	TxRx / TxRx	N/A					TxRx / Rx	N/A		
TECHNOLOGY	GSM / 850	N/A					UMTS / 850	N/A		
FEEDERS (# /TYPE/LENGTH)	2 / 1 5/8" - RFS / 160						2 / 1 5/8" - RFS / 160			
ANTENNA MAKE - MODEL	XDUO1416						XDUO1416			
ANTENNA VENDOR	CSS ANTENNA INC, (410)344-1010						CSS ANTENNA INC, (410)344-1010			
ANTENNA SIZE H"xW"xD"	50.5 x 14.6 x 7.1						50.5 x 14.6 x 7.1			
ANTENNA WEIGHT	23						23			
ANTENNA GAIN										
AZIMUTH	263 °						263 °			
RADIATION CENTER	110 '						110 '			
ANTENNA TIP HEIGHT	112 '						112 '			
MAGNETIC DECLINATION	-14 °						-14 °			
ELECTRICAL TILT (700/850/1900/AWS)	4 °	0 °					4 °	0 °		
MECHANICAL DOWNTILT	0 °						0 °			
SCPA/MCPA?	N/A						N/A			
MCPA MODULES	N/A						N/A			
HATCHPLATE POWER (Watts)	TBD	TBD					TBD	TBD		
ERP (Watts)	TBD	TBD					TBD	TBD		

NARROW BAND LLC (QTY/MODEL)	N/A			N/A	
HYBRID COMBINER (QTY/MODEL)	N/A			N/A	
TMA/LNA (TYPE/MODEL)	2 / ADC / 1900W650BP			N/A	
CURRENT INJECTORS FOR TMA	ADC BiasT			N/A	
CURRENT INJCTR POWER CABLE	ADC			N/A	
ANTENNA SHARING KIT?	N/A			N/A	
BAS Filter	N/A			N/A	
DIPLEXER (QTY/MODEL)	N/A + 2 / Powerwave / LGP 21901			2 + 2 / Powerwave / LGP 21901	
DUPLEXER (QTY/MODEL)	N/A			N/A	
SURGE ARRESTOR (QTY/MODEL)	N/A			2 / ADC BiasT	
DC BLOCK (QTY/MODEL)	N/A			N/A	
RET EQUIPMENT (QTY/MODEL)	N/A			N/A	
RET CABLING	N/A			N/A	
1900 PDU FOR TMAS	ADC / CG-PDU-SmPWR			N/A	

Section 15D - CURRENT SECTOR/CELL INFORMATION - GAMMA

ANTENNA CONFIG (FROM BACK):	ANTENNA 1 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 2 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 3 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 4 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 5 GSM, UMTS (850 / 1900) or LTE (700 / AWS)
TX/RX?	TxRx / TxRx | N/A			TxRx / Rx | N/A	
TECHNOLOGY	GSM / 850 | N/A			UMTS / 850 | N/A	
FEEDERS (# /TYPE/LENGTH)	2 / 1 5/8" - RFS / 160 '			2 / 1 5/8" - RFS / 160 '	
ANTENNA MAKE - MODEL	XDUO1416			XDUO1416	
ANTENNA VENDOR	CSS ANTENNA INC. (410)344-1010			CSS ANTENNA INC. (410)344-1010	
ANTENNA SIZE H"xW"xD"	50.5 x 14.6 x 7.1			50.5 x 14.6 x 7.1	
ANTENNA WEIGHT	23			23	
ANTENNA GAIN	1			1	
AZIMUTH	23 °			23 °	
RADIATION CENTER	110 '			110 '	
ANTENNA TIP HEIGHT	112 '			112 '	
MAGNETIC DECLINATION	-14 °			-14 °	
ELECTRICAL TILT (700/850/1900/AWS)	4 ° | 0 °			4 ° | 0 °	
MECHANICAL DOWNTILT	0 °			0 °	
SCPA/MCPA?	N/A			N/A	
MCPA MODULES	N/A			N/A	
HATCHPLATE POWER (Watts)	TBD | TBD			TBD | TBD	
ERP (Watts)	TBD | TBD			TBD | TBD	
NARROW BAND LLC (QTY/MODEL)	N/A			N/A	
HYBRID COMBINER (QTY/MODEL)	N/A			N/A	
TMA/LNA (TYPE/MODEL)	2 / ADC / 1900W650BP			N/A	
CURRENT INJECTORS FOR TMA	ADC BiasT			N/A	
CURRENT INJCTR POWER CABLE	ADC			N/A	
ANTENNA SHARING KIT?	N/A			N/A	
BAS Filter	N/A			N/A	
DIPLEXER (QTY/MODEL)	N/A + 2 / Powerwave / LGP 21901			2 + 2 / Powerwave / LGP 21901	
DUPLEXER (QTY/MODEL)	N/A			N/A	
SURGE ARRESTOR (QTY/MODEL)	N/A			2 / ADC BiasT	
DC BLOCK (QTY/MODEL)	N/A			N/A	
RET EQUIPMENT (QTY/MODEL)	N/A			N/A	
RET CABLING	N/A			N/A	
1900 PDU FOR TMAS	ADC / CG-PDU-SmPWR			N/A	

Section 15D - CURRENT SECTOR/CELL INFORMATION - DELTA

ANTENNA CONFIG (FROM BACK):	ANTENNA 1 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 2 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 3 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 4 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 5 GSM, UMTS (850 / 1900) or LTE (700 / AWS)
TX/RX?					
TECHNOLOGY					
FEEDERS (# /TYPE/LENGTH)					
ANTENNA MAKE - MODEL					
ANTENNA VENDOR					
ANTENNA SIZE H"xW"xD"					
ANTENNA WEIGHT					
ANTENNA GAIN					
AZIMUTH					
RADIATION CENTER					
ANTENNA TIP HEIGHT					
MAGNETIC DECLINATION					
ELECTRICAL TILT (700/850/1900/AWS)					
MECHANICAL DOWNTILT					
SCPA/MCPA?					
MCPA MODULES					
HATCHPLATE POWER (Watts)					
ERP (Watts)					
NARROW BAND LLC (QTY/MODEL)					
HYBRID COMBINER (QTY/MODEL)					
TMA/LNA (TYPE/MODEL)					
CURRENT INJECTORS FOR TMA					
CURRENT INJCTR POWER CABLE					
ANTENNA SHARING KIT?					
BAS Filter					
DIPLEXER (QTY/MODEL)					
DUPLEXER (QTY/MODEL)					
SURGE ARRESTOR (QTY/MODEL)					
DC BLOCK (QTY/MODEL)					
RET EQUIPMENT (QTY/MODEL)					
RET CABLING					
1900 PDU FOR TMAS					

Section 15E - CURRENT SECTOR/CELL INFORMATION - EPSILON

ANTENNA CONFIG (FROM BACK):	ANTENNA 1 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 2 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 3 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 4 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 5 GSM, UMTS (850 / 1900) or LTE (700 / AWS)
TX/RX?					
TECHNOLOGY					
FEEDERS (# /TYPE/LENGTH)					
ANTENNA MAKE - MODEL					
ANTENNA VENDOR					
ANTENNA SIZE H"xW"xD"					
ANTENNA WEIGHT					
ANTENNA GAIN					
AZIMUTH					
RADIATION CENTER					
ANTENNA TIP HEIGHT					
MAGNETIC DECLINATION					
ELECTRICAL TILT (700/850/1900/AWS)					
MECHANICAL DOWNTILT					
SCPA/MCPA?					
MCPA MODULES					
HATCHPLATE POWER (Watts)					
ERP (Watts)					
NARROW BAND LLC (QTY/MODEL)					
HYBRID COMBINER (QTY/MODEL)					
TMA/LNA (TYPE/MODEL)					
CURRENT INJECTORS FOR TMA					
CURRENT INJCTR POWER CABLE					
ANTENNA SHARING KIT?					
BAS Filter					
DIPLEXER (QTY/MODEL)					
DUPLEXER (QTY/MODEL)					
SURGE ARRESTOR (QTY/MODEL)					
DC BLOCK (QTY/MODEL)					
RET EQUIPMENT (QTY/MODEL)					
RET CABLING					
1900 PDU FOR TMAS					

Section 15F - CURRENT SECTOR/CELL INFORMATION - ZETA

ANTENNA CONFIG (FROM BACK):	ANTENNA 1 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 2 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 3 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 4 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 5 GSM, UMTS (850 / 1900) or LTE (700 / AWS)
TX/RX?					
TECHNOLOGY					
FEEDERS (# /TYPE/LENGTH)					
ANTENNA MAKE - MODEL					
ANTENNA VENDOR					
ANTENNA SIZE H"xW"xD"					
ANTENNA WEIGHT					
ANTENNA GAIN					
AZIMUTH					
RADIATION CENTER					
ANTENNA TIP HEIGHT					
MAGNETIC DECLINATION					
ELECTRICAL TILT (700/850/1900/AWS)					
MECHANICAL DOWNTILT					
SCPA/MCPA?					
MCPA MODULES					
HATCHPLATE POWER (Watts)					
ERP (Watts)					
NARROW BAND LLC (QTY/MODEL)					
HYBRID COMBINER (QTY/MODEL)					
TMA/LNA (TYPE/MODEL)					
CURRENT INJECTORS FOR TMA					
CURRENT INJCTR POWER CABLE					
ANTENNA SHARING KIT?					
BAS Filter					
DIPLEXER (QTY/MODEL)					
DUPLEXER (QTY/MODEL)					
SURGE ARRESTOR (QTY/MODEL)					
DC BLOCK (QTY/MODEL)					
RET EQUIPMENT (QTY/MODEL)					
RET CABLING					
1900 PDU FOR TMAS					

Section 15A - NEW/PROPOSED SECTOR/CELL INFORMATION - ALPHA (OR OMNI)

ANTENNA CONFIG (FROM BACK):	ANTENNA 1 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 2 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 3 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 4 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	ANTENNA 5 GSM, UMTS (850 / 1900) or LTE (700 / AWS)
TX/RX?	TxRx / Rx | TxRx / Rx			TxRx / TxRx | N/A	
TECHNOLOGY	UMTS / 850 | UMTS / 1900			GSM / 850 | N/A	
FEEDERS (# /TYPE/LENGTH)	2 / 1 5/8" - RFS / 160 '			2 / 1 5/8" - RFS / 160 '	
ANTENNA MAKE - MODEL	P65-15-XLH-RR			P65-15-XLH-RR	
ANTENNA VENDOR	Powerwave			Powerwave	
ANTENNA SIZE H"xW"xD"	51.0 x 12.0 x 8.0			51.0 x 12.0 x 8.0	
ANTENNA WEIGHT	41			41	
ANTENNA GAIN	13.5 dBi | 16.3 dBi			13.5 dBi | 16.3 dBi	
AZIMUTH	143 °			143 °	
RADIATION CENTER	110 '			110 '	
ANTENNA TIP HEIGHT	112 '			112 '	
MAGNETIC DECLINATION	-14 °			-14 °	
ELECTRICAL TILT (700/850/1900/AWS)	4 ° | 0 °			4 ° | 0 °	
MECHANICAL DOWNTILT	0 °			0 °	
SCPA/MCPA?	N/A			N/A	
MCPA MODULES	N/A			N/A	
HATCHPLATE POWER (Watts)	TBD | TBD			TBD | TBD	
ERP (Watts)	TBD | TBD			TBD | TBD	
NARROW BAND LLC (QTY/MODEL)	N/A			N/A	
HYBRID COMBINER (QTY/MODEL)	N/A			N/A	
TMA/LNA (TYPE/MODEL)	1 / Powerwave / TT19-08BP111-001			1 / Powerwave / TT19-08BP111-001	

CURRENT INJECTORS FOR TMA	Andrew / ABT-DFDM-ADBH						Powerwave AISG Diplexer (Built In)			
CURRENT INJCTR POWER CABLE	Powerwave						Powerwave			
ANTENNA SHARING KIT?	N/A						N/A			
BAS Filter	N/A						N/A			
DIPLEXER (QTY/MODEL)	A + 2 / Powerwave / CM1007-DBPXBC-0						A + 2 / Powerwave / CM1007-DBPXBC-0			
DUPLEXER (QTY/MODEL)	N/A						N/A			
SURGE ARRESTOR (QTY/MODEL)	N/A						N/A			
DC BLOCK (QTY/MODEL)	N/A						N/A			
RET EQUIPMENT (QTY/MODEL)	N/A / Powerwave / Built-in RET Equipment						N/A / Powerwave / Built-in RET Equipment			
RET CABLING	Daisy chain to ANT4						Daisy chain to TMA from ANT4			
1900 PDU FOR TMAS	LGP 12104 (1900 AND 850 Bypass TMA)						Powerwave / 7070			
Section 16B - NEW/PROPOSED SECTOR/CELL INFORMATION - BETA										
ANTENNA CONFIG (FROM BACK):	ANTENNA 1 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 2 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 3 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 4 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 5 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	
TX/RX?	TxRx / Rx	TxRx / Rx					TxRx / TxRx	N/A		
TECHNOLOGY	UMTS / 850	UMTS / 1900					GSM / 850	N/A		
FEEDERS (# /TYPE/LENGTH)	2 / 1 5/8" - RFS / 160 '						2 / 1 5/8" - RFS / 160 '			
ANTENNA MAKE - MODEL	P65-15-XLH-RR						P65-15-XLH-RR			
ANTENNA VENDOR	Powerwave						Powerwave			
ANTENNA SIZE H"xW"xD"	51.0 x 12.0 x 6.0						51.0 x 12.0 x 6.0			
ANTENNA WEIGHT	41						41			
ANTENNA GAIN	13.5 dBi	16.3 dBi					13.5 dBi	16.3 dBi		
AZIMUTH	263 °						263 °			
RADIATION CENTER	110 '						110 '			
ANTENNA TIP HEIGHT	112 '						112 '			
MAGNETIC DECLINATION	-14 °						-14 °			
ELECTRICAL TILT (700/850/1900/AWS)	4 °	0 °					4 °	0 °		
MECHANICAL DOWNTILT	0 °						0 °			
SCPA/MCPA?	N/A						N/A			
MCPA MODULES	N/A						N/A			
HATCHPLATE POWER (Watts)	TBD	TBD					TBD	TBD		
ERP (Watts)	TBD	TBD					TBD	TBD		
NARROW BAND LLC (QTY/MODEL)	N/A						N/A			
HYBRID COMBINER (QTY/MODEL)	N/A						N/A			
TMA/LNA (TYPE/MODEL)	1 / Powerwave / TT19-08BP111-001						1 / Powerwave / TT19-08BP111-001			
CURRENT INJECTORS FOR TMA	Andrew / ABT-DFDM-ADBH						Powerwave AISG Diplexer (Built In)			
CURRENT INJCTR POWER CABLE	Powerwave						Powerwave			
ANTENNA SHARING KIT?	N/A						N/A			
BAS Filter	N/A						N/A			
DIPLEXER (QTY/MODEL)	A + 2 / Powerwave / CM1007-DBPXBC-0						A + 2 / Powerwave / CM1007-DBPXBC-0			
DUPLEXER (QTY/MODEL)	N/A						N/A			
SURGE ARRESTOR (QTY/MODEL)	N/A						N/A			
DC BLOCK (QTY/MODEL)	N/A						N/A			
RET EQUIPMENT (QTY/MODEL)	N/A / Powerwave / Built-in RET Equipment						N/A / Powerwave / Built-in RET Equipment			
RET CABLING	Daisy chain to ANT4						Daisy chain to TMA from ANT4			
1900 PDU FOR TMAS	LGP 12104 (1900 AND 850 Bypass TMA)						Powerwave / 7070			
Section 16C - NEW/PROPOSED SECTOR/CELL INFORMATION - GAMMA										
ANTENNA CONFIG (FROM BACK):	ANTENNA 1 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 2 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 3 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 4 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 5 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	
TX/RX?	TxRx / Rx	TxRx / Rx					TxRx / TxRx	N/A		
TECHNOLOGY	UMTS / 850	UMTS / 1900					GSM / 850	N/A		
FEEDERS (# /TYPE/LENGTH)	2 / 1 5/8" - RFS / 160 '						2 / 1 5/8" - RFS / 160 '			
ANTENNA MAKE - MODEL	P65-15-XLH-RR						P65-15-XLH-RR			
ANTENNA VENDOR	Powerwave						Powerwave			
ANTENNA SIZE H"xW"xD"	51.0 x 12.0 x 6.0						51.0 x 12.0 x 6.0			
ANTENNA WEIGHT	41						41			
ANTENNA GAIN	13.5 dBi	16.3 dBi					13.5 dBi	16.3 dBi		
AZIMUTH	23 °						23 °			
RADIATION CENTER	110 '						110 '			
ANTENNA TIP HEIGHT	112 '						112 '			
MAGNETIC DECLINATION	-14 °						-14 °			
ELECTRICAL TILT (700/850/1900/AWS)	4 °	0 °					4 °	0 °		
MECHANICAL DOWNTILT	0 °						0 °			
SCPA/MCPA?	N/A						N/A			
MCPA MODULES	N/A						N/A			
HATCHPLATE POWER (Watts)	TBD	TBD					TBD	TBD		
ERP (Watts)	TBD	TBD					TBD	TBD		
NARROW BAND LLC (QTY/MODEL)	N/A						N/A			
HYBRID COMBINER (QTY/MODEL)	N/A						N/A			
TMA/LNA (TYPE/MODEL)	1 / Powerwave / TT19-08BP111-001						1 / Powerwave / TT19-08BP111-001			
CURRENT INJECTORS FOR TMA	Andrew / ABT-DFDM-ADBH						Powerwave AISG Diplexer (Built In)			
CURRENT INJCTR POWER CABLE	Powerwave						Powerwave			
ANTENNA SHARING KIT?	N/A						N/A			
BAS Filter	N/A						N/A			
DIPLEXER (QTY/MODEL)	A + 2 / Powerwave / CM1007-DBPXBC-0						A + 2 / Powerwave / CM1007-DBPXBC-0			
DUPLEXER (QTY/MODEL)	N/A						N/A			
SURGE ARRESTOR (QTY/MODEL)	N/A						N/A			
DC BLOCK (QTY/MODEL)	N/A						N/A			
RET EQUIPMENT (QTY/MODEL)	N/A / Powerwave / Built-in RET Equipment						N/A / Powerwave / Built-in RET Equipment			
RET CABLING	Daisy chain to ANT4						Daisy chain to TMA from ANT4			
1900 PDU FOR TMAS	LGP 12104 (1900 AND 850 Bypass TMA)						Powerwave / 7070			
Section 16D - NEW/PROPOSED SECTOR/CELL INFORMATION - DELTA										
ANTENNA CONFIG (FROM BACK):	ANTENNA 1 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 2 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 3 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 4 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 5 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	
TX/RX?										
TECHNOLOGY										
FEEDERS (# /TYPE/LENGTH)										
ANTENNA MAKE - MODEL										
ANTENNA VENDOR										
ANTENNA SIZE H"xW"xD"										
ANTENNA WEIGHT										
ANTENNA GAIN										
AZIMUTH										
RADIATION CENTER										
ANTENNA TIP HEIGHT										
MAGNETIC DECLINATION										
ELECTRICAL TILT (700/850/1900/AWS)										
MECHANICAL DOWNTILT										
SCPA/MCPA?										
MCPA MODULES										
HATCHPLATE POWER (Watts)										
ERP (Watts)										
NARROW BAND LLC (QTY/MODEL)										
HYBRID COMBINER (QTY/MODEL)										
TMA/LNA (TYPE/MODEL)										
CURRENT INJECTORS FOR TMA										
CURRENT INJCTR POWER CABLE										
ANTENNA SHARING KIT?										
BAS Filter										
DIPLEXER (QTY/MODEL)										
DUPLEXER (QTY/MODEL)										
SURGE ARRESTOR (QTY/MODEL)										
DC BLOCK (QTY/MODEL)										
RET EQUIPMENT (QTY/MODEL)										
RET CABLING										
1900 PDU FOR TMAS										
Section 16E - NEW/PROPOSED SECTOR/CELL INFORMATION - EPSILON										
ANTENNA CONFIG (FROM BACK):	ANTENNA 1 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 2 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 3 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 4 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 5 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	
TX/RX?										
TECHNOLOGY										
FEEDERS (# /TYPE/LENGTH)										
ANTENNA MAKE - MODEL										
ANTENNA VENDOR										
ANTENNA SIZE H"xW"xD"										
ANTENNA WEIGHT										
ANTENNA GAIN										
AZIMUTH										
RADIATION CENTER										
ANTENNA TIP HEIGHT										
MAGNETIC DECLINATION										
ELECTRICAL TILT (700/850/1900/AWS)										
MECHANICAL DOWNTILT										
SCPA/MCPA?										
MCPA MODULES										
HATCHPLATE POWER (Watts)										
ERP (Watts)										
NARROW BAND LLC (QTY/MODEL)										
HYBRID COMBINER (QTY/MODEL)										
TMA/LNA (TYPE/MODEL)										
CURRENT INJECTORS FOR TMA										
CURRENT INJCTR POWER CABLE										
ANTENNA SHARING KIT?										
BAS Filter										
DIPLEXER (QTY/MODEL)										
DUPLEXER (QTY/MODEL)										
SURGE ARRESTOR (QTY/MODEL)										
DC BLOCK (QTY/MODEL)										
RET EQUIPMENT (QTY/MODEL)										
RET CABLING										
1900 PDU FOR TMAS										
Section 16F - NEW/PROPOSED SECTOR/CELL INFORMATION - ZETA										
ANTENNA CONFIG (FROM BACK):	ANTENNA 1 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 2 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 3 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 4 GSM, UMTS (850 / 1900) or LTE (700 / AWS)		ANTENNA 5 GSM, UMTS (850 / 1900) or LTE (700 / AWS)	
TX/RX?										
TECHNOLOGY										
FEEDERS (# /TYPE/LENGTH)										
ANTENNA MAKE - MODEL										
ANTENNA VENDOR										
ANTENNA SIZE H"xW"xD"										
ANTENNA WEIGHT										
ANTENNA GAIN										
AZIMUTH										
RADIATION CENTER										
ANTENNA TIP HEIGHT										
MAGNETIC DECLINATION										
ELECTRICAL TILT (700/850/1900/AWS)										
MECHANICAL DOWNTILT										
SCPA/MCPA?										
MCPA MODULES										
HATCHPLATE POWER (Watts)										
ERP (Watts)										
NARROW BAND LLC (QTY/MODEL)										
HYBRID COMBINER (QTY/MODEL)										
TMA/LNA (TYPE/MODEL)										
CURRENT INJECTORS FOR TMA										
CURRENT INJCTR POWER CABLE										
ANTENNA SHARING KIT?										
BAS Filter										

Site Name	COLLINSVILLE CT	Site #	8-0411
Latitude	41-51-02.03	Longitude	72-56-55.41
		GEL (Feet)	458

New Build

850 MHz Cellular Site Info	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	Cellular Modcell 4.0B	Cellular Modcell 4.0B	Cellular Modcell 4.0B
ANTENNA TYPE	LPA-80080/6CF	LPA-80080/6CF	LPA-80080/6CF
QUANTITY PER FACE	2	2	2
ORIENTATION	30°	150°	270°
DOWN TILT (DEG.)	0° Mech	4° Mech	0° Mech
RAD CTR (FT AGL)	120	120	120
TOWER MOUNTED AMPS (QTY)			
MCPA BRICKS (QTY)			

New Build

1900 MHz PCS Site Info	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	PCS Modcell 4.0B	PCS Modcell 4.0B	PCS Modcell 4.0B
ANTENNA TYPE	DB950F85E-M	DB950F85E-M	DB950F85E-M
QUANTITY PER FACE	2	2	2
ORIENTATION	30°	150°	270°
DOWN TILT (DEG.)	0° Mech	0° Mech	0° Mech
RAD CTR (FT AGL)	120	120	120
TOWER MOUNTED AMPS (QTY)			
MCPA BRICKS (QTY)			

New Build

700 MHz Site Info	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	eNodeB	eNodeB	eNodeB
ANTENNA TYPE	BXA-70063/6CF-2	BXA-70063/6CF-2	BXA-70063/6CF-2
QUANTITY PER FACE	1	1	1
ORIENTATION	30°	150°	270°
DOWN TILT (DEG.)	2° Mech	2° Mech	2° Mech
RAD CTR (FT AGL)	120	120	120
TOWER MOUNTED AMPS (QTY)			
MCPA BRICKS (QTY)			

CABLE INFORMATION

FEEDLINE SIZE	1 5/8	FEEDLINE SIZE	1 5/8	FEEDLINE SIZE	1 5/8
JUMPER SIZE	1/2"	JUMPER SIZE	1/2"	JUMPER SIZE	1/2"

ALPHA				BETA				GAMMA			
Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code
A1	800	Tx1/Rx0	RED	A7	800	Tx2/Rx0	BLUE	A13	800	Tx3/Rx0	GREEN
A2	1900	Tx1/Rx0	RED/WHITE	A8	1900	Tx2/Rx0	BLUE/WHITE	A14	1900	Tx3/Rx0	GREEN/WHITE
A3	700	Tx1/Rx0	RED/ORANGE	A9	700	Tx2/Rx0	BLUE/ORANGE	A15	700	Tx3/Rx0	GREEN/ORANGE
A4	700	Tx4/Rx1	RED/RED/ORANGE	A10	700	Tx5/Rx1	BLUE/BLUE/ORANGE	A16	700	Tx6/Rx1	GREEN/GREEN/ORANGE
A5	1900	Tx4/Rx1	RED/RED/WHITE	A11	1900	Tx5/Rx1	BLUE/BLUE/WHITE	A17	1900	Tx6/Rx1	GREEN/GREEN/WHITE
A6	800	Tx4/Rx1	RED/RED	A12	800	Tx5/Rx1	BLUE/BLUE	A18	800	Tx6/Rx1	GREEN/GREEN

APPROVALS	INITIALS	DATE
Prepared By : Mark Brauer > RF Engineer	MB	1/26/2010
Steve Weatherbee > RF Design Manager		
Mark Gauger > Construction Manager		
Sandy Carter > Regulatory Manager		

Site Configuration

P65-15-XLH-RR | Dual Broadband Antennas

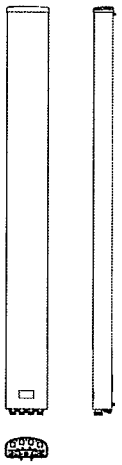
POLARIZATION: Dual linear ±45°
FREQUENCY (MHz): 698-894, 1710-2170
HORIZONTAL BEAM WIDTH (°): 65, 65
GAIN (dBi/dBd): 14.7/12.6, 17.0/14.9
TILT: 0-13, 0-9
LENGTH: 51"

ELECTRICAL SPECIFICATIONS*

Frequency range (MHz)	698-894		1710-2170		
Frequency band (MHz)	698-806	806-894	1710-1880	1850-1990	1900-2170
Gain (dBi/dBd)	14/11.9	14.7/12.6	16.4/14.3	16.7/14.6	17.0/14,9
Polarization	Dual Linear +/- 45			Dual Linear +/- 45	
Nominal Impedance (Ω)	50			50	
VSWR	< 1.5:1			< 1.5:1	
Horizontal beam width, -3 dB (°)	73	63	65	61	60
Vertical beam width, -3 dB (°)	17			7.5	
Electrical down tilt (°)	0-13			0-9	
Side lobe suppression, vertical 1st upper (dB)	> 14			>20	
Isolation between inputs (dB)	>30			> 30	
Inter band Isolation (dB)	> 40			> 40	
Tracking, horizontal plane ±60° (dB)	< 2			< 2	
Vertical beam squint (°)	<1.25			< 0.5	
Front to back ratio (dB) 180°±30° copolar	> 25			> 28	
Front to back ratio (dB) 180°±30° total power	> 25			> 25	
Cross polar discrimination (XPD) 0° (dB)	> 15			> 15	
Cross polar discrimination (XPD) ±60° (dB)	> 10			> 10	
IM3, 2xTx@43dBm (dBc)	<-153			<-153	
Power handling, average per input (W)	500			300	
Power handling, average total (W)	1000			600	

MECHANICAL SPECIFICATIONS*

Connector	4 X 7/16 DIN Female, IP67
Connector position	Bottom
Dimensions, HxWxD, in (mm)	51" x 12" x 6" (1295 x 305 x 152)
Mounting	Pre-mounted Tilt Brackets
Weight, with brackets, lbs (kg)	41 (19)
Weight, without brackets, lbs (kg)	30 (14)
Wind load, frontal/lateral/rear side 42 m/s Cd=1.0 (N)	920
Maximum operational wind speed, mph (m/s)	100 (45)
Survival wind speed, mph (m/s)	150 (67)
Lightning protection	DC Ground
Operating Temperature	-40°C to +60°C
Radome material	PVC, IP55
Packet size, HxWxD, in (mm)	60" x 16" x 10" (1524 x 400 x 255)
Radome colour	Light Grey
Shipping weight, lbs (kg)	52 (24)
RET	iRET AISGv1.1, MET and AISGv2.0
Brackets	7256.00, 7454.00



*All specifications subject to change without notice. Please contact your Powerwave representative for complete performance data.

ANTENNA PATTERNS*

For detailed patterns visit http://www.powerwave.com/rpa/.

Updated: 2010-12-03

TT19-08BP111-001 | TMA Twin 1900 with 850 Bypass 12 dB AISG 1.1

ELECTRICAL SPECIFICATIONS

UL Frequency Range (MHz)	1850-1910 with 824-894 bypass
UL Rejection	>77 dB
UL Gain(dB)	12
UL Return Loss	>18
UL Noise Figure	<1.7 dB, Typical
UL Output 3rd Order Intercept Point(dBm)	>+23
UL Bypass Loss(dB)	2.5, Typical
UL Max Input Power (dBm)	+14 dBm
DL Frequency Range (MHz)	1930-1990 with 824-894 bypass
DL Return Loss	>18
DL Insertion Loss (dB)	850 MHz, <0.3; 1900 MHz, <0.5
Intermodulation	@ 2 x +43 dBm TX carriers, in receive band, <160 dBc, reffered to antenna port
Input Voltage (V)	AISG Mode: 10-30; Current alarm mode: 8 -17
Alarm Functionality	AISG compatible or in case of no AISG command received, current alarm mode 170-190 mA
Power Consumption	<1.1W @12V
Power Handling, RMS	850: >57 dBm; 1900: >55 dBm
AISG Compatibility	AISG 1.1 fully upgreadable to AISG 2.0 (AISG version only dependent on loaded SW version) TT19-08BP112-001 has AISG 2.0 loaded from factory

MECHANICAL SPECIFICATIONS

Dimension HxWxD mm(ft)	250x169x137 mm (9.9"x6.7"x5.4")
Weight(lbs)	<16
Colors	Off white (NCS 1502-R)
RF Connectors	DIN 7/16 female, long neck
Mounting Kit	Mounting kit for pole and wall is included

ENVIRONMENTAL SPECIFICATIONS

Temperature Range	-40° C to +65° C (-40° F to +149° F)
Operational	ETS 300 019-1-4
Transportation	ETS 300 019-1-2
Storage	ETS 300 019-1-1
Lightning Protection	3 kA 10/350 µs; 20 kA (Shield)
Housing	Aluminum
MTBF	>1 million hours per TMA
Ingress Protection	IP65 and IP68

APPROVAL AND TESTS

Safety	EN60950
EMC	3GPP: TS 25.113

*All specifications subject to change without notice. Contact your Powerwave representative for complete performance data.