STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
Internet: ct.gov/csc

Daniel F. Caruso
Chairman

September 8, 2010

Thomas J. Regan, Esq.
Brown Rudnick LLP
CityPlace I, 185 Asylum Street
Hartford, CT 06103

RE: **EM-T-MOBILE-018-100819** - Omnipoint Communications, as subsidiary of T-Mobile USA, Inc., notice of intent to modify an existing telecommunications facility located at 20 Vale Road, Brookfield, Connecticut.

Dear Attorney Regan:

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

- Prior to the antenna and tower mounted amplifier swap, the mast shall be replaced in accordance with the structural analysis prepared by CENTEK Engineering, Inc. dated May 24, 2010 and stamped by Carlo F. Centore, P.E.; and
- The tower shall not exceed 100 percent of its post-construction structural rating; and
- Prior to the antenna and tower mounted amplifier swap, a signed letter from a Professional Engineer duly licensed in the State of Connecticut shall be submitted to the Council to certify that the mast replacement have been properly completed and the tower does not exceed 100 percent of its post-construction structural rating.

The proposed modifications are to be implemented as specified here and in your notice dated August 19, 2010, including the placement of all necessary equipment and shelters within the tower compound. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

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

deviation from this format may result in the Council implementing enforcement proceedings pursuant to General Statutes § 16-50u including, without limitation, imposition of expenses resulting from such failure and of civil penalties in an amount not less than one thousand dollars per day for each day of construction or operation in material violation.

Thank you for your attention and cooperation.

Very truly yours,

Linda Roberts

Linda Roberts
Executive Director

LR/CDM/laf

c: The Honorable Bill Davidson, First Selectman, Town of Brookfield
Heather Paton, Land Use Office, Town of Brookfield
Clare Ann Walsh, Land Use Enforcement Officer, Town of Brookfield
Daniel J. Garstka, Senior Engineer, Transmission Projects, Northeast Utilities Service Company

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

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Phone: (860) 827-2935 Fax: (860) 827-2950
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Daniel F. Caruso
Chairman

August 26, 2010

The Honorable Bill Davidson
First Selectman
Town of Brookfield
Brookfield Municipal Center
Pocono Road
P. O. Box 5106
Brookfield, CT 06804-5106

RE: **EM-T-MOBILE-018-100819** - Omnipoint Communications, as subsidiary of T-Mobile USA, Inc., notice of intent to modify an existing telecommunications facility located at 20 Vale Road, Brookfield, Connecticut.

Dear First Selectman Davidson:

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

If you have any questions or comments regarding this proposal, please call me or inform the Council by September 9, 2010.

Thank you for your cooperation and consideration.

Very truly yours,

Melanie Bachman
Acting Executive Director

MB/jbw

Enclosure: Notice of Intent

c: Heather Paton, Land Use Office, Town of Brookfield
Clare Ann Walsh, Land Use Enforcement Officer, Town of Brookfield

CONNECT

EM-T-MOBILE-018-100819

In re:
T-Mobile USA, Inc. Notice to Make an Exempt Modification to an Existing Facility, 20 Vale Road, Brookfield, Connecticut.

: EXEMPT MODIFICATION NO. _____
:
: August 19, 2010

ORIGINAL

RECEIVED
AUG 19 2010
CONNECTICUT SITING COUNCIL

NOTICE OF EXEMPT MODIFICATION

Pursuant to Conn. Agencies Regs. §§ 16-50j-73 and 16-50j-72(b), T-Mobile USA, Inc. ("T-Mobile") hereby gives notice to the Connecticut Siting Council ("Council") and the Town of Brookfield of T-Mobile's intent to make an exempt modification to the existing Connecticut Light and Power ("CL&P) tower (the "Tower") located at 20 Vale Road in Brookfield, Connecticut. Specifically, T-Mobile plans to upgrade its wireless system in Connecticut by implementing its Universal Mobile Telecommunications System ("UMTS"). UMTS is a third-generation ("3G") technology that utilizes a code division multiple access ("CDMA") base to allow for fast and large data transfers. To accomplish this upgrade, T-Mobile must modify its antenna and equipment configurations at many of its existing sites.

Once the UMTS upgrade is complete, T-Mobile will operate on a more unified communication system, allowing international wireless telephones to function world-wide. Furthermore, UMTS will enhance GPS navigation capabilities and provide emergency responders with more advanced tracking capabilities. The proposed UMTS technology is compatible with the existing second-generation ("2G") Global System for Mobile Communication ("GSM") currently on the Tower and the proposed upgrade is expected to enhance the existing 2G system. In order to accomplish the upgrade at this site, T-Mobile plans to add UMTS technology and install associated equipment at the base of the Tower.

Under the Council's regulations (Conn. Agencies Regs. § 16-50j-72(b)), T-Mobile's plans do not constitute a modification subject to the Council's review because T-Mobile will not

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185 ASYLUM STREET
HARTFORD, CT 06103
(860) 509-6500

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.

The Tower is a 115-foot CL&P pole (Pole No. 10247), with an existing 24′ 4″ pipe mast extension, located at 20 Vale Road in Brookfield, Connecticut (latitude 41° 25' 51.4" N, longitude 73° 24' 8.5" W). The Tower is owned by CL&P. Currently, T-Mobile has 6 antennas and 3 Ground Mounted Amplifiers ("GMA") located on the Tower with centerlines of 123 feet and 130 feet. A site plan with Tower specifications is attached.

T-Mobile plans to remove its 6 existing antennas and install 3 quad pole GSM antennas and 3 quad pole UMTS antennas on the Tower. T-Mobile also proposes to remove its existing GMAs and install 6 new Tower Mounted Amplifiers ("TMA"). The 6 new TMAs will include 3 PCS TMA and 3 AWS TMA. The proposed antennas and TMAs will have the same centerlines as the existing installation – 123 feet and 130 feet. In order to support its proposed modifications T-Mobile also plans to replace the existing 24′ 4″ (approximately) pipe mast extension with a new 27′ 6″ (approximately) pipe mast extension. T-Mobile commissioned Centek Engineering to perform a structural analysis of the Tower (attached). According to the Structural Analysis Report, dated May 24, 2010, the "utility pole with the proposed mast replacement is adequate to support the proposed T-Mobile equipment upgrade" (Section 1-5, Structural Analysis Report).

In addition, T-Mobile plans to route six new 1-1/4 inch coax cables along the outside of the Tower. T-Mobile proposes to install its UMTS equipment cabinet on the existing 12′ by 13′ (approximately) concrete pad. Hence, no increase in the boundaries of the site is necessary.

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Therefore, excluding brief, minor, construction-related noise during the addition of the antennas and the installation of the equipment cabinet, T-Mobile's changes to the Tower will not increase noise levels at the site.

The proposed antennas and TMAs 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 power density analysis measured at the base of the Tower indicates that T-Mobile's antennas will emit 6.5016% 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 20.9516% of the NCRP's standard for maximum permissible exposure. 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. The power density analysis is attached.

In conclusion, T-Mobile's proposed plan to remove and replace antennas, add TMAs and add equipment at this site 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. *See* Conn. Agencies Regs. § 16-50j-72.

T-Mobile USA, Inc.

By: Thomas J. Regan

Thomas J. Regan
Brown Rudnick LLP
185 Asylum Street, CityPlace I
Hartford, CT 06103-3402
Email - tregan@brownrudnick.com
Phone - 860.509.6522 /Fax - 860.509.6501

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Certificate of Service

This is to certify that on this 19th day of August, 2010, the foregoing Notice of Exempt Modification was sent, via first class mail, to the following:

Town of Brookfield
First Selectman Bill Davidson
Town Hall – Room 201
100 Pocono Road
Brookfield, CT 06804

By: Thomas J. Regan
Thomas J. Regan

40274264 v1 - 025064/0016

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HARTFORD, CT 06103
(860) 509-6500

T-MOBILE NORTHEAST, LLC

Wireless Communications Facility

CL&P BROOKFIELD / CT11201A

POLE #10247

20 VALE ROAD
BROOKFIELD, CT 06804

GENERAL NOTES

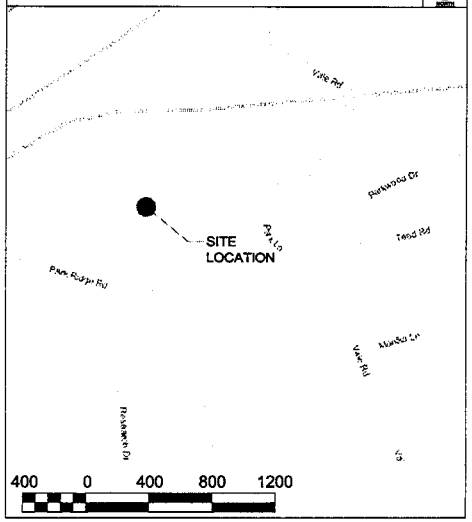
1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2003 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2005 CONNECTICUT SUPPLEMENT, INCLUDING THE TIA/EIA-222 REVISION "F" STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES".
2. CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A [illegible] CONTRACTORS AND ALL RELATED PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
3. CONTRACTOR SHALL PROVIDE A COMPLETE BUILD-OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON THE DRAWINGS OR IN THE WRITTEN SPECIFICATIONS.
4. CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.
5. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION, PLUMBING, ELECTRICAL AND HVAC. PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.
6. CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE, ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. THE CONTRACTOR SHALL FURNISH AN 'AS-BUILT' SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
7. LOCATION OF EQUIPMENT, AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMMATICALLY INDICATED ON THE DRAWINGS SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS.
8. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITIONS OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY.
9. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCE, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
10. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
11. ALL EQUIPMENT PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MFR.'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
12. ANY AND ALL ERRORS, DISCREPANCIES, AND 'MISSED' ITEMS ARE TO BE BROUGHT TO THE ATTENTION OF T-MOBILE DURING THE BIDDING PROCESS BY THE CONTRACTOR. ALL THESE ITEMS ARE TO BE INCLUDED IN THE BID. NO 'EXTRA' WILL BE ALLOWED FOR MISSED ITEMS.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
14. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE CONSTRUCTION MANGER FOR REVIEW.
15. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLE, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND /OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
16. COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUIT AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
17. ALL DAMAGES CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
18. THE CONTRACTOR SHALL CONTACT "CALL BEFORE YOU DIG" AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS AT 1-800-922-4455. ALL UTILITIES SHALL BE IDENTIFIED AND CLEARLY MARKED. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
19. CONTRACTOR SHALL COMPLY WITH OWNERS ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.

DIRECTIONS: FROM: 35 GRIFFIN DR. BLOOMFIELD, CT TO: 20 VALE ROAD BROOKFIELD, CT

1. DEPART GRIFFIN RD SOUTH
2. TURN RIGHT ONTO SR-187 SOUTH / BLUE HILLS AVE EXT
3. KEEP LEFT ONTO DAY HILL RD
4. TAKE RAMP RIGHT FOR I-91 SOUTH / RICHARD P HORAN MEMORIAL HWY TOWARD HARTFORD COURTYARD BY MARRIOTT ON THE CORNER
5. AT EXIT 32A-32B, TAKE RAMP RIGHT FOR I-84 WEST / US-6 WEST TOWARD WATERBURY
6. AT EXIT 9, TAKE RAMP RIGHT FOR SR-25 TOWARD BROOKFIELD
7. TURN LEFT ONTO SR-25 / HAWLEYVILLE RD
8. TURN RIGHT ONTO US-6 / MT PLEASANT RD
9. TURN RIGHT ONTO VAIL RD
10. KEEP LEFT TO STAY ON VAIL RD
11. ROAD NAME CHANGES TO VALE RD., ARRIVE AT 20 VALE RD,

VICINITY MAP

SCALE:1"= 800'



PROJECT SUMMARY

SITE NAME:	CL&P BROOKFIELD
SITE ADDRESS:	20 VALE ROAD BROOKFIELD, CT 06804
SITE LOCATION:	LATITUDE N 41° 25' 51.4" LONGITUDE W 73° 24' 08.5" GROUND EL. 396'± (A.M.S.L.)
PROPERTY OWNER:	BERKSHIRE NORTH LLC 2 PARKLAWN DRIVE BETHEL, CT 06801
APPLICANT, LESSEE/LICENSEE, PROJECT OWNER:	T-MOBILE NORTHEAST, LLC 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002 (860) 692-7100
CONTACT:	LISA LIN NIEDERMEIER TRANSCEND WIRELESS, LLC 203) 275-6869
ASSESSOR'S PARCEL NO.:	MAP D16 - LOT 001
ZONING DISTRICT:	IL80

SHEET INDEX

SHT. NO.	DESCRIPTION
01	TITLE SHEET
02	COMPOUND PLAN, NOTES AND DETAILS
03	ELEVATION
04	EQUIPMENT DETAILS
05	ANTENNA DETAILS
06	UTILITY ROUTING PAN
07	GROUNDING NOTES, RISERS AND DETAILS
08	ELECTRICAL SPECIFICATIONS AND NOTES
09	GROUNDING NOTES

GENERAL NOTES

THE PROPOSED SCOPE OF WORK GENERALLY INCLUDES (1) NEW ERICSSON RBS 3106 UMTS CABINET ON EXISTING CONCRETE PAD WITHIN FENCED COMPOUND.

A TOTAL OF SIX (6) DIRECTIONAL PANEL ANTENNAS ARE PROPOSED TO REPLACE SIX (6) EXISTING PANEL ANTENNAS MOUNTED ON AN EXISTING 17'-4" TOWER EXTENSION MAST ATTACHED TO THE 115' TALL TRANSMISSION LINE TOWER (UTILITY POLE DESIGN BY OTHERS) AT RAD CENTER ELEVATIONS OF 130' AND AT 123' ABOVE THE TOWER BASE PLATE. SIX (6) NEW COAXIAL CABLES IN ADDITION TO TWELVE (12) EXISTING COAXIAL CABLES WILL BE MOUNTED TO THE EXTERIOR OF THE UTILITY POLE. NO HOLES OR WELDING SHALL BE MADE TO EXISTING UTILITY POLE.

PROPOSED ELECTRICAL AND TELCO SERVICE WILL BE ROUTED ABOVE GRADE FROM EXISTING BREAKER PANEL AND TELCO ENCLOSURE TO PROPOSED RBS 3106 UMTS CABINET LOCATED WITHIN THE FENCED COMPOUND.

TRANSCEND WIRELESS, LLC
10 INDUSTRIAL AVE.
MAHWAH, NJ 07430
OFFICE: (201) 684-0055
FAX:(201) 684-0066

FOR

T-MOBILE NORTHEAST, LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
OFFICE: (860) 692-7100
FAX:(860) 692-7199

ATLANTIS GROUP
1340 Centre Street Suite 203
Newton Center, MA 02459
Office: 617-965-0789
Fax: 617-663-6032

STATE OF CONNECTICUT
HOSSEIN VALEDI
No. ARI. 11162
LICENSED ARCHITECT

APPROVALS

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

DRAWN BY:	S.B.
CHECKED BY:	SM

SUBMITTALS

A	04/19/10	ISSUED FOR REVIEW
0	04/22/10	REVISED PER COMMENTS
1	05/19/10	REVISED PER COMMENTS

CT11201A
CL&P BROOKFIELD

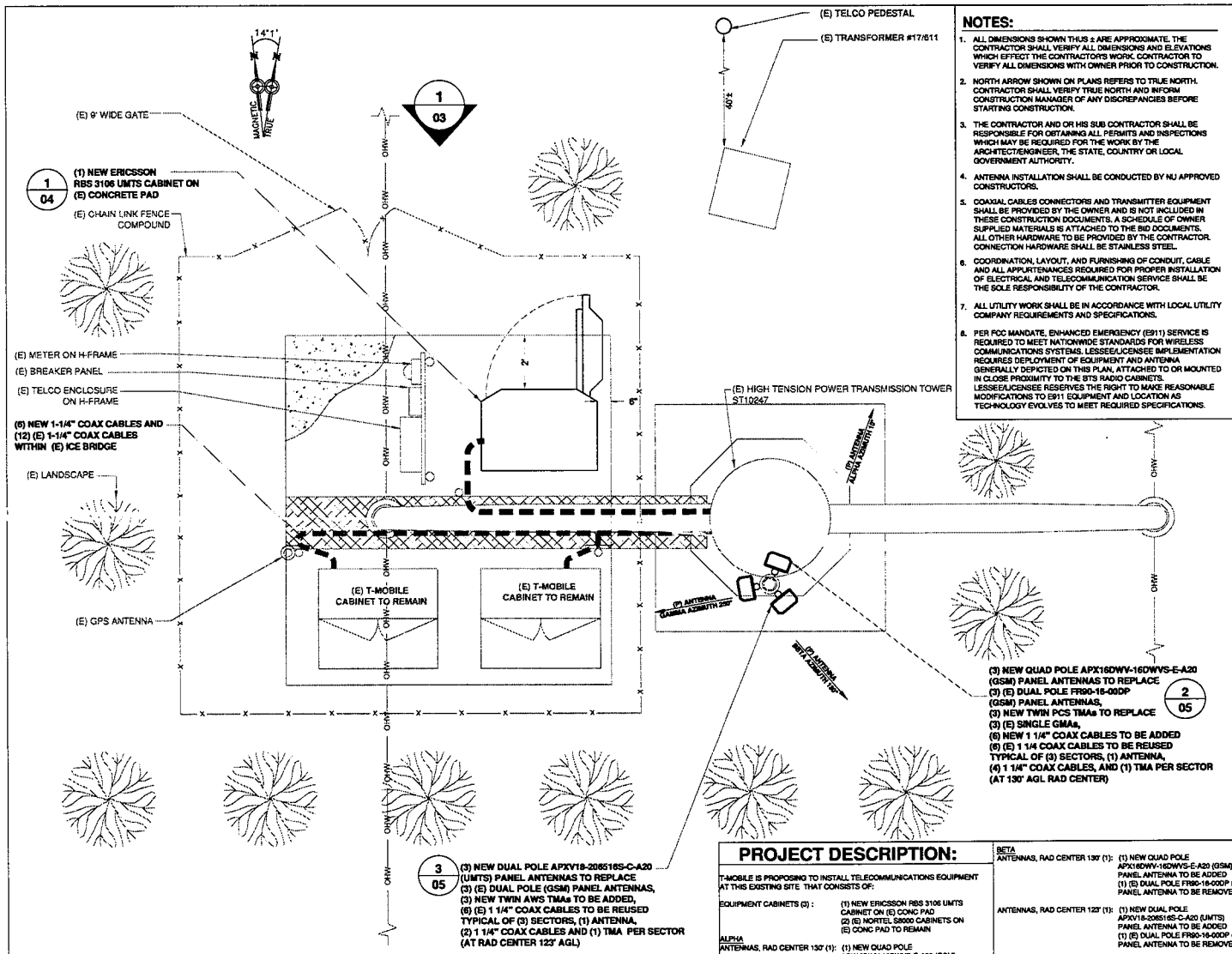
20 VALE ROAD
BROOKFIELD, CT 06804

SHEET TITLE:

TITLE SHEET

SHEET NUMBER:

01



(P) UMTS ANTENNA AZIMUTHS:
SECTOR A= 10°
SECTOR B= 130°
SECTOR C= 250°

COMPOUND PLAN 1/02
SCALE: 1/4" = 1'-0" (11x17)
SCALE: 1/2" = 1'-0" (24x36)

2 0 2 4 6

NOTES:

1. ALL DIMENSIONS SHOWN THUS ± ARE APPROXIMATE. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND ELEVATIONS WHICH EFFECT THE CONTRACTOR'S WORK. CONTRACTOR TO VERIFY ALL DIMENSIONS WITH OWNER PRIOR TO CONSTRUCTION.
2. NORTH ARROW SHOWN ON PLANS REFERS TO TRUE NORTH. CONTRACTOR SHALL VERIFY TRUE NORTH AND INFORM CONSTRUCTION MANAGER OF ANY DISCREPANCIES BEFORE STARTING CONSTRUCTION.
3. 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, COUNTRY OR LOCAL GOVERNMENT AUTHORITY.
4. ANTENNA INSTALLATION SHALL BE CONDUCTED BY NU APPROVED CONSTRUCTORS.
5. COAXIAL CABLES CONNECTORS AND TRANSMITTER EQUIPMENT SHALL BE PROVIDED BY THE OWNER AND IS NOT INCLUDED IN THESE CONSTRUCTION DOCUMENTS. A SCHEDULE OF OWNER SUPPLIED MATERIALS IS ATTACHED TO THE BID DOCUMENTS. ALL OTHER HARDWARE TO BE PROVIDED BY THE CONTRACTOR. CONNECTION HARDWARE SHALL BE STAINLESS STEEL.
6. 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.
7. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
8. PER FCC MANDATE, ENHANCED EMERGENCY (E911) SERVICE IS REQUIRED TO MEET NATIONWIDE STANDARDS FOR WIRELESS COMMUNICATIONS SYSTEMS. LESSEE/LICENSEE IMPLEMENTATION REQUIRES DEPLOYMENT OF EQUIPMENT AND ANTENNA GENERALLY DEPICTED ON THIS PLAN, ATTACHED TO OR MOUNTED IN CLOSE PROXIMITY TO THE BTS RADIO CABINETS. LESSEE/LICENSEE RESERVES THE RIGHT TO MAKE REASONABLE MODIFICATIONS TO E911 EQUIPMENT AND LOCATION AS TECHNOLOGY EVOLVES TO MEET REQUIRED SPECIFICATIONS.

ABREVIATIONS

ADJ	ADJUSTABLE	UB	UTILITY BOX
AGL	ABOVE GROUND LEVEL	UON	UNLESS OTHERWISE NOTED
AMSL	ABOVE MEAN SEA LEVEL	WWF	WELDED WIRE FABRIC
APPROX	APPROXIMATE	W	WITH
ASPH.	ASPHALT	NIC	NOT IN CONTRACT
BLDG.	BUILDING	EQUIP	EQUIPMENT
CAB	CABINET	(E)	EXISTING
CLG	CEILING	EXT	EXTERIOR
CONC	CONCRETE	FF	FINISHED FLOOR
CONT.	CONTINUOUS	GA	GAUGE
CJ	CONCRETE JOINT	GALV	GALVANIZED
DIA	DIAMETER	GC	GENERAL CONTRACTOR
DWG	DRAWING	GRND	GROUND
EGB	EQUIPMENT GROUND BAR	LG	LONG
EA	EACH	MAX	MAXIMUM
ELEC	ELECTRIC	MECH	MECHANICAL
EL	ELEVATION	MFR	MANUFACTURER
EQ	EQUAL	MGB	MASTER GROUND BAR
NTS	NOT TO SCALE	MH	MANHOLE
OC	ON CENTER	MIN	MINIMUM
OHW	OVERHEAD WIRE	MTL	METAL
OPP	OPPOSITE	NIC	NOT IN CONTRACT
SF	SQUARE FOOT	BTS	BASE TRANSMISSION STATION
SHT	SHEET	PCS	PERSONAL COMMUNICATIONS SERVICE
SIM	SIMILAR	A-1	ANTENNA MARK 1
SS	STAINLESS STEEL	℄	CENTERLINE
STL	STEEL	℄	PLATE
TOC	TOP OF CONCRETE	&	AND
TOM	TOP OF MASONRY	@	AT
TYP	TYPICAL	GPS	GLOBAL POSITIONING SYSTEM
VIF	VERIFY IN FIELD		

SYMBOLS AND MATERIALS

NEW ANTENNA
EXISTING ANTENNA
ASPHALT
NEW ACCESS EASEMENT
CONCRETE
ELECTRIC BOX
LIGHT POLE
FND. MONUMENT
SPOT ELEVATION
SET POINT
REVISION
GRID REFERENCE
REVISION REFERENCE (DCI. / SHT.)
ELEVATION (D / SH)
SECTIONS & DETAILS (D / SH)

GROUT OR PLASTER
(E) BRICK
(E) MASONRY
CONCRETE
EARTH
GRAVEL
PLYWOOD
SAND
WOOD CONT.
WOOD BLOCKING
STEEL
CENTER LINE
PROPERTY LINE
STEPPED FOOTING
MATCH LINE
WORK POINT
UGP — UNDERGROUND POWER LINE
UGT — UNDERGROUND TELCO LINE
OHU — OVERHEAD UTILITY LINE
GROUND WIRE
COAXIAL CABLE
CHAIN LINK FENCE

PROJECT DESCRIPTION:

T-MOBILE IS PROPOSING TO INSTALL TELECOMMUNICATIONS EQUIPMENT AT THIS EXISTING SITE THAT CONSISTS OF:

EQUIPMENT CABINETS (3) :	(1) NEW ERICSSON RBS 3106 UMTS CABINET ON (E) CONC PAD (2) (E) NORTEL S8000 CABINETS ON (E) CONC PAD TO REMAIN
ALPHA	
ANTENNAS, RAD CENTER 130' (1):	(1) NEW QUAD POLE APX16DWV-16DWVS-E-A20 (GSM) PANEL ANTENNA TO BE ADDED (1) (E) DUAL POLE FR90-16-00DP (GSM) PANEL ANTENNA TO BE REMOVED
ANTENNAS, RAD CENTER 123' (1):	(1) NEW DUAL POLE APXV18-206516S-C-A20 (UMTS) PANEL ANTENNA TO BE ADDED (1) (E) DUAL POLE FR90-16-00DP (GSM) PANEL ANTENNA TO BE REMOVED
COAX (6) :	(2) NEW 1 1/4" COAX CABLES TO BE ADDED (4) (E) 1 1/4" COAX CABLES TO REMAIN
TMAs (2) :	(1) NEW TWIN PCS TMA TO BE ADDED (1) NEW TWIN AWS TMA TO BE ADDED (1) (E) SINGLE GSM GMA TO BE REMOVED

BETA	
ANTENNAS, RAD CENTER 130' (1):	(1) NEW QUAD POLE APX16DWV-16DWVS-E-A20 (GSM) PANEL ANTENNA TO BE ADDED (1) (E) DUAL POLE FR90-16-00DP (GSM) PANEL ANTENNA TO BE REMOVED
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GAMMA	
ANTENNAS, RAD CENTER 130' (1):	(1) NEW QUAD POLE APX16DWV-16DWVS-E-A20 (GSM) PANEL ANTENNA TO BE ADDED (1) (E) DUAL POLE FR90-16-00DP (GSM) PANEL ANTENNA TO BE REMOVED
ANTENNAS, RAD CENTER 123' (1):	(1) NEW DUAL POLE APXV18-206516S-C-A20 (UMTS) PANEL ANTENNA TO BE ADDED (1) (E) DUAL POLE FR90-16-00DP (GSM) PANEL ANTENNA TO BE REMOVED
COAX (6) :	(2) NEW 1 1/4" COAX CABLES TO BE ADDED (4) (E) 1 1/4" COAX CABLES TO REMAIN
TMAs (2) :	(1) NEW TWIN PCS TMA TO BE ADDED (1) NEW TWIN AWS TMA TO BE ADDED (1) (E) SINGLE GSM GMA TO BE REMOVED

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FOR

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Fax: 617-663-6032

STATE OF CONNECTICUT
HOSSEIN VAHEDI
NO. ARI. 11162
LICENSED ARCHITECT

APPROVALS

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

DRAWN BY: S.B.

CHECKED BY: SM

SUBMITTALS

A	04/19/10	ISSUED FOR REVIEW
0	04/22/10	REVISED PER COMMENTS
1	05/19/10	REVISED PER COMMENTS

CT11201A
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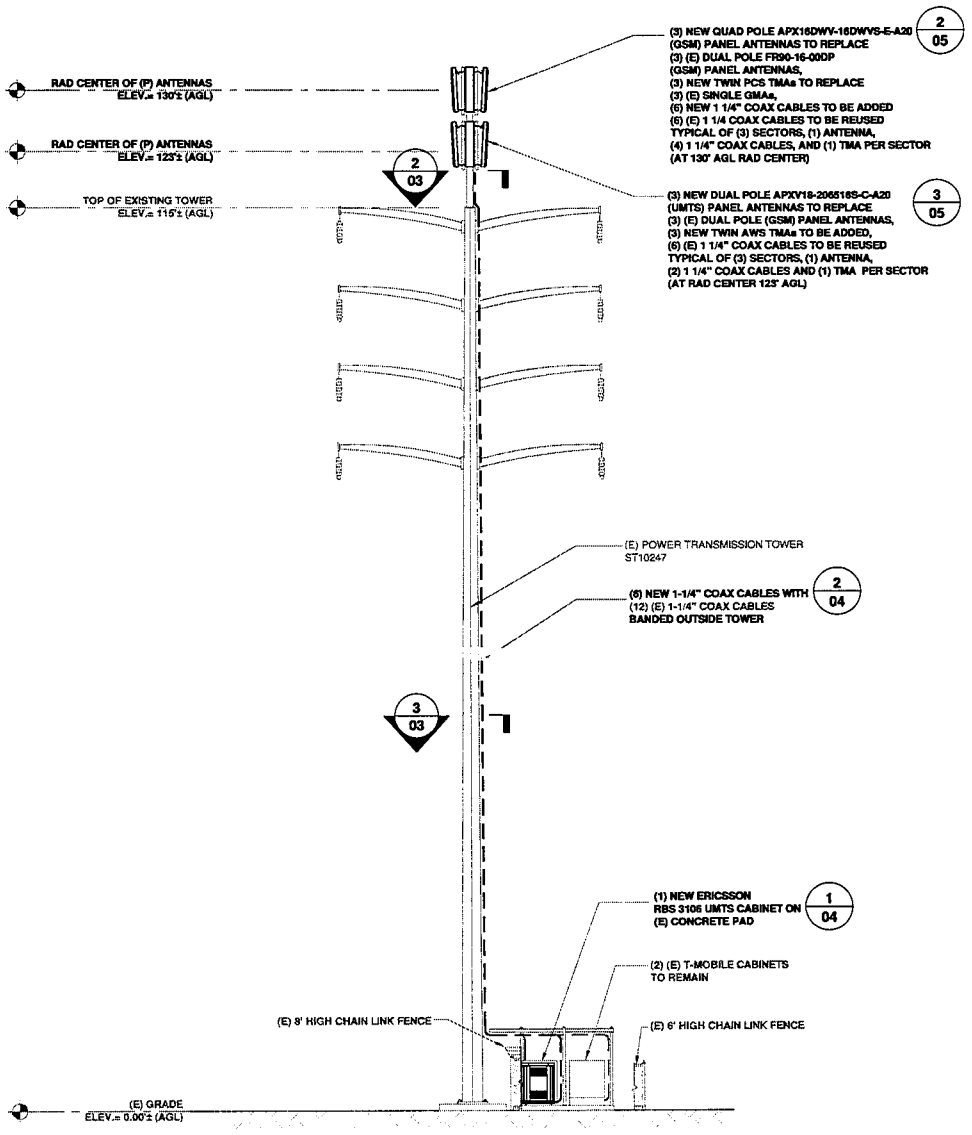
20 VALE ROAD
BROOKFIELD, CT 06804

SHEET TITLE:
COMPOUND PLAN, NOTES AND DETAILS

SHEET NUMBER:
02

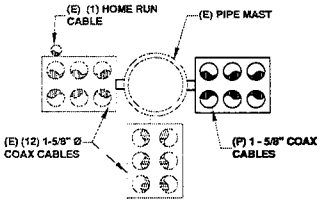


NORTH ELEVATION 1/03

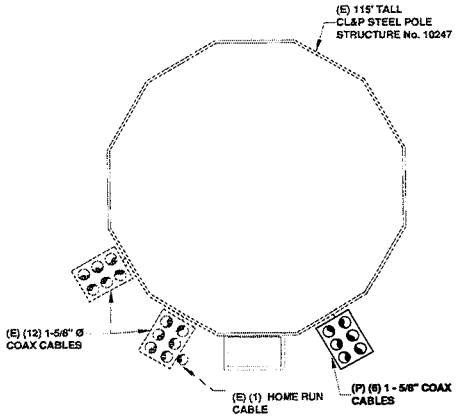
SCALE: 1/16" = 1'-0" (11x17)
SCALE: 1/8" = 1'-0" (24x36)

8 0 8 16 24

NOTE: NO STRUCTURAL EVALUATION HAS BEEN CONDUCTED BY ATLANTIS GROUP, INC. NO ADDITIONS OR MODIFICATIONS TO THE TOWER SHALL BE MADE WITHOUT THE APPROVAL OF THE STRUCTURAL ENGINEER.



COAX PLAN 2/03
N.T.S.



COAX PLAN 3/03
N.T.S.

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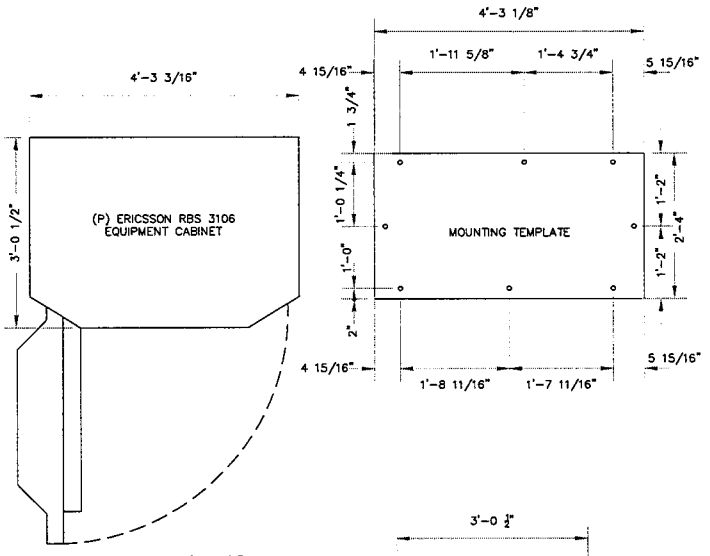
BROOKFIELD, CT 06804

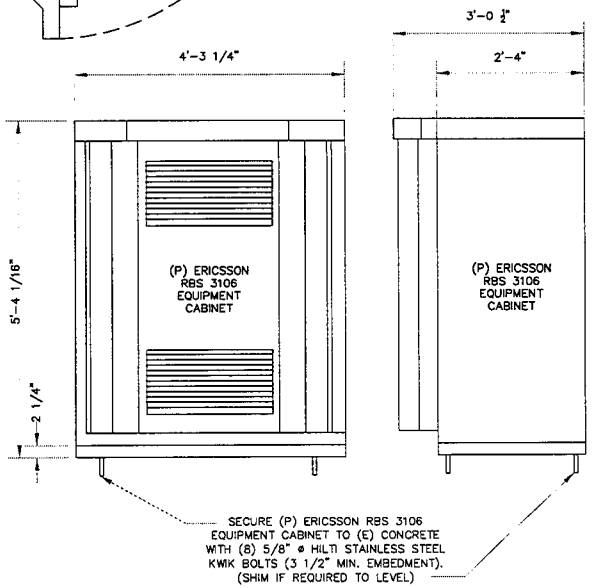
SHEET TITLE:

ELEVATION

SHEET NUMBER:

03

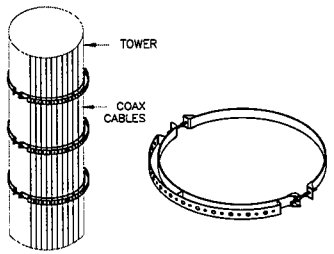




ERICSSON RBS 3106 EQUIPMENT CABINET

1 / 04

SCALE: 1/2" = 1'-0" (11x17)
SCALE: 1" = 1'-0" (24x36)



COAX MOUNTING DETAIL

2 / 04

N.T.S.

STRUCTURAL NOTES

1. DESIGN REQUIREMENTS ARE PER STATE BUILDING CODE AND APPLICABLE SUPPLEMENTS, ANSI/ASCE7, EIA/TIA-222-F STRUCTURAL STANDARDS FOR STEEL ANTENNA SUPPORTING STRUCTURES.
2. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS IN FIELD PRIOR TO FABRICATION AND ERECTION OF ANY MATERIAL. ANY UNUSUAL CONDITIONS SHALL BE REPORTED TO THE ATTENTION OF THE CONSTRUCTION MANAGER.
3. DESIGN AND CONSTRUCTION OF STRUCTURAL STEEL SHALL CONFORM TO THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION. "SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS".
4. STRUCTURAL AND MISCELLANEOUS STEEL SHALL CONFORM TO ASTM A572 GRADE 50 STRUCTURAL STEEL UNLESS OTHERWISE INDICATED.
5. STEEL PIPE SHALL CONFORM TO ASTM A500 COLD-FORMED WELDED & SEAMLESS CARBON STEEL STRUCTURAL TUBING", GRADE A, OR ASTM A53 PIPE STEEL BLACK AND HOT-DIPPED ZINC-COATED WELDED AND SEAMLESS TYPE E OR S, GRADE B. PIPE SIZES INDICATED ARE NOMINAL ACTUAL OUTSIDE DIAMETER IS LARGER.
6. STRUCTURAL CONNECTION BOLTS SHALL BE HIGH STRENGTH BOLTS (BEARING TYPE) AND CONFORM TO ASTM A325 "HIGH STRENGTH BOLTS FOR STRUCTURAL JOINTS, INCLUDING SUITABLE NUTS AND PLAIN HARDENED WASHERS". ALL BOLTS SHALL 5/8" DIA UNLESS OTHERWISE NOTED.
7. ALL STEEL MATERIAL SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC-(HOT-DIP GALVANIZED) COATINGS ON IRON AND STEEL PRODUCTS". UNLESS OTHERWISE NOTED.
8. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC-COATING (HOT-DIP) ON IRON AND STEEL HARDWARE". UNLESS OTHERWISE NOTED.
9. FIELD WELDS, DRILL HOLES, SAW CUTS AND ALL DAMAGED GALVANIZED SURFACES SHALL BE REPAIRED WITH AN ORGANIC ZINC REPAIR PAINT COMPLYING WITH THE REQUIREMENTS OF ASTM A780. GALVANIZING REPAIR PAINT SHALL HAVE 65 PERCENT ZINC BY WEIGHT, ZIRP BY DUCAN GALVANIZING, GALVA BRIGHT PREMIUM BY CROWN OR EQUAL THICKNESS OF APPLIED GALVANIZING REPAIR PAINT SHALL BE NOT LESS THAN 4 COATS (ALLOWED TIME TO DRY BETWEEN COATS) WITH A RESULTING COATING THICKNESS REQUIRED BY ASTM A123 OR A153 AS APPLICABLE.
10. CONTRACTOR SHALL COMPLY WITH AWS CODE FOR PROCEDURES, APPEARANCE AND QUALITY OF WELDS AND METHODS USED IN CORRECTING WELDING. ALL WELDERS AND WELDING PROCESSES SHALL BE QUALIFIED IN ACCORDANCE WITH AWS "STANDARD QUALIFICATION PROCEDURES". ALL WELDING SHALL BE DONE USING E70XX ELECTRODES AND WELDING SHALL CONFORM TO AISC AND DLI. WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLE J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION" 9TH EDITION.
11. NO WELDING, DRILLING, TAPPING OR CUTTING INTO CL&P OR WMECo STRUCTURES.
12. INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NOCONFORMING MATERIALS OR CONDITIONS SHALL BE REPORTED TO THE CONSTRUCTION MANAGER PRIOR TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE CONSTRUCTION MANAGER APPROVAL.
13. UNISTRUTS SHALL BE FORMED STEEL CHANNEL STRUT FRAMING AS MANUFACTURED BY UNISTRUT CORP, WAYNE, MI OR EQUAL. STRUT MEMBERS SHALL BE 1 5/8"x1 5/8"x12GA, UNLESS OTHERWISE NOTED, AND SHALL BE HOT-HIP GALVANIZED AFTER FABRICATION.
14. EPOXY ANCHOR ASSEMBLY SHALL CONSIST OF 1/2" DIAMETER STAINLESS STEEL ANCHOR ROD WITH NUTS & WASHERS. AN INTERNALLY THREADED INSERT, A SCREEN TUBE AND A EPOXY ADHESIVE. THE ANCHORING SYSTEM SHALL BE THE HILTI-HIT HY-20 AND OR HY-150 SYSTEMS (AS SPECIFIED ON DWG.) OR ENGINEERS APPROVED EQUAL WITH 4-1/4" MIN. EMBEDMENT DEPTH.
15. EXPANSION BOLTS SHALL CONFORM TO FEDERAL SPECIFICATION FF-S-325, GROUP II, TYPE 4, CLASS I, HILTI KWIK BOLTS II OR APPROVED EQUAL. INSTALLATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. MINIMUM EMBEDMENT SHALL BE THREE AND ONE HALF (3 1/2) INCHES.

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R.F. _____
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CHECKED BY:	SM

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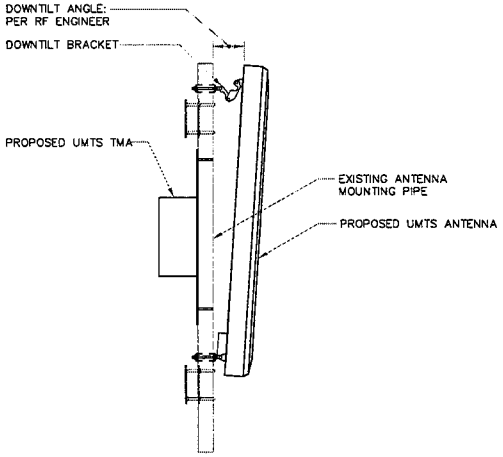
BROOKFIELD, CT 06804

SHEET TITLE:
EQUIPMENT DETAILS

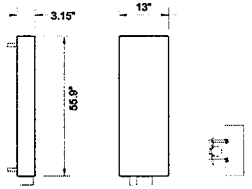
SHEET NUMBER:
04



MOUNTING ASSEMBLY (ALL ANTENNAS)

1 / 05

N.T.S.

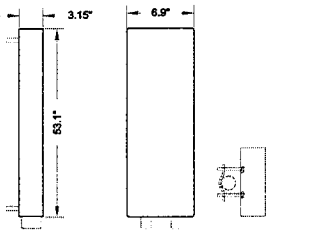


MANUFACTURE: RFS:
MODEL NO. APX16DWV-16DWVS-E-A20
DIMENSIONS – HxWxD, (IN) 55.9x13x3.15

QUAD POLE ANTENNA DETAIL

2 / 05

N.T.S.

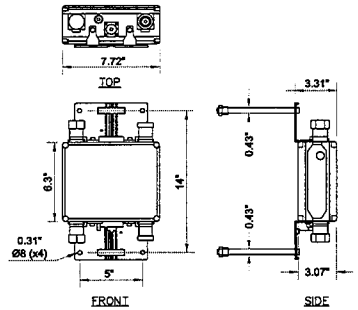


MANUFACTURE: RFS:
MODEL NO. APXV18-206516S-C-A20
DIMENSIONS – HxWxD, (IN) 53.1x6.9x3.15

DUAL POLE ANTENNA DETAIL

3 / 05

N.T.S.



TWIN TMA DETAIL

4 / 05

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A/E _____

DRAWN BY:	S.B.
CHECKED BY:	SM

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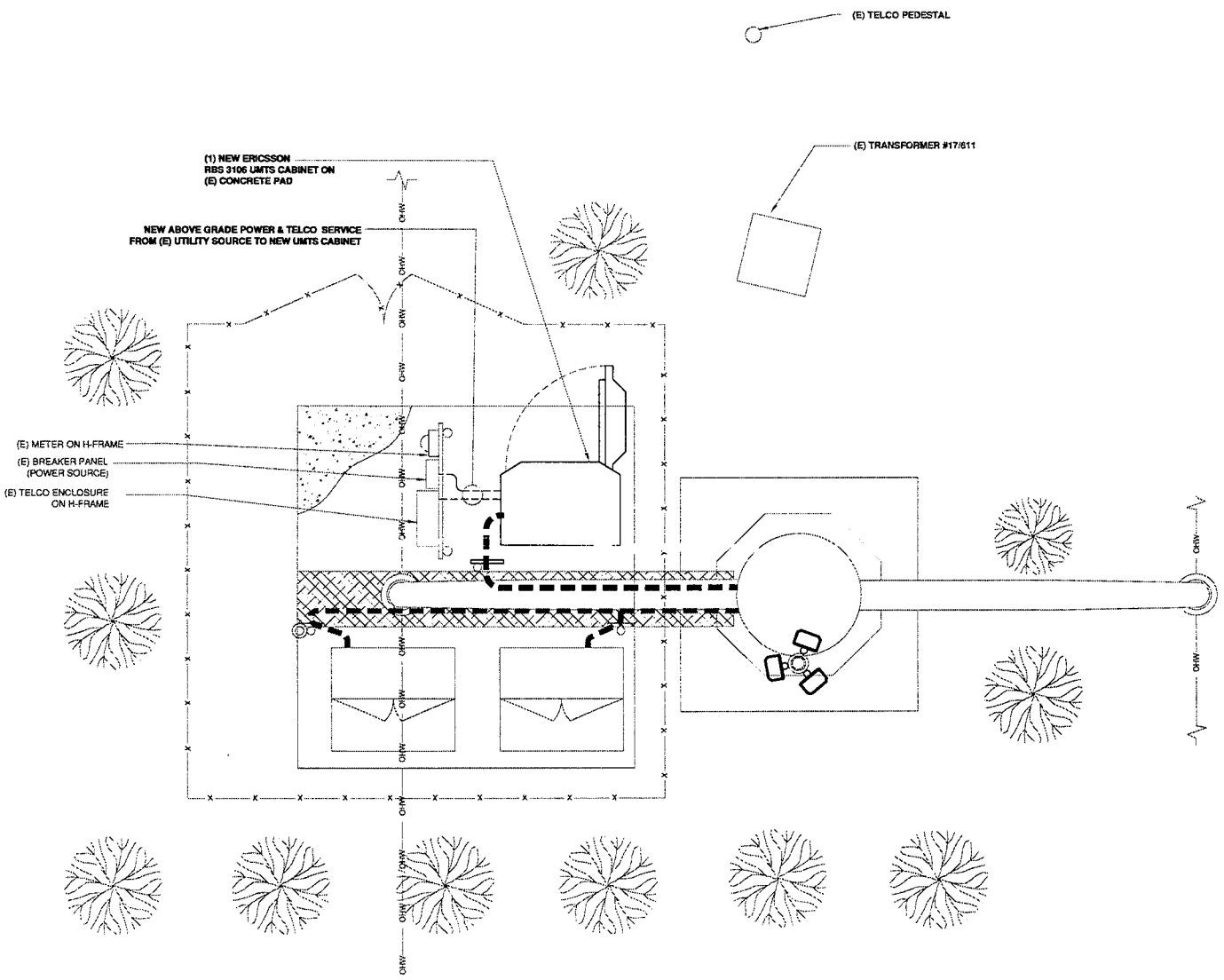
20 VALE ROAD
BROOKFIELD, CT 06804

SHEET TITLE:

ANTENNA DETAILS

SHEET NUMBER:

05



ELECTRICAL AND TELCO PLAN (1/06)

SCALE: 1/4" = 1'-0" (11x17)
SCALE: 1/8" = 1'-0" (24x36)

2 0 2 4 6

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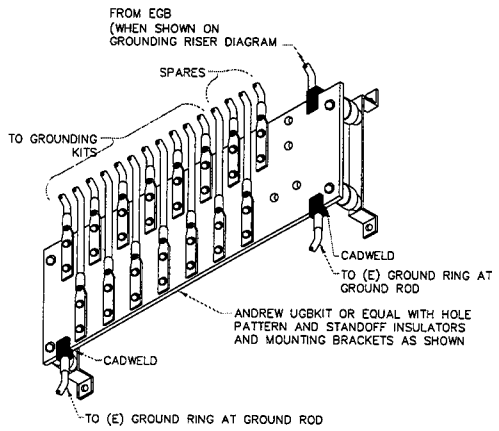
BROOKFIELD, CT 06804

SHEET TITLE:

UTILITY ROUTING PLAN

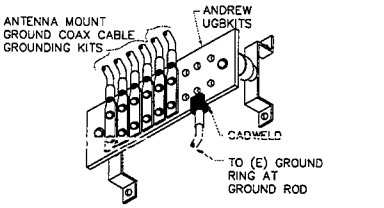
SHEET NUMBER:

06



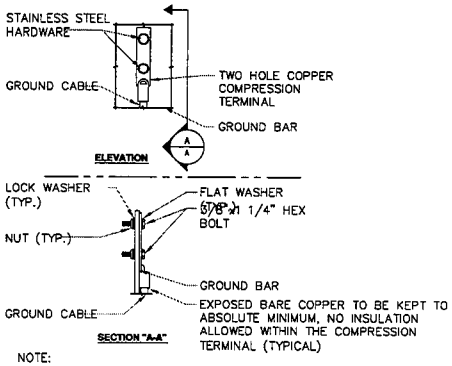
MASTER GROUND BAR (EGB) — 1/07

SCALE: N.T.S.



EQUIPMENT GROUND BAR (EGB) — 2/07

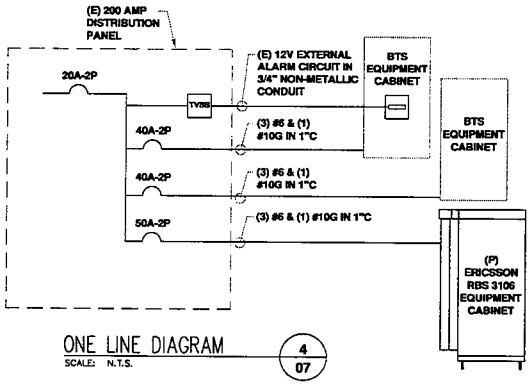
SCALE: N.T.S.



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

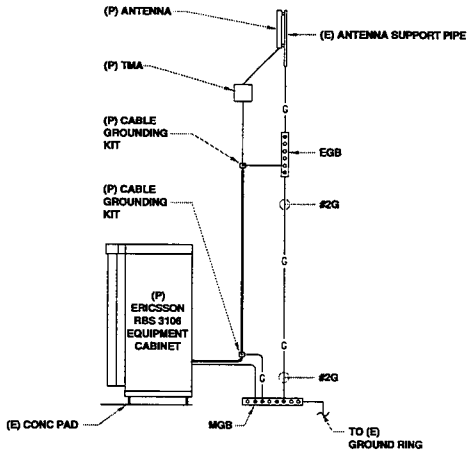
TYPICAL GROUND BAR CONNECTIONS DETAIL — 3/07

SCALE: N.T.S.



ONE LINE DIAGRAM — 4/07

SCALE: N.T.S.



GROUNDING RISER DIAGRAM — 5/07

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.
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR WITH BUILT-IN FUSES, SURFACE MOUNTED
	DUPLEX OUTLET, SURFACE MOUNTED, 20 AMPS, 125 VOLTS, SINGLE PHASE
J	JUNCTION BOX, SURFACE MOUNTED 15" A.F.F.
	EXPOSED WIRING
	HOME RUNS, MINIMUM 2#10 + 1#10G IN 3/4" CONDUIT U.G.U.
A.F.F.	ABOVE FINISHED FLOOR
U.G.U.	UNLESS OTHERWISE NOTED
WP	WEATHERPROOF
GFI	GROUND FAULT INTERRUPTER
A	AMPERE
V	VOLT
KWH	KILOWATT - HOUR
C	CONDUIT
G	GROUND
	GROUND
MGB	MASTER GROUND ○ 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 STEEL GROUND ROD
	* EXOTHERMIC (CADWELD) OR MECHANICAL (COMPRESSION TYPE) CONNECTION
PPC	POWER PROTECTION CABINET

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 PULL 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.
14. GROUND COAXIAL CABLE SHIELDS MINIMUM AT BOTH ENDS USING MANUFACTURER'S 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 8" 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. BOND ANTENNA MOUNTING BRACKETS, COAXIAL CABLE GROUND KITS, AND TMA TO EGB PLACED NEAR THE ANTENNA LOCATION.
21. BOND ANTENNA EGB'S AND MGB TO GROUND RING.
22. CONTRACTOR SHALL TEST COMPLETED GROUND SYSTEM AND RECORD RESULT FOR PROJECT CLOSE-OUT DOCUMENTATION. 5 OHMS MINIMUM RESISTANCE REQUIRED.
23. CONTRACTOR SHALL CONDUCT ANTENNA, COAX, AND TMA RETURN-LOSS AND DISTANCE-TO-FAULT MEASUREMENTS (SWEEP TESTS) AND RECORD RESULTS FOR PROJECT CLOSE OUT.

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APPROVALS

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CT11201A
CL&P BROOKFIELD

20 VALE ROAD
BROOKFIELD, CT 06804

SHEET TITLE:
GROUNDING DETAILS AND RISER DIAGRAMS

SHEET NUMBER:
07

ELECTRICAL SPECIFICATIONS

SECTION 16010

1.01. SCOPE OF WORK

A. WORK SHALL INCLUDE ALL LABOR, EQUIPMENT AND SERVICES REQUIRED TO COMPLETE)MAKE READY FOR OPERATION) ALL THE ELECTRICAL WORK INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING:

1. ALL EQUIPMENT AND HAND TRENCHING FOR POWER, TELECOMMUNICATION, GROUNDING SYSTEM INSTALLATION.

2. PROVIDE A COMPLETE EXTERIOR GROUNDING SYSTEM, CONSISTING OF ANTENNA GROUNDING, GROUND RODS, GROUNDING CABLE, COMPRESSION AND EXOTHERMIC CONNECTIONS.

3. PROVIDE GROUNDING SYSTEM TEST FOR THE EXISTING SITE (BEFORE CONNECTION OF THE NEW WIRELESS CARRIER CELLULAR SITE). PROVIDE REPORT TO WIRELESS CARRIER CONSTRUCTION MANGER. PROVIDE NEW WIRELESS CARRIER CELLULAR SITE GROUNDING TEST AND A GROUNDING SYSTEM TEST FOR WHEN ALL SYSTEMS ARE CONNECTED. PROVIDE SEPARATE REPORTS FOR EACH TEST TO CONSTRUCTION MANGER.

B. CONTRACTOR SHALL CONFER WITH LOCAL UTILITY COMPANIES TO ASCERTAIN THE LIMITS OF THEIR WORK. ALL UTILITY CHARGES OR FEES FOR THE ABOVE WORK WILL BE DIRECTLY BILLED TO WIRELESS CARRIER. THE CONTRACTOR SHALL EXCLUDE THESE ITEMS FROM THE BID. THE CONTRACTOR MUST BE AN APPROVED NU CONTRACTOR.

1.02. GENERAL REQUIREMENTS

A. THE ENTIRE ELECTRICAL INSTALLATION SHALL BE MADE IN STRICT ACCORDANCE WITH ALL LOCAL, STATE AND NATIONAL CODES AND REGULATIONS WHICH MAY APPLY AND NOTHING IN THE DRAWINGS OR SPECIFICATIONS SHALL BE INTERPRETED AS AN INFRINGEMENT OF SUCH CODES OR REGULATIONS.

B. THE ELECTRICAL CONTRACTOR IS TO BE RESPONSIBLE FOR THE COMPLETE INSTALLATION AND COORDINATION OF THE ENTIRE ELECTRICAL SERVICE. ALL ACTIVITIES TO BE COORDINATED THROUGH WIRELESS CARRIER REPRESENTATIVE, DESIGN ENGINEER AND OTHER AUTHORITIES HAVING JURISDICTION OF TRADES.

C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND PAY ALL FEES AS MAY BE REQUIRED FOR THE ELECTRICAL WORK AND FOR SCHEDULING OF ALL INSPECTIONS AS MY REQUIRED BY THE LOCAL AUTHORITY

D. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH THE LAND LEASE OWNER FOR NEW AND/OR DEMOLITION WORK INVOLVED.

E. NO MATERIAL OTHER THAN THAT CONTAINED IN THE "LATEST LIST OF ELECTRICAL FITTINGS" APPROVED BY THE UNDERWRITER'S LABORATORIES, SHALL BE USED IN ANY PART OF THE WORK. ALL MATERIAL FOR WHICH LABEL SERVICE HAS BEEN ESTABLISHED SHALL BEAR THE U.L. LABEL.

F. THE CONTRACTOR SHALL GUARANTEE ALL WORK FOR A PERIODS OF ONE YEAR FROM THE ACCEPTANCE DATE BY THE OWNER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING WARRANTIES FROM ALL EQUIPMENT MANUFACTURERS FOR SUBMISSION TO THE OWNER.

G. DRAWINGS INDICATE GENERAL ARRANGEMENT OF WORK INCLUDED IN CONTRACT. CONTRACTOR SHALL WITHOUT EXTRA CHARGE, MAKE MODIFICATIONS TO THE LAYOUT OF THE WORK TO PREVENT CONFLICT WITH WORK OF OTHER TRADES AND FOR THE PROPER INSTALLATION OF WORK. CHECK ALL DRAWINGS AND VISIT JOB SITE TO VERIFY SPACE AND TYPE OF EXISTING CONDITIONS IN WHICH WORK WILL BE DONE, PRIOR TO SUBMITTAL OF BID.

H. THE ELECTRICAL CONTRACTOR SHALL SUPPLY SIX (6) COMPLETE SETS OF APPROVED DRAWINGS, ENGINEERING DATA SHEETS, MAINTENANCE AND OPERATING INSTRUCTION MANUALS FOR ALL SYSTEMS AND THEIR RESPECTIVE EQUIPMENT. THESE MANUALS SHALL BE INSERTED IN VINYL COVERED 3-RING BINDERS AND TURNED OVER TO OWNER;S REPRESENTATIVE ONE (1) WEEK PRIOR TO FINAL PUNCH LIST.

I. ALL WORK SHALL BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER AND WILL BE SUBJECT TO THE APPROVAL OF THE OWNER'S REPRESENTATIVE.

J. ALL EQUIPMENT AND MATERIALS TO BE INSTALLED SHALL BE NEW, UNLESS OTHERWISE NOTED.

K. BEFORE FINAL PAYMENT, THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF PRINTS (AS-BUILTS), LEGIBLY MARKED IN RED PENCIL TO SHOW ALL CHANGES FROM THE ORIGINAL PLANS.

L. PROVIDE TEMPORARY POWER AND LIGHTING IN WORK AREAS AS REQUIRED.

M. SHOP DRAWINGS

1. CONTRACTOR SHALL SUBMIT SIX (6) COPIES OF SHOP DRAWINGS ON ALL EQUIPMENT AND MATERIALS PROPOSED FOR USE ON THIS PROJECT, GIVING ALL DETAILS, WHICH INCLUDE DIMENSIONS, CAPACITIES, ETC.

2. CONTRACTOR SHALL SUBMIT SIX (6) COPIES OF ALL TEST REPORTS CALLED FOR IN THE SPECIFICATIONS AND DRAWINGS.

SECTION 16450

1.01. GROUNDING

A. ALL NON-CURRENT CARRYING PARTS OF THE ELECTRICAL AND TELEPHONE CONDUIT SYSTEMS SHALL BE MECHANICALLY AND ELECTRICALLY CONNECTED TO PROVIDE AND INDEPENDENT RETURN PATH TO THE EQUIPMENT GROUNDING SOURCES.

B. GROUNDING SYSTEM WILL BE IN ACCORDANCE WITH THE LATEST ACCEPTABLE EDITION OF THE NATIONAL ELECTRICAL CODE AND REQUIREMENTS PER LOCAL INSPECTOR HAVING JURISDICTION.

C. CELLULAR GROUNDING SYSTEM:

CONTRACTOR SHALL PROVIDE A CELLULAR GROUNDING SYSTEM WITH THE MAXIMUM AC RESISTANCE TO GROUND OF 5 OHM BETWEEN ANY POINT ON THE GROUNDING SYSTEM AS MEASURED BY 3-POINT GROUNDING TEST. (REFER TO SECTION 16960).

PROVIDE THE CELLULAR GROUNDING SYSTEM AS SPECIFIED ON DRAWINGS, INCLUDING, BUT NOT LIMITED TO:

1. GROUNDING BARS
2. GROUND RODS
3. EXTERIOR GROUNDING
4. ICE BRIDGE GROUND CONNECTIONS.

D. CONTRACTOR, AFTER COMPLETION OF THE COMPLETE GROUNDING SYSTEM BUT PRIOR TO CONCEALMENT/BURIAL OF SAME, SHALL NOTIFY WIRELESS CARRIER CONSTRUCTION MANGER WHO WILL HAVE A DESIGN ENGINEER VISIT SITE AND MAKE A VISUAL INSPECTION OF THE GROUNDING GRID AND CONNECTIONS OF THE SYSTEM.

SECTION 16960

1.01. TESTS BY INDEPENDENT ELECTRICAL TESTING FIRM

A. CONTRACTOR SHALL RETAIN THE SERVICES OF A LOCAL INDEPENDENT ELECTRICAL TESTING FIRM (WITH MINIMUM5 YEARS COMMERCIAL EXPERIENCE IN THE ELECTRICAL TESTING INDUSTRY) AS SPECIFIED BY WIRELESS CARRIER AND/ OR EXISTING CARRIER(S) TO PERFORM:

TEST 1: THERMAL OVERLOAD AND MAGNETIC TRIP TEST, AND CABLE INSULATION TEST FOR ALL CIRCUIT BREAKERS RATED 100 AMPS OR GREATER.

TEST 2: RESISTANCE TO GROUND TEST ON THE CELLULAR GROUNDING SYSTEM AS MEASURED BY THE 3-POINT GROUNDING TEST AS FOLLOWS:

1. TEST OF EXISTING GROUND RING PRIOR TO COMMENCEMENT OF WORK.

2. TEST OF COMPLETE GROUNDING RING.

3. TEST OF COMPLETE WIRELESS CARRIER IN CONJUNCTION WITH EXISTING GROUND RING'S.

THE TESTING FIRM SHALL INCLUDE THE FOLLOWING INFORMATION WITH THE REPORT:

1. TESTING PROCEDURE INCLUDING THE MAKE AND MODEL OF TEST EQUIPMENT.

2. CERTIFICATION OF TESTING EQUIPMENT CALIBRATION WITHIN SIX (6) MONTHS OF DATE OF TESTING. INCLUDE CERTIFICATION LAB ADDRESS AND TELEPHONE NUMBER.

3. GRAPHICAL DESCRIPTION OF TESTING METHOD ACTUALLY IMPLEMENTED.

B. THESE TESTS SHALL BE PERFORMED IN THE PRESENCE AND TO THE SATISFACTION OF CONSTRUCTION REPRESENTATIVES. TESTING DATA SHALL BE INITIALED AND DATED BY THE CONSTRUCTION REPRESENTATIVES AND INCLUDED WITH THE WRITTEN REPORT/ANALYSIS.

C. THE CONTRACTOR SHALL FORWARD SIX (6) COPIES OF THE INDEPENDENT ELECTRICAL TESTING FIRM REPORT/ANALYSIS TO ENGINEER A MINIMUM OF TEN (10) WORKING DAYS PRIOR TO THE JOB TURNOVER.

D. CONTRACTOR TO PROVIDE A MINIMUM OF ONE (1) WEEK NOTICE TO OWNER AND ENGINEER FOR ALL TESTS REQUIRING WITNESSING.

SECTION 16961

1.01. TESTS BY CONTRACTOR

A. ALL TESTS AS REQUIRED UPON COMPLETION OF WORK, SHALL BE MADE BY THIS CONTRACTOR. THESE SHALL BE CONTINUITY AND INSULATION TESTS; TEST TO DETERMINE THE QUALITY OF MATERIALS, ETC. AND SHALL BE MADE IN ACCORDANCE WITH NEC RECOMMENDATIONS. ALL FEEDERS AND BRANCH CIRCUIT WIRING (EXCEPT CLASS 2 SIGNAL CIRCUITS) MUST BE TESTED FREE FROM SHORT CIRCUIT AND GROUND FAULT CONDITIONS AT 500V IN A REASONABLY DRY AMBIENT OF APPROXIMATELY 70 DEGREES F.

B. ALL TESTS, UPON REQUEST, BE REPEATED IN THE PRESENCE OF WIRELESS CARRIER CONSTRUCTION MANAGER. ALL TESTS SHALL BE DOCUMENTED AND TURNED OVER TO WIRELESS CARRIER. WIRELESS CARRIER SHALL HAVE THE AUTHORITY TO STOP ANY OF THE WORK NOT BEING PROPERLY INSTALLED. ALL SUCH DETECTED WORK SHALL BE REPAIRED OR REPLACED AT NO ADDITIONAL EXPENSE TO THE OWNER AND THE TESTS SHALL BE REPEATED.

CELLULAR GROUNDING NOTES

OBJECTIVE
PROVIDE A CELLULAR GROUNDING SYSTEM WITH A 5 OHM MAXIMUM ALTERNATING CURRENT RESISTANCE BETWEEN ANY POINT ON THE GROUNDING SYSTEM AS MEASURED BY 3-POINT GROUNDING TEST. EXTERIOR GROUNDING SCHEME WITH WIRELESS CARRIER/ENGINEER'S APPROVAL AS REQUIRED TO ACHIEVE DESIRED MAXIMUM AC RESISTANCE TO GROUND. TESTING PROCEDURE AS DESCRIBED IN SPEC. CHEMICAL ADDITIVES SHALL NOT BE USED TO ENHANCE MINIMUM RESISTANCE ON THE CELLULAR GROUNDING SYSTEM UNLESS APPROVED BY CELLULAR ENGINEER.

TESTING
CONTRACTOR TO PROVIDE AND INDEPENDENT TESTING CONTRACTOR TO DETERMINE THE GROUNDING SYSTEM RESISTANCE BY USE OF THE THREE POINT TEST AND AN AEMC MODEL 4500, OR APPROVED EQUAL. TEST TO BE PERFORMED PRIOR TO CONNECTION OF POWER SUPPLY TO THE CELL SITE AND CONNECTION OF THE GROUNDING SYSTEM TO THE WATER MAIN OR AC SUPPLY.

CONDUCTOR USED FOR CELLULAR GROUNDING SYSTEM
EGR - #2 AWG ANNEALED TEMPER SOLID TINNED BARE COPPER
IGR - #2 AWG ANNEALED TEMPER STRANDED (7 STRAND) 'THW' GREEN COLORED INSULATION
SGR - #2 AWG ANNEALED TEMPER STRANDED (7 STRAND) TYPE 'THW' INSULATION GREEN COLORED.
INTER-BUS EXTENSION (FROM IGR TO EGR) - SEE DETAILS
EXTERNAL BOND CONNECTIONS TO EGR - #2 ANNEALED SOLID TINNED BARE COPPER
INTERIOR BOND CONNECTIONS TO IGR - #6 ANNEALED STRANDED (7 STRAND) 'THW' GREEN COLORED INSULATION
ANTENNA BOND CONNECTION TO EGR - #2 SOLID COPPER.

MINIMUM BENDING RADIUS
IGR #2 : 1'-0" NOMINAL AND 8" MINIMUM
SGR #2 ; 1'-0" NOMINAL AND 8" MINIMUM
EGR #2 ; 2'-0" NOMINAL AND 6" MINIMUM
CELLULAR GROUNDING CONDUCTOR SHALL BE AS STRAIGHT AS POSSIBLE WITH MINIMUM 8" BENDING RADIUS.

FASTENER FOR CELLULAR GROUNDING CONDUCTOR
USE NON-METALLIC FASTENER AND STANDOFF 'CLIC' (AVAIL. FROM NEFCO 203-289-0285) TO SURFACE SUPPORT CONDUCTOR 3" AWAY FROM SURFACES.

SPACING OF FASTENERS: 2'-0" O.C. OUTSIDE BUILDING
3'-0" O.C. INSIDE BUILDING

GROUNDING ELECTRODE
GROUNDING ELECTRODE SHALL BE 5/8" DIA. x 8'-0" L COPPER CLAD STEEL ROD. ADJUST LOCATION OF GROUNDING ELECTRODE IF SOIL CONDITION IS NOT CONDUCTIVE (GRAVEL, SANDY SOIL, ROCKS). SPACE GROUNDING ELECTRODES 8'-0" TO 10'-0" APART. ELECTRODES SHALL BE DRIVEN ONLY WITH PROPER DRIVER TO PREVENT MUSHROOMING TOP OF ROD. WHEN ROCK BOTTOM IS ENCOUNTERED, THE ELECTRODE SHALL BE DRIVEN AT AN OBLIQUE ANGLE NOT TO EXCEED 45° FROM THE VERTICAL AWAY FROM STRUCTURES. TOP OF GROUNDING ELECTRODE SHALL BE MIN. 3'-6" BELOW FINISH GRADE.

CONNECTIONS ABOVE GRADE (MECHANICAL)
COMPRESSION LUG CONNECTOR - 15 TON COMPRESSION, 2 HOLE, LONG BARREL, ELECTRO TINNED PLATE, HIGH CONDUCTIVITY, COPPER 600V RATED. USE 1/4"" BOLT, 3/4" SPACING LUGS TO BOND OBJECTS FROM THE IGR. (CONNECTOR SHALL BE BURNDY HYLUG SERIES OR EQUAL.)

EXOTHERMIC WELD LUG CONNECTOR - 2 HOLE, OFFSET, ELECTRO TINNED PLATED, HIGH CONDUCTIVITY, COPPER 600V. USE 1/2"Ø BOLT, 1-3/4" SPACING LUGS, CONNECTOR SHALL BE CADWELD CONNECTION STYLE (CABLE TO SURFACE) TYPE LA, LUG SIZE 1/8 x 1. EXOTHERMIC WELD TO LUG AS REQUIRED.

C-TAP COMPRESSION CONNECTOR - HIGH CONDUCTIVITY COPPER FOR MAIN TO BRANCH LINE TAPPING. (CONNECTOR SHALL BE BURNDY HYTAP SERIES OR EQUAL.)

MECHANICAL CONNECTIONS
USE MATCHING MANUFACTURER TOOL AND DIE FOR COMPRESSION CONNECTION.

APPLY ANTI-OXIDANT CONDUCTIVITY ENHANCER COMPOUND ON SURFACES THAT ARE COMPRESSED.

SURFACES INTENDED TO BE CONNECTED WITH MECHANICAL CONNECTORS SHALL BE BARE METAL TO BARE METAL. PRIME AND PAINT OVER BONDED AREA TO PREVENT CORROSION.

WHEN BONDING #2 TO #2
EXTERIOR OF BUILDING - USE EXOTHERMIC WELD CONNECTION
INTERIOR OF BUILDING - USE COMPRESSION CONNECTION ON STRANDED CONDUCTORS ONLY
- USE EXOTHERMIC WELD CONNECTION ON SOLID CONDUCTOR.

WHEN BONDING #2 TO FENCE POST
USE EXOTHERMIC WELD 'CADWELD TYPE VS' CONNECTION TO FENCE POST STEEL SURFACE. TEST WELD FOR POSSIBLE BURN THRU. PATCH WELDED AREA WITH GALVANIZED COATING AS REQUIRED FOR PROPER WELDED PERMANENT BOND. REFER TO MANUFACTURER'S REQUIREMENTS FOR DETAILS

GROUNDING SYSTEM INTERCONNECTION
BOND THE EGR DOWN CONDUCTORS, AND/OR BURIED GROUND RING TO ANY METALLIC OBJECT OR EXISTING GROUNDING SYSTEM WITHIN 6'.

WHEN BONDING #2 TO TOWER GROUND PLATE
TOWER GROUND PLATE SHALL BE 6" X 6" X 1/4" COPPER AND MADE AVAILABLE TO TOWER CONTRACTOR TO BE INSTALLED DURING TOWER CONSTRUCTION. USE EXOTHERMIC WELD 'CADWELD TYPE HS' TO TOWER GROUND PLATE TEST WELD FOR POSSIBLE BURN THRU. COORDINATE THE SIZE OF THE MOUNTING HOLE WITH TOWER CONTRACTOR.

METALLIC CONDUITS
BOND ALL STEEL CONDUITS TO PANELS AT POINT OF CONTACT WITH APPROVED GROUNDING BUSHING.

OTHER
ANY WORK ON NU TOWER GROUNDING SHALL BE PER NU SPECIFICATIONS.

GENERAL NOTES

REFER TO DRAWING 1/ 03 FOR ACTUAL LOCATION OF STRUCTURES ON SITE.

COORDINATION, LAYOUT AND FURNISHING OF CONDUIT, CABLE AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL/TELECOMMUNICATIONS SERVICES SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.

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

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STATE OF CONNECTICUT
HOSSEIN VAHEDI
NO. ARI. 11162
LICENSED ARCHITECT

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SHEET TITLE:
ELECTRICAL SPECIFICATIONS AND NOTES

SHEET NUMBER:
08

NORTHEAST UTILITIES - TOWER GROUNDING SYSTEM NOTES:

GENERAL-

1. T-MOBILE, NORTHEAST, LLC. WILL FURNISH THE WIRE, CONNECTORS, AND MISCELLANEOUS MATERIAL ASSOCIATED WITH THE COUNTERPOISE GROUNDING SYSTEM.

2. THE CONTRACTOR SHALL FURNISH ALL LABOR, MATERIALS AND EQUIPMENT NECESSARY TO INSTALL THE GROUNDING SYSTEM AND TO REHABILITATE THE RIGHT-OF-WAY AS CLOSE AS POSSIBLE TO ITS ORIGINAL CONDITION.

3. THE CONTRACTOR SHALL HANDLE AND TRANSPORT THE OWNER SUPPLIED MATERIAL FROM THE OWNER'S STOREROOMS AND YARDS TO THE JOB SITE AND SHALL RETURN SURPLUS MATERIAL AND EMPTY REELS TO DESIGNATED STOREROOMS AND YARDS UPON COMPLETION OF THE CONTRACT.

4. NORTHEAST UTILITIES WILL BE RESPONSIBLE FOR PERFORMING TEST FOR SURGE IMPEDANCE AND WAVE IMPENDENCE.

INSTALLATION-

1. UNLESS OTHERWISE DIRECTED BY THE OWNER'S REPRESENTATIVE, COUNTERPOISE SHALL BE BURIED A MINIMUM OF 24" IN CULTIVATED AREAS AND 18" IN WOODED OR OTHER AREAS. IN ROCKY AREAS OR WHERE OBSTRUCTIONS ARE ENCOUNTERED, THE COUNTERPOISE SHALL BE DIVERTED AROUND SUCH OBSTRUCTIONS. ALL INSTALLATIONS SHALL INCLUDE CONNECTIONS TO EXISTING OR PROPOSED STRUCTURES, AND SUCH CONNECTIONS SHALL BE MADE BELOW GROUND USING BOLTED PARALLEL GROVE CONNECTORS.

2. WHERE MULTIPLE STRUCTURE GROUNDS EXIST AT MULTI POLE STRUCTURES, THEY SHALL BE CONNECTED TOGETHER WITH BURIED COPPERWELD WIRE, BUT ONLY IF SUCH GROUNDS HAVE METALLIC CONNECTIONS UP THE POLES TO THE SHIELD WIRE(S). AT STRUCTURES THAT HAVE PALE GROUNDS AND ALSO POLE GUY GROUNDS, CONNECTIONS SHALL BE MADE ONLY TO THE POLE GROUNDS, AND THE MINIMUM SPACING BETWEEN THE COUNTERPOISE AND ANCHOR RODS SHALL BE 10'. AT WOOD POLE STRUCTURES WHERE NO SUCH POLE GROUND EXIST, COUNTERPOISE CONNECTIONS SHALL BE MADE TO THE POLE TOP GUYS.

3. FOR SINGLE CONTINUOUS (TYPE A) AND SINGLE BROKEN (TYPE B) COUNTERPOISE, THE WIRE SHALL IN GENERAL BE LAYED AT THE CENTERLINE OF THE TRANSMISSION LINE. FOR DOUBLE CONTINUOUS Z(TYPE C) AND DOUBLE BROKEN (TYPE D) COUNTERPOISE, THE WIRES SHALL IN GENERAL SHALL BE LAYED UNDER THE OUTSIDE PHASE WIRES OF THE TRANSMISSION LINE. COUNTERPOISE SHALL NOT BE INSTALLED ACROSS BROOKS, RIVERS, HIGHWAYS, RAILROADS, OR THE VICINITY OF TELEPHONE CABLES OR PIPELINES.

4. AT STEEL POLE STRUCTURES, A BURIED GRADING RING AND SPOKES SHALL ALSO BE INSTALLED AROUND THE STRUCTURE UNLESS THE STRUCTURE HAS A PAD PIER FOUNDATION OR UNLESS A RING ALREADY EXISTS. COUNTERPOISE WIRE SHALL BE CONNECTED AT TWO PLACES TO EACH RING, AND COPPERWELD SPOKES SHALL SLOPE LINEARLY UP TO THE STRUCTURE GROUND.

5. AT WOOD POLE STRUCTURES, AN 8' LENGTH OF PLASTIC MOLDING SHALL BE STAPLED OVER THE BOTTOM WITH 8' OF DOWNLEAD

GROUND RODS-

1. WHERE GROUND RODS ARE REQUIRED, THEY SHALL BE SINGLE OR SECTIONAL WITH THE LENGTH SPECIFIED. THEY SHALL BE DRIVEN VERTICALLY INTO THE GROUND TO A DEPTH WHICH WILL LEAVE THE TOP OF THE ROD AT LEAST 12" BELOW GRADE. ALL RODS SHALL BE CONNECTED TO COUNTERPOISE OR TO POLE GROUNDS USING BOLTED CONNECTORS.

REHABILITATION-

1. SELECTIVE CLEARING PROCEDURES WERE USED IN THE DEVELOPMENT OF THE RIGHT-OF-WAY, AND GROWTH OF SELECTED SPECIES HAS BEEN SAVED. THE CONTRACTOR SHALL NOT VIOLATE THE OWNER'S INTENT TO SAVE SELECTIVE SPECIES AND IMPOSE THE MINIMUM ENVIRONMENTAL IMPACT ON THE RIGHT OF WAY DURING THE EXECUTION OF THE WORK. THE CONTRACTOR SHALL REVIEW THE ROUTING OF EACH SECTION OF COUNTERPOISE WITH THE OWNER'S REPRESENTATIVE PRIOR TO ITS FIELD SPECIFIED LOCATION. THE CONTRACTOR IS RESPONSIBLE TO THE OWNER FOR DAMAGES TO THE RIGHT-OF-WAY IN OTHER THAN THE FIELD SPECIFIED LOCATIONS.

2. ANY BRUSH ALONG THE FIELD SPECIFIED COUNTERPOISE ROUTES WHICH IS LEFT IN AN UNSIGHTLY CONDITION BY THE INSTALLATION WORK WILL BE CUT TO THE GROUND BY THE CONTRACTOR AND LEFT IN SMALL, NEAT PILES IN PLACE WHERE CUT.

3. IN LOCATION WHERE EXCAVATION FOR THE INSTALLATION OF COUNTERPOISE BRINGS TO THE SURFACE ANY SMALL BOULDERS, THEY WILL BE BACKFIELD BELOW GARDE OR DISPERSED ON THE RIGHT-OF-WAY AS THE OWNER'S REPRESENTATIVE MAY DIRECT. INSTALLATION OF THE COUNTERPOISE SHALL NOT RESULT IN A PATH OF SMALL BOULDERS ON THE FINISHED SURFACE.

4. THE OWNER ANTICIPATES THAT SEASONAL CONDITIONS MAY NOT ALLOW PERMANENT REHABILITATION OF WORK SITES AND THE RIGHT-IO-WAY UPON COMPLETION OF THE INSTALLATION OF THE COUNTERPOISE. WHERE TEMPORARY REHABILITATION HAS BEEN COMPLETED IN ADVERSE SEASON, THE CONTRACTOR SHALL TAKE THE FOLLOWING STEPS:

   A. WATERBARS WILL BE CONSTRUCTED ON ACCESS ROADS AND TRENCH LINES TO SHUNT WATER OFF THIS LINE OF DISTURBED SURFACES AND CONTROL EROSION ALONG THE DISTURBED SURFACE.

   B. ALL DISTURBED SURFACES OF FOUNDATION SITES OR LONG TRENCH LINES OR ACCESS ROADS WILL BE GRADED AND COVERED WITH HAY MULCH. SUCH DISTURBED SY=URFACES ON SLOPES GREATER THAN ONE (VERTICAL) ON FOUR (HORIZONTAL) SHALL BE COVERED WITH WOOD CHIPS.

5. AS DRYING CONDITIONS PERMIT IN THE SPRING, FOLLOWING COMPLETION OF THE INSTALLATION OF COUNTERPOISE, PERMANENT REHABILITATION OF ALL DISTURBED OR ERODED SURFACES SHALL BE ACCOMPLISHED AS FOLLOWS:

   A. LAWNS. GOLF COURSES, CEMETERIES AND OTHER SIMILAR OCCUPANCIES SHALL BE LOAMED, GRADED, FERTILIZED, SEEDED AND WHERE APPROPRIATE, MULCHED, TO ESTABLISH A REHABILITATION CONSISTENT WITH THE USE ESTABLISHED BY THE OCCUPANT.

   B. GARDENS, OTHER CULTIVATED AREAS AND PASTURES, SHALL BE GRADED AND TOPSOILED TO RESTORE THE DEPTH PF FERTILE SOIL COMMON TO THE ADJACENT GROUND. WHERE APPROPRIATE, SEEDING SHALL BE DONE IN ACCORDANCE WITH STEP C BELOW.

   C. THE CONTRACTOR SHALL SEED ALL DISTURBED AREAS ALONG THE NEW COUNTERPOISE ROUTES, SEED SHALL BE SPREAD AT THE RATE OF 100 LBS. PER ACRE AND SHALL BE AS FOLLOWS OR APPROVED EQUAL:

	% BY WEIGHT	% BY GERMINATION	% BY PURITY
CREEPING RED FESCUE	30	85	98
DOMESTIC RYE	20	90	98
KENTUCKY TALL FESCUE	50	–	–

   D. ALL OTHER DISTURBED AREAS INCLUDING REMAINING FOUNDATION SITES, ACCESS ROADS, AND REPAIR OF EROSION OF SITUATION SHALL BE SEEDED WITH MIXED SPECIFICATION ABOVE. IN REMOTE AREAS, A CONSERVATION MIX, AS USED BY THE CONNECTICUT STATE PARKS AND FOREST COMMISSION MAY BE SUBSTITUTED. ALL AREAS WHICH EXPERIENCED EROSION DAMAGE AND ALL SLOPES OVER ONE (VERTICAL) AND FOUR (HORIZONTAL) WHERE TEMPORARY REHABILITATION WORK HAS BEEN DONE SHALL BE REMULCHED.

6. IT IS IMPERATIVE THAT PERMANENT REHABILITATION BE ACCOMPLISHED IN GOOD TIME, WHICH WILL ALLOW THE OCCUPANT FULL AND UNDISTURBED USE OF THE SITE SUCCEEDING SEASON, AND TO PREVENT UNNECESSARY AND UNREASONABLE SPREADING OF CONTINUATION OF DISTURBED SURFACES.

7. ANY BRUSH ALONG THE ACCESS ROADS WHICH IS LEFT IN AN UNSIGHTLY CONDITION BY THE WORK CONDUCTED, SHALL BE CUT TO THE GROUND BY THE CONTRACTOR AND LEFT IN SMALL NEAT PILES IN PLACE WHERE CUT.

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GROUNDING NOTES

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09

CENTEK engineering

Centered on Solutions℠

Structural Analysis of PCS Structure and CL&P Pole

T-Mobile: CT11-201A

CL&P Structure No. 10247
115' Electric Transmission Pole

20 Vale Road
Brookfield, CT

CENTEK Project No. 10021.CO10

~~Date: May 12, 2010~~
Rev 1: May 24, 2010

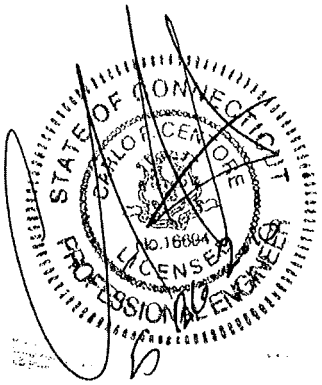

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Table of Contents

Introduction

The purpose of this report is to analyze the existing 24'-4" long PCS mast and 115' CL&P pole located at 20 Vale Road in Brookfield, CT for the proposed antenna and equipment upgrade by T-Mobile.

The proposed loads consist of the following:

- T-MOBILE (Existing to be removed):

  Antennas: Six (6) FR90-16-00DP panel antennas and one (1) TMA mounted in two (2) clusters on a PCS mast with RAD center elevations of 123-ft and 130-ft above tower base plate.

- T-MOBILE (Existing to remain):

  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on the outside of the tower as indicated in section 4 of this report.

- **T-MOBILE (Proposed):**

  Antennas: Three (3) RFS APXV18-206516S-C-A20 panel antennas and three (3) TMAs mounted on a PCS mast with a RAD center elevation of 123-ft above tower base plate. Three (3) RFS APX16DWV-16DWVS-E-A20 panel antennas and three (3) TMAs mounted on a PCS mast with a RAD center elevation of 130-ft above tower base plate.
  Coax Cables: Six (6) 1-5/8" ∅ coax cables running on the outside of the tower as indicated in section 4 of this report.

Primary assumptions used in the analysis

- Allowable steel stresses are defined by AISC-ASD 9th edition for design of the PCS Mast and antenna supporting elements.
- ASCE Manual No. 72, "Design of Steel Transmission Pole Structures Second Edition", defines allowable steel stresses for evaluation of the CL&P utility pole.
- All utility pole members are adequately protected to prevent corrosion of steel members.
- All proposed antenna mounts are modeled as listed above.
- All coaxial cable will be installed within the pipe mast unless specified otherwise.
- Pipe mast will be properly installed and maintained.
- No residual stresses exist due to incorrect pole erection.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds conform to the requirements of AWS D1.1.
- All proposed pipe mast members will be as specified in the construction documents to be prepared by CENTEK engineering, Inc.
- Pipe mast and utility pole will be in plumb condition.
- Utility pole was properly installed and maintained and all members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
- Any deviation from the analyzed loading will require a new analysis for verification of structural adequacy.

Analysis

Structural analysis of the existing *PCS Mast Structure* was independently completed using the current version of RISA-3D computer program licensed to CENTEK Engineering, Inc.

The existing mast consisting of a 3-in x 24-ft-4-in long SCH. 40 pipe (O.D. = 3.5") connected at two points to the existing tower was analyzed for its ability to resist loads prescribed by the TIA/EIA standard. Section 5 of this report details these gravity and lateral wind loads. NESC prescribed loads were also applied to the mast structure in order to obtain reactions needed for analyzing the CL&P pole structure. These loads are developed in Section 7 of this report. Load cases and combinations used in RISA-3D for TIA/EIA loading and for NESC/NU loading are listed in report Sections 6 and 8, respectively.

An envelope solution was first made to determine maximum and minimum forces, stresses, and deflections to confirm the selected section as adequate. Additional analyses were then made to determine the NESC forces to be applied to the CL&P pole structure.

The RISA-3D program contains a library of all AISC shapes and corresponding section properties are computed and applied directly within the program. The program's Steel Code Check option was also utilized. The forces calculated in RISA-3D using NESC guidelines were then applied to the CL&P pole using PLS-Pole. Maximum usage for the pole was calculated considering the additional forces from the mast and associated appurtenances.

Design Basis

Our analysis was performed in accordance with EIA-222-F-1996, ASCE Manual No. 72 – "Design of Steel Transmission Pole Structures Second Edition", NESC C2-2007 and Northeast Utilities Design Criteria.

The CL&P pole structure, considering existing and future conductor and shield wire loading, with the proposed antenna mast was analyzed under two conditions:

- UTILITY POLE ANALYSIS

  The purpose of this analysis is to determine the adequacy of the existing utility pole to support the proposed antenna loads. The loading and design requirements were analyzed in accordance with the NU Design Criteria Table, NESC C2-2007 ~ Construction Grade B, and ASCE Manual No. 72.

  Load cases considered:

  Load Case 1: NESC Heavy

Wind Pressure.....	4.0 psf
Vertical Overload Capacity Factor.....	1.50
Wind Overload Capacity Factor.....	2.50
Wire Tension Overload Capacity Factor.....	1.65

  Load Case 2: NESC Extreme

Wind Speed.....	100 mph [1]
Radial Ice Thickness.....	0"

  Note 1: NESC C2-2007, Section25, Rule 250C: Extreme Wind Loading, 1.25 x Gust Response Factor (wind speed: 3-second gust)

- PCS MAST ANALYSIS

The PCS mast, appurtenances and connections to the utility pole were analyzed and designed in accordance with the NU Design Criteria Table, TIA/EIA-222-F, and AISC-ASD standards.

Load cases considered:

Load Case 1:
Wind Speed..... 85 mph [(2)]
Radial Ice Thickness..... 0"

Load Case 2:
Wind Pressure..... 75% of 85 mph wind pressure
Radial Ice Thickness..... 0.5"

Note 2: Per NU Mast Design Criteria Exception 1.

Results

- PCS MAST

The existing pipe mast was determined to be structurally **inadequate**. Replacement of the existing antenna mast with a **8 SCH. 80 Pipe x 27.5-ft long (O.D. = 8.63")**, conforming to ASTM A53, Grade B, F_y = 35 ksi specifications will be required.

- UTILITY POLE

This analysis finds that the subject utility pole is adequate to support the proposed antenna mast and related appurtenances. The pole stresses meet the requirements set forth by the ASCE Manual No. 72, "Design of Steel Transmission Pole Structures Second Edition", for the applied NESC Heavy and Hi-Wind load cases. The detailed analysis results are provided in Section 9 of this report. The analysis results are summarized as follows:

A maximum usage of **99.74%** occurs in the utility pole under the **NESC Extreme** loading condition.

POLE SECTION:

The utility pole was found to be within allowable limits.

Tower Section	Elevation	Stress Ratio (% of capacity)	Result
Tube Number 3	0' -25.83' (AGL)	69.44%	**PASS**

BASE PLATE:

The base plate was found to be within allowable limits from the PLS output based on 24 bend lines.

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Base Plate	Bending	99.74%	**PASS**

- FOUNDATION AND ANCHORS

The existing foundation consists of a 8-ft x 8-ft x 15.0-ft long reinforced concrete pier with twelve (12) rock anchors embedded 22-ft into rock. The base of the tower is connected to the foundation by means of sixteen (16) 2.25"Ø, ASTM A615-75 anchor bolts embedded into the concrete foundation structure. Foundation information was obtained from NUSCO drawing # 01143-60001.

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:

BASE REACTIONS:

From PLS-Pole analysis of CL&P pole based on NESC/NU prescribed loads.

Load Case	Transverse	Axial	Overturning Moment
NESC Heavy Wind	21.0 kips	73.9 kips	1758.1 ft-kips
NESC Extreme Wind	36.6 kips	36.8 kips	2758.3 ft-kips
NESC Heavy Broken Wire	21.2 kips	73.8 kips	1820.3 ft-kips

ANCHOR BOLTS:

The anchor bolts were found to be within allowable limits.

Tower Component	Design Limit	Stress Ratio (% of capacity)	Result
Anchor Bolts	Tension	55.01%	**PASS**

FOUNDATION:

The foundation was found to be within allowable limits.

Foundation	Design Limit	Allowable Limit	Proposed Loading [4]	Result
Reinf. Conc. Pier w/ Rock Anchors	OTM [1]	1.5 FS [2]	5.56 FS [2]	**PASS**
	Bearing Pressure	50 ksf [3]	45.6 ksf	**PASS**

Note 1: OTM denote overturning moment.
Note 2: FS denotes Factor of Safety
Note 3: Bearing Capacity based on Weak Rock.
Note 4: 10% increase to PLS base reactions used in foundation analysis per OTRM 051.

Conclusions and Recommendations

This analysis shows that the subject utility pole with the proposed mast replacement **is adequate** to support the proposed T-Mobile equipment upgrade.

The analysis is based, in part on the information provided to this office by Northeast Utilities and Transcend Wireless. If the existing conditions are different than the information in this report, CENTEK engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:

Carlo F. Centore, PE
Principal ~ Structural Engineer

STATE OF CONNECTICUT
CARLO F. CENTORE
No. 16684
LICENSED
PROFESSIONAL ENGINEER

Prepared by:

Timothy J. Lynn, EIT
Structural Engineer

STANDARD CONDITIONS FOR FURNISHING OF PROFESSIONAL ENGINEERING SERVICES ON EXISTING STRUCTURES

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

- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.

- Information from the field and/or drawings in the possession of CENTEK engineering, Inc. or generated by field inspections or measurements of the structure.

- It is the responsibility of the client to ensure that the information provided to CENTEK engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the "as new" condition.

- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222.

- All services are performed, results obtained, and recommendations made in accordance with generally accepted engineering principles and practices. CENTEK engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM ~ RISA-3D

RISA-3D Structural Analysis Program is an integrated structural analysis and design software package for buildings, bridges, tower structures, etc.

Modeling Features:

- Comprehensive CAD-like graphic drawing/editing capabilities that let you draw, modify and load elements as well as snap, move, rotate, copy, mirror, scale, split, merge, mesh, delete, apply, etc.
- Versatile drawing grids (orthogonal, radial, skewed)
- Universal snaps and object snaps allow drawing without grids
- Versatile general truss generator
- Powerful graphic select/unselect tools including box, line, polygon, invert, criteria, spreadsheet selection, with locking
- Saved selections to quickly recall desired selections
- Modification tools that modify single items or entire selections
- Real spreadsheets with cut, paste, fill, math, sort, find, etc.
- Dynamic synchronization between spreadsheets and views so you can edit or view any data in the plotted views or in the spreadsheets
- Simultaneous view of multiple spreadsheets
- Constant in-stream error checking and data validation
- Unlimited undo/redo capability
- Generation templates for grids, disks, cylinders, cones, arcs, trusses, tanks, hydrostatic loads, etc.
- Support for all units systems & conversions at any time
- Automatic interaction with RISASection libraries
- Import DXF, RISA-2D, STAAD and ProSteel 3D files
- Export DXF, SDNF and ProSteel 3D files

Analysis Features:

- Static analysis and P-Delta effects
- Multiple simultaneous dynamic and response spectra analysis using Gupta, CQC or SRSS mode combinations
- Automatic inclusion of mass offset (5% or user defined) for dynamic analysis
- Physical member modeling that does not require members to be broken up at intermediate joints
- State of the art 3 or 4 node plate/shell elements
- High-end automatic mesh generation — draw a polygon with any number of sides to create a mesh of well-formed quadrilateral (NOT triangular) elements.
- Accurate analysis of tapered wide flanges - web, top and bottom flanges may all taper independently
- Automatic rigid diaphragm modeling
- Area loads with one-way or two-way distributions
- Multiple simultaneous moving loads with standard AASHTO loads and custom moving loads for bridges, cranes, etc.
- Torsional warping calculations for stiffness, stress and design
- Automatic Top of Member offset modeling
- Member end releases & rigid end offsets
- Joint master-slave assignments
- Joints detachable from diaphragms
- Enforced joint displacements
- 1-Way members, for tension only bracing, slipping, etc.

- 1-Way springs, for modeling soils and other effects
- Euler members that take compression up to their buckling load, then turn off.
- Stress calculations on any arbitrary shape
- Inactive members, plates, and diaphragms allows you to quickly remove parts of structures from consideration
- Story drift calculations provide relative drift and ratio to height
- Automatic self-weight calculations for members and plates
- Automatic subgrade soil spring generator

Graphics Features:

- Unlimited simultaneous model view windows
- Extraordinary "true to scale" rendering, even when drawing
- High-speed redraw algorithm for instant refreshing
- Dynamic scrolling stops right where you want
- Plot & print virtually everything with color coding & labeling
- Rotate, zoom, pan, scroll and snap views
- Saved views to quickly restore frequent or desired views
- Full render or wire-frame animations of deflected model and dynamic mode shapes with frame and speed control
- Animation of moving loads with speed control
- High quality customizable graphics printing

Design Features:

- Designs concrete, hot rolled steel, cold formed steel and wood
- ACI 1999/2002, BS 8110-97, CSA A23.3-94, IS456:2000,EC 2-1992 with consistent bar sizes through adjacent spans
- Exact integration of concrete stress distributions using parabolic or rectangular stress blocks
- Concrete beam detailing (Rectangular, T and L)
- Concrete column interaction diagrams
- Steel Design Codes: AISC ASD 9th, LRFD 2nd & 3rd, HSS Specification, CAN/CSA-S16.1-1994 & 2004, BS 5950-1-2000, IS 800-1984, Euro 3-1993 including local shape databases
- AISI 1999 cold formed steel design
- NDS 1991/1997/2001 wood design, including Structural Composite Lumber, multi-ply, full sawn
- Automatic spectra generation for UBC 1997, IBC 2000/2003
- Generation of load combinations: ASCE, UBC, IBC, BOCA, SBC, ACI
- Unbraced lengths for physical members that recognize connecting elements and full lengths of members
- Automatic approximation of K factors
- Tapered wide flange design with either ASD or LRFD codes
- Optimization of member sizes for all materials and all design codes, controlled by standard or user-defined lists of available sizes and criteria such as maximum depths
- Automatic calculation of custom shape properties
- Steel Shapes: AISC, HSS, CAN, ARBED, British, Euro, Indian, Chilean
- Light Gage Shapes: AISI, SSMA, Dale / Incor, Dietrich, Marino\WARE
- Wood Shapes: Complete NDS species/grade database
- Full seamless integration with RISAFoot (Ver 2 or better) for advanced footing design and detailing
- Plate force summation tool

Results Features:

- Graphic presentation of color-coded results and plotted designs
- Color contours of plate stresses and forces with quadratic smoothing, the contours may also be animated
- Spreadsheet results with sorting and filtering of: reactions, member & joint deflections, beam & plate forces/stresses, optimized sizes, code designs, concrete reinforcing, material takeoffs, frequencies and mode shapes
- Standard and user-defined reports
- Graphic member detail reports with force/stress/deflection diagrams and detailed design calculations and expanded diagrams that display magnitudes at any dialed location
- Saved solutions quickly restore analysis and design results.

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM ~ PLS-POLE

PLS-POLE provides all of the capabilities a structural engineer requires to design transmission, substation or communications structures. It does so using a simple easy to use graphical interface that rests upon our time tested finite element engine. Regardless of whether you want to model a simple wood pole or a guyed steel X-Frame; PLS-POLE can handle the job simply, reliably and efficiently.

Modeling Features:

- Structures are made of standard reusable components that are available in libraries. You can easily create your own libraries or get them from a manufacturer
- Structure models are built interactively using interactive menus and graphical commands
- Automatic generation of underlying finite element model of structure
- Steel poles can have circular, 4, 6, 8, 12, 16, or 18-sided, regular, elliptical or user input cross sections (flat-to-flat or tip-to-tip orientations)
- Steel and concrete poles can be selected from standard sizes available from manufacturers
- Automatic pole class selection
- Cross brace position optimizer
- Capability to specify pole ground line rotations
- Capability to model foundation displacements
- Can optionally model foundation stiffness
- Guys are easily handled (modeled as exact cable elements in nonlinear analysis)
- Powerful graphics module (members color-coded by stress usage)
- Graphical selection of joints and components allows graphical editing and checking
- Poles can be shown as lines, wire frames or can be rendered as 3-d polygon surfaces

Analysis Features:

- Automatic distribution of loads in 2-part suspension insulators (v-strings, horizontal vees, etc.)
- Design checks for ASCE, ANSI/TIA/EIA 222 (Revisions F and G) or other requirements
- Automatic calculation of dead and wind loads
- Automated loading on structure (wind, ice and drag coefficients) according to:
    - ASCE 74-1991
    - NESC 2002
    - NESC 2007
    - IEC 60826:2003
    - EN50341-1:2001 (CENELEC)
    - EN50341-3-9:2001 (UK NNA)
    - EN50341-3-17:2001 (Portugal NNA)
    - ESAA C(b)1-2003 (Australia)
    - TPNZ (New Zealand)
    - REE (Spain)
    - EIA/TIA 222-F
    - ANSI/TIA 222-G
    - CSA S37-01
- Automated microwave antenna loading as per EIA/TIA 222-F and ANSI/TIA 222-G
- Detects buckling by nonlinear analysis

Results Features:

- Detects buckling by nonlinear analysis
- Easy to interpret text, spreadsheet and graphics design summaries
- Automatic determination of allowable wind and weight spans
- Automatic determination of interaction diagrams between allowable wind and weight spans
- Automatic tracking of part numbers and costs

Criteria for Design of PCS Facilities On or Extending Above Metal Electric Transmission Towers & Analysis of Transmission Towers Supporting PCS Masts [1]

Introduction

This criteria is the result from an evaluation of the methods and loadings specified by the separate standards, which are used in designing telecommunications towers and electric transmission towers. That evaluation is detailed elsewhere, but in summary; the methods and loadings are significantly different. This criteria specifies the manner in which the appropriate standard is used to design PCS facilities including masts and brackets (hereafter referred to as "masts"), and to evaluate the electric transmission towers to support PCS masts. The intent is to achieve an equivalent level of safety and security under the extreme design conditions expected in Connecticut and Massachusetts.

ANSI Standard TIA/EIA-222 covering the design of telecommunications structures specifies a working strength/allowable stress design approach. This approach applies the loads from extreme weather loading conditions, and designs the structure so that it does not exceed some defined percentage of failure strength (allowable stress).

ANSI Standard C2-2007 (National Electrical Safety Code) covering the design of electric transmission metal structures is based upon an ultimate strength/yield stress design approach. This approach applies a multiplier (overload capacity factor) to the loads possible from extreme weather loading conditions, and designs the structure so that it does not exceed its ultimate strength (yield stress).

Each standard defines the details of how loads are to be calculated differently. Most of the NU effort in "unifying" both codes was to establish what level of strength each approach would provide, and then increasing the appropriate elements of each to achieve a similar level of security under extreme weather loadings.

Two extreme weather conditions are considered. The first is an extreme wind condition (hurricane) based upon a 50-year recurrence (2% annual probability). The second is a winter condition combining wind and ice loadings.

The following sections describe the design criteria for any PCS mast extending above the top of an electric transmission tower, and the analysis criteria for evaluating the loads on the transmission tower from such a mast from the lower portions of such a mast, and loads on the pre-existing electric lower portions of such a mast, and loads on the pre-existing electric transmission tower and the conductors it supports.

Note 1: *Prepared from documentation provide from Northeast Utilities.*

P C S M a s t

The PCS facility (mast, external cable/trays, including the initial and any planned future support platforms, antennas, etc. extending the full height above the top level of the electric transmission structure) shall be designed in accordance with the provisions of TIA/EIA Standard 222 with two exceptions:

1. An 85 mph extreme wind speed shall be used for locations in all counties throughout the NU system.
2. The stress increase of TIA Section 3.1.1.1 is disallowed. The combined wind and ice condition shall consider ½" radial ice in combination with the wind load (0.75 Wi) as specified in TIA section 2.3.16.

E L E C T R I C T R A N S M I S S I O N T O W E R

The electric transmission tower shall be analyzed using yield stress theory in accordance with the attached table titled "NU Design Criteria". This specifies uniform loadings (different from the TIA loadings) on the each of the following components of the installed facility:

- PCS mast for its total height above ground level, including the initial and planned future support platforms, antennas, etc. above the top of an electric transmission structure.
- Conductors are related devices and hardware.
- Electric transmission structure. The loads from the PCS facility and from the electric conductors shall be applied to the structure at conductor and PCS mast attachment points, where those load transfer to the tower.

The uniform loadings and factors specified for the above components in the table are based upon the National Electrical Safety Code 2007 Edition Extreme Wind (Rule 250C) and Combined Ice and Wind (Rule 250B-Heavy) Loadings. These provide equivalent loadings compared to TIA and its loads and factors with the exceptions noted above. (Note that the NESC does not require the projected wind surfaces of structures and equipment to be increased by the ice covering.)

In the event that the electric transmission tower is not sufficient to support the additional loadings of the PCS mast, reinforcement will be necessary to upgrade the strength of the overstressed members.

Northeast Utilities
Overhead Transmission Standards

Attachment A

NU Design Criteria

			Basic Wind Speed	Pressure	Height Factor	Gust Factor	Load or Stress Factor	Force Coef - Shape Factor
			V (MPH)	Q (PSF)	Kz	Gh		
Ice Condition	TIA/EIA	Antenna Mount	TIA	TIA (.75Wi)	TIA	TIA	TIA Section 3.1.1 disallowed for connection design	TIA
	NESC Heavy	Tower/Pole Analysis with antennas extending above top of Tower/Pole (Yield Stress)	-----	4	1.00	1.00	2.50	1.6 Flat Surfaces 1.3 Round Surfaces
		Tower/Pole Analysis with Antennas below top of Tower/Pole (on two faces)	-----	4	1.00	1.00	2.50	1.6 Flat Surfaces 1.3 Round Surfaces
		Conductors:	Conductor loads provided by NU					
High Wind Condtion	TIA/EIA	Antenna Mount	85	TIA	TIA	TIA	TIA Section 3.1.1 disallowed for connection design	TIA
	NESC Extreme Wind	Tower/Pole Analysis with antennas extending above top of Tower/Pole	Use NESC C2-2007, Section 25, Rule 250C: Extreme Wind Loading 1.25 x Gust Response Factor Height above ground level based on top of Mast/Antenna					1.6 Flat Surfaces 1.3 Round Surfaces
		Tower/Pole Analysis with Antennas below top of Tower/Pole	Use NESC C2-2007, Section 25, Rule 250C: Extreme Wind Loading Height above ground level based on top of Tower/Pole					1.6 Flat Surfaces 1.3 Round Surfaces
		Conductors:	Conductor loads provided by NU					
NESC Extreme Ice with Wind Conditon*		Tower/Pole Analysis with antennas extending above top of Tower/Pole	Use NESC C2-2007, Section 25, Rule 250D: Extreme Ice with Wind Loading 4PSF Wind Load 1.25 x Gust Response Factor Height above ground level based on top of Mast/Antenna					1.6 Flat Surfaces 1.3 Round Surfaces
		Tower/Pole Analysis with Antennas below top of Tower/Pole	Use NESC C2-2007, Section 25, Rule 250D: Extreme Ice with Wind Loading 4PSF Wind Load Height above ground level based on top of Tower/Pole					1.6 Flat Surfaces 1.3 Round Surfaces
		Conductors:	Conductor loads provided by NU					
		* Only for Structures Installed after 2007						

2) STEP 2 - The electric transmission structure analysis and evaluation shall be performed in accordance with NESC requirements and shall include the mast and antenna loads determined from NESC applied loading conditions (not TIA/EIA Loads) on the structure and mount as specified below, and shall include the wireless communication mast and antenna loads per NESC criteria)

The structure shall be analyzed using yield stress theory in accordance with Attachment A, "NU Design Criteria." This specifies uniform loadings (different from the TIA loadings) on each of the following components of the installed facility:

a) Wireless communication mast for its total height above ground level, including the initial and any planned future equipment (Support Platforms, Antennas, TMA's etc.) above the top of an electric transmission structure.

b) Conductors and related devices and hardware (wire loads will be provided by NU).

c) Electric Transmission Structure

i) The loads from the wireless communication equipment components based on NESC and NU Criteria in Attachment A, and from the electric conductors shall be applied to the structure at conductor and wireless communication mast attachment points, where those loads transfer to the tower.

ii) Shape Factor Multiplier:

NESC Structure Shape	Cd
Polyround (for polygonal steel poles)	1.3
Flat	1.6
Open Lattice	3.2

iii) When Coaxial Cables are mounted along side the pole structure, the shape multiplier shall be:

Mount Type	Cable Cd	Pole Cd
Coaxial Cables on outside periphery (One layer)	1.45	1.45
Coaxial Cables mounted on stand offs	1.6	1.3

d) The uniform loadings and factors specified for the above components in Attachment A, "NU Design Criteria" are based upon the National Electric Safety Code 2007 Edition Extreme Wind (Rule 250C) and Combined Ice and Wind (Rule 250B-Heavy) Loadings. These provide equivalent loadings compared to the TIA and its loads and factors with the exceptions noted above.

Note: The NESC does not require ice load be included in the supporting structure. (Ice on conductors and shield wire only, and NU will provide these loads).

e) Mast reaction loads shall be evaluated for local effects on the transmission structure members at the attachment points.

If the electric transmission structure is not sufficient to support the additional loadings of the wireless communication mast, reinforcement will be required to upgrade the strength of the overstressed members. Any reinforcement design will be reviewed by NU TL&CE to determine the feasibility of construction and its impact on the use of the structure as a transmission structure.

Northeast Utilities System

Job : T-MOBILE
Description: RETRO

Spec. Number
Computed by
Checked by

Page of
Sheet of
Date 8/20/09
Date

INPUT DATA

TOWER ID: 10247
EAST SIDE

Structure Height (ft) : 115

Wind Zone : Central CT (green)

Wind Speed : 90.5711047 mph

Tower Type : (•) Suspension ( ) Strain

Extreme Wind Model : PCS Addition

Shield Wire Properties:

	BACK	AHEAD
NAME =	*3/8 AW*	*3/8 AW*
DESCRIPTION =	3/8	3/8
STRANDING =	7 #8 Al Weld	7 #8 Al Weld
DIAMETER =	0.385 in	0.385 in
WEIGHT =	0.262 lb/ft	0.262 lb/ft

Conductor Properties:

	BACK	AHEAD		
NAME =	*BITTERN*	*BITTERN*		
Number of Conductors per phase: 2	1272.000	1272.000	2	Number of Conductors per phase
	45/7 ACSR	45/7 ACSR		
DIAMETER =	1.345 in	1.345 in		
WEIGHT =	1.432 lb/ft	1.432 lb/ft		

Insulator Weight = 0 lbs

Broken Wire Side = AHEAD SPAN

Horizontal Line Tensions:

	BACK		AHEAD	
	Shield	Conductor	Shield	Conductor
NESC HEAVY =	4,200	10,000	4,200	10,000
EXTREME WIND =	3,440	10,733	3,400	10,733
LONG. WIND =	na	na	na	na
250D COMBINED =	na	na	na	na
NESC W/O OLF =	na	na	na	na
60 DEG F NO WIND =	1,239	4,616	1,239	4,616

Line Geometry:

					SUM
LINE ANGLE (deg) =	BACK:	0	AHEAD:	0	0
WIND SPAN (ft) =	BACK:	257	AHEAD:	305	562
WEIGHT SPAN (ft) =	BACK:	525	AHEAD:	131	657

Northeast Utilities System

Job :
Description:

Spec. Number
Computed by
Checked by

Page of
Sheet of
Date 8/20/09
Date

WIRE LOADING AT ATTACHMENTS

TOWER ID: 10247

Wind Span =	562 ft
Weight Span =	657 ft
Total Angle =	0 degrees

Broken Wire Span =	AHEAD SPAN
Type of Insulator Attachment =	SUSPENSION

1. NESC RULE 250B Heavy Loading:

	INTACT CONDITION			BROKEN WIRE CONDITION		
	Horizontal	Longitudinal	Vertical	Horizontal	Longitudinal	Vertical
Shield Wire =	648 lb	0 lb	800 lb	296 lb	4,830 lb	640 lb
Conductor =	2,195 lb	0 lb	5,082 lb	1,003 lb	23,000 lb	4,065 lb

2. NESC RULE 250C Transverse Extreme Wind Loading:

	Horizontal	Longitudinal	Vertical
Shield Wire =	433 lb	46 lb	198 lb
Conductor =	3,028 lb	0 lb	2,163 lb

3. NESC RULE 250C Longitudinal Extreme Wind Loading:

	Horizontal	Longitudinal	Vertical
Shield Wire =	#VALUE!	#VALUE!	198 lb
Conductor =	#VALUE!	#VALUE!	2,163 lb

4. NESC RULE 250D Extreme Ice & Wind Loading:

	Horizontal	Longitudinal	Vertical
Shield Wire =	#VALUE!	#VALUE!	1,303 lb
Conductor =	#VALUE!	#VALUE!	5,712 lb

5. NESC RULE 250B w/o OLF's

	Horizontal	Longitudinal	Vertical
Shield Wire =	#VALUE!	#VALUE!	533 lb
Conductor =	#VALUE!	#VALUE!	3,388 lb

6. 60 Deg. F, No Wind

	Horizontal	Longitudinal	Vertical
Shield Wire =	0 lb	0 lb	172 lb
Conductor =	0 lb	0 lb	1,881 lb

7. Construction

	Horizontal	Longitudinal	Vertical
Shield Wire =	0 lb	0 lb	258 lb
Conductor =	0 lb	0 lb	2,822 lb

NOTE: All loads include required overload factors (OLF's).

Northeast Utilities System

Job :	T. Mobile	Spec. Number	Page of
Description:	Bethel	Computed by	Sheet of
		Checked by	Date 8/20/09
			Date

INPUT DATA

TOWER ID: 10247 [redacted] WEST SIDE

Structure Height (ft) : 115

Wind Zone : Central CT (green)

Wind Speed : 90.5711047 mph

Tower Type : (●) Suspension ( ) Strain

Extreme Wind Model : PCS Addition

Shield Wire Properties:

	BACK	AHEAD
NAME =	*3/8 AW*	*3/8 AW*
DESCRIPTION =	3/8	3/8
STRANDING =	7 #8 Al Weld	7 #8 Al Weld
DIAMETER =	0.385 in	0.385 in
WEIGHT =	0.262 lb/ft	0.262 lb/ft

Conductor Properties:

	BACK	AHEAD	
NAME =	*BITTERN*	*BITTERN*	
Number of Conductors per phase: 2	1272.000 45/7 ACSR	1272.000 45/7 ACSR	2 Number of Conductors per phase
DIAMETER =	1.345 in	1.345 in	
WEIGHT =	1.432 lb/ft	1.432 lb/ft	

Insulator Weight = 0 lbs

Broken Wire Side = AHEAD SPAN

Horizontal Line Tensions:

	BACK		AHEAD	
	Shield	Conductor	Shield	Conductor
NESC HEAVY =	4,200	10,000	4,200	10,000
EXTREME WIND =	3,446	10,924	3,446	10,924
LONG. WIND =	na	na	na	na
250D COMBINED =	na	na	na	na
NESC W/O OLF =	na	na	na	na
60 DEG F NO WIND =	1,174	4,638	1,174	4,638

Line Geometry:

					SUM
LINE ANGLE (deg) =	BACK:	0	AHEAD:	0	0
WIND SPAN (ft) =	BACK:	231	AHEAD:	305	536
WEIGHT SPAN (ft) =	BACK:	447	AHEAD:	131	578

Northeast Utilities System

Job :
Description:

Spec. Number
Computed by
Checked by

Page of
Sheet of
Date 8/20/09
Date

WIRE LOADING AT ATTACHMENTS

TOWER ID: 10247

Wind Span =	536 ft
Weight Span =	578 ft
Total Angle =	0 degrees

Broken Wire Span =	AHEAD SPAN
Type of Insulator Attachment =	SUSPENSION

1. NESC RULE 250B Heavy Loading:

	INTACT CONDITION			BROKEN WIRE CONDITION		
	Horizontal	Longitudinal	Vertical	Horizontal	Longitudinal	Vertical
Shield Wire =	619 lb	0 lb	704 lb	267 lb	4,830 lb	544 lb
Conductor =	2,095 lb	0 lb	4,473 lb	903 lb	23,000 lb	3,456 lb

2. NESC RULE 250C Transverse Extreme Wind Loading:

	Horizontal	Longitudinal	Vertical
Shield Wire =	417 lb	0 lb	174 lb
Conductor =	2,915 lb	0 lb	1,904 lb

3. NESC RULE 250C Longitudinal Extreme Wind Loading:

	Horizontal	Longitudinal	Vertical
Shield Wire =	#VALUE!	#VALUE!	174 lb
Conductor =	#VALUE!	#VALUE!	1,904 lb

4. NESC RULE 250D Extreme Ice & Wind Loading:

	Horizontal	Longitudinal	Vertical
Shield Wire =	#VALUE!	#VALUE!	1,147 lb
Conductor =	#VALUE!	#VALUE!	5,027 lb

5. NESC RULE 250B w/o OLF's

	Horizontal	Longitudinal	Vertical
Shield Wire =	#VALUE!	#VALUE!	469 lb
Conductor =	#VALUE!	#VALUE!	2,982 lb

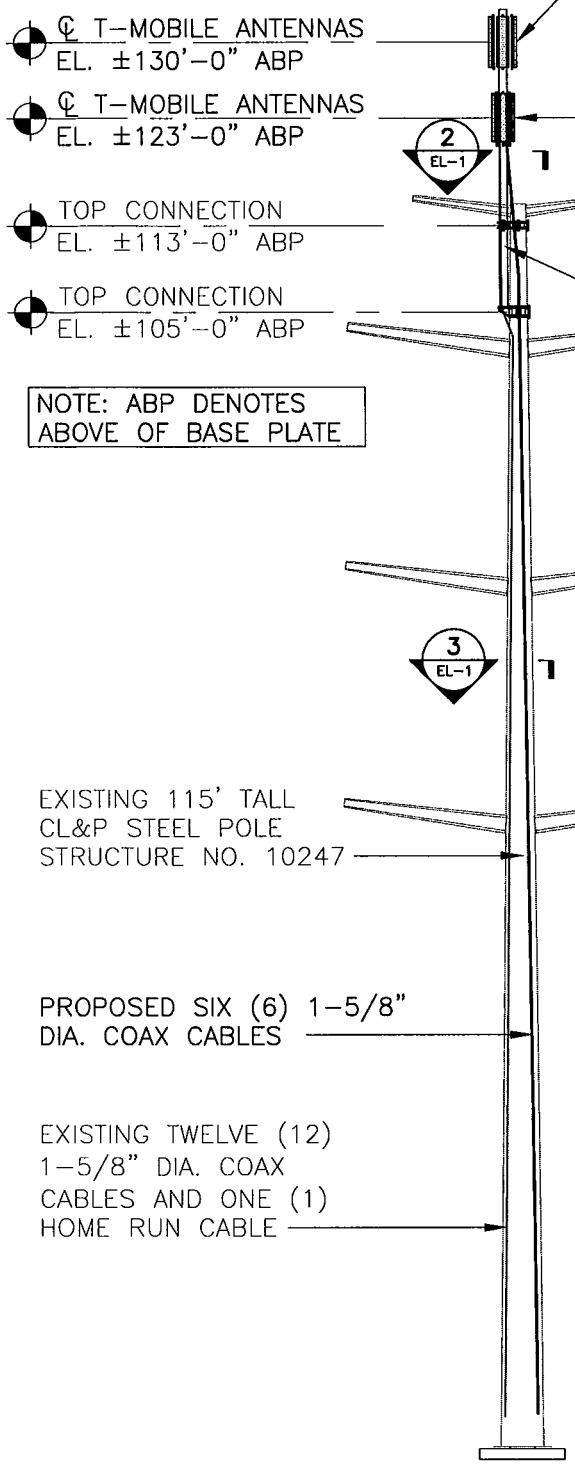
6. 60 Deg. F, No Wind

	Horizontal	Longitudinal	Vertical
Shield Wire =	0 lb	0 lb	151 lb
Conductor =	0 lb	0 lb	1,656 lb

7. Construction

	Horizontal	Longitudinal	Vertical
Shield Wire =	0 lb	0 lb	227 lb
Conductor =	0 lb	0 lb	2,484 lb

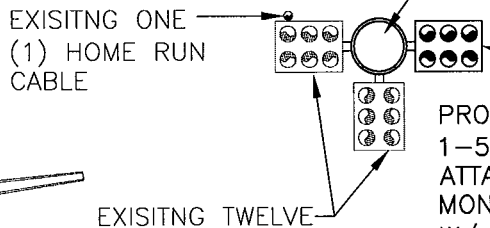
NOTE: All loads include required overload factors (OLF's).



PROPOSED THREE (3) RFS APX16DWV-16DWVS-E-A20 PANEL ANTENNAS AND THREE (3) TMAs MOUNTED ON THE PROPOSED PIPE MAST WITH VALMONT TRI-SECTOR CHAIN MOUNT PART NO. B1639. EXISTING (3) PANEL ANTENNAS TO BE REMOVED.

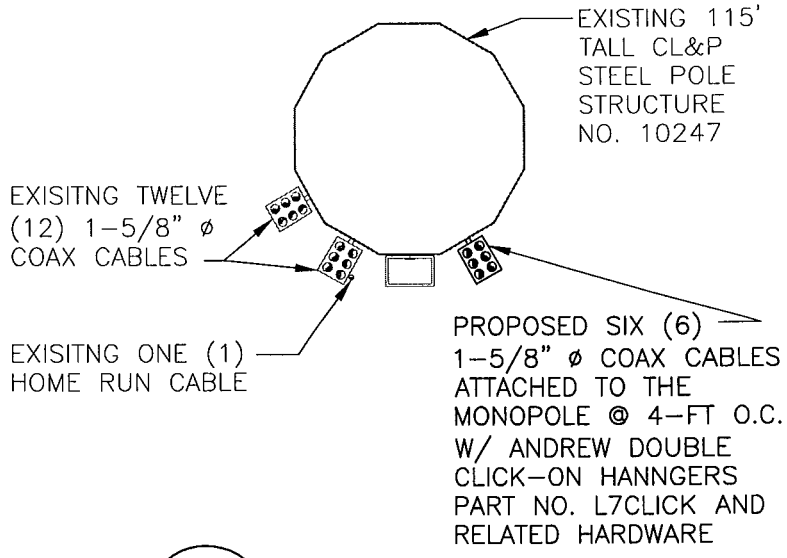
PROPOSED THREE (3) RFS APX18-206516S-A20 PANEL ANTENNAS AND THREE (3) TMAs MOUNTED ON THE PROPOSED PIPE MAST WITH VALMONT TRI-SECTOR CHAIN MOUNT PART NO. B1639. EXISTING (3) PANEL ANTENNAS TO BE REMOVED.

PROPOSED 8" SCH. 80 X 29'-6" LONG PIPE MAST (O.D. = 8.63")



2 EL-1 COAX PLAN

SCALE: NOT TO SCALE



3 EL-1 COAX PLAN

SCALE: NOT TO SCALE

1 EL-1 TOWER & MAST ELEVATION

SCALE: NOT TO SCALE

REVISIONS		
00	5/12/10	ISSUED FOR NU REVIEW
01	5/24/10	CONSTRUCTION

CENTEK engineering
Centered on Solutions℠
www.CentekEng.com
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road, Branford, CT 06405

CT11201A
CL&P 10247

20 VALE ROAD
BROOKFIELD, CT 06804

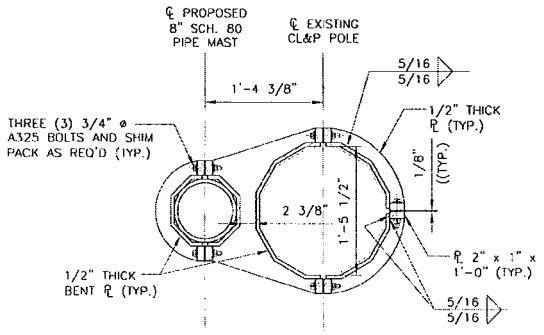
PROJECT NO:	10021.CO10
DRAWN BY:	TJL
CHECKED BY:	CFC
SCALE:	AS NOTED
DATE:	4/29/10

T-Mobile

TOWER AND MAST ELEVATION

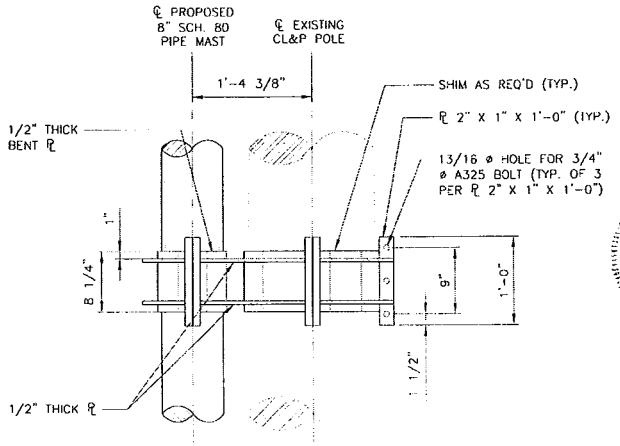
EL-1

DWG. 1 OF 4



2 / S-1 **TOP PCS BRACKET PLAN VIEW**

SCALE: 1" = 1'-0"



1 / S-1 **TOP PCS BRACKET DETAIL**

SCALE: 1" = 1'-0"

DESIGNED BY: T.A.
DRAWN BY: T.A.
CHK'D BY: C.F.C.

1	3/17/10	T.A.
2	5/12/10	T.A.

ISSUED FOR CONSTRUCTION

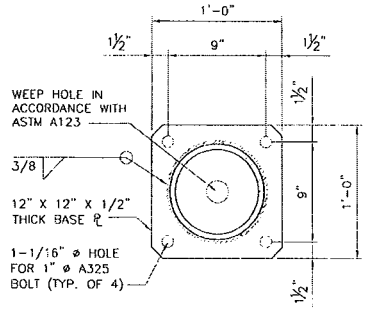
CENTEK Engineering

T-MOBILE
CT11-201A
CL&P STRUCTURE 10247
85 HALE ROAD
BROOKFIELD, CT 06804

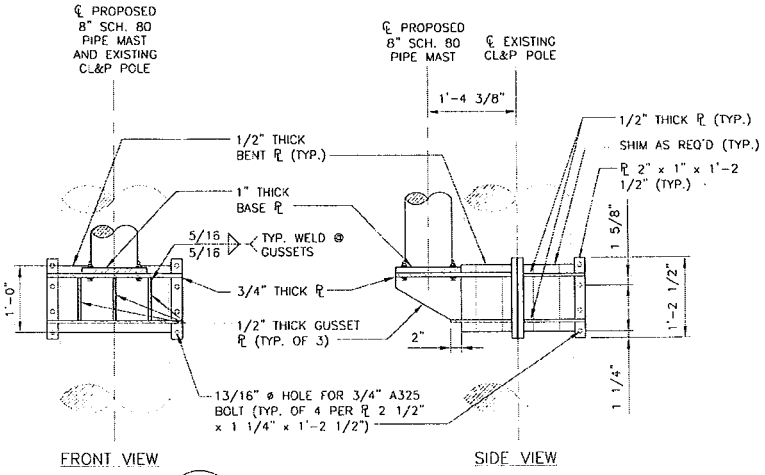
DATE: 05/12/10
SCALE: AS SHOWN
JOB NO: 10031.0019

TOP CONNECTION DETAILS

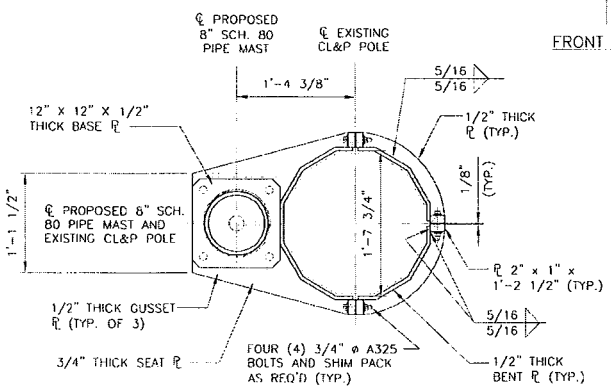
SHEET NO
S-1



2 / S-2 **BASE PLATE DETAIL**
SCALE: 1-1/2" = 1'-0"

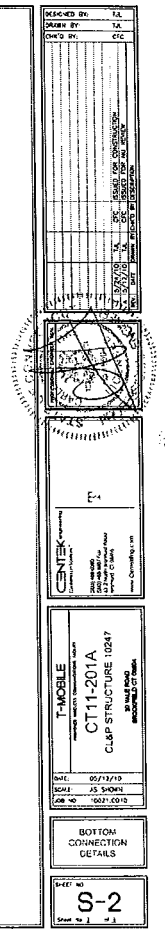


1 / S-2 **BOTTOM PCS BRACKET DETAIL**
SCALE: 3/4" = 1'-0"



3 / S-2 **BOTTOM PCS BRACKET PLAN VIEW**
SCALE: 1" = 1'-0"

NOTE:
1. CL&P POLE TAPER = 0.2830"/FT (V.I.F.)



DESIGN BASIS:

1. GOVERNING CODE: TIA/EIA-222 REVISION "F" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES", ASCE MANUAL NO. 72 - "DESIGN OF STEEL TRANSMISSION POLE STRUCTURES SECOND EDITION", NESC C2-2002 AND NORTHEAST UTILITIES DESIGN CRITERIA.

2. DESIGN CRITERIA

   WIND LOAD: (PCS MAST)
   BASIC WIND SPEED (V) = 85 MPH (FASTEST MILE); BASED ON TIA/EIA-222F AND NU MAST DESIGN CRITERIA EXCEPTION 1.

GENERAL NOTES:

1. ALL WORK SHALL BE IN ACCORDANCE WITH TIA/EIA-222 REVISION "F" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES", ASCE MACL&PAL NO. 72 - "DESIGN OF STEEL TRANSMISSION POLE STRUCTURES SECOND EDITION", NESC C2-2002 AND NORTHEAST UTILITIES DESIGN CRITERIA.

2. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY. MAINTAIN EXISTING SITE OPERATIONS, COORDINATE WORK WITH NORTHEAST UTILITIES.

3. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.

4. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.

5. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD)

   A. STRUCTURAL STEEL (W SHAPES)---ASTM A992 (FY = 50 KSI)
   B. STRUCTURAL STEEL (OTHER SHAPES)---ASTM A36 (FY = 36 KSI)
   C. STRUCTURAL HSS (RECTANGULAR SHAPES)---ASTM A500 GRADE B, (FY = 46 KSI)
   D. STRUCTURAL HSS (ROUND SHAPES)---ASTM A500 GRADE B, (FY = 42 KSI)
   E. PIPE---ASTM A53 (FY = 35 KSI)
   F. CONNECTION BOLTS---ASTM A325-N
   G. U-BOLTS---ASTM A36
   H. ANCHOR RODS---ASTM F 1554
   I. WELDING ELECTRODE---ASTM E 70XX

2. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE ENGINEER FOR REVIEW. SHOP DRAWINGS SHALL INCLUDE THE FOLLOWING: SECTION PROFILES, SIZES, CONNECTION ATTACHMENTS, REINFORCING, ANCHORAGE, SIZE AND TYPE OF FASTENERS AND ACCESSORIES. INCLUDE ERECTION DRAWINGS, ELEVATIONS AND DETAILS.

3. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.

4. PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.

5. FIT AND SHOP ASSEMBLE FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.

6. INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.

7. AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, ABRASIONS AND NON-GALVANIZED SURFACES WITH A 95% ORGANIC ZINC RICH PAINT IN ACCORDANCE WITH ASTM 780.

8. ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.

9. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE".

10. CONTRACTOR SHALL COMPLY WITH AWS CODE FOR PROCEDURES APPEARANCE AND QUALITY OF WELDS, AND WELDING PROCESSES SHALL BE QUALIFIED IN ACCORDANCE WITH AWS "STANDARD QUALIFICATION PROCEDURES". ALL WELDING SHALL BE DONE USING E70XX ELECTRODES AND WELDING SHALL CONFORM TO AISC AND D1.1 WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLET J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION" 9TH EDITION. AT THE COMPLETION OF WELDING, ALL DAMAGE TO GALVANIZED COATING SHALL BE REPAIRED.

11. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON CONFORMING MATERIALS OR CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW.

12. CONNECTION ANGLES SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCHES.

13. STRUCTURAL CONNECTION BOLTS SHALL CONFORM TO ASTM A325. ALL BOLTS SHALL BE 3/4" DIAMETER MINIMUM AND SHALL HAVE A MINIMUM OF TWO BOLTS, UNLESS OTHERWISE ON THE DRAWINGS.

14. LOCK WASHER ARE NOT PERMITTED FOR A325 STEEL ASSEMBLIES.

15. SHOP CONNECTIONS SHALL BE WELDED OR HIGH STRENGTH BOLTED.

16. MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.

17. FABRICATE BEAMS WITH MILL CAMBER UP.

18. LEVEL AND PLUMB INDIVIDUAL MEMBERS OF THE STRUCTURE TO AN ACCURACY OF 1:500, BUT NOT TO EXCEED 1/4" IN THE FULL HEIGHT OF THE COLUMN.

19. COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.

20. INSPECTION AND TESTING OF ALL WELDING AND HIGH STRENGTH BOLTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY.

21. FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE ENGINEER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

DESIGNED BY: TJL
DRAWN BY: TJL
CHK'D BY: DFC

NO.	DATE	BY	DESCRIPTION
A	05/12/10	TJL	REVISED PER CONSTRUCTION
0	03/12/10	DFC	ISSUED FOR CONSTRUCTION

CENTEK engineering

T-MOBILE

CT11-201A
CL&P STRUCTURE 10247

DATE: 05/12/10
SCALE: AS SHOWN
JOB NO: 10021.C010

STRUCTURAL NOTES

SHEET NO
N-1

T-Mobile

T-Mobile USA Inc.
35 Griffin Rd South, Bloomfield, CT 06002-1853
Phone: (860) 692-7100
Fax: (860) 692-7159

Technical Memo

To: Transcend
From: Amir Uzzaman - Radio Frequency Engineer
cc: Jason Overbey
Subject: Power Density Report for CT11201A
Date: June 8, 2010

1. Introduction:

This report is the result of an Electromagnetic Field Intensities (EMF - Power Densities) study for the T-Mobile antenna installation on a Utility Monopole at 20 Vale Road Tower #10247, Brookfield, 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 (1940-1949.8), (2140-2145), (2110-2120)MHz frequency Band.
2) The antenna array consists of three sectors, with 2 antennas per sector.
3) The model number for GSM antenna is APX16DWV-16DWV.
3) The model number for UMTS antenna is APXV18-206516.
4) GSM antenna center line height is 130 ft.
4) UMTS antenna center line height is 123 ft.
5) The maximum transmit power from any GSM sector is 2104.36 Watts Effective Radiated Power (EiRP) assuming 8 channels per sector.
5) The maximum transmit power from any UMTS sector is 2183.18 Watts Effective Radiated Power (EiRP) assuming 2 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 antenna installation on a Utility Monopole at 20 Vale Road Tower #10247, Brookfield, CT, is 0.06502 mW/cm^2. This value represents 6.502% 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.

The combined Power Density from other carriers is 14.45%. The combined Power Density for the site is 20.952% of the M.P.E. standard.

Connecticut Market

T-Mobile

Worst Case Power Density

Site:	**CT11201A**
Site Address:	**20 Vale Road Tower #10247**
Town:	**Brookfield**
Tower Height:	**115 ft.**
Tower Style:	**Utility Monopole**

GSM Data		**UMTS Data**	
Base Station TX output	20 W	**Base Station TX output**	40 W
Number of channels	8	**Number of channels**	2
Antenna Model	APX16DWV-16DWV	**Antenna Model**	APXV18-206516
Cable Size	1 1/4 in.	**Cable Size**	1 1/4 in.
Cable Length	150 ft.	**Cable Length**	150 ft.
Antenna Height	130.0 ft.	**Antenna Height**	123.0 ft.
Ground Reflection	1.6	**Ground Reflection**	1.6
Frequency	1945.0 MHz	**Frequency**	2.1 GHz
Jumper & Connector loss	4.50 dB	**Jumper & Connector loss**	1.50 dB
Antenna Gain	18.0 dBi	**Antenna Gain**	17.6 dBi
Cable Loss per foot	0.0154 dB	**Cable Loss per foot**	0.0116 dB
Total Cable Loss	2.3100 dB	**Total Cable Loss**	1.7400 dB
Total Attenuation	6.8100 dB	**Total Attenuation**	3.2400 dB
Total EIRP per Channel	54.20 dBm	**Total EIRP per Channel**	60.38 dBm
(In Watts)	263.04 W	**(In Watts)**	1091.59 W
Total EIRP per Sector	63.23 dBm	**Total EIRP per Sector**	63.39 dBm
(In Watts)	2104.36 W	**(In Watts)**	2183.18 W
nsg	11.1900	**nsg**	14.3600
Power Density (S) =	**0.030026 mW/cm^2**	**Power Density (S) =**	**0.034990 mW/cm^2**
T-Mobile Worst Case % MPE =		**6.5016%**	

Equation Used :

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

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

Co-Location Total

Carrier	**% of Standard**
Verizon	
Cingular	
Sprint	14.4500 %
AT&T Wireless	
Pocket	
MetroPCS	
Nextel	
Other Antenna Systems	
Total Excluding T-Mobile	**14.4500 %**
T-Mobile	6.5016
Total % MPE for Site	**20.9516%**