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@po.state.ct.us
www.ct.gov/csc

November 18, 2005

Karina Fournier
Zoning Department
T-Mobile
100 Filley Street
Bloomfield, CT 06002

RE: **TS-T-MOBILE-007-051028** - Omnipoint Communications, Inc. a.k.a. T-Mobile request for an order to approve tower sharing at an existing telecommunications facility located at 1657 Berlin Turnpike, Berlin, Connecticut.

Dear Ms. Fournier:

At a public meeting held November 17, 2005, the Connecticut Siting Council (Council) ruled that the shared use of this existing tower site is technically, legally, environmentally, and economically feasible and meets public safety concerns, and therefore, in compliance with General Statutes § 16-50aa, the Council has ordered the shared use of this facility to avoid the unnecessary proliferation of tower structures. 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. Any additional change to this facility may require an explicit request to this agency pursuant to General Statutes § 16-50aa or notice pursuant to Regulations of Connecticut State Agencies Section 16-50j-73, as applicable. Such request or 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. Any deviation from this format may result in the Council implementing enforcement proceedings pursuant to General Statutes § 16-50u including, without limitation, imposition of expenses resulting from such failure and of civil penalties in an amount not less than one thousand dollars per day for each day of construction or operation in material violation.

This decision applies only to this request for tower sharing and is not applicable to any other request or construction. Please be advised that the validity of this action shall expire one year from the date of this letter.

The proposed shared use is to be implemented as specified in your letter dated October 28, 2005, including the placement of all necessary equipment and shelters within the tower compound.

Thank you for your attention and cooperation.

Very truly yours,

Pamela B. Katz, P.E.
Chairman

PBK/laf

c: The Honorable Adam P. Salina, Mayor, Town of Berlin
Hellyn Riggins, Town Planner, Town of Berlin
Berlin Fire Department
Thomas J. Regan, Esq., Brown Rudnick Berlack Israels LLP
Christopher B. Fisher, Esq., Cuddy & Feder LLP

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October 31, 2005

The Honorable Adam P. Salina
Mayor
Town of Berlin
240 Kensington Road
Kensington, CT 06037

RE: **TS-T-MOBILE-007-051028** - Omnipoint Communications, Inc. a.k.a. T-Mobile (formerly Voicestream Wireless Corp.) request for an order to approve tower sharing at an existing telecommunications facility located at 1657 Berlin Turnpike, Berlin, Connecticut.

Dear Mayor Salina:

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.

The Council will consider this item at the next meeting scheduled for November 17, 2005 at 1.30 p.m. in Hearing Room One, Ten Franklin Square, New Britain, Connecticut.

If you have any questions or comments regarding this proposal, please call me or inform the council by November 16, 2005.

Thank you for your cooperation and consideration.

Very truly yours,

SDP/EKS

S. Derek Phelps
Executive Director

SDP/ap

Enclosure: Notice of Intent

c: Hellyn Riggins, Town Planner, Town of Berlin

ORIGINAL

T-Mobile
Get more from life®

100 Filley Street, Bloomfield, CT 06002
860-692-7118 fax 860-692-7159
Karina.Fournier@t-mobile.com

TS-T-MOBILE-007-051028

October 28, 2005

BY HAND

Pamela B. Katz, Chairman and
Members of the Siting Council
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

RE: **Tower Sharing Request by T-Mobile**
1657 Berlin Turnpike Berlin, CT
Latitude: 41 36 21 / Longitude: 72 45 00

Dear Ms. Katz and Members of the Siting Council:

Pursuant to Connecticut General Statutes (C.G.S.) § 16-50aa, Omnipoint Communications, Inc. a.k.a. T-Mobile (formerly Voicestream Wireless Corp.) hereby requests an order from the Connecticut Siting Council ("Council") to approve the proposed shared use of an existing communications tower, located at 1657 Berlin Turnpike ("Berlin Fire Department"), in Berlin, CT owned by the Berlin Fire Department. T-Mobile and the Berlin Fire Department have agreed to the shared use of the Berlin Fire Department tower, as detailed below.

Berlin Fire Department Facility

The Berlin Fire Department facility consists of a one hundred seventy six (176) foot high monopole ("Tower") owned and operated by the Berlin Fire Department. T-Mobile proposes to locate antennas at a centerline mounting height of one hundred sixty (160) feet. The equipment will be located within the existing compound at the base of the tower.

Berlin Fire Department Facility

As shown on the enclosed plans prepared by Westcott and Mapes, Inc., including a site plan and tower elevation of the Berlin Fire Department Facility, annexed hereto as Exhibit 1, T-Mobile proposes a shared use of the Facility by placing antennas on the tower and equipment needed to provide personal communications services ("PCS") within the existing site plan. T-Mobile will install nine (9) antennas at the one hundred sixty (160) foot level of the Tower. Three (3) associated unmanned equipment cabinets will be located at the base of the tower.

Connecticut General Statutes § 16-50aa provides that, upon written request for shared use approval, an order approving such use shall be issued, "if the council finds that the proposed shared use of the facility is technically, legally, environmentally and economically feasible and meets public safety concerns." (C.G.S. § 16-50aa(c)(1).) Further, upon approval of such shared use, it is exclusive and no local zoning or land use approvals are required C.G.S. §16-50x. Shared use of the Berlin Fire Department facility satisfies the approval criteria set forth in C.G.S. § 16-50aa as follows:

A. Technical Feasibility The existing Tower and compound were designed to accommodate multiple carriers. A structural analysis of the Tower with the proposed T-Mobile installation has been performed and is attached as Exhibit 2. The structural analysis concludes that the tower can safely accommodate the proposed T-Mobile antennas. The proposed shared use of this Tower is technically feasible. Further there is sufficient room at the base of the facility, thus the site plan will not have to be altered.

B. Legal Feasibility Pursuant to C.G.S. § 16-50aa, the Council has been authorized to issue an order approving shared use of the existing Berlin Fire Department facility. (C.G.S. § 16-50aa (C)(1)). Under the authority vested in the Council by C.G.S. § 16-50aa, an order by the Council approving the shared use of a tower would permit the Applicant to obtain a building permit for the proposed installation.

C. Environmental Feasibility The proposed shared use would have a minimal environmental effect, for the following reasons:

1.) The proposed installation would have a de minimis visual impact, and would not cause any significant change or alteration in the physical or environmental characteristics of the existing facility,

2.) The proposed installation by T-Mobile would not increase the height of the tower nor expand the site plan at the Berlin Fire Department facility and will be of minimal impact to the facility;

3.) The proposed installation would not increase the noise levels at the existing facility boundaries by six decibels or more;

4.) Operation of T-Mobile's antennas at this site would not exceed the total radio frequency electromagnetic radiation power density level adopted by the FCC and Connecticut Department of Health. The "worst case" exposure calculated for the operation of this facility for all carriers would be approximately 3.8% of the standard. See Radio Frequency Memo dated October 28, 2005, prepared by Marlon DePaz, annexed hereto as Exhibit 3;

5.) The proposed shared use of the Berlin Fire Department facility will not require any water or sanitary facilities, or generate any air emissions or discharges to water bodies. Further, the installation will not generate any traffic other than for periodic maintenance visits.

D. Economic Feasibility The Applicant and the tower owner have agreed to share use of the Berlin Fire Department facility on terms agreeable to both parties. The proposed tower sharing is therefore economically feasible.

E. Public Safety As stated above and evidenced in the Radio Frequency Field Survey annexed hereto as Exhibit 3, the operation of T-Mobile's antennas at this site would not exceed the total radio frequency electromagnetic radiation power density level adopted by the FCC and Connecticut Department of Health. Further, the addition of T-Mobile's telecommunications service in the Berlin area through shared use of the Berlin Fire Department facility is expected to enhance the safety and welfare of local residents and travelers through the area resulting in an improvement to public safety in this area.

Conclusion

As delineated above, the proposed shared use of the Berlin Fire Department facility satisfies the criteria set forth in C.G.S. § 16-50aa, and advances the General Assembly's and the Siting Council's goal of preventing the proliferation of tower in the State of Connecticut. T-Mobile therefore requests the Siting Council issue an order approving the proposed shared use of the Berlin Fire Department facility.

Respectfully submitted,

Karina Fournier
Zoning Dept.
T-Mobile
100 Filley St.
Bloomfield, CT 06002
(860) 692-7118

cc: Mayor, Adam P. Salina

Exhibit 1

BERLIN FIRE DEPARTMENT

1657 BERLIN TURNPIKE
BERLIN, CT 06037

SITE NUMBER: CTHA-231A

SITE TYPE: CO-LOCATE

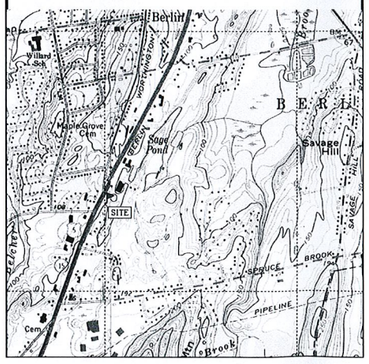
GENERAL NOTES

1. THE CONTRACTOR SHALL GIVE ALL NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY, MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS, AND LOCAL AND STATE JURISDICTIONAL CODES BEARING ON THE PERFORMANCE OF THE WORK. THE WORK PERFORMED ON THE PROJECT AND THE MATERIALS INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES.
2. THE ARCHITECT/ENGINEER HAVE MADE EVERY EFFORT TO SET FORTH IN THE CONSTRUCTION AND CONTRACT DOCUMENTS THE COMPLETE SCOPE OF WORK. THE CONTRACTOR BIDDING THE JOB IS NEVERTHELESS CAUTIONED THAT MINOR OMISSIONS OR ERRORS IN THE DRAWINGS AND OR SPECIFICATIONS SHALL NOT EXCUSE SAID CONTRACTOR FROM COMPLETING THE PROJECT AND IMPROVEMENTS IN ACCORDANCE WITH THE INTENT OF THESE DOCUMENTS.
3. THE CONTRACTOR OR BIDDER SHALL BEAR THE RESPONSIBILITY OF NOTIFYING (IN WRITING) THE LESSEE/LICENSEE REPRESENTATIVE OF ANY CONFLICTS, ERRORS, OR OMISSIONS PRIOR TO THE SUBMISSION OF CONTRACTOR'S PROPOSAL OR PERFORMANCE OF WORK. IN THE EVENT OF DISCREPANCIES THE CONTRACTOR SHALL PRICE THE MORE COSTLY OR EXTENSIVE WORK, UNLESS DIRECTED IN WRITING OTHERWISE.
4. THE SCOPE OF WORK SHALL INCLUDE FURNISHING ALL MATERIALS, EQUIPMENT, LABOR AND ALL OTHER MATERIALS AND LABOR DEEMED NECESSARY TO COMPLETE THE WORK/PROJECT AS DESCRIBED HEREIN.
5. THE CONTRACTOR SHALL VISIT THE JOB SITE PRIOR TO THE SUBMISSION OF BIDS OR PERFORMING WORK TO FAMILIARIZE HIMSELF WITH THE FIELD CONDITIONS AND TO VERIFY THAT THE PROJECT CAN BE CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
6. THE CONTRACTOR SHALL OBTAIN AUTHORIZATION TO PROCEED WITH CONSTRUCTION PRIOR TO STARTING WORK ON ANY ITEM NOT CLEARLY DEFINED BY THE CONSTRUCTION DRAWINGS / CONTRACT DOCUMENTS.
7. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS ACCORDING TO THE MANUFACTURER'S / VENDOR'S SPECIFICATIONS UNLESS NOTED OTHERWISE OR WHERE LOCAL CODES OR ORDINANCES TAKE PRECEDENCE.
8. THE CONTRACTOR SHALL PROVIDE A FULL SET OF CONSTRUCTION DOCUMENTS AT THE SITE UPDATED WITH THE LATEST REVISIONS AND ADDENDUMS OR CLARIFICATIONS AVAILABLE FOR THE USE BY ALL PERSONNEL INVOLVED WITH THE PROJECT.
9. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE PROJECT DESCRIBED HEREIN. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES AND FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.
10. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL NECESSARY CONSTRUCTION CONTROL SURVEYS, ESTABLISHING AND MAINTAINING ALL LINES AND GRADES REQUIRED TO CONSTRUCT ALL IMPROVEMENTS AS SHOWN HEREIN.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS WHICH MAY BE REQUIRED FOR THE WORK BY THE ARCHITECT/ENGINEER, THE STATE, COUNTY OR LOCAL GOVERNMENT AUTHORITY.
12. THE CONTRACTOR SHALL MAKE NECESSARY PROVISIONS TO PROTECT EXISTING IMPROVEMENTS, EASEMENTS, PAVING, CURBING, ETC. DURING CONSTRUCTION. UPON COMPLETION OF WORK, THE CONTRACTOR SHALL REPAIR ANY DAMAGE THAT MAY HAVE OCCURRED DUE TO CONSTRUCTION ON OR ABOUT THE PROPERTY.
13. THE CONTRACTOR SHALL KEEP THE GENERAL WORK AREA CLEAN AND HAZARD FREE DURING CONSTRUCTION AND DISPOSE OF ALL DIRT, DEBRIS, RUBBISH AND REMOVE EQUIPMENT NOT SPECIFIED AS REMAINING ON THE PROPERTY. PREMISES SHALL BE LEFT IN CLEAN CONDITION AND FREE FROM PAINT SPOTS, DUST, OR SMUDGES OF ANY NATURE.
14. THE CONTRACTOR SHALL COMPLY WITH ALL OSHA REQUIREMENTS AS THEY APPLY TO THIS PROJECT.
15. THE CONTRACTOR SHALL NOTIFY THE LESSEE/LICENSEE REPRESENTATIVE WHERE A CONFLICT OCCURS ON ANY OF THE CONTRACT DOCUMENTS. THE CONTRACTOR IS NOT TO ORDER MATERIAL OR CONSTRUCT ANY PORTION OF THE WORK THAT IS IN CONFLICT UNTIL CONFLICT IS RESOLVED BY THE LESSEE/LICENSEE REPRESENTATIVE.
16. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS, PROPERTY LINES, ETC. ON THE JOB.
17. ALL UNDERGROUND UTILITY INFORMATION WAS DETERMINED FROM SURFACE INVESTIGATIONS AND EXISTING PLANS OF RECORD. THE CONTRACTOR SHALL LOCATE ALL UNDERGROUND UTILITIES IN THE FIELD PRIOR TO ANY SITE WORK. CALL THE FOLLOWING FOR ALL PRE-CONSTRUCTION NOTIFICATION 72-HOURS PRIOR TO ANY EXCAVATION ACTIVITY:
DIG SAFE SYSTEM (MA, ME, NH, RI, VT): 1-888-344-7233
CALL BEFORE YOU DIG (CT): 1-800-922-4455

VICINITY MAP

NO SCALE

TRUE NORTH



DO NOT SCALE DRAWINGS

CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE LESSEE/LICENSEE REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

SHEET INDEX

SHT. NO.	DESCRIPTION	REV. NO.
T-1	TITLE SHEET	1
A-1	PLANS, ELEVATION, DETAILS AND NOTES	1
S-1	STRUCT. NOTES, PLANS, SECTIONS & DETAILS	1
E-1	ELEC. & GROUNDING NOTES, RISERS & DETAILS	1

PROJECT SUMMARY

SITE NUMBER:	CTHA-231A
SITE NAME:	BERLIN FIRE DEPARTMENT TOWER
SITE ADDRESS:	1657 BERLIN TURNPIKE BERLIN, CT 06037
ASSESSOR'S PARCEL NO.:	MAP 22-1, BLOCK 141, LOT 17
CONSTRUCTION TYPE:	MONOPOLE
STRUCTURE OWNER:	BERLIN FIRE DEPARTMENT 1657 BERLIN TURNPIKE BERLIN, CT 06037
PROPERTY OWNER:	BERLIN FIRE DEPARTMENT 1657 BERLIN TURNPIKE BERLIN, CT 06037
APPLICANT:	OMNIPOINT COMMUNICATIONS, INC. 100 FILLEY STREET BLOOMFIELD, CT 06002

OMNIPOINT COMMUNICATIONS, INC.
A WHOLLY-OWNED SUBSIDIARY
OF T-MOBILE USA, INC.
100 FILLEY STREET
BLOOMFIELD, CT 06002
OFFICE: (860)-692-7100
FAX: (860)-692-7159

Westcott and Mapes, Inc.
Consulting Engineers and Architects since 1916
142 Temple Street
New Haven, CT 06510
TEL (203) 789-1260 • FAX (203) 789-8261

STATE OF CONNECTICUT
MICHAEL J. CRAPO
No. 8422
LICENSED ARCHITECT

APPROVALS

LANDLORD _____
LEASING _____
R.F. _____
ZONING _____
CONSTRUCTION _____
A/E _____

PROJECT NO: 05062.16

DRAWN BY: RGG/MMC

CHECKED BY: CMM

SUBMITTALS

1	10/28/05	CONSTRUCTION FINAL
0	9/29/05	CONSTRUCTION

CTHA-231A
BERLIN FIRE
DEPARTMENT TOWER

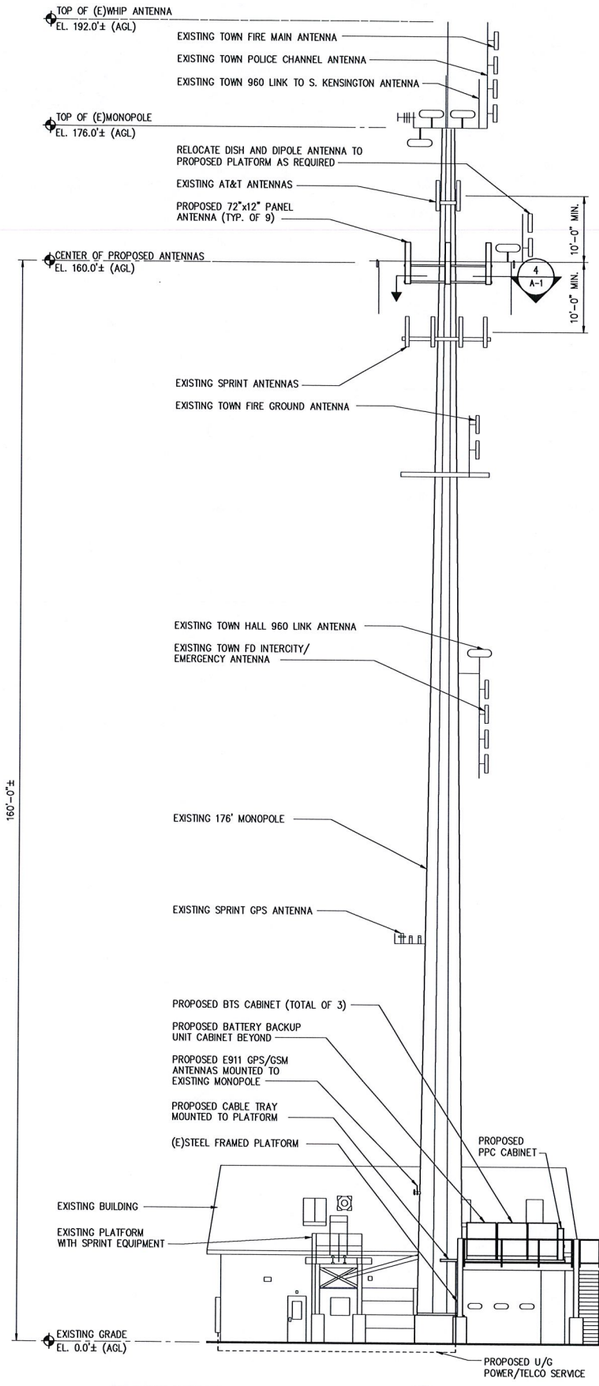
1657 BERLIN TURNPIKE
BERLIN, CT 06037

SHEET TITLE

TITLE SHEET

SHEET NUMBER

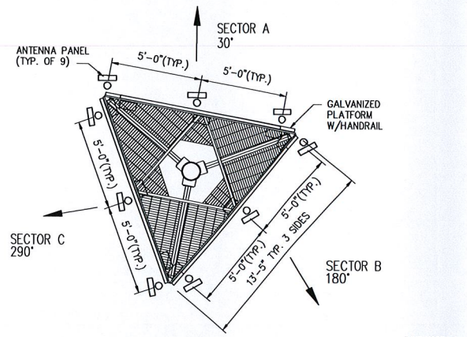
T-1



ELEVATION

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

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



ANTENNA PLATFORM PLAN

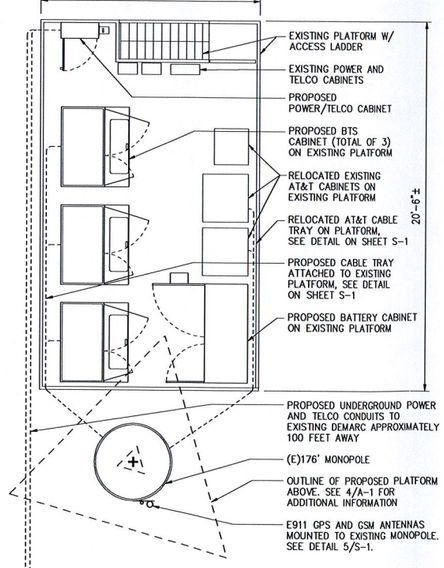
SCALE: 1/4"=1'-0" (4 / A-1)

0 2 4 8 12

TRUE NORTH

NOTE:

EXISTING AT&T EQUIPMENT AND CABLES ARE TO BE RELOCATED TO ACCOMODATE PROPOSED T-MOBILE EQUIPMENT. CONTRACTOR TO COORDINATE WITH EXISTING CARRIER PRIOR TO CONSTRCUTION.

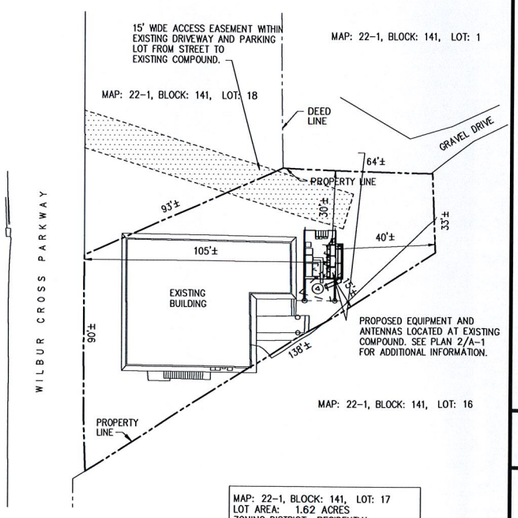


COMPOUND PLAN

SCALE: 1/4"=1'-0" (2 / A-1)

0 2 4 8 12

TRUE NORTH



NOTES:

PLOT PLAN BASED ON TAX MAPS FROM THE CITY OF BETHEL, CT.
SETBACKS ARE TAKEN FROM PROPOSED EQUIPMENT TO PROPERTY LINES.

PLOT PLAN

SCALE: 1"=30'-0" (1 / A-1)

0 15 30 60 90

TRUE NORTH

NOTES:

1. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL NECESSARY CONSTRUCTION CONTROL SURVEYS AND MAINTAINING ALL LINES AND GRADES REQUIRED TO CONSTRUCT ALL IMPROVEMENTS SHOWN HEREIN.
2. ALL DIMENSIONS SHOWN THUS ± ARE APPROXIMATE. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND ELEVATIONS WHICH EFFECT THE CONTRACTORS WORK. CONTRACTOR TO VERIFY ALL DIMENSIONS WITH OWNER PRIOR TO CONSTRUCTION.
3. NORTH ARROW SHOWN ON PLANS REFERS TO TRUE NORTH. PRIOR TO THE START OF CONSTRUCTION, ORDERING OR FABRICATION OF ANTENNA MOUNTS, CONTRACTOR SHALL CONSULT WITH PROJECT OWNER'S RF ENGINEER AND FIELD VERIFY ALL ANTENNA SECTOR LOCATIONS AND ANTENNA AZIMUTHS.
4. THE CONTRACTOR AND OR HIS SUB CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS WHICH MAY BE REQUIRED FOR THE WORK BY THE ARCHITECT/ENGINEER, THE STATE, COUNTY OR LOCAL GOVERNMENT AUTHORITY.
5. ANTENNA INSTALLATION SHALL BE CONDUCTED BY FIELD CREWS EXPERIENCED IN THE ASSEMBLY AND ERECTION OF RADIO ANTENNAS, TRANSMISSION LINES AND SUPPORT STRUCTURES.
6. COAXIAL CABLE CONNECTORS AND TRANSMITTER EQUIPMENT SHALL BE PROVIDED BY THE OWNER AND IS NOT INCLUDED IN THESE CONSTRUCTION DOCUMENTS. A SCHEDULE OF OWNER SUPPLIED MATERIALS IS ATTACHED TO THE BID DOCUMENTS (SEE ATTACHMENT K). ALL OTHER HARDWARE TO BE PROVIDED BY THE CONTRACTOR. CONNECTION HARDWARE SHALL BE STAINLESS STEEL.
7. ANTENNAS, SUPPORTS AND CABLE MOUNTS SHALL BE PAINTED TO MATCH EXISTING SURFACES TO WHICH IT IS ATTACHED. PAINT SHALL BE SHERWIN WILLIAMS, COROTHANE II. SURFACE PREPARATION AND APPLICATION SHALL BE IN ACCORDANCE WITH MANUFACTURER SPECIFICATIONS AND LESSEE/LICENSEE GUIDELINES.
8. COORDINATION, LAYOUT, AND FURNISHING OF CONDUIT, CABLE AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
9. EQUIPMENT WILL BE INDEPENDENTLY POWERED WITH SEPARATE METER.
10. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
11. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL NECESSARY CONSTRUCTION CONTROL SURVEYS AND MAINTAINING ALL LINES AND GRADES REQUIRED TO CONSTRUCT ALL IMPROVEMENTS AS SHOWN HEREIN.
12. ALL (E)ACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES, AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY ENGINEERS. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR PIER DRILLING AROUND OR NEAR UTILITIES. CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW.
13. ALL (E)INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTEBFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF UTILITY COMPANY ENGINEERING.
14. THE AREAS OF THE PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE EQUIPMENT, DRIVEWAY OR GRAVEL, SHALL BE GRADED TO A UNIFORM SLOPE, FERTILIZED, SEEDED AND COVERED WITH MULCH.
15. THE CONTRACTOR SHALL ESTABLISH AND MAINTAIN SOIL EROSION AND SEDIMENTATION CONTROLS AT ALL TIMES DURING CONSTRUCTION.
16. PER FCC MANDATE, ENHANCED EMERGENCY (E911) SERVICE IS REQUIRED TO MEET NATIONWIDE STANDARDS FOR WIRELESS COMMUNICATIONS SYSTEMS. LESSEE/LICENSEE IMPLEMENTATION REQUIRES DEPLOYMENT OF EQUIPMENT AND ANTENNAS GENERALLY DEPICTED ON THIS PLAN, ATTACHED TO OR MOUNTED IN CLOSE PROXIMITY TO THE BTS RADIO CABINETS. LESSEE/LICENSEE RESERVES THE RIGHT TO MAKE REASONABLE MODIFICATIONS TO E911 EQUIPMENT AND LOCATION AS TECHNOLOGY EVOLVES TO MEET REQUIRED SPECIFICATIONS.

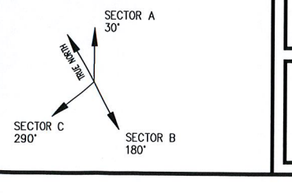
ABBREVIATIONS

ADJ	ADJUSTABLE	OC	ON CENTER
AGL	ABOVE GRADE LEVEL	OPP	OPPOSITE
APPROX	APPROXIMATE	SF	SQUARE FOOT
C	CONDUIT	SHT	SHEET
CONC	CONCRETE	SIM	SIMILAR
CONT	CONTINUOUS	STL	STEEL
CJ	CONSTRUCTION JOINT	TOC	TOP OF CONCRETE
DIA	DIAMETER	TOM	TOP OF MASONRY
DWG	DRAWING	TYP	TYPICAL
EGB	EQUIPMENT GROUND BAR	VIF	VERIFY IN FIELD
EA	EACH	UG	UNDERGROUND
ELEC	ELECTRICAL	UON	UNLESS OTHERWISE NOTED
EL	ELEVATION	WWF	WELDED WIRE FABRIC
EQ	EQUAL	W/	WITH
EQUIP	EQUIPMENT	BTS	BASE TRANSMISSION STATION
(E)	EXISTING	LNA	LOW NOISE AMPLIFIER
EXT	EXTERIOR	PCS	PERSONAL COMMUNICATIONS SERVICES
FCM	FIELD CONSTRUCTION MANAGER	A-1	ANTENNA MARK NO.
FF	FINISHED FLOOR	PL	PLATE
FG	FINISHED GRADE	&	AND
GA	GAUGE	@	AT
GALV	GALVANIZED		
GC	GENERAL CONTRACTOR		
LG	LONG		
MAX	MAXIMUM		
MECH	MECHANICAL		
MFR	MANUFACTURER		
MGB	MASTER GROUND BAR		
MIN	MINIMUM		
MTL	METAL		
NIC	NOT IN CONTRACT		
NTS	NOT TO SCALE		

SYMBOLS AND MATERIALS

	NEW ANTENNA		GROUT OR PLASTER
	EXISTING ANTENNAS		(E)BRICK
	ASPHALT		(E)MASONRY
	NEW ACCESS EASEMENT		CONCRETE
	CONCRETE		EARTH
	ELECTRIC BOX		GRAVEL
	LIGHT POLE		PLYWOOD
	FND. MONUMENT		SAND
	SPOT ELEVATION		WOOD CONT.
	SET POINT		WOOD BLOCKING
	REVISION		STEEL
	GRID REFERENCE		CENTER LINE
DET. / SHT.	DETAIL REFERENCE		PROPERTY LINE
			STEPPED FOOTING
D / SH	ELEVATION		MATCH LINE
			WORK POINT
D / SH	SECTIONS & DETAILS	G	GROUND WIRE
			COAXIAL CABLE

ANTENNA ORIENTATION KEY



OMNIPOINT COMMUNICATIONS, INC.
A WHOLLY-OWNED SUBSIDIARY OF T-MOBILE USA, INC.
100 FILLEY STREET
BLOOMFIELD, CT 06002
OFFICE: (860)-692-7100
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STATE OF CONNECTICUT · MICHAEL J. SPAK · No. 8422 · LICENSED ARCHITECT

APPROVALS

LANDLORD _____
LEASING _____
R.F. _____
ZONING _____
CONSTRUCTION _____
A/E _____

PROJECT NO: 05062.16

DRAWN BY: MMC

CHECKED BY: CMM

SUBMITTALS

1	10/28/05	CONSTRUCTION FINAL
0	9/29/05	CONSTRUCTION

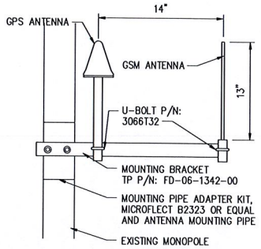
CTHA-231A
BERLIN FIRE DEPARTMENT TOWER

1657 BERLIN TURNPIKE
BERLIN, CT 06037

PLANS, ELEVATION, DETAILS AND NOTES

SHEET NUMBER

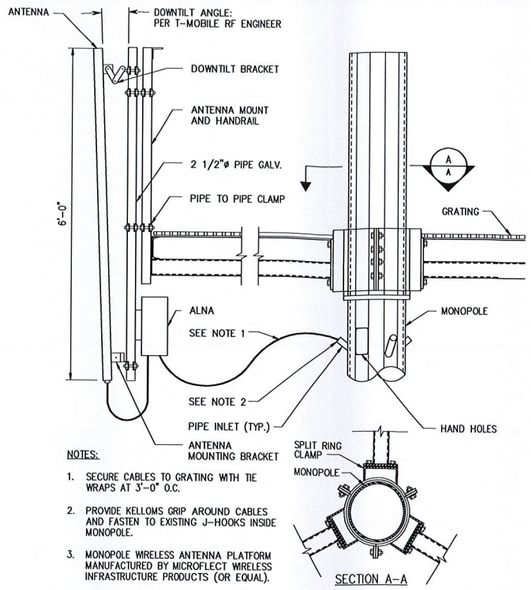
A-1



GPS AND GSM ANTENNA MOUNTING DETAIL

SCALE: N.T.S.

5 / S-1



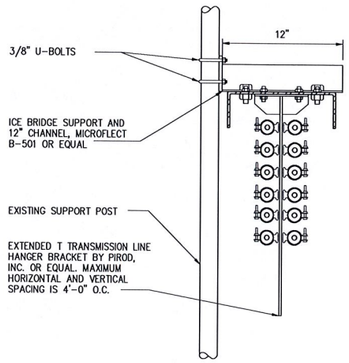
NOTES:

1. SECURE CABLES TO GRATING WITH TIE WRAPS AT 3'-0" O.C.
2. PROVIDE KELLOMS GRIP AROUND CABLES AND FASTEN TO EXISTING J-HOOKS INSIDE MONOPOLE.
3. MONOPOLE WIRELESS ANTENNA PLATFORM MANUFACTURED BY MICROFLECT WIRELESS INFRASTRUCTURE PRODUCTS (OR EQUAL).

ANTENNA MOUNTING DETAIL

SCALE: 3/4"=1'-0"

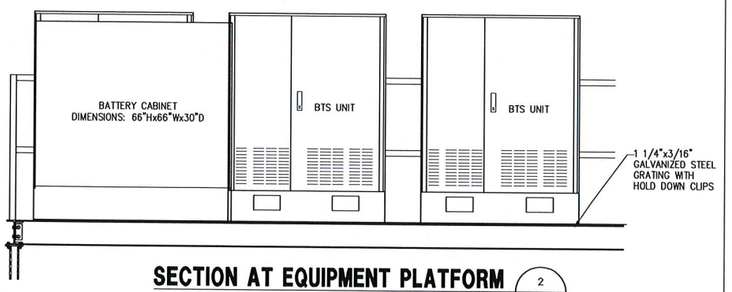
3 / S-1



COAX CABLE SUPPORT

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

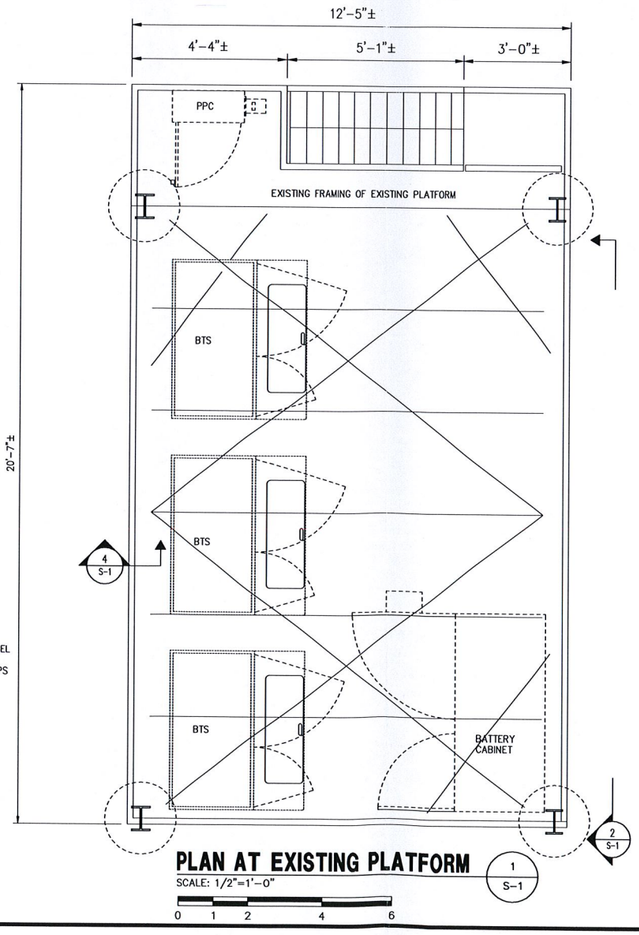
4 / S-1



SECTION AT EQUIPMENT PLATFORM

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

2 / S-1



PLAN AT EXISTING PLATFORM

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

1 / S-1

0 1 2 4 6

STRUCTURAL NOTES

1. DESIGN REQUIREMENTS ARE PER STATE BUILDING CODE AND APPLICABLE SUPPLEMENTS, ANSI/ASCE7, EIA/TIA-222-F STRUCTURAL STANDARDS FOR STEEL ANTENNA SUPPORTING STRUCTURES.
2. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS IN THE FIELD PRIOR TO FABRICATION AND ERECTION OF ANY MATERIAL. ANY UNUSUAL CONDITIONS SHALL BE REPORTED TO THE ATTENTION OF THE CONSTRUCTION MANAGER.
3. DESIGN AND CONSTRUCTION OF STRUCTURAL STEEL SHALL CONFORM TO THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION "SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS".
4. STRUCTURAL STEEL WIDE-FLANGE SHAPES SHALL CONFORM TO ASTM 992A. ALL OTHER SHAPES AND MISCELLANEOUS STEEL SHALL CONFORM TO ASTM A36 STRUCTURAL STEEL, UNLESS OTHERWISE NOTED.
5. STEEL PIPE SHALL CONFORM TO ASTM A500 "COLD-FORMED WELDED & SEAMLESS CARBON STEEL STRUCTURAL TUBING", GRADE A, OR ASTM A53 PIPE STEEL BLACK AND HOT-DIPPED ZINC-COATED WELDED AND SEAMLESS TYPE E OR S, GRADE B. PIPE SIZES INDICATED ARE NOMINAL. ACTUAL OUTSIDE DIAMETER IS LARGER.
6. STRUCTURAL CONNECTION BOLTS SHALL BE HIGH STRENGTH BOLTS (BEARING TYPE) AND CONFORM TO ASTM A325 "HIGH STRENGTH BOLTS FOR STRUCTURAL JOINTS, INCLUDING SUITABLE NUTS AND PLAIN HARDENED WASHERS". ALL BOLTS SHALL BE 5/8" DIA UON.
7. ALL STEEL MATERIALS SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT-DIP GALVANIZED) COATINGS ON IRON AND STEEL PRODUCTS", UNLESS OTHERWISE NOTED.
8. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC- COATING (HOT-DIP) ON IRON AND STEEL HARDWARE", UNLESS OTHERWISE NOTED.
9. FIELD WELDS, DRILL HOLES, SAW CUTS AND ALL DAMAGED GALVANIZED SURFACES SHALL BE REPAIRED WITH AN ORGANIC ZINC REPAIR PAINT COMPLYING WITH REQUIREMENTS OF ASTM A780. GALVANIZING REPAIR PAINT SHALL HAVE 65 PERCENT ZINC BY WEIGHT, ZIRP BY DUNCAN GALVANIZING, GALVA BRIGHT PREMIUM BY CROWN OR EQUAL. THICKNESS OF APPLIED GALVANIZING REPAIR PAINT SHALL BE NOT NOT LESS THAN 4 COATS (ALLOW TIME TO DRY BETWEEN COATS) WITH A RESULTING COATING THICKNESS REQUIRED BY ASTM A123 OR A153 AS APPLICABLE.
10. CONTRACTOR SHALL COMPLY WITH AWS CODE FOR PROCEDURES, APPEARANCE AND QUALITY OF WELDS, AND FOR METHODS USED IN CORRECTING WELDING. ALL WELDERS AND WELDING PROCESSES SHALL BE QUALIFIED IN ACCORDANCE WITH AWS "STANDARD QUALIFICATION PROCEDURES". ALL WELDING SHALL BE DONE USING E70XX ELECTRODES AND WELDING SHALL CONFORM TO AISC AND DI.I. WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLE J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION". 9TH EDITION.
11. INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NONCONFORMING MATERIALS OR CONDITIONS SHALL BE REPORTED TO THE CONSTRUCTION MANAGER PRIOR TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE CONSTRUCTION MANAGER APPROVAL.
12. UNISTRUTS SHALL BE FORMED STEEL CHANNEL STRUT FRAMING AS MANUFACTURED BY UNISTRUT CORP, WAYNE, MI OR EQUAL. STRUT MEMBERS SHALL BE 1 5/8"x1 5/8"x12GA, UNLESS OTHERWISE NOTED, AND SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION.
13. EPOXY ANCHOR ASSEMBLY SHALL CONSIST OF 1/2" DIAMETER STAINLESS STEEL ANCHOR ROD WITH NUTS & WASHERS. AN INTERNALLY THREADED INSERT, A SCREEN TUBE AND A EPOXY ADHESIVE. THE ANCHORING SYSTEM SHALL BE THE HILTI-HIT HY-20 AND OR HY-150 SYSTEMS (AS SPECIFIED AN DWG.) OR ENGINEERS APPROVED EQUAL WITH 4-1/4" MIN. EMBEDMENT DEPTH.
14. EXPANSION BOLTS SHALL CONFORM TO FEDERAL SPECIFICATION FF-S-325, GROUP II, TYPE 4, CLASS I, HILTI KWIK BOLT II OR APPROVED EQUAL. INSTALLATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. MINIMUM EMBEDMENT SHALL BE THREE AND ONE HALF (3 1/2) INCHES.
15. GRAVEL SUB BASE AND CONCRETE SHALL BE PLACED AGAINST UNDISTURBED SOIL.
16. CONCRETE FOR FENCE AND ICE BRIDGE SUPPORT SHALL BE 3000 PSI AIR ENTRAINED (4 %-6 %) NORMAL WEIGHT CONCRETE.
17. ALL CAST IN PLACE CONCRETE SHALL BE MIXED AND PLACED IN ACCORDANCE WITH THE REQUIREMENTS OF ACI 318 AND ACI 301.
18. THE FOLLOWING MINIMUM CONCRETE COVER OVER REINFORCING STEEL SHALL BE AS FOLLOWS UNLESS NOTED OTHERWISE:
    - CONCRETE CAST AGAINST EARTH ... 3 INCHES.
    - CONCRETE EXPOSED TO EARTH OR WATER
    - #6 AND LARGER .....2 INCHES
    - #5 AND SMALLER .....1 1/2 INCHES

    ALL EXPOSED EDGES SHALL BE PROVIDED WITH A 3/4"x3/4" CHAMFER UNLESS NOTED OTHERWISE.
19. LUMBER SHALL COMPLY WITH THE REQUIREMENTS OF THE AMERICAN INSTITUTE OF TIMBER CONSTRUCTION AND THE NATIONAL FOREST PRODUCTS ASSOCIATION'S NATIONAL DESIGN SPECIFICATION FOR WOOD CONSTRUCTION. ALL LUMBER SHALL BE PRESSURE TREATED AND SHALL BE STRUCTURAL GRADE NO. 2 OR BETTER.
20. WHERE ROOF PENETRATIONS ARE REQUIRED, THE CONTRACTOR SHALL CONTACT AND COORDINATE RELATED WORK WITH THE BUILDING OWNER AND THE EXISTING ROOF INSTALLER. WORK SHALL BE PERFORMED IN SUCH A MANNER AS TO NOT VOID THE EXISTING ROOF WARRANTY.

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APPROVALS

LANDLORD _____

LEASING _____

R.F. _____

ZONING _____

CONSTRUCTION _____

A/E _____

PROJECT NO: 05062.16

DRAWN BY: MMC

CHECKED BY: CMM

SUBMITTALS

1	10/28/05	CONSTRUCTION FINAL
0	9/29/05	CONSTRUCTION

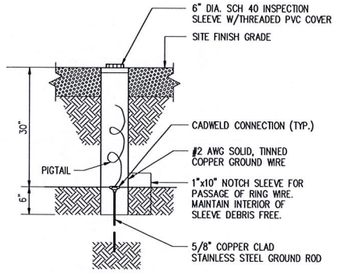
CT11-115F
BERLIN FIRE
DEPARTMENT TOWER

1657 BERLIN TURNPIKE
BERLIN, CT 06037

STRUCTURAL NOTES, PLAN SECTIONS AND DETAILS

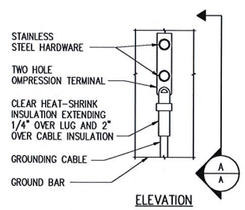
SHEET NUMBER

S-1

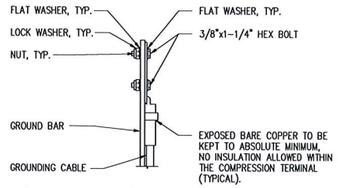


GROUND ROD TEST WELL DETAIL

SCALE: N.T.S. — 8 / E-1



ELEVATION

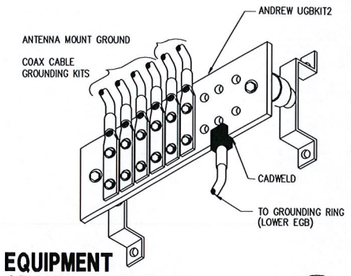


SECTION A-A

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

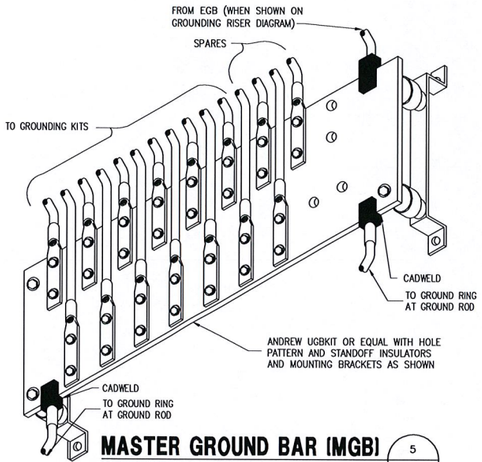
TYPICAL GROUND BAR CONNECTIONS DETAIL

SCALE: N.T.S. — 7 / E-1



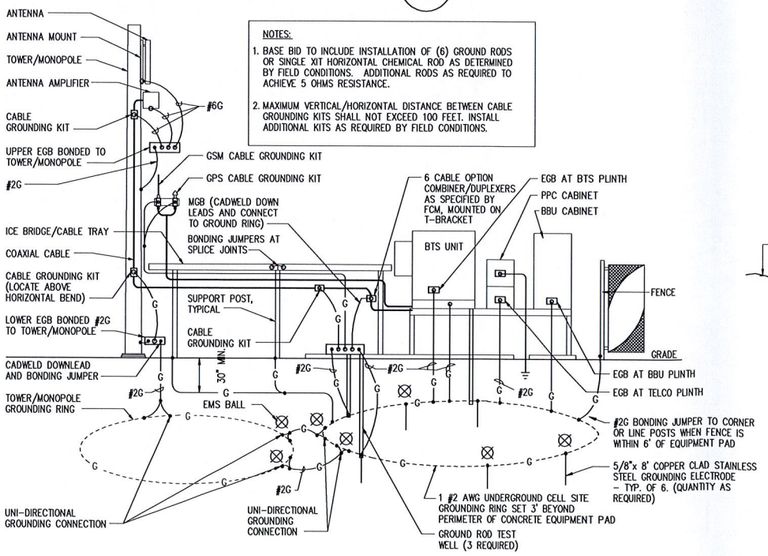
EQUIPMENT GROUND BAR (EGB)

SCALE: N.T.S. — 6 / E-1



MASTER GROUND BAR (MGB)

SCALE: N.T.S. — 5 / E-1

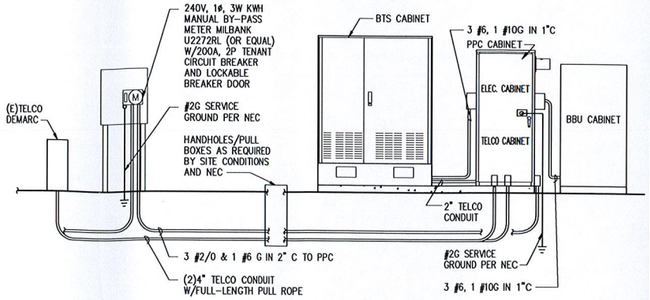


NOTES:
1. BASE BID TO INCLUDE INSTALLATION OF (6) GROUND RODS OR SINGLE XIT HORIZONTAL CHEMICAL ROD AS DETERMINED BY FIELD CONDITIONS. ADDITIONAL RODS AS REQUIRED TO ACHIEVE 5 OHMS RESISTANCE.
2. MAXIMUM VERTICAL/HORIZONTAL DISTANCE BETWEEN CABLE GROUNDING KITS SHALL NOT EXCEED 100 FEET. INSTALL ADDITIONAL KITS AS REQUIRED BY FIELD CONDITIONS.

GROUNDING RISER DIAGRAM

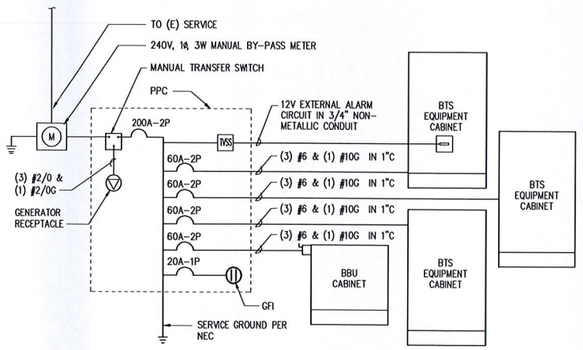
SCALE: N.T.S. — 4 / E-1

MAKE ALL CONNECTIONS AS PER UTILITY COMPANY'S REQUIREMENTS.



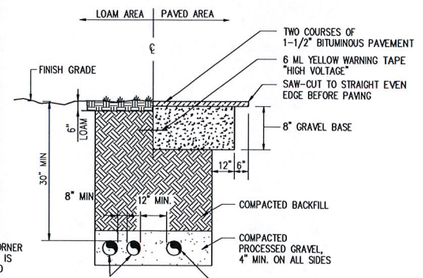
POWER RISER DIAGRAM

SCALE: N.T.S. — 3 / E-1



ONE LINE DIAGRAM

SCALE: N.T.S. — 2 / E-1



SCHEDULE 40 CONDUITS FOR NEW ELECTRICAL AND TELEPHONE SERVICES SEE UTILITY AND SITE PLANS. PROVIDE APPROVED PULL BOXES AS REQUIRED, AND COORDINATE INSTALLATION W/ ALL UTILITY COMPANIES FOR INTERFACING AT TERMINATION POINTS. PROVIDE FULL LENGTH PULL ROPES (TYP.).

NOTE: DETAIL AS SHOWN IS FOR SECONDARY ELECTRIC SERVICE. PRIMARY HIGH VOLTAGE SERVICE REQUIRES 4" CONCRETE ENCASEMENT.

BURIED CONDUIT DETAIL

SCALE: N.T.S. — 1 / E-1

ELECTRICAL LEGEND

	NEW PANEL BOARD, SURFACE MOUNTED
	EXISTING PANEL BOARD, SURFACE MOUNTED
T	DRY TYPE TRANSFORMER
M	METER
	CIRCUIT BREAKER
	NON-FUSIBLE DISCONNECT SWITCH, MOUNTED 54" A.F.F.
F	FUSIBLE DISCONNECT SWITCH, MOUNTED 54"A.F.F.
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR WITH BUILT-IN FUSES, SURFACE MOUNTED
	DUPLEX OUTLET, SURFACE MOUNTED, 20 AMPS, 125 VOLTS, SINGLE PHASE
J	JUNCTION BOX, SURFACE MOUNTED 18" A.F.F.
	EXPOSED WIRING
	HOME RUNS, MINIMUM 2#10 + 1#10G IN 3/4" CONDUIT U.O.N.
A.F.F.	ABOVE FINISHED FLOOR
U.O.N.	UNLESS OTHERWISE NOTED
WP	WEATHERPROOF
GFI	GROUND FAULT INTERRUPTER
A	AMPERE
V	VOLT
KWH	KILOWATT - HOUR
C	CONDUIT
GRC	GALVANIZED RIGID CONDUIT
G	GROUND
	GROUND
MGB	MASTER GROUND BAR ○MECHANICAL CONNECTION ●CADWELD CONNECTION
EGB	EQUIPMENT GROUND BAR ○MECHANICAL CONNECTION ●CADWELD CONNECTION
G	GROUND COPPER WIRE, SIZE AS NOTED
	EXPOSED WIRING
	COAXIAL CABLE
	5/8"x8' COPPER CLAD STAINLESS STEEL GROUND ROD
	●EXOTHERMIC (CADWELD) OR ○MECHANICAL (COMPRESSION TYPE) CONNECTION
PPC	POWER PROTECTION CABINET
	OMNI-DIRECTIONAL ELECTRONIC MARKER SYSTEM (EMS) BALL

ELECTRICAL AND GROUNDING NOTES

1. ALL ELECTRICAL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC) AS WELL AS APPLICABLE STATE AND LOCAL CODES.
2. ALL ELECTRICAL ITEMS SHALL BE U.L. APPROVED OR LISTED AND PROCURED PER SPECIFICATION REQUIREMENTS.
3. THE ELECTRICAL WORK INCLUDES ALL LABOR AND MATERIAL DESCRIBED BY DRAWINGS AND SPECIFICATION INCLUDING INCIDENTAL WORK TO PROVIDE COMPLETE OPERATING AND APPROVED ELECTRICAL SYSTEM.
4. GENERAL CONTRACTOR SHALL PAY FEES FOR PERMITS, AND IS RESPONSIBLE FOR OBTAINING SAID PERMITS AND COORDINATION OF INSPECTIONS.
5. ELECTRICAL AND TELCO WIRING OUTSIDE A BUILDING AND EXPOSED TO WEATHER SHALL BE IN WATER TIGHT GALVANIZED RIGID STEEL CONDUITS OR SCHEDULE 80 PVC (AS PERMITTED BY CODE) AND WHERE REQUIRED IN LIQUID TIGHT FLEXIBLE METAL OR NONMETALLIC CONDUITS.
6. BURIED CONDUIT SHALL BE SCHEDULE 40 PVC.
7. ELECTRICAL WIRING SHALL BE COPPER WITH TYPE XHHW, THWN, OR THHNINSULATION.
8. RUN ELECTRICAL CONDUIT OR CABLE BETWEEN ELECTRICAL UTILITY DEMARCATION POINT AND PROJECT OWNER CELL SITE PPC AS INDICATED ON THIS DRAWING. PROVIDE FULL LENGTH PULL ROPE. COORDINATE INSTALLATION WITH UTILITY COMPANY.
9. RUN TELCO CONDUIT OR CABLE BETWEEN TELEPHONE UTILITY DEMARCATION POINT AND PROJECT OWNER CELL SITE TELCO CABINET AND BTS CABINET AS INDICATED ON THIS DRAWING PROVIDE FULL LENGTH PULL ROPE IN INSTALLED TELCO CONDUIT. PROVIDE GREENLEE CONDUIT MEASURING TAPE AT EACH END.
10. WHERE CONDUIT BETWEEN BTS AND PROJECT OWNER CELL SITE PPC AND BETWEEN BTS AND PROJECT OWNER CELL SITE TELCO SERVICE CABINET ARE UNDERGROUND USE PVC, SCHEDULE 40 CONDUIT. ABOVE THE GROUND PORTION OF THESE CONDUITS SHALL BE PVC CONDUIT.
11. ALL EQUIPMENT LOCATED OUTSIDE SHALL HAVE NEMA 3R ENCLOSURE.
12. PPC SUPPLIED BY PROJECT OWNER.
13. GROUNDING SHALL COMPLY WITH NEC ART. 250. ADDITIONALLY, GROUNDING, BONDING AND LIGHTNING PROTECTION SHALL BE DONE IN ACCORDANCE WITH "T-MOBILE BTS SITE GROUNDING STANDARDS".
14. GROUND COAXIAL CABLE SHIELDS MINIMUM AT BOTH ENDS USING MANUFACTURERS COAX CABLE GROUNDING KITS SUPPLIED BY PROJECT OWNER.
15. USE #6 COPPER STRANDED WIRE WITH GREEN COLOR INSULATION FOR ABOVE GRADE GROUNDING (UNLESS OTHERWISE SPECIFIED) AND #2 SOLID TINNED BARE COPPER WIRE FOR BELOW GRADE GROUNDING AS INDICATED ON THE DRAWING.
16. ALL GROUND CONNECTIONS TO BE BURNDY HYGROUND COMPRESSION TYPE CONNECTORS OR CADWELD EXOTHERMIC WELD. DO NOT ALLOW BARE COPPER WIRE TO BE IN CONTACT WITH GALVANIZED STEEL.
17. ROUTE GROUNDING CONDUCTORS ALONG THE SHORTEST AND STRAIGHTEST PATH POSSIBLE, EXCEPT AS OTHERWISE INDICATED. GROUNDING LEADS SHOULD NEVER BE BENT AT RIGHT ANGLE. ALWAYS MAKE AT LEAST 12" RADIUS BENDS. #6 WIRE CAN BE BENT AT 6" RADIUS WHEN NECESSARY. BOND ANY METAL OBJECTS WITHIN 6 FEET OF PROJECT OWNER EQUIPMENT OR CABINET TO MASTER GROUND BAR OR GROUNDING RING.
18. CONNECTIONS TO GROUND BARS SHALL BE MADE WITH TWO HOLE COMPRESSION TYPE COPPER LUGS. APPLY OXIDE INHIBITING COMPOUND TO ALL LOCATIONS.
19. APPLY OXIDE INHIBITING COMPOUND TO ALL COMPRESSION TYPE GROUND CONNECTIONS.
20. CONTRACTOR SHALL PROVIDE AND INSTALL OMNI DIRECTIONAL ELECTRONIC MARKER SYSTEM (EMS) BALLS OVER EACH GROUND ROD AND BONDING POINT BETWEEN EXISTING TOWER/ MONOPOLE GROUNDING RING AND EQUIPMENT GROUNDING RING.
21. CONTRACTOR SHALL TEST COMPLETED GROUND SYSTEM AND RECORD RESULTS FOR PROJECT CLOSE-OUT DOCUMENTATION. 5 OHMNS MINIMUM RESISTANCE REQUIRED.
22. CONTRACTOR SHALL CONDUCT ANTENNA, COAX, AND LNA RETURN-LOSS AND DISTANCE-TO-FAULT MEASUREMENTS (SWEEP TESTS) AND RECORD RESULTS FOR PROJECT CLOSE OUT.

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STATE OF CONNECTICUT
MICHAEL J. [illegible]
No. 8428
LICENSED ARCHITECT

APPROVALS

LANDLORD _____
LEASING _____
R.F. _____
ZONING _____
CONSTRUCTION _____
A/E _____

PROJECT NO: 05062.16

DRAWN BY: MJE

CHECKED BY: CMM

SUBMITTALS

1	10/28/05	CONSTRUCTION FINAL
0	9/29/05	CONSTRUCTION

CTHA-231A
BERLIN FIRE DEPARTMENT TOWER

1657 BERLIN TURNPIKE
BERLIN, CT 06037

ELECTRICAL AND GROUNDING NOTES, RISERS, AND DETAILS

SHEET NUMBER

E-1

Exhibit 2

DETAILED STRUCTURAL ANALYSIS AND EVALUATION OF 176' EXISTING MONOPOLE FOR NEW ANTENNA ARRANGEMENT

Berlin Fire Department
1657 Wilbur Cross Parkway
Berlin, Connecticut
T-Mobile Site No.: CTHA231A

prepared for

T-Mobile

100 FILLEY STREET
BLOOMFIELD, CT. 06002
TEL. 860-692-7100

prepared by

URS

URS CORPORATION
500 ENTERPRISE DR, SUITE 3B
ROCKY HILL, CT 06067
TEL. 860-529-8882

36922118.00000
VS1-034

September 29, 2005

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

This report summarizes the structural analysis of the existing 176' steel monopole structure located at 1657 Wilbur Cross Parkway in Berlin, Connecticut. The analysis was conducted in accordance with the TIA/EIA-222-F standard for wind velocity of 85 mph and 74 mph concurrent with ½" ice. The antenna loading considered in the analysis consists of all existing and proposed antennas, transmission lines, and ancillary items as outlined in the Introduction Section of this report. The proposed T-Mobile modification is as follows:

Proposed Antenna and Mount	Carrier	Antenna Center Elevation
Remove (1) Standoff Mount and relocate (1) Dipole antenna and (1) Grid Dish to new 10' low-profile platform	**(Proposed)**	**@ 160'**
Install (9) EMS DR65-19-00DPQ antennas and (12) Decibel PCS 1900 TMA's on a new 10' low-profile platform with (24) 1 5/8" coax cables within the monopole.	**T-Mobile (Proposed)**	**@ 160'**
Install (1) VIC-100 GPS antenna on (1) side arm mount with (1) 1/2" coax cable within the monopole	**T-Mobile (Proposed)**	**@ 60'**

The results of the analysis indicate that the tower structure is in compliance with the proposed loading conditions. **The tower and its foundation are considered structurally adequate with the TIA/EIA-222-F wind load classification specified above and all the existing and proposed antenna loading.**

This analysis is based on:

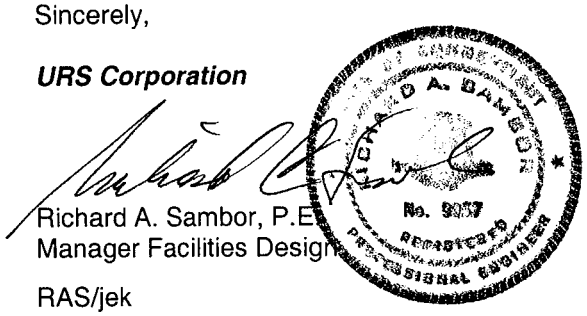
1) The tower structure's theoretical capacity, not including any assessment of the condition of the tower.
2) Tower geometry and structural member sizes taken from original construction drawings (EEI Job #: 11129) prepared by Engineered Endeavors, Inc., signed and sealed September 16, 2002.
3) Antenna and mount configuration as specified on the following page of this report.

This report is only valid as per the assumptions and data utilized in this report for antenna inventory, mounts and associated cables. The user of this report shall field verify the assumption of the antenna and mount configuration. Notify the engineer in writing immediately if any of the information in this report is found to be other than specified.

If you should have any questions, please call.

Sincerely,

URS Corporation



Richard A. Sambor, P.E.
Manager Facilities Design

RAS/jek

cc: AA, DR, IA – URS
CF/Book

2. INTRODUCTION

The subject tower is located at 1657 Wilbur Cross Parkway in Berlin, Connecticut. The structure is a 176' steel monopole designed by EEI, Inc.

The tower geometry and structure member sizes were taken from the original construction drawings (EEI Job #: 11129) prepared by Engineered Endeavors, Inc., signed and sealed September 16, 2002.

The inventory is summarized in the table below:

Antenna Type	*Carrier*	*Mount*	*Antenna Centerline Elevation*	*Cable*
(2) Dipole antennas	Town (existing)	Low-Profile Platform	176'	(2) 1 5/8" coax cables (within monopole)
(2) Grid Dishes	Town (existing)	Low-Profile Platform (listed above)	176'	(2) 1 5/8" coax cables (within monopole)
(2) Omni antennas	Town (existing)	Low-Profile Platform (listed above)	176'	(2) 1 5/8" coax cables (within monopole)
(1) Dipole antenna	Town (future)	Low-Profile Platform (listed above)	176'	(1) 1 5/8" coax cable (within monopole)
(3) Allgon 7184 antennas	Cingular (existing)	(3) Flush Mounts	168'	(6) 1 5/8" coax cables (within monopole)
(9) EMS DR65-19-00DPQ antennas and (12) Decibel PCS 1900 TMA's	**T-Mobile (proposed)**	**Low-Profile Platform**	**160'**	**(24) 1 5/8" coax cables (within monopole)**
(12) Dapa 48000 antennas	Sprint (existing and future)	Low-Profile Platform	150'	(12) 1 5/8" coax cables (within monopole)
(1) Dipole antenna	Town (existing)	Standoff Mount	130'	(1) 1 5/8" coax cable (within monopole)
(1) Dipole antenna	Town (existing)	Standoff Mount	100'	(1) 1 5/8" coax cable (within monopole)
(1) Grid Dish	Town (existing)	Standoff Mount (listed above)	100'	(1) 1 5/8" coax cable (within monopole)
(1) GPS antenna	Sprint (existing)	Standoff Mount	75'	(1) 1/2" coax cable (within monopole)
(1) VIC-100 GPS antenna	**T-Mobile (proposed)**	**Standoff Mount**	**60'**	**(1) 1/2" coax cable (within monopole)**
(1) Scanner antenna	Town (existing)	Standoff Mount	60'	(1) 1/2" coax cable (within monopole)

This structural analysis of the communications tower was performed by URS Corporation (URS) for T-Mobile. The purpose of this analysis was to investigate the structural integrity of the existing tower with its existing and proposed antenna loads. This analysis was conducted to evaluate stress on the tower and the effect of forces to the foundation of the tower resulting from existing and proposed antenna arrangements.

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS

The structural analysis was done in accordance with TIA/EIA-222-F, Structural Standard for Steel Antenna Towers and Antenna Supporting Structures, and the American Institute of Steel Construction (AISC) Manual of Steel Construction, Allowable Stress Design (ASD).

The analysis was conducted using ERI Tower 3.0. Two load conditions were evaluated as shown below which were compared to allowable stresses according to AISC and TIA/EIA.

Load Condition 1 = 85 mph Wind Load (without ice) + Tower Dead Load
Load Condition 2 = 74 mph Wind Load (with ice) + Ice Load + Tower Dead Load

Please note that wind pressure is a function of velocity squared. Under Load Condition 2, a 25 percent reduction in wind pressure is allowed by code to account for the unlikelihood of the full wind pressure and ice load occurring at the same time. The same results may be achieved by utilizing a lower wind pressure without taking the 25 percent reduction, as shown above.

The TIA/EIA standard permits a one-third increase in allowable stresses for towers and monopoles less than 700 feet tall. For the purposes of this analysis, in computing the load capacity the allowable stresses of the tower members were increased by one-third.

4. FINDINGS AND EVALUATION

Combined axial and bending stresses on the monopole structure were evaluated to compare with allowable stresses in accordance with AISC. The calculated stresses under the proposed loading were below the allowable stresses. Detailed analysis and calculations for the proposed load condition are provided in section 6 of this report. The anchor bolts and base plate were found to be within allowable limits. No further analysis was conducted on the foundation since the shear and the moment at the top of the foundation were below the original design.

5. CONCLUSIONS

The results of the analysis indicate that the tower structure is in compliance with the proposed loading conditions. **The tower and its foundation are structurally adequate under the TIA/EIA-222-F wind load classification specified above and the proposed antenna loadings.**

Limitations/Assumptions:

This report is based on the following:

1. Tower inventory as listed in this report.
2. Tower is properly installed and maintained.
3. All members are as specified in the original design documents and are in good condition.
4. All required members are in place.
5. All bolts are in place and are properly tightened.
6. Tower is in plumb condition.
7. All member protective coatings are in good condition.
8. All tower members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
9. Foundations were properly constructed to support original design loads as specified in the original design documents.
10. All coaxial cable is installed within the monopole unless specified otherwise.

URS is not responsible for any modifications completed prior to or hereafter in which URS is not or was not directly involved. Modifications include but are not limited to:

A. Adding antennas
B. Removing/replacing antennas
C. Adding coaxial cables

URS hereby states that this document represents the entire report and that it assumes no liability for any factual changes that may occur after the date of this report. All representations, recommendations, and conclusions are based upon information contained and set forth herein. If you are aware of any information which conflicts with that which is contained herein, or you are aware of any defects arising from original design, material, fabrication, or erection deficiencies, you should disregard this report and immediately contact URS. URS disclaims all liability for any representation, recommendation, or conclusion not expressly stated herein.

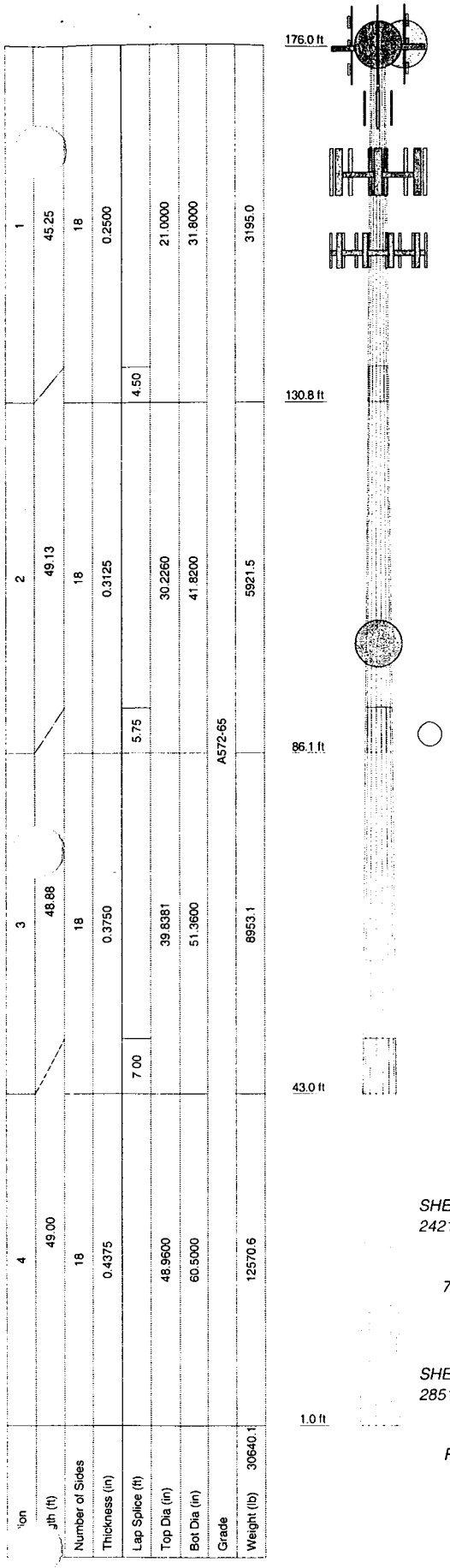
Ongoing and Periodic Inspection and Maintenance:

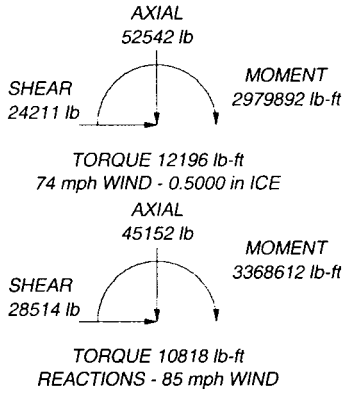
After the Contractor has successfully completed the installation and the work has been accepted, the owner will be responsible for the ongoing and periodic inspection and maintenance of the tower.

The owner shall refer to TIA/EIA-222-F for recommendations for maintenance and inspection. The frequency of the inspection and maintenance intervals is to be determined by the owner based upon actual site and environmental conditions. It is recommended that a complete and thorough inspection of the entire tower structural system be performed at least yearly and more frequently as conditions warrant. According to TIA/EIA-222-F section 14.1, Note 1: It is recommended that the structure be inspected after severe wind and/or ice storms or other extreme loading conditions.

6. DRAWINGS AND DATA

ERI TOWER INPUT/OUTPUT SUMMARY





APPURTENANCES

TYPE	ELEVATION	TYPE	ELEVATION
12' Low Profile Platform (Town)	176	(4) Decibel PCS 1900 TMA (T-Mobile)	160
4 Bay Dipole (Town)	176	(4) Decibel PCS 1900 TMA (T-Mobile)	160
Omni (Town)	176	(4) Decibel PCS 1900 TMA (T-Mobile)	160
Grid Dish (Town)	176	Low Profile Platform (Sprint)	150
Dipole (Town)	176	(4) 48000 (Sprint)	150
Grid Dish (Town)	176	(4) 48000 (Sprint)	150
Omni (Town)	176	(4) 48000 (Sprint)	150
Dipole (future) (Town)	176	2 Bay Dipole (Town)	130
5'3"x4" Pipe Mount (Cingular)	168	6' Side Mount Standoff (Town)	130
5'3"x4" Pipe Mount (Cingular)	168	6' Side Mount Standoff (Town)	100
5'3"x4" Pipe Mount (Cingular)	168	4 Bay Dipole (Town)	100
7184 (Cingular)	168	Grid Dish (Town)	100
7184 (Cingular)	168	Side Mount Standoff (Sprint)	75
7184 (Cingular)	168	GPS (Sprint)	75
10' Low Profile Platform (T-Mobile)	160	Side Mount Standoff (T-Mobile)	60
(3) DR65-19-00DPQ (T-Mobile)	160	GPS (T-Mobile)	60
(3) DR65-19-00DPQ (T-Mobile)	160	Side Mount Standoff (Town)	60
(3) DR65-19-00DPQ (T-Mobile)	160	Scanner Antenna (Town)	60

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 71.1%

URS Corporation
500 Enterprise Dr, Suite 3B
Rocky Hill, CT 06067
Phone: (860) 529-8882
FAX: (860) 529-5566

Job: ***176' EEI Monopole, Berlin, CT***			
Project: ***T-Mobile Site No: CTHA231A***			
Client: T-Mobile	Drawn by: Jed Kiernan	App'd:	
Code: TIA/EIA-222-F	Date: 09/29/05	Scale: NTS	
Path: P:\034\F08\ERI Files\176' EEI monopole eri		Dwg No. E-	

ERI TOWER DETAILED OUTPUT

Tower Input Data

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

Tower is located in Hartford County, Connecticut.
Basic wind speed of 85 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 74 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*	*Section Length*	*Splice Length*	*Number of Sides*	*Top Diameter*	*Bottom Diameter*	*Wall Thickness*	*Bend Radius*	*Pole Grade*
	ft	*ft*	*ft*		*in*	*in*	*in*	*in*	
L1	176.01-130.76	45.25	4.50	18	21.0000	31.8000	0.2500	1.0000	A572-65 (65 ksi)
L2	130.76-86.13	49.13	5.75	18	30.2260	41.8200	0.3125	1.2500	A572-65 (65 ksi)
L3	86.13-43.00	48.88	7.00	18	39.8381	51.3600	0.3750	1.5000	A572-65 (65 ksi)
L4	43.00-1.00	49.00		18	48.9600	60.5000	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	21.3240	16.4651	895.6507	7.3663	10.6680	83.9568	1792.4800	8.2341	3.2560	13.024
	32.2906	25.0349	3148.3461	11.2003	16.1544	194.8909	6300.8349	12.5198	5.1568	20.627
L2	31.7706	29.6704	3354.2439	10.6193	15.3548	218.4493	6712.9014	14.8380	4.7698	15.263
	42.4651	41.1703	8961.3641	14.7352	21.2446	421.8192	17934.5198	20.5890	6.8103	21.793
L3	41.8289	46.9709	9241.6269	14.0094	20.2377	456.6531	18495.4142	23.4899	6.3515	16.937
	52.1523	60.6849	19929.7987	18.0997	26.0909	763.8607	39885.8215	30.3482	8.3794	22.345
L4	51.3893	67.3795	20042.4648	17.2255	24.8717	805.8353	40111.3019	33.6962	7.8470	17.936
	61.4333	83.4043	38013.0437	21.3222	30.7340	1236.8401	76076.1060	41.7101	9.8780	22.578

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 176.01-130.76				1	1	1		
L2 130.76-86.13				1	1	1		
L3 86.13-43.00				1	1	1		
L4 43.00-1.00				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 (Town)	C	No	Inside Pole	176.00 - 4.00	7	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (Cingular)	C	No	Inside Pole	169.00 - 7.00	6	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (T-Mobile)	C	No	Inside Pole	161.00 - 7.00	24	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (Town)	C	No	Inside Pole	161.00 - 7.00	2	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (Sprint)	C	No	Inside Pole	151.00 - 7.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (Town)	C	No	Inside Pole	131.00 - 7.00	1	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (Town)	C	No	Inside Pole	101.00 - 7.00	2	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1/2 (Sprint)	C	No	Inside Pole	76.00 - 7.00	1	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
1/2 (Town)	C	No	Inside Pole	61.00 - 7.00	1	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
1/2 (T-Mobile)	C	No	Inside Pole	61.00 - 7.00	1	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
L1	176.01-130.76	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	1638.50
L2	130.76-86.13	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	2444.52
L3	86.13-43.00	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	2439.43
L4	43.00-1.00	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	2070.60

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
L1	176.01-130.76	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	1638.50
L2	130.76-86.13	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	2444.52
L3	86.13-43.00	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	2439.43
L4	43.00-1.00	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	2070.60

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
12' Low Profile Platform (Town)	C	None		0.0000	176.00	No Ice	15.70	15.70	1300.00
						1/2" Ice	20.10	20.10	1765.00
4 Bay Dipole (Town)	C	From Face	3.00 0.00 0.00	0.0000	176.00	No Ice	5.40	5.40	50.00
						1/2" Ice	9.00	9.00	80.00
Omni (Town)	C	From Face	3.00 0.00 0.00	0.0000	176.00	No Ice	5.40	5.40	50.00
						1/2" Ice	9.00	9.00	80.00
Grid Dish (Town)	C	From Face	3.00 0.00 0.00	0.0000	176.00	No Ice	5.40	5.40	50.00
						1/2" Ice	9.00	9.00	80.00
Dipole (Town)	B	From Face	3.00 0.00 0.00	0.0000	176.00	No Ice	5.40	5.40	50.00
						1/2" Ice	9.00	9.00	80.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Offsets: Horz ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
Grid Dish	B	From Face	3.00	0.00	0.00	0.0000	176.00	No Ice	5.40	5.40	50.00
(Town)								1/2" Ice	9.00	9.00	80.00
Omni	A	From Face	3.00	0.00	0.00	0.0000	176.00	No Ice	5.40	5.40	50.00
(Town)								1/2" Ice	9.00	9.00	80.00
Dipole (future)	A	From Face	3.00	0.00	0.00	0.0000	176.00	No Ice	5.40	5.40	50.00
(Town)								1/2" Ice	9.00	9.00	80.00
5'3"x4" Pipe Mount	A	None				0.0000	168.00	No Ice	1.88	1.88	57.00
(Cingular)								1/2" Ice	2.21	2.21	73.81
5'3"x4" Pipe Mount	B	None				0.0000	168.00	No Ice	1.88	1.88	57.00
(Cingular)								1/2" Ice	2.21	2.21	73.81
5'3"x4" Pipe Mount	C	None				0.0000	168.00	No Ice	1.88	1.88	57.00
(Cingular)								1/2" Ice	2.21	2.21	73.81
7184	A	From Face	1.00	0.00	0.00	0.0000	168.00	No Ice	2.68	1.89	11.20
(Cingular)								1/2" Ice	3.00	2.21	27.10
7184	B	From Face	1.00	0.00	0.00	0.0000	168.00	No Ice	2.68	1.89	11.20
(Cingular)								1/2" Ice	3.00	2.21	27.10
7184	C	From Face	1.00	0.00	0.00	0.0000	168.00	No Ice	2.68	1.89	11.20
(Cingular)								1/2" Ice	3.00	2.21	27.10
10' Low Profile Platform	C	None				0.0000	160.00	No Ice	15.70	15.70	1300.00
(T-Mobile)								1/2" Ice	20.10	20.10	1765.00
(3) DR65-19-00DPQ	A	From Face	3.00	0.00	0.00	0.0000	160.00	No Ice	8.40	3.53	32.00
(T-Mobile)								1/2" Ice	8.95	3.97	73.77
(3) DR65-19-00DPQ	B	From Face	3.00	0.00	0.00	0.0000	160.00	No Ice	8.40	3.53	32.00
(T-Mobile)								1/2" Ice	8.95	3.97	73.77
(3) DR65-19-00DPQ	C	From Face	3.00	0.00	0.00	0.0000	160.00	No Ice	8.40	3.53	32.00
(T-Mobile)								1/2" Ice	8.95	3.97	73.77
(4) Decibel PCS 1900 TMA	A	From Face	3.00	0.00	0.00	0.0000	160.00	No Ice	0.00	0.63	17.60
(T-Mobile)								1/2" Ice	0.00	0.81	23.50
(4) Decibel PCS 1900 TMA	B	From Face	3.00	0.00	0.00	0.0000	160.00	No Ice	0.00	0.63	17.60
(T-Mobile)								1/2" Ice	0.00	0.81	23.50
(4) Decibel PCS 1900 TMA	C	From Face	3.00	0.00	0.00	0.0000	160.00	No Ice	0.00	0.63	17.60
(T-Mobile)								1/2" Ice	0.00	0.81	23.50
Low Profile Platform	C	None				0.0000	150.00	No Ice	17.30	17.30	1500.00
(Sprint)								1/2" Ice	22.10	22.10	2030.00
(4) 48000	A	From Face	3.00	0.00	0.00	0.0000	150.00	No Ice	4.51	1.82	18.30
(Sprint)								1/2" Ice	4.91	2.15	40.88
(4) 48000	B	From Face	3.00	0.00	0.00	0.0000	150.00	No Ice	4.51	1.82	18.30
(Sprint)								1/2" Ice	4.91	2.15	40.88
(4) 48000	C	From Face	3.00	0.00	0.00	0.0000	150.00	No Ice	4.51	1.82	18.30
(Sprint)								1/2" Ice	4.91	2.15	40.88
2 Bay Dipole	C	From Face	6.00	0.00	0.00	0.0000	130.00	No Ice	5.40	5.40	50.00
(Town)								1/2" Ice	9.00	9.00	80.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
			0.00						
6' Side Mount Standoff (Town)	C	From Face	3.00 0.00 0.00	0.0000	130.00	No Ice 1/2" Ice	4.97 6.12	4.97 6.12	70.00 130.00
6' Side Mount Standoff (Town)	C	From Face	3.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice	4.97 6.12	4.97 6.12	70.00 130.00
4 Bay Dipole (Town)	C	From Face	6.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice	5.40 9.00	5.40 9.00	50.00 80.00
Grid Dish (Town)	C	From Face	6.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice	5.40 9.00	5.40 9.00	50.00 80.00
Side Mount Standoff (Sprint)	C	From Face	1.50 0.00 0.00	0.0000	75.00	No Ice 1/2" Ice	4.97 6.12	4.97 6.12	70.00 130.00
GPS (Sprint)	C	From Face	3.00 0.00 0.00	0.0000	75.00	No Ice 1/2" Ice	1.00 1.50	1.00 1.50	15.00 30.00
Side Mount Standoff (T-Mobile)	C	From Face	1.50 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	4.97 6.12	4.97 6.12	70.00 130.00
GPS (T-Mobile)	C	From Face	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	1.00 1.50	1.00 1.50	15.00 30.00
Side Mount Standoff (Town)	C	From Face	1.50 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	4.97 6.12	4.97 6.12	70.00 130.00
Scanner Antenna (Town)	C	From Face	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	1.00 1.50	1.00 1.50	15.00 30.00

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 176.01-130.76	152.08	1.547	29	99.550	A	0.000	99.550	99.550	100.00	0.000	0.000
					B	0.000	99.550		100.00		
					C	0.000	99.550		100.00		
L2 130.76-86.13	107.70	1.402	26	135.950	A	0.000	135.950	135.950	100.00	0.000	0.000
					B	0.000	135.950		100.00		
					C	0.000	135.950		100.00		
L3 86.13-43.00	64.29	1.21	22	166.326	A	0.000	166.326	166.326	100.00	0.000	0.000
					B	0.000	166.326		100.00		
					C	0.000	166.326		100.00		
L4 43.00-1.00	21.38	1	18	194.440	A	0.000	194.440	194.440	100.00	0.000	0.000

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
					B	0.000	194.440		100.00		
					C	0.000	194.440		100.00		

Tower Pressure - With Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	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 176.01-130.76	152.08	1.547	21	0.5000	103.321	A	0.000	103.321	103.321	100.00	0.000	0.000
						B	0.000	103.321		100.00		
						C	0.000	103.321		100.00		
L2 130.76-86.13	107.70	1.402	19	0.5000	139.669	A	0.000	139.669	139.669	100.00	0.000	0.000
						B	0.000	139.669		100.00		
						C	0.000	139.669		100.00		
L3 86.13-43.00	64.29	1.21	17	0.5000	169.920	A	0.000	169.920	169.920	100.00	0.000	0.000
						B	0.000	169.920		100.00		
						C	0.000	169.920		100.00		
L4 43.00-1.00	21.38	1	14	0.5000	197.940	A	0.000	197.940	197.940	100.00	0.000	0.000
						B	0.000	197.940		100.00		
						C	0.000	197.940		100.00		

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 176.01-130.76	152.08	1.547	10	99.550	A	0.000	99.550	99.550	100.00	0.000	0.000
					B	0.000	99.550		100.00		
					C	0.000	99.550		100.00		
L2 130.76-86.13	107.70	1.402	9	135.950	A	0.000	135.950	135.950	100.00	0.000	0.000
					B	0.000	135.950		100.00		
					C	0.000	135.950		100.00		
L3 86.13-43.00	64.29	1.21	8	166.326	A	0.000	166.326	166.326	100.00	0.000	0.000
					B	0.000	166.326		100.00		
					C	0.000	166.326		100.00		
L4 43.00-1.00	21.38	1	6	194.440	A	0.000	194.440	194.440	100.00	0.000	0.000
					B	0.000	194.440		100.00		
					C	0.000	194.440		100.00		

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 176.01-130.76	1638.50	3195.00	A	1	0.65	1	1	1	99.550	3126.60	69.10	C
			B	1	0.65	1	1	1	99.550			
			C	1	0.65	1	1	1	99.550			
L2 130.76-86.13	2444.52	5921.52	A	1	0.65	1	1	1	135.950	3865.28	86.61	C
			B	1	0.65	1	1	1	135.950			
			C	1	0.65	1	1	1	135.950			
L3 86.13-43.00	2439.43	8953.08	A	1	0.65	1	1	1	166.326	4067.52	94.31	C
			B	1	0.65	1	1	1	166.326			
			C	1	0.65	1	1	1	166.326			
L4 43.00-1.00	2070.60	12570.55	A	1	0.65	1	1	1	194.440	3950.60	94.06	C
			B	1	0.65	1	1	1	194.440			
			C	1	0.65	1	1	1	194.440			
Sum Weight:	8593.05	30640.15						OTM	1222744.27 lb-ft	15010.01		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 176.01-130.76	1638.50	3195.00	A	1	0.65	1	1	1	99.550	3126.60	69.10	C
			B	1	0.65	1	1	1	99.550			
			C	1	0.65	1	1	1	99.550			
L2 130.76-86.13	2444.52	5921.52	A	1	0.65	1	1	1	135.950	3865.28	86.61	C
			B	1	0.65	1	1	1	135.950			
			C	1	0.65	1	1	1	135.950			
L3 86.13-43.00	2439.43	8953.08	A	1	0.65	1	1	1	166.326	4067.52	94.31	C
			B	1	0.65	1	1	1	166.326			
			C	1	0.65	1	1	1	166.326			
L4 43.00-1.00	2070.60	12570.55	A	1	0.65	1	1	1	194.440	3950.60	94.06	C
			B	1	0.65	1	1	1	194.440			
			C	1	0.65	1	1	1	194.440			
Sum Weight:	8593.05	30640.15						OTM	1222744.27 lb-ft	15010.01		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 176.01-130.76	1638.50	3195.00	A	1	0.65	1	1	1	99.550	3126.60	69.10	C
			B	1	0.65	1	1	1	99.550			
			C	1	0.65	1	1	1	99.550			
L2 130.76-86.13	2444.52	5921.52	A	1	0.65	1	1	1	135.950	3865.28	86.61	C
			B	1	0.65	1	1	1	135.950			
			C	1	0.65	1	1	1	135.950			
L3 86.13-43.00	2439.43	8953.08	A	1	0.65	1	1	1	166.326	4067.52	94.31	C
			B	1	0.65	1	1	1	166.326			
			C	1	0.65	1	1	1	166.326			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L4 43.00-1.00	2070.60	12570.55	A	1	0.65	1	1	1	194.440	3950.60	94.06	C
			B	1	0.65	1	1	1	194.440			
			C	1	0.65	1	1	1	194.440			
Sum Weight:	8593.05	30640.15						OTM	1222744.2 7 lb-ft	15010.01		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 176.01-130.76	1638.50	3195.00	A	1	0.65	1	1	1	99.550	3126.60	69.10	C
			B	1	0.65	1	1	1	99.550			
			C	1	0.65	1	1	1	99.550			
L2 130.76-86.13	2444.52	5921.52	A	1	0.65	1	1	1	135.950	3865.28	86.61	C
			B	1	0.65	1	1	1	135.950			
			C	1	0.65	1	1	1	135.950			
L3 86.13-43.00	2439.43	8953.08	A	1	0.65	1	1	1	166.326	4067.52	94.31	C
			B	1	0.65	1	1	1	166.326			
			C	1	0.65	1	1	1	166.326			
L4 43.00-1.00	2070.60	12570.55	A	1	0.65	1	1	1	194.440	3950.60	94.06	C
			B	1	0.65	1	1	1	194.440			
			C	1	0.65	1	1	1	194.440			
Sum Weight:	8593.05	30640.15						OTM	1222744.2 7 lb-ft	15010.01		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 176.01-130.76	1638.50	3946.23	A	1	0.65	1	1	1	103.321	2433.78	53.79	C
			B	1	0.65	1	1	1	103.321			
			C	1	0.65	1	1	1	103.321			
L2 130.76-86.13	2444.52	6942.14	A	1	0.65	1	1	1	139.669	2978.27	66.73	C
			B	1	0.65	1	1	1	139.669			
			C	1	0.65	1	1	1	139.669			
L3 86.13-43.00	2439.43	10198.20	A	1	0.65	1	1	1	169.920	3116.57	72.26	C
			B	1	0.65	1	1	1	169.920			
			C	1	0.65	1	1	1	169.920			
L4 43.00-1.00	2070.60	14023.54	A	1	0.65	1	1	1	197.940	3016.29	71.82	C
			B	1	0.65	1	1	1	197.940			
			C	1	0.65	1	1	1	197.940			
Sum Weight:	8593.05	35110.10						OTM	944199.96 lb-ft	11544.90		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 176.01-130.76	1638.50	3946.23	A	1	0.65	1	1	1	103.321	2433.78	53.79	C
			B	1	0.65	1	1	1	103.321			
			C	1	0.65	1	1	1	103.321			
L2 130.76-86.13	2444.52	6942.14	A	1	0.65	1	1	1	139.669	2978.27	66.73	C
			B	1	0.65	1	1	1	139.669			
			C	1	0.65	1	1	1	139.669			
L3 86.13-43.00	2439.43	10198.20	A	1	0.65	1	1	1	169.920	3116.57	72.26	C
			B	1	0.65	1	1	1	169.920			
			C	1	0.65	1	1	1	169.920			
L4 43.00-1.00	2070.60	14023.54	A	1	0.65	1	1	1	197.940	3016.29	71.82	C
			B	1	0.65	1	1	1	197.940			
			C	1	0.65	1	1	1	197.940			
Sum Weight:	8593.05	35110.10						OTM	944199.96 lb-ft	11544.90		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 176.01-130.76	1638.50	3946.23	A	1	0.65	1	1	1	103.321	2433.78	53.79	C
			B	1	0.65	1	1	1	103.321			
			C	1	0.65	1	1	1	103.321			
L2 130.76-86.13	2444.52	6942.14	A	1	0.65	1	1	1	139.669	2978.27	66.73	C
			B	1	0.65	1	1	1	139.669			
			C	1	0.65	1	1	1	139.669			
L3 86.13-43.00	2439.43	10198.20	A	1	0.65	1	1	1	169.920	3116.57	72.26	C
			B	1	0.65	1	1	1	169.920			
			C	1	0.65	1	1	1	169.920			
L4 43.00-1.00	2070.60	14023.54	A	1	0.65	1	1	1	197.940	3016.29	71.82	C
			B	1	0.65	1	1	1	197.940			
			C	1	0.65	1	1	1	197.940			
Sum Weight:	8593.05	35110.10						OTM	944199.96 lb-ft	11544.90		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 176.01-130.76	1638.50	3946.23	A	1	0.65	1	1	1	103.321	2433.78	53.79	C
			B	1	0.65	1	1	1	103.321			
			C	1	0.65	1	1	1	103.321			
L2 130.76-86.13	2444.52	6942.14	A	1	0.65	1	1	1	139.669	2978.27	66.73	C
			B	1	0.65	1	1	1	139.669			
			C	1	0.65	1	1	1	139.669			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L3 86.13-43.00	2439.43	10198.20	A	1	0.65	1	1	1	169.920	3116.57	72.26	C
			B	1	0.65	1	1	1	169.920			
			C	1	0.65	1	1	1	169.920			
L4 43.00-1.00	2070.60	14023.54	A	1	0.65	1	1	1	197.940	3016.29	71.82	C
			B	1	0.65	1	1	1	197.940			
			C	1	0.65	1	1	1	197.940			
Sum Weight:	8593.05	35110.10						OTM	944199.96 lb-ft	11544.90		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 176.01-130.76	1638.50	3195.00	A	1	0.65	1	1	1	99.550	1081.87	23.91	C
			B	1	0.65	1	1	1	99.550			
			C	1	0.65	1	1	1	99.550			
L2 130.76-86.13	2444.52	5921.52	A	1	0.65	1	1	1	135.950	1337.47	29.97	C
			B	1	0.65	1	1	1	135.950			
			C	1	0.65	1	1	1	135.950			
L3 86.13-43.00	2439.43	8953.08	A	1	0.65	1	1	1	166.326	1407.45	32.63	C
			B	1	0.65	1	1	1	166.326			
			C	1	0.65	1	1	1	166.326			
L4 43.00-1.00	2070.60	12570.55	A	1	0.65	1	1	1	194.440	1366.99	32.55	C
			B	1	0.65	1	1	1	194.440			
			C	1	0.65	1	1	1	194.440			
Sum Weight:	8593.05	30640.15						OTM	423094.90 lb-ft	5193.77		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 176.01-130.76	1638.50	3195.00	A	1	0.65	1	1	1	99.550	1081.87	23.91	C
			B	1	0.65	1	1	1	99.550			
			C	1	0.65	1	1	1	99.550			
L2 130.76-86.13	2444.52	5921.52	A	1	0.65	1	1	1	135.950	1337.47	29.97	C
			B	1	0.65	1	1	1	135.950			
			C	1	0.65	1	1	1	135.950			
L3 86.13-43.00	2439.43	8953.08	A	1	0.65	1	1	1	166.326	1407.45	32.63	C
			B	1	0.65	1	1	1	166.326			
			C	1	0.65	1	1	1	166.326			
L4 43.00-1.00	2070.60	12570.55	A	1	0.65	1	1	1	194.440	1366.99	32.55	C
			B	1	0.65	1	1	1	194.440			
			C	1	0.65	1	1	1	194.440			
Sum Weight:	8593.05	30640.15						OTM	423094.90 lb-ft	5193.77		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 176.01-130.76	1638.50	3195.00	A	1	0.65	1	1	1	99.550	1081.87	23.91	C
			B	1	0.65	1	1	1	99.550			
			C	1	0.65	1	1	1	99.550			
L2 130.76-86.13	2444.52	5921.52	A	1	0.65	1	1	1	135.950	1337.47	29.97	C
			B	1	0.65	1	1	1	135.950			
			C	1	0.65	1	1	1	135.950			
L3 86.13-43.00	2439.43	8953.08	A	1	0.65	1	1	1	166.326	1407.45	32.63	C
			B	1	0.65	1	1	1	166.326			
			C	1	0.65	1	1	1	166.326			
L4 43.00-1.00	2070.60	12570.55	A	1	0.65	1	1	1	194.440	1366.99	32.55	C
			B	1	0.65	1	1	1	194.440			
			C	1	0.65	1	1	1	194.440			
Sum Weight:	8593.05	30640.15						OTM	423094.90 lb-ft	5193.77		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 176.01-130.76	1638.50	3195.00	A	1	0.65	1	1	1	99.550	1081.87	23.91	C
			B	1	0.65	1	1	1	99.550			
			C	1	0.65	1	1	1	99.550			
L2 130.76-86.13	2444.52	5921.52	A	1	0.65	1	1	1	135.950	1337.47	29.97	C
			B	1	0.65	1	1	1	135.950			
			C	1	0.65	1	1	1	135.950			
L3 86.13-43.00	2439.43	8953.08	A	1	0.65	1	1	1	166.326	1407.45	32.63	C
			B	1	0.65	1	1	1	166.326			
			C	1	0.65	1	1	1	166.326			
L4 43.00-1.00	2070.60	12570.55	A	1	0.65	1	1	1	194.440	1366.99	32.55	C
			B	1	0.65	1	1	1	194.440			
			C	1	0.65	1	1	1	194.440			
Sum Weight:	8593.05	30640.15						OTM	423094.90 lb-ft	5193.77		

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Leg Weight	30640.15					
Bracing Weight	0.00					
Total Member Self-Weight	30640.15			2884.73	0.00	
Total Weight	45151.60			2884.73	0.00	

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Wind 0 deg - No Ice		0.00	-28514.07	-3261907.27	0.00	0.00
Wind 30 deg - No Ice		14257.04	-24693.91	-2824508.08	-1632396.00	5435.90
Wind 45 deg - No Ice		20162.49	-20162.49	-2305671.83	-2308556.56	7687.53
Wind 60 deg - No Ice		24693.91	-14257.04	-1629511.27	-2827392.81	9415.26
Wind 90 deg - No Ice		28514.07	0.00	2884.73	-3264792.00	10871.81
Wind 120 deg - No Ice		24693.91	14257.04	1635280.73	-2827392.81	9415.26
Wind 135 deg - No Ice		20162.49	20162.49	2311441.29	-2308556.56	7687.53
Wind 150 deg - No Ice		14257.04	24693.91	2830277.54	-1632396.00	5435.90
Wind 180 deg - No Ice		0.00	28514.07	3267676.73	0.00	0.00
Wind 210 deg - No Ice		-14257.04	24693.91	2830277.54	1632396.00	-5435.90
Wind 225 deg - No Ice		-20162.49	20162.49	2311441.29	2308556.56	-7687.53
Wind 240 deg - No Ice		-24693.91	14257.04	1635280.73	2827392.81	-9415.26
Wind 270 deg - No Ice		-28514.07	0.00	2884.73	3264792.00	-10871.81
Wind 300 deg - No Ice		-24693.91	-14257.04	-1629511.27	2827392.81	-9415.26
Wind 315 deg - No Ice		-20162.49	-20162.49	-2305671.83	2308556.56	-7687.53
Wind 330 deg - No Ice		-14257.04	-24693.91	-2824508.08	1632396.00	-5435.90
Member Ice	4469.95					
Total Weight Ice	52542.40			5049.60	0.00	
Wind 0 deg - Ice		0.00	-24211.22	-2854868.34	0.00	0.00
Wind 30 deg - Ice		12105.61	-20967.53	-2471711.98	-1429958.97	6122.26
Wind 45 deg - Ice		17119.92	-17119.92	-2017217.76	-2022267.37	8658.18
Wind 60 deg - Ice		20967.53	-12105.61	-1424909.37	-2476761.59	10604.06
Wind 90 deg - Ice		24211.22	0.00	5049.60	-2859917.94	12244.52
Wind 120 deg - Ice		20967.53	12105.61	1435008.58	-2476761.59	10604.06
Wind 135 deg - Ice		17119.92	17119.92	2027316.97	-2022267.37	8658.18
Wind 150 deg - Ice		12105.61	20967.53	2481811.19	-1429958.97	6122.26
Wind 180 deg - Ice		0.00	24211.22	2864967.55	0.00	0.00
Wind 210 deg - Ice		-12105.61	20967.53	2481811.19	1429958.97	-6122.26
Wind 225 deg - Ice		-17119.92	17119.92	2027316.97	2022267.37	-8658.18
Wind 240 deg - Ice		-20967.53	12105.61	1435008.58	2476761.59	-10604.06
Wind 270 deg - Ice		-24211.22	0.00	5049.60	2859917.94	-12244.52
Wind 300 deg - Ice		-20967.53	-12105.61	-1424909.37	2476761.59	-10604.06
Wind 315 deg - Ice		-17119.92	-17119.92	-2017217.76	2022267.37	-8658.18
Wind 330 deg - Ice		-12105.61	-20967.53	-2471711.98	1429958.97	-6122.26
Total Weight	45151.60			2884.73	0.00	
Wind 0 deg - Service		0.00	-9866.46	-1126801.08	0.00	0.00
Wind 30 deg - Service		4933.23	-8544.61	-975451.88	-564842.91	1880.94
Wind 45 deg - Service		6976.64	-6976.64	-795923.77	-798808.50	2660.04
Wind 60 deg - Service		8544.61	-4933.23	-561958.17	-978336.61	3257.88
Wind 90 deg - Service		9866.46	0.00	2884.73	-1129685.81	3761.87
Wind 120 deg - Service		8544.61	4933.23	567727.64	-978336.61	3257.88
Wind 135 deg - Service		6976.64	6976.64	801693.23	-798808.50	2660.04
Wind 150 deg - Service		4933.23	8544.61	981221.34	-564842.91	1880.94
Wind 180 deg - Service		0.00	9866.46	1132570.55	0.00	0.00
Wind 210 deg - Service		-4933.23	8544.61	981221.34	564842.91	-1880.94
Wind 225 deg - Service		-6976.64	6976.64	801693.23	798808.50	-2660.04
Wind 240 deg - Service		-8544.61	4933.23	567727.64	978336.61	-3257.88
Wind 270 deg - Service		-9866.46	0.00	2884.73	1129685.81	-3761.87
Wind 300 deg - Service		-8544.61	-4933.23	-561958.17	978336.61	-3257.88
Wind 315 deg - Service		-6976.64	-6976.64	-795923.77	798808.50	-2660.04
Wind 330 deg - Service		-4933.23	-8544.61	-975451.88	564842.91	-1880.94

Load Combinations

Comb. No.	Description

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
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 lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
L1	176.01 - 130.76	Pole	Max Tension	18	0.00	0.00	0.00
			Max. Compression	18	-12815.99	0.00	-364.43

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Mx	6	-8591.86	-373169.79	-312.00
			Max. My	10	-8590.46	0.00	-373383.27
			Max. Vy	6	15101.00	-373169.79	-312.00
			Max. Vx	10	15101.86	0.00	-373383.27
			Max. Torque	23			-1338.60
L2	130.76 - 86.13	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-22075.54	0.00	-3427.32
			Max. Mx	6	-16859.12	-1133940.54	-1932.35
			Max. My	10	-16857.96	0.00	-1135941.80
			Max. Vy	6	20064.70	-1133940.54	-1932.35
			Max. Vx	10	20065.82	0.00	-1135941.80
			Max. Torque	23			-9787.97
L3	86.13 - 43	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-34409.77	0.00	-5205.80
			Max. Mx	6	-28155.01	-2064857.49	-2948.65
			Max. My	10	-28154.42	0.00	-2067835.86
			Max. Vy	6	24513.80	-2064857.49	-2948.65
			Max. Vx	10	24514.66	0.00	-2067835.86
			Max. Torque	23			-12203.92
L4	43 - 1	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-52542.40	0.00	-5205.79
			Max. Mx	6	-45137.64	-3365615.31	-2966.36
			Max. My	10	-45137.63	0.00	-3368612.13
			Max. Vy	6	28536.16	-3365615.31	-2966.36
			Max. Vx	10	28536.18	0.00	-3368612.13
			Max. Torque	23			-12200.25

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	27	52542.40	0.00	-24211.23
	Max. H_x	14	45151.60	28514.07	-0.00
	Max. H_z	2	45151.60	0.00	28514.08
	Max. M_x	2	3362607.82	0.00	28514.08
	Max. M_z	6	3365615.32	-28514.07	-0.00
	Max. Torsion	31	12196.05	24211.23	0.00
	Min. Vert	1	45151.60	0.00	-0.00
	Min. H_x	6	45151.60	-28514.07	-0.00
	Min. H_z	10	45151.60	0.00	-28514.08
	Min. M_x	10	-3368612.13	0.00	-28514.08
	Min. M_z	14	-3365615.32	28514.07	-0.00
	Min. Torsion	23	-12196.05	-24211.23	0.00

Tower Mast Reaction Summary

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Dead Only	45151.60	0.00	0.00	2894.92	0.00	0.00
Dead+Wind 0 deg - No Ice	45151.60	0.00	-28514.08	-3362607.82	0.00	0.00
Dead+Wind 30 deg - No Ice	45151.60	14257.04	-24693.91	-2911715.52	-1682791.49	5409.28
Dead+Wind 45 deg - No Ice	45151.60	20162.49	-20162.49	-2376865.93	-2379830.74	7649.84
Dead+Wind 60 deg - No Ice	45151.60	24693.91	-14257.04	-1679833.54	-2914692.18	9369.06
Dead+Wind 90 deg - No Ice	45151.60	28514.07	0.00	2964.75	-3365615.32	10818.39
Dead+Wind 120 deg - No Ice	45151.60	24693.91	14257.04	1685781.75	-2914724.58	9368.95
Dead+Wind 135 deg - No Ice	45151.60	20162.49	20162.49	2382832.85	-2379868.14	7649.68
Dead+Wind 150 deg - No Ice	45151.60	14257.04	24693.91	2917701.14	-1682823.88	5409.11
Dead+Wind 180 deg - No Ice	45151.60	0.00	28514.08	3368612.13	0.00	0.00
Dead+Wind 210 deg - No Ice	45151.60	-14257.04	24693.91	2917701.14	1682823.88	-5409.11
Dead+Wind 225 deg - No Ice	45151.60	-20162.49	20162.49	2382832.85	2379868.14	-7649.68
Dead+Wind 240 deg - No Ice	45151.60	-24693.91	14257.04	1685781.75	2914724.58	-9368.95
Dead+Wind 270 deg - No Ice	45151.60	-28514.07	0.00	2964.75	3365615.32	-10818.39
Dead+Wind 300 deg - No Ice	45151.60	-24693.91	-14257.04	-1679833.54	2914692.18	-9369.06
Dead+Wind 315 deg - No Ice	45151.60	-20162.49	-20162.49	-2376865.93	2379830.74	-7649.84
Dead+Wind 330 deg - No Ice	45151.60	-14257.04	-24693.91	-2911715.52	1682791.49	-5409.28
Dead+Ice+Temp	52542.40	0.00	0.00	5205.79	0.00	0.00
Dead+Wind 0 deg+Ice+Temp	52542.40	0.00	-24211.23	-2969259.17	0.00	0.00
Dead+Wind 30 deg+Ice+Temp	52542.40	12105.61	-20967.54	-2570754.13	-1487266.21	6098.17
Dead+Wind 45 deg+Ice+Temp	52542.40	17119.92	-17119.92	-2098051.19	-2103317.63	8624.05
Dead+Wind 60 deg+Ice+Temp	52542.40	20967.54	-12105.61	-1482008.94	-2576036.39	10562.19
Dead+Wind 90 deg+Ice+Temp	52542.40	24211.23	-0.00	5266.30	-2974575.51	12196.05
Dead+Wind 120 deg+Ice+Temp	52542.40	20967.54	12105.61	1492566.49	-2576079.59	10561.99
Dead+Wind 135 deg+Ice+Temp	52542.40	17119.92	17119.92	2108633.68	-2103367.51	8623.77
Dead+Wind 150 deg+Ice+Temp	52542.40	12105.61	20967.54	2581361.56	-1487309.42	6097.88
Dead+Wind 180 deg+Ice+Temp	52542.40	0.00	24211.23	2979891.55	0.00	0.00
Dead+Wind 210 deg+Ice+Temp	52542.40	-12105.61	20967.54	2581361.56	1487309.42	-6097.88
Dead+Wind 225 deg+Ice+Temp	52542.40	-17119.92	17119.92	2108633.68	2103367.51	-8623.77
Dead+Wind 240 deg+Ice+Temp	52542.40	-20967.54	12105.61	1492566.49	2576079.59	-10561.99
Dead+Wind 270 deg+Ice+Temp	52542.40	-24211.23	-0.00	5266.30	2974575.51	-12196.05
Dead+Wind 300 deg+Ice+Temp	52542.40	-20967.54	-12105.61	-1482008.94	2576036.39	-10562.19
Dead+Wind 315 deg+Ice+Temp	52542.40	-17119.92	-17119.92	-2098051.19	2103317.63	-8624.05
Dead+Wind 330 deg+Ice+Temp	52542.40	-12105.61	-20967.54	-2570754.13	1487266.21	-6098.17
Dead+Wind 0 deg - Service	45151.60	0.00	-9866.46	-1162542.10	0.00	0.00
Dead+Wind 30 deg - Service	45151.60	4933.23	-8544.61	-1006388.40	-582775.83	1880.50
Dead+Wind 45 deg - Service	45151.60	6976.64	-6976.64	-821161.06	-824169.98	2659.42
Dead+Wind 60 deg - Service	45151.60	8544.61	-4933.23	-579767.74	-1009398.75	3257.10
Dead+Wind 90 deg - Service	45151.60	9866.46	0.00	3008.90	-1165555.52	3760.98
Dead+Wind 120 deg - Service	45151.60	8544.61	4933.23	585787.79	-1009402.64	3257.10
Dead+Wind 135 deg - Service	45151.60	6976.64	6976.64	827183.36	-824174.47	2659.40
Dead+Wind 150 deg - Service	45151.60	4933.23	8544.61	1012412.95	-582779.72	1880.47
Dead+Wind 180 deg - Service	45151.60	0.00	9866.46	1168568.88	0.00	0.00
Dead+Wind 210 deg - Service	45151.60	-4933.23	8544.61	1012412.95	582779.72	-1880.47
Dead+Wind 225 deg - Service	45151.60	-6976.64	6976.64	827183.36	824174.47	-2659.40
Dead+Wind 240 deg - Service	45151.60	-8544.61	4933.23	585787.79	1009402.64	-3257.10
Dead+Wind 270 deg - Service	45151.60	-9866.46	0.00	3008.90	1165555.52	-3760.98
Dead+Wind 300 deg - Service	45151.60	-8544.61	-4933.23	-579767.74	1009398.75	-3257.10
Dead+Wind 315 deg - Service	45151.60	-6976.64	-6976.64	-821161.06	824169.98	-2659.42
Dead+Wind 330 deg - Service	45151.60	-4933.23	-8544.61	-1006388.40	582775.83	-1880.50

Solution Summary

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
1	0.00	-45151.60	0.00	0.00	45151.60	-0.00	0.000%
2	0.00	-45151.60	-28514.07	0.00	45151.60	28514.08	0.000%
3	14257.04	-45151.60	-24693.91	-14257.04	45151.60	24693.91	0.000%
4	20162.49	-45151.60	-20162.49	-20162.49	45151.60	20162.49	0.000%
5	24693.91	-45151.60	-14257.04	-24693.91	45151.60	14257.04	0.000%
6	28514.07	-45151.60	0.00	-28514.07	45151.60	-0.00	0.000%
7	24693.91	-45151.60	14257.04	-24693.91	45151.60	-14257.04	0.000%
8	20162.49	-45151.60	20162.49	-20162.49	45151.60	-20162.49	0.000%
9	14257.04	-45151.60	24693.91	-14257.04	45151.60	-24693.91	0.000%
10	0.00	-45151.60	28514.07	0.00	45151.60	-28514.08	0.000%
11	-14257.04	-45151.60	24693.91	14257.04	45151.60	-24693.91	0.000%
12	-20162.49	-45151.60	20162.49	20162.49	45151.60	-20162.49	0.000%
13	-24693.91	-45151.60	14257.04	24693.91	45151.60	-14257.04	0.000%
14	-28514.07	-45151.60	0.00	28514.07	45151.60	-0.00	0.000%
15	-24693.91	-45151.60	-14257.04	24693.91	45151.60	14257.04	0.000%
16	-20162.49	-45151.60	-20162.49	20162.49	45151.60	20162.49	0.000%
17	-14257.04	-45151.60	-24693.91	14257.04	45151.60	24693.91	0.000%
18	0.00	-52542.40	0.00	0.00	52542.40	-0.00	0.000%
19	0.00	-52542.40	-24211.22	0.00	52542.40	24211.23	0.000%
20	12105.61	-52542.40	-20967.53	-12105.61	52542.40	20967.54	0.000%
21	17119.92	-52542.40	-17119.92	-17119.92	52542.40	17119.92	0.000%
22	20967.53	-52542.40	-12105.61	-20967.54	52542.40	12105.61	0.000%
23	24211.22	-52542.40	0.00	-24211.23	52542.40	0.00	0.000%
24	20967.53	-52542.40	12105.61	-20967.54	52542.40	-12105.61	0.000%
25	17119.92	-52542.40	17119.92	-17119.92	52542.40	-17119.92	0.000%
26	12105.61	-52542.40	20967.53	-12105.61	52542.40	-20967.54	0.000%
27	0.00	-52542.40	24211.22	0.00	52542.40	-24211.23	0.000%
28	-12105.61	-52542.40	20967.53	12105.61	52542.40	-20967.54	0.000%
29	-17119.92	-52542.40	17119.92	17119.92	52542.40	-17119.92	0.000%
30	-20967.53	-52542.40	12105.61	20967.54	52542.40	-12105.61	0.000%
31	-24211.22	-52542.40	0.00	24211.23	52542.40	0.00	0.000%
32	-20967.53	-52542.40	-12105.61	20967.54	52542.40	12105.61	0.000%
33	-17119.92	-52542.40	-17119.92	17119.92	52542.40	17119.92	0.000%
34	-12105.61	-52542.40	-20967.53	12105.61	52542.40	20967.54	0.000%
35	0.00	-45151.60	-9866.46	0.00	45151.60	9866.46	0.000%
36	4933.23	-45151.60	-8544.61	-4933.23	45151.60	8544.61	0.000%
37	6976.64	-45151.60	-6976.64	-6976.64	45151.60	6976.64	0.000%
38	8544.61	-45151.60	-4933.23	-8544.61	45151.60	4933.23	0.000%
39	9866.46	-45151.60	0.00	-9866.46	45151.60	-0.00	0.000%
40	8544.61	-45151.60	4933.23	-8544.61	45151.60	-4933.23	0.000%
41	6976.64	-45151.60	6976.64	-6976.64	45151.60	-6976.64	0.000%
42	4933.23	-45151.60	8544.61	-4933.23	45151.60	-8544.61	0.000%
43	0.00	-45151.60	9866.46	0.00	45151.60	-9866.46	0.000%
44	-4933.23	-45151.60	8544.61	4933.23	45151.60	-8544.61	0.000%
45	-6976.64	-45151.60	6976.64	6976.64	45151.60	-6976.64	0.000%
46	-8544.61	-45151.60	4933.23	8544.61	45151.60	-4933.23	0.000%
47	-9866.46	-45151.60	0.00	9866.46	45151.60	-0.00	0.000%
48	-8544.61	-45151.60	-4933.23	8544.61	45151.60	4933.23	0.000%
49	-6976.64	-45151.60	-6976.64	6976.64	45151.60	6976.64	0.000%
50	-4933.23	-45151.60	-8544.61	4933.23	45151.60	8544.61	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	0.00011101
3	Yes	5	0.00000001	0.00030514
4	Yes	5	0.00000001	0.00032118
5	Yes	5	0.00000001	0.00025361
6	Yes	5	0.00000001	0.00008063
7	Yes	5	0.00000001	0.00032625
8	Yes	5	0.00000001	0.00032255
9	Yes	5	0.00000001	0.00026452
10	Yes	4	0.00000001	0.00011132
11	Yes	5	0.00000001	0.00026452
12	Yes	5	0.00000001	0.00032255
13	Yes	5	0.00000001	0.00032625
14	Yes	5	0.00000001	0.00008063
15	Yes	5	0.00000001	0.00025361
16	Yes	5	0.00000001	0.00032118
17	Yes	5	0.00000001	0.00030514
18	Yes	4	0.00000001	0.00000958
19	Yes	5	0.00000001	0.00016859
20	Yes	5	0.00000001	0.00058924
21	Yes	5	0.00000001	0.00063377
22	Yes	5	0.00000001	0.00051403
23	Yes	5	0.00000001	0.00023891
24	Yes	5	0.00000001	0.00062829
25	Yes	5	0.00000001	0.00063859
26	Yes	5	0.00000001	0.00052888
27	Yes	5	0.00000001	0.00016925
28	Yes	5	0.00000001	0.00052888
29	Yes	5	0.00000001	0.00063859
30	Yes	5	0.00000001	0.00062829
31	Yes	5	0.00000001	0.00023891
32	Yes	5	0.00000001	0.00051403
33	Yes	5	0.00000001	0.00063377
34	Yes	5	0.00000001	0.00058924
35	Yes	4	0.00000001	0.00004092
36	Yes	4	0.00000001	0.00056637
37	Yes	4	0.00000001	0.00058888
38	Yes	4	0.00000001	0.00041978
39	Yes	4	0.00000001	0.00034702
40	Yes	4	0.00000001	0.00066610
41	Yes	4	0.00000001	0.00059704
42	Yes	4	0.00000001	0.00042221
43	Yes	4	0.00000001	0.00004126
44	Yes	4	0.00000001	0.00042221
45	Yes	4	0.00000001	0.00059704
46	Yes	4	0.00000001	0.00066610
47	Yes	4	0.00000001	0.00034702
48	Yes	4	0.00000001	0.00041978
49	Yes	4	0.00000001	0.00058888
50	Yes	4	0.00000001	0.00056637

Maximum Tower Deflections - Service Wind

Section No.	*Elevation*	*Horz. Deflection*	*Gov. Load Comb.*	*Tilt*	*Twist*
	ft	*in*		°	°
L1	176.01 - 130.76	32.720	43	1.6932	0.0134
L2	135.26 - 86.13	18.966	43	1.4370	0.0099
L3	91.88 - 43	8.200	43	0.8930	0.0057
L4	50 - 1	2.297	43	0.4308	0.0023

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
176.00	12' Low Profile Platform	43	32.716	1.6932	0.0134	38540
168.00	5'3"x4" Pipe Mount	43	29.883	1.6548	0.0127	24057
160.00	10' Low Profile Platform	43	27.082	1.6136	0.0121	12036
150.00	Low Profile Platform	43	23.675	1.5536	0.0112	7408
130.00	2 Bay Dipole	43	17.407	1.3846	0.0094	4735
100.00	6' Side Mount Standoff	43	9.855	1.0058	0.0065	4780
75.00	Side Mount Standoff	43	5.290	0.6687	0.0041	4774
60.00	Side Mount Standoff	43	3.305	0.5060	0.0028	4758

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	176.01 - 130.76	94.121	10	4.8707	0.0456
L2	135.26 - 86.13	54.582	10	4.1353	0.0329
L3	91.88 - 43	23.615	10	2.5710	0.0189
L4	50 - 1	6.620	10	1.2410	0.0073

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
176.00	12' Low Profile Platform	10	94.111	4.8706	0.0456	13564
168.00	5'3"x4" Pipe Mount	10	85.968	4.7627	0.0431	8466
160.00	10' Low Profile Platform	10	77.917	4.6460	0.0407	4234
150.00	Low Profile Platform	10	68.121	4.4744	0.0375	2604
130.00	2 Bay Dipole	10	50.100	3.9813	0.0312	1661
100.00	6' Side Mount Standoff	10	28.376	2.8846	0.0215	1670
75.00	Side Mount Standoff	10	15.238	1.9658	0.0136	1663
60.00	Side Mount Standoff	10	9.523	1.5019	0.0095	1655

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 lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
L1	176.01 - 130.76 (1)	TP31.8x21x0.25	45.25	175.01	194.1	3.963	24.1827	-11934.50	95838.30	0.125
L2	130.76 - 86.13 (2)	TP41.82x30.226x0.3125	49.13	175.01	147.3	6.879	39.8244	-16858.00	273938.00	0.062
L3	86.13 - 43 (3)	TP51.36x39.8381x0.375	48.88	175.01	119.9	10.386	58.7209	-28154.40	609849.00	0.046
L4	43 - 1 (4)	TP60.5x48.96x0.4375	49.00	175.01	98.5	15.393	83.4043	-45137.60	1283850.00	0.035

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	176.01 - 130.76 (1)	TP31.8x21x0.25	353891.67	23.360	39.000	0.599	0.00	0.000	39.000	0.000
L2	130.76 - 86.13 (2)	TP41.82x30.226x0.3125	1135941.67	34.545	39.000	0.886	0.00	0.000	39.000	0.000
L3	86.13 - 43 (3)	TP51.36x39.8381x0.375	2067833.33	34.703	39.000	0.890	0.00	0.000	39.000	0.000
L4	43 - 1 (4)	TP60.5x48.96x0.4375	3368608.33	32.683	39.000	0.838	0.00	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V lb	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T lb-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	176.01 - 130.76 (1)	TP31.8x21x0.25	13691.60	0.566	26.000	0.044	0.00	0.000	26.000	0.000
L2	130.76 - 86.13 (2)	TP41.82x30.226x0.3125	20065.80	0.504	26.000	0.039	0.00	0.000	26.000	0.000
L3	86.13 - 43 (3)	TP51.36x39.8381x0.375	24514.70	0.417	26.000	0.032	0.00	0.000	26.000	0.000
L4	43 - 1 (4)	TP60.5x48.96x0.4375	28536.20	0.342	26.000	0.026	0.00	0.000	26.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	176.01 - 130.76 (1)	0.125	0.599	0.000	0.044	0.000	0.724 ✓	1.333	H1-3+VT ✓
L2	130.76 - 86.13 (2)	0.062	0.886	0.000	0.039	0.000	0.948 ✓	1.333	H1-3+VT ✓
L3	86.13 - 43 (3)	0.046	0.890	0.000	0.032	0.000	0.936 ✓	1.333	H1-3+VT ✓

ERITower	Job	Page
	176' EEI Monopole, Berlin, CT	20 of 20
URS Corporation 500 Enterprise Dr, Suite 3B Rocky Hill, CT 06067 Phone: (860) 529-8882 FAX: (860) 529-5566	**Project** T-Mobile Site No: CTHA231A	**Date** 10:24:20 09/29/05
	Client T-Mobile	**Designed by** Jed Kiernan

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L4	43 - 1 (4)	0.035	0.838	0.000	0.026	0.000	0.873 ✔	1.333	H1-3+VT ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
L1	176.01 - 130.76	Pole	TP31.8x21x0.25	1	-11934.50	127752.44	54.3	Pass
L2	130.76 - 86.13	Pole	TP41.82x30.226x0.3125	2	-16858.00	365159.34	71.1	Pass
L3	86.13 - 43	Pole	TP51.36x39.8381x0.375	3	-28154.40	812928.68	70.2	Pass
L4	43 - 1	Pole	TP60.5x48.96x0.4375	4	-45137.60	1711371.98	65.5	Pass
							Summary	
						Pole (L2)	71.1	Pass
						RATING =	**71.1**	**Pass**

Program Version 3.0.0.17 - 7/15/2004 File:P:/034/F08/ERI Files/176'.EEI.monopole.eri

ANCHOR BOLT AND BASE PLATE ANALYSIS

ANCHOR BOLT AND BASE PLATE ANALYSIS

Input Data

Tower Reactions:

Overturning Moment:	$OM := 4306.5 \cdot ft \cdot kips$	*user input*	
Shear Force:	$Shear := 34.94 \cdot kips$	*user input*	Original Design Loads - Conservative
Axial Force:	$Axial := 49.6 \cdot kips$	*user input*	

Anchor Bolt Data:

Use ASTM 615 Grade 75

Number of Anchor Bolts = N	$N := 18$	*user input*
Diameter of Bolt Circle:	$D_{bc} := 70in$	*user input*
Bolt "Column" Distance:	$l := 3in$	*user input*
Bolt Ultimate Strength:	$F_u := 100 \cdot ksi$	*user input*
Bolt Yield Strength:	$Fy := 75 \cdot ksi$	*user input*
Bolt Modulus:	$E := 29000 \cdot ksi$	*user input*
Thickness Of Anchor Bolts	$D := 2.25in$	*user input*
Threads per Inch:	$n := 4.5$	*user input*

Base Plate Data:

Plate Yield Strength:	$Fy_{bp} := 60 \cdot ksi$	*user input*
Base Plate Thickness:	$PlateThickness := 2 \cdot in$	*user input*
Base Plate Diameter:	$D_{bp} := 76 \cdot in$	*user input*
Outer Pole Diameter:	$D_{pole} := 60.5in$	*user input*

Geometric Layout Data:

Distance from the center of gravity of the group to bolt in question = d(i)

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

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

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

$d_1 = 11.97\,in$ $d_7 = 22.50\,in$

$d_2 = 22.50\,in$ $d_8 = 11.97\,in$

$d_3 = 30.31\,in$ $d_9 = 0.00\,in$

$d_4 = 34.47\,in$ $d_{10} = -11.97\,in$

$d_5 = 34.47\,in$ $d_{11} = -22.50\,in$

$d_6 = 30.31\,in$ etc.

Critical Distances For Bending in Plate:

Outer Pole Radius: $R_{pole} := \frac{D_{pole}}{2}$ $R_{pole} = 30.25\,in$

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

$MA_1 = 0.00\,in$ $MA_7 = 0.00\,in$

$MA_2 = 0.00\,in$ $MA_8 = 0.00\,in$

$MA_3 = 0.06\,in$ $MA_9 = 0.00\,in$

$MA_4 = 4.22\,in$ $MA_{10} = 0.00\,in$

$MA_5 = 4.22\,in$ $MA_{11} = 0.00\,in$

$MA_6 = 0.06\,in$ etc.

Effective Width of Baseplate for Bending: $EffectiveWidth := 2 \cdot \sqrt{\left(\frac{D_{bp}}{2}\right)^2 - \left(\frac{D_{pole}}{2}\right)^2}$ $EffectiveWidth = 46.00\,in$

Anchor Bolt Analysis:

Polar Moment of Inertia I_p:

$$I_p := \sum_i \left(d_i\right)^2 \qquad I_p = 1.103 \times 10^4\,in^2$$

Gross Area of Bolt:

$$A_g := \frac{\pi}{4}\cdot D^2 \qquad A_g = 3.976\,in^2$$

Net Area of Bolt:

$$A_n := \frac{\pi}{4}\cdot\left(D - \frac{0.9743\cdot in}{n}\right)^2 \qquad A_n = 3.248\,in^2$$

Net Diameter:

$$D_n := \frac{2\cdot\sqrt{A_n}}{\sqrt{\pi}} \qquad D_n = 2.03\,in$$

Radius of Gyration of Bolt:

$$r := \frac{D_n}{4} \qquad r = 0.51\,in$$

Section Modulus of Bolt:

$$S_x := \frac{\pi\cdot D_n^{\,3}}{32} \qquad S_x = 0.826\,in^3$$

Anchor Bolt Bending Stress:

Maximum Applied Bending:

$$M_x := \left(\frac{Shear}{N}\right)\cdot l \qquad M_x = 0.485\,ft\cdot kips$$

$$f_{bx} := \frac{M_x}{S_x} \qquad f_{bx} = 7.1\,ksi$$

Allowable Bending

$$F_{bx} := 1.33\cdot 0.60\cdot Fy \qquad F_{bx} = 59.8\,ksi$$

Note: 1.33 increase allowed per TIA/EIA

Check Tensile Forces:

Allowable Tensile Force:

$AllowableTension := 1.33 \cdot (0.33 \cdot A_g \cdot F_u)$ AllowableTension = 174.5 kips

Note: 1.33 increase allowed per TIA/EIA

Applied Tension:

$MaxTension := \frac{OM \cdot R_{bc}}{I_p} - \frac{Axial}{N}$ MaxTension = 161.3 kips

Check Stresses:

$$\frac{MaxTension}{AllowableTension} = 0.92$$

$$Condition := if\left(\frac{MaxTension}{AllowableTension} \le 1.00, "OK", "Overstressed"\right)$$

Condition = "OK"

Check Compression & Combined Stresses (if required):

Check to see if a complete combined stress analysis is required:

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."

Set the clear space between the plate and bolt to zero and remove bending stresses if a combined stress analysis is not required:

$$l := \begin{cases} l & \text{if } l > 2 \cdot D_n \\ 0.00\,\text{in} & \text{otherwise} \end{cases} \qquad l = 0.00\,\text{in}$$

$$f_{bx} := \begin{cases} f_{bx} & \text{if } l > 2 \cdot D_n \\ 0.0\,\text{ksi} & \text{otherwise} \end{cases} \qquad f_{bx} = 0.0\,\text{ksi}$$

Allowable Compressive Force:

$$K := 0.65$$

$$C_c := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{Fy}} \qquad C_c = 87.36$$

$$F_a := \begin{cases} \dfrac{\left[1 - \dfrac{\left(\frac{K \cdot l}{r}\right)^2}{2 \cdot C_c^{\,2}}\right] \cdot Fy}{\frac{5}{3} + \dfrac{3 \cdot \left(\frac{K \cdot l}{r}\right)}{8 \cdot C_c} - \dfrac{\left(\frac{K \cdot l}{r}\right)^3}{8 \cdot C_c^{\,3}}} & \text{if } \dfrac{K \cdot l}{r} \le C_c \\ \dfrac{12 \cdot \pi^2 \cdot E}{23 \cdot \left(\frac{K \cdot l}{r}\right)^2} & \text{if } \dfrac{K \cdot l}{r} > C_c \end{cases} \qquad F_a = 45.0\,\text{ksi}$$

$$F_a := 1.33 \cdot F_a \quad \text{Note: 1.33 increase allowed per TIA/EIA} \qquad F_a = 59.9\,\text{ksi}$$

Applied Compressive Force:

$$\text{MaxCompression} := \frac{OM \cdot R_{bc}}{I_p} + \frac{\text{Axial}}{N} \qquad \text{MaxCompression} = 166.8\,\text{kips}$$

$$f_a := \frac{\text{MaxCompression}}{A_n} \qquad f_a = 51.4\,\text{ksi}$$

Check Combined Stresses:

$$\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} = 0.86$$

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

Base Plate Analysis:

Force from Bolt(s):

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

$C_1 = 58.9\,kips$ $C_7 = 108.2\,kips$

$C_2 = 108.2\,kips$ $C_8 = 58.9\,kips$

$C_3 = 144.8\,kips$ $C_9 = 2.8\,kips$

$C_4 = 164.3\,kips$ $C_{10} = -53.4\,kips$

$C_5 = 164.3\,kips$ $C_{11} = -102.7\,kips$

$C_6 = 144.8\,kips$ etc.

Bending Stress in Plate:

$$f_{bp} := \sum_i \frac{6 \cdot C_i \cdot MA_i}{EffectiveWidth \cdot PlateThickness^2} \qquad f_{bp} = 45.8\,ksi$$

Check Stresses:

$$\frac{f_{bp}}{1.33 \cdot 0.75 Fy_{bp}} = 0.76$$

$$Condition := if\left(\frac{f_{bp}}{1.33 \cdot 0.75 Fy_{bp}} < 1.00, "OK", "Overstressed"\right)$$

Condition = "OK"

Exhibit 3

T-Mobile USA Inc.
100 Filley St, Bloomfield, CT 06002-1853
Phone: (860) 692-7100
Fax: (860) 692-7159

Technical Memo

To: Karina Fournier
From: Marlon DePaz - Radio Frequency Engineer
cc: Jason Overbey
Subject: Power Density Report for CTHA231A
Date: October 28, 2005

1. Introduction:

This report is the result of an Electromagnetic Field Intensities (EMF - Power Densities) study for the T-Mobile PCS antenna installation on a Monopole at 1657 Berlin Tpke, Berlin, CT. This study incorporates the most conservative consideration for determining the practical combined worst case power density levels that would be theoretically encountered from locations surrounding the transmitting location.

2. Discussion:

The following assumptions were used in the calculations:

1) The emissions from T-Mobile transmitters are in the 1935-1945 MHz frequency band.
2) The antenna array consists of three sectors, with 3 antennas per sector.
3) The model number for each antenna is EMS RR90-17-02DP.
4) The antenna center line height is 160 ft.
5) The maximum transmit power from any sector is 2108.86 Watts Effective Radiated Power (EiRP) assuming 8 channels per sector.
6) All the antennas are simultaneously transmitting and receiving, 24 hours a day.
7) Power levels emitting from the antennas are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.
8) The average ground level of the studied area does not change significantly with respect to the transmitting location

Equations given in "FCC OET Bulletin 65, Edition 97-01" were then used with the above information to perform the calculations.

3. Conclusion:

Based on the above worst case assumptions, the power density calculation from the T-Mobile PCS antenna installation on a Monopole at 1657 Berlin Tpke, Berlin, CT, is 0.01951 mW/cm^2. This value represents 1.951% of the Maximum Permissible Emission (MPE) standard of 1 milliwatt per square centimeter (mW/cm^2) set forth in the FCC/ANSI/IEEE C95.1-1991. Furthermore, the proposed antenna location for T-Mobile will not interfere with existing public safety communications, AM or FM radio broadcasts, TV, Police Communications, HAM Radio communications or any other signals in the area.
The combined Power Density from other carriers is 1.8394%. The combined Power Density for the site is 3.79% of the M.P.E. standard.

New England Market
Connecticut
Worst Case Power Density

Site:	**CTHA231A**
Site Address:	**1657 Berlin Tpke**
Town:	**Berlin**
Tower Height:	**180 ft.**
Tower Style:	**Monopole**
Base Station TX output	28 W
Number of channels	8
Antenna Model	EMS RR90-17-02DP
Cable Size	1 5/8 in.
Cable Length	195 ft.
Antenna Height	160.0 ft.
Ground Reflection	1.6
Frequency	1935.0 MHz
Jumper & Connector loss	4.50 dB
Antenna Gain	16.5 dBi
Cable Loss per foot	0.0116 dB
Total Cable Loss	2.2620 dB
Total Attenuation	6.7620 dB
Total EIRP per Channel	54.21 dBm
(In Watts)	263.61 W
Total EIRP per Sector	63.24 dBm
(In Watts)	2108.86 W
nsg	9.7380
Power Density (S) =	**0.019509 mW/cm^2**
T-Mobile Worst Case % MPE =	**1.9509%**

Equation Used :

$$S = \frac{(1000)(grf)^2 (Power) * 10^{(nsg/10)}}{4\pi (R)^2}$$

Office of Engineering and Technology (OET) Bulletin 65, Edition 97-01, August 1997

Co-Location Total

Carrier	% of Standard
Combined all 12 antenna systems including AT&T Wireless, Sprint	1.8394 %
Total Excluding T-Mobile	**1.8394 %**
T-Mobile	1.9509
Total % MPE for Site	**3.7903%**