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ORIGINAL

EM-T-MOBILE-034-081114

35 Griffin Road South
Bloomfield, CT 06002
860-796-3988

November 12, 2008

Daniel Caruso, Chairman and
Members of the Siting Council
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

RE: **Notice of Exempt Modification to an existing lattice tower located at 303 Boxwood Lane, Danbury, Connecticut**

<u>Latitude: 41 23 41.93 / Longitude:73 29 12.27</u>

Dear Mr. Caruso and Members of the Siting Council:

Pursuant to Connecticut Agencies Regs § 16-50j-73 and 16-50j-72(b), Omnipoint Communications, Inc. a.k.a. T-Mobile ("T-Mobile") hereby gives notice to the Connecticut Siting Council ("Council") and the City of Danbury, of T-Mobile's intent to make an exempt modification to an existing lattice tower ("Tower") located on the campus of Western Connecticut State University at 303 Boxwood Lane in Danbury, Connecticut. T-Mobile plans to install three (3) panel antennas and associated ground equipment.

Under the Council's regulations (Conn. Agencies Regs. Sec 16-50j-72(b)), T-Mobile's plans do not constitute a modification subject to the Council's review because T-Mobile will not change the height of the Tower, will not extend the boundaries of the compound, will not increase the noise levels at the site, and will not increase the total radio frequency electromagnetic radiation power density at the site to levels above applicable standards.

Tower

The Facility consists of a one hundred foot (100') foot high lattice tower located on the campus of Western Connecticut State University at 303 Boxwood Lane, Danbury, Connecticut. The Tower is owned by Western Connecticut State University, which has also located antennas on the Tower. Sprint has also located antennas on the Tower. T-Mobile proposes to install three (3) antennas the on the Tower at a centerline of Eighty

Three feet (83') The equipment cabinets will be located on a ten foot (10') by twenty foot (20') concrete pad located within the existing compound at the base of the Tower. T-Mobile will also install a global positioning antenna (GPS) on the proposed ice bridge.

The enclosed plans prepared by Maxton, including a site plan and Tower section of the existing Tower and proposed Facility are annexed hereto as Exhibit 1. The installation will have virtually no additional impact on the area beyond that which the current Tower imposes.

Structural Analysis

A structural analysis of the Tower was prepared by Natcomm Engineering and is attached hereto as Exhibit 2. The report indicates that the Tower, at present, is not adequate to support the proposed modifications. The Report does recommend certain modifications to the Tower which would eliminate the overstress created by the proposed installation. T-Mobile shall proceed with modification "Option 2" for the Tower Steel and shall implement the proposed foundation modifications (See Section 1-6 of the Structural Report)

Need for the Facility

T-Mobile's antennas will be used to fill existing gaps in coverage in parts of Danbury. T-Mobile has a need for the facility and the proposed antennas installed at a centerline height of Eighty Three feet (83') feet will satisfy the need for coverage in this area.

The addition of the proposed antennas will not adversely impact the health and safety of the surrounding community or the people working on the Tower. The total radio frequency exposure measured around the tower will be well below the National Council on Radiation Protection and Measurements' ("NCRP") standard adopted by the Federal Communications Commission ("FCC"). The "worst case" exposure calculated for the operation of this facility for the proposed antennas would be approximately 8.5127% of the NCRP's standard for maximum permissible exposure. A cumulative power density analysis indicates that together, all of the antennas on the tower will emit only 28.286% of the NCRP's standard for maximum possible exposure (See Exhibit 3 attached hereto). Therefore, the power density levels will be well below the FCC mandated radio frequency exposure limits in all locations around the Tower, even with extremely conservative assumptions.

Conclusion

T-Mobile respectfully submits that the project presents the opportunity to install antennas on the existing Tower, thereby avoiding the unnecessary proliferation of new towers in the area. T-Mobile's proposal does not constitute a modification subject to the Council's jurisdiction because T-Mobile will not increase the height of the Tower, will not extend the boundaries of the site, will not increase the noise levels at the site, and the total radio frequency electromagnetic radiation power density will stay within all applicable standards.

Respectfully submitted,
T-Mobile

By______________________
Raymond J. Lemley, consultant
Ray@iwsllc.net
203-499-8631

cc: Danbury Mayor, Honorable Mark D. Boughton
Danbury Planning and Zoning Director, Mr. Dennis I. Elpern

WCSU
303 BOXWOOD LANE
DANBURY, CT 06810
SITE NO.: CTFF703A
SITE TYPE: LATTICE TOWER

T-MOBILE TECHNICIAN SITE SAFETY NOTES

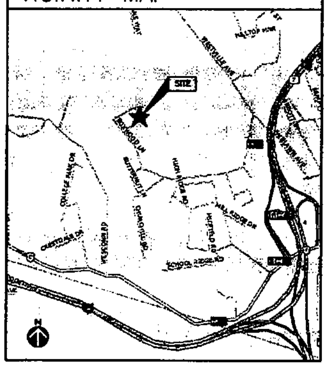
LOCATION	SPECIAL RESTRICTIONS
SECTOR A:	ACCESS NOT PERMITED
SECTOR B:	ACCESS NOT PERMITED
SECTOR C:	ACCESS NOT PERMITED
GPS/LMU:	UNRESTRICTED
RADIO CABINETS:	UNRESTRICTED
PPC DISCONNECT:	UNRESTRICTED
MAIN CIRCUIT D/C:	UNRESTRICTED
NIU/T-1 DEMARC:	UNRESTRICTED
OTHER / SPECIAL:	UNRESTRICTED

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 PROJECT OWNER'S 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 FROM THE PROJECT OWNER'S REPRESENTATIVE 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 PROJECT OWNER'S 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 PROJECT OWNER'S 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



DO NOT SCALE DRAWINGS

CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE PROJECT OWNER'S 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	0
A-1	PLAN & NOTES	0
A-2	ELEVATION & DETAILS	0
A-3	CONSTRUCTION DETAILS	0
E-1	POWER RISER, LAYOUT & NOTES	0
E-2	GROUNDING RISER DIAGRAM & DETAILS	0

PROJECT SUMMARY

SITE NUMBER:	CTFF703A
SITE NAME:	WCSU
SITE ADDRESS:	303 BOXWOOD LANE DANBURY, CT 06810
SITE TYPE:	LATTICE TOWER
PROPERTY OWNER:	WESTERN CONNECTICUT STATE UNIVERSITY 303 BOXWOOD LANE DANBURY, CT 06811
APPLICANT:	OMNIPOINT COMMUNICATIONS INC. 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002

OMNIPOINT COMMUNICATIONS INC.

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OF T-MOBILE USA, INC.
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PHONE: (508) 934-6303
FAX: (508) 934-6305

STATE OF CONNECTICUT · GORDON E. GOVALET · No. 16430 · LICENSED · PROFESSIONAL ENGINEER

11/11/08

APPROVALS

LANDLORD ______

LEASING ______

R.F. ______

ZONING ______

CONSTRUCTION ______

A/E ______

PROJECT NO:	2806.122
DRAWN BY:	JT
CHECKED BY:	RS

SUBMITTALS

0	11/11/08	FOR CONSTRUCTION
B	11/07/08	PER COMMENTS
A	11/06/08	ISSUED FOR REVIEW

SITE
CTFF703A
WCSU

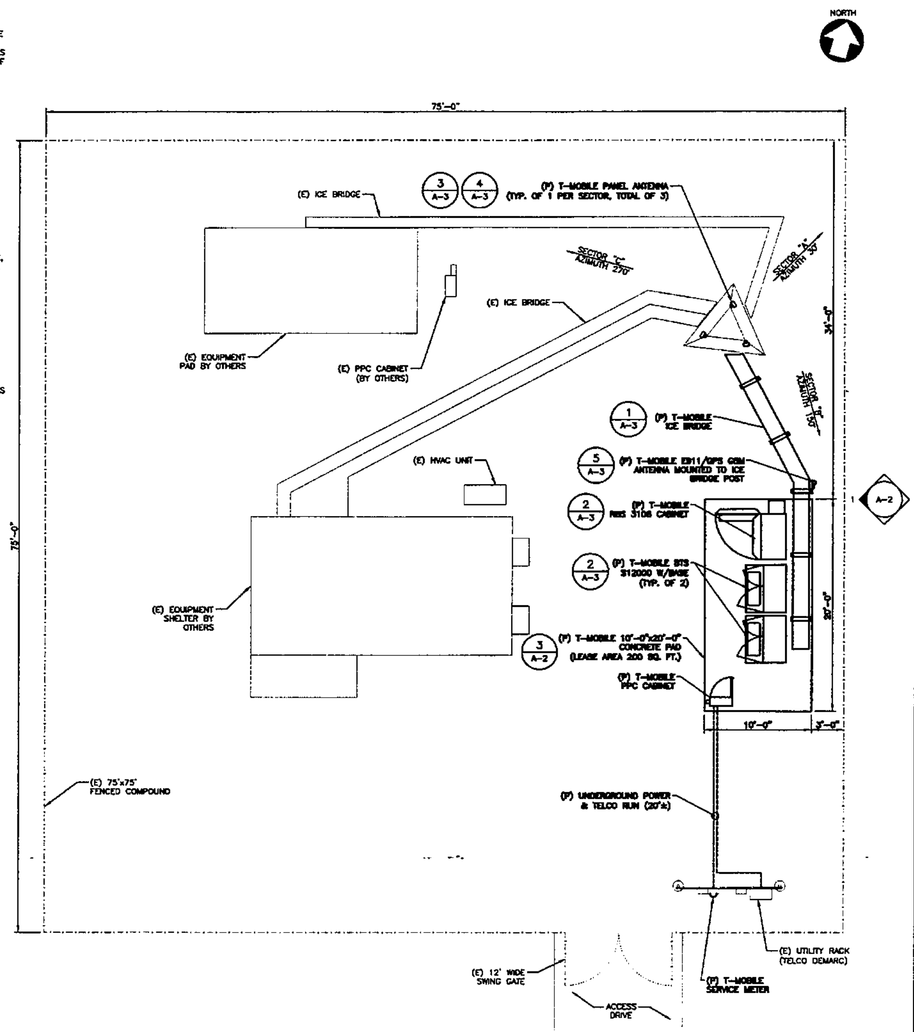
303 BOXWOOD LANE
DANBURY, CT 06810

SHEET TITLE
TITLE SHEET

SHEET NUMBER
T-1

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 PROJECT OWNER PRIOR TO CONSTRUCTION.
3. NORTH ARROW SHOWN ON PLANS REFERS TO APPROXIMATE TRUE NORTH. CONTRACTOR SHALL RETAIN THE SERVICES OF A PROFESSIONAL SURVEYOR TO VERIFY TRUE NORTH AND PROVIDE AS-BUILT ANTENNA AZIMUTH, ANTENNA MECHANICAL DOWN-TILT AND ANTENNA RADIATION CENTER HEIGHT (AGL) CERTIFICATIONS FOR ANTENNA AZIMUTHS MUST BE WITHIN 3 DEGREES OF THE SPECIFIED SECTOR ORIENTATION ON THE RF BUILD SHEET.
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 PROJECT OWNER AND IS NOT INCLUDED IN THESE CONSTRUCTION DOCUMENTS. A SCHEDULE OF PROJECT OWNER SUPPLIED MATERIALS IS ATTACHED TO THE BID DOCUMENTS (SEE EXHIBIT 3). ALL OTHER HARDWARE TO BE PROVIDED BY THE CONTRACTOR. CONNECTION HARDWARE SHALL BE STAINLESS STEEL.
7. WHEN "PAINT TO MATCH" IS SPECIFIED FOR ANTENNA CONCEALMENT, PAINT PRODUCT FOR ANTENNA RADOME SHALL BE SHERWIN WILLIAMS COROTHANE II. SURFACE PREPARATION AND APPLICATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND PROJECT OWNER'S GUIDELINE'S.
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. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
10. 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.
11. ALL (E) INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF UTILITY COMPANY ENGINEERING.
12. 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 UNLESS OTHERWISE NOTED.
13. THE CONTRACTOR SHALL ESTABLISH AND MAINTAIN SOIL EROSION AND SEDIMENTATION CONTROLS AT ALL TIMES DURING CONSTRUCTION.
14. PER FCC MANDATE, ENHANCED EMERGENCY (E911) SERVICE IS REQUIRED TO MEET NATIONWIDE STANDARDS FOR WIRELESS COMMUNICATIONS SYSTEMS. PROJECT OWNER'S IMPLEMENTATION REQUIRES DEPLOYMENT OF EQUIPMENT AND ANTENNAS GENERALLY DEPICTED ON THIS PLAN, ATTACHED TO OR MOUNTED IN CLOSE PROXIMITY TO THE BTS RADIO CABINETS. PROJECT OWNER RESERVES THE RIGHT TO MAKE REASONABLE MODIFICATIONS TO E911 EQUIPMENT AND LOCATION AS TECHNOLOGY EVOLVES TO MEET REQUIRED SPECIFICATIONS.



SITE PLAN

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

(1)

(E)-EXISTING
(F)-FUTURE
(P)-PROPOSED

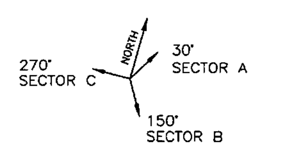
ABBREVIATIONS

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

SYMBOLS AND MATERIALS

NEW ANTENNA	GROUT OR PLASTER
EXISTING ANTENNAS	GWB
ASPHALT	(E)CONSTRUCTION
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
DETAIL REFERENCE (DET# / SH#)	PROPERTY LINE
	STEPPED FOOTING
ELEVATION (SH / D)	MATCH LINE
	WORK POINT
	GROUND WIRE
SECTIONS & DETAILS (DET# / SH#)	COAXIAL CABLE
	CHAIN LINK FENCE
WORK ITEM NOTE	WATER MAIN

ANTENNA ORIENTATION KEY



OMNIPOINT COMMUNICATIONS INC.

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PHONE: (508) 938-6303

STATE OF CONNECTICUT
GORDON E. GOVALET
No. 18430
LICENSED
PROFESSIONAL ENGINEER
11/11/08

APPROVALS

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

PROJECT NO: 2806.122

DRAWN BY: JT

CHECKED BY: RP

SUBMITTALS

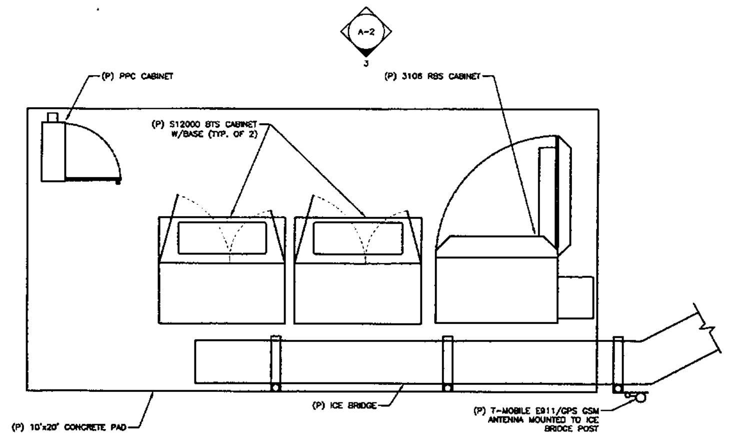
0	11/11/08	FOR CONSTRUCTION
B	11/07/08	PER COMMENTS
A	11/06/08	ISSUED FOR REVIEW

IF THIS DRAWING IS NOT 24"X36", IT IS NOT TO SCALE.

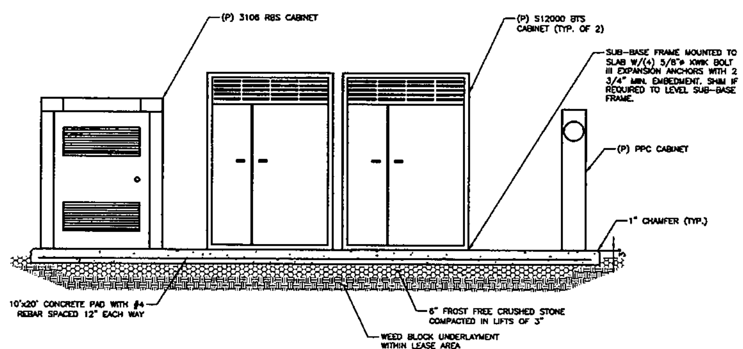
SITE
CTFF703A
WCSU
303 BOXWOOD LANE
DANBURY, CT 06810

SHEET TITLE
PLAN & NOTES

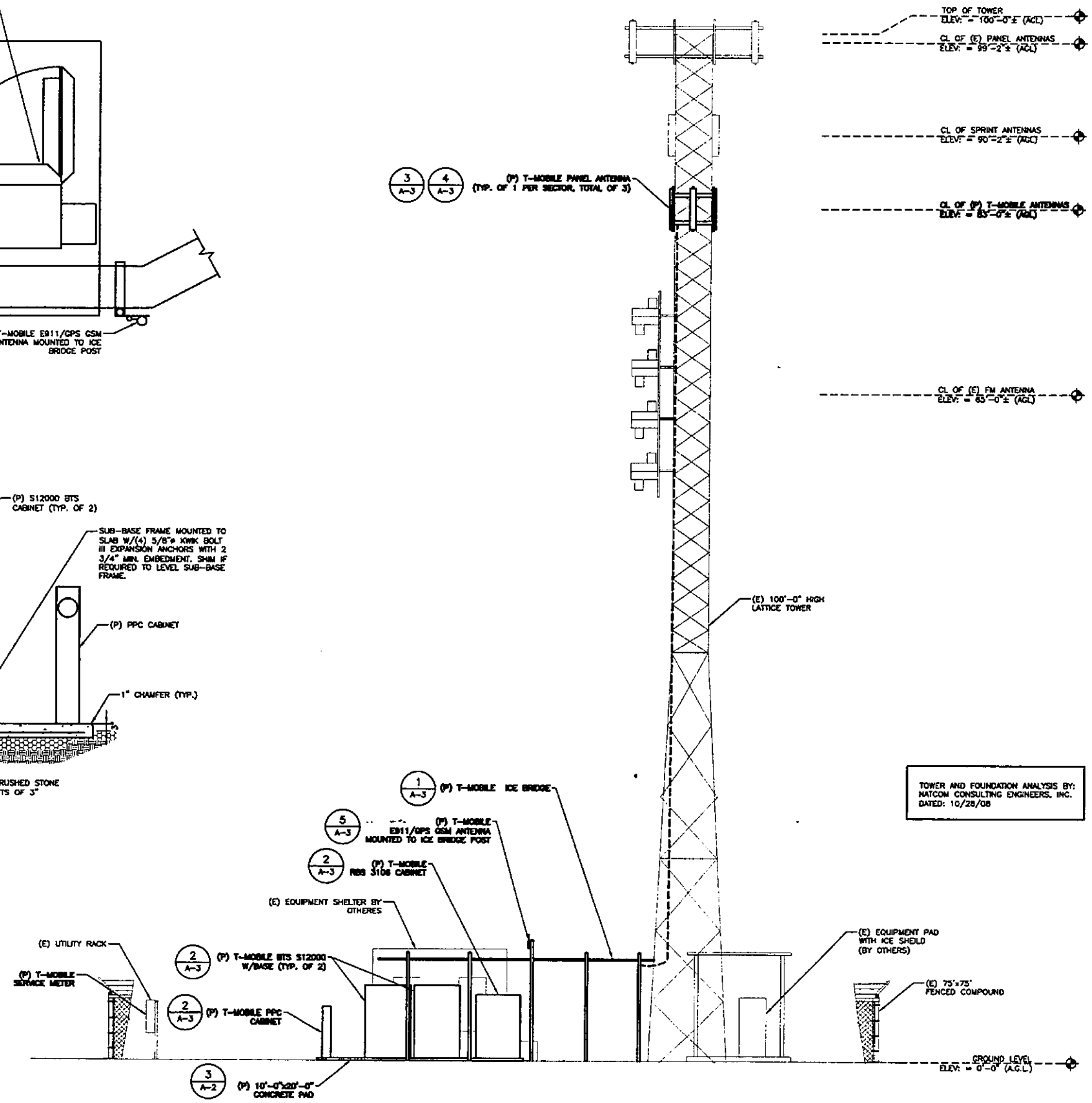
SHEET NUMBER
A-1



EQUIPMENT LAYOUT (2)
SCALE: 1/2" = 1'-0"



ELEVATION AT EQUIPMENT PAD (3)
SCALE: 1/2" = 1'-0"



TOWER AND FOUNDATION ANALYSIS BY: NATCOM CONSULTING ENGINEERS, INC. DATED: 10/28/08

ELEVATION (1)
SCALE: 3/16" = 1'-0"

(E)–EXISTING
(F)–FUTURE
(P)–PROPOSED

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FAX: [illegible]

STATE OF CONNECTICUT
GORDON E. GOVALET
No. 16430
LICENSED
PROFESSIONAL ENGINEER
11/11/08

APPROVALS

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

PROJECT NO:	2806.122
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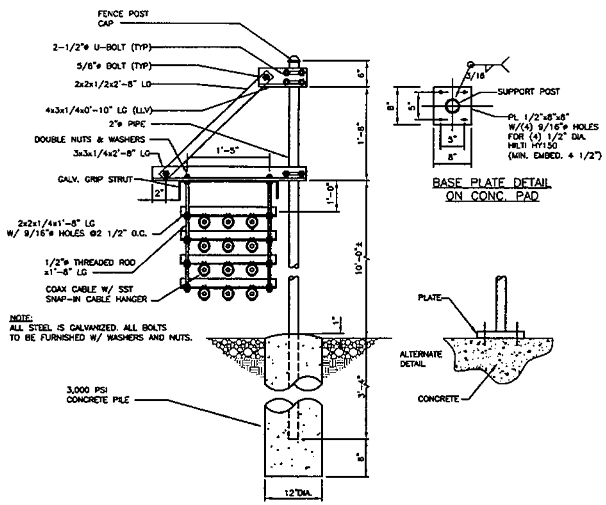
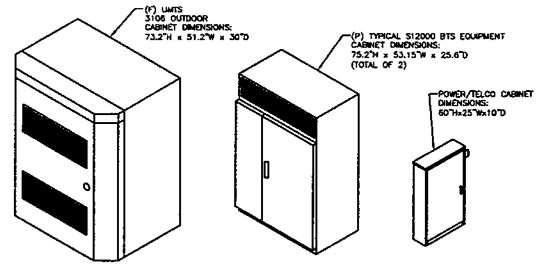
SHEET TITLE
ELEVATION & DETAILS

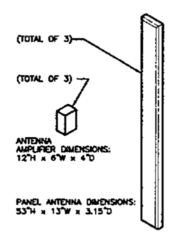
SHEET NUMBER
A-2



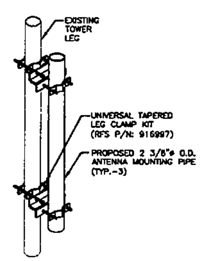
SECTION AT CABLE BRIDGE (1)
SCALE: 3/4"=1'-0"



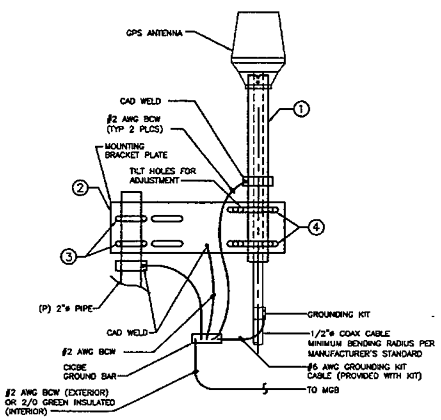
BTS EQUIPMENT DETAIL (2)
SCALE: N.T.S.



AMPLIFIER & PANEL ANTENNA DETAIL (3)
SCALE: N.T.S.



ANTENNA PIPE MOUNT (TYP) (4)
SCALE: N.T.S.



BILL OF MATERIALS		
ITEM#	DESCRIPTION	QUANTITY (each)
①	1-1/4"ø sch. 40 x 18" LG. ... GALV. PIPE	1
②	PLATE 1/4 x 4-1/4 x 10-1/4" LG. GALV.(A-36)	1
③	STD. U-BOLT FOR 2"ø PIPE W/ DOUBLE HEX NUTS AND WASHER, GALV.	2
④	STD. U-BOLT FOR 2"ø PIPE W/ DOUBLE HEX NUTS AND WASHER, GALV. (SEE NOTE 3)	2

NOTE:

1. THE ELEVATION AND LOCATION OF THE GPS ANTENNA SHALL BE IN ACCORDANCE WITH THE FINAL RF REPORT.
2. THE GPS ANTENNA MOUNT IS DESIGNED TO FASTEN TO A STANDARD 1-1/4" DIAMETER, SCHEDULE 40, GALVANIZED STEEL OR STAINLESS STEEL PIPE. THE PIPE MUST NOT BE THREADED AT THE ANTENNA MOUNT END. THE PIPE SHALL BE CUT TO THE REQUIRED LENGTH (MINIMUM OF 18 INCHES) USING A HAND OR ROTARY PIPE CUTTER TO ASSURE A SMOOTH AND PERPENDICULAR CUT. A HACK SAW SHALL NOT BE USED. THE CUT PIPE END SHALL BE DEBURRED AND SMOOTH IN ORDER TO SEAL AGAINST THE NEOPRENE GASKET ATTACHED TO THE ANTENNA MOUNT.
3. THE MOUNTING PLATE SHALL BE FABRICATED AS SHOWN AND ATTACHED TO THE APPROPRIATE SUPPORT STRUCTURE USING U-BOLTS. THE SUPPORT PIPE SHALL THEN BE ATTACHED TO THE MOUNTING PLATE USING THE OVERSIZE U-BOLTS PROVIDED TO ALLOW ADJUSTMENT. IT IS CRITICAL THAT THE GPS ANTENNA IS MOUNTED SUCH THAT IT IS WITHIN 2 DEGREES OF VERTICAL AND THE BASE OF THE ANTENNA IS WITHIN 2 DEGREES OF LEVEL.

GPS ANTENNA DETAIL (5)
SCALE: N.T.S.

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STATE OF CONNECTICUT · GORDON E. GOVALET · No. 16430 · LICENSED · PROFESSIONAL ENGINEER · 11/11/08

APPROVALS

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

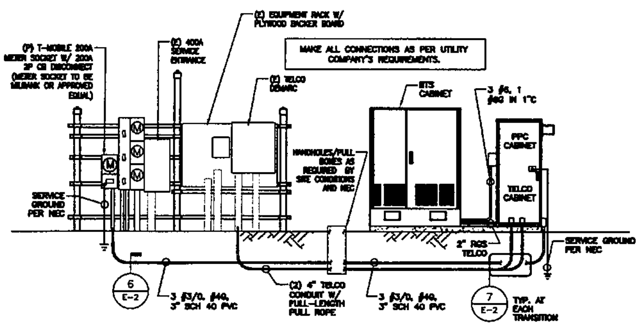
PROJECT NO:	2806.122
DRAWN BY:	JT
CHECKED BY:	RP

SUBMITTALS		
0	11/11/08	FOR CONSTRUCTION
B	11/07/08	PER COMMENTS
A	11/06/08	ISSUED FOR REVIEW

SITE
CTFF703A
WCSU
303 BOXWOOD LANE
DANBURY, CT 06810

SHEET TITLE
CONSTRUCTION DETAILS

SHEET NUMBER
A-3

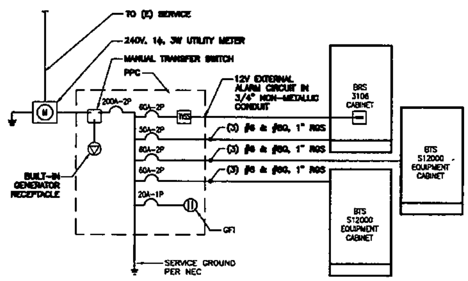


POWER RISER DIAGRAM (1)

SCALE: N.T.S.

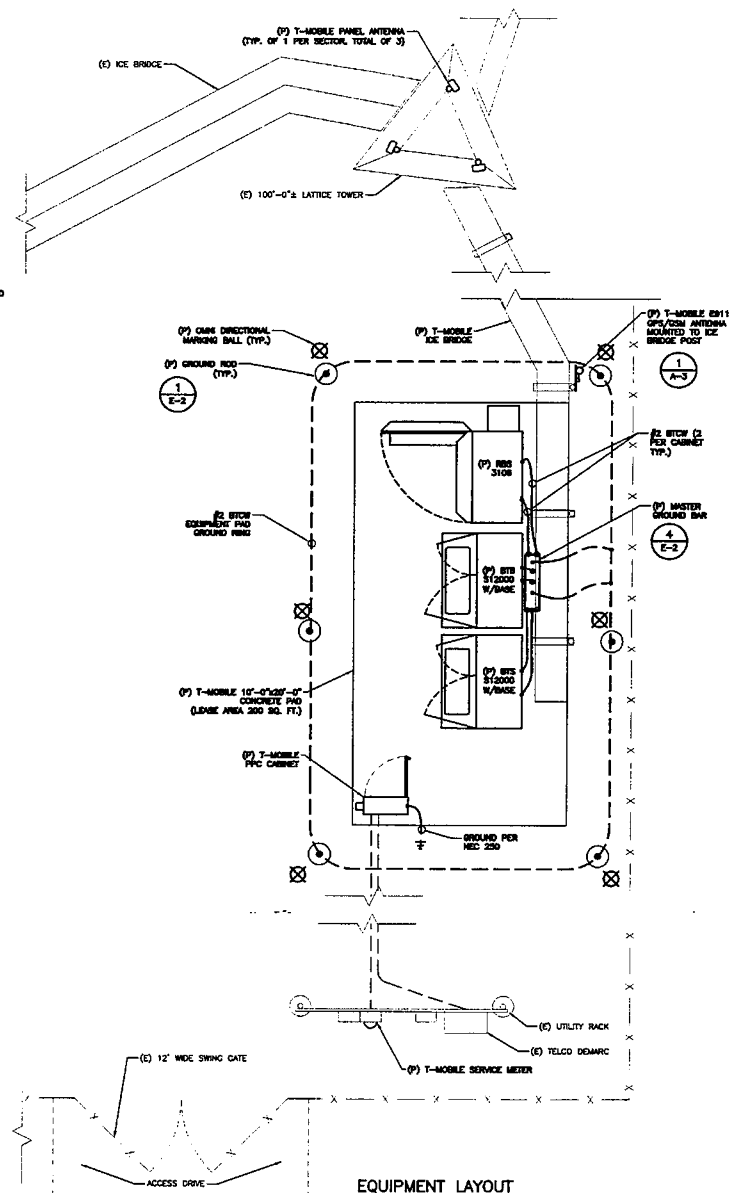
NOTES:

1. PPC/TELCO TO BE NORTHERN TECHNOLOGIES COMBINATION AC/TELCO CABINET W/200A MAIN BREAKER, MODEL NO. CS252-W736, WITH BUILT IN TRANSFER SWITCH, GENERATOR RECEPTACLE AND TVSS OR ITS EQUIVALENT.
2. ALL UTILITY RUNS SHALL BE COORDINATED WITH T-MOBILE CONSTRUCTION MANAGER AND RESPECTIVE UTILITY COMPANIES. UTILITY COMPANY TO ASSESS THE CAPACITY OF THE EXISTING SERVICE TO ACCOMODATE AN ADDITIONAL 200A, 120/240V,1-PH REQUIRED FOR THE T-MOBILE CELLULAR SITE.
3. UTILITY SERVICES SHOWN ARE PROPOSED. THE ELECTRICAL CONTRACTOR SHALL COORDINATE EXACT TELEPHONE AND ELECTRIC SERVICE CONNECTIONS POINTS, ROUTING, ASSOCIATED REQUIREMENTS AND BACKCHARGES WITH LOCAL UTILITY COMPANIES.
4. PROPOSED EXPOSED GROUNDING RUNS TO EXISTING OR PROPOSED GROUND SYSTEM EXCEEDING 18" OR IN HIGH TRAFFIC AREAS SHOULD BE RUN IN 1/2" - 3/4" PVC SEALTITE-CORE FLEX CONDUIT (OR THE APPROVED EQUAL) AND SHALL BE SEALED WITH SILICONE SEALANT.



ONE LINE DIAGRAM (2)

SCALE: N.T.S.



EQUIPMENT LAYOUT AND GROUNDING PLAN (3)

SCALE: N.T.S.

ELECTRICAL LEGEND

	NEW PANEL BOARD, SURFACE MOUNTED
	EXISTING PANEL BOARD, SURFACE MOUNTED
	DRY TYPE TRANSFORMER
	METER
	CIRCUIT BREAKER
	NON-FUSIBLE DISCONNECT SWITCH, MOUNTED 54" A.F.F.
	FUSIBLE DISCONNECT SWITCH, MOUNTED 54"A.F.F.
	TRANSIENT VOLTAGE SURGE SUPPRESSOR WITH BUILT-IN FUSES, SURFACE MOUNTED
	DUPLEX OUTLET, SURFACE MOUNTED, 20 AMPS, 125 VOLTS, SINGLE PHASE
	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 (OEMS) 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 THHN INSULATION.
8. RUN ELECTRICAL CONDUIT OR CABLE BETWEEN ELECTRICAL UTILITY DEMARCATION POINT AND PROJECT OWNER CELL SITE PPC AS INDICATED ON THIS DRAWING. PROVIDE FULL LENGTH PULL ROPE. COORDINATE INSTALLATION WITH UTILITY COMPANY.
9. RUN TELCO CONDUIT OR CABLE BETWEEN TELEPHONE UTILITY DEMARCATION POINT AND PROJECT OWNER CELL SITE TELCO CABINET AND BTS CABINET AS INDICATED ON THIS DRAWING PROVIDE FULL LENGTH PULL ROPE 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 (OEMS) 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. A RESISTANCE OF 5 OHMS OR LESS IS 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.

OMNIPOINT COMMUNICATIONS INC.
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50 EASTMAN ST.
SOUTH EASTON, MA 02375

STATE OF CONNECTICUT · TRICHURA VENKATARAMANI · No. 22848 · LICENSED PROFESSIONAL ENGINEER

APPROVALS

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

PROJECT NO:	2806.122
DRAWN BY:	MS
CHECKED BY:	RS

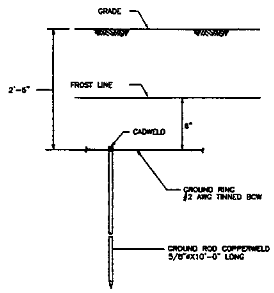
SUBMITTALS

0	11/11/08	FOR CONSTRUCTION
B	11/07/08	PER COMMENTS
A	11/06/08	ISSUED FOR REVIEW

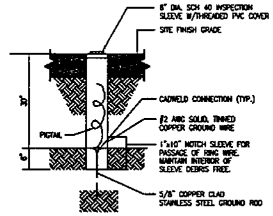
SITE
CTFF703A
WCSU
303 BOXWOOD LANE
DANBURY, CT 06810

SHEET TITLE
POWER RISER, LAYOUT, & NOTES

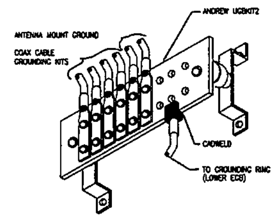
SHEET NUMBER
E-1



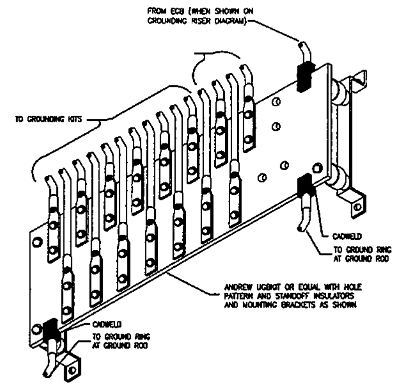
STANDARD GROUND ROD (1)
SCALE: NTS



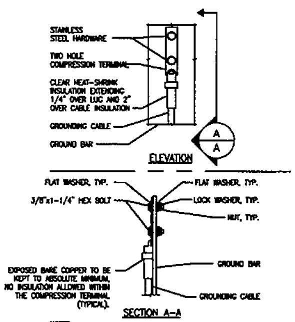
GROUND ROD TEST WELL DETAIL (2)
SCALE: N.T.S.



EQUIPMENT GROUND BAR (EGB) (3)
SCALE: N.T.S.

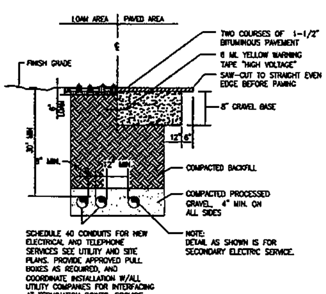


MASTER GROUND BAR (MGB) (4)
SCALE: N.T.S.



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

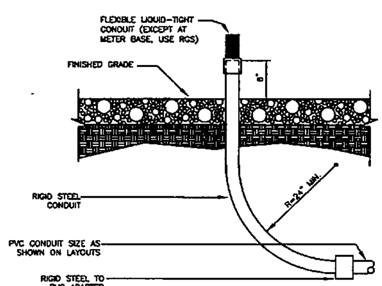
TYPICAL GROUND BAR CONNECTIONS DETAIL (5)
SCALE: N.T.S.



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.).

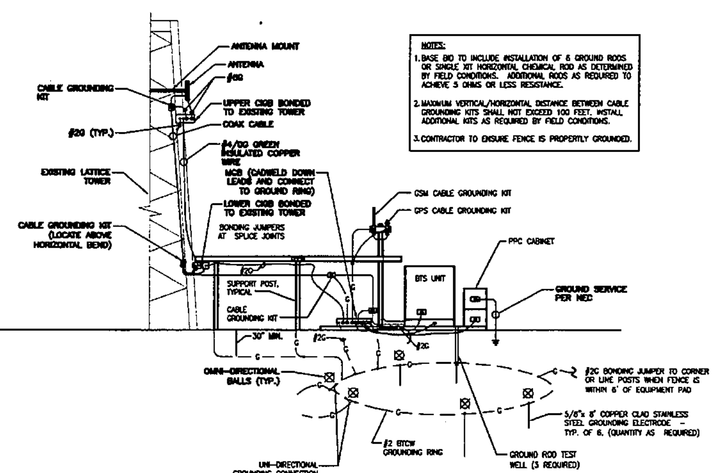
NOTE: DETAIL AS SHOWN IS FOR SECONDARY ELECTRIC SERVICE.

BURIED CONDUIT DETAIL (6)
SCALE: N.T.S.



NOTE:
CONTRACTOR TO FIELD VERIFY EXACT LOCATION OF CONDUIT STUB-UP.

CONDUIT STUB-UP (7)
SCALE: NTS



NOTES:
1. BASE BID TO INCLUDE INSTALLATION OF 6 GROUND RODS OR SINGLE KIT HORIZONTAL CHEMICAL ROD AS DETERMINED BY FIELD CONDITIONS. ADDITIONAL RODS AS REQUIRED TO ACHIEVE 5 OHMS OR LESS RESISTANCE.
2. MAXIMUM VERTICAL/HORIZONTAL DISTANCE BETWEEN CABLE GROUNDING KITS SHALL NOT EXCEED 100 FEET. INSTALL ADDITIONAL KITS AS REQUIRED BY FIELD CONDITIONS.
3. CONTRACTOR TO ENSURE FENCE IS PROPERLY GROUNDED.

GROUNDING RISER DIAGRAM (8)
SCALE: N.T.S.

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SOUTH EASTON, MA 02375

STATE OF CONNECTICUT ★ TRICHURA VENKATARAMAN ★ No. 22348 LICENSED PROFESSIONAL ENGINEER

APPROVALS

LANDLORD ________
LEASING ________
R.F. ________
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CONSTRUCTION ________
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PROJECT NO:	2806.122
DRAWN BY:	MS
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SUBMITTALS

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SITE
CTFF703A
WCSU
303 BOXWOOD LANE
DANBURY, CT 06810

SHEET TITLE
GROUNDING RISER DIAGRAM & DETAILS

SHEET NUMBER
E-2

NATCOMM INC.
CONSULTING ENGINEERS

Structural Analysis Report

100' Existing Lattice Tower

CTFF703
303 Boxwood Lane
Danbury, CT

Natcomm Project No. 08140

~~Date: October 28, 2008~~
Revision #1: November 07, 2008

STATE OF CONNECTICUT
CARL F. CENTORE
No. 16894
LICENSED
PROFESSIONAL ENGINEER

Prepared for:

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Natcomm, Inc.
Structural Lattice Analysis
100' Existing Lattice Tower
Danbury, CT
Revision #1 ~ November 7, 2008

Table of Contents

Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna installation proposed by T-Mobile on the existing lattice tower located in Danbury, Connecticut.

The host tower is a 100-ft, three-legged self-support lattice tower originally designed and manufactured by Fred A. Nudd Corporation; file no: 96-4992 signed and sealed January 21, 1997. Subsequent reinforcement and partial member replacement was designed by Natcomm LLC; job no. 361A and is depicted in design drawing S-1, Revision #4, dated November 28, 2001. The tower geometry, structure member sizes and the foundation system information were taken from the aforementioned design documents. Antenna and appurtenance information were obtained from a comparison of the design documents and field documentation conducted by Natcomm Inc. during October 2008.

The tower is made up of five (5) steel sections consisting of A500-42, A500-50, and A500-61ksi pipe legs. Diagonal lateral support bracing consists of A36 single angle and steel rod construction. The vertical tower sections are connected by bolted flange plates while the pipe legs and bracing are connected by welded (0'-40'), bolted and welded gusset connections (40'-100'). The tower face width is 3.5-ft at the top and 7.5-ft at the bottom.

The aforementioned design report prepared by Fred A. Nudd Corporation and subsequent reinforcement by Natcomm LLC; is available for reference in Section 4 of this report.

T-Mobile is proposing the installation of three (3) RFS APX16PV-16PVL-X Quad-pol panel antennas and six (6) TMA's mounted to the existing tower. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna configuration.

Antenna and Appurtenance Summary

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

- CARRIER SPRINT NEXTEL (Existing):
  Antennas: (8) DB844H90, (2) 5' Unknown Panels, and (2) 6' Unknown Panel antennas mounted to (3) 12' Nudd Starmount Sector Frames with a centerline elevation of 98-ft above the existing tower base.
  Coax Cables: Sixteen (16) 7/8" ∅ coax cables and six (6) 1 5/8" ∅ coax cables.

- CARRIER UNKNOWN (Existing):
  Antennas: (1) 3' parabolic grid antenna with a centerline elevation of 96-ft above the existing tower base.
  Coax Cables: One (1) 1/2" ∅ coax cable.

- CARRIER SPRINT NEXTEL (Existing):
  Antennas: (2) 4' Unknown Panels and (1) 6' Panel antennas flush mounted to the tower legs with a centerline elevation of 89-ft above the existing tower base.
  <u>Coax Cables:</u> Six (6) 1 5/8" ∅ coax cables.

- CARRIER WCSU FM (Existing):
  <u>Antennas:</u> (1) 4-Bay Shively Labs 6810 FM Antenna w/Radomes with a centerline elevation of 65-ft above the existing tower base.
  <u>Coax Cables:</u> One (1) 1 5/8" ∅ coax cable.

- CARRIER SPRINT NEXTEL (Existing):
  <u>Antennas:</u> (1) GPS antenna mounted to a 2' standoff mount with a centerline elevation of 30-ft above the existing tower base.
  <u>Coax Cables:</u> One (1) 1/2" ∅ coax cable.

- **T-Mobile: (Proposed):**
  <u>Antennas:</u> Three (3) RFS APX16PV-16PVL-X Quad-pol panel antennas and six (6) TMA's flush mounted to the tower legs with a centerline elevation of 83-ft above the existing tower base.
  <u>Coax Cables:</u> Twelve (12) 1 5/8" ∅ coax cables.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents or reinforcement drawings.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- All coax cables to be installed as specified in the report.

Analysis

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

The existing tower was analyzed for 85 mph basic wind speed (fastest mile) with no ice and 74mph with ½ inch accumulative ice to determine stresses in members as per guidelines of the TIA/EIA-222-F-96 entitled "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Allowable Stress Design (ASD).

Tower Loading

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

Basic Wind Speed:	Fairfield County; v = 85 mph (fastest mile)	*[Section 16 of TIA/EIA-222-F-96]*
	Danbury; v = 95 mph (3 second gust) equivalent to v = 77.5 mph (fastest mile)	*[Appendix K of the 2005 CT Building Code Supplement]*
	TIA/EIA-222-F wind speed controls	
Load Cases:	Load Case 1; 85 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation. This load case typically controls the design of monopole towers.	*[Section 16 of TIA/EIA-222-F-96]*
	Load Case 2; 74 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. This load case typically controls the design of lattice towers.	*[Section 16 of TIA/EIA-222-F-96]*
	Load Case 3; Seismic – not checked	*[Section 1610.1.3 of State Bldg. Code 2005] does not control in the design of this structure type*

Tower Capacity

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

Calculated stresses were found to be above allowable limits. In Load Case 2, per RISATower "Section Capacity Table", this tower was found to be at **120.1%** of its total capacity.

Foundation and Anchors

The existing foundation consists of three piers and a reinforced concrete pad bearing directly on existing sub grade. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned manufacturers original design documents; Fred A. Nudd Corporation; file no: 96-4992. Tower legs are connected to the foundation by means of (4) 1.5" ∅, ASTM A36 anchor bolts per leg, embedded into the concrete foundation structure.

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

- The tower base maximum corner reactions developed from the governing Load Case 2 were used in the verification of the foundation and its anchors:
  - Uplift @ base of leg = **142.5** kips
  - Shear @ base of leg= **12.1** kips
  - Compression @ base of leg= **171.7** kips
  - Overturning Moment= **1064.2** kip-ft
- Tower anchor bolts were found to be within allowable limits.
- Foundation resists over one and a half times the calculated wind load, but not the two times per the requirements of Section 3108.4.2 of the 2005 CT State Building Code Supplement to the 2003 International Building Code (IBC).

Natcomm, Inc.
Structural Lattice Analysis
100' Existing Lattice Tower
Danbury, CT
Revision #1 ~ November 7, 2008

Conclusions and Recommendations

This analysis shows that the subject tower **is not adequate** to support the proposed modified antenna configuration. Natcomm Inc., recommends the following listed items to eliminate the overstress in the structure:

Tower Steel:

- Option 1: Add two (2) levels of guy wires (6 total) and three (3) guy anchor foundations. This option has limited use as the proposed guy anchors will fall outside the existing compound area.
- Option 2: Grout the existing tower legs between 40-ft to 80-ft. Reinforce all diagonals and horizontal members from 40-ft to 60-ft.

Foundation:

- In addition a code modification should be filed requesting that the required factor of safety for overturning be modified from 2.0x as stipulated by Section 3108.4.2 of the 2005 CT State Building Code Supplement to the 2003 International Building Code (IBC) to 1.5x; applicable at the time of the original design of the tower structure. Should a modification not be approved by the local official, foundation reinforcements involving a geo-technical study and anchorage design for the existing foundation will be necessary.

This report is not intended to serve as a specification for remedial items recommended herein. Site specific engineering documents and/or repair procedures prepared by a licensed engineer are necessary for any remedial work discussed.

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

Please feel free to call with any questions or comments.

Respectfully Submitted by:

Carlo F. Centore, PE
Principal ~ Structural Engineer

STATE OF CONNECTICUT
CARLO F. CENTORE
No. 16694
LICENSED
PROFESSIONAL ENGINEER
11/7/08

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

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

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

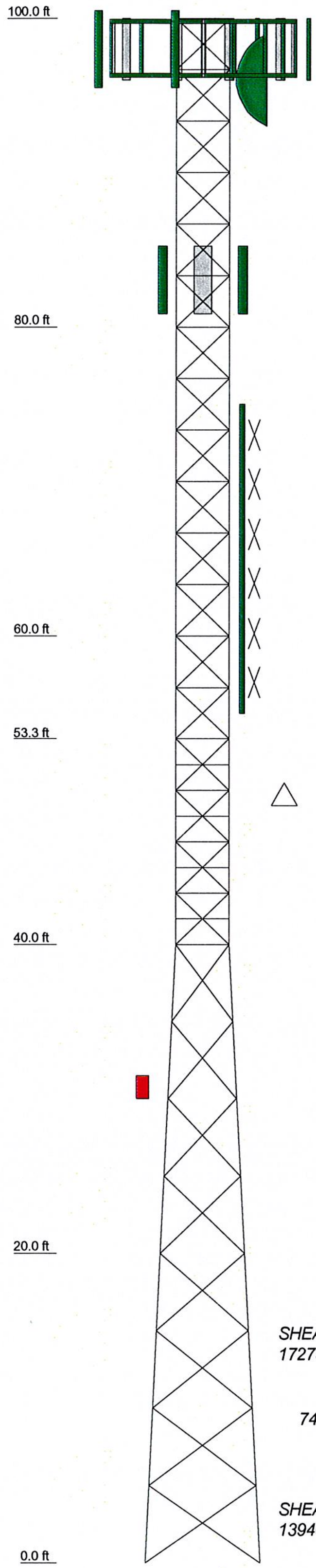
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

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

RISATower Features:

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

Section	T1	T2	T3	T4	T5	T6
Legs	P2.5x.276		P3x3		P5x.375	
Leg Grade	A500-50		A500M-61		A500-42	
Diagonals	SR 5/8				L2x2x3/16	L2 1/2x2 1/2x3/16
Diagonal Grade	A36					
Top Girts	L1 1/2x1 1/2x3/16				N.A.	
Bottom Girts	N.A.		L1 1/2x1 1/2x3/16		N.A.	
Horizontals	L1 1/2x1 1/2x3/16				N.A.	
Sec. Horizontals	N.A.		L2 1/2x2 1/2x5/16		N.A.	
Face Width (ft) 7.5	3.5				5.5	
# Panels @ (ft)	12 @ 3.33333		2 @ 3.335	4 @ 3.3325	8 @ 5	
Weight (lb) 6145.8	754.8	754.8	303.6	834.4	1643.6	1854.6



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
12' Boom Starmount (Sprint Nextel)	98	APX16PV-16PVL-X w/mount pipe (T-Mobile)	83
12' Boom Starmount (Sprint Nextel)	98	APX16PV-16PVL-X w/mount pipe (T-Mobile)	83
12' Boom Starmount (Sprint Nextel)	98	APX16PV-16PVL-X w/mount pipe (T-Mobile)	83
(4) DB844H90 (Sprint Nextel)	98	(2) G20057A1 TMA (T-Mobile)	83
(4) DB844H90 (Sprint Nextel)	98	(2) G20057A1 TMA (T-Mobile)	83
(2) 60"x12"x4" Panel (Sprint Nextel)	98	(2) G20057A1 TMA (T-Mobile)	83
72" x 10" x 5" Panel (Sprint Nextel)	98	4-Bay 6810 w/Radome	65
72" x 10" x 5" Panel (Sprint Nextel)	98	2.5" Tube x 2' Standoff (Sprint)	30
Parabolic Grid	96	GPS (Sprint)	30
72" x 10" x 5" Panel w/mount pipe (Sprint)	89		
48"x6.5"x3" Panel w/mount pipe (Sprint)	89		
48"x6.5"x3" Panel w/mount pipe (Sprint)	89		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A500-50	50 ksi	62 ksi	A500M-61	61 ksi	75 ksi
A36	36 ksi	58 ksi	A500-42	42 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. TOWER RATING: 120.1%

MAX. CORNER REACTIONS AT BASE:
DOWN: 171656 lb
UPLIFT: -142460 lb
SHEAR: 12116 lb

AXIAL 23422 lb
SHEAR 17275 lb
MOMENT 1064238 lb-ft
TORQUE 1176 lb-ft
74 mph WIND - 0.5000 in ICE

AXIAL 13452 lb
SHEAR 13940 lb
MOMENT 876573 lb-ft
TORQUE 1950 lb-ft
REACTIONS - 85 mph WIND

NATCOMM INC	Job: **100' Nudd Self-Support Lattice - Rev 1**		
63-3 N Branford Rd	Project: **08140 - 303 Boxwood Lane, Danbury, CT**		
Branford, CT 06405	Client: T-Mobile	Drawn by: Staff	App'd:
Phone: (203) 488-0580	Code: TIA/EIA-222-F	Date: 11/07/08	Scale: NTS
FAX: (203) 488-8587	Path:		Dwg No. E-1

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 100.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 3.50 ft at the top and 7.50 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

- 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.
- Tension only take-up is 0.0313 in.
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in tower member design is 1.333.
- Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

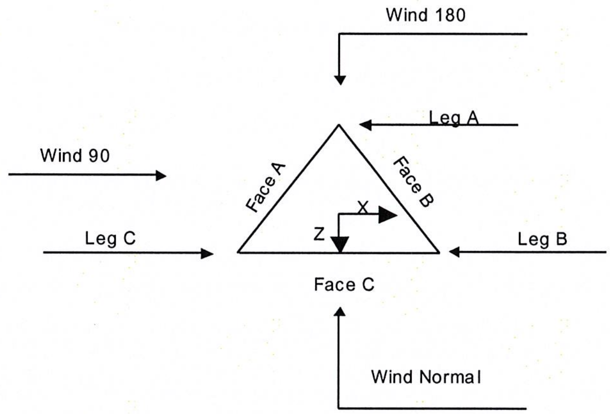
Consider Moments - Legs
Consider Moments - Horizontals
Consider Moments - Diagonals
Use Moment Magnification
√ Use Code Stress Ratios
√ Use Code Safety Factors - Guys
Escalate Ice
Always Use Max Kz
Use Special Wind Profile
√ Include Bolts In Member Capacity
Leg Bolts Are At Top Of Section
√ Secondary Horizontal Braces Leg
Use Diamond Inner Bracing (4 Sided)
Add IBC .6D+W Combination

Distribute Leg Loads As Uniform
Assume Legs Pinned
√ Assume Rigid Index Plate
√ Use Clear Spans For Wind Area
√ Use Clear Spans For KL/r
Retension Guys To Initial Tension
Bypass Mast Stability Checks
√ Use Azimuth Dish Coefficients
√ Project Wind Area of Appurt.
Autocalc Torque Arm Areas
√ SR Members Have Cut Ends
√ Sort Capacity Reports By Component
Triangulate Diamond Inner Bracing

Treat Feedline Bundles As Cylinder
Use ASCE 10 X-Brace Ly Rules
√ Calculate Redundant Bracing Forces
Ignore Redundant Members in FEA
SR Leg Bolts Resist Compression
√ All Leg Panels Have Same Allowable
Offset Girt At Foundation
√ Consider Feedline Torque
Include Angle Block Shear Check

Poles

Include Shear-Torsion Interaction
Always Use Sub-Critical Flow
Use Top Mounted Sockets



Triangular Tower

Tower Section Geometry

Tower Section	*Tower Elevation* *ft*	*Assembly Database*	*Description*	*Section Width* *ft*	*Number of Sections*	*Section Length* *ft*
T1	100.00-80.00			3.50	1	20.00
T2	80.00-60.00			3.50	1	20.00
T3	60.00-53.33			3.50	1	6.67
T4	53.33-40.00			3.50	1	13.33
T5	40.00-20.00			3.50	1	20.00
T6	20.00-0.00			5.50	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	*Tower Elevation* *ft*	*Diagonal Spacing* *ft*	*Bracing Type*	*Has K Brace End Panels*	*Has Horizontals*	*Top Girt Offset* *in*	*Bottom Girt Offset* *in*
T1	100.00-80.00	3.33	TX Brace	No	Yes	0.0000	0.0000
T2	80.00-60.00	3.33	TX Brace	No	Yes	0.0000	0.0000
T3	60.00-53.33	3.34	TX Brace	No	Yes	0.0000	0.0000
T4	53.33-40.00	3.33	TX Brace	No	Yes	0.0000	0.0000
T5	40.00-20.00	5.00	X Brace	No	No	0.0000	0.0000
T6	20.00-0.00	5.00	X Brace	No	No	0.0000	0.0000

NATCOMM INC
63-3 N Branford Rd
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Tower Section Geometry *(cont'd)*

Tower Elevation ft	*Leg Type*	*Leg Size*	*Leg Grade*	*Diagonal Type*	*Diagonal Size*	*Diagonal Grade*
T1 100.00-80.00	Pipe	P2.5x.276	A500-50 (50 ksi)	Solid Round	5/8	A36 (36 ksi)
T2 80.00-60.00	Pipe	P2.5x.276	A500-50 (50 ksi)	Solid Round	5/8	A36 (36 ksi)
T3 60.00-53.33	Pipe	P3x.3	A500M-61 (61 ksi)	Solid Round	5/8	A36 (36 ksi)
T4 53.33-40.00	Pipe	P3x.3	A500M-61 (61 ksi)	Solid Round	5/8	A36 (36 ksi)
T5 40.00-20.00	Pipe	P5x.375	A500-42 (42 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)
T6 20.00-0.00	Pipe	P5x.375	A500-42 (42 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	*Top Girt Type*	*Top Girt Size*	*Top Girt Grade*	*Bottom Girt Type*	*Bottom Girt Size*	*Bottom Girt Grade*
T1 100.00-80.00	Equal Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)	Equal Angle		A36 (36 ksi)
T2 80.00-60.00	Equal Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)	Equal Angle		A36 (36 ksi)
T3 60.00-53.33	Equal Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)	Equal Angle		A36 (36 ksi)
T4 53.33-40.00	Equal Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)	Equal Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	*No. of Mid Girts*	*Mid Girt Type*	*Mid Girt Size*	*Mid Girt Grade*	*Horizontal Type*	*Horizontal Size*	*Horizontal Grade*
T1 100.00-80.00	None	Solid Round		A572-50 (50 ksi)	Equal Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)
T2 80.00-60.00	None	Single Angle		A36 (36 ksi)	Equal Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)
T3 60.00-53.33	None	Single Angle		A36 (36 ksi)	Equal Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)
T4 53.33-40.00	None	Single Angle		A36 (36 ksi)	Equal Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation *ft*	*Secondary Horizontal Type*	*Secondary Horizontal Size*	*Secondary Horizontal Grade*	*Inner Bracing Type*	*Inner Bracing Size*	*Inner Bracing Grade*
T4 53.33-40.00	Equal Angle	L2 1/2x2 1/2x5/16	A36 (36 ksi)	Equal Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation *ft*	*Gusset Area (per face)* ft^2	*Gusset Thickness* *in*	*Gusset Grade*	*Adjust. Factor* A_f	*Adjust. Factor* A_r	*Weight Mult.*	*Double Angle Stitch Bolt Spacing Diagonals* *in*	*Double Angle Stitch Bolt Spacing Horizontals* *in*
T1 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T2 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T3 60.00-53.33	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T4 53.33-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T5 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T6 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000

Tower Section Geometry *(cont'd)*

			K Factors[1]							
Tower Elevation *ft*	*Calc K Single Angles*	*Calc K Solid Rounds*	*Legs*	*X Brace Diags* *X* *Y*	*K Brace Diags* *X* *Y*	*Single Diags* *X* *Y*	*Girts* *X* *Y*	*Horiz.* *X* *Y*	*Sec. Horiz.* *X* *Y*	*Inner Brace* *X* *Y*
T1 100.00-80.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 80.00-60.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 60.00-53.33	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 53.33-40.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 40.00-20.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T6 20.00-0.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 100.00-80.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T2 80.00-60.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T3 60.00-53.33	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T4 53.33-40.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T5 40.00-20.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T6 20.00-0.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 100.00-80.00	Flange	0.7500 A325N	4	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0
T2 80.00-60.00	Flange	0.7500 A325N	4	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0
T3 60.00-53.33	Flange	0.7500 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0
T4 53.33-40.00	Flange	1.0000 A325N	4	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.7500 A325N	1
T5 40.00-20.00	Flange	1.0000 A325N	6	0.6250 A325N	1	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0
T6 20.00-0.00	Flange	1.5000 A36	4	0.6250 A325N	1	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
7/8 (Sprint Nextel)	A	Yes	Ar (CfAe)	98.00 - 3.00	0.0000	0	16	9	0.7500	1.1100		0.54
1 5/8 (FM)	A	Yes	Ar (CfAe)	55.00 - 3.00	0.0000	0.115	1	1	1.9800	1.9800		1.04
1/2	A	Yes	Ar (CfAe)	98.00 - 3.00	0.0000	0.135	1	1	0.5800	0.5800		0.25
1 5/8 (Sprint Nextel)	A	Yes	Ar (CfAe)	98.00 - 3.00	-1.0000	0.03	6	6	0.7500	1.9800		1.04
1 5/8 (Sprint)	B	Yes	Ar (CfAe)	89.00 - 3.00	0.0000	0.25	6	6	0.7500	1.9800		1.04
1/2 (Sprint)	B	Yes	Ar (CfAe)	30.00 - 3.00	0.0000	0.15	1	1	0.5800	0.5800		0.25
1 5/8 (T-Mobile)	C	Yes	Ar (CfAe)	83.00 - 3.00	0.0000	0	12	6	0.7500	1.9800		1.04

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight lb
T1	100.00-80.00	A	33.675	0.000	0.000	0.000	272.34
		B	8.910	0.000	0.000	0.000	56.16
		C	2.970	0.000	0.000	0.000	37.44
T2	80.00-60.00	A	37.417	0.000	0.000	0.000	302.60
		B	19.800	0.000	0.000	0.000	124.80
		C	19.800	0.000	0.000	0.000	249.60
T3	60.00-53.33	A	12.754	0.000	0.000	0.000	102.65
		B	6.603	0.000	0.000	0.000	41.62
		C	6.603	0.000	0.000	0.000	83.24
T4	53.33-40.00	A	27.138	0.000	0.000	0.000	215.55
		B	13.197	0.000	0.000	0.000	83.18
		C	13.197	0.000	0.000	0.000	166.36
T5	40.00-20.00	A	40.717	0.000	0.000	0.000	323.40
		B	20.283	0.000	0.000	0.000	127.30
		C	19.800	0.000	0.000	0.000	249.60
T6	20.00-0.00	A	34.609	0.000	0.000	0.000	274.89
		B	17.652	0.000	0.000	0.000	110.33
		C	16.830	0.000	0.000	0.000	212.16

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight lb
T1	100.00-80.00	A	0.500	10.005	42.795	0.000	0.000	795.43
		B		2.235	10.238	0.000	0.000	158.28
		C		0.745	3.412	0.000	0.000	102.89
T2	80.00-60.00	A	0.500	11.117	47.550	0.000	0.000	883.81
		B		4.967	22.750	0.000	0.000	351.73
		C		4.967	22.750	0.000	0.000	685.95
T3	60.00-53.33	A	0.500	4.122	15.858	0.000	0.000	299.02
		B		1.656	7.587	0.000	0.000	117.30
		C		1.656	7.587	0.000	0.000	228.77
T4	53.33-40.00	A	0.500	10.720	31.692	0.000	0.000	623.12
		B		3.310	15.163	0.000	0.000	234.43
		C		3.310	15.163	0.000	0.000	457.19
T5	40.00-20.00	A	0.500	16.083	47.550	0.000	0.000	934.91
		B		6.283	22.750	0.000	0.000	360.83
		C		4.967	22.750	0.000	0.000	685.95
T6	20.00-0.00	A	0.500	13.671	40.417	0.000	0.000	794.68
		B		6.460	19.337	0.000	0.000	314.44
		C		4.222	19.337	0.000	0.000	583.06

Feed Line Shielding

Section	Elevation ft	Face	A_R ft²	A_R Ice ft²	A_F ft²	A_F Ice ft²
T1	100.00-80.00	A	1.453	7.244	1.263	1.980

Section	Elevation ft	Face	A_R ft^2	A_R Ice ft^2	A_F ft^2	A_F Ice ft^2
		B	0.385	1.711	0.334	0.468
		C	0.128	0.570	0.111	0.156
T2	80.00-60.00	A	1.615	8.049	1.403	2.200
		B	0.854	3.803	0.743	1.039
		C	0.854	3.803	0.743	1.039
T3	60.00-53.33	A	0.550	2.740	0.478	0.749
		B	0.285	1.268	0.248	0.346
		C	0.285	1.268	0.248	0.346
T4	53.33-40.00	A	1.171	7.146	2.969	4.640
		B	0.570	3.112	1.444	2.021
		C	0.570	3.112	1.444	2.021
T5	40.00-20.00	A	0.000	3.204	4.100	6.408
		B	0.000	1.462	2.042	2.923
		C	0.000	1.395	1.994	2.791
T6	20.00-0.00	A	0.000	2.283	3.652	5.707
		B	0.000	1.089	1.862	2.722
		C	0.000	0.994	1.776	2.486

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	100.00-80.00	-1.9226	-1.6574	-1.7166	-1.4072
T2	80.00-60.00	-0.2899	0.7248	-0.5965	0.2105
T3	60.00-53.33	-0.3293	0.6174	-0.6256	0.1388
T4	53.33-40.00	-0.4215	0.3550	-0.6470	-0.0623
T5	40.00-20.00	-0.4874	0.3459	-0.7983	-0.1068
T6	20.00-0.00	-0.5716	0.3172	-0.8754	-0.1908

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
12' Boom Starmount (Sprint Nextel)	A	From Leg	1.50 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice	16.00 21.00	8.00 11.00	1000.00 1250.00
12' Boom Starmount (Sprint Nextel)	B	From Leg	1.50 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice	16.00 21.00	8.00 11.00	1000.00 1250.00
12' Boom Starmount (Sprint Nextel)	C	From Leg	1.50 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice	16.00 21.00	8.00 11.00	1000.00 1250.00
(4) DB844H90 (Sprint Nextel)	A	From Leg	3.00 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice	2.87 3.18	3.97 4.34	10.00 36.27
(4) DB844H90	B	From Leg	3.00	0.0000	98.00	No Ice	2.87	3.97	10.00

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft* *ft* *ft*	*Azimuth Adjustment* °	*Placement* *ft*		C_AA_A *Front* ft^2	C_AA_A *Side* ft^2	*Weight* *lb*
(Sprint Nextel)			0.00 0.00			1/2" Ice	3.18	4.34	36.27
(2) 60"x12"x4" Panel (Sprint Nextel)	C	From Leg	3.00 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice	7.00 7.47	2.78 3.15	50.00 85.16
72" x 10" x 5" Panel (Sprint Nextel)	C	From Leg	3.00 2.00 0.00	0.0000	98.00	No Ice 1/2" Ice	7.03 7.54	4.12 4.56	35.00 74.47
72" x 10" x 5" Panel (Sprint Nextel)	C	From Leg	3.00 -2.00 0.00	0.0000	98.00	No Ice 1/2" Ice	7.03 7.54	4.12 4.56	35.00 74.47
Parabolic Grid	B	From Leg	0.50 0.00 0.00	0.0000	96.00	No Ice 1/2" Ice	1.20 2.00	1.20 2.00	20.00 40.00
72" x 10" x 5" Panel w/mount pipe (Sprint)	A	From Leg	0.50 0.00 0.00	0.0000	89.00	No Ice 1/2" Ice	7.03 7.54	5.54 6.48	56.90 109.83
48"x6.5"x3" Panel w/mount pipe (Sprint)	B	From Leg	0.50 0.00 0.00	0.0000	89.00	No Ice 1/2" Ice	3.10 3.44	2.62 3.17	50.21 76.93
48"x6.5"x3" Panel w/mount pipe (Sprint)	C	From Leg	0.50 0.00 0.00	0.0000	89.00	No Ice 1/2" Ice	3.10 3.44	2.62 3.17	50.21 76.93
APX16PV-16PVL-X w/mount pipe (T-Mobile)	A	From Leg	1.00 0.00 0.00	0.0000	83.00	No Ice 1/2" Ice	6.85 7.32	3.33 3.96	68.95 114.34
APX16PV-16PVL-X w/mount pipe (T-Mobile)	B	From Leg	1.00 0.00 0.00	0.0000	83.00	No Ice 1/2" Ice	6.85 7.32	3.33 3.96	68.95 114.34
APX16PV-16PVL-X w/mount pipe (T-Mobile)	C	From Leg	1.00 0.00 0.00	0.0000	83.00	No Ice 1/2" Ice	6.85 7.32	3.33 3.96	68.95 114.34
(2) G20057A1 TMA (T-Mobile)	A	From Leg	0.50 0.00 0.00	0.0000	83.00	No Ice 1/2" Ice	0.82 0.95	0.39 0.49	11.00 16.41
(2) G20057A1 TMA (T-Mobile)	B	From Leg	0.50 0.00 0.00	0.0000	83.00	No Ice 1/2" Ice	0.82 0.95	0.39 0.49	11.00 16.41
(2) G20057A1 TMA (T-Mobile)	C	From Leg	0.50 0.00 0.00	0.0000	83.00	No Ice 1/2" Ice	0.82 0.95	0.39 0.49	11.00 16.41
4-Bay 6810 w/Radome	B	From Leg	1.00 0.00 0.00	0.0000	65.00	No Ice 1/2" Ice	29.90 35.40	29.90 35.40	447.00 1040.00
2.5" Tube x 2' Standoff (Sprint)	C	From Leg	1.00 0.00 0.00	0.0000	30.00	No Ice 1/2" Ice	1.11 1.44	0.63 0.84	115.44 128.13
GPS (Sprint)	C	From Leg	2.00 0.00 0.00	0.0000	30.00	No Ice 1/2" Ice	1.00 1.50	1.00 1.50	10.00 15.00

Tower Pressures - No Ice

$G_H = 1.162$

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
T1 100.00-80.00	90.00	1.332	25	74.792	A	1.183	44.619	9.583	20.92	0.000	0.000
					B	2.111	20.923		41.61	0.000	0.000
					C	2.334	15.239		54.53	0.000	0.000
T2 80.00-60.00	70.00	1.24	23	74.792	A	1.042	48.199	9.583	19.46	0.000	0.000
					B	1.703	31.343		29.00	0.000	0.000
					C	1.703	31.343		29.00	0.000	0.000
T3 60.00-53.33	56.67	1.167	22	25.290	A	0.331	17.022	3.891	22.42	0.000	0.000
					B	0.561	11.136		33.26	0.000	0.000
					C	0.561	11.136		33.26	0.000	0.000
T4 53.33-40.00	46.67	1.104	20	50.543	A	1.710	35.588	7.776	20.85	0.000	0.000
					B	3.235	22.249		30.51	0.000	0.000
					C	3.235	22.249		30.51	0.000	0.000
T5 40.00-20.00	30.00	1	18	99.283	A	4.003	59.291	18.574	29.35	0.000	0.000
					B	6.060	38.858		41.35	0.000	0.000
					C	6.109	38.374		41.76	0.000	0.000
T6 20.00-0.00	10.00	1	18	139.283	A	9.052	53.183	18.574	29.85	0.000	0.000
					B	10.841	36.226		39.46	0.000	0.000
					C	10.928	35.404		40.09	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.162$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
T1 100.00-80.00	90.00	1.332	18	0.5000	76.458	A	43.260	24.624	12.917	19.03	0.000	0.000
						B	12.215	22.387		37.33	0.000	0.000
						C	5.702	22.038		46.56	0.000	0.000
T2 80.00-60.00	70.00	1.24	17	0.5000	76.458	A	47.795	24.931	12.917	17.76	0.000	0.000
						B	24.156	23.027		27.38	0.000	0.000
						C	24.156	23.027		27.38	0.000	0.000
T3 60.00-53.33	56.67	1.167	16	0.5000	25.846	A	15.918	9.333	5.003	19.81	0.000	0.000
						B	8.049	8.340		30.52	0.000	0.000
						C	8.049	8.340		30.52	0.000	0.000
T4 53.33-40.00	46.67	1.104	15	0.5000	51.654	A	31.731	20.777	9.998	19.04	0.000	0.000
						B	17.821	17.401		28.38	0.000	0.000
						C	17.821	17.401		28.38	0.000	0.000
T5 40.00-20.00	30.00	1	14	0.5000	100.952	A	49.245	38.844	21.913	24.88	0.000	0.000
						B	27.929	30.786		37.32	0.000	0.000
						C	28.062	29.536		38.05	0.000	0.000
T6 20.00-0.00	10.00	1	14	0.5000	140.952	A	47.414	38.383	21.913	25.54	0.000	0.000
						B	29.319	32.366		35.52	0.000	0.000
						C	29.555	30.222		36.66	0.000	0.000

Tower Pressure - Service

$G_H = 1.162$

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
T1 100.00-80.00	90.00	1.332	9	74.792	A	1.183	44.619	9.583	20.92	0.000	0.000
					B	2.111	20.923		41.61	0.000	0.000
					C	2.334	15.239		54.53	0.000	0.000
T2 80.00-60.00	70.00	1.24	8	74.792	A	1.042	48.199	9.583	19.46	0.000	0.000
					B	1.703	31.343		29.00	0.000	0.000
					C	1.703	31.343		29.00	0.000	0.000
T3 60.00-53.33	56.67	1.167	7	25.290	A	0.331	17.022	3.891	22.42	0.000	0.000
					B	0.561	11.136		33.26	0.000	0.000
					C	0.561	11.136		33.26	0.000	0.000
T4 53.33-40.00	46.67	1.104	7	50.543	A	1.710	35.588	7.776	20.85	0.000	0.000
					B	3.235	22.249		30.51	0.000	0.000
					C	3.235	22.249		30.51	0.000	0.000
T5 40.00-20.00	30.00	1	6	99.283	A	4.003	59.291	18.574	29.35	0.000	0.000
					B	6.060	38.858		41.35	0.000	0.000
					C	6.109	38.374		41.76	0.000	0.000
T6 20.00-0.00	10.00	1	6	139.283	A	9.052	53.183	18.574	29.85	0.000	0.000
					B	10.841	36.226		39.46	0.000	0.000
					C	10.928	35.404		40.09	0.000	0.000

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
T1 100.00-80.00	365.94	754.80	A	0.612	1.797	0.761	1	1	35.149	1808.20	90.41	A
			B	0.308	2.275	0.618	1	1	15.049			
			C	0.235	2.483	0.598	1	1	11.449			
T2 80.00-60.00	677.00	754.80	A	0.658	1.779	0.791	1	1	39.171	1857.27	92.86	A
			B	0.442	1.987	0.67	1	1	22.689			
			C	0.442	1.987	0.67	1	1	22.689			
T3 60.00-53.33	227.52	303.60	A	0.686	1.776	0.81	1	1	14.119	628.97	94.30	A
			B	0.463	1.953	0.679	1	1	8.124			
			C	0.463	1.953	0.679	1	1	8.124			
T4 53.33-40.00	465.08	834.35	A	0.738	1.783	0.848	1	1	31.879	1349.02	101.20	A
			B	0.504	1.895	0.7	1	1	18.801			
			C	0.504	1.895	0.7	1	1	18.801			
T5 40.00-20.00	700.30	1643.58	A	0.638	1.786	0.777	1	1	50.087	1922.31	96.12	A
			B	0.452	1.97	0.674	1	1	32.265			
			C	0.448	1.977	0.672	1	1	31.911			
T6 20.00-0.00	597.38	1854.65	A	0.447	1.979	0.672	1	1	44.782	1904.65	95.23	A
			B	0.338	2.2	0.628	1	1	33.599			
			C	0.333	2.213	0.626	1	1	33.106			
Sum Weight:	3033.22	6145.77						OTM	468055.36 lb-ft	9470.42		

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 ft^2	F lb	w plf	Ctrl. Face
T1 100.00-80.00	365.94	754.80	A	0.612	1.797	0.761	0.8	1	34.913	1796.04	89.80	A
			B	0.308	2.275	0.618	0.8	1	14.627			
			C	0.235	2.483	0.598	0.8	1	10.983			
T2 80.00-60.00	677.00	754.80	A	0.658	1.779	0.791	0.8	1	38.963	1847.39	92.37	A
			B	0.442	1.987	0.67	0.8	1	22.348			
			C	0.442	1.987	0.67	0.8	1	22.348			
T3 60.00-53.33	227.52	303.60	A	0.686	1.776	0.81	0.8	1	14.053	626.03	93.86	A
			B	0.463	1.953	0.679	0.8	1	8.012			
			C	0.463	1.953	0.679	0.8	1	8.012			
T4 53.33-40.00	465.08	834.35	A	0.738	1.783	0.848	0.8	1	31.537	1334.54	100.12	A
			B	0.504	1.895	0.7	0.8	1	18.154			
			C	0.504	1.895	0.7	0.8	1	18.154			
T5 40.00-20.00	700.30	1643.58	A	0.638	1.786	0.777	0.8	1	49.287	1891.59	94.58	A
			B	0.452	1.97	0.674	0.8	1	31.053			
			C	0.448	1.977	0.672	0.8	1	30.689			
T6 20.00-0.00	597.38	1854.65	A	0.447	1.979	0.672	0.8	1	42.971	1827.65	91.38	A
			B	0.338	2.2	0.628	0.8	1	31.431			
			C	0.333	2.213	0.626	0.8	1	30.920			
Sum Weight:	3033.22	6145.77						OTM	463734.74 lb-ft	9323.23		

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 ft^2	F lb	w plf	Ctrl. Face
T1 100.00-80.00	365.94	754.80	A	0.612	1.797	0.761	0.85	1	34.972	1799.08	89.95	A
			B	0.308	2.275	0.618	0.85	1	14.733			
			C	0.235	2.483	0.598	0.85	1	11.099			
T2 80.00-60.00	677.00	754.80	A	0.658	1.779	0.791	0.85	1	39.015	1849.86	92.49	A
			B	0.442	1.987	0.67	0.85	1	22.433			
			C	0.442	1.987	0.67	0.85	1	22.433			
T3 60.00-53.33	227.52	303.60	A	0.686	1.776	0.81	0.85	1	14.070	626.76	93.97	A
			B	0.463	1.953	0.679	0.85	1	8.040			
			C	0.463	1.953	0.679	0.85	1	8.040			
T4 53.33-40.00	465.08	834.35	A	0.738	1.783	0.848	0.85	1	31.622	1338.16	100.39	A
			B	0.504	1.895	0.7	0.85	1	18.316			
			C	0.504	1.895	0.7	0.85	1	18.316			
T5 40.00-20.00	700.30	1643.58	A	0.638	1.786	0.777	0.85	1	49.487	1899.27	94.96	A
			B	0.452	1.97	0.674	0.85	1	31.356			
			C	0.448	1.977	0.672	0.85	1	30.994			
T6 20.00-0.00	597.38	1854.65	A	0.447	1.979	0.672	0.85	1	43.424	1846.90	92.35	A
			B	0.338	2.2	0.628	0.85	1	31.973			
			C	0.333	2.213	0.626	0.85	1	31.467			
Sum Weight:	3033.22	6145.77						OTM	464814.89 lb-ft	9360.03		

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 ft^2	F lb	w plf	Ctrl. Face
T1 100.00-80.00	1056.61	1095.63	A	0.888	1.907	0.972	1	1	67.196	2751.92	137.60	A
			B	0.453	1.969	0.674	1	1	27.314			
			C	0.363	2.142	0.637	1	1	19.743			
T2 80.00-60.00	1921.50	1095.63	A	0.951	2.006	1	1	1	72.726	2914.96	145.75	A
			B	0.617	1.794	0.764	1	1	41.754			
			C	0.617	1.794	0.764	1	1	41.754			
T3 60.00-53.33	645.09	424.88	A	0.977	2.053	1	1	1	25.251	972.53*	145.81	A
			B	0.634	1.787	0.775	1	1	14.514			
			C	0.634	1.787	0.775	1	1	14.514			
T4 53.33-40.00	1314.74	1190.77	A	1	2.1	1	1	1	52.508	1838.71*	137.94	A
			B	0.682	1.776	0.807	1	1	31.865			
			C	0.682	1.776	0.807	1	1	31.865			
T5 40.00-20.00	1981.70	2179.61	A	0.873	1.888	0.958	1	1	86.470	2631.28	131.56	A
			B	0.582	1.817	0.743	1	1	50.788			
			C	0.571	1.825	0.736	1	1	49.800			
T6 20.00-0.00	1692.18	2535.54	A	0.609	1.799	0.759	1	1	76.545	2219.74	110.99	A
			B	0.438	1.994	0.668	1	1	50.929			
			C	0.424	2.018	0.662	1	1	49.554			
Sum Weight:	8611.81	8522.06			*$2A_g$ limit			OTM	693767.19 lb-ft	13329.14		

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 ft^2	F lb	w plf	Ctrl. Face
T1 100.00-80.00	1056.61	1095.63	A	0.888	1.907	0.972	0.8	1	58.544	2397.58	119.88	A
			B	0.453	1.969	0.674	0.8	1	24.871			
			C	0.363	2.142	0.637	0.8	1	18.603			
T2 80.00-60.00	1921.50	1095.63	A	0.951	2.006	1	0.8	1	63.167	2531.82	126.59	A
			B	0.617	1.794	0.764	0.8	1	36.923			
			C	0.617	1.794	0.764	0.8	1	36.923			
T3 60.00-53.33	645.09	424.88	A	0.977	2.053	1	0.8	1	22.068	852.53	127.82	A
			B	0.634	1.787	0.775	0.8	1	12.904			
			C	0.634	1.787	0.775	0.8	1	12.904			
T4 53.33-40.00	1314.74	1190.77	A	1	2.1	1	0.8	1	46.162	1725.37	129.44	A
			B	0.682	1.776	0.807	0.8	1	28.301			
			C	0.682	1.776	0.807	0.8	1	28.301			
T5 40.00-20.00	1981.70	2179.61	A	0.873	1.888	0.958	0.8	1	76.621	2331.57	116.58	A
			B	0.582	1.817	0.743	0.8	1	45.202			
			C	0.571	1.825	0.736	0.8	1	44.188			
T6 20.00-0.00	1692.18	2535.54	A	0.609	1.799	0.759	0.8	1	67.062	1944.75	97.24	A
			B	0.438	1.994	0.668	0.8	1	45.065			
			C	0.424	2.018	0.662	0.8	1	43.643			
Sum Weight:	8611.81	8522.06						OTM	611227.71 lb-ft	11783.63		

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 ft^2	F lb	w plf	Ctrl. Face
T1 100.00-80.00	1056.61	1095.63	A	0.888	1.907	0.972	0.85	1	60.707	2486.17	124.31	A
			B	0.453	1.969	0.674	0.85	1	25.482			
			C	0.363	2.142	0.637	0.85	1	18.888			
T2 80.00-60.00	1921.50	1095.63	A	0.951	2.006	1	0.85	1	65.557	2627.60	131.38	A
			B	0.617	1.794	0.764	0.85	1	38.130			
			C	0.617	1.794	0.764	0.85	1	38.130			
T3 60.00-53.33	645.09	424.88	A	0.977	2.053	1	0.85	1	22.863	883.28	132.43	A
			B	0.634	1.787	0.775	0.85	1	13.306			
			C	0.634	1.787	0.775	0.85	1	13.306			
T4 53.33-40.00	1314.74	1190.77	A	1	2.1	1	0.85	1	47.748	1784.67	133.88	A
			B	0.682	1.776	0.807	0.85	1	29.192			
			C	0.682	1.776	0.807	0.85	1	29.192			
T5 40.00-20.00	1981.70	2179.61	A	0.873	1.888	0.958	0.85	1	79.083	2406.50	120.32	A
			B	0.582	1.817	0.743	0.85	1	46.599			
			C	0.571	1.825	0.736	0.85	1	45.591			
T6 20.00-0.00	1692.18	2535.54	A	0.609	1.799	0.759	0.85	1	69.433	2013.50	100.67	A
			B	0.438	1.994	0.668	0.85	1	46.531			
			C	0.424	2.018	0.662	0.85	1	45.120			
Sum Weight:	8611.81	8522.06						OTM	633349.98 lb-ft	12201.72		

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 ft^2	F lb	w plf	Ctrl. Face
T1 100.00-80.00	365.94	754.80	A	0.612	1.797	0.761	1	1	35.149	625.68	31.28	A
			B	0.308	2.275	0.618	1	1	15.049			
			C	0.235	2.483	0.598	1	1	11.449			
T2 80.00-60.00	677.00	754.80	A	0.658	1.779	0.791	1	1	39.171	642.65	32.13	A
			B	0.442	1.987	0.67	1	1	22.689			
			C	0.442	1.987	0.67	1	1	22.689			
T3 60.00-53.33	227.52	303.60	A	0.686	1.776	0.81	1	1	14.119	217.64	32.63	A
			B	0.463	1.953	0.679	1	1	8.124			
			C	0.463	1.953	0.679	1	1	8.124			
T4 53.33-40.00	465.08	834.35	A	0.738	1.783	0.848	1	1	31.879	466.79	35.02	A
			B	0.504	1.895	0.7	1	1	18.801			
			C	0.504	1.895	0.7	1	1	18.801			
T5 40.00-20.00	700.30	1643.58	A	0.638	1.786	0.777	1	1	50.087	665.16	33.26	A
			B	0.452	1.97	0.674	1	1	32.265			
			C	0.448	1.977	0.672	1	1	31.911			
T6 20.00-0.00	597.38	1854.65	A	0.447	1.979	0.672	1	1	44.782	659.05	32.95	A
			B	0.338	2.2	0.628	1	1	33.599			
			C	0.333	2.213	0.626	1	1	33.106			
Sum Weight:	3033.22	6145.77						OTM	161956.87 lb-ft	3276.96		

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 ft^2	F lb	w plf	Ctrl. Face
T1 100.00-80.00	365.94	754.80	A	0.612	1.797	0.761	0.8	1	34.913	621.47	31.07	A
			B	0.308	2.275	0.618	0.8	1	14.627			
			C	0.235	2.483	0.598	0.8	1	10.983			
T2 80.00-60.00	677.00	754.80	A	0.658	1.779	0.791	0.8	1	38.963	639.23	31.96	A
			B	0.442	1.987	0.67	0.8	1	22.348			
			C	0.442	1.987	0.67	0.8	1	22.348			
T3 60.00-53.33	227.52	303.60	A	0.686	1.776	0.81	0.8	1	14.053	216.62	32.48	A
			B	0.463	1.953	0.679	0.8	1	8.012			
			C	0.463	1.953	0.679	0.8	1	8.012			
T4 53.33-40.00	465.08	834.35	A	0.738	1.783	0.848	0.8	1	31.537	461.78	34.64	A
			B	0.504	1.895	0.7	0.8	1	18.154			
			C	0.504	1.895	0.7	0.8	1	18.154			
T5 40.00-20.00	700.30	1643.58	A	0.638	1.786	0.777	0.8	1	49.287	654.53	32.73	A
			B	0.452	1.97	0.674	0.8	1	31.053			
			C	0.448	1.977	0.672	0.8	1	30.689			
T6 20.00-0.00	597.38	1854.65	A	0.447	1.979	0.672	0.8	1	42.971	632.41	31.62	A
			B	0.338	2.2	0.628	0.8	1	31.431			
			C	0.333	2.213	0.626	0.8	1	30.920			
Sum Weight:	3033.22	6145.77						OTM	160461.85 lb-ft	3226.03		

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 ft^2	F lb	w plf	Ctrl. Face
T1 100.00-80.00	365.94	754.80	A	0.612	1.797	0.761	0.85	1	34.972	622.52	31.13	A
			B	0.308	2.275	0.618	0.85	1	14.733			
			C	0.235	2.483	0.598	0.85	1	11.099			
T2 80.00-60.00	677.00	754.80	A	0.658	1.779	0.791	0.85	1	39.015	640.09	32.00	A
			B	0.442	1.987	0.67	0.85	1	22.433			
			C	0.442	1.987	0.67	0.85	1	22.433			
T3 60.00-53.33	227.52	303.60	A	0.686	1.776	0.81	0.85	1	14.070	216.87	32.51	A
			B	0.463	1.953	0.679	0.85	1	8.040			
			C	0.463	1.953	0.679	0.85	1	8.040			
T4 53.33-40.00	465.08	834.35	A	0.738	1.783	0.848	0.85	1	31.622	463.03	34.74	A
			B	0.504	1.895	0.7	0.85	1	18.316			
			C	0.504	1.895	0.7	0.85	1	18.316			
T5 40.00-20.00	700.30	1643.58	A	0.638	1.786	0.777	0.85	1	49.487	657.19	32.86	A
			B	0.452	1.97	0.674	0.85	1	31.356			
			C	0.448	1.977	0.672	0.85	1	30.994			
T6 20.00-0.00	597.38	1854.65	A	0.447	1.979	0.672	0.85	1	43.424	639.07	31.95	A
			B	0.338	2.2	0.628	0.85	1	31.973			
			C	0.333	2.213	0.626	0.85	1	31.467			
Sum Weight:	3033.22	6145.77						OTM	160835.60 lb-ft	3238.76		

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	4035.84					
Bracing Weight	2109.93					
Total Member Self-Weight	6145.77			1815.35	365.56	
Total Weight	13451.60			1815.35	365.56	
Wind 0 deg - No Ice		241.70	-13543.44	-825885.99	-23018.80	1686.16
Wind 30 deg - No Ice		7050.97	-11754.22	-723880.89	-444333.22	1950.90
Wind 60 deg - No Ice		11939.06	-6907.45	-430126.46	-745555.51	1687.58
Wind 90 deg - No Ice		13683.29	-241.70	-21569.01	-848529.09	971.30
Wind 120 deg - No Ice		11824.83	6562.40	395414.57	-725912.92	-0.34
Wind 150 deg - No Ice		6632.33	11512.51	704127.23	-403830.31	-979.60
Wind 180 deg - No Ice		-241.70	13396.26	825196.07	23749.93	-1693.85
Wind 210 deg - No Ice		-7050.97	11754.22	727511.60	445064.34	-1950.90
Wind 240 deg - No Ice		-12066.53	6981.04	435917.48	750028.40	-1685.82
Wind 270 deg - No Ice		-13683.29	241.70	25199.72	849260.21	-971.30
Wind 300 deg - No Ice		-11697.36	-6488.81	-389623.55	722902.27	6.28
Wind 330 deg - No Ice		-6632.33	-11512.51	-700496.53	404561.43	979.60
Member Ice	2376.29					
Total Weight Ice	23421.56			3674.78	271.96	
Wind 0 deg - Ice		187.58	-16962.58	-1011108.85	-17823.80	929.32
Wind 30 deg - Ice		8179.98	-13807.45	-831878.66	-502287.05	1181.16
Wind 60 deg - Ice		13618.48	-7870.98	-478118.68	-832931.58	1051.79
Wind 90 deg - Ice		16035.06	-187.58	-14420.98	-973503.29	597.04
Wind 120 deg - Ice		14769.35	8318.85	495395.21	-886317.11	25.85
Wind 150 deg - Ice		7855.08	13619.87	821132.47	-470944.28	-584.12
Wind 180 deg - Ice		-187.58	15417.08	935918.94	18367.72	-1051.42
Wind 210 deg - Ice		-8179.98	13807.45	839228.23	502830.98	-1181.16
Wind 240 deg - Ice		-14956.93	8643.74	526737.99	904956.79	-955.17
Wind 270 deg - Ice		-16035.06	187.58	21770.54	974047.22	-597.04
Wind 300 deg - Ice		-13430.90	-7546.09	-446775.91	815379.74	-0.37
Wind 330 deg - Ice		-7855.08	-13619.87	-813782.90	471488.20	584.12
Total Weight	13451.60			1815.35	365.56	
Wind 0 deg - Service		83.63	-4686.31	-285161.35	-8339.72	583.45
Wind 30 deg - Service		2439.78	-4067.20	-249865.47	-154123.25	675.05
Wind 60 deg - Service		4131.16	-2390.12	-148220.34	-258352.42	583.94
Wind 90 deg - Service		4734.70	-83.63	-6850.98	-293983.41	336.09
Wind 120 deg - Service		4091.64	2270.73	137433.99	-251555.67	-0.12
Wind 150 deg - Service		2294.92	3983.57	244254.99	-140108.40	-338.96
Wind 180 deg - Service		-83.63	4635.38	286147.32	7843.24	-586.11
Wind 210 deg - Service		-2439.78	4067.20	252346.46	153626.77	-675.05
Wind 240 deg - Service		-4175.27	2415.59	151448.84	259150.67	-583.33
Wind 270 deg - Service		-4734.70	83.63	9331.97	293486.93	-336.09
Wind 300 deg - Service		-4047.53	-2245.26	-134205.49	249764.46	2.17
Wind 330 deg - Service		-2294.92	-3983.57	-241774.00	139611.92	338.96

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice

Comb. No.	*Description*
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	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*
T1	100 - 80	Leg	Max Tension	4	15359.39	-57.65	34.87
			Max. Compression	23	-29307.93	75.94	-44.22
			Max. Mx	5	-5697.54	591.43	41.84
			Max. My	2	-5461.84	-39.26	-540.42
			Max. Vy	11	-646.47	263.36	-5.84
			Max. Vx	8	587.66	8.33	-250.41
		Diagonal	Max Tension	16	5673.25	0.00	0.00
		Horizontal	Max Tension	1	0.00	0.00	0.00
			Max. Compression	4	-4996.36	0.00	0.00
			Max. Mx	14	-4395.79	-5.12	0.00
			Max. My	26	-4640.87	0.00	-0.00
			Max. Vy	14	5.85	0.00	0.00
			Max. Vx	26	0.00	0.00	0.00
		Top Girt	Max Tension	1	0.00	0.00	0.00
			Max. Compression	4	-2588.24	0.00	0.00
			Max. Mx	14	-2443.44	-5.12	0.00
			Max. My	26	-2446.81	0.00	-0.00
			Max. Vy	14	5.85	0.00	0.00
			Max. Vx	26	0.00	0.00	0.00
T2	80 - 60	Leg	Max Tension	17	59055.66	-227.83	65.15
			Max. Compression	23	-81330.28	235.54	-148.44
			Max. Mx	18	-9188.29	-265.54	1.27
			Max. My	8	-29732.43	45.81	-278.32

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Vy	4	215.89	-232.47	178.42
			Max. Vx	3	304.53	-150.27	256.67
		Diagonal	Max Tension	24	8563.85	0.00	0.00
		Horizontal	Max Tension	1	0.00	0.00	0.00
			Max. Compression	23	-6311.41	0.00	0.00
			Max. Mx	14	-4298.26	-5.12	0.00
			Max. My	20	-4393.70	0.00	-0.00
			Max. Vy	14	5.85	0.00	0.00
			Max. Vx	20	0.00	0.00	0.00
		Top Girt	Max Tension	1	0.00	0.00	0.00
			Max. Compression	10	-5184.90	0.00	0.00
			Max. Mx	14	-4383.30	-5.12	0.00
			Max. My	26	-4401.15	0.00	-0.00
			Max. Vy	14	5.85	0.00	0.00
			Max. Vx	26	0.00	0.00	0.00
T3	60 - 53.33	Leg	Max Tension	17	78727.01	-408.58	234.28
			Max. Compression	23	-104322.97	711.96	-382.95
			Max. Mx	18	-84474.02	-717.11	-15.00
			Max. My	15	-98877.08	15.04	771.04
			Max. Vy	23	-154.35	711.96	-382.95
			Max. Vx	15	-166.93	15.04	771.04
		Diagonal	Max Tension	24	9306.24	0.00	0.00
		Horizontal	Max Tension	1	0.00	0.00	0.00
			Max. Compression	24	-6774.29	0.00	0.00
			Max. Mx	14	-4521.09	-5.12	0.00
			Max. My	26	-6706.52	0.00	-0.00
			Max. Vy	14	5.85	0.00	0.00
			Max. Vx	26	0.00	0.00	0.00
		Top Girt	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-6364.21	0.00	0.00
			Max. Mx	14	-4365.37	-5.12	0.00
			Max. My	20	-6302.27	0.00	-0.00
			Max. Vy	14	5.85	0.00	0.00
			Max. Vx	20	0.00	0.00	0.00
T4	53.33 - 40	Leg	Max Tension	17	122715.70	607.32	-374.07
			Max. Compression	23	-155239.79	2759.65	-1432.57
			Max. Mx	23	-155239.79	2759.65	-1432.57
			Max. My	15	-148297.28	141.82	2971.35
			Max. Vy	23	-1512.90	2759.65	-1432.57
			Max. Vx	15	-1641.19	141.82	2971.35
		Diagonal	Max Tension	24	10606.67	0.00	0.00
		Horizontal	Max Tension	1	0.00	0.00	0.00
			Max. Compression	23	-6849.56	0.00	0.00
			Max. Mx	14	-3858.51	-5.12	0.00
			Max. My	16	-5023.70	0.00	0.00
			Max. Vy	14	5.85	0.00	0.00
			Max. Vx	16	-0.00	0.00	0.00
		Secondary Horizontal	Max Tension	23	2688.83	0.00	0.00
			Max. Compression	23	-2688.83	0.00	0.00
			Max. Mx	14	179.25	-11.17	0.00
			Max. My	15	2568.58	0.00	-0.00
			Max. Vy	14	12.77	0.00	0.00
			Max. Vx	15	0.00	0.00	0.00
		Top Girt	Max Tension	1	0.00	0.00	0.00
			Max. Compression	24	-6320.25	0.00	0.00
			Max. Mx	14	-4169.36	-5.12	0.00
			Max. My	26	-6235.65	0.00	-0.00
			Max. Vy	14	5.85	0.00	0.00
			Max. Vx	26	0.00	0.00	0.00
		Bottom Girt	Max Tension	1	0.00	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Compression	23	-3005.01	0.00	0.00
			Max. Mx	14	-1943.67	-5.12	0.00
			Max. My	16	-2714.55	0.00	0.00
			Max. Vy	14	5.85	0.00	0.00
			Max. Vx	16	-0.00	0.00	0.00
T5	40 - 20	Leg	Max Tension	17	135629.25	-1094.71	-4.12
			Max. Compression	23	-160002.65	1009.38	2.13
			Max. Mx	23	-152495.47	3106.18	138.95
			Max. My	22	-1816.88	-327.70	2486.19
			Max. Vy	23	538.16	3106.18	138.95
			Max. Vx	18	351.20	-280.71	2479.18
		Diagonal	Max Tension	23	2146.03	0.00	0.00
			Max. Compression	16	-2890.87	0.00	0.00
			Max. Mx	23	507.40	63.33	6.08
			Max. My	23	-2231.84	-62.75	15.47
			Max. Vy	23	-24.92	63.33	6.08
			Max. Vx	23	-5.44	0.00	0.00
T6	20 - 0	Leg	Max Tension	17	141081.75	-1722.72	-1.81
			Max. Compression	23	-170765.91	-0.00	-0.46
			Max. Mx	23	-166726.76	1873.27	-7.54
			Max. My	22	-6276.29	942.51	1681.09
			Max. Vy	17	-394.24	-1722.72	-1.81
			Max. Vx	18	357.12	969.75	1675.51
		Diagonal	Max Tension	21	2779.56	0.00	0.00
			Max. Compression	21	-1958.82	0.00	0.00
			Max. Mx	23	337.59	80.22	2.91
			Max. My	22	2186.43	25.53	9.48
			Max. Vy	23	-29.45	80.22	2.91
			Max. Vx	22	-2.56	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Leg C	Max. Vert	23	171656.24	9406.67	-5331.76
	Max. H_x	23	171656.24	9406.67	-5331.76
	Max. H_z	17	-142460.38	-10532.11	5990.01
	Min. Vert	17	-142460.38	-10532.11	5990.01
	Min. H_x	17	-142460.38	-10532.11	5990.01
	Min. H_z	23	171656.24	9406.67	-5331.76
Leg B	Max. Vert	19	166653.30	-9130.03	-5281.37
	Max. H_x	25	-137596.52	10248.21	5955.85
	Max. H_z	25	-137596.52	10248.21	5955.85
	Min. Vert	25	-137596.52	10248.21	5955.85
	Min. H_x	19	166653.30	-9130.03	-5281.37
	Min. H_z	19	166653.30	-9130.03	-5281.37
Leg A	Max. Vert	15	165994.63	94.74	10540.06
	Max. H_x	18	10066.15	498.88	-1048.40
	Max. H_z	15	165994.63	94.74	10540.06
	Min. Vert	21	-138606.64	-112.09	-11880.00
	Min. H_x	24	4370.12	-501.81	-1353.06
	Min. H_z	21	-138606.64	-112.09	-11880.00

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
Dead Only	13451.60	0.00	0.00	1745.35	368.33	-3.10
Dead+Wind 0 deg - No Ice	13451.60	241.70	-13543.44	-834374.32	-23353.96	1678.82
Dead+Wind 30 deg - No Ice	13451.60	7050.94	-11754.23	-731325.95	-449005.37	1949.63
Dead+Wind 60 deg - No Ice	13451.60	11939.06	-6907.45	-434565.85	-753297.93	1714.44
Dead+Wind 90 deg - No Ice	13451.60	13683.29	-241.66	-21841.07	-857317.84	1014.40
Dead+Wind 120 deg - No Ice	13451.60	11824.82	6562.41	399424.44	-733417.80	28.25
Dead+Wind 150 deg - No Ice	13451.60	6632.35	11512.50	711312.13	-407967.66	-975.28
Dead+Wind 180 deg - No Ice	13451.60	-241.70	13396.26	833643.34	24051.06	-1693.96
Dead+Wind 210 deg - No Ice	13451.60	-7051.00	11754.20	735018.77	449740.99	-1944.20
Dead+Wind 240 deg - No Ice	13451.60	-12066.53	6981.04	440492.11	757857.25	-1706.72
Dead+Wind 270 deg - No Ice	13451.60	-13683.29	241.73	25567.25	858056.45	-1017.60
Dead+Wind 300 deg - No Ice	13451.60	-11697.36	-6488.81	-393536.47	730323.50	-20.37
Dead+Wind 330 deg - No Ice	13451.60	-6632.30	-11512.53	-707650.11	408661.06	975.21
Dead+Ice+Temp	23421.56	-0.00	0.00	3780.34	253.55	2.76
Dead+Wind 0 deg+Ice+Temp	23421.56	187.58	-16962.58	-1027457.59	-18250.16	935.18
Dead+Wind 30 deg+Ice+Temp	23421.56	8179.89	-13807.49	-845358.57	-510520.47	1175.50
Dead+Wind 60 deg+Ice+Temp	23421.56	13618.50	-7870.96	-485846.70	-846503.02	1123.74
Dead+Wind 90 deg+Ice+Temp	23421.56	16035.06	-187.49	-14672.44	-989355.01	705.32
Dead+Wind 120 deg+Ice+Temp	23421.56	14769.35	8318.84	503355.42	-900733.47	82.96
Dead+Wind 150 deg+Ice+Temp	23421.56	7855.14	13619.84	834334.86	-478578.26	-598.76
Dead+Wind 180 deg+Ice+Temp	23421.56	-187.56	15417.08	950985.68	18729.20	-1069.87
Dead+Wind 210 deg+Ice+Temp	23421.56	-8180.06	13807.39	852831.20	511136.26	-1171.70
Dead+Wind 240 deg+Ice+Temp	23421.56	-14956.92	8643.75	535400.39	919754.37	-1018.90
Dead+Wind 270 deg+Ice+Temp	23421.56	-16035.06	187.65	22324.37	989878.15	-709.25
Dead+Wind 300 deg+Ice+Temp	23421.56	-13430.91	-7546.09	-453841.11	828502.48	-50.38
Dead+Wind 330 deg+Ice+Temp	23421.56	-7855.03	-13619.90	-826876.31	478984.59	598.32
Dead+Wind 0 deg - Service	13451.60	83.63	-4686.31	-287505.86	-7840.37	583.86
Dead+Wind 30 deg - Service	13451.60	2439.78	-4067.20	-251861.17	-155136.23	681.02
Dead+Wind 60 deg - Service	13451.60	4131.16	-2390.12	-149181.23	-260441.38	593.22
Dead+Wind 90 deg - Service	13451.60	4734.70	-83.63	-6358.75	-296424.79	346.23
Dead+Wind 120 deg - Service	13451.60	4091.64	2270.73	139414.29	-253539.05	9.05
Dead+Wind 150 deg - Service	13451.60	2294.92	3983.57	247346.41	-140926.49	-333.66
Dead+Wind 180 deg - Service	13451.60	-83.63	4635.38	289688.17	8567.00	-586.30
Dead+Wind 210 deg - Service	13451.60	-2439.78	4067.20	255551.01	155863.20	-680.74
Dead+Wind 240 deg - Service	13451.60	-4175.27	2415.59	153622.70	262472.97	-592.62
Dead+Wind 270 deg - Service	13451.60	-4734.70	83.63	10046.00	297157.05	-346.47
Dead+Wind 300 deg - Service	13451.60	-4047.53	-2245.26	-134976.44	252968.35	-6.91
Dead+Wind 330 deg - Service	13451.60	-2294.92	-3983.57	-243661.86	141655.70	333.66

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	-13451.60	0.00	-0.00	13451.60	-0.00	0.000%
2	241.70	-13451.60	-13543.44	-241.70	13451.60	13543.44	0.000%
3	7050.97	-13451.60	-11754.22	-7050.94	13451.60	11754.23	0.000%
4	11939.06	-13451.60	-6907.45	-11939.06	13451.60	6907.45	0.000%
5	13683.29	-13451.60	-241.70	-13683.29	13451.60	241.66	0.000%
6	11824.83	-13451.60	6562.40	-11824.82	13451.60	-6562.41	0.000%
7	6632.33	-13451.60	11512.51	-6632.35	13451.60	-11512.50	0.000%
8	-241.70	-13451.60	13396.26	241.70	13451.60	-13396.26	0.000%
9	-7050.97	-13451.60	11754.22	7051.00	13451.60	-11754.20	0.000%
10	-12066.53	-13451.60	6981.04	12066.53	13451.60	-6981.04	0.000%
11	-13683.29	-13451.60	241.70	13683.29	13451.60	-241.73	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
12	-11697.36	-13451.60	-6488.81	11697.36	13451.60	6488.81	0.000%
13	-6632.33	-13451.60	-11512.51	6632.30	13451.60	11512.53	0.000%
14	0.00	-23421.56	0.00	0.00	23421.56	-0.00	0.000%
15	187.58	-23421.56	-16962.59	-187.58	23421.56	16962.58	0.000%
16	8179.98	-23421.56	-13807.45	-8179.89	23421.56	13807.49	0.000%
17	13618.48	-23421.56	-7870.98	-13618.50	23421.56	7870.96	0.000%
18	16035.06	-23421.56	-187.58	-16035.06	23421.56	187.49	0.000%
19	14769.35	-23421.56	8318.85	-14769.35	23421.56	-8318.84	0.000%
20	7855.08	-23421.56	13619.87	-7855.14	23421.56	-13619.84	0.000%
21	-187.58	-23421.56	15417.08	187.56	23421.56	-15417.08	0.000%
22	-8179.98	-23421.56	13807.45	8180.06	23421.56	-13807.39	0.000%
23	-14956.93	-23421.56	8643.74	14956.92	23421.56	-8643.75	0.000%
24	-16035.06	-23421.56	187.58	16035.06	23421.56	-187.65	0.000%
25	-13430.90	-23421.56	-7546.09	13430.91	23421.56	7546.09	0.000%
26	-7855.08	-23421.56	-13619.87	7855.03	23421.56	13619.90	0.000%
27	83.63	-13451.60	-4686.31	-83.63	13451.60	4686.31	0.000%
28	2439.78	-13451.60	-4067.20	-2439.78	13451.60	4067.20	0.000%
29	4131.16	-13451.60	-2390.12	-4131.16	13451.60	2390.12	0.000%
30	4734.70	-13451.60	-83.63	-4734.70	13451.60	83.63	0.000%
31	4091.64	-13451.60	2270.73	-4091.64	13451.60	-2270.73	0.000%
32	2294.92	-13451.60	3983.57	-2294.92	13451.60	-3983.57	0.000%
33	-83.63	-13451.60	4635.38	83.63	13451.60	-4635.38	0.000%
34	-2439.78	-13451.60	4067.20	2439.78	13451.60	-4067.20	0.000%
35	-4175.27	-13451.60	2415.59	4175.27	13451.60	-2415.59	0.000%
36	-4734.70	-13451.60	83.63	4734.70	13451.60	-83.63	0.000%
37	-4047.53	-13451.60	-2245.26	4047.53	13451.60	2245.26	0.000%
38	-2294.92	-13451.60	-3983.57	2294.92	13451.60	3983.57	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00016010
2	Yes	4	0.00000001	0.00028491
3	Yes	4	0.00000001	0.00014899
4	Yes	4	0.00000001	0.00000486
5	Yes	4	0.00000001	0.00046123
6	Yes	4	0.00000001	0.00017434
7	Yes	4	0.00000001	0.00037083
8	Yes	4	0.00000001	0.00000431
9	Yes	4	0.00000001	0.00023887
10	Yes	4	0.00000001	0.00031740
11	Yes	4	0.00000001	0.00041739
12	Yes	4	0.00000001	0.00000428
13	Yes	4	0.00000001	0.00037846
14	Yes	4	0.00000001	0.00010630
15	Yes	4	0.00000001	0.00028945
16	Yes	4	0.00000001	0.00033492
17	Yes	4	0.00000001	0.00020348
18	Yes	4	0.00000001	0.00055413
19	Yes	4	0.00000001	0.00031688
20	Yes	4	0.00000001	0.00042761
21	Yes	4	0.00000001	0.00011789
22	Yes	4	0.00000001	0.00036402
23	Yes	4	0.00000001	0.00031834
24	Yes	4	0.00000001	0.00044322

25	Yes	4	0.00000001	0.00002514
26	Yes	4	0.00000001	0.00044596
27	Yes	4	0.00000001	0.00000554
28	Yes	4	0.00000001	0.00000572
29	Yes	4	0.00000001	0.00000584
30	Yes	4	0.00000001	0.00000570
31	Yes	4	0.00000001	0.00000555
32	Yes	4	0.00000001	0.00000567
33	Yes	4	0.00000001	0.00000581
34	Yes	4	0.00000001	0.00000570
35	Yes	4	0.00000001	0.00000557
36	Yes	4	0.00000001	0.00000567
37	Yes	4	0.00000001	0.00000581
38	Yes	4	0.00000001	0.00000567

Maximum Tower Deflections - Service Wind

Section No.	*Elevation* *ft*	*Horz. Deflection* *in*	*Gov. Load Comb.*	*Tilt* °	*Twist* °
T1	100 - 80	6.592	35	0.5756	0.0696
T2	80 - 60	4.188	35	0.5444	0.0673
T3	60 - 53.33	2.090	35	0.4090	0.0600
T4	53.33 - 40	1.534	35	0.3511	0.0455
T5	40 - 20	0.710	35	0.1917	0.0170
T6	20 - 0	0.160	35	0.0790	0.0039

Critical Deflections and Radius of Curvature - Service Wind

Elevation *ft*	*Appurtenance*	*Gov. Load Comb.*	*Deflection* *in*	*Tilt* °	*Twist* °	*Radius of Curvature* *ft*
98.00	12' Boom Starmount	35	6.347	0.5751	0.0692	71363
96.00	Parabolic Grid	35	6.102	0.5744	0.0688	71363
89.00	72" x 10" x 5" Panel w/mount pipe	35	5.252	0.5686	0.0676	32438
83.00	APX16PV-16PVL-X w/mount pipe	35	4.538	0.5553	0.0669	20935
65.00	4-Bay 6810 w/Radome	35	2.562	0.4484	0.0660	7539
30.00	2.5" Tube x 2' Standoff	35	0.353	0.1184	0.0071	7344

Maximum Tower Deflections - Design Wind

Section No.	*Elevation* *ft*	*Horz. Deflection* *in*	*Gov. Load Comb.*	*Tilt* °	*Twist* °
T1	100 - 80	22.525	23	1.9134	0.3431
T2	80 - 60	14.527	23	1.8228	0.3349
T3	60 - 53.33	7.389	23	1.3908	0.2732
T4	53.33 - 40	5.436	23	1.1988	0.1936
T5	40 - 20	2.470	23	0.6591	0.0492
T6	20 - 0	0.561	23	0.2746	0.0110

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
98.00	12' Boom Starmount	23	21.713	1.9128	0.3420	25746
96.00	Parabolic Grid	23	20.902	1.9117	0.3408	25746
89.00	72" x 10" x 5" Panel w/mount pipe	23	18.080	1.8963	0.3373	11702
83.00	APX16PV-16PVL-X w/mount pipe	23	15.698	1.8565	0.3353	7553
65.00	4-Bay 6810 w/Radome	23	9.020	1.5188	0.3099	2529
30.00	2.5" Tube x 2' Standoff	23	1.214	0.4098	0.0179	1991

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	100	Leg	A325N	0.7500	4	3839.85	19438.40	0.198 ✔	1.333	Bolt Tension
T2	80	Leg	A325N	0.7500	4	14763.90	19438.60	0.760 ✔	1.333	Bolt Tension
T4	53.33	Leg	A325N	1.0000	4	30663.20	34557.30	0.887 ✔	1.333	Bolt Tension
		Secondary Horizontal	A325N	0.7500	1	2688.83	9277.52	0.290 ✔	1.333	Bolt Shear
T5	40	Leg	A325N	1.0000	6	22604.90	34557.50	0.654 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	2890.87	6442.72	0.449 ✔	1.333	Bolt Shear
T6	20	Leg	A36	1.5000	4	34988.60	33823.20	1.034 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	2779.56	6117.19	0.454 ✔	1.333	Member Bearing

Compression Checks

Leg Design Data (Compression)

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 $\frac{P}{P_a}$
T1	100 - 80	P2.5x.276	20.00	3.33	43.3 K=1.00	25.362	2.2535	-29307.90	57154.90	0.513 ✔
T2	80 - 60	P2.5x.276	20.00	3.33	43.3 K=1.00	25.362	2.2535	-81330.30	57154.90	**1.423** ✘
T3	60 - 53.33	H1-3 (1.42 CR) - 58 P3x.3	6.67	3.34	35.2 K=1.00	31.702	3.0159	-104323.00	95611.60	1.091 ✔
T4	53.33 - 40	P3x.3	13.33	1.67	17.6 K=1.00	34.598	3.0159	-155240.00	104344.00	**1.488** ✘

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* $\frac{P}{P_a}$
		H1-3 (1.49 CR) - 136								
T5	40 - 20	P5x.375	20.03	5.01	32.7 K=1.00	22.813	6.1120	-160003.00	139434.00	1.148 ✓
T6	20 - 0	P5x.375	20.03	5.01	32.7 K=1.00	22.813	6.1120	-170766.00	139434.00	1.225 ✓

Diagonal Design Data (Compression)

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* $\frac{P}{P_a}$
T5	40 - 20	L2x2x3/16	6.25	2.85	95.0 K=1.10	13.595	0.7150	-2890.87	9720.71	0.297 ✓
T6	20 - 0	L2 1/2x2 1/2x3/16	8.40	3.91	101.1 K=1.07	12.844	0.9020	-1958.82	11585.00	0.169 ✓

Horizontal Design Data (Compression)

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* $\frac{P}{P_a}$
T1	100 - 80	L1 1/2x1 1/2x3/16	3.50	3.26	128.2 K=0.96	9.083	0.5273	-4656.66	4789.66	0.972* ✓
T2	80 - 60	L1 1/2x1 1/2x3/16	3.50	3.26	128.2 K=0.96	9.083	0.5273	-6311.41	4789.66	1.318 ✓
T3	60 - 53.33	L1 1/2x1 1/2x3/16	3.50	3.21	126.9 K=0.97	9.271	0.5273	-6774.29	4889.07	**1.386** ✗
		H1-3 (1.39 CR) - 127								
T4	53.33 - 40	L1 1/2x1 1/2x3/16	3.50	3.21	126.9 K=0.97	9.271	0.5273	-6849.56	4889.07	**1.401** ✗
		H1-3 (1.40 CR) - 152								

* DL controls

Secondary Horizontal Design Data (Compression)

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* $\frac{P}{P_a}$
T4	53.33 - 40	L2 1/2x2 1/2x5/16	3.50	2.88	95.3 K=1.35	13.567	1.4600	-2688.83	19807.80	0.136 ✓

Top Girt Design Data (Compression)

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 $\frac{P}{P_a}$
T1	100 - 80	L1 1/2x1 1/2x3/16	3.50	3.26	128.2 K=0.96	9.083	0.5273	-2450.74	4789.66	0.512* ✔
T2	80 - 60	L1 1/2x1 1/2x3/16	3.50	3.26	128.2 K=0.96	9.083	0.5273	-4442.55	4789.66	0.928* ✔
T3	60 - 53.33	L1 1/2x1 1/2x3/16	3.50	3.26	128.2 K=0.96	9.083	0.5273	-6364.21	4789.66	1.329 ✔
T4	53.33 - 40	L1 1/2x1 1/2x3/16	3.50	3.21	126.9 K=0.97	9.271	0.5273	-6320.25	4889.07	1.293 ✔

* DL controls

Bottom Girt Design Data (Compression)

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 $\frac{P}{P_a}$
T4	53.33 - 40	L1 1/2x1 1/2x3/16	3.50	3.21	126.9 K=0.97	9.271	0.5273	-3005.01	4889.07	0.615 ✔

Tension Checks

Leg Design Data (Tension)

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 $\frac{P}{P_a}$
T1	100 - 80	P2.5x.276	20.00	3.33	43.3	30.000	2.2535	15359.40	67606.20	0.227 ✔
T2	80 - 60	P2.5x.276	20.00	3.33	43.3	30.000	2.2535	59055.70	67606.20	0.874 ✔
T3	60 - 53.33	H1-3 (1.42 CR) - 58 P3x.3	6.67	3.34	35.2	36.600	3.0159	78727.00	110383.00	0.713 ✔
T4	53.33 - 40	P3x.3	13.33	1.67	17.6	36.600	3.0159	122716.00	110383.00	1.112 ✔
T5	40 - 20	H1-3 (1.49 CR) - 136 P5x.375	20.03	5.01	32.7	25.200	6.1120	135629.00	154022.00	0.881 ✔
T6	20 - 0	P5x.375	20.03	5.01	32.7	25.200	6.1120	141082.00	154022.00	0.916 ✔

Diagonal Design Data (Tension)

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 $\frac{P}{P_a}$
T1	100 - 80	5/8	4.83	4.50	345.8	21.600	0.3068	5673.25	6626.80	0.856 ✓
T2	80 - 60	5/8	4.83	4.50	345.8	21.600	0.3068	8563.85	6626.80	1.292 ✓
T3	60 - 53.33	5/8	4.83	4.43	340.3	21.600	0.3068	9306.24	6626.80	**1.404** ✗
		H2-1 (1.40 CR) - 122								
T4	53.33 - 40	5/8	4.83	4.43	340.2	21.600	0.3068	10606.70	6626.80	**1.601** ✗
		H2-1 (1.60 CR) - 158								
T5	40 - 20	L2x2x3/16	6.25	2.85	58.6	21.600	0.7150	2146.03	15444.00	0.139 ✓
T6	20 - 0	L2 1/2x2 1/2x3/16	8.81	4.11	65.9	21.600	0.9020	2779.56	19483.20	0.143 ✓

Secondary Horizontal Design Data (Tension)

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 $\frac{P}{P_a}$
T4	53.33 - 40	L2 1/2x2 1/2x5/16	3.50	2.88	50.6	21.600	1.4600	2688.83	31536.00	0.085 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
T1	100 - 80	Leg	P2.5x.276	1	-29307.90	76187.48	38.5	Pass
T2	80 - 60	Leg	P2.5x.276	58	-81330.30	76187.48	106.8	Fail ✗
T3	60 - 53.33	Leg	P3x.3	115	-104323.00	127450.26	81.9	Pass
T4	53.33 - 40	Leg	P3x.3	136	-155240.00	139090.55	111.6	Fail ✗
T5	40 - 20	Leg	P5x.375	190	-160003.00	185865.51	86.1	Pass
T6	20 - 0	Leg	P5x.375	217	-170766.00	185865.51	91.9	Pass
T1	100 - 80	Diagonal	5/8	12	5673.25	8833.52	64.2	Pass
T2	80 - 60	Diagonal	5/8	65	8563.85	8833.52	96.9	Pass
T3	60 - 53.33	Diagonal	5/8	122	9306.24	8833.52	105.4	Fail ✗
T4	53.33 - 40	Diagonal	5/8	158	10606.70	8833.52	120.1	Fail ✗
T5	40 - 20	Diagonal	L2x2x3/16	214	-2890.87	12957.71	22.3 33.7 (b)	Pass
T6	20 - 0	Diagonal	L2 1/2x2 1/2x3/16	228	-1958.82	15442.80	12.7 34.1 (b)	Pass
T1	100 - 80	Horizontal	L1 1/2x1 1/2x3/16	50	-4656.66	4789.66	97.2	Pass
T2	80 - 60	Horizontal	L1 1/2x1 1/2x3/16	71	-6311.41	6384.62	98.9	Pass
T3	60 - 53.33	Horizontal	L1 1/2x1 1/2x3/16	127	-6774.29	6517.13	103.9	Fail ✗
T4	53.33 - 40	Horizontal	L1 1/2x1 1/2x3/16	152	-6849.56	6517.13	105.1	Fail ✗
T4	53.33 - 40	Secondary Horizontal	L2 1/2x2 1/2x5/16	154	-2688.83	26403.80	10.2	Pass

Section No.	*Elevation ft*	*Component Type*	*Size*	*Critical Element*	*P lb*	$SF*P_{allow}$ *lb*	*% Capacity*	*Pass Fail*
							21.7 (b)	
T1	100 - 80	Top Girt	L1 1/2x1 1/2x3/16	5	-2450.74	4789.66	51.2	Pass
T2	80 - 60	Top Girt	L1 1/2x1 1/2x3/16	62	-4442.55	4789.66	92.8	Pass
T3	60 - 53.33	Top Girt	L1 1/2x1 1/2x3/16	118	-6364.21	6384.62	99.7	Pass
T4	53.33 - 40	Top Girt	L1 1/2x1 1/2x3/16	139	-6320.25	6517.13	97.0	Pass
T4	53.33 - 40	Bottom Girt	L1 1/2x1 1/2x3/16	142	-3005.01	6517.13	46.1	Pass
							Summary	
						Leg (T4)	111.6	Fail
						Diagonal (T4)	120.1	Fail
						Horizontal (T4)	105.1	Fail
						Secondary Horizontal (T4)	21.7	Pass
						Top Girt (T3)	99.7	Pass
						Bottom Girt (T4)	46.1	Pass
						Bolt Checks	77.6	Pass
						RATING =	**120.1**	**Fail**

PIER AND MAT FOUNDATION ANALYSIS - 3 PIERS

TOWER FORCES:

Moment Caused by Tower	$M_t := 1064.2 \cdot kip \cdot ft$
Shear at Base of Tower	$S_t := 17.3 \cdot kip$
Max Compressive Force	$C_t := 171.7 \cdot kip$
Max Uplift	$U_t := 142.5 \cdot kip$
Height of Tower	$H_t := 100 \cdot ft$
Width of Tower at Base	$W_t := 7.5 \cdot ft$
Weight of Tower	$WT_t := 1.0 \cdot kip$

NOTE: Weight of Tower is incorporated into the other loads listed above and is therefore set equal to one for programming.

FOOTING DIMENSIONS:

Width of Footing	$W_f := 14.5 \cdot ft$
Overall Depth of Footing	$D_f := 7.0ft$
Length of Pier	$L_p := 4.25 \cdot ft$
Extension of Pier Above Grade	$L_{pag} := .25 \cdot ft$
Diameter of Pier	$d_p := 2.0 \cdot ft$
Thickness of Footing	$T_f := 3.0 \cdot ft$
Reinforement Cover:	$Cvr := 3in$

MATERIAL PROPERTIES:

Compressive Strength of Concrete	$f'c := 4000 \cdot psi$
Yield Strength of Steel Reinforcement	$fy := 60000 \cdot psi$
Internal Friction Angle of Soil	$\phi_s := 30 \cdot deg$
Allowable Bearing Capacity	$q_s := 10000 \cdot psf$
Unit Weight of Soil	$\gamma_s := 120 \cdot pcf$
Unit Weight of Concrete	$\gamma_c := 150 \cdot pcf$
Depth to Neglect	$n := 0 \cdot ft$
Cohesion of Clay Type Soil Note: Use 0 for Sandy Soil	$c := 0 \cdot ksf$

Coefficient of Lateral Soil Pressure $K_p := \dfrac{1 + \sin(\phi_s)}{1 - \sin(\phi_s)}$ $K_p = 3$

What is Position of Center of Tower with respect to Center of Pad? 1=Offset 2=Not Offset $Pos_{tower} := 2$

STEEL REINFORCING:

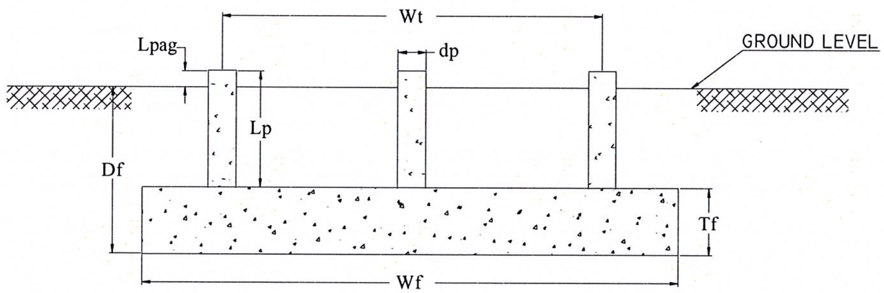
PIER REINFORCEMENT:

Bar Size	$BSpier := 8$	Bar Diameter	$d_{bpier} := 1.0 \cdot in$
Number of Bars	$NBpier := 8$	Bar Area	$A_{bpier} := 0.79 \cdot in^2$

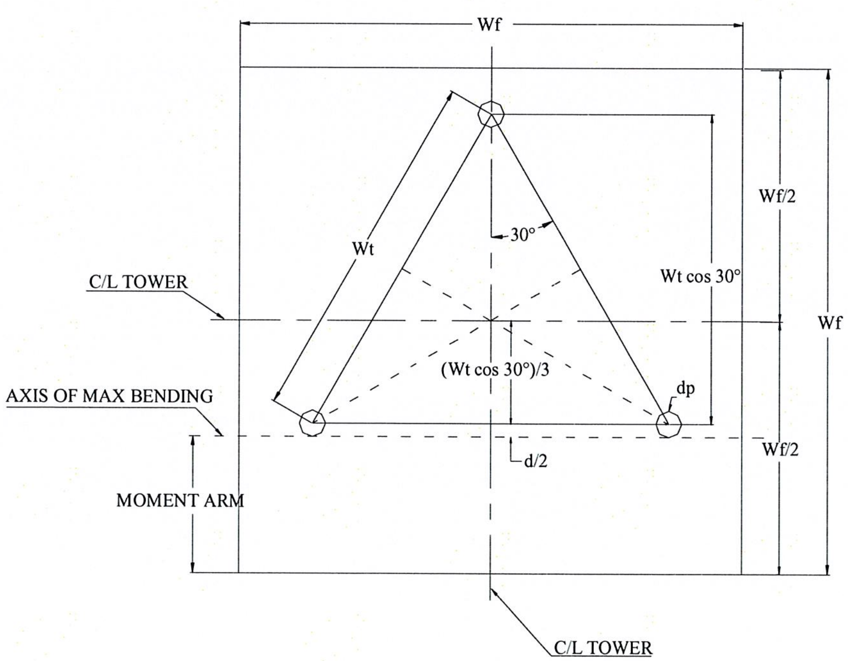
PAD REINFORCEMENT:

Bar Size	$BS_{pad} := 8$	Bar Diameter	$d_{bpad} := 1.0 \cdot in$
Number of Bars	$NB_{pad} := 15$	Bar Area	$A_{bpad} := 0.79 \cdot in^2$

FOUNDATION OVERVIEW



ELEVATION



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Page ___ of ___

STABILITY OF FOOTING

Factor of Safety Req'd: $FS_{req} := 2.0$

Passive Pressure:

$P_{pn} := K_p \cdot \gamma_s \cdot n + c \cdot 2 \cdot \sqrt{K_p}$ $\qquad P_{pn} = 0 \cdot ksf$

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p}$ $\qquad P_{pt} = 1.44 \cdot ksf$

$P_{top} := if[n < (D_f - T_f), P_{pt}, P_{pn}]$ $\qquad P_{top} = 1.44 \cdot ksf$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p}$ $\qquad P_{bot} = 2.52 \cdot ksf$

$P_{ave} := \frac{P_{top} + P_{bot}}{2}$ $\qquad P_{ave} = 1.98 \cdot ksf$

Shear:

$T_{pp} := if[n < (D_f - T_f), T_f, (D_f - n)]$ $\qquad T_{pp} = 3 \cdot ft$

$A_{pp} := W_f \cdot T_{pp}$ $\qquad A_{pp} = 43.5 \cdot ft^2$

Ultimate Shear: $S_u := P_{ave} \cdot A_{pp}$ $\qquad S_u = 86.13 \cdot kip$

Weight of Concrete Pad: $WT_c := (W_f^2 \cdot T_f) \cdot \gamma_c$ $\qquad WT_c = 94.6125 \cdot kip$

Weight of Soil: above Footing: $WT_{s1} := W_f^2 (|D_f - T_f|) \cdot \gamma_s$ $\qquad WT_{s1} = 100.92 \cdot kip$

Weight of Soil Wedge at back face: $WT_{s2} := \left[\frac{(D_f - n)^2 \cdot \tan(\phi_s)}{2} \cdot W_f\right] \cdot \gamma_s$ $\qquad WT_{s2} = 24.6124 \cdot kip$

Distance to center of Tower Leg from Edge of Footing:

$X_{t1} := \frac{W_f}{2} - \frac{W_t \cdot \cos(30 \cdot deg)}{2}$ $\qquad X_{t2} := \frac{W_f}{2} - \frac{W_t \cdot \cos(30 \cdot deg)}{3}$

$X_t := if(Pos_{tower} = 1, X_{t1}, X_{t2})$ $\qquad X_t = 5.0849 \cdot ft$

Additional Offset of Footing:

$X_{off1} := \frac{W_f}{2} - \left(\frac{W_t \cdot \cos(30 \cdot deg)}{3} + X_t\right)$ $\qquad X_{off2} := 0$

$X_{off} := if(Pos_{tower} = 1, X_{off1}, X_{off2})$ $\qquad X_{off} = 0 \cdot ft$

Resisting Moment:

$M_r := (WT_c + WT_{s1}) \cdot \frac{W_f}{2} + WT_t \cdot \left(\frac{W_f}{2} - X_{off}\right) + S_u \cdot \frac{T_{pp}}{3} + WT_{s2} \cdot \left(W_f + \frac{T_{pp} \cdot \tan(\phi_s)}{3}\right)$

$M_r = 1882.081 \cdot kip \cdot ft$

Overturning Moment: $M_{ot} := M_t + S_t \cdot (L_p + T_f) + WT_t \cdot X_{off}$ $\qquad M_{ot} = 1189.625 \cdot kip \cdot ft$

Factor of Safety: $FS := \frac{M_r}{M_{ot}}$ $\qquad FS = 1.5821$

SafetyCheck := if(FS > FS_{req}, "Okay", "No Good") $\qquad$ SafetyCheck = "No Good"

BEARING PRESSURE CHECK:

Pressure Applied:

$LOAD_{tot} := WT_c + WT_{s1} + WT_t$ $\qquad LOAD_{tot} = 196.5325 \cdot kip$

$A_{mat} := W_f^{\,2}$ $\qquad A_{mat} = 210.25 \cdot ft^2$

$S := \dfrac{W_f^{\,3}}{6}$ $\qquad S = 508.1042 \cdot ft^3$

$P_{max} := \dfrac{LOAD_{tot}}{A_{mat}} + \dfrac{M_{ot}}{S}$ $\qquad P_{max} = 3.2761 \cdot ksf$

$P_{min} := \dfrac{LOAD_{tot}}{A_{mat}} - \dfrac{M_{ot}}{S}$ $\qquad P_{min} = -1.4065 \cdot ksf$

$MaxPressure := if(P_{max} < q_s, "Okay", "No Good")$ $\qquad MaxPressure = "Okay"$

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

Distance to Resultant of Pressure Distribution:

$X_p := \dfrac{P_{max}}{\dfrac{P_{max} - P_{min}}{W_f}} \cdot \dfrac{1}{3}$ $\qquad X_p = 3.3815 \cdot ft$

Distance to Kern: $X_k := \dfrac{W_f}{3}$ $\qquad X_k = 4.8333 \cdot ft$

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

Eccentricity: $e := \dfrac{M_{ot}}{LOAD_{tot}}$ $\qquad e = 6.0531$

Adjusted Soil Pressure: $q_a := \dfrac{2 \cdot LOAD_{tot}}{3 \cdot W_f \cdot \left(\dfrac{W_f}{2} - e\right)}$ $\qquad q_a = 7.5493 \cdot ksf$

Revised Maximum: $q_{max} := if(X_p < X_k, q_a, P_{max})$ $\qquad q_{max} = 7.5493 \cdot kip$

$PressureCheck := if(q_{max} < q_s, "Okay", "No Good")$ $\qquad PressureCheck = "Okay"$

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Page of

CHECK PUNCHING AND BEAM SHEAR:

Load Factor: (EIA 3.1.1) $LF := if\left[H_t \le 700 \cdot ft, 1.3, if\left[H_t \ge 1200, 1.7, 1.3 + \left(\frac{H_t - 700}{1200 - 700}\right) \cdot 0.4\right]\right]$ $LF = 1.3$

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

$\phi_c := .85$ (ACI 9.3.2.3)

$d := T_f - Cvr - .5 \cdot in$ $d = 32.5 \cdot in$

Factored load: $FL := LF \cdot \frac{C_t}{W_f^{\,2}}$ $FL = 1.0616 \cdot ksf$

$V_{req} := \frac{FL \cdot \left(X_t - 0.5 \cdot d_p - d\right) \cdot W_f}{\phi_c}$ $V_{req} = 24.9308 \cdot kip$

ACI 11.3.1.1 $V_{Avail} := 2 \cdot \sqrt{f'c \cdot psi} \cdot W_f \cdot d$ $V_{Avail} = 715.3072 \cdot kip$

BeamShearCheck := if($V_{req} < V_{Avail}$, "Okay", "No Good") BeamShearCheck = "Okay"

Punching Shear: (Critical Section Located at a distance of d/2 from the face of pier) (ACI 11.12.2.1)

$b_o := \left(d_p + d\right) \cdot \pi$ $b_o = 14.7917 \cdot ft$

$V_{req} := FL \cdot \frac{W_f^{\,2} - \left(d_p + d\right)^2 \cdot \frac{\pi}{4}}{\phi_c}$ $V_{req} = 240.8538 \cdot kip$

$V_{Avail} := 4 \cdot \sqrt{f'c \cdot psi} \cdot b_o \cdot d$ $V_{Avail} = 1459.391 \cdot kip$

PunchingShearCheck := if($V_{req} < V_{Avail}$, "Okay", "No Good") PunchingShearCheck = "Okay"

TENSILE REINFORCEMENT IN PAD:

$\phi_m := .90$ per ACI 9.3.2.2

Applied Moments:

$$M_{nT} := LF\cdot\left[U_t\cdot\left(W_t\cdot\sin(60\cdot deg) - \frac{d_p}{2}\right) + S_t\cdot\left(D_f + L_{pag}\right)\right] - WT_t\cdot X_{off}$$

$$M_{nS} := -1\cdot\left[\frac{1}{2}\cdot\left(\frac{W_f}{2} + \frac{W_t}{3}\cdot\cos(30\cdot deg) - \frac{d_p}{2}\right)^2\cdot W_t\cdot\left[\gamma_s\cdot\left(T_{pp} - T_f\right)\right] + WT_{s2}\cdot\left[\frac{W_f}{2} + \frac{W_t}{3}\cdot\cos(30\cdot deg) - \frac{d_p}{2} + \left(D_f - n\right)\cdot\tan\left(\phi_s\right)\right]\right]$$

$$M_{nC} := -1\cdot\left[\frac{1}{2}\cdot\left(\frac{W_f}{2} + \frac{W_t}{3}\cdot\cos(30\cdot deg) - \frac{d_p}{2}\right)^2\cdot W_t\cdot\left(\gamma_c\cdot T_f\right)\right]$$

Design Moment: $M_n := \frac{M_{nT} + M_{nS} + M_{nC}}{\phi_m}$ $\quad M_n = 838.8376\cdot kips\cdot ft$

Required Reinforcement:

ACI 10.2.7.3 $\quad \beta := \mathrm{if}\left[f'c \le 4000\cdot psi, .85, \mathrm{if}\left[f'c \ge 8000\cdot psi, .65, .85 - \left(\frac{\frac{f'c}{psi} - 4000}{1000}\right)\cdot .05\right]\right]$ $\quad \beta = 0.85$

Effective Width: $b_{eff} := W_t\cdot\cos(30\cdot deg) + d_p$ $\quad b_{eff} = 101.9423\cdot in$

$A_s := \frac{M_n}{\phi_m\cdot fy\cdot d}$ $\quad A_s = 5.7356\cdot in^2$

$a := \frac{A_s\cdot fy}{\beta\cdot f'c\cdot b_{eff}}$ $\quad a = 0.9929\cdot in$

$A_s := \frac{M_n}{fy\cdot\left(d - \frac{a}{2}\right)}$ $\quad A_s = 5.2422\cdot in^2$

$\rho := \frac{A_s}{b_{eff}\cdot d}$ $\quad \rho = 0.0016$

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Page ___ of ___

Temperature and Shrinkage: (ACI 7.12.2.1b) $\rho_{sh} := \text{if}(fy \geq 60000 \cdot psi, 0.0018, 0.0020)$ $\rho_{sh} = 0.0018$

Area Required: $As := \text{if}\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right)$ $As = 2.9818 \cdot in^2$

Area Provided: $As_{prov} := A_{bpad} \cdot NB_{pad}$ $As_{prov} = 11.85 \cdot in^2$

$PadReinforcement := \text{if}(As_{prov} > As, \text{"Okay"}, \text{"No Good"})$ PadReinforcement = "Okay"

DEVELOPMENT LENGTH OF PAD REINFORCEMENT:

TENSION (ACI 12.2.3)

Bar Spacing: $B_{sPad} := \frac{W_f - 2 \cdot Cvr - NB_{pad} \cdot d_{bpad}}{NB_{pad} - 1}$ $B_{sPad} = 10.9286 \cdot in$

Development Length Factors:

- Reinforcement Location Factor $\alpha := 1.0$
- Coating Factor $\beta := 1.0$
- Concrete strength Factor $\lambda := 1.0$
- Reinforcement Size Factor $\gamma := 1.0$

Spacing or Cover Dimension: $c := \text{if}\left(Cvr < \frac{B_{sPad}}{2}, Cvr, \frac{B_{sPad}}{2}\right)$ $c = 3 \cdot in$

Transverse Reinforcement Inde:As allowed by ACI 12.2.4 $k_{tr} := 0$

Development Length: $L_{dbt} := \frac{3}{40} \cdot \frac{fy}{\sqrt{f'c \cdot psi}} \cdot \frac{\alpha \cdot \beta \cdot \gamma \cdot \lambda}{\frac{c + k_{tr}}{d_{bpad}}} \cdot d_{bpad}$ $L_{dbt} = 23.7171 \cdot in$

$L_{dbmin} := 12 \cdot in$

Minimum Development Length: (ACI 12.2.1) $L_{dbtCheck} := \text{if}(L_{dbt} \geq L_{dbmin}, \text{"Use L.dbt"}, \text{"Use L.dbmin"})$ $L_{dbtCheck}$ = "Use L.dbt"

Available Length in Pad: $L_{Pad} := \frac{W_f}{2} - \frac{W_t}{2} - Cvr$ $L_{Pad} = 39 \cdot in$

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

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Page ___ of ___

REINFORCEMENT IN PIER:

Pier Area: $A_p := \frac{\pi \cdot d_p^2}{4}$ $\qquad A_p = 452.3893 \cdot in^2$

(ACI 10.8.4 and 10.9.1) $A_{smin} := 0.01 \cdot 0.5 \cdot A_p$ $\qquad A_{smin} = 2.2619 \cdot in^2$

$A_{sprov} := NBpier \cdot A_{bpier}$ $\qquad A_{sprov} = 6.32 \cdot in^2$

$SteelAreaCheck := if\left(A_{sprov} > A_{smin}, \text{"Okay"}, \text{"No Good"}\right)$ $\qquad SteelAreaCheck = \text{"Okay"}$

NOTE: Anchor Bolts are not accounted for in reinforcement calculation and will provide additional reinforcement to satisfy minimum requirement of steel.

Bar Spacing In Pier: $B_{sPier} := \frac{d_p \cdot \pi}{NBpier} - d_{bpier}$ $\qquad B_{sPier} = 8.4248 \cdot in$

Diamter of Reinforcement Cage: $Diam_{cage} := d_p - 2 \cdot Cvr$ $\qquad Diam_{cage} = 18 \cdot in$

Maximum Moment in Pier: $M_p := \left(S_t \cdot L_p\right) \cdot LF$ $\qquad M_p = 1146.99 \cdot kips \cdot in$

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

(defined variables) $\left(f'_c \;\; f_y \;\; cl \;\; Spiral\right) = (3 \;\; 60 \;\; 4 \;\; 0)$

The required input is column diameter in inches, number of reinforcing bars, bar size number, factored axial load in kips and moment in kip inches: $\left(D \;\; N \;\; n \;\; P_u \;\; M_{xu}\right) := (24 \;\; 8 \;\; 8 \;\; 180 \;\; 1200)$

Clears any previous output: $\left(\phi P_n \;\; \phi M_{xn} \;\; f_{sp} \;\; \rho\right) := (0 \;\; 0 \;\; 0 \;\; 0)$

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

The Output is given as useable axial load in kips, moment capacity in kip inches, splicing stress in ksi, and reinforcement ratio: $\left(\phi P_n \;\; \phi M_{xn} \;\; f_{sp} \;\; \rho\right) = (433.6401 \;\; 2890.9343 \;\; -44.934 \;\; 0.014)$

Column size and reinforcement may be changed to match capacity to the applied load.

$AxialLoadCheck := if\left(\phi P_n \ge P_u, \text{"Okay"}, \text{"No Good"}\right)$ $\qquad AxialLoadCheck = \text{"Okay"}$

$BendingCheck := if\left(\phi M_{xn} \ge M_{xu}, \text{"Okay"}, \text{"No Good"}\right)$ $\qquad BendingCheck = \text{"Okay"}$

DEVELOPMENT LENGTH OF PIER REINFORCEMENT:

TENSION (ACI 12.2.3)

Spacing and Cover: $Cvr = 3\cdot in$ $\quad B_{sPier} = 8.4248\cdot in$

Factors for development:

Reinforcement Location Factor $\alpha := 1.0$

Coating Factor $\beta := 1.0$

Concrete strength Factor $\lambda := 1.0$

Reinforcement Size Factor $\gamma := 1.0$

Spacing or Cover Dimension: $c := if\left(Cvr < \frac{B_{sPier}}{2}, Cvr, \frac{B_{sPier}}{2}\right)$ $\quad c = 3\cdot in$

Transverse Reinforcement: As allowed by ACI 12.2.4 $\quad k_{tr} := 0$

$$L_{dbt} := \frac{3}{40}\cdot\frac{fy}{\sqrt{f'c\cdot psi}}\cdot\frac{\alpha\cdot\beta\cdot\gamma\cdot\lambda}{\frac{c+k_{tr}}{d_{bpier}}}\cdot d_{bpier} \qquad L_{dbt} = 23.7171\cdot in$$

Minimum Development Length: (ACI 12.2.1) $\quad L_{dbmin} := 12\cdot in$

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

COMPRESSION: (ACI 12.3.2)

$$L_{dbc1} := \frac{.02\cdot d_{bpier}\cdot fy}{\sqrt{f'c\cdot psi}} \qquad L_{dbc1} = 18.9737\cdot in$$

$$L_{dbmin} := 0.0003\cdot\frac{in^2}{lb}\cdot\left(d_{bpier}\cdot fy\right) \qquad L_{dbmin} = 18\cdot in$$

$$L_{dbc} := if\left(L_{dbc1} \geq L_{dbmin}, L_{dbc1}, L_{dbmin}\right) \qquad L_{dbc} = 18.9737\cdot in$$

Available Length in Pier:

$L_{pier} := L_p - 3\cdot in$ $\quad L_{pier} = 48\cdot in$

$L_{piertension} := if(L_{pier} > L_{dbt}, \text{"Okay"}, \text{"No Good"})$ $\quad L_{piertension} = \text{"Okay"}$

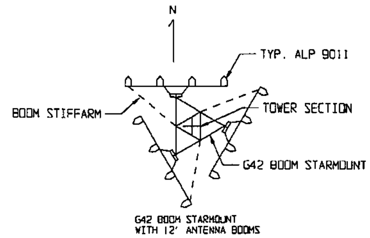
$L_{piercompression} := if(L_{pier} > L_{dbc}, \text{"Okay"}, \text{"No Good"})$ $\quad L_{piercompression} = \text{"Okay"}$

Available Length in Pad:

$L_{pad} := T_f - 3\cdot in$ $\quad L_{pad} = 33\cdot in$

$L_{padtension} := if(L_{pad} > L_{dbt}, \text{"Okay"}, \text{"No Good"})$ $\quad L_{padtension} = \text{"Okay"}$

$L_{padcompression} := if(L_{pad} > L_{dbc}, \text{"Okay"}, \text{"No Good"})$ $\quad L_{padcompression} = \text{"Okay"}$



TOWER DESIGN CONDITIONS
This tower was designed to resist 85 mph wind speed with 1/2" radial ice per ANSI/EIA/TIA 222-E recommended standard.
Worst case load condition is wind without ice.
Allowable steel stresses per AISC ASD 9th Edition
Allowable concrete stresses per ACI 318-89.

MATERIAL SPECIFICATIONS
Tower Legs: ASTM A500, Section 3 Fy = 61 ksi
ASTM A500, All Other Sections Fy > 50 ksi
All other steel: ASTM A36, Fy > 36 ksi
Hardware: A325 Hot Dipped Galvanized Bolts with Anco Nuts
Galvanizing: ASTM A123
Anchor Bolts: ASTM A36, Fy > 36 ksi

ANTENNA INSTALLATION NOTES:
1. Azimuth locations per Herbst/Musciano
2. Initial antenna installation: (9) ALP 9011
(1) Shively 6810

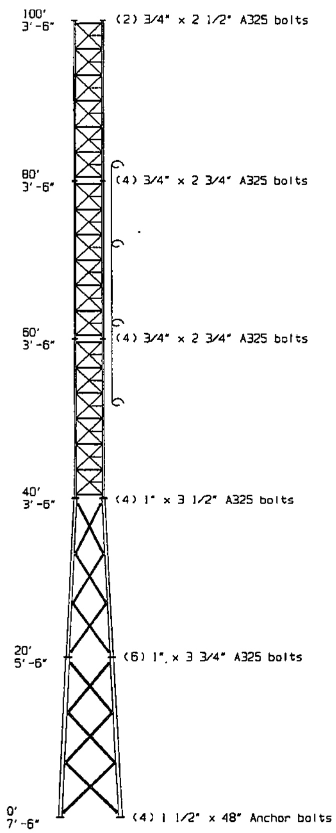
Tower Loading Conditions

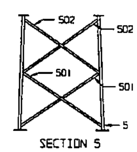
QTY	Antenna	Elevation	Windload	Deadload
1	G42 Starmount	100	1026	513
3	12' Boom	100	411	142
12	ALP9011	100	71	53
1	Shively 6810 without radom	67	426	405

QTY	Type	Elevation Start	Elevation Stop	Windload #/ft	Deadload #/ft
12	1-5/8" Heliax	10	100	4.20	2.400
1	1-5/8" Heliax	10	67	4.20	2.400

NOTE: Any deviation from the proposed design antenna loading will require a tower analysis for verification of structural integrity.

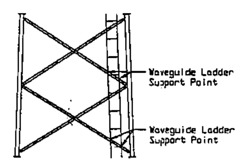
SECTION #:	1	2	3	4	5
LEGS:	5" Sch 40		3" Sch 80	2 1/2" Sch 80	
DIAGONALS:	L2.5x2.5x3/16	L2x2x3/16	5/8" rod		
BRACING BOLTS:	(1) 5/8" A325 bolt		Welded		
HORIZONTALS:			L1.5x1.5x3/16		

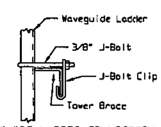




PART NO. DESIGNATION
501
PANEL #
(D)IAGONAL
SECTION #

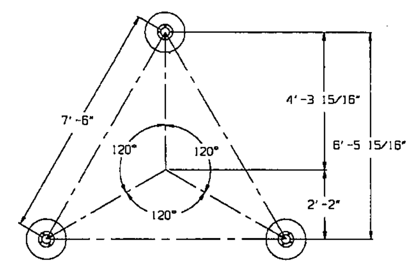
Note location of part no.





WAVEGUIDE LADDER CONNECTION

APPROX. TOWER SECTION WEIGHTS (lb):
Section 5 : 802 +/-
Section 4 : 802 +/-
Section 3 : 962 +/-
Section 2 : 1251 +/-
Section 1 : 1411 +/-
Total Tower Weight: 5229 +/-



FOUNDATION LAYOUT

CT43XC836

GENERAL NOTES:
1. All bolts must be tightened to AISC "snug fit" specifications.
2. Step bolts are provided on one leg to the top of the tower and on three legs to the top of 2 panel sections.
3. Install safety climb equipment per manufacturer's specifications.
4. Install all hardware to facilitate in-place visual inspection.
5. Install hardened washers against all slotted connections.

STATE OF CONNECTICUT
GEORGE R. UNDERHILL
No. 15005
LICENSED
PROFESSIONAL ENGINEER

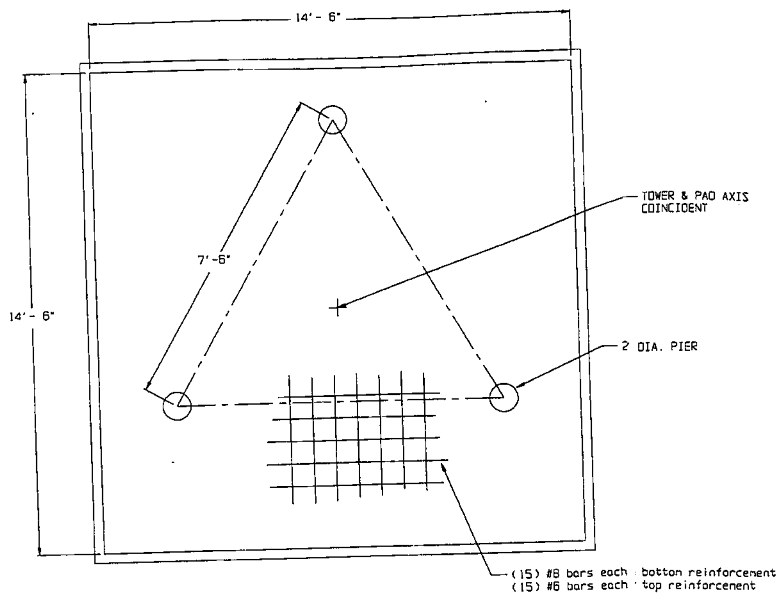
FRED A. NUDO CORPORATION
Route 104=Ontario, New York 14519=315/524-2531

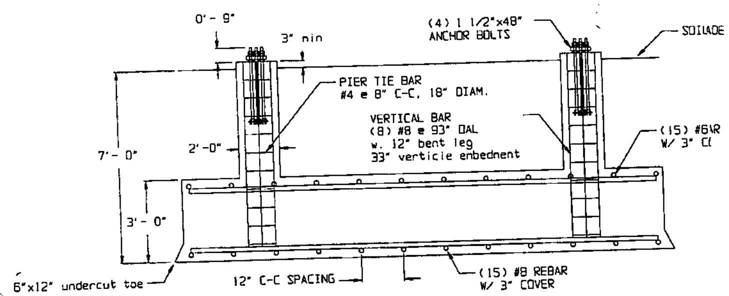
SCALE: N/S
DRAWN BY: PEB
DATE: 1/21/97
APPROVED BY:
THIS DRAWING IS THE PROPERTY OF THE FRED A. NUDO CORPORATION AND IS NOT TO BE REPRODUCED IN WHOLE OR IN PART BY ANY MEANS WITHOUT PRIOR WRITTEN PERMISSION BY THE FRED A. NUDO CORPORATION.

100' S128PA CELLULAR TOWER

NEXTEL
WEST CONNECTICUT STATE UNIV.
DRAWING NUMBER: 96-4992-1

361A





CONCRETE SPECIFICATIONS

1. Concrete shall have a nininun conpressive strength of at least 4000 psi at 28 days. It is our reconnendation that 4000 psi concrete be installed to account for any unknown installation variables that could degrade the concrete. Certified conpression test results nust be submitted to Bechtel prior to site acceptance.
2. Concrete installation shall neet ACI 318-89 installation requirenents for reinforced concrete.
3. All concrete shall be placed against undisturbed soil free of free standing water and all foreign objects and naterials. If this is not possible, special pouring procedures will be required.
4. Mininun concrete cover shall be 3" over all reinforcing bars.
6. Reinforcing bars shall be ASTM A-615 Grade 60 deforned bars.
7. Assenble bars with tie wires.
8. Proportion pouring: 80% 1's and 2's, 20% 1's only for finishing.

SOIL SPECIFICATIONS

Soil is assuned to be per Vector Eng. boring logs dated 9/9/94.

1. Per observation of the boring logs, undrillable rock occurs at 7' below grade.
2. Allowable soil bearing capacity to be a nininun 10,000 psf (glacial till layer), with subgrade reaction of 2,000 kips/cu. ft at botton of concrete pad.
3. All foundations shall be free of free standing water as far as possible prior to pouring concrete and shall be kept thus until backfill is in place. If not possible, special pouring procedures nust be followed.
4. Rock, non-cohesive, saturated or subnerged soils are not to be considered as normal soil. See EIA 7.2.2.
5. Backfill shall be conpacted to 100 pcf in 6" lifts using excavated naterial.
6. Backfill shall be placed so as to prevent accunulation of water around foundations or anchors.

Total Concrete: 25 cuyd

Tenplate Flange: 50C1

STATE OF CONNECTICUT · GEORGE R. UNDERHILL · No. 15005 · LICENSED · PROFESSIONAL ENGINEER

FRED A. NUDD CORPORATION
Route 104=Ontario, New York 14519=315/524-2531

SCALE: N/S	DRAWN BY: PEB	APPROVED BY:
DATE: 1/21/97		

FOUNDATION DETAILS

NEXTEL
WEST CONNECTICUT ST., CT

DRAWING NUMBER: 96-4992-2

TOWER STRUCTURAL NOTES

TOWER DESIGN CRITERIA
THIS TOWER IS DESIGNED AND REINFORCED TO RESIST 85 MPH WIND SPEED AND 1/2" RADIAL ICE AND 75% WIND LOAD PER ANSI/EIA/TIA 22-F RECOMMENDED STANDARD. ALLOWABLE STEEL STRESS PER AISC ASD 9TH EDITION. CONCRETE PER ACI 318-95.

MATERIAL SPECIFICATIONS (FOR EXISTING TOWER) PER ORIGINAL DRAWING

TOWER LEGS:	ASTM A500, SECTION 3 Fy > 61 KSI
TOWER LEGS:	ASTM A500, ALL OTHER SECTIONS Fy > 50 KSI
ALL OTHER STEEL:	ASTM A36, Fy > 38 KSI
HARDWARE:	A325 HOT DIPPED GALVANIZED BOLTS WITH ANCO NUTS
GALVANIZING (FOR STRUCTURAL STEEL):	ASTM A123
ANCHOR BOLTS:	ASTM A36, Fy > 36 KSI

MATERIAL SPECIFICATIONS (FOR PROPOSED REINFORCEMENT OF TOWER)

TOWER LEGS:	ASTM A500 GRADE B GALVANIZED FY= 42 KSI
ALL OTHER STEEL:	ASTM A36 FY = 36 KSI
HARDWARE:	A325 HOT DIPPED GALVANIZED BOLTS WITH ANCO NUTS
GALVANIZING:	ASTM A123
ANCHOR BOLTS:	ASTM A307 GALVANIZED

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS WHICH MAY BE REQUIRED FOR THE WORK BY THE STATE, COUNTY OR LOCAL GOVERNMENT AUTHORITY.
2. CONTRACTOR SHALL TAKE EXTREME CARE NOT TO DAMAGE THE EXISTING TOWER, THE EXISTING COMMUNICATION EQUIPMENT, COAXIAL CABLE AND THEIR COMPONENTS. IN THE EVENT THAT THE EXISTING COMMUNICATION EQUIPMENT IS DAMAGED DURING CONSTRUCTION THE CONTRACTOR SHALL REPAIR THE DAMAGE IMMEDIATELY (WITH THE APPROVAL OF THE COMMUNICATION CARRIER) AT NO ADDITIONAL COST TO THE CONTRACT.
3. EXISTING TOWER STRUCTURE, SHALL BE REINFORCED PER CONTRACT DRAWINGS.
4. ALL NEW ANTENNAS AND COAX LINES SHALL BE INSTALLED PER CONTRACT DRAWINGS.
5. STRUCTURAL STEEL SHALL CONFORM TO THE CURRENT "AISC SPECIFICATION FOR THE DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS", AND THE "AISC CODE OF STANDARDS PRACTICE FOR STEEL".
6. ALL WELDING SHALL BE DONE BY A CERTIFIED WELDER IN ACCORDANCE WITH A.W.S. STANDARDS.
7. CONNECTIONS SHALL CONFORM TO ALL REQUIREMENTS OF THE "AISC SPECIFICATION FOR THE DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS", LATEST EDITION, AND THE "SPECIFICATION FOR STRUCTURAL STEEL JOINTS USING ASTM A325 OR A490 BOLTS" APPROVED.
8. SHOP AND ERECTION DRAWINGS SHALL BE SUBMITTED FOR ALL STRUCTURAL STEEL WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. SUBMIT 6 SETS OF PRINTS TO THE ENGINEER FOR REVIEW.
9. CONTRACTOR SHALL VISIT THE SITE PRIOR TO THE START OF WORK WITH SUFFICIENT RIGGING EQUIPMENT AND PERSONNEL TO OBTAIN DETAILED FABRICATION MEASUREMENTS OF EXISTING TOWER STEEL MEMBERS TO BE REPLACED OR REINFORCED. SHOP DRAWINGS FOR ALL TOWER STEEL MEMBERS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW PRIOR TO FABRICATION, GALVANIZATION AND INSTALLATION.
10. THE STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER THE WORK IS FULLY COMPLETED.
11. MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACE TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.
12. EXISTING TOWER STRUCTURE DIMENSIONS WERE TAKEN FROM DRAWING NO. 96-4992-1 DATED 1/21/97 BY FRED A. NUDD CORPORATION, AND ARE NOT GUARANTEED. CONTRACTOR SHALL TAKE FIELD MEASUREMENTS NECESSARY TO ASSURE PROPER FIT OF ALL FINISHED WORK AND SHALL ASSUME FULL RESPONSIBILITY FOR THEIR ACCURACY WHEN PREPARING SHOP DRAWING. THE FIELD MEASUREMENT SHALL BE SUBMITTED FOR REFERENCE TO THE ENGINEER.
13. TOWER REINFORCING SHALL BE CONDUCTED BY CERTIFIED WELDERS AND FIELD CREWS EXPERIENCED IN THE ASSEMBLY AND ERECTION OF RADIO ANTENNAS, TRANSMISSION LINES AND SUPPORT STRUCTURES, ALL SAFETY PROCEDURES, RIGGING AND ERECTION METHODS SHALL BE STANDARD TO THE INDUSTRY AND IN COMPLIANCE WITH OSHA.
14. CONTRACTOR SHALL SUBMIT THE METHOD OF CONSTRUCTION AND ERECTION FOR REVIEW BY THE ENGINEER PRIOR TO FABRICATION.
15. THE PROPOSED HORIZONTAL AND DIAGONAL BRACING MEMBER SHALL CLEAR THE EXISTING TOWER LEGS SPLICE CONNECTORS.
16. ALL PROPOSED HORIZONTAL, DIAGONAL BRACING AND GUSSET PLATES MAY BE FIELD MEASURED AND FIELD FABRICATED. EXCEPT AS NOTED.
17. ALL REINFORCEMENT SHOWN FOR LEGS, DIAGONALS, AND HORIZONTALS APPLY TO ALL SIDES OF THE TOWER.
18. ALL A-325 BOLTS ARE TO BE TIGHTENED TO SNUG TIGHT CONDITION AS DEFINED BY AISC SPECIFICATION UNLESS OTHERWISE NOTED.
19. GUSSET PLATES SHALL HAVE A MINIMUM THICKNESS OF 5/16" INCHES. CONNECTIONS SHALL MATCH EXISTING. BOLTS SHALL BE 5/8" TYPE A 325-N. UNLESS SPECIFICALLY NOTED.
20. BOLT HOLES SHALL BE PUNCHED OR DRILLED. FLAME CUT HOLES ARE NOT ACCEPTABLE.
21. INSPECTION AND TESTING OF WELDING AND HIGH STRENGTH BOLTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY, TO BE APPROVED BY THE ENGINEER AND PAID FOR BY THE CONTRACTOR.
22. ALL WELDING SHALL BE DONE USING E70XX ELECTRODES. WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLE J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION", 9TH EDITION. AT THE COMPLETION ALL WELDING, ALL DAMAGE TO GALVANIZED COATING SHALL BE REPAIRED.
23. TOUCH-UP ALL DAMAGED GALVANIZED STEEL WITH COLD ZINC. "GALVANOX", "DRY GALV", "ZINC-IT", OR APPROVED EQUIVALENT, IN ACCORDANCE WITH MANUFACTURERS GUIDELINES. TOUCH-UP DAMAGED NON GALVANIZED STEEL WITH SAME PAINT APPLIED IN SHOP OR FIELD.
24. A SMALL PORTION OF THE GALVANIZATION MAY BE OMITTED TO FACILITATE THE WELDING OF THE GUSSET PLATE, IN THE AREA EFFECTED BY THE WELD, TO THE EXISTING TOWER LEG. PAINT THE AREA AFTER CONNECTIONS ARE COMPLETED. REFER TO PANTING NOTES.
25. USE PRECAUTIONS & PROCEDURES PER AWS D1.1 WHEN WELDING GALVANIZED METALS.
26. ALL STEEL WORK SHALL BE GALVANIZED IN ACCORDANCE WITH THE SPECIFICATION ASTM A123 UNLESS OTHERWISE NOTED.
27. EXISTING COAXIAL CABLE AND APERTURES IN CONFLICT WITH TOWER REANFORCEMENT MEASURES SHALL BE RELOCATED AND REINSTALLED BY THE CONTRACTOR WITHOUT INTERRUPTION IN SERVICE.

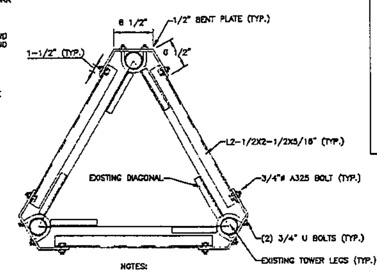
PAINTING:

1- SHERWIN WILLIAM PANTING SCHEDULE
   - A. STEEL-GALVAIZED
     1. TWO COATS OF LATEX ENAMEL, SEMI-GLOSS,
     2. DTM ACRYLIC COATING.
     3. COLOR TO BE FIELD MATCHED WITH EXISTING STRUCTURE.

2- EXAMINATION AND PREPARATION
   - A. DO NOT APPLY PAINT IN SNOW, RAIN FOG OR MIST OR WHEN RELATIVE HUMIDITY EXCEEDS 85%. DO NOT APPLY PAINT TO DAMP OR WET SURFACES.
   - B. VERIFY THAT SUBSTRATE CONDITIONS ARE READY TO RECEIVE WORK. EXAMINE SURFACE SCHEDULED TO BE FINISHED PRIOR TO COMMENCEMENT OF WORK. REPORT ANY CONDITION THAT MAY POTENTIALLY AFFECT PROPER APPLICATION.
   - C. PERFORM PREPARATION AND CLEANING PROCEDURE IN STRICT ACCORDANCE WITH COATING MANUFACTURER'S INSTRUCTIONS FOR EACH SUBSTRATE CONDITION.
   - E. CORRECT DEFECTS AND CLEAN SURFACES WHICH AFFECT WORK OF THIS SECTION. REMOVE EXISTING COATINGS THAT EXHIBIT LOOSE SURFACE DEFECTS.
   - H. GALVANIZED SURFACES: REMOVE SURFACE CONTAMINATION AND OILS AND WASH WITH SOLVENT. APPLY COAT OF ETCHING AND PRIMER.

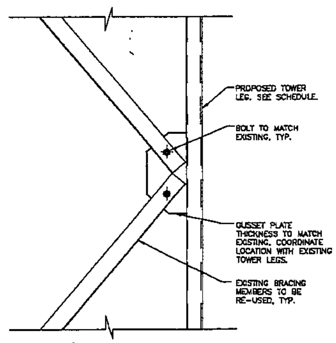
3. CLEANING
   - A. COLLECT WASTE MATERIAL, WHICH MAY CONSTITUTE A FIRE HAZARD, PLACE IN CLOSED METAL CONTAINERS AND REMOVE DAILY FROM SITE.

4. APPLICATION
   - A. APPLY PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTION.



NOTES:
1. U BOLT CONNECTION SHALL CLEAR EXISTING GUSSET PLATE AND FLANGED SPLICE
2. COAX CABLE SHALL CLEAR THE PROPOSED ANGLE
3. LEG BRACING BETWEEN EL. 40'-00" & EL. 53'-7"

2/S-1 DETAIL
NOT TO SCALE



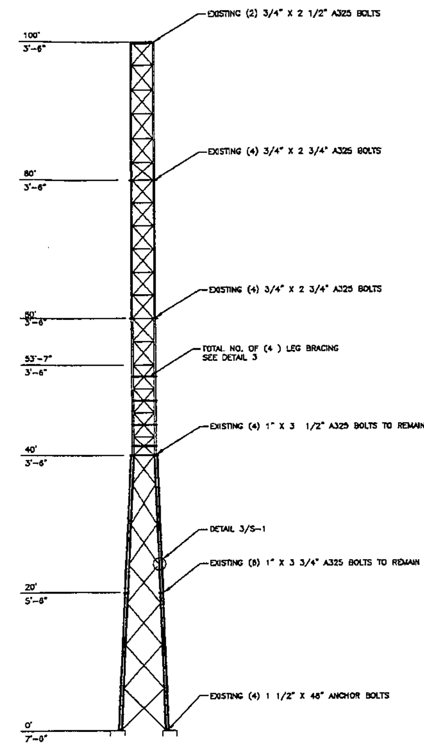
3/S-1 DETAIL
NOT TO SCALE

EXISTING TOWER MEMBER TABLE

SECTION #:	1	2	3	4	5
LEGS:	5" SCH 40	5" SCH 40	3" SCH 80	2 1/2" SCH 80	2 1/2" SCH 80
DIAGONALS:	L2.5X2.5X3/16	L3X2X3/16	5/8" ROD	5/8" ROD	5/8" ROD
BRACING BOLTS:	(1) 5/8" A325 BOLT	(1) 5/8" A325 BOLT	WELDED	WELDED	WELDED
HORIZONTALS:			L1.5X1.5X3/16	L1.5X1.5X3/16	L1.5X1.5X3/16

REINFORCING TABLE

SECTION #:	1	2	3	4	5
LEGS:	REPLACE WITH 5" SCH 80	REPLACE WITH 5" SCH 80	REINFORCE AS DETAIL 2		
DIAGONALS:	EXISTING TO REMAIN	EXISTING TO REMAIN	EXISTING TO REMAIN	EXISTING TO REMAIN	EXISTING TO REMAIN



1/S-1 EXISTING TOWER ELEVATION
NOT TO SCALE

Natcomm, L.L.C.
83-2 North Branford Road
Branford, Connecticut 06405
Tel. (203) 488-0580
Fax (203) 488-8587
Consulting Engineers - Project Management
Civil - Structural - Mechanical - Electrical

WCSU TOWER
303 BOXWOOD LANE
DANBURY, CONNECTICUT

SITE NO.: CT43XC836

Sprint Spectrum LP
1 International Blvd.~Suite 300
Mahwah, NJ 07495

NO.	DATE	REVISIONS	BY	CHK	APPV.
4	11/28/01	REVISED REINFORCEMENT	DFB	FJT	CFC
3	11/02/01	REVISED ANTENNAS	DFB	FJT	CFC
2	09/07/01	ISSUED FOR CONSTRUCTION	JBA	JJP	CFC
1	09/06/01	ISSUED FOR REVIEW	DFB	FJT	CFC
0	08/14/01	ISSUED FOR PRELIMINARY CONSTRUCTION REVIEW	JBA	JJP	CFC

DRAWN BY: P.A.M. | CHECKED BY: EM | SCALE: AS NOTED | DATE: 04/03/01

PROFESSIONAL ENGINEER SEAL

Sprint Spectrum LP

STRUCTURAL REINFORCEMENT AND STRUCTURAL NOTES

JOB NO.	DRAWING NUMBER	REV.
361A	S-1	4

361ACS1.dwg 11-28-01 8:07:26 am EST

T · Mobile ·

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: Scott Heffernan - Radio Frequency Engineer
cc: Jason Overbey
Subject: Power Density Report for CTFF703A
Date: November 4, 2008

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 SST at 303 Boxwood Lane, Danbury, 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 1940-1950 MHz frequency band.
2) The antenna array consists of three sectors, with 1 antennas per sector.
3) The model number for each antenna is APX16DWV-16DWV-S-E-ACU.
4) The antenna center line height is 83 ft.
5) The maximum transmit power from any sector is 2300.54 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 SST at 303 Boxwood Lane, Danbury, CT, is 0.08513 mW/cm^2. This value represents 8.513% of the Maximum Permissible Exposure (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.

Total Site MPE %:	28.286%

New England Market

T-Mobile

Worst Case Power Density

Site:	**CTFF703A**
Site Address:	**303 Boxwood Lane**
Town:	**Danbury**
Tower Height:	**100 ft.**
Tower Style:	**SST**
Base Station TX output	25 W
Number of channels	8
Antenna Model	APX16DWV-16DWV-S-E-ACU
Cable Size	1 5/8
Cable Length	120 ft.
Antenna Height	83.0 ft.
Ground Reflection	1.6
Frequency	1945.0 MHz
Jumper & Connector loss	4.50 dB
Antenna Gain	16.5 dBi
Cable Loss per foot	0.0116 dB
Total Cable Loss	1.3920 dB
Total Attenuation	5.8920 dB
Total EIRP per Channel	54.59 dBm
(In Watts)	287.57 W
Total EIRP per Sector	63.62 dBm
(In Watts)	2300.54 W
nsg	10.6080
Power Density (S) =	**0.085127 mW/cm^2**
T-Mobile Worst Case % MPE =	**8.5127%**

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

Additional Carrier Information (% MPE)	
Nextel (iDEN)	12.28%
Sprint WiMAX	6.18%
Sprint (PCS)	0.03%
WCXI (WCSU)	1.28%
Total % MPE for Site	**28.286%**