



Crown Castle
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065

February 12, 2016

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

RE: Notice of Exempt Modification for AT&T/ LTE 3C Crown Site BU: 842861
AT&T Site ID: CT5126
223 Brainard Road, Hartford, CT 06114
Latitude: 41° 43' 59.0" / Longitude: -72° 39' 43.1"

Dear Ms. Bachman:

AT&T currently maintains nine (9) antennas at the 102-foot level of the existing 100-foot monopole at 223 Brainard Road in Hartford, CT. The tower is owned by Crown Castle. The property is owned by the Connecticut Light & Power. AT&T now intends to replace three (3) antennas with three (3) new CCI 700 MHz antennas. These antennas would be installed at the 102-foot level of the tower. AT&T also intends to install three (3) RRHs and one (1) A2 module.

In a visit to the City of Hartford Town Hall, no original zoning documents were available. The available zoning documentation has been enclosed.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.S.C.A. § 16-50j-73, a copy of this letter is being sent to The Honorable Luke Bronin, Mayor, City of Hartford, as well as the property owner, and Crown Castle is the tower owner.

1. The proposed modifications will not result in an increase in the height of the existing tower.
2. The proposed modifications will not require the extension of the site boundary.
3. The proposed modification will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communication Commission safety standard.

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5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The existing structure and its foundation can support the proposed loading.

For the foregoing reasons, AT&T respectfully submits that the proposed modifications to the above-reference telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2). Please send approval/rejection letter to Attn: Jeffrey Barbadora.

Sincerely,

Jeffrey Barbadora
Real Estate Specialist
12 Gill Street, Suite 5800, Woburn, MA 01801
781-729-0053
Jeff.Barbadora@crowncastle.com

Attachments:

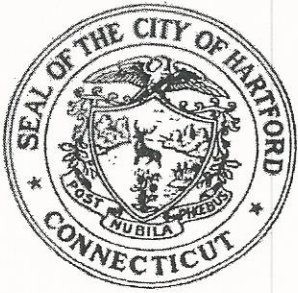
Tab 1: Exhibit-1: Compound plan and elevation depicting the planned changes

Tab 2: Exhibit-2: Structural Modification Report

Tab 3: Exhibit-3: General Power Density Table Report (RF Emissions Analysis Report)

cc: The Honorable Luke Bronin, Mayor, City of Hartford
Office of the Mayor
550 Main Street Room 200
Hartford, CT 06103

Connecticut Light & Power
PO Box 650031
Eversource Energy
Dallas, TX 75265



Planning Division Report

DATE OF REPORT: September, 26 2008

FROM: Jonathan Mullen Senior Planner

TO: Roger J. O'Brien, AICP, Director of Planning

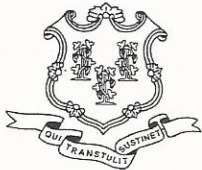
SUBJECT: Installation of antennas on existing tower located at 223 Brainard Road

The Request

The request is to modify the existing cell tower located at 223 Brainard Road by installing 4 new antennas 10 feet below the existing antennas. The modifications would also include the installation of a pre-fabricated shed at the base of the tower which would house a propane fueled back-up generator. A 1,000 gallon propane tank would also be installed on the site. The applicant is requesting that the installation of the antennas be considered an exempt modification pursuant to R.C.S.A. 16-50j-72(b)(2). The submission includes a report describing the modifications. The modifications would not increase the size of the tower or the fenced area at the base of the tower.

Staff Recommendation

Staff recommends approval of the proposal.



Daniel F. Caruso
Chairman

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

Jon Muehr

RECEIVED

SEP 19 2008

CITY OF HARTFORD PLANNING DEPARTMENT

September 16, 2008

The Honorable Eddie A. Perez
Mayor
City of Hartford
Municipal Building
550 Main Street
Hartford, CT 06103

RE: **EM-VER-064-080912** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 223 Brainard Road, Hartford, Connecticut.

Dear Mayor Perez:

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 30, 2008.

Thank you for your cooperation and consideration.

Very truly yours,

S. Derek Phelps
Executive Director

SDP/jb

Enclosure: Notice of Intent

c: Roger J. O'Brien, Director of Planning, City of Hartford

PROJECT INFORMATION

- SCOPE OF WORK:
- REMOVE (1) ANTENNA PER SECTOR (TOTAL OF 3 ANTENNAS)
 - INSTALL (1) ANTENNA PER SECTOR (TOTAL OF 3 NEW ANTENNAS)
 - RELOCATE (1) ANTENNA PER SECTOR (TOTAL OF 3 ANTENNAS)
 - ADD (1) RRH PER SECTOR (TOTAL OF 3 NEW RRHS)
 - ADD (1) A-2 MODULE PER SECTOR (TOTAL OF 3 NEW A-2 MODULES)

SITE ADDRESS: 223 BRAINARD ROAD
HARTFORD, CT 06114

LATITUDE: 41.7377919 41° 43' 58.05"N
LONGITUDE: -72.6618989 72° 39' 42.83"W

USID: 4539

TOWER OWNER: TBD

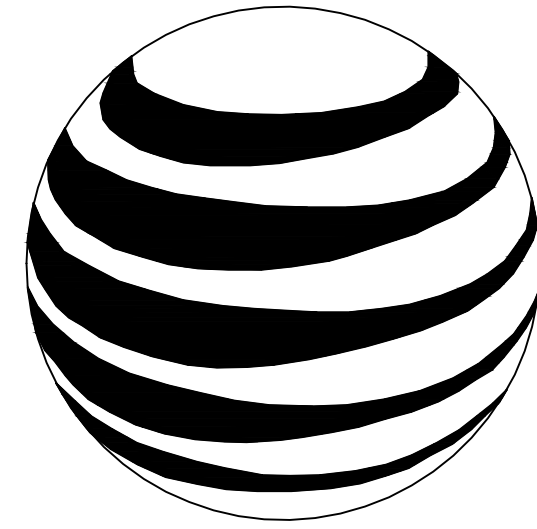
TYPE OF SITE: MONOPOLE/INDOOR EQUIPMENT

TOWER HEIGHT: 100'-0"±

RAD CENTER: 102'-0"±

CURRENT USE: UNMANNED WIRELESS TELECOMMUNICATIONS FACILITY

PROPOSED USE: UNMANNED WIRELESS TELECOMMUNICATIONS FACILITY



at&t
MOBILITY

FA CODE: 10071011
SITE NUMBER: CT5126
SITE NAME: EAST HARTFORD HOCHANUM

PROJECT TEAM

CLIENT REPRESENTATIVE

COMPANY: EMPIRE TELECOM
ADDRESS: 16 ESQUIRE ROAD
BILLERICA, MA 01821
CONTACT: DAVID COOPER
PHONE: 617-639-4908
EMAIL: dcooper@empiretelecomm.com

SITE ACQUISITION:

COMPANY: EMPIRE TELECOM
ADDRESS: 16 ESQUIRE ROAD
BILLERICA, MA 01821
CONTACT: DAVID COOPER
PHONE: 617-639-4908
EMAIL: dcooper@empiretelecomm.com

ZONING:

COMPANY: EMPIRE TELECOM
ADDRESS: 16 ESQUIRE ROAD
BILLERICA, MA 01821
CONTACT: DAVID COOPER
PHONE: 617-639-4908
EMAIL: dcooper@empiretelecomm.com

ENGINEERING:

COMPANY: COM-EX CONSULTANTS, LLC
ADDRESS: 115 ROUTE 46
SUITE E39
MOUNTAIN LAKES, NJ 07046
CONTACT: NICHOLAS D. BARILE, P.E.
PHONE: 862-209-4300
EMAIL: nbarile@comexconsultants.com

RF ENGINEER:

COMPANY: AT&T MOBILITY – NEW ENGLAND
ADDRESS: 550 COCHITUATE ROAD
SUITE 550 13 & 14
FRAMINGHAM, MA 01701
CONTACT: CAMERON SYME
PHONE: 508-596-7146
EMAIL: cs6970@att.com

CONSTRUCTION MANAGEMENT:

COMPANY: EMPIRE TELECOM
ADDRESS: 16 ESQUIRE ROAD
BILLERICA, MA 01821
CONTACT: GRZEGORZ "GREG" DORMAN
PHONE: 484-683-1750
EMAIL: gdorman@empiretelecomm.com

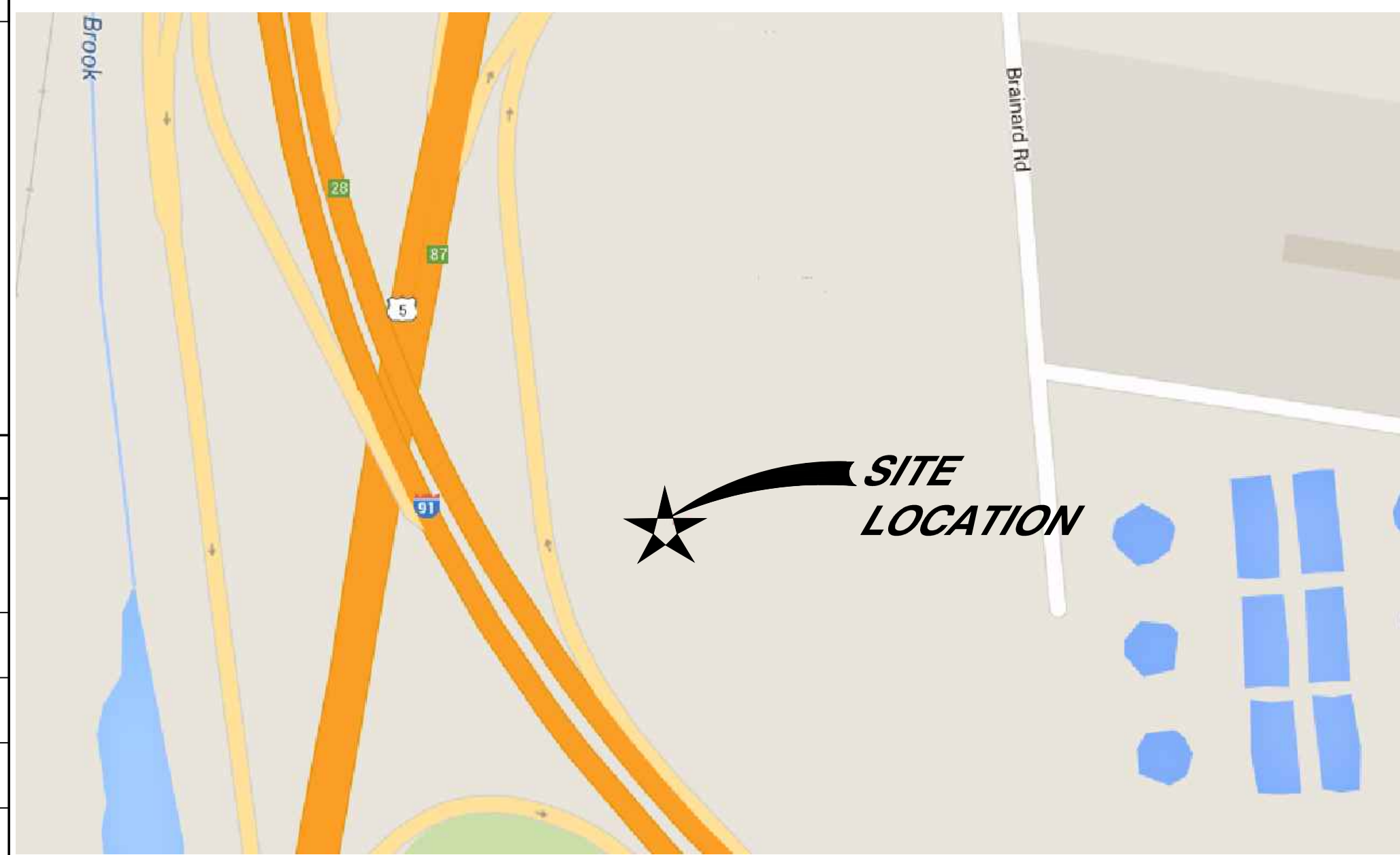
DRAWING INDEX

REV.

T-1	TITLE SHEET	0
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VICINITY MAP

FROM ROCKY HILL, HEAD SOUTHWEST ON CONCRIB LN. TURN LEFT ONTO SOLO DR. TURN RIGHT ONTO GILBERT AVE. TURN RIGHT ONTO STATE HWY 411. TURN LEFT TO MERGE ONTO I-91 N. TAKE EXIT 27 FOR BRAINARD RD TOWARD AIRPORT RD. TURN RIGHT ONTO BRAINARD RD. SITE WILL BE ON RIGHT.



GENERAL NOTES

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

APPROVALS

THE FOLLOWING PARTIES HEREBY APPROVE AND ACCEPT THESE DOCUMENTS AND AUTHORIZE THE SUBCONTRACTOR TO PROCEED WITH THE CONSTRUCTION DESCRIBED HEREIN, ALL DOCUMENTS ARE SUBJECT TO REVIEW BY THE LOCAL BUILDING DEPARTMENT AND MAY IMPOSE CHANGES OR SITE MODIFICATIONS.

DISCIPLINE:	NAME:	DATE:
SITE ACQUISITION:		
CONSTRUCTION MANAGER:		
AT&T PROJECT MANAGER:		



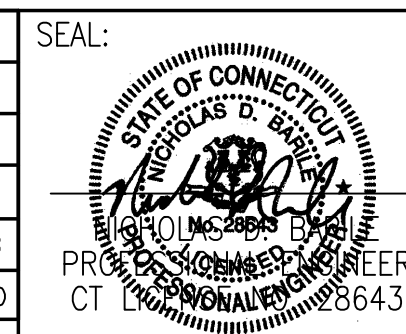
CONNECTICUT LAW REQUIRES TWO WORKING DAYS NOTICE PRIOR TO ANY EARTH MOVING ACTIVITIES BY CALLING 800-922-4455 OR DIAL 811



SITE NUMBER: CT5126
SITE NAME: EAST HARTFORD HOCHANUM
223 BRAINARD ROAD
HARTFORD, CT 06114
HARTFORD COUNTY



0	01/27/16	ISSUED AS FINAL	JW	NDB	NDB
NO.	DATE	REVISIONS	BY	CHK	APP'D
SCALE: AS SHOWN		DESIGNED BY: JW	DRAWN BY: JW		



AT&T		
DRAWING TITLE: TITLE SHEET		
JOB NUMBER 15144-EMP	DRAWING NUMBER T-1	REV 0

GROUNDING NOTES:

1. THE SUBCONTRACTOR SHALL REVIEW AND INSPECT THE EXISTING FACILITY GROUNDING SYSTEM AND LIGHTNING PROTECTION SYSTEM (AS DESIGNED AND INSTALLED) FOR STRICT COMPLIANCE WITH THE NEC (AS ADOPTED BY THE AHJ), THE SITE-SPECIFIC (UL, LPI, OR NFPA) LIGHTING PROTECTION CODE, AND GENERAL COMPLIANCE WITH TELCORDIA AND TIA GROUNDING STANDARDS. THE SUBCONTRACTOR SHALL REPORT ANY VIOLATIONS OR ADVERSE FINDINGS TO THE CONTRACTOR FOR RESOLUTION.
2. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION, AND AC POWER GES'S) SHALL BE BONDED TOGETHER, AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.
3. THE SUBCONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR NEW GROUND ELECTRODE SYSTEMS. THE SUBCONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS. TESTS SHALL BE PERFORMED IN ACCORDANCE WITH 25471-000-3PS-EG00-0001, DESIGN & TESTING OF FACILITY GROUNDING FOR CELL SITES.
4. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO BTS EQUIPMENT.
5. EACH BTS CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, 6 AWG STRANDED COPPER OR LARGER FOR INDOOR BTS; 2 AWG STRANDED COPPER FOR OUTDOOR BTS.
6. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.
7. APPROVED ANTIOXIDANT COATINGS (I.E., CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.
8. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED WITH STAINLESS STEEL HARDWARE TO THE BRIDGE AND THE TOWER GROUND BAR.
9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.
10. MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.
11. METAL CONDUIT AND TRAY SHALL BE GROUNDED AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH 6 AWG COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.
12. GROUND CONDUCTORS USED IN THE FACILITY GROUND AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS. WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS, NON-METALLIC MATERIAL SUCH AS PVC PLASTIC CONDUIT SHALL BE USED. WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (E.G., NON-METALLIC CONDUIT PROHIBITED BY LOCAL CODE) THE GROUND CONDUCTOR SHALL BE BONDED TO EACH END OF THE METAL CONDUIT.
13. ALL TOWER GROUNDING SYSTEMS SHALL COMPLY WITH THE REQUIREMENTS OF ANSI/TIA 222. FOR TOWERS BEING BUILT TO REV-G OF THE STANDARD, THE WIRE SIZE OF THE BURIED GROUND RING AND CONNECTIONS BETWEEN THE TOWER AND THE BURIED GROUND RING SHALL BE CHANGED FROM 2 AWG TO 2/0 AWG. IN ADDITION, THE MINIMUM LENGTH OF THE GROUND RODS SHALL BE INCREASED FROM EIGHT FEET (8') TO TEN FEET (10').
14. ALL NEW STRUCTURES WITH A FOUNDATION AND/OR FOOTING HAVING 20 FT. OR MORE 1/2" OR GREATER ELECTRICALLY CONDUCTIVE REINFORCING STEEL MUST HAVE IT BONDED TO THE GROUND RING USING AN EXOTHERMIC WELD CONNECTION USING #2 AWG SOLID TINNED COPPER GROUND WIRE, PER NEC 250.50.

GENERAL NOTES:

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:
 CONTRACTOR - EMPIRE TELECOM
 SUBCONTRACTOR - GENERAL CONTRACTOR (CONSTRUCTION)
 OWNER - AT&T MOBILITY
 OEM - ORIGINAL EQUIPMENT MANUFACTURER
2. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING SUBCONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CONTRACTOR.
3. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. SUBCONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
4. DRAWINGS PROVIDED HERE ARE NOT TO BE SCALED AND ARE INTENDED TO SHOW OUTLINE ONLY.
5. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
6. THE SUBCONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
7. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE SUBCONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION SPACE FOR APPROVAL BY THE CONTRACTOR.
8. SUBCONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER AND T1 CABLES, GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. SUBCONTRACTOR SHALL UTILIZE EXISTING TRAYS AND/OR SHALL ADD NEW TRAYS AS NECESSARY. SUBCONTRACTOR SHALL CONFIRM THE ACTUAL ROUTING WITH THE CONTRACTOR. ROUTING OF TRENCHING SHALL BE APPROVED BY CONTRACTOR
9. THE SUBCONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT SUBCONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.
10. SUBCONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OFF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
11. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.
12. ALL CONCRETE REPAIR WORK SHALL BE DONE IN ACCORDANCE WITH AMERICAN CONCRETE INSTITUTE (ACI) 301.
13. ANY NEW CONCRETE NEEDED FOR THE CONSTRUCTION SHALL HAVE 4000 PSI STRENGTH AT 28 DAYS UNLESS OTHERWISE SPECIFIED. ALL CONCRETING WORK SHALL BE DONE IN ACCORDANCE WITH ACI 318 CODE REQUIREMENTS.
14. ALL STRUCTURAL STEEL WORK SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH AISC SPECIFICATIONS. ALL STRUCTURAL STEEL SHALL BE ASTM A36 (Fy=36 ksi). ALL STEEL EXPOSED TO WEATHER SHALL BE HOT DIPPED GALVANIZED. TOUCH UP ALL SCRATCHES AND OTHER MARKS IN THE FIELD AFTER STEEL IS ERECTED USING A COMPATIBLE ZINC RICH PAINT.
15. CONSTRUCTION SHALL COMPLY WITH SPECIFICATION 25741-000-3APS-A00Z-00002, "GENERAL CONSTRUCTION SERVICES FOR CONSTRUCTION OF AT&T MOBILITY SITES."
16. SUBCONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING ANY WORK. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS MUST BE VERIFIED. SUBCONTRACTOR SHALL NOTIFY THE CONTRACTOR OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.
17. THE EXISTING CELL SITE IS IN FULL COMMERCIAL OPERATION. ANY CONSTRUCTION WORK BY SUBCONTRACTOR SHALL NOT DISRUPT THE EXISTING NORMAL OPERATION. ANY WORK ON EXISTING EQUIPMENT MUST BE COORDINATED WITH CONTRACTOR. ALSO, WORK MAY NEED TO BE SCHEDULED FOR AN APPROPRIATE MAINTENANCE WINDOW USUALLY IN LOW TRAFFIC PERIODS AFTER MIDNIGHT.
18. SINCE THE CELL SITE MAY BE ACTIVE, ALL SAFETY PRECAUTIONS MUST BE TAKEN WHEN WORKING AROUND HIGH LEVELS OF ELECTROMAGNETIC RADIATION. EQUIPMENT SHOULD BE SHUTDOWN PRIOR TO PERFORMING ANY WORK THAT COULD EXPOSE THE WORKERS TO DANGER. PERSONAL RF EXPOSURE MONITORS ARE REQUIRED TO BE WORN TO ALERT OF ANY DANGEROUS EXPOSURE LEVELS.

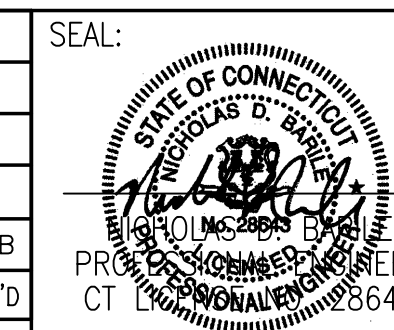
19. SUBCONTRACTOR'S WORK SHALL COMPLY WITH ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES AS ADOPTED BY THE LOCAL AUTHORITY HAVING JURISDICTION (AHJ) FOR THE LOCATION. THE EDITION OF THE AHJ ADOPTED CODES AND STANDARDS IN EFFECT ON THE DATE OF CONTRACT AWARD SHALL GOVERN THE DESIGN.
 - INTERNATIONAL BUILDING CODE: IBC 2009 WITH LOCAL & COUNTY AMENDMENTS
 - NATIONAL ELECTRICAL CODE: NEC 2011 WITH LOCAL & COUNTY AMENDMENTS
 - FIRE/LIFE SAFETY CODE: NFPA-101 2009 WITH LOCAL & COUNTY AMENDMENTS
20. SUBCONTRACTOR'S WORK SHALL COMPLY WITH THE LATEST EDITION OF THE FOLLOWING STANDARDS:
 - AMERICAN CONCRETE INSTITUTE (ACI) 318, BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE
 - AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC), MANUAL OF STEEL CONSTRUCTION, THIRTEENTH EDITION
 - AMERICAN SOCIETY OF TESTING OF MATERIALS, ASTM
 - TELECOMMUNICATIONS INDUSTRY ASSOCIATION (ANSI/TIA-222-G-1), STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWER AND ANTENNA SUPPORTING STRUCTURES:
 - TIA 607, COMMERCIAL BUILDING GROUNDING AND BONDING REQUIREMENTS FOR TELECOMMUNICATIONS
 - OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, OSHA
 - INSTITUTE FOR ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE) 81, GUIDE FOR MEASURING EARTH RESISTIVELY, GROUND IMPEDANCE, AND EARTH SURFACE POTENTIALS OF A GROUND SYSTEM IEEE 1100 (1999) RECOMMENDED PRACTICE FOR POWERING AND GROUNDING OF ELECTRONIC EQUIPMENT
 - TELCORDIA GR-1503, COAXIAL CABLE CONNECTIONS
21. FOR ANY CONFLICTS BETWEEN SECTIONS OF LISTED CODES AND STANDARDS REGARDING MATERIAL, METHODS OF CONSTRUCTION, OR OTHER REQUIREMENTS, THE MOST RESTRICTIVE REQUIREMENT SHALL GOVERN. WHERE THERE IS CONFLICT BETWEEN A GENERAL REQUIREMENT AND A SPECIFIC REQUIREMENT, THE SPECIFIC REQUIREMENT SHALL GOVERN.
22. INFORMATION SHOWN ON THIS SET OF PLANS TAKEN FROM DRAWINGS PREPARED BY HUDSON DESIGN GROUP FOR A RECENT UPGRADE DATED 04/18/2012. CONTRACTOR TO NOTIFY DESIGN ENGINEER OF ANY DISCREPANCIES PRIOR TO COMMENCEMENT OF CONSTRUCTION.



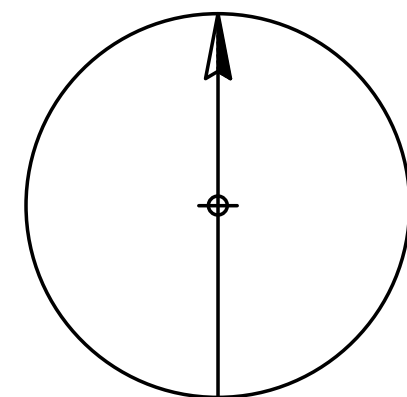
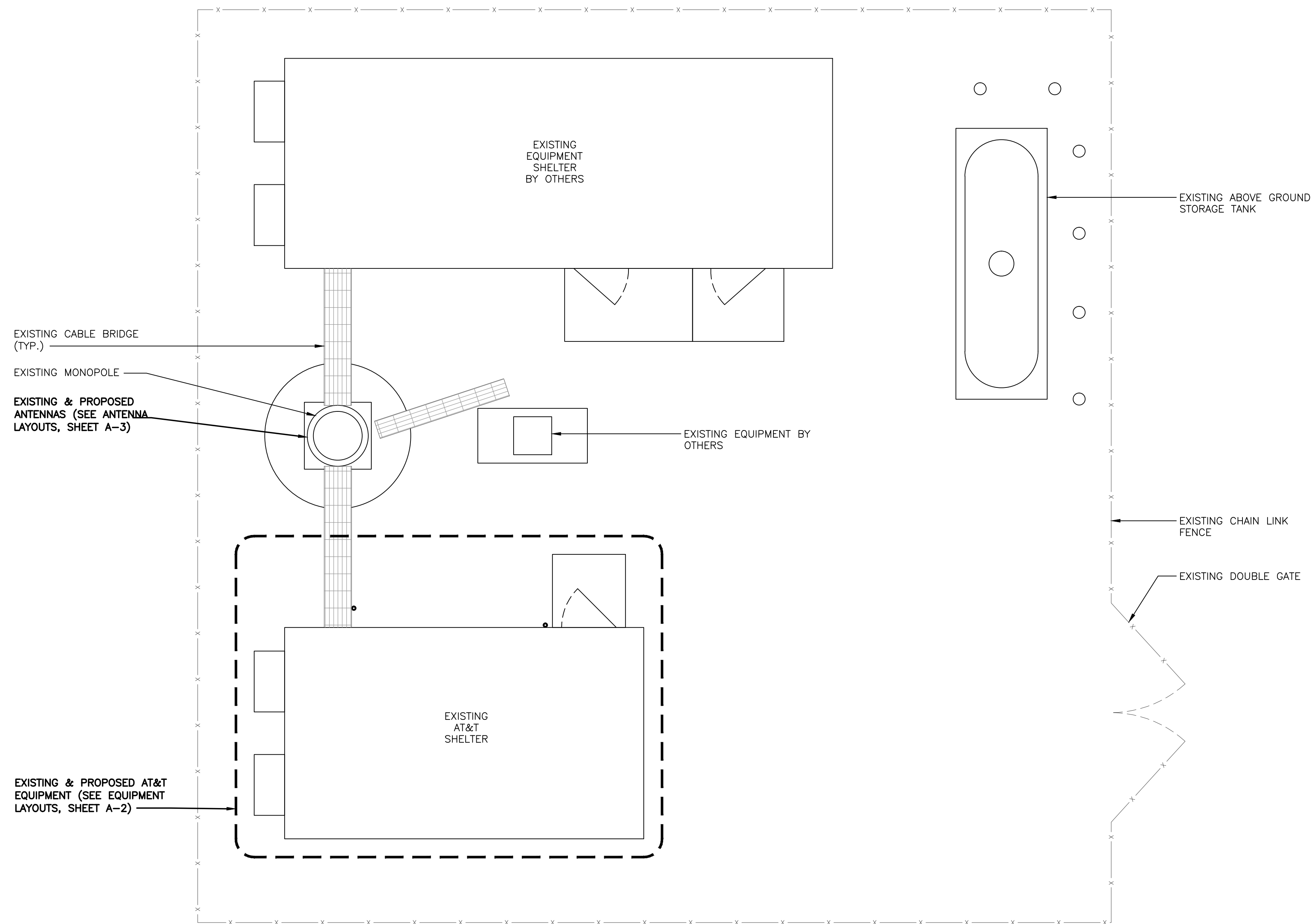
SITE NUMBER: CT5126
SITE NAME: EAST HARTFORD
HOCHANUM
 223 BRAINARD ROAD
 HARTFORD, CT 06114
 HARTFORD COUNTY



0	01/27/16	ISSUED AS FINAL	JW	NDB	NDB
NO.	DATE	REVISIONS	BY	CHK	APP'D
SCALE: AS SHOWN			DESIGNED BY: JW		DRAWN BY: JW



AT&T		
DRAWING TITLE: GROUNDING NOTES & GENERAL NOTES		
JOB NUMBER 15144-EMP	DRAWING NUMBER GN-1	REV 0



NORTH

COMPOUND LAYOUT
 SCALE: 1/4" = 1'-0"
 GRAPHIC SCALE: 1/4" = 1'-0"

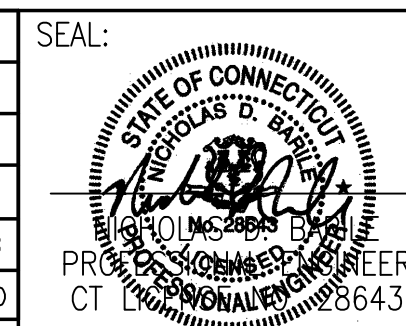
COM-EX
 Consultants
 115 ROUTE 46
 SUITE E39
 MOUNTAIN LAKES, NJ 07046
 PHONE: 862.209.4300
 FAX: 862.209.4301

EMPIRE
 telecom
 16 ESQUIRE ROAD
 BILLERICA, MA 01821

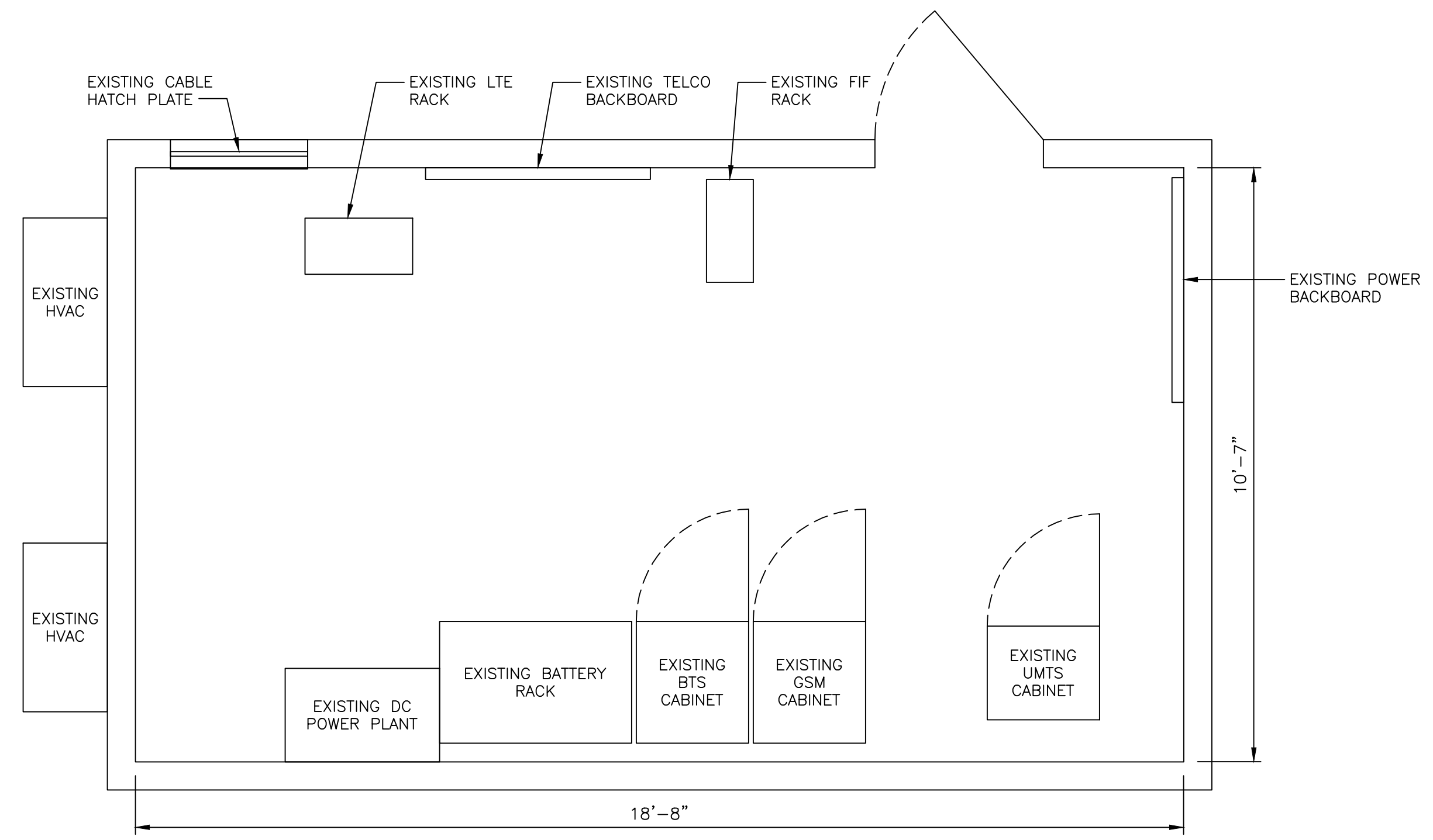
SITE NUMBER: CT5126
SITE NAME: EAST HARTFORD
HOCHANUM
 223 BRAINARD ROAD
 HARTFORD, CT 06114
 HARTFORD COUNTY

 **at&t**
 MOBILITY
 550 COCHITUATE ROAD
 FRAMINGHAM, MA 01701

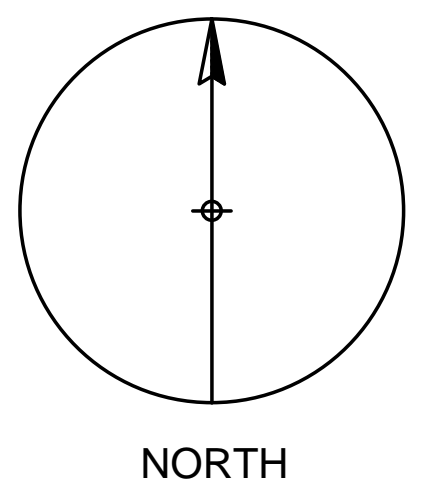
0	01/27/16	ISSUED AS FINAL	JW	NDB	NDB
NO.	DATE	REVISIONS	BY	CHK	APP'D
SCALE: AS SHOWN			DESIGNED BY: JW		DRAWN BY: JW



AT&T		
DRAWING TITLE: COMPOUND LAYOUT		
JOB NUMBER 15144-EMP	DRAWING NUMBER A-1	REV 0



NOTE:
NO GROUND EQUIPMENT CHANGES
ARE PROPOSED UNDER THIS SCOPE
OF WORK. EXISTING GROUND
EQUIPMENT CONFIGURATION TO
REMAIN.



EXISTING EQUIPMENT LAYOUT

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



(IN FEET)
1/2 Inch = 1 Foot

COM-EX
Consultants
115 ROUTE 46
SUITE E39
MOUNTAIN LAKES, NJ 07046
PHONE: 862.209.4300
FAX: 862.209.4301

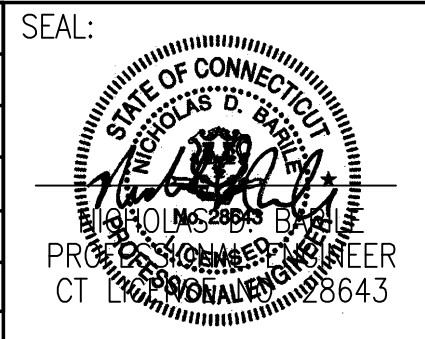
EMPIRE
telecom
16 ESQUIRE ROAD
BILLERICA, MA 01821

SITE NUMBER: CT5126
SITE NAME: EAST HARTFORD
HOCHANUM
223 BRAINARD ROAD
HARTFORD, CT 06114
HARTFORD COUNTY

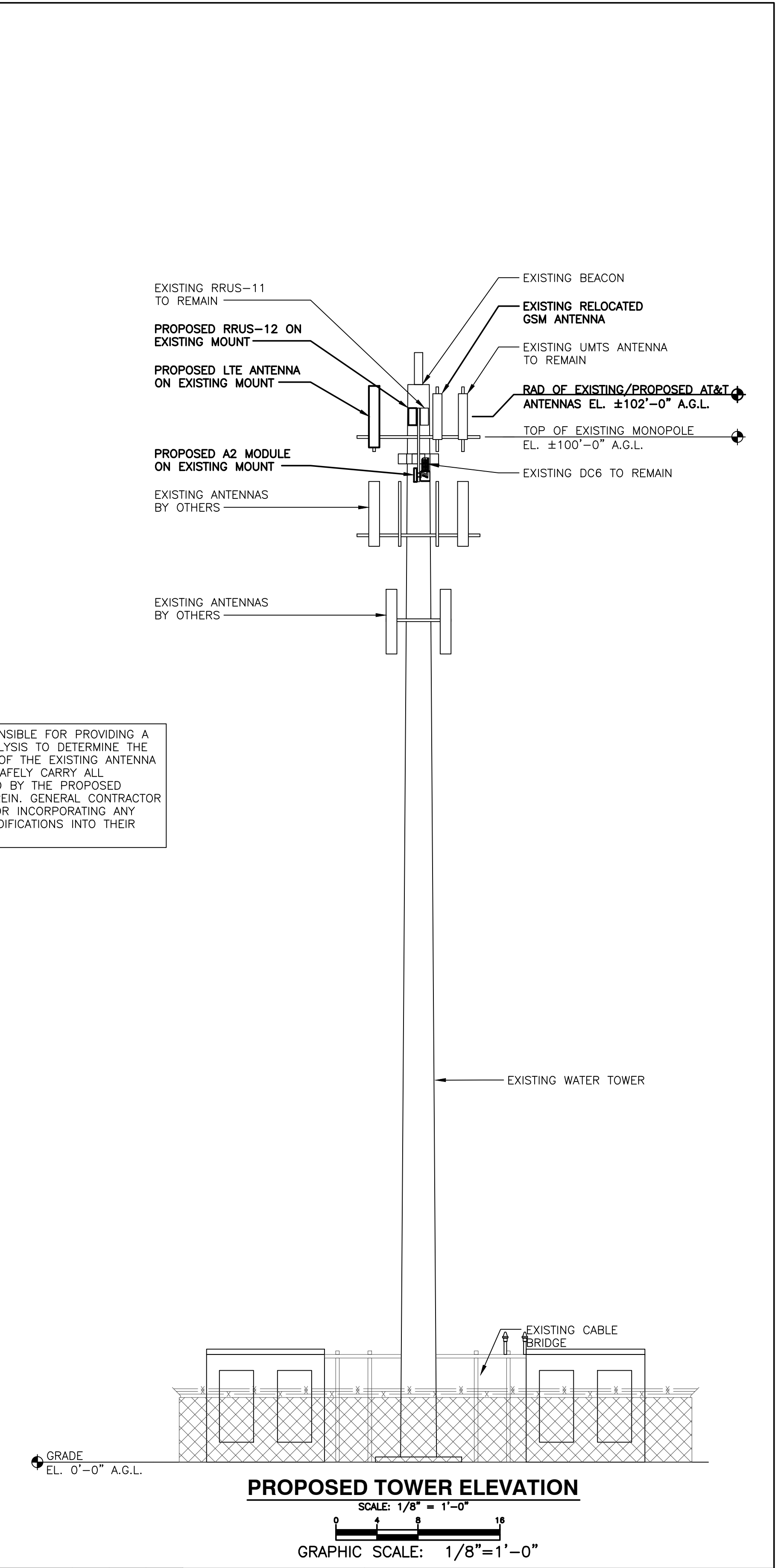
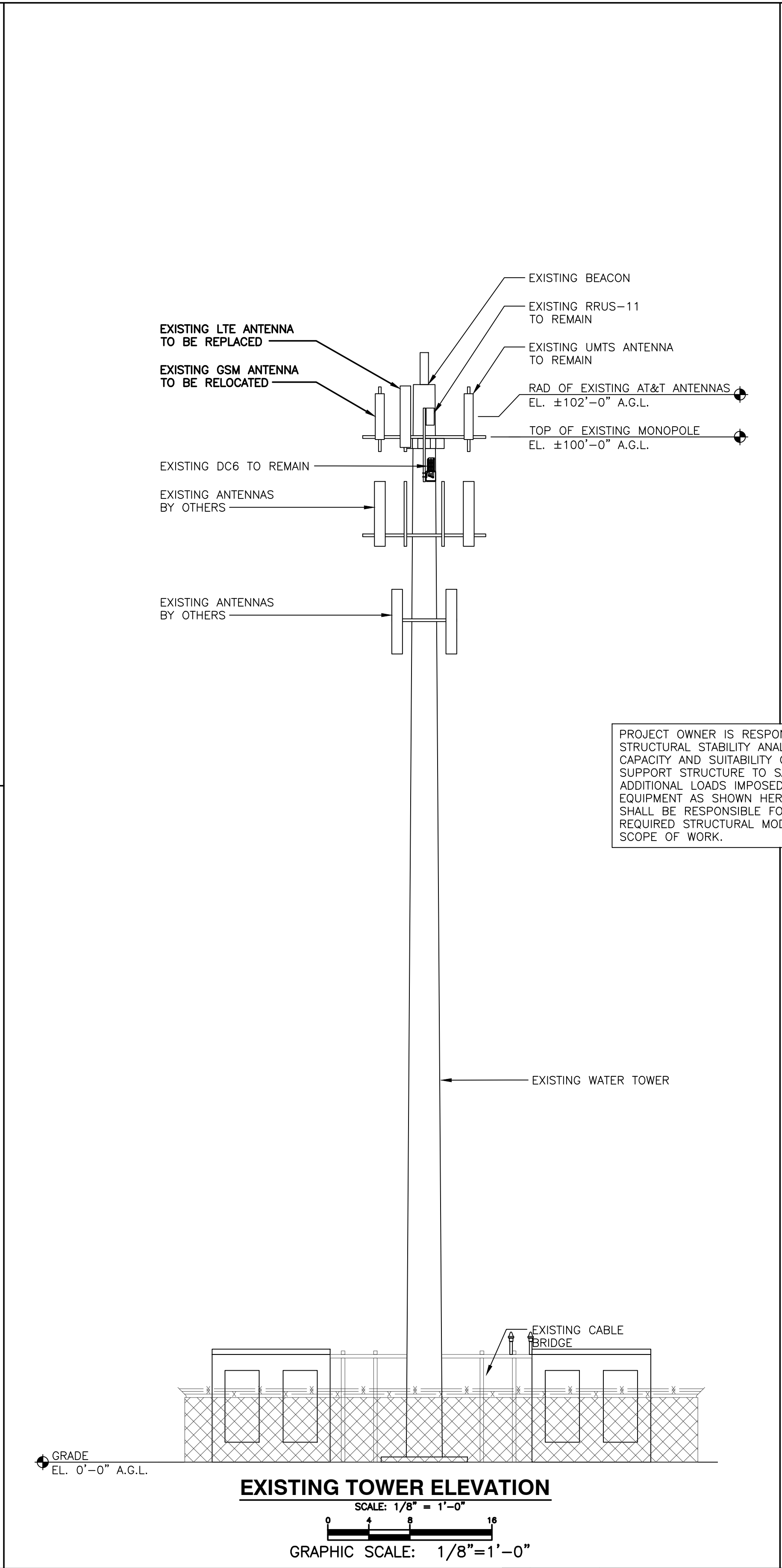
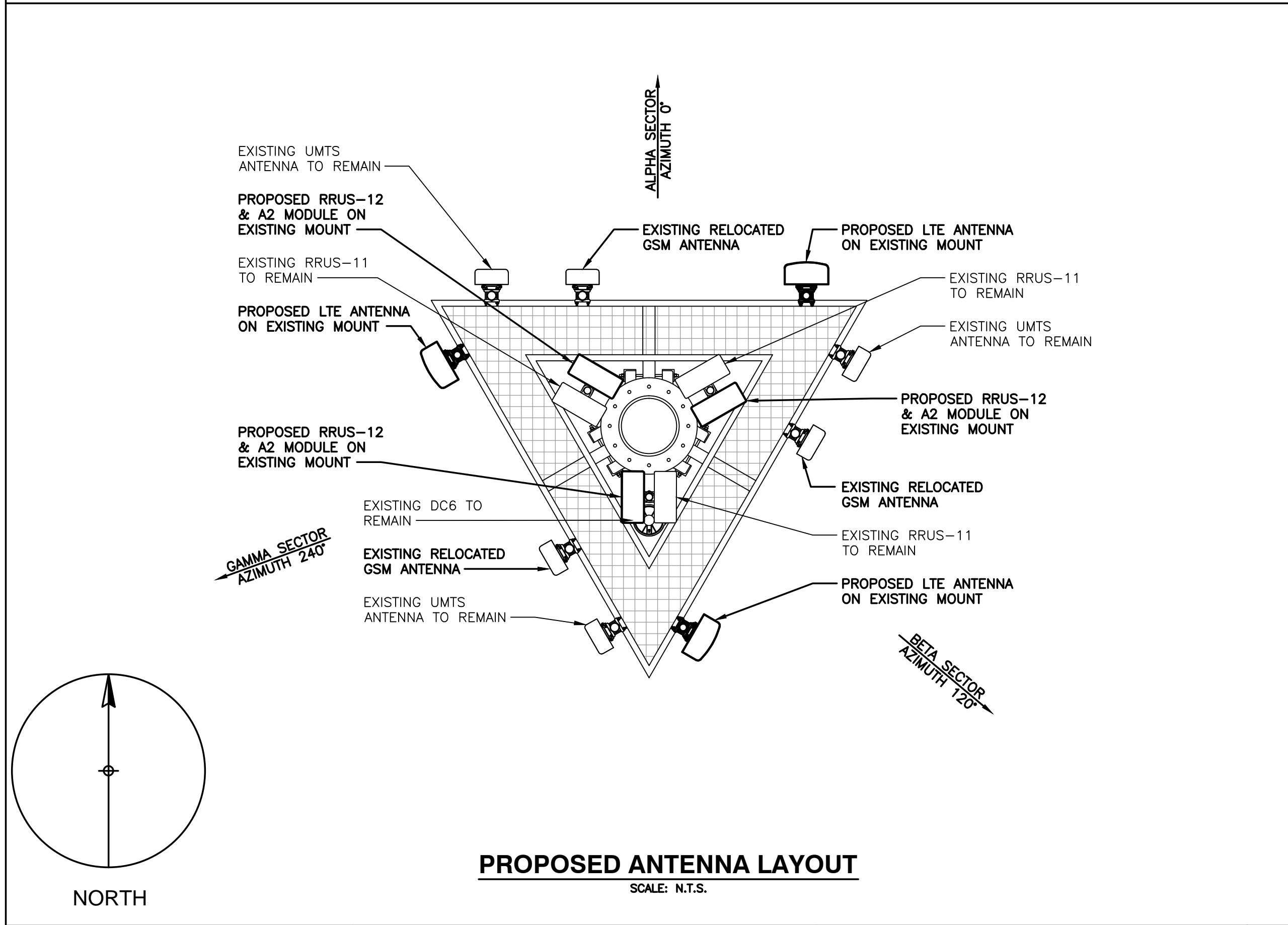
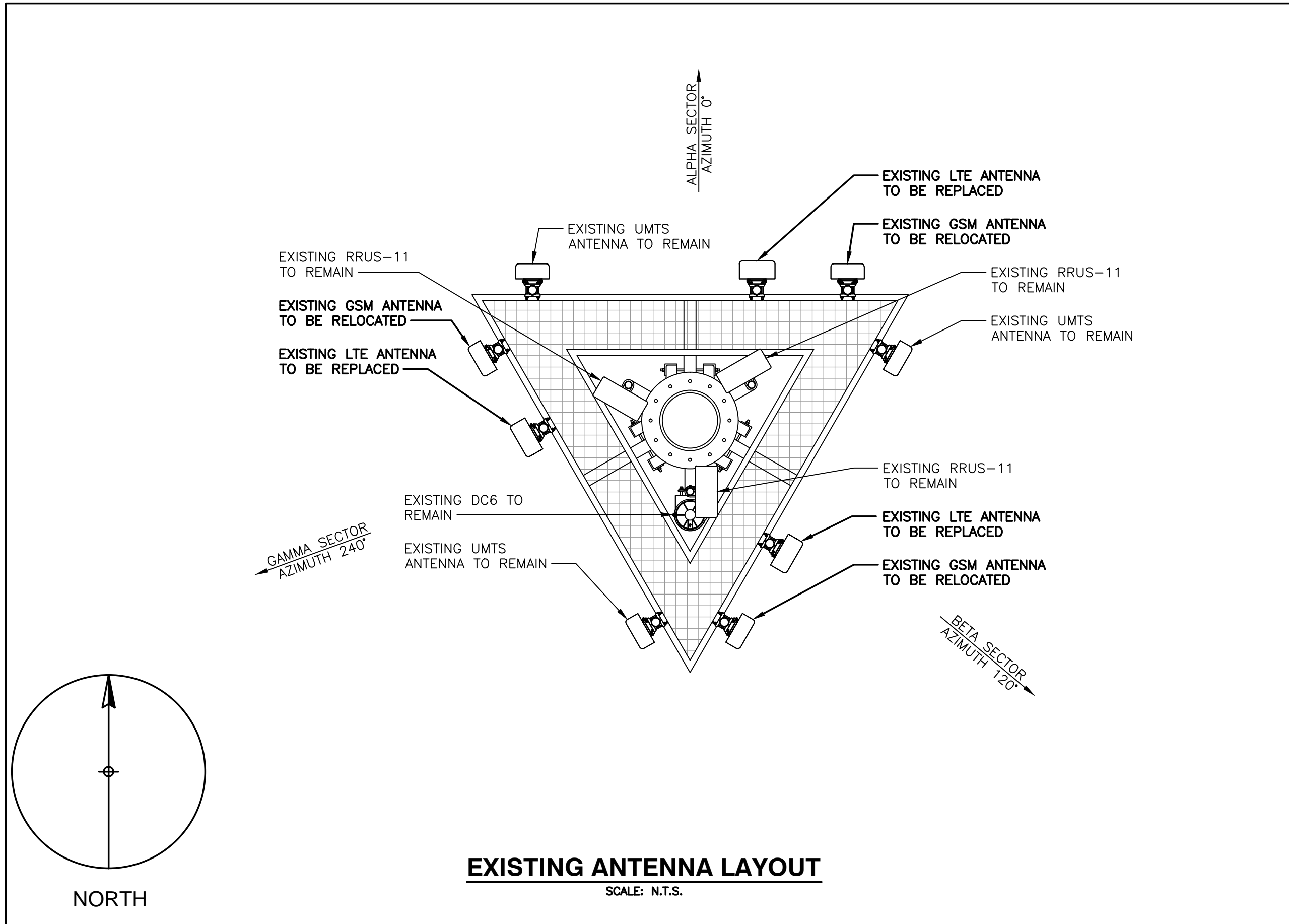
at&t
MOBILITY
550 COCHITUATE ROAD
FRAMINGHAM, MA 01701

NO.	DATE	REVISIONS	BY	CHK	APP'D
0	01/27/16	ISSUED AS FINAL	JW	NDB	NDB

SCALE: AS SHOWN DESIGNED BY: JW DRAWN BY: JW



AT&T		
DRAWING TITLE: EQUIPMENT LAYOUTS		
JOB NUMBER 15144-EMP	DRAWING NUMBER A-2	REV 0



PROJECT OWNER IS RESPONSIBLE FOR PROVIDING A STRUCTURAL STABILITY ANALYSIS TO DETERMINE THE CAPACITY AND SUITABILITY OF THE EXISTING ANTENNA SUPPORT STRUCTURE TO SAFELY CARRY ALL ADDITIONAL LOADS IMPOSED BY THE PROPOSED EQUIPMENT AS SHOWN HEREIN. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR INCORPORATING ANY REQUIRED STRUCTURAL MODIFICATIONS INTO THEIR SCOPE OF WORK.

COM-EX
Consultants
115 ROUTE 46
SUITE E39
MOUNTAIN LAKES, NJ 07046
PHONE: 862.209.4300
FAX: 862.209.4301

EMPIRE
telecom
16 ESQUIRE ROAD
BILLERICA, MA 01821

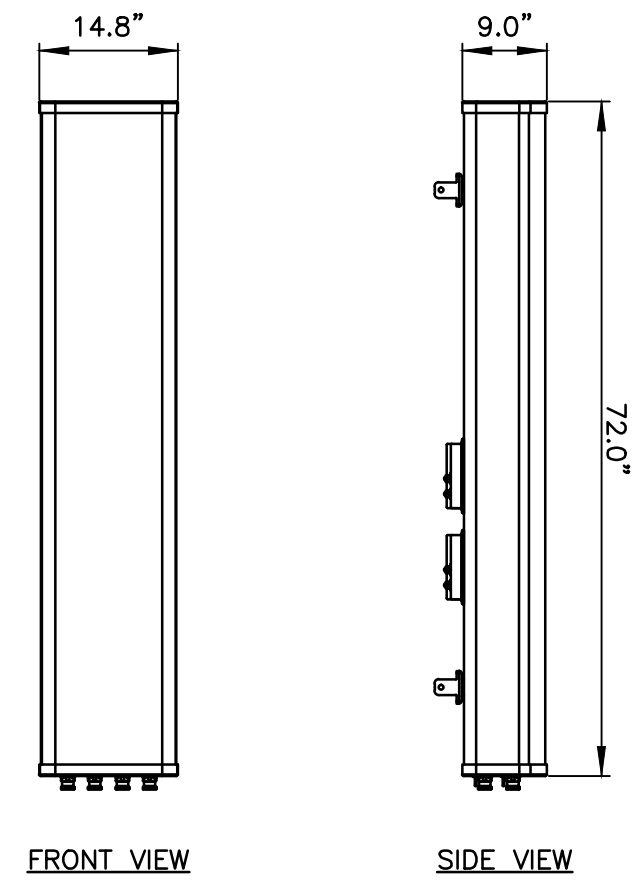
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SITE NAME: EAST HARTFORD HOCHANUM
223 BRAINARD ROAD
HARTFORD, CT 06114
HARTFORD COUNTY

at&t
MOBILITY
550 COCHITUATE ROAD
FRAMINGHAM, MA 01701

0	01/27/16	ISSUED AS FINAL	JW	NDB	NDB
NO.	DATE	REVISIONS	BY	CHK	APP'D
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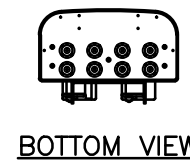
SEAL:
STATE OF CONNECTICUT
PROFESSIONAL ENGINEER
CT LICENSE NO. 28643

AT&T		
DRAWING TITLE: ANTENNA LAYOUTS & ELEVATIONS		
JOB NUMBER 15144-EMP	DRAWING NUMBER A-3	REV 0



FRONT VIEW

SIDE VIEW

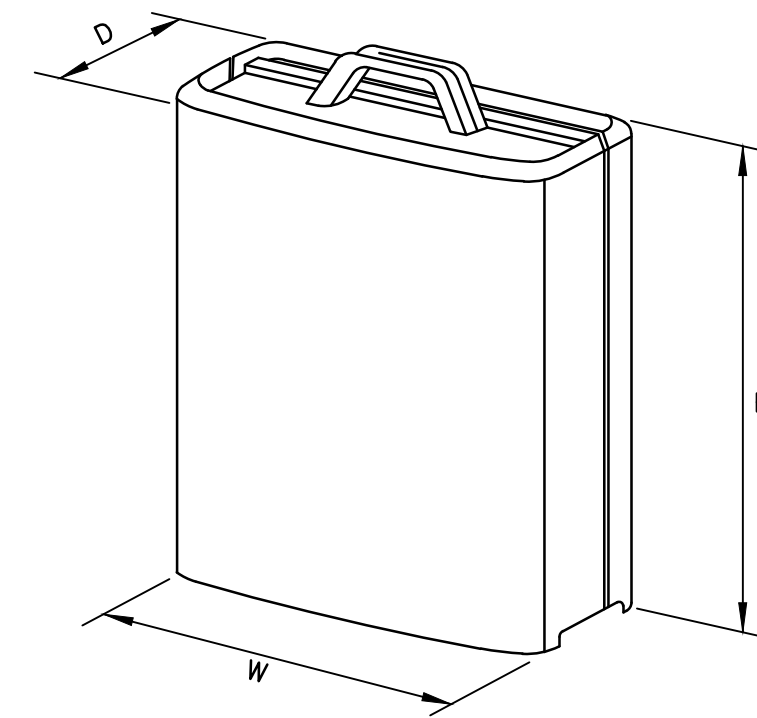


BOTTOM VIEW

MANUFACTURER	CCI
MODEL	HPA-65R-BUU-H6
WEIGHT	50.7 LBS

LTE ANTENNA DETAIL

SCALE: N.T.S.



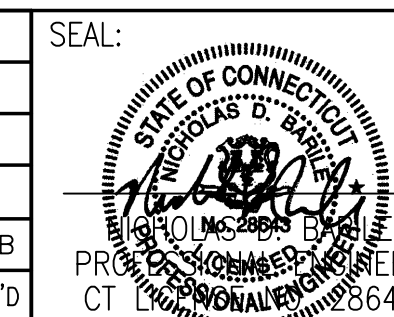
MODEL	L x W x H	WEIGHT
* RRUS-11	19.69" x 16.97" x 7.17"	50.7 LBS
RRUS-12	19.69" x 16.97" x 7.17"	50.7 LBS

* DENOTES EXISTING

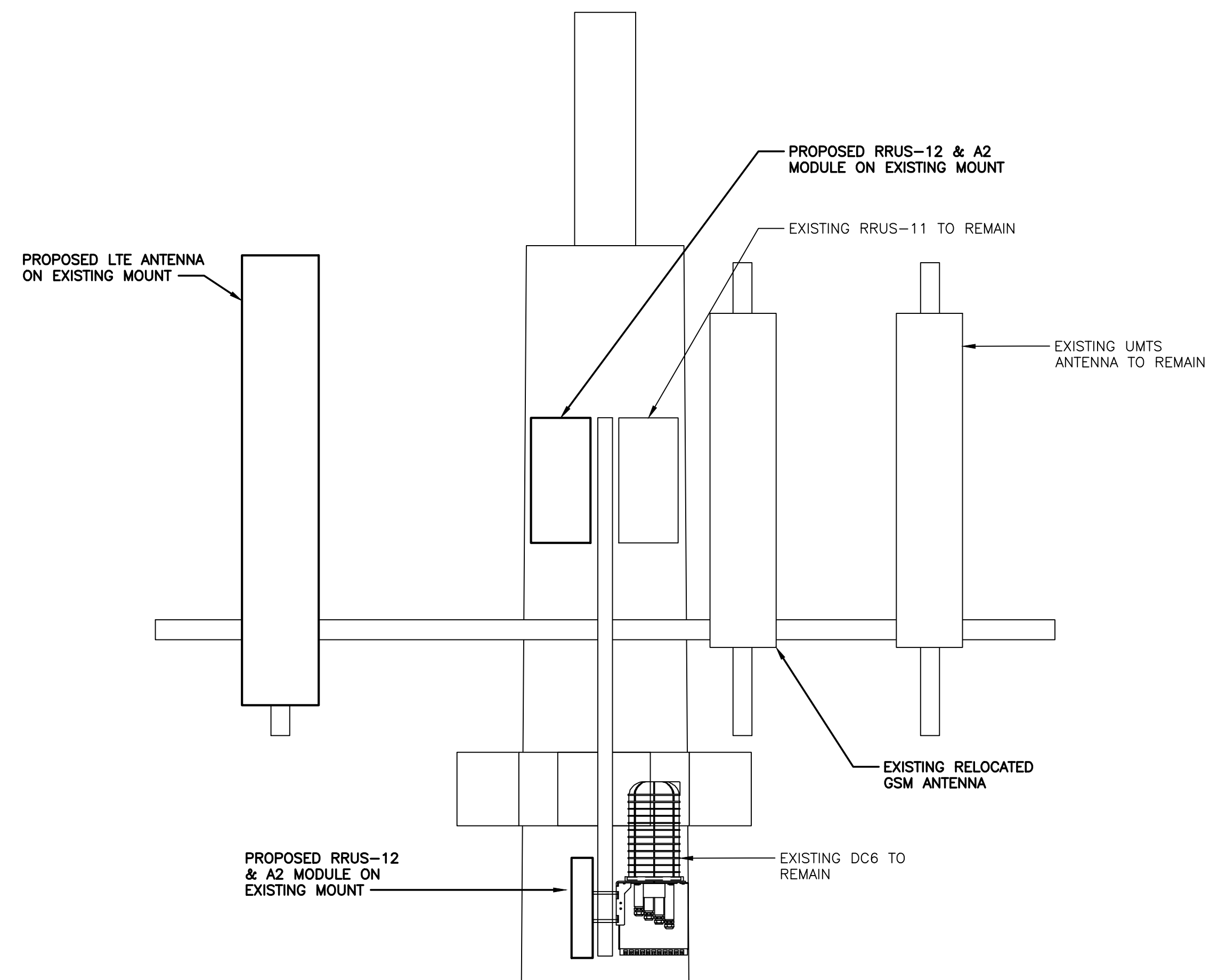
RRUS DETAIL

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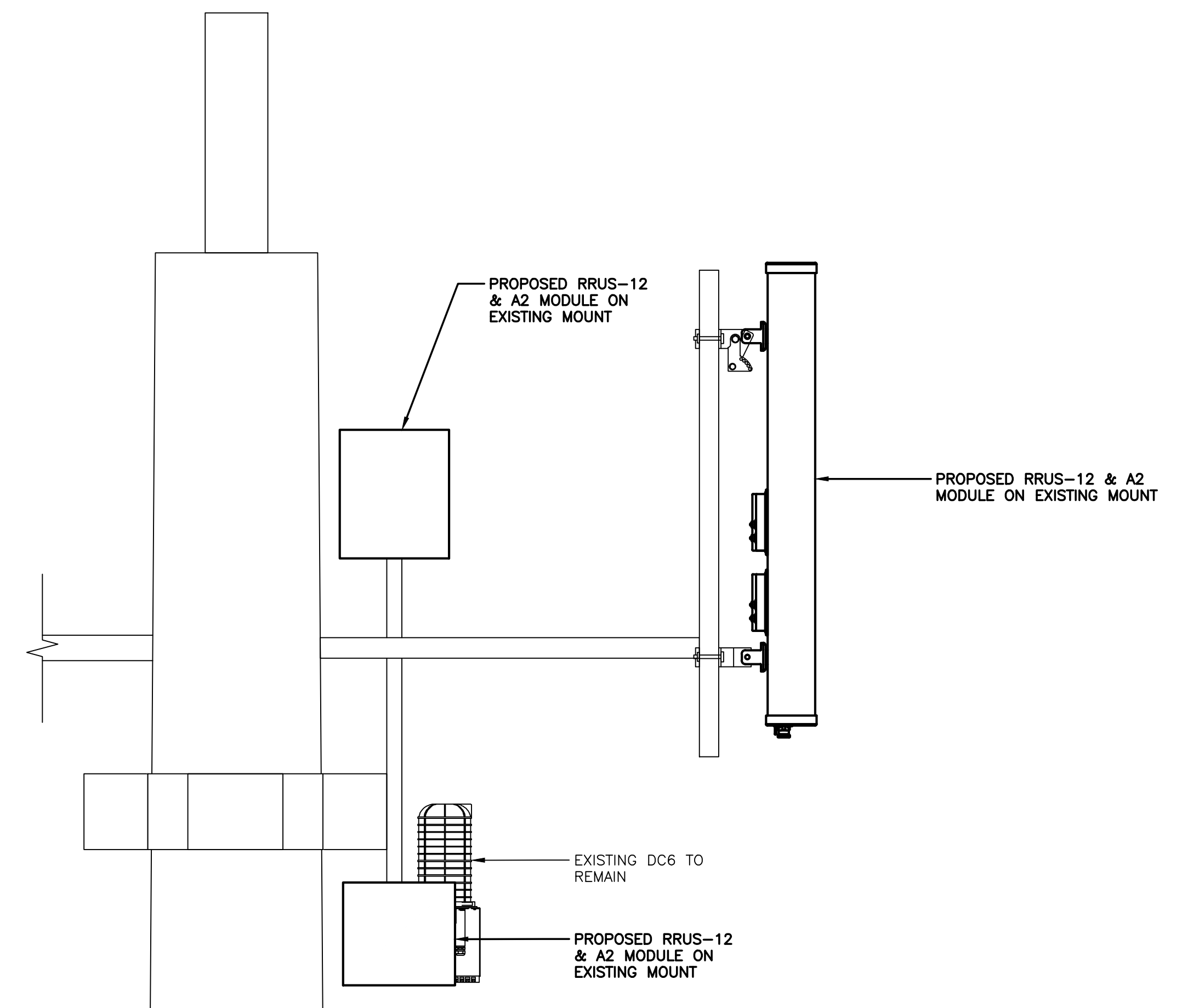
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SCALE: AS SHOWN		DESIGNED BY: JW	DRAWN BY: JW		



AT&T		
DRAWING TITLE:		
DETAILS		
JOB NUMBER	DRAWING NUMBER	REV
15144-EMP	A-4	0



PROPOSED ANTENNA MOUNTING DETAIL (FRONT VIEW)
SCALE: N.T.S.



PROPOSED ANTENNA MOUNTING DETAIL (SIDE VIEW)
SCALE: N.T.S.

EXISTING ANTENNA SCHEDULE

SECTOR	POSITION	MAKE	MODEL	SIZE (INCHES)
ALPHA	A1	POWERWAVE	7770	63"x11"x5"
	A2	-	-	-
	A3	KMW	AM-X-CD-16-65-00T-RET	72"x11.8"x5.9"
	A4	POWERWAVE	7770	63"x11"x5"
BETA	B1	POWERWAVE	7770	63"x11"x5"
	B2	-	-	-
	B3	KMW	AM-X-CD-16-65-00T-RET	72"x11.8"x5.9"
	B4	POWERWAVE	7770	63"x11"x5"
GAMMA	C1	POWERWAVE	7770	63"x11"x5"
	C2	-	-	-
	C3	KMW	AM-X-CD-16-65-00T-RET	72"x11.8"x5.9"
	C4	POWERWAVE	7770	63"x11"x5"

FINAL ANTENNA SCHEDULE

SECTOR	POSITION	MAKE	MODEL	SIZE (INCHES)
ALPHA	A1	POWERWAVE	7770	63"x11"x5"
	A2	POWERWAVE	7770	63"x11"x5"
	A3	-	-	-
	A4	CCI	HPA-65R-BUU-H6	72.0"x14.8"x9.0"
BETA	B1	POWERWAVE	7770	63"x11"x5"
	B2	POWERWAVE	7770	63"x11"x5"
	B3	-	-	-
	B4	CCI	HPA-65R-BUU-H6	72.0"x14.8"x9.0"
GAMMA	C1	POWERWAVE	7770	63"x11"x5"
	C2	POWERWAVE	7770	63"x11"x5"
	C3	-	-	-
	C4	CCI	HPA-65R-BUU-H6	72.0"x14.8"x9.0"

PROPOSED RRU SCHEDULE

SECTOR	MAKE	MODEL	SIZE (INCHES)	ADDITIONAL COMPONENT	SIZE (INCHES)
ALPHA	ERICSSON	RRUS-11 (EXISTING)	19.7"x16.9"x7.2"		
	ERICSSON	RRUS-12	19.7"x16.9"x7.2"	ERICSSON A2 MODULE	16.4"x15.2"x3.4"
BETA	ERICSSON	RRUS-11 (EXISTING)	19.7"x16.9"x7.2"		
	ERICSSON	RRUS-12	19.7"x16.9"x7.2"	ERICSSON A2 MODULE	16.4"x15.2"x3.4"
GAMMA	ERICSSON	RRUS-11 (EXISTING)	19.7"x16.9"x7.2"		
	ERICSSON	RRUS-12	19.7"x16.9"x7.2"	ERICSSON A2 MODULE	16.4"x15.2"x3.4"

PROJECT OWNER IS RESPONSIBLE FOR PROVIDING A STRUCTURAL STABILITY ANALYSIS TO DETERMINE THE CAPACITY AND SUITABILITY OF THE EXISTING ANTENNA SUPPORT STRUCTURE TO SAFELY CARRY ALL ADDITIONAL LOADS IMPOSED BY THE PROPOSED EQUIPMENT AS SHOWN HEREIN. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR INCORPORATING ANY REQUIRED STRUCTURAL MODIFICATIONS INTO THEIR SCOPE OF WORK.

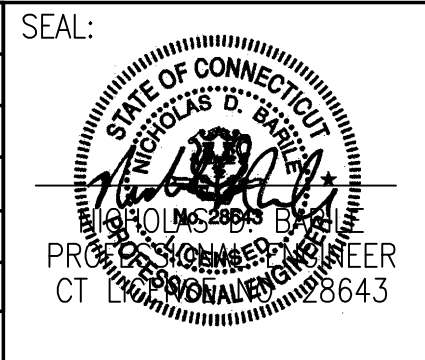


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SITE NAME: EAST HARTFORD HOCHANUM
223 BRAINARD ROAD
HARTFORD, CT 06114
HARTFORD COUNTY

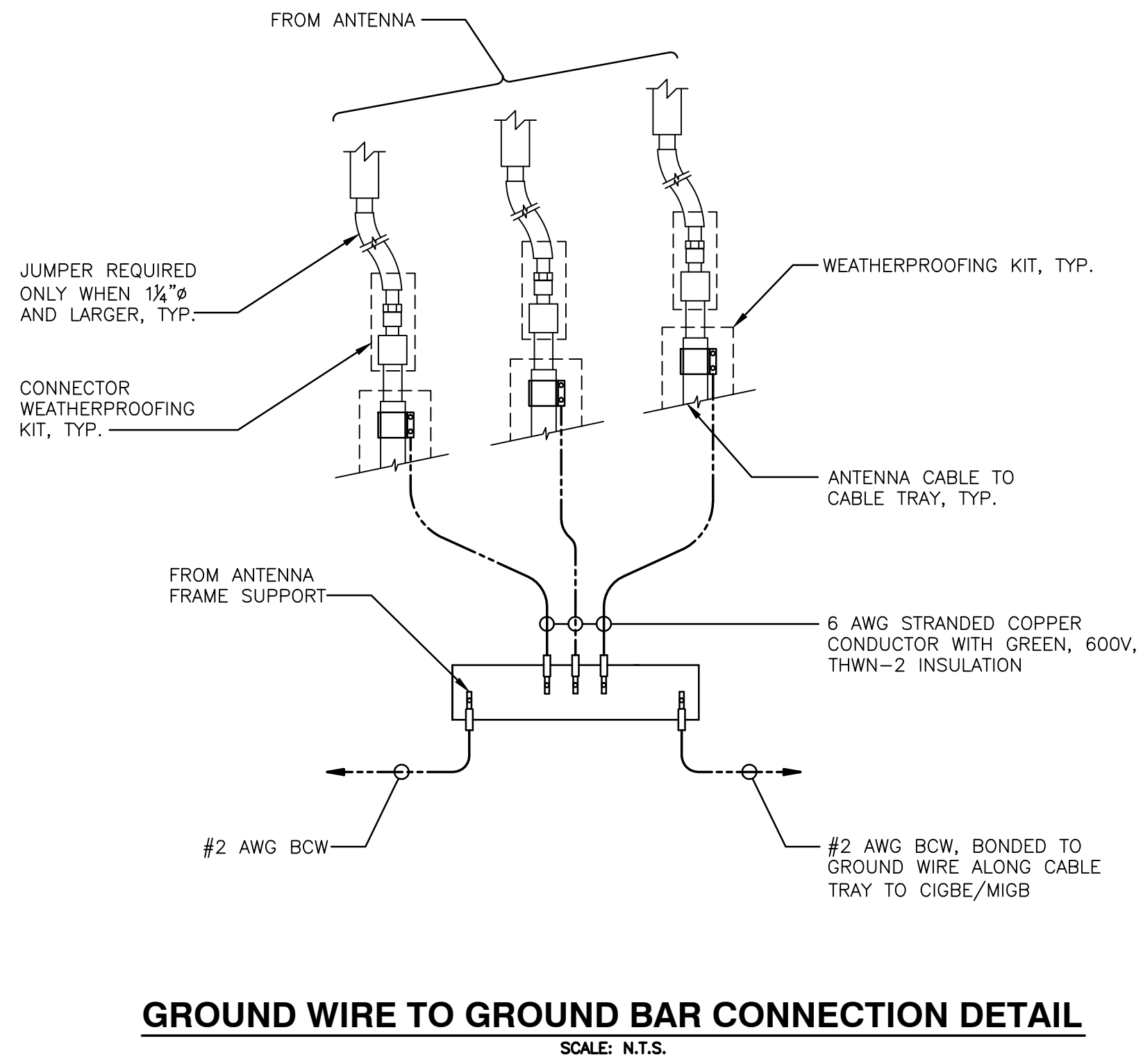


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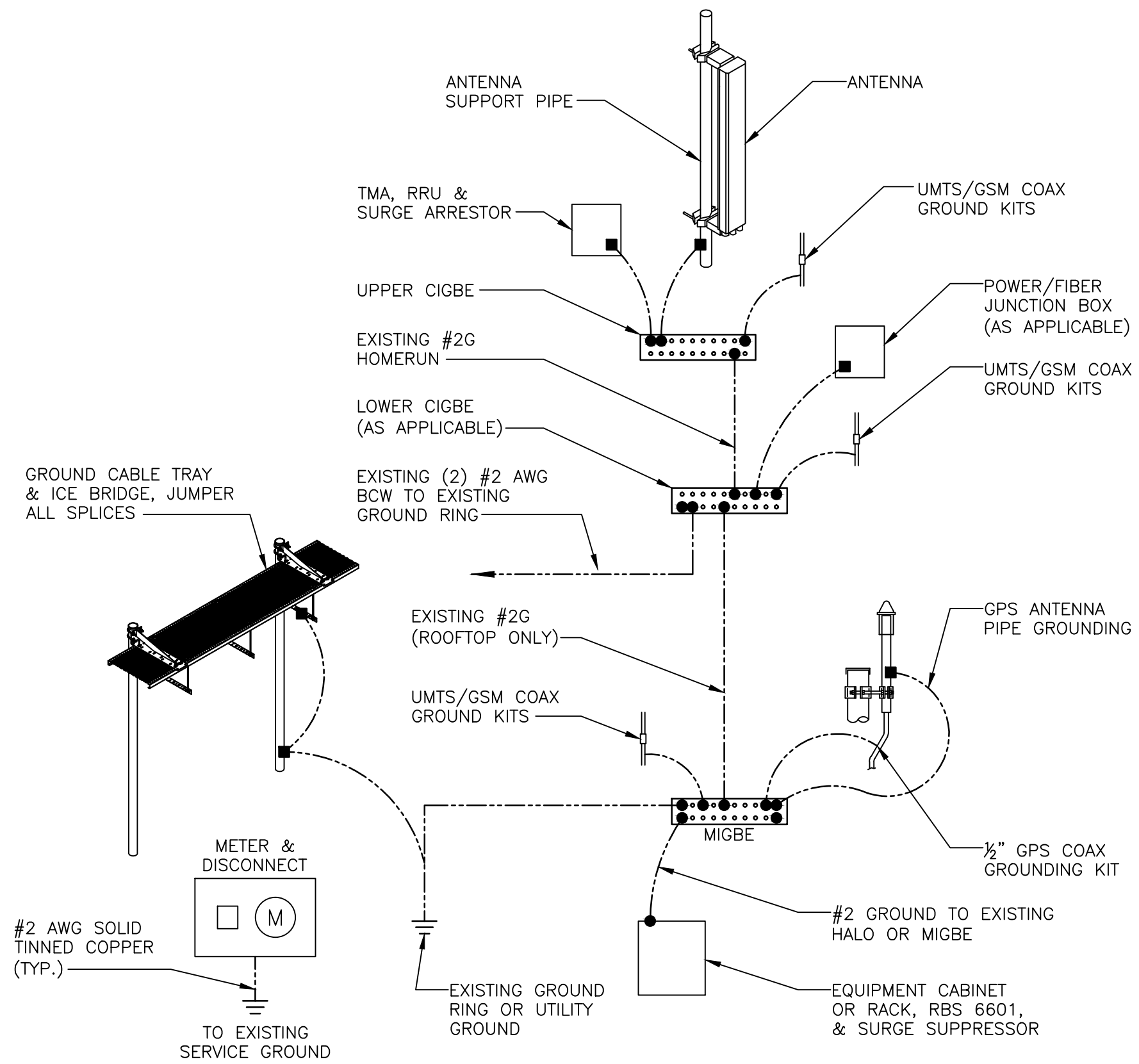
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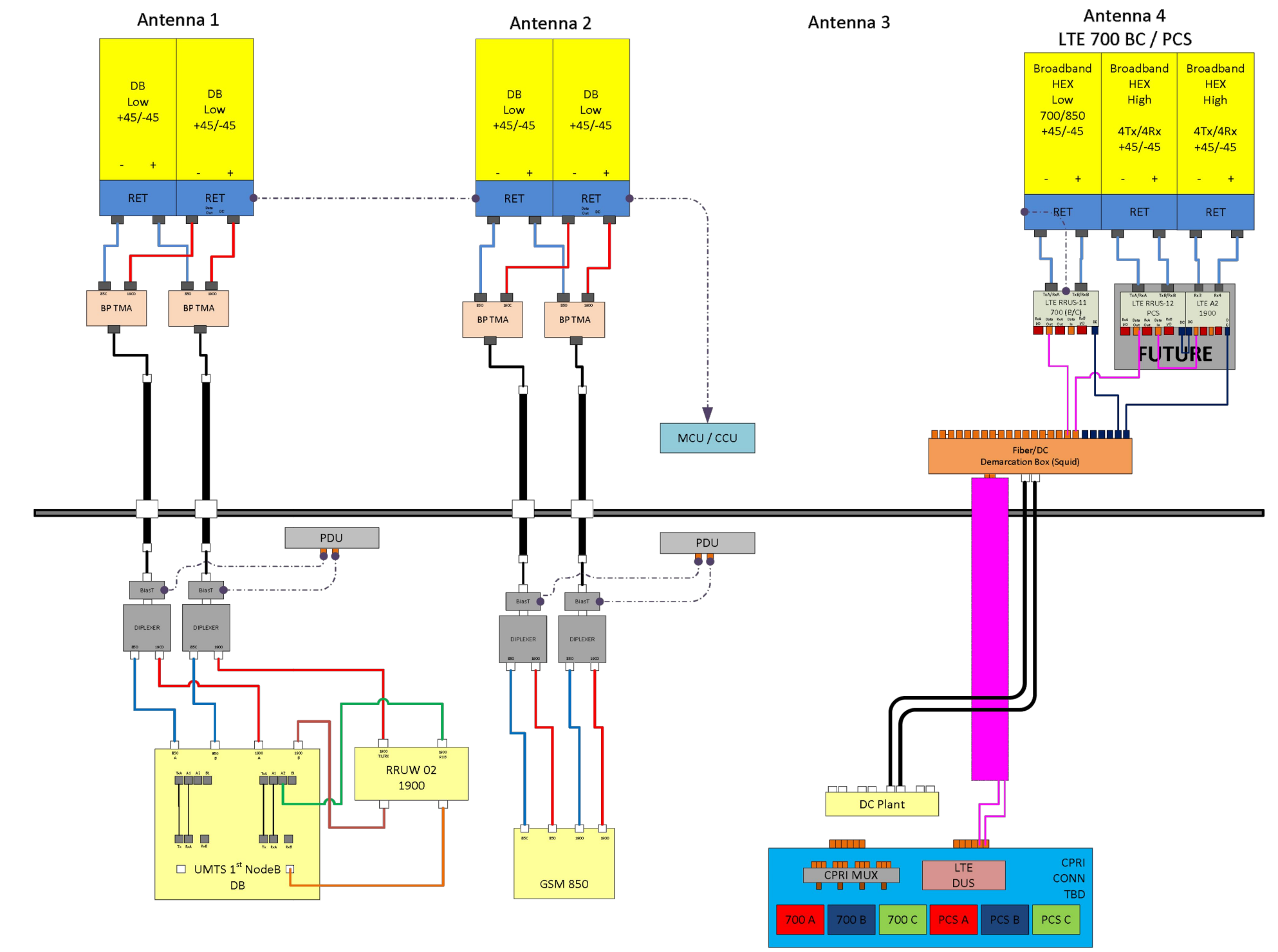
AT&T		
DRAWING TITLE: ANTENNA MOUNTING DETAILS		
JOB NUMBER 15144-EMP	DRAWING NUMBER A-5	REV 0



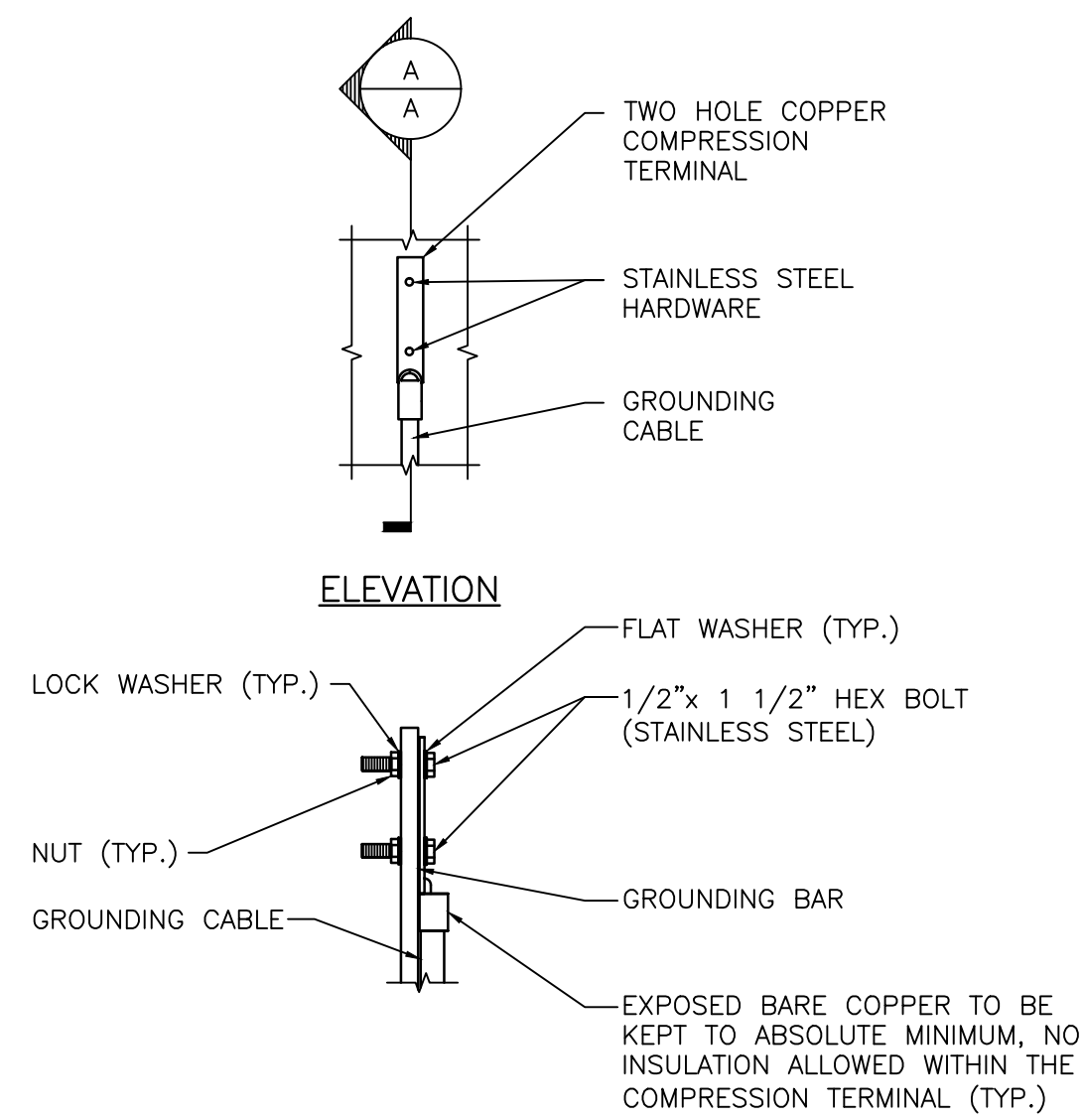
GROUND WIRE TO GROUND BAR CONNECTION DETAIL
SCALE: N.T.S.



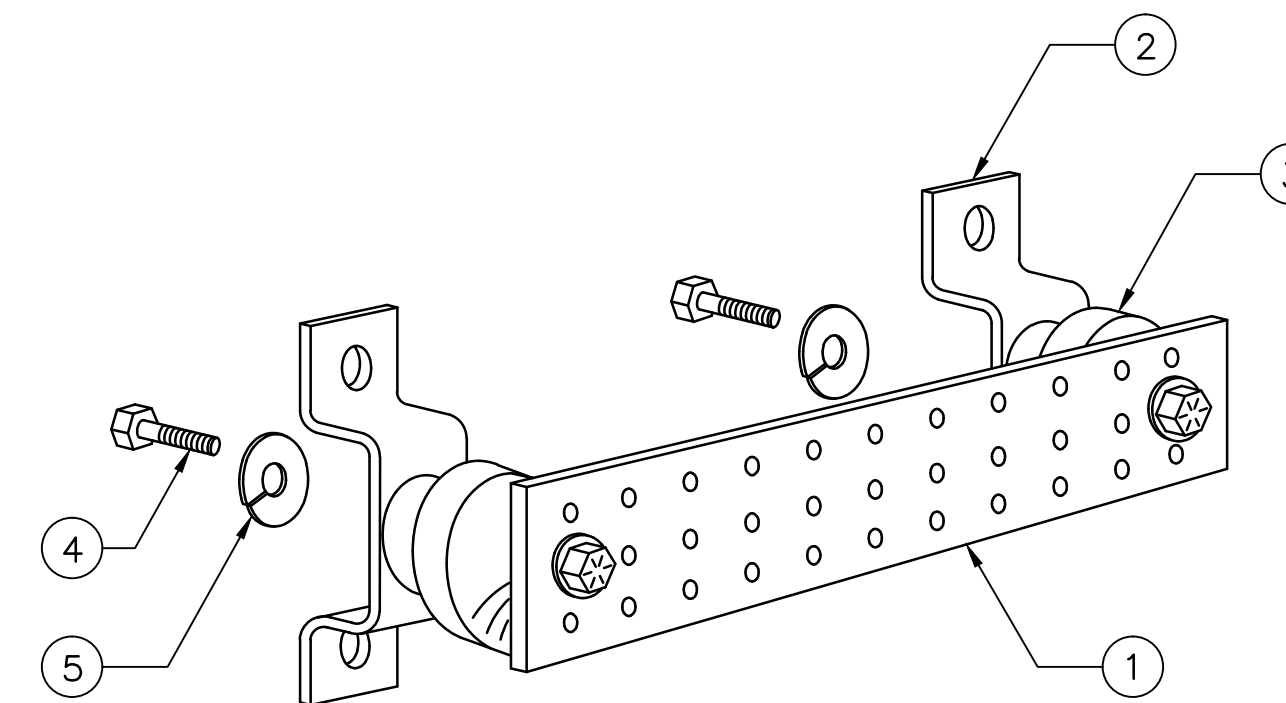
GROUNDING RISER DIAGRAM
SCALE: N.T.S.



TYPICAL PLUMBING DIAGRAM (PER SECTOR)
SCALE: N.T.S.



TYPICAL GROUND BAR CONNECTION DETAIL
SCALE: N.T.S.

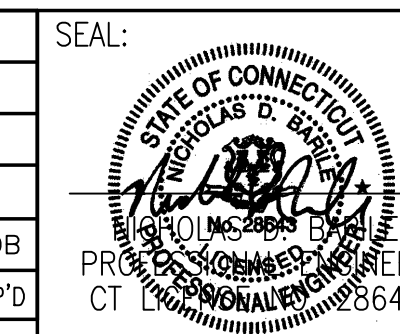


ITEM NO.	QTY.	DESCRIPTION
1	1	SOLID GROUND BAR (20"x 4"x 1/4")
2	2	WALL MOUNTING BRACKET
3	2	INSULATORS
4	4	5/8"-11x1" H.H.C.S.
5	4	5/8" LOCK WASHER

- NOTES:
- EACH GROUND CONDUCTOR TERMINATING ON ANY GROUND BAR SHALL HAVE AN IDENTIFICATION TAG ATTACHED AT EACH END THAT WILL IDENTIFY ITS ORIGIN AND DESTINATION
- SECTION "P" - SURGE PRODUCERS**
- CABLE ENTRY PORTS (HATCH PLATES) (#2)
 - GENERATOR FRAMEWORK (IF AVAILABLE) (#2)
 - TELCO GROUND BAR
 - COMMERCIAL POWER COMMON NEUTRAL/GROUND BOND (#2)
 - +24V POWER SUPPLY RETURN BAR (#2)
 - -48V POWER SUPPLY RETURN BAR (#2)
 - RECTIFIER FRAMES
- SECTION "A" - SURGE ABSORBERS**
- INTERIOR GROUND RING (#2)
 - EXTERNAL EARTH GROUND FIELD (BURIED GROUND RING) (#2)
 - METALLIC COLD WATER PIPE (IF AVAILABLE) (#2)
 - BUILDING STEEL (IF AVAILABLE) (#2)

GROUND BAR DETAIL
SCALE: N.T.S.

NO.	DATE	REVISIONS	BY	CHK	APP'D
0	01/27/16	ISSUED AS FINAL	JW	NDB	NDB
SCALE: AS SHOWN		DESIGNED BY: JW	DRAWN BY: JW		



Date: **January 06, 2016**



Holly Haas
Crown Castle
3530 Toringdon Way Suite 300
Charlotte, NC 28277

Black & Veatch Corp.
6800 W 115th St. Suite 2292
Overland Park, KS 66211
(913) 458-7245

Subject: Structural Analysis Report

Carrier Designation: **AT&T Mobility Co-Locate**
Carrier Site Number: CT5126
Carrier Site Name: East Hartford
Hochanum

Crown Castle Designation: **Crown Castle BU Number:** 842861
Crown Castle Site Name: EAST HARTFORD
HOCHANUM
Crown Castle JDE Job Number: 355204
Crown Castle Work Order Number: 1151508
Crown Castle Application Number: 319163 Rev. 0

Engineering Firm Designation: **Black & Veatch Corp. Project Number:** 182896

Site Data: **223 Brainard Road, Hartford, Hartford County, CT**
Latitude 41° 43' 59", Longitude -72° 39' 43.1"
98 Foot - Monopole Tower

Dear Holly Haas,

Black & Veatch Corp. is pleased to submit this “**Structural Analysis Report**” to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural ‘Statement of Work’ and the terms of Crown Castle Purchase Order Number 848899, in accordance with application 319163, revision 0.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC5: Existing + Proposed Equipment

Sufficient Capacity

Note: See Table I and Table II for the proposed and existing loading, respectively.

The analysis has been performed in accordance with the TIA/EIA-222-F standard and 2005 CT State Building Code with 2009 amendment based upon a wind speed of 80 mph fastest mile.

We at *Black & Veatch Corp.* appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Structural analysis prepared by: Narongkorn Wongwattanapong / Jumpon Uea-areevorakul

Respectfully submitted by:

Ping Jiang, P.E.
Professional Engineer



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2) ANALYSIS CRITERIA

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3.2) Assumptions

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Table 5 - Tower Components vs. Capacity

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tnxTower Output

6) APPENDIX B

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7) APPENDIX C

Additional Calculations

1) INTRODUCTION

This is 98 ft Monopole tower mapped by STG Communications in August of 2006. The original design standard and wind speed are unknown.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 80 mph with no ice, 37.6 mph with 1 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
100.0	101.0	3	cci antennas	HPA-65R-BUU-H6 w/ Mount Pipe	2	3/4 3/8	1
		3	ericsson	RRUS 12 B4/RRUS A2	1		

Notes:

- 1) Refer Appendix B for detailed coax layout. Proposed (1) 3/8" coax cable to be installed in conduit.

Table 2 - Existing Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
100.0	101.0	3	kmw communications	AM-X-CD-16-65-00T-RET w/ Mount Pipe	-	-	2
		3	ericsson	RBS 6601	12 5 2	1-1/4 1/2 3/8	1
		6	powerwave technologies	7770.00 w/ Mount Pipe			
		12	powerwave technologies	LGP21401			
		1	raycap	DC6-48-60-18-8F	19	1-5/8	1
	100.0	1	cci tower mounts	Miscellaneous [NA 507-1]			
	100.0	1	cci tower mounts	Platform Mount [LP 1201-1]			
86.0	88.0	3	alcatel lucent	RRH2X40-AWS	19	1-5/8	1
		5	antel	BXA-171063-12BF w/ Mount Pipe			
		1	antel	BXA-171063-8BF-2 w/ Mount Pipe			
		2	antel	BXA-70063/4CF w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			
		2	swedcom	SCCP 2x6015 w/ Mount Pipe			
	2	swedcom	SLCP 2x6015 w/ Mount Pipe				
86.0	1	cci tower mounts	Platform Mount [LP 303-1]				

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
79.0	80.0	1	andrew	VHLP2-23	6 2	5/16 1/2	1
		3	argus technologies	LLPX310R w/ Mount Pipe			
		1	dragonwave	HORIZON DUO			
		1	ericsson	RRU22 20 W			
		3	samsung telecommunicatio ns	FDD_R6_RRH			
	79.0	1	cci tower mounts	T-Arm Mount [TA 702-3]			

Notes:

- 1) Existing Equipment
- 2) Equipment To Be Removed and Not Considered in This Analysis

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Tower Engineering Professionals, Inc.	6049468	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Tower Engineering Professionals, Inc. (Mapped)	6049752	CCISITES
4-TOWER MANUFACTURER DRAWINGS	STG Communications (Mapped)	5210316	CCISITES
4-TOWER STRUCTURAL ANALYSIS REPORTS	Morrison Hershfield Corp.	4922390	CCISITES

3.1) Analysis Method

tnxTower (version 6.1.4.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

- 1) Tower and structures were built in accordance with the manufacturer's specifications.
- 2) The tower and structures have been maintained in accordance with the manufacturer's specification.
- 3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
- 4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.
- 5) This analysis was performed under the assumption that all information provided to Black & Veatch is current and correct. This is to include site data, existing/proposed appurtenance loading, tower/foundation details, and geotechnical data. The existing/proposed loading on the structure is based on CAD level drawings and carrier applications provided by the owner. If any of this information is not current and correct, this report should be considered obsolete and further analysis will be required.

This analysis may be affected if any assumptions are not valid or have been made in error. Black & Veatch Corp. should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	98 - 77	Pole	TP28.371x25.44x0.1875	1	-6.11	790.94	29.1	Pass
L2	77 - 40.5	Pole	TP33.466x27.5075x0.25	2	-11.12	1244.96	67.8	Pass
L3	40.5 - 0	Pole	TP39.12x32.4446x0.3125	3	-18.21	1847.16	81.8	Pass
							Summary	
						Pole (L3)	81.8	Pass
						Rating =	81.8	Pass

Table 5 - Tower Component Stresses vs. Capacity - LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	80.5	Pass
	Base Plate		58.9	Pass
1	Base Foundation	0	44.0	Pass
	Base Foundation Soil Interaction		10.1	Pass

Structure Rating (max from all components) =	81.8%
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Notes:

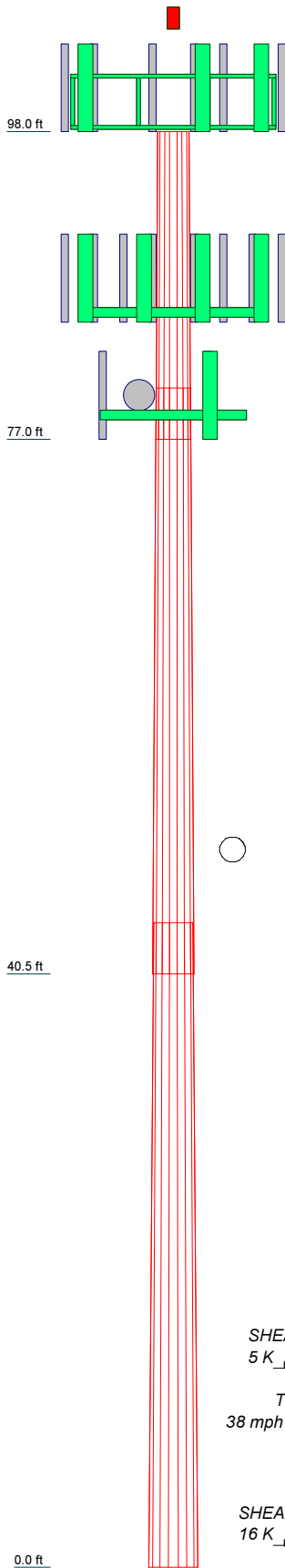
- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

4.1) Recommendations

The tower and its foundation have sufficient capacity to carry the existing and proposed loads. No modifications are required at this time.

APPENDIX A
TNXTOWER OUTPUT

Section	1	2	3
Length (ft)	21.00	40.00	44.00
Number of Sides	18	18	18
Thickness (in)	0.1875	0.2500	0.3125
Socket Length (ft)	3.50	3.50	3.50
Top Dia (in)	25.4400	27.5075	32.4446
Bot Dia (in)	28.3710	33.4680	39.1200
Grade	A572-60	A572-60	A572-60
Weight (K)	1.1	3.3	5.3



DESIGNED APPURTENANCE LOADING

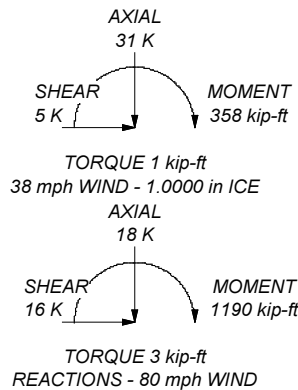
TYPE	ELEVATION	TYPE	ELEVATION
Big Beacon	105	BXA-171063-12BF w/ Mount Pipe	86
Platform Mount [LP 1201-1]	100	BXA-171063-8BF-2 w/ Mount Pipe	86
Miscellaneous [NA 507-1]	100	RRH2X40-AWS	86
7770.00 w/ Mount Pipe	100	DB-T1-6Z-8AB-0Z	86
7770.00 w/ Mount Pipe	100	SLCP 2x6015 w/ Mount Pipe	86
HPA-65R-BUU-H6 w/ Mount Pipe	100	SCCP 2x6015 w/ Mount Pipe	86
DC6-48-60-18-8F	100	BXA-171063-12BF w/ Mount Pipe	86
(2) LGP21401	100	BXA-171063-12BF w/ Mount Pipe	86
(2) LGP21401	100	RRH2X40-AWS	86
RBS 6601	100	SLCP 2x6015 w/ Mount Pipe	86
RRUS 12 B4/RRUS A2	100	SCCP 2x6015 w/ Mount Pipe	86
7770.00 w/ Mount Pipe	100	BXA-171063-12BF w/ Mount Pipe	86
7770.00 w/ Mount Pipe	100	BXA-171063-12BF w/ Mount Pipe	86
HPA-65R-BUU-H6 w/ Mount Pipe	100	RRH2X40-AWS	86
(2) LGP21401	100	T-Arm Mount [TA 702-3]	79
(2) LGP21401	100	6' x 2" Mount Pipe	79
RBS 6601	100	6' x 2" Mount Pipe	79
RRUS 12 B4/RRUS A2	100	6' x 2" Mount Pipe	79
7770.00 w/ Mount Pipe	100	LLPX310R w/ Mount Pipe	79
7770.00 w/ Mount Pipe	100	FDD_R6_RRH	79
HPA-65R-BUU-H6 w/ Mount Pipe	100	HORIZON DUO	79
(2) LGP21401	100	LLPX310R w/ Mount Pipe	79
(2) LGP21401	100	FDD_R6_RRH	79
RBS 6601	100	LLPX310R w/ Mount Pipe	79
RRUS 12 B4/RRUS A2	100	FDD_R6_RRH	79
Platform Mount [LP 303-1]	86	RRU22 20 W	79
BXA-70063/4CF w/ Mount Pipe	86	VHLP2-23	79
BXA-70063/4CF w/ Mount Pipe	86		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-60	60 ksi	75 ksi			

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 81.8%



 BLACK & VEATCH Building a world of difference.	Black & Veatch Corp. 6800 W. 115th St. Suite 2292 Overland Park, KS 66211 Phone: (913) 458-7245 FAX: (913) 458-8136	Job: EAST HARTFORD HOCHANUM (BU#842861) Project: 182896 (842861.1151508) Client: Crown Castle Code: TIA/EIA-222-F Path:	Drawn by: Jumpon Uea-areevorakul Date: 01/06/16 App'd: Scale: NTS Dwg No. E-1
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Tower Input Data

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

- 1) Tower is located in Hartford County, Connecticut.
- 2) Basic wind speed of 80 mph.
- 3) Nominal ice thickness of 1.0000 in.
- 4) Ice thickness is considered to increase with height.
- 5) Ice density of 56 pcf.
- 6) A wind speed of 38 mph is used in combination with ice.
- 7) Temperature drop of 50 °F.
- 8) Deflections calculated using a wind speed of 50 mph.
- 9) A non-linear (P-delta) analysis was used.
- 10) Pressures are calculated at each section.
- 11) Stress ratio used in pole design is 1.333.
- 12) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

- | | | |
|--|--|--|
| Consider Moments - Legs
Consider Moments - Horizontals
Consider Moments - Diagonals
Use Moment Magnification
✓ Use Code Stress Ratios
✓ Use Code Safety Factors - Guys
✓ Escalate Ice
Always Use Max Kz
Use Special Wind Profile
Include Bolts In Member Capacity
Leg Bolts Are At Top Of Section
Secondary Horizontal Braces Leg
Use Diamond Inner Bracing (4 Sided)
Add IBC .6D+W Combination | Distribute Leg Loads As Uniform
Assume Legs Pinned
✓ Assume Rigid Index Plate
✓ Use Clear Spans For Wind Area
✓ Use Clear Spans For KL/r
Retension Guys To Initial Tension
✓ Bypass Mast Stability Checks
✓ Use Azimuth Dish Coefficients
✓ Project Wind Area of Appurt.
Autocalc Torque Arm Areas
SR Members Have Cut Ends
Sort Capacity Reports By Component
Triangulate Diamond Inner Bracing
Use TIA-222-G Tension Splice
Capacity Exemption | Treat Feedline Bundles As Cylinder
Use ASCE 10 X-Brace Ly Rules
Calculate Redundant Bracing Forces
Ignore Redundant Members in FEA
SR Leg Bolts Resist Compression
All Leg Panels Have Same Allowable
Offset Girt At Foundation
✓ Consider Feedline Torque
Include Angle Block Shear Check
<div style="text-align: center; background-color: #e0e0e0; padding: 2px;">Poles</div> ✓ Include Shear-Torsion Interaction
Always Use Sub-Critical Flow
Use Top Mounted Sockets |
|--|--|--|

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	98.00-77.00	21.00	3.50	18	25.4400	28.3710	0.1875	0.7500	A572-60 (60 ksi)
L2	77.00-40.50	40.00	3.50	18	27.5075	33.4660	0.2500	1.0000	A572-60 (60 ksi)
L3	40.50-0.00	44.00		18	32.4446	39.1200	0.3125	1.2500	A572-60 (60 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	It/Q in ²	w in	w/t
L1	25.8325 28.8087	15.0284 16.7727	1210.7620 1683.1795	8.9646 10.0051	12.9235 14.4125	93.6867 116.7863	2423.1172 3368.5737	7.5156 8.3879	4.1474 4.6633	22.12 24.871

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	It/Q in ²	w in	w/t
L2	28.4613	21.6288	2030.2169	9.6764	13.9738	145.2873	4063.1053	10.8165	4.4013	17.605
	33.9823	26.3569	3673.8919	11.7917	17.0007	216.1020	7352.6181	13.1810	5.4500	21.8
L3	33.4843	31.8711	4157.3156	11.4069	16.4819	252.2356	8320.1014	15.9386	5.1603	16.513
	39.7235	38.4922	7323.8829	13.7767	19.8730	368.5351	14657.402	19.2498	6.3351	20.272

Tower Elevation ft	Gusset Area (per face) ft ²	Gusset Thickness in	Gusset Grade	Adjust. Factor A _r	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontal in
L1 98.00-77.00				1	1	1		
L2 77.00-40.50				1	1	1		
L3 40.50-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C _A A _A ft ² /ft	Weight plf
Safety Line 3/8	B	No	CaAa (Out Of Face)	98.00 - 12.00	1	No Ice	0.04	0.22
						1/2" Ice	0.14	0.75
						1" Ice	0.24	1.28
						2" Ice	0.44	2.34
						4" Ice	0.84	4.46

LDF2-50(3/8)	C	No	Inside Pole	98.00 - 8.00	2	No Ice	0.00	0.08
						1/2" Ice	0.00	0.08
						1" Ice	0.00	0.08
						2" Ice	0.00	0.08
						4" Ice	0.00	0.08
LDF4-50A(1/2")	C	No	Inside Pole	98.00 - 8.00	5	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15
LDF6-50A(1-1/4)	C	No	Inside Pole	98.00 - 8.00	12	No Ice	0.00	0.60
						1/2" Ice	0.00	0.60
						1" Ice	0.00	0.60
						2" Ice	0.00	0.60
						4" Ice	0.00	0.60
2" innerduct conduit	C	No	Inside Pole	98.00 - 8.00	1	No Ice	0.00	0.20
						1/2" Ice	0.00	0.20
						1" Ice	0.00	0.20
						2" Ice	0.00	0.20
						4" Ice	0.00	0.20
FB-L98B-034-XXX(3/8)	C	No	Inside Pole	98.00 - 8.00	1	No Ice	0.00	0.06
						1/2" Ice	0.00	0.06
						1" Ice	0.00	0.06
						2" Ice	0.00	0.06
						4" Ice	0.00	0.06
WR-VG86ST-BRD(3/4")	C	No	Inside Pole	98.00 - 8.00	2	No Ice	0.00	0.58
						1/2" Ice	0.00	0.58
						1" Ice	0.00	0.58
						2" Ice	0.00	0.58
						4" Ice	0.00	0.58

LDF7-50A(1-5/8")	A	No	CaAa (Out Of Face)	86.00 - 8.00	2	No Ice	0.20	0.82
						1/2" Ice	0.30	2.33
						1" Ice	0.40	4.46
						2" Ice	0.60	10.54
						4" Ice	1.00	30.04
LDF7-50A(1-5/8")	A	No	CaAa (Out Of Face)	86.00 - 8.00	5	No Ice	0.00	0.82
						1/2" Ice	0.00	2.33

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C _{AA} A _{AA} ft ² /ft	Weight plf
LDF7-50A(1-5/8")	A	No	Inside Pole	86.00 - 8.00	11	1" Ice	0.00	4.46
						2" Ice	0.00	10.54
						4" Ice	0.00	30.04
						No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
						1" Ice	0.00	0.82
						2" Ice	0.00	0.82
MLE Hybrid 9Power/18Fiber RL 2(1 5/8)	A	No	Inside Pole	86.00 - 8.00	1	4" Ice	0.00	0.82
						No Ice	0.00	1.07
						1/2" Ice	0.00	1.07
						1" Ice	0.00	1.07
						2" Ice	0.00	1.07
						4" Ice	0.00	1.07
LDF4-50A(1/2")	B	No	Inside Pole	79.00 - 3.00	2	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
						1" Ice	0.00	0.15
						2" Ice	0.00	0.15
						4" Ice	0.00	0.15
9207(5/16")	B	No	Inside Pole	79.00 - 3.00	6	No Ice	0.00	0.60
						1/2" Ice	0.00	0.60
						1" Ice	0.00	0.60
						2" Ice	0.00	0.60
						4" Ice	0.00	0.60
						No Ice	0.00	0.20
2" innerduct conduit	B	No	Inside Pole	79.00 - 3.00	2	1/2" Ice	0.00	0.20
						1" Ice	0.00	0.20
						2" Ice	0.00	0.20
						4" Ice	0.00	0.20
						No Ice	0.00	0.20
						No Ice	0.00	0.20

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _{AA} A _{AA} In Face ft ²	C _{AA} A _{AA} Out Face ft ²	Weight K
L1	98.00-77.00	A	0.000	0.000	0.000	3.564	0.14
		B	0.000	0.000	0.000	0.787	0.01
		C	0.000	0.000	0.000	0.000	0.20
L2	77.00-40.50	A	0.000	0.000	0.000	14.454	0.58
		B	0.000	0.000	0.000	1.369	0.16
		C	0.000	0.000	0.000	0.000	0.35
L3	40.50-0.00	A	0.000	0.000	0.000	12.870	0.51
		B	0.000	0.000	0.000	1.069	0.17
		C	0.000	0.000	0.000	0.000	0.31

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	C _{AA} A _{AA} In Face ft ²	C _{AA} A _{AA} Out Face ft ²	Weight K
L1	98.00-77.00	A	1.124	0.000	0.000	0.000	7.610	0.42
		B		0.000	0.000	0.000	5.508	0.04
		C		0.000	0.000	0.000	0.000	0.20
L2	77.00-40.50	A	1.071	0.000	0.000	0.000	30.862	1.70
		B		0.000	0.000	0.000	9.573	0.21
		C		0.000	0.000	0.000	0.000	0.35
L3	40.50-0.00	A	1.000	0.000	0.000	0.000	26.798	1.44
		B		0.000	0.000	0.000	7.176	0.20
		C		0.000	0.000	0.000	0.000	0.31

Feed Line Center of Pressure

Section	Elevation	CP _x	CP _z	CP _x Ice	CP _z Ice
	ft	in	in	in	in
L1	98.00-77.00	0.0446	-0.2145	0.2501	-0.2671
L2	77.00-40.50	0.0417	-0.4840	0.2263	-0.7118
L3	40.50-0.00	0.0300	-0.4032	0.1676	-0.6322

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustmen t °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K	
Big Beacon	C	None		0.0000	105.00	No Ice	3.89	3.89	0.09
						1/2" Ice	4.20	4.20	0.14
						1" Ice	4.52	4.52	0.19
						2" Ice	5.20	5.20	0.31
						4" Ice	6.69	6.69	0.59
Platform Mount [LP 1201-1]	C	None		0.0000	100.00	No Ice	23.10	23.10	2.10
						1/2" Ice	26.80	26.80	2.50
						1" Ice	30.50	30.50	2.90
						2" Ice	37.90	37.90	3.70
						4" Ice	52.70	52.70	5.30
Miscellaneous [NA 507-1]	C	None		0.0000	100.00	No Ice	4.80	4.80	0.25
						1/2" Ice	6.70	6.70	0.29
						1" Ice	8.60	8.60	0.34
						2" Ice	12.40	12.40	0.44
						4" Ice	20.00	20.00	0.64
7770.00 w/ Mount Pipe	A	From Face	4.00 -6.00 1.00	0.0000	100.00	No Ice	6.12	4.25	0.06
						1/2" Ice	6.63	5.01	0.10
						1" Ice	7.13	5.71	0.16
						2" Ice	8.16	7.16	0.29
						4" Ice	10.36	10.41	0.66
7770.00 w/ Mount Pipe	A	From Face	4.00 -2.00 1.00	0.0000	100.00	No Ice	6.12	4.25	0.06
						1/2" Ice	6.63	5.01	0.10
						1" Ice	7.13	5.71	0.16
						2" Ice	8.16	7.16	0.29
						4" Ice	10.36	10.41	0.66
HPA-65R-BUU-H6 w/ Mount Pipe	A	From Face	4.00 6.00 1.00	0.0000	100.00	No Ice	10.60	8.11	0.08
						1/2" Ice	11.27	9.30	0.16
						1" Ice	11.91	10.21	0.25
						2" Ice	13.21	12.17	0.46
						4" Ice	15.93	16.35	1.02
DC6-48-60-18-8F	A	From Face	1.00 0.00 1.00	0.0000	100.00	No Ice	1.47	1.47	0.02
						1/2" Ice	1.67	1.67	0.04
						1" Ice	1.88	1.88	0.06
						2" Ice	2.33	2.33	0.11
						4" Ice	3.38	3.38	0.24
(2) LGP21401	A	From Face	4.00 -6.00 1.00	0.0000	100.00	No Ice	1.29	0.36	0.01
						1/2" Ice	1.45	0.48	0.02
						1" Ice	1.61	0.60	0.03
						2" Ice	1.97	0.87	0.05
						4" Ice	2.79	1.52	0.14
(2) LGP21401	A	From Face	4.00	0.0000	100.00	No Ice	1.29	0.36	0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K	
			-2.00			1/2"	1.45	0.48	0.02
			1.00			Ice	1.61	0.60	0.03
						1" Ice	1.97	0.87	0.05
						2" Ice	2.79	1.52	0.14
						4" Ice			
RBS 6601	A	From Face	4.00	0.0000	100.00	No Ice	0.48	0.35	0.02
			6.00			1/2"	0.62	0.46	0.03
			1.00			Ice	0.77	0.58	0.05
						1" Ice	1.10	0.84	0.08
						2" Ice	1.87	1.47	0.20
						4" Ice			
RRUS 12 B4/RRUS A2	A	From Face	4.00	0.0000	100.00	No Ice	3.67	2.16	0.07
			6.00			1/2"	3.93	2.36	0.10
			1.00			Ice	4.19	2.58	0.13
						1" Ice	4.75	3.04	0.20
						2" Ice	5.96	4.06	0.40
						4" Ice			
7770.00 w/ Mount Pipe	B	From Face	4.00	0.0000	100.00	No Ice	6.12	4.25	0.06
			-6.00			1/2"	6.63	5.01	0.10
			1.00			Ice	7.13	5.71	0.16
						1" Ice	8.16	7.16	0.29
						2" Ice	10.36	10.41	0.66
						4" Ice			
7770.00 w/ Mount Pipe	B	From Face	4.00	0.0000	100.00	No Ice	6.12	4.25	0.06
			-2.00			1/2"	6.63	5.01	0.10
			1.00			Ice	7.13	5.71	0.16
						1" Ice	8.16	7.16	0.29
						2" Ice	10.36	10.41	0.66
						4" Ice			
HPA-65R-BUU-H6 w/ Mount Pipe	B	From Face	4.00	0.0000	100.00	No Ice	10.60	8.11	0.08
			6.00			1/2"	11.27	9.30	0.16
			1.00			Ice	11.91	10.21	0.25
						1" Ice	13.21	12.17	0.46
						2" Ice	15.93	16.35	1.02
						4" Ice			
(2) LGP21401	B	From Face	4.00	0.0000	100.00	No Ice	1.29	0.36	0.01
			-6.00			1/2"	1.45	0.48	0.02
			1.00			Ice	1.61	0.60	0.03
						1" Ice	1.97	0.87	0.05
						2" Ice	2.79	1.52	0.14
						4" Ice			
(2) LGP21401	B	From Face	4.00	0.0000	100.00	No Ice	1.29	0.36	0.01
			-2.00			1/2"	1.45	0.48	0.02
			1.00			Ice	1.61	0.60	0.03
						1" Ice	1.97	0.87	0.05
						2" Ice	2.79	1.52	0.14
						4" Ice			
RBS 6601	B	From Face	4.00	0.0000	100.00	No Ice	0.48	0.35	0.02
			6.00			1/2"	0.62	0.46	0.03
			1.00			Ice	0.77	0.58	0.05
						1" Ice	1.10	0.84	0.08
						2" Ice	1.87	1.47	0.20
						4" Ice			
RRUS 12 B4/RRUS A2	B	From Face	4.00	0.0000	100.00	No Ice	3.67	2.16	0.07
			6.00			1/2"	3.93	2.36	0.10
			1.00			Ice	4.19	2.58	0.13
						1" Ice	4.75	3.04	0.20
						2" Ice	5.96	4.06	0.40
						4" Ice			
7770.00 w/ Mount Pipe	C	From Face	4.00	0.0000	100.00	No Ice	6.12	4.25	0.06
			-6.00			1/2"	6.63	5.01	0.10
			1.00			Ice	7.13	5.71	0.16
						1" Ice	8.16	7.16	0.29
						2" Ice	10.36	10.41	0.66
						4" Ice			

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz Lateral	Vert					
7770.00 w/ Mount Pipe	C	From Face	4.00	0.0000	100.00	No Ice	6.12	4.25	0.06
			-2.00			1/2"	6.63	5.01	0.10
			1.00			Ice	7.13	5.71	0.16
						1" Ice	8.16	7.16	0.29
						2" Ice	10.36	10.41	0.66
						4" Ice			
HPA-65R-BUU-H6 w/ Mount Pipe	C	From Face	4.00	0.0000	100.00	No Ice	10.60	8.11	0.08
			6.00			1/2"	11.27	9.30	0.16
			1.00			Ice	11.91	10.21	0.25
						1" Ice	13.21	12.17	0.46
						2" Ice	15.93	16.35	1.02
						4" Ice			
(2) LGP21401	C	From Face	4.00	0.0000	100.00	No Ice	1.29	0.36	0.01
			-6.00			1/2"	1.45	0.48	0.02
			1.00			Ice	1.61	0.60	0.03
						1" Ice	1.97	0.87	0.05
						2" Ice	2.79	1.52	0.14
						4" Ice			
(2) LGP21401	C	From Face	4.00	0.0000	100.00	No Ice	1.29	0.36	0.01
			-2.00			1/2"	1.45	0.48	0.02
			1.00			Ice	1.61	0.60	0.03
						1" Ice	1.97	0.87	0.05
						2" Ice	2.79	1.52	0.14
						4" Ice			
RBS 6601	C	From Face	4.00	0.0000	100.00	No Ice	0.48	0.35	0.02
			6.00			1/2"	0.62	0.46	0.03
			1.00			Ice	0.77	0.58	0.05
						1" Ice	1.10	0.84	0.08
						2" Ice	1.87	1.47	0.20
						4" Ice			
RRUS 12 B4/RRUS A2	C	From Face	4.00	0.0000	100.00	No Ice	3.67	2.16	0.07
			6.00			1/2"	3.93	2.36	0.10
			1.00			Ice	4.19	2.58	0.13
						1" Ice	4.75	3.04	0.20
						2" Ice	5.96	4.06	0.40
						4" Ice			
*** Platform Mount [LP 303-1]	C	None		0.0000	86.00	No Ice	14.66	14.66	1.25
						1/2"	18.87	18.87	1.48
						Ice	23.08	23.08	1.71
						1" Ice	31.50	31.50	2.18
						2" Ice	48.34	48.34	3.10
						4" Ice			
BXA-70063/4CF w/ Mount Pipe	A	From Face	4.00	0.0000	86.00	No Ice	5.40	3.62	0.03
			-6.00			1/2"	5.84	4.22	0.07
			2.00			Ice	6.30	4.83	0.12
						1" Ice	7.24	6.16	0.23
						2" Ice	9.26	9.18	0.57
						4" Ice			
BXA-70063/4CF w/ Mount Pipe	A	From Face	4.00	0.0000	86.00	No Ice	5.40	3.62	0.03
			-2.00			1/2"	5.84	4.22	0.07
			2.00			Ice	6.30	4.83	0.12
						1" Ice	7.24	6.16	0.23
						2" Ice	9.26	9.18	0.57
						4" Ice			
BXA-171063-12BF w/ Mount Pipe	A	From Face	4.00	0.0000	86.00	No Ice	4.97	5.23	0.04
			2.00			1/2"	5.52	6.39	0.09
			2.00			Ice	6.04	7.26	0.14
						1" Ice	7.09	9.05	0.27
						2" Ice	9.36	12.82	0.67
						4" Ice			
BXA-171063-8BF-2 w/ Mount Pipe	A	From Face	4.00	0.0000	86.00	No Ice	3.18	3.35	0.03
			6.00			1/2"	3.56	3.97	0.06
			2.00			Ice	3.96	4.60	0.10
						1" Ice	4.85	5.89	0.19

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K	
RRH2X40-AWS	A	From Face	4.00 2.00 2.00	0.0000	86.00	2" Ice	6.77	8.89	0.49
						4" Ice	2.52	1.59	0.04
						No Ice	2.75	1.80	0.06
						1/2" Ice	2.99	2.01	0.08
						1" Ice	3.50	2.46	0.13
DB-T1-6Z-8AB-OZ	A	From Face	4.00 6.00 2.00	0.0000	86.00	2" Ice	4.61	3.48	0.28
						4" Ice	5.60	2.33	0.04
						No Ice	5.92	2.56	0.08
						1/2" Ice	6.24	2.79	0.12
						1" Ice	6.91	3.28	0.21
SLCP 2x6015 w/ Mount Pipe	B	From Face	4.00 -6.00 2.00	-30.0000	86.00	2" Ice	8.37	4.37	0.45
						4" Ice	10.72	10.00	0.06
						No Ice	11.42	11.34	0.15
						1/2" Ice	12.09	12.45	0.25
						1" Ice	13.45	14.57	0.47
SCCP 2x6015 w/ Mount Pipe	B	From Face	4.00 -2.00 2.00	-30.0000	86.00	2" Ice	16.28	19.03	1.09
						4" Ice	9.29	8.02	0.05
						No Ice	9.91	9.14	0.13
						1/2" Ice	10.51	10.05	0.21
						1" Ice	11.73	11.92	0.41
BXA-171063-12BF w/ Mount Pipe	B	From Face	4.00 2.00 2.00	-30.0000	86.00	2" Ice	14.29	15.88	0.94
						4" Ice	4.97	5.23	0.04
						No Ice	5.52	6.39	0.09
						1/2" Ice	6.04	7.26	0.14
						1" Ice	7.09	9.05	0.27
BXA-171063-12BF w/ Mount Pipe	B	From Face	4.00 6.00 2.00	-30.0000	86.00	2" Ice	9.36	12.82	0.67
						4" Ice	4.97	5.23	0.04
						No Ice	5.52	6.39	0.09
						1/2" Ice	6.04	7.26	0.14
						1" Ice	7.09	9.05	0.27
RRH2X40-AWS	B	From Face	4.00 2.00 2.00	-30.0000	86.00	2" Ice	9.36	12.82	0.67
						4" Ice	2.52	1.59	0.04
						No Ice	2.75	1.80	0.06
						1/2" Ice	2.99	2.01	0.08
						1" Ice	3.50	2.46	0.13
SLCP 2x6015 w/ Mount Pipe	C	From Face	4.00 -6.00 2.00	30.0000	86.00	2" Ice	4.61	3.48	0.28
						4" Ice	10.72	10.00	0.06
						No Ice	11.42	11.34	0.15
						1/2" Ice	12.09	12.45	0.25
						1" Ice	13.45	14.57	0.47
SCCP 2x6015 w/ Mount Pipe	C	From Face	4.00 -2.00 2.00	30.0000	86.00	2" Ice	16.28	19.03	1.09
						4" Ice	9.29	8.02	0.05
						No Ice	9.91	9.14	0.13
						1/2" Ice	10.51	10.05	0.21
						1" Ice	11.73	11.92	0.41
BXA-171063-12BF w/ Mount Pipe	C	From Face	4.00 2.00 2.00	30.0000	86.00	2" Ice	14.29	15.88	0.94
						4" Ice	4.97	5.23	0.04
						No Ice	5.52	6.39	0.09
						1/2" Ice	6.04	7.26	0.14
						1" Ice	7.09	9.05	0.27
BXA-171063-12BF w/ Mount Pipe	C	From Face	4.00 6.00 2.00	30.0000	86.00	2" Ice	9.36	12.82	0.67
						4" Ice	4.97	5.23	0.04
						No Ice	5.52	6.39	0.09
						1/2" Ice	6.04	7.26	0.14
						1" Ice	7.09	9.05	0.27

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment t °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K	
RRH2X40-AWS	C	From Face	4.00 2.00 2.00	30.0000	86.00	1" Ice	7.09	9.05	0.27
						2" Ice	9.36	12.82	0.67
						4" Ice			
						No Ice	2.52	1.59	0.04
						1/2" Ice	2.75	1.80	0.06
						1" Ice	2.99	2.01	0.08
						2" Ice	3.50	2.46	0.13
*** T-Arm Mount [TA 702-3]	C	None		0.0000	79.00	4" Ice	4.61	3.48	0.28
						No Ice	5.64	5.64	0.34
						1/2" Ice	6.55	6.55	0.43
						Ice	7.46	7.46	0.52
						1" Ice	9.28	9.28	0.70
						2" Ice	12.92	12.92	1.06
						4" Ice			
6' x 2" Mount Pipe	A	From Face	3.00 2.50 1.00	0.0000	79.00	No Ice	1.43	1.43	0.02
						1/2" Ice	1.92	1.92	0.03
						Ice	2.29	2.29	0.05
						1" Ice	3.06	3.06	0.09
						2" Ice	4.70	4.70	0.23
						4" Ice			
						No Ice	1.43	1.43	0.02
6' x 2" Mount Pipe	B	From Face	3.00 2.50 1.00	0.0000	79.00	1/2" Ice	1.92	1.92	0.03
						Ice	2.29	2.29	0.05
						1" Ice	3.06	3.06	0.09
						2" Ice	4.70	4.70	0.23
						4" Ice			
						No Ice	1.43	1.43	0.02
						1/2" Ice	1.92	1.92	0.03
6' x 2" Mount Pipe	C	From Face	3.00 2.50 1.00	0.0000	79.00	Ice	2.29	2.29	0.05
						1" Ice	3.06	3.06	0.09
						2" Ice	4.70	4.70	0.23
						4" Ice			
						No Ice	1.43	1.43	0.02
						1/2" Ice	1.92	1.92	0.03
						Ice	2.29	2.29	0.05
LLPX310R w/ Mount Pipe	A	From Face	3.00 -2.50 1.00	30.0000	79.00	1" Ice	3.06	3.06	0.09
						2" Ice	4.70	4.70	0.23
						4" Ice			
						No Ice	5.07	2.98	0.05
						1/2" Ice	5.48	3.53	0.08
						Ice	5.91	4.09	0.13
						1" Ice	6.79	5.31	0.23
FDD_R6_RRH	A	From Face	3.00 -2.50 1.00	30.0000	79.00	2" Ice	8.70	8.13	0.54
						4" Ice			
						No Ice	1.79	0.78	0.03
						1/2" Ice	1.97	0.92	0.04
						Ice	2.16	1.07	0.06
						1" Ice	2.57	1.39	0.09
						2" Ice	3.49	2.14	0.20
HORIZON DUO	A	From Face	3.00 2.50 1.00	0.0000	79.00	4" Ice			
						No Ice	0.55	0.34	0.01
						1/2" Ice	0.65	0.43	0.01
						Ice	0.76	0.52	0.02
						1" Ice	1.00	0.73	0.04
						2" Ice	1.60	1.25	0.10
						4" Ice			
LLPX310R w/ Mount Pipe	B	From Face	3.00 -2.50 1.00	30.0000	79.00	No Ice	5.07	2.98	0.05
						1/2" Ice	5.48	3.53	0.08
						Ice	5.91	4.09	0.13
						1" Ice	6.79	5.31	0.23
						2" Ice	8.70	8.13	0.54
						4" Ice			
						No Ice	5.07	2.98	0.05
FDD_R6_RRH	B	From Face	3.00 -2.50 1.00	30.0000	79.00	1" Ice	1.79	0.78	0.03
						1/2" Ice	1.97	0.92	0.04
						Ice	2.16	1.07	0.06
						1" Ice	2.57	1.39	0.09
						2" Ice	3.49	2.14	0.20
						4" Ice			
						No Ice	1.79	0.78	0.03
LLPX310R w/ Mount Pipe	C	From Face	3.00	30.0000	79.00	No Ice	5.07	2.98	0.05

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K	
			-2.50		1/2"	5.48	3.53	0.08	
			1.00		Ice	5.91	4.09	0.13	
					1" Ice	6.79	5.31	0.23	
					2" Ice	8.70	8.13	0.54	
					4" Ice				
FDD_R6_RRH	C	From Face	3.00	30.0000	79.00	No Ice	1.79	0.78	0.03
			-2.50		1/2"	1.97	0.92	0.04	
			1.00		Ice	2.16	1.07	0.06	
					1" Ice	2.57	1.39	0.09	
					2" Ice	3.49	2.14	0.20	
					4" Ice				
RRU22 20 W	C	From Face	3.00	30.0000	79.00	No Ice	2.58	2.02	0.06
			-2.50		1/2"	2.80	2.22	0.09	
			1.00		Ice	3.03	2.43	0.11	
					1" Ice	3.51	2.86	0.17	
					2" Ice	4.57	3.84	0.34	
					4" Ice				

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft	Aperture Area ft ²	Weight K	
VHLP2-23	A	Paraboloid w/Shroud (HP)	From Face	3.00	0.0000		79.00	2.17	No Ice	3.70	0.04
				2.50					1/2" Ice	3.99	0.06
				1.00					1" Ice	4.28	0.08
									2" Ice	4.86	0.12
									4" Ice	6.01	0.20

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp

Comb. No.	Description
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	98 - 77	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-13.01	-1.46	1.37
			Max. Mx	5	-6.11	-127.68	0.02
			Max. My	2	-6.11	0.17	127.42
			Max. Vy	5	9.38	-127.68	0.02
			Max. Vx	2	-9.33	0.17	127.42
			Max. Torque	2			-2.99
L2	77 - 40.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-21.51	-1.63	3.04
			Max. Mx	5	-11.12	-558.76	-3.01
			Max. My	2	-11.13	3.27	555.05
			Max. Vy	5	13.05	-558.76	-3.01
			Max. Vx	8	12.96	-5.02	-554.17
			Max. Torque	8			3.32
L3	40.5 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-31.41	-1.71	4.87
			Max. Mx	5	-18.21	-1187.91	-6.62
			Max. My	2	-18.21	7.13	1180.17
			Max. Vy	5	15.51	-1187.91	-6.62
			Max. Vx	8	15.42	-10.33	-1179.02
			Max. Torque	7			3.34

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	31.41	2.29	3.89
	Max. H _x	11	18.22	15.46	0.08
	Max. H _z	2	18.22	0.09	15.40
	Max. M _x	2	1180.17	0.09	15.40
	Max. M _z	5	1187.91	-15.50	-0.09
	Max. Torsion	7	3.34	-7.82	-13.38
	Min. Vert	1	18.22	0.00	0.00
	Min. H _x	5	18.22	-15.50	-0.09
	Min. H _z	8	18.22	-0.12	-15.41
	Min. M _x	8	-1179.02	-0.12	-15.41
	Min. M _z	11	-1184.57	15.46	0.08
	Min. Torsion	13	-3.27	7.80	13.35

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
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Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead Only	18.22	0.00	0.00	-0.86	-0.31	0.00
Dead+Wind 0 deg - No Ice	18.22	-0.09	-15.40	-1180.17	7.13	3.19
Dead+Wind 30 deg - No Ice	18.22	7.67	-13.32	-1020.18	-587.44	2.18
Dead+Wind 60 deg - No Ice	18.22	13.40	-7.60	-582.16	-1027.16	0.61
Dead+Wind 90 deg - No Ice	18.22	15.50	0.09	6.62	-1187.91	-1.07
Dead+Wind 120 deg - No Ice	18.22	13.45	7.77	594.34	-1031.27	-2.51
Dead+Wind 150 deg - No Ice	18.22	7.82	13.38	1023.85	-600.61	-3.34
Dead+Wind 180 deg - No Ice	18.22	0.12	15.41	1179.02	-10.33	-3.32
Dead+Wind 210 deg - No Ice	18.22	-7.70	13.30	1017.22	588.85	-2.10
Dead+Wind 240 deg - No Ice	18.22	-13.38	7.63	582.32	1024.69	-0.63
Dead+Wind 270 deg - No Ice	18.22	-15.46	-0.08	-7.56	1184.57	0.98
Dead+Wind 300 deg - No Ice	18.22	-13.42	-7.75	-594.77	1028.33	2.42
Dead+Wind 330 deg - No Ice	18.22	-7.80	-13.35	-1023.69	597.91	3.27
Dead+Ice+Temp	31.41	0.00	-0.00	-4.87	-1.71	-0.00
Dead+Wind 0 deg+Ice+Temp	31.41	-0.04	-4.47	-356.02	2.15	0.69
Dead+Wind 30 deg+Ice+Temp	31.41	2.22	-3.86	-307.50	-176.06	0.40
Dead+Wind 60 deg+Ice+Temp	31.41	3.90	-2.19	-176.60	-308.21	0.01
Dead+Wind 90 deg+Ice+Temp	31.41	4.52	0.04	-1.02	-357.23	-0.38
Dead+Wind 120 deg+Ice+Temp	31.41	3.93	2.27	173.78	-311.20	-0.67
Dead+Wind 150 deg+Ice+Temp	31.41	2.30	3.89	301.03	-182.84	-0.80
Dead+Wind 180 deg+Ice+Temp	31.41	0.05	4.47	346.37	-6.27	-0.73
Dead+Wind 210 deg+Ice+Temp	31.41	-2.23	3.85	297.38	173.16	-0.38
Dead+Wind 240 deg+Ice+Temp	31.41	-3.89	2.20	167.30	304.29	-0.01
Dead+Wind 270 deg+Ice+Temp	31.41	-4.51	-0.04	-8.57	353.07	0.35
Dead+Wind 300 deg+Ice+Temp	31.41	-3.92	-2.27	-183.23	307.15	0.65
Dead+Wind 330 deg+Ice+Temp	31.41	-2.29	-3.89	-310.33	178.85	0.78
Dead+Wind 0 deg - Service	18.22	-0.03	-6.02	-461.78	2.58	1.25
Dead+Wind 30 deg - Service	18.22	3.00	-5.20	-399.25	-229.79	0.85
Dead+Wind 60 deg - Service	18.22	5.24	-2.97	-228.06	-401.64	0.24
Dead+Wind 90 deg - Service	18.22	6.05	0.03	2.05	-464.47	-0.42
Dead+Wind 120 deg - Service	18.22	5.25	3.03	231.75	-403.25	-0.98
Dead+Wind 150 deg - Service	18.22	3.06	5.23	399.61	-234.94	-1.31
Dead+Wind 180 deg - Service	18.22	0.05	6.02	460.25	-4.24	-1.30
Dead+Wind 210 deg - Service	18.22	-3.01	5.20	397.02	229.94	-0.82
Dead+Wind 240 deg - Service	18.22	-5.23	2.98	227.04	400.28	-0.25
Dead+Wind 270 deg - Service	18.22	-6.04	-0.03	-3.49	462.76	0.38
Dead+Wind 300 deg - Service	18.22	-5.24	-3.03	-232.99	401.70	0.95
Dead+Wind 330 deg - Service	18.22	-3.05	-5.22	-400.62	233.48	1.28

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-18.22	0.00	0.00	18.22	0.00	0.000%
2	-0.09	-18.22	-15.40	0.09	18.22	15.40	0.000%
3	7.67	-18.22	-13.32	-7.67	18.22	13.32	0.000%
4	13.40	-18.22	-7.60	-13.40	18.22	7.60	0.000%
5	15.50	-18.22	0.09	-15.50	18.22	-0.09	0.000%
6	13.45	-18.22	7.77	-13.45	18.22	-7.77	0.000%
7	7.82	-18.22	13.38	-7.82	18.22	-13.38	0.000%
8	0.12	-18.22	15.41	-0.12	18.22	-15.41	0.000%
9	-7.70	-18.22	13.30	7.70	18.22	-13.30	0.000%
10	-13.38	-18.22	7.63	13.38	18.22	-7.63	0.000%
11	-15.46	-18.22	-0.08	15.46	18.22	0.08	0.000%
12	-13.42	-18.22	-7.75	13.42	18.22	7.75	0.000%
13	-7.80	-18.22	-13.35	7.80	18.22	13.35	0.000%
14	0.00	-31.41	0.00	-0.00	31.41	0.00	0.000%
15	-0.04	-31.41	-4.47	0.04	31.41	4.47	0.000%
16	2.22	-31.41	-3.86	-2.22	31.41	3.86	0.000%
17	3.90	-31.41	-2.19	-3.90	31.41	2.19	0.000%
18	4.52	-31.41	0.04	-4.52	31.41	-0.04	0.000%
19	3.93	-31.41	2.27	-3.93	31.41	-2.27	0.000%
20	2.30	-31.41	3.89	-2.30	31.41	-3.89	0.000%
21	0.05	-31.41	4.47	-0.05	31.41	-4.47	0.000%
22	-2.23	-31.41	3.85	2.23	31.41	-3.85	0.000%
23	-3.89	-31.41	2.20	3.89	31.41	-2.20	0.000%
24	-4.51	-31.41	-0.04	4.51	31.41	0.04	0.000%
25	-3.92	-31.41	-2.27	3.92	31.41	2.27	0.000%
26	-2.29	-31.41	-3.89	2.29	31.41	3.89	0.000%
27	-0.03	-18.22	-6.02	0.03	18.22	6.02	0.000%
28	3.00	-18.22	-5.20	-3.00	18.22	5.20	0.000%
29	5.24	-18.22	-2.97	-5.24	18.22	2.97	0.000%
30	6.05	-18.22	0.03	-6.05	18.22	-0.03	0.000%
31	5.25	-18.22	3.03	-5.25	18.22	-3.03	0.000%
32	3.06	-18.22	5.23	-3.06	18.22	-5.23	0.000%
33	0.05	-18.22	6.02	-0.05	18.22	-6.02	0.000%
34	-3.01	-18.22	5.20	3.01	18.22	-5.20	0.000%
35	-5.23	-18.22	2.98	5.23	18.22	-2.98	0.000%
36	-6.04	-18.22	-0.03	6.04	18.22	0.03	0.000%
37	-5.24	-18.22	-3.03	5.24	18.22	3.03	0.000%
38	-3.05	-18.22	-5.22	3.05	18.22	5.22	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00008151
3	Yes	5	0.00000001	0.00025742
4	Yes	5	0.00000001	0.00020951
5	Yes	4	0.00000001	0.00074529
6	Yes	5	0.00000001	0.00019911
7	Yes	5	0.00000001	0.00028206
8	Yes	5	0.00000001	0.00009255
9	Yes	5	0.00000001	0.00019556
10	Yes	5	0.00000001	0.00022965
11	Yes	4	0.00000001	0.00088836
12	Yes	5	0.00000001	0.00026308
13	Yes	5	0.00000001	0.00019608
14	Yes	4	0.00000001	0.00003402
15	Yes	5	0.00000001	0.00011708
16	Yes	5	0.00000001	0.00014793
17	Yes	5	0.00000001	0.00014472

18	Yes	5	0.00000001	0.00011454
19	Yes	5	0.00000001	0.00014281
20	Yes	5	0.00000001	0.00015131
21	Yes	5	0.00000001	0.00011425
22	Yes	5	0.00000001	0.00013572
23	Yes	5	0.00000001	0.00013721
24	Yes	5	0.00000001	0.00011267
25	Yes	5	0.00000001	0.00015175
26	Yes	5	0.00000001	0.00014505
27	Yes	4	0.00000001	0.00060147
28	Yes	4	0.00000001	0.00096295
29	Yes	4	0.00000001	0.00062152
30	Yes	4	0.00000001	0.00017783
31	Yes	4	0.00000001	0.00061952
32	Yes	5	0.00000001	0.00003574
33	Yes	4	0.00000001	0.00064518
34	Yes	4	0.00000001	0.00059517
35	Yes	4	0.00000001	0.00074642
36	Yes	4	0.00000001	0.00018052
37	Yes	4	0.00000001	0.00098918
38	Yes	4	0.00000001	0.00067570

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	98 - 77	15.685	31	1.2729	0.0109
L2	80.5 - 40.5	11.127	31	1.1925	0.0095
L3	44 - 0	3.526	31	0.7208	0.0036

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
105.00	Big Beacon	31	15.685	1.2729	0.0113	30076
100.00	Platform Mount [LP 1201-1]	31	15.685	1.2729	0.0113	30076
86.00	Platform Mount [LP 303-1]	31	12.534	1.2262	0.0104	12531
80.00	VHLP2-23	31	11.001	1.1889	0.0098	8329
79.00	T-Arm Mount [TA 702-3]	31	10.750	1.1812	0.0097	7878

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	98 - 77	40.107	6	3.2561	0.0279
L2	80.5 - 40.5	28.457	6	3.0503	0.0243
L3	44 - 0	9.021	6	1.8442	0.0091

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
-----------------	--------------	-----------------	------------------	-----------	------------	---------------------------

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
105.00	Big Beacon	6	40.107	3.2561	0.0288	11869
100.00	Platform Mount [LP 1201-1]	6	40.107	3.2561	0.0288	11869
86.00	Platform Mount [LP 303-1]	6	32.052	3.1365	0.0266	4945
80.00	VHLP2-23	6	28.135	3.0409	0.0250	3284
79.00	T-Arm Mount [TA 702-3]	6	27.493	3.0213	0.0247	3106

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
L1	98 - 77 (1)	TP28.371x25.44x0.1875	21.00	0.00	0.0	36.000	16.4820	-6.11	593.35	0.010
L2	77 - 40.5 (2)	TP33.466x27.5075x0.25	40.00	0.00	0.0	36.000	25.9432	-11.12	933.96	0.012
L3	40.5 - 0 (3)	TP39.12x32.4446x0.3125	44.00	0.00	0.0	36.000	38.4922	-18.21	1385.72	0.013

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M _x kip-ft	Actual f _{bx} ksi	Allow. F _{bx} ksi	Ratio f _{bx} F _{bx}	Actual M _y kip-ft	Actual f _{by} ksi	Allow. F _{by} ksi	Ratio f _{by} F _{by}
L1	98 - 77 (1)	TP28.371x25.44x0.1875	127.65	13.584	36.000	0.377	0.00	0.000	36.000	0.000
L2	77 - 40.5 (2)	TP33.466x27.5075x0.25	559.83	32.090	36.000	0.891	0.00	0.000	36.000	0.000
L3	40.5 - 0 (3)	TP39.12x32.4446x0.3125	1190.2	38.757	36.000	1.077	0.00	0.000	36.000	0.000

8

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f _v ksi	Allow. F _v ksi	Ratio f _v F _v	Actual T kip-ft	Actual f _{vt} ksi	Allow. F _{vt} ksi	Ratio f _{vt} F _{vt}
L1	98 - 77 (1)	TP28.371x25.44x0.1875	9.40	0.571	24.000	0.048	2.04	0.106	24.000	0.004
L2	77 - 40.5 (2)	TP33.466x27.5075x0.25	13.08	0.504	24.000	0.042	2.42	0.068	24.000	0.003
L3	40.5 - 0 (3)	TP39.12x32.4446x0.3125	15.55	0.404	24.000	0.034	2.51	0.040	24.000	0.002

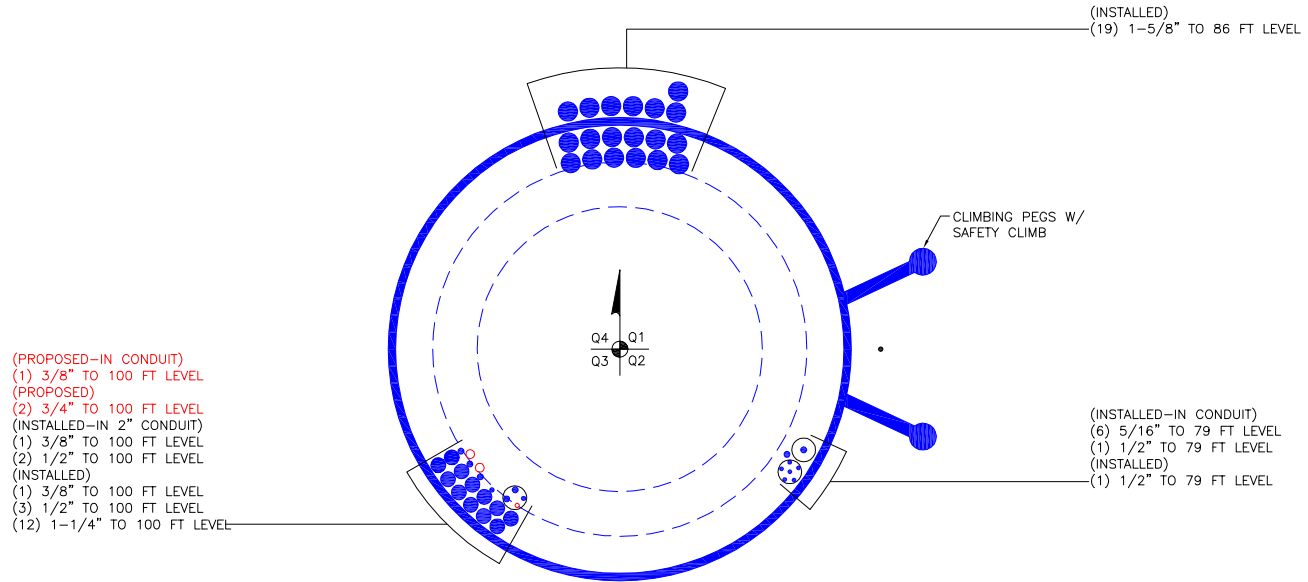
Pole Interaction Design Data

Section No.	Elevation ft	Ratio P P _a	Ratio f _{bx} F _{bx}	Ratio f _{by} F _{by}	Ratio f _v F _v	Ratio f _{vt} F _{vt}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	98 - 77 (1)	0.010	0.377	0.000	0.048	0.004	0.388	1.333	H1-3+VT ✓
L2	77 - 40.5 (2)	0.012	0.891	0.000	0.042	0.003	0.904	1.333	H1-3+VT ✓
L3	40.5 - 0 (3)	0.013	1.077	0.000	0.034	0.002	1.090	1.333	H1-3+VT ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P _{allow} K	% Capacity	Pass Fail
L1	98 - 77	Pole	TP28.371x25.44x0.1875	1	-6.11	790.94	29.1	Pass
L2	77 - 40.5	Pole	TP33.466x27.5075x0.25	2	-11.12	1244.96	67.8	Pass
L3	40.5 - 0	Pole	TP39.12x32.4446x0.3125	3	-18.21	1847.16	81.8	Pass
Summary								
Pole (L3)							81.8	Pass
RATING =							81.8	Pass

APPENDIX B
BASE LEVEL DRAWING



APPENDIX C
ADDITIONAL CALCULATIONS

Square, Stiffened / Unstiffened Base Plate, Any Rod Material - Rev. F / G

- Assumptions:**
- 1) Rod groups at corners. Total # rods divisible by 4. Maximum total # of rods = 48 (12 per Corner).
 - 2) Rod Spacing = Straight Center-to-Center distance between any (2) adjacent rods (same corner)
 - 3) Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU#: 842861

Site Name: EAST HARTFORD HOCHAN

App #: 319163 Rev.0

Anchor Rod Data

Eta Factor, η	0.5	TIA G (Fig. 4-4)
Qty:	8	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, F_y :	75	ksi
Strength, F_u :	100	ksi
Bolt Circle:	44.878	in
Anchor Spacing:	6	in

Plate Data

W=Side:	44	in
Thick:	2.75	in
Grade:	50	ksi
Clip Distance:	6.89	in

Stiffener Data (Welding at both sides)

Configuration:	Unstiffened	
Weld Type:		**
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:		in
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data

Diam:	39.12	in
Thick:	0.3125	in
Grade:	60	ksi
# of Sides:	18	"0" IF Round

Stress Increase Factor

ASD ASIF:	1.333
-----------	-------

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Base Reactions

TIA Revision:	F	
Unfactored Moment, M:	1190	ft-kips
Unfactored Axial, P:	18	kips
Unfactored Shear, V:	16	kips

Anchor Rod Results

TIA F --> Maximum Rod Tension: 156.9 Kips
 Allowable Tension: 195.0 Kips
 Anchor Rod Stress Ratio: 80.5% **Pass**

Base Plate Results

Base Plate Stress: 29.4 ksi
 Allowable PL Bending Stress: 50.0 ksi
 Base Plate Stress Ratio: 58.9% **Pass**

Flexural Check

PL Ref. Data

Yield Line (in):	23.11
Max PL Length:	23.11

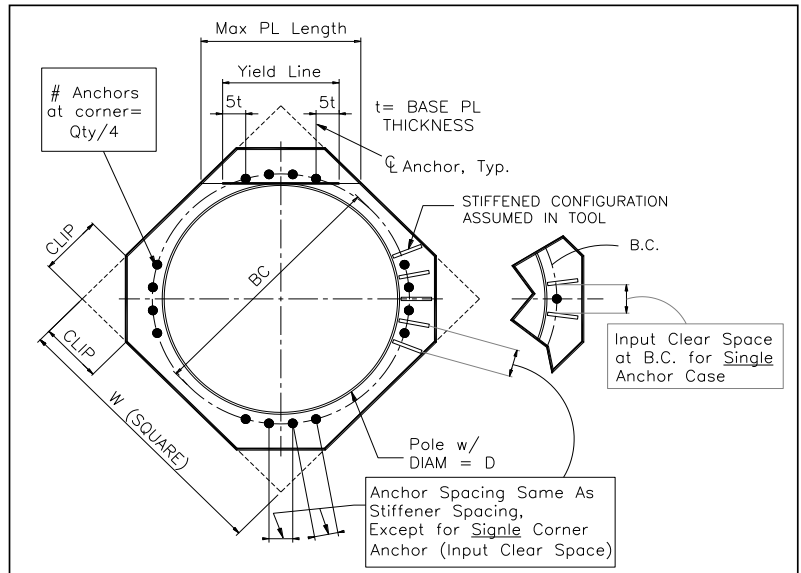
N/A - Unstiffened

Stiffener Results

Horizontal Weld: N/A
 Vertical Weld: N/A
 Plate Flex+Shear, $f_b/F_b + (f_v/F_v)^2$: N/A
 Plate Tension+Shear, $f_t/F_t + (f_v/F_v)^2$: N/A
 Plate Comp. (AISC Bracket): N/A

Pole Results

Pole Punching Shear Check: N/A



LPile Plus for Windows, Version 6 (6.0.23)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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This program is licensed to:

Jumpon
BV

Files Used for Analysis

Path to file locations: \\Bngk-mpdc-01\bngk_data\Departments\Telecom\Public\2016\Engineering\Tower Analysis (SA)\CCI\842861\842861.1151508 - TSA\Structural\FDN\
Name of input data file: 842861.1151508 Foundation Analysis.lp6d
Name of output report file: 842861.1151508 Foundation Analysis.lp6o
Name of plot output file: 842861.1151508 Foundation Analysis.lp6p
Name of runtime message file: 842861.1151508 Foundation Analysis.lp6r

Date and Time of Analysis

Date: January 6, 2016 Time: 11:23:53

Problem Title

Project Name: EAST HARTFORD HOCHANUM (BU# 842861)

Job Number: 182896 (842861.1151508)

Client: Crown Castle

Engineer: Jumpon Uea-areevoraku1

Description: 842861.1151508 Foundation Analysis

Program Options

Engineering units are US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes nonlinear bending stiffness and nominal moment
capacity with pile response computed using nonlinear EI

Computation Options:

- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)

- Analysis uses tip shear resistance for short pile or shaft
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output summary table of values for pile-head deflection, maximum bending moment, and shear force only
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:

- Number of pile increments = 100
- Maximum number of iterations allowed = 1000
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 100.0000 in

Pile Response Output Options:

- Only summary tables of pile-head deflection, maximum bending moment, and maximum shear force are to be written to output report file.

 Pile Structural Properties and Geometry

- Total Number of Sections = 1
- Total Pile Length = 45.00 ft
- Depth of ground surface below top of pile = 0.25 ft
- Slope angle of ground surface = 0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points.
 p-y curves are computed using values of pile diameter interpolated over the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	84.0000000
2	45.00000	84.0000000

Input Structural Properties:

Pile Section No. 1:

- Section Type = Drilled Shaft (Bored Pile)
- Section Length = 45.000 ft
- Section Diameter = 84.000 in

 Ground Slope and Pile Batter Angles

- Ground Slope Angle = 0.000 degrees
- = 0.000 radians

Pile Batter Angle = 0.000 degrees
 = 0.000 radians

 Soil and Rock Layering Information

The soil profile is modelled using 12 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 0.250 ft
 Distance from top of pile to bottom of layer = 1.250 ft
 p-y subgrade modulus k for top of soil layer = 0.000 lbs/in**3
 p-y subgrade modulus k for bottom of layer = 0.000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 2 is stiff clay without free water

Distance from top of pile to top of layer = 1.250 ft
 Distance from top of pile to bottom of layer = 3.750 ft

Layer 3 is stiff clay without free water

Distance from top of pile to top of layer = 3.750 ft
 Distance from top of pile to bottom of layer = 6.250 ft

Layer 4 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 6.250 ft
 Distance from top of pile to bottom of layer = 8.750 ft
 p-y subgrade modulus k for top of soil layer = 0.000 lbs/in**3
 p-y subgrade modulus k for bottom of layer = 0.000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 5 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 8.750 ft
 Distance from top of pile to bottom of layer = 13.750 ft
 p-y subgrade modulus k for top of soil layer = 0.000 lbs/in**3
 p-y subgrade modulus k for bottom of layer = 0.000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 6 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 13.750 ft
 Distance from top of pile to bottom of layer = 18.750 ft
 p-y subgrade modulus k for top of soil layer = 0.000 lbs/in**3
 p-y subgrade modulus k for bottom of layer = 0.000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 7 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 18.750 ft
 Distance from top of pile to bottom of layer = 23.750 ft
 p-y subgrade modulus k for top of soil layer = 0.000 lbs/in**3
 p-y subgrade modulus k for bottom of layer = 0.000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 8 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 23.750 ft
 Distance from top of pile to bottom of layer = 28.750 ft
 p-y subgrade modulus k for top of soil layer = 0.000 lbs/in**3
 p-y subgrade modulus k for bottom of layer = 0.000 lbs/in**3

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 9 is stiff clay without free water

Distance from top of pile to top of layer = 28.750 ft
 Distance from top of pile to bottom of layer = 33.750 ft

Layer 10 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 33.750 ft
 Distance from top of pile to bottom of layer = 38.750 ft

Layer 11 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 38.750 ft
 Distance from top of pile to bottom of layer = 43.750 ft

Layer 12 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 43.750 ft
 Distance from top of pile to bottom of layer = 48.750 ft

(Depth of lowest layer extends 3.75 ft below pile tip)

 Effective Unit weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 24 points

Point No.	Depth X ft	Eff. Unit weight pcf
1	0.25	108.00000
2	1.25	108.00000
3	1.25	114.00000
4	3.75	114.00000
5	3.75	110.00000
6	6.25	110.00000
7	6.25	112.00000
8	8.75	112.00000
9	8.75	49.60000
10	13.75	49.60000
11	13.75	50.60000

12	18.75	50.60000
13	18.75	51.60000
14	23.75	51.60000
15	23.75	50.60000
16	28.75	50.60000
17	28.75	47.60000
18	33.75	47.60000
19	33.75	47.60000
20	38.75	47.60000
21	38.75	47.60000
22	43.75	47.60000
23	43.75	47.60000
24	48.75	47.60000

Summary of Soil Properties

Layer Num.	Test Type (p-y Curve)	Soil Type Test Prop. Criteria	Elas. Subgr. pci	Depth ft	Eff. Unit wt., pcf	Cohesion psf	Friction Ang., deg.	qu psi	RQD percent	Epsilon 50	kpy pci	Rock Emass psi	krm
1	Sand (Reese, et al.)		--	0.250	108.000	--	28.000	--	--	--	default	--	--
				1.250	108.000	--	28.000	--	--	--	default	--	--
2	Stiff clay w/o Free Water		--	1.250	114.000	1625.000	--	--	--	0.00	--	--	--
				3.750	114.000	1625.000	--	--	--	0.00	--	--	--
3	Stiff clay w/o Free Water		--	3.750	110.000	775.000	--	--	--	0.00	--	--	--
				6.250	110.000	775.000	--	--	--	0.00	--	--	--
4	Sand (Reese, et al.)		--	6.250	112.000	--	34.000	--	--	--	default	--	--
				8.750	112.000	--	34.000	--	--	--	default	--	--
5	Sand (Reese, et al.)		--	8.750	49.600	--	34.000	--	--	--	default	--	--
				13.750	49.600	--	34.000	--	--	--	default	--	--
6	Sand (Reese, et al.)		--	13.750	50.600	--	38.000	--	--	--	default	--	--
				18.750	50.600	--	38.000	--	--	--	default	--	--
7	Sand (Reese, et al.)		--	18.750	51.600	--	45.000	--	--	--	default	--	--
				23.750	51.600	--	45.000	--	--	--	default	--	--
8	Sand (Reese, et al.)		--	23.750	50.600	--	35.000	--	--	--	default	--	--
				28.750	50.600	--	35.000	--	--	--	default	--	--
9	Stiff clay w/o Free Water		--	28.750	47.600	800.000	--	--	--	0.00	--	--	--
				33.750	47.600	800.000	--	--	--	0.00	--	--	--
10	soft clay		--	33.750	47.600	250.000	--	--	--	0.00	--	--	--

				38.750	47.600	250.000	--	--	--	0.00	--	--	--
11	Soft Clay	--	--	38.750	47.600	200.000	--	--	--	0.00	--	--	--
		--	--	43.750	47.600	200.000	--	--	--	0.00	--	--	--
12	Soft Clay	--	--	43.750	47.600	450.000	--	--	--	0.00	--	--	--
		--	--	48.750	47.600	450.000	--	--	--	0.00	--	--	--

 Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

 Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 3

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs
1	1	V = 16000. lbs	M = 14280000. in-lbs	18000.
2	1	V = 25600. lbs	M = 22848000. in-lbs	21600.
3	1	V = 25600. lbs	M = 22848000. in-lbs	16200.

V = perpendicular shear force applied to pile head
 M = bending moment applied to pile head
 y = lateral deflection relative to pile axis
 S = pile slope relative to original pile batter angle
 R = rotational stiffness applied to pile head
 Axial thrust is assumed to be acting axially for all pile batter angles.

 Shear Resistance Curve at Pile Tip

Point No.	Displacement in	Tip Shear Force lbs
1	0.000	0.000
2	0.120	9524.920
3	10.000	9524.920

 Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Dimensions and Properties of Drilled Shaft:

```

-----
Length of Section                = 45.00000000 ft
Shaft Diameter                  = 84.00000000 in
Concrete Cover Thickness        = 3.50000000 in
Number of Reinforcing Bars      = 22 bars
Yield Stress of Reinforcing Bars = 60.00000000 ksi
Modulus of Elasticity of Reinforcing Bars = 29000. ksi
Gross Area of Shaft             = 5541.76944093 sq. in.
Total Area of Reinforcing Steel = 27.94000000 sq. in.
Area Ratio of Steel Reinforcement = 0.50 percent
Edge-to-Edge Bar Spacing       = 9.50750270 in
    
```

Axial Structural Capacities:

```

-----
Nom. Axial Structural Capacity = 0.85 Fc Ac + Fy As = 15736.665 kips
Tensile Load for Cracking of Concrete = -2090.084 kips
Nominal Axial Tensile Capacity = -1676.400 kips
    
```

Reinforcing Bar Dimensions and Positions Used in Computations:

Bar Number	Bar Diam. inches	Bar Area sq. in.	X inches	Y inches
1	1.27000	1.27000	37.86500	0.00000
2	1.27000	1.27000	36.33120	10.66780
3	1.27000	1.27000	31.85407	20.47136
4	1.27000	1.27000	24.79630	28.61646
5	1.27000	1.27000	15.72969	34.44322
6	1.27000	1.27000	5.38875	37.47959
7	1.27000	1.27000	-5.38875	37.47959
8	1.27000	1.27000	-15.72969	34.44322
9	1.27000	1.27000	-24.79630	28.61646
10	1.27000	1.27000	-31.85407	20.47136
11	1.27000	1.27000	-36.33120	10.66780
12	1.27000	1.27000	-37.86500	0.00000
13	1.27000	1.27000	-36.33120	-10.66780
14	1.27000	1.27000	-31.85407	-20.47136
15	1.27000	1.27000	-24.79630	-28.61646
16	1.27000	1.27000	-15.72969	-34.44322
17	1.27000	1.27000	-5.38875	-37.47959
18	1.27000	1.27000	5.38875	-37.47959
19	1.27000	1.27000	15.72969	-34.44322
20	1.27000	1.27000	24.79630	-28.61646
21	1.27000	1.27000	31.85407	-20.47136
22	1.27000	1.27000	36.33120	-10.66780

Concrete Properties:

```

-----
Compressive Strength of Concrete = 3.0000000 ksi
Modulus of Elasticity of Concrete = 3122.0185778 ksi
Modulus of Rupture of Concrete = -0.4107919 ksi
Compression Strain at Peak Stress = 0.0016336
Tensile Strain at Fracture of Concrete = -0.0001160
    
```

Maximum Coarse Aggregate Size =

Number of Axial Thrust Force Values Determined from Pile-head Loadings = 3

Number	Axial Thrust Force kips
1	16.200
2	18.000
3	21.600

Definitions of Run Messages and Notes:

C = concrete in section has cracked in tension
 Y = stress in reinforcing steel has reached yield stress
 T = tensile strain in reinforcement exceeds 0.005 when compressive strain
 in concrete is less than 0.003.
 Z = depth of tensile zone in concrete section is less than 10 percent of section depth
 Bending Stiffness (EI) = Bending Moment / Curvature
 Position of neutral axis is computed from compression side of pile
 Compressive stresses are positive in sign. Tensile stresses are negative in sign.

Axial Thrust Force = 16.200 kips

Bending Curvature rad/in.	Bending Moment in-kip	Bending Stiffness kip-in2	Depth to N Axis in	Max Comp Strain in/in	Max Tens Strain in/in	Max Concrete Stress ksi	Max Steel Stress ksi	Run Msg
0.000000313	2956.4223227	9460551433.	44.4693881	0.0000139	-0.0000124	0.0503469	0.3991976	
0.000000625	5897.7436213	9436389794.	43.2387727	0.0000270	-0.0000255	0.0974897	0.7760903	
0.000000938	8823.8983241	9412158212.	42.8285870	0.0000402	-0.0000386	0.1442528	1.1529835	
0.000001250	11735.	9387909119.	42.6235080	0.0000533	-0.0000517	0.1906362	1.5298772	
0.000001563	14631.	9363653020.	42.5004718	0.0000664	-0.0000648	0.2366398	1.9067714	
0.000001875	17511.	9339393419.	42.4184571	0.0000795	-0.0000780	0.2822638	2.2836661	
0.000002188	20377.	9315131816.	42.3598832	0.0000927	-0.0000911	0.3275080	2.6605613	
0.000002500	23227.	9290868961.	42.3159599	0.0001058	-0.0001042	0.3723726	3.0374571	
0.000002813	23227.	8258550188.	18.5384151	0.0000521	-0.0001841	0.1842477	-5.3049543	C
0.000003125	23227.	7432695169.	18.4026882	0.0000575	-0.0002050	0.2028552	-5.9066939	C
0.000003438	23227.	6756995608.	18.2925229	0.0000629	-0.0002259	0.2214117	-6.5083454	C
0.000003750	23227.	6193912641.	18.2015312	0.0000683	-0.0002467	0.2399172	-7.1099085	C
0.000004063	23227.	5717457822.	18.1252906	0.0000736	-0.0002676	0.2583717	-7.7113829	C
0.000004375	23227.	5309067978.	18.0606422	0.0000790	-0.0002885	0.2767749	-8.3127685	C
0.000004688	23227.	4955130113.	18.0022208	0.0000844	-0.0003094	0.2950771	-8.9144793	C
0.000005000	23227.	4645434481.	17.9517155	0.0000898	-0.0003302	0.3133282	-9.5161012	C
0.000005313	23227.	4372173629.	17.9077605	0.0000951	-0.0003511	0.3315287	-10.1176294	C
0.000005625	23227.	4129275094.	17.8692660	0.0001005	-0.0003720	0.3496785	-10.7190635	C
0.000005938	23227.	3911944826.	17.8353716	0.0001059	-0.0003929	0.3677777	-11.3204032	C
0.000006250	23227.	3716347584.	17.8053888	0.0001113	-0.0004137	0.3858260	-11.9216483	C
0.000006563	23227.	3539378652.	17.7787604	0.0001167	-0.0004346	0.4038233	-12.5227984	C
0.000006875	23227.	3378497804.	17.7550305	0.0001221	-0.0004554	0.4217697	-13.1238535	C
0.000007188	23227.	3231606595.	17.7338225	0.0001275	-0.0004763	0.4396651	-13.7248128	C
0.000007500	23227.	3096956320.	17.7148225	0.0001329	-0.0004971	0.4575093	-14.3256762	C
0.000007813	23227.	2973078068.	17.6977670	0.0001383	-0.0005180	0.4753023	-14.9264435	C
0.000008125	23227.	2858728911.	17.6824328	0.0001437	-0.0005388	0.4930439	-15.5271144	C
0.000008438	23227.	2752850063.	17.6686300	0.0001491	-0.0005597	0.5107342	-16.1276884	C
0.000008750	23227.	2654533989.	17.6561958	0.0001545	-0.0005805	0.5283730	-16.7281654	C
0.000009063	23227.	2562998334.	17.6449897	0.0001599	-0.0006013	0.5459602	-17.3285450	C
0.000009375	23227.	2477565056.	17.6348900	0.0001653	-0.0006222	0.5634958	-17.9288268	C
0.000009688	23227.	2397643603.	17.6257909	0.0001707	-0.0006430	0.5809797	-18.5290106	C

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0.0000100	23227.	2322717240.	17.6175997	0.0001762	-0.0006638	0.5984118	-19.1290961	C
0.0000103	23227.	2252331869.	17.6102348	0.0001816	-0.0006846	0.6157919	-19.7290829	C
0.0000106	23227.	2186086814.	17.6036244	0.0001870	-0.0007055	0.6331201	-20.3289707	C
0.0000109	23227.	2123627191.	17.5977049	0.0001925	-0.0007263	0.6503962	-20.9287592	C
0.0000113	23227.	2064637547.	17.5924196	0.0001979	-0.0007471	0.6676202	-21.5284481	C
0.0000116	23227.	2008836532.	17.5877182	0.0002034	-0.0007679	0.6847919	-22.1280370	C
0.0000119	23227.	1955972413.	17.5835555	0.0002088	-0.0007887	0.7019113	-22.7275256	C
0.0000122	23227.	1905819274.	17.5798910	0.0002143	-0.0008095	0.7189783	-23.3269135	C
0.0000128	23227.	1812852480.	17.5739143	0.0002252	-0.0008511	0.7529546	-24.5253862	C
0.0000134	23227.	1728533760.	17.5695369	0.0002361	-0.0008927	0.7867203	-25.7234523	C
0.0000141	23227.	1651710038.	17.5665523	0.0002470	-0.0009342	0.8202745	-26.9211091	C
0.0000147	23227.	1581424504.	17.5647891	0.0002580	-0.0009758	0.8536166	-28.1183539	C
0.0000153	23227.	1516876565.	17.5641040	0.0002690	-0.0010173	0.8867457	-29.3151838	C
0.0000159	23227.	1457391210.	17.5643763	0.0002799	-0.0010588	0.9196613	-30.5115960	C
0.0000166	23227.	1402395315.	17.5655037	0.0002909	-0.0011003	0.9523625	-31.7075877	C
0.0000172	23227.	1351399122.	17.5673987	0.0003019	-0.0011418	0.9848487	-32.9031559	C
0.0000178	23227.	1303981609.	17.5699860	0.0003130	-0.0011833	1.0171189	-34.0982978	C
0.0000184	23854.	1293768352.	17.5732010	0.0003240	-0.0012247	1.0491725	-35.2930103	C
0.0000191	24639.	1292560393.	17.5769873	0.0003351	-0.0012662	1.0810088	-36.4872904	C
0.0000197	25424.	1291396176.	17.5812958	0.0003461	-0.0013076	1.1126269	-37.6811352	C
0.0000203	26209.	1290271470.	17.5860837	0.0003572	-0.0013490	1.1440260	-38.8745414	C
0.0000209	26992.	1289182544.	17.5913130	0.0003683	-0.0013904	1.1752053	-40.0675059	C
0.0000216	27775.	1288126101.	17.5969505	0.0003794	-0.0014318	1.2061641	-41.2600257	C
0.0000222	28558.	1287099209.	17.6029667	0.0003906	-0.0014732	1.2369015	-42.4520974	C
0.0000228	29339.	1286099259.	17.6093354	0.0004017	-0.0015145	1.2674168	-43.6437179	C
0.0000234	30120.	1285123916.	17.6160333	0.0004129	-0.0015559	1.2977090	-44.8348838	C
0.0000241	30900.	1284171085.	17.6230394	0.0004241	-0.0015972	1.3277774	-46.0255917	C
0.0000247	31680.	1283238883.	17.6303350	0.0004352	-0.0016385	1.3576210	-47.2158384	C
0.0000253	32459.	1282325610.	17.6379035	0.0004465	-0.0016798	1.3872392	-48.4056204	C
0.0000259	33237.	1281429727.	17.6457297	0.0004577	-0.0017211	1.4166309	-49.5949342	C
0.0000266	34015.	1280549839.	17.6538000	0.0004689	-0.0017623	1.4457953	-50.7837762	C
0.0000272	34791.	1279684676.	17.6621020	0.0004802	-0.0018036	1.4747315	-51.9721430	C
0.0000278	35568.	1278833081.	17.6706247	0.0004915	-0.0018448	1.5034387	-53.1600309	C
0.0000284	36343.	1277993996.	17.6793579	0.0005028	-0.0018860	1.5319159	-54.3474362	C
0.0000291	37118.	1277166452.	17.6882925	0.0005141	-0.0019272	1.5601622	-55.5343552	C
0.0000297	37892.	1276349561.	17.6974201	0.0005254	-0.0019684	1.5881767	-56.7207841	C
0.0000303	38665.	1275542504.	17.7067332	0.0005367	-0.0020095	1.6159585	-57.9067192	C
0.0000309	39437.	1274744527.	17.7162247	0.0005481	-0.0020507	1.6435067	-59.0921565	C
0.0000316	40209.	1273954935.	17.7258885	0.0005595	-0.0020918	1.6708202	-60.0000000	CY
0.0000322	40980.	1273173084.	17.7357187	0.0005709	-0.0021329	1.6978981	-60.0000000	CY
0.0000328	41751.	1272398375.	17.7457101	0.0005823	-0.0021740	1.7247394	-60.0000000	CY
0.0000334	42503.	1271107287.	17.7533948	0.0005936	-0.0022151	1.7511480	-60.0000000	CY
0.0000341	43132.	1266257854.	17.7441799	0.0006044	-0.0022568	1.7759527	-60.0000000	CY
0.0000347	43724.	1260513143.	17.7306553	0.0006150	-0.0022987	1.8001346	-60.0000000	CY
0.0000353	44272.	1253716750.	17.7117951	0.0006254	-0.0023408	1.8236030	-60.0000000	CY
0.0000359	44719.	1244348042.	17.6797952	0.0006354	-0.0023834	1.8457104	-60.0000000	CY
0.0000366	45143.	1234688963.	17.6461405	0.0006452	-0.0024261	1.8673813	-60.0000000	CY
0.0000372	45567.	1225344295.	17.6139177	0.0006550	-0.0024687	1.8888718	-60.0000000	CY
0.0000397	47099.	1186755900.	17.4750853	0.0006935	-0.0026402	1.9710610	-60.0000000	CY
0.0000422	48221.	1143020368.	17.3018873	0.0007299	-0.0028138	2.0456563	-60.0000000	CY
0.0000447	49337.	1104041229.	17.1463577	0.0007662	-0.0029875	2.1172926	-60.0000000	CY
0.0000472	50173.	1063268985.	16.9633393	0.0008005	-0.0031633	2.1821604	-60.0000000	CY
0.0000497	50845.	1023294269.	16.7776670	0.0008336	-0.0033401	2.2426219	-60.0000000	CY
0.0000522	51514.	987094690.	16.6120976	0.0008669	-0.0035168	2.3009760	-60.0000000	CY
0.0000547	52180.	954151610.	16.4639096	0.0009004	-0.0036934	2.3571997	-60.0000000	CY
0.0000572	52805.	923369703.	16.3206506	0.0009333	-0.0038704	2.4103192	-60.0000000	CY
0.0000597	53167.	890757490.	16.1419519	0.0009635	-0.0040503	2.4567314	-60.0000000	CY
0.0000622	53525.	860710983.	15.9789731	0.0009937	-0.0042301	2.5013675	-60.0000000	CY
0.0000647	53882.	832958235.	15.8301782	0.0010240	-0.0044097	2.5442373	-60.0000000	CY
0.0000672	54237.	807242733.	15.6940043	0.0010544	-0.0045893	2.5853225	-60.0000000	CY
0.0000697	54589.	783344763.	15.5691136	0.0010850	-0.0047688	2.6246044	-60.0000000	CY
0.0000722	54936.	761013502.	15.4465037	0.0011150	-0.0049487	2.6613649	-60.0000000	CY
0.0000747	55279.	740133527.	15.3310572	0.0011450	-0.0051287	2.6961403	-60.0000000	CY

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0.0000772	55586.	720136959.	15.2177504	0.0011746	-0.0053091	2.7285771	-60.0000000	CY
0.0000797	55793.	700144718.	15.0939305	0.0012028	-0.0054910	2.7577199	-60.0000000	CY
0.0000822	55960.	680887332.	14.9714879	0.0012305	-0.0056733	2.7847106	-60.0000000	CY
0.0000847	56127.	662752420.	14.8573563	0.0012582	-0.0058555	2.8101925	-60.0000000	CY
0.0000872	56292.	645643181.	14.7508331	0.0012861	-0.0060377	2.8341499	-60.0000000	CY
0.0000897	56453.	629436367.	14.6461469	0.0013136	-0.0062202	2.8561960	-60.0000000	CY
0.0000922	56609.	614059476.	14.5430847	0.0013407	-0.0064031	2.8763922	-60.0000000	CY
0.0000947	56763.	599482432.	14.4464411	0.0013679	-0.0065859	2.8951243	-60.0000000	CY
0.0000972	56917.	585643353.	14.3557338	0.0013952	-0.0067686	2.9123769	-60.0000000	CY
0.0000997	57070.	572486519.	14.2705292	0.0014226	-0.0069512	2.9281342	-60.0000000	CY
0.0001022	57221.	559961662.	14.1904367	0.0014501	-0.0071337	2.9423799	-60.0000000	CY
0.0001047	57371.	548023307.	14.1151034	0.0014777	-0.0073161	2.9550975	-60.0000000	CY
0.0001072	57520.	536630219.	14.0442096	0.0015054	-0.0074984	2.9662701	-60.0000000	CY
0.0001097	57668.	525744916.	13.9774657	0.0015332	-0.0076806	2.9758802	-60.0000000	CY
0.0001122	57814.	515333255.	13.9146078	0.0015610	-0.0078627	2.9839103	-60.0000000	CY
0.0001147	57958.	505352625.	13.8545903	0.0015889	-0.0080448	2.9903228	-60.0000000	CY
0.0001172	58089.	495696948.	13.7899980	0.0016160	-0.0082277	2.9949892	-60.0000000	CY
0.0001197	58168.	486001419.	13.7155357	0.0016416	-0.0084122	2.9979933	-60.0000000	CY
0.0001222	58242.	476663661.	13.6438434	0.0016671	-0.0085966	2.9996450	-60.0000000	CY
0.0001247	58300.	467566385.	13.5717140	0.0016922	-0.0087815	2.9986923	-60.0000000	CY
0.0001272	58356.	458818426.	13.5032651	0.0017174	-0.0089663	2.9936711	-60.0000000	CY
0.0001297	58412.	450402305.	13.4380956	0.0017428	-0.0091510	2.9966960	-60.0000000	CY
0.0001322	58466.	442299100.	13.3760276	0.0017681	-0.0093356	2.9988509	-60.0000000	CY
0.0001347	58521.	434491294.	13.3168964	0.0017936	-0.0095201	2.9998954	-60.0000000	CY
0.0001372	58574.	426959877.	13.2607620	0.0018192	-0.0097045	2.9973421	-60.0000000	CY
0.0001522	58873.	386842319.	12.9678314	0.0019735	-0.0108102	2.9957648	-60.0000000	CY
0.0001672	59133.	353694532.	12.7162663	0.0021260	-0.0119177	2.9998108	-60.0000000	CY
0.0001822	59377.	325910532.	12.5207834	0.0022811	-0.0130226	2.9981012	60.0000000	CY
0.0001972	59607.	302286781.	12.3665885	0.0024385	-0.0141252	2.9876183	60.0000000	CY
0.0002122	59818.	281908727.	12.2395889	0.0025971	-0.0152267	2.9996836	60.0000000	CY
0.0002272	59965.	263943807.	12.1077048	0.0027507	-0.0163330	2.9859680	60.0000000	CY
0.0002422	60022.	247832483.	11.9517021	0.0028946	-0.0174492	2.9957687	60.0000000	CY
0.0002572	60072.	233573851.	11.8156483	0.0030388	-0.0185649	2.9997851	60.0000000	CY
0.0002722	60112.	220846513.	11.7054755	0.0031861	-0.0196777	2.9862116	60.0000000	CY
0.0002872	60150.	209443540.	11.6093808	0.0033341	-0.0207897	2.9866992	60.0000000	CY
0.0003022	60180.	199149228.	11.5299412	0.0034842	-0.0218995	2.9968259	60.0000000	CY
0.0003172	60189.	189758595.	11.4770053	0.0036404	-0.0230034	2.9982297	60.0000000	CY
0.0003322	60194.	181206027.	11.4331342	0.0037979	-0.0241058	2.9851268	60.0000000	CY
0.0003472	60194.	173377144.	11.5024578	0.0039935	-0.0251702	2.9840885	60.0000000	CY

Axial Thrust Force = 18.000 kips

Bending Curvature rad/in.	Bending Moment in-kip	Bending Stiffness kip-in ²	Depth to N Axis in	Max Comp Strain in/in	Max Tens Strain in/in	Max Concrete Stress ksi	Max Steel Stress ksi	Run Msg
0.000000313	2956.4068948	9460502063.	44.7437652	0.0000140	-0.0000123	0.0506592	0.4016841	
0.000000625	5897.7280677	9436364908.	43.3764118	0.0000271	-0.0000254	0.0978005	0.7785850	
0.000000938	8823.8826649	9412141509.	42.9206496	0.0000402	-0.0000385	0.1445621	1.1554864	
0.000001250	11735.	9387896507.	42.6927838	0.0000534	-0.0000516	0.1909439	1.5323884	
0.000001563	14631.	9363642862.	42.5560768	0.0000665	-0.0000648	0.2369461	1.9092910	
0.000001875	17511.	9339384897.	42.4649492	0.0000796	-0.0000779	0.2825685	2.2861941	
0.000002188	20377.	9315124462.	42.3998670	0.0000927	-0.0000910	0.3278112	2.6630978	
0.000002500	23227.	9290862483.	42.3510634	0.0001059	-0.0001041	0.3726742	3.0400021	
0.000002813	23227.	8258544429.	18.6960883	0.0000526	-0.0001837	0.1858255	-5.2920940	C
0.000003125	23227.	7432689986.	18.5447315	0.0000580	-0.0002045	0.2044293	-5.8938212	C
0.000003438	23227.	6756990897.	18.4217786	0.0000633	-0.0002254	0.2229821	-6.4954602	C
0.000003750	23227.	6193908322.	18.3201309	0.0000687	-0.0002463	0.2414839	-7.0970107	C
0.000004063	23227.	5717453836.	18.2348742	0.0000741	-0.0002672	0.2599346	-7.6984726	C
0.000004375	23227.	5309064276.	18.1624980	0.0000795	-0.0002880	0.2783341	-8.2998456	C
0.000004688	23227.	4955126658.	18.1004282	0.0000848	-0.0003089	0.2966824	-8.9011293	C
0.000005000	23227.	4645431242.	18.0459943	0.0000902	-0.0003298	0.3149664	-9.5024308	C

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0.000005313	23227.	4372170580.	17.9965861	0.0000956	-0.0003506	0.3331631	-10.1039447	C
0.000005625	23227.	4129272215.	17.9532445	0.0001010	-0.0003715	0.3513091	-10.7053645	C
0.000005938	23227.	3911942098.	17.9150136	0.0001064	-0.0003924	0.3694043	-11.3066898	C
0.000006250	23227.	3716344993.	17.8811282	0.0001118	-0.0004132	0.3874487	-11.9079205	C
0.000006563	23227.	3539376184.	17.8509692	0.0001171	-0.0004341	0.4054422	-12.5090562	C
0.000006875	23227.	3378495448.	17.8240299	0.0001225	-0.0004550	0.4233847	-13.1100965	C
0.000007188	23227.	3231604342.	17.7998918	0.0001279	-0.0004758	0.4412762	-13.7110413	C
0.000007500	23227.	3096954161.	17.7782062	0.0001333	-0.0004967	0.4591164	-14.3118903	C
0.000007813	23227.	2973075995.	17.7586801	0.0001387	-0.0005175	0.4769055	-14.9126429	C
0.000008125	23227.	2858726918.	17.7410656	0.0001441	-0.0005384	0.4946432	-15.5132990	C
0.000008438	23227.	2752848143.	17.7251517	0.0001496	-0.0005592	0.5123295	-16.1138583	C
0.000008750	23227.	2654532138.	17.7107573	0.0001550	-0.0005800	0.5299644	-16.7143204	C
0.000009063	23227.	2562996547.	17.6977264	0.0001604	-0.0006009	0.5475477	-17.3146851	C
0.000009375	23227.	2477563329.	17.6859239	0.0001658	-0.0006217	0.5650793	-17.9149520	C
0.000009688	23227.	2397641931.	17.6752320	0.0001712	-0.0006425	0.5825592	-18.5151208	C
0.0000100	23227.	2322715621.	17.6655476	0.0001767	-0.0006633	0.5999872	-19.1151912	C
0.0000103	23227.	2252330299.	17.6567804	0.0001821	-0.0006842	0.6173634	-19.7151629	C
0.0000106	23227.	2186085290.	17.6488502	0.0001875	-0.0007050	0.6346875	-20.3150355	C
0.0000109	23227.	2123625710.	17.6416866	0.0001930	-0.0007258	0.6519596	-20.9148088	C
0.0000113	23227.	2064636107.	17.6352265	0.0001984	-0.0007466	0.6691796	-21.5144824	C
0.0000116	23227.	2008835131.	17.6294139	0.0002038	-0.0007674	0.6863472	-22.1140559	C
0.0000119	23227.	1955971049.	17.6241987	0.0002093	-0.0007882	0.7034626	-22.7135291	C
0.0000122	23227.	1905817945.	17.6195358	0.0002147	-0.0008090	0.7205255	-23.3129016	C
0.0000128	23227.	1812851216.	17.6117090	0.0002257	-0.0008506	0.7544937	-24.5113432	C
0.0000134	23227.	1728532555.	17.6056542	0.0002366	-0.0008922	0.7882511	-25.7093779	C
0.0000141	23227.	1651708886.	17.6011418	0.0002475	-0.0009337	0.8217971	-26.9070031	C
0.0000147	23227.	1581423401.	17.5979814	0.0002585	-0.0009753	0.8551309	-28.1042160	C
0.0000153	23227.	1516875507.	17.5960138	0.0002694	-0.0010168	0.8882517	-29.3010138	C
0.0000159	23227.	1457390193.	17.5951048	0.0002804	-0.0010583	0.9211590	-30.4973937	C
0.0000166	23227.	1402394337.	17.5951404	0.0002914	-0.0010998	0.9538518	-31.6933528	C
0.0000172	23227.	1351398179.	17.5960236	0.0003024	-0.0011413	0.9863294	-32.8888882	C
0.0000178	23227.	1303980699.	17.5976707	0.0003135	-0.0011828	1.0185912	-34.0839970	C
0.0000184	23898.	1296142875.	17.6000096	0.0003245	-0.0012242	1.0506363	-35.2786761	C
0.0000191	24683.	1294854802.	17.6029778	0.0003356	-0.0012657	1.0824639	-36.4729226	C
0.0000197	25468.	1293615542.	17.6065206	0.0003466	-0.0013071	1.1140734	-37.6667334	C
0.0000203	26252.	1292420396.	17.6105903	0.0003577	-0.0013485	1.1454638	-38.8601054	C
0.0000209	27036.	1291265221.	17.6151449	0.0003688	-0.0013899	1.1766344	-40.0530355	C
0.0000216	27819.	1290146353.	17.6201472	0.0003799	-0.0014313	1.2075844	-41.2455205	C
0.0000222	28601.	1289060540.	17.6255644	0.0003911	-0.0014727	1.2383130	-42.4375572	C
0.0000228	29383.	1288004883.	17.6313674	0.0004022	-0.0015140	1.2688194	-43.6291423	C
0.0000234	30164.	1286976789.	17.6375301	0.0004134	-0.0015554	1.2991027	-44.8202726	C
0.0000241	30944.	1285973935.	17.6440293	0.0004246	-0.0015967	1.3291621	-46.0109447	C
0.0000247	31723.	1284994228.	17.6508442	0.0004358	-0.0016380	1.3589967	-47.2011552	C
0.0000253	32502.	1284035783.	17.6579560	0.0004470	-0.0016793	1.3886058	-48.3909006	C
0.0000259	33280.	1283096891.	17.6653479	0.0004582	-0.0017206	1.4179884	-49.5801776	C
0.0000266	34058.	1282176005.	17.6730048	0.0004694	-0.0017618	1.4471436	-50.7689825	C
0.0000272	34835.	1281271715.	17.6809129	0.0004807	-0.0018031	1.4760706	-51.9573118	C
0.0000278	35611.	1280382739.	17.6890597	0.0004920	-0.0018443	1.5047685	-53.1451619	C
0.0000284	36386.	1279507903.	17.6974339	0.0005033	-0.0018855	1.5332364	-54.3325291	C
0.0000291	37161.	1278646134.	17.7060254	0.0005146	-0.0019267	1.5614733	-55.5194097	C
0.0000297	37935.	1277796445.	17.7148247	0.0005259	-0.0019678	1.5894784	-56.7057998	C
0.0000303	38708.	1276957931.	17.7238234	0.0005373	-0.0020090	1.6172507	-57.8916958	C
0.0000309	39480.	1276129755.	17.7330137	0.0005486	-0.0020501	1.6447892	-59.0770936	C
0.0000316	40252.	1275311148.	17.7423885	0.0005600	-0.0020913	1.6720931	-60.0000000	CY
0.0000322	41023.	1274501395.	17.7519413	0.0005714	-0.0021324	1.6991613	-60.0000000	CY
0.0000328	41793.	1273699836.	17.7616663	0.0005828	-0.0021734	1.7259929	-60.0000000	CY
0.0000334	42546.	1272396856.	17.7691599	0.0005942	-0.0022146	1.7523970	-60.0000000	CY
0.0000341	43177.	1267579842.	17.7599673	0.0006049	-0.0022563	1.7772140	-60.0000000	CY
0.0000347	43769.	1261810134.	17.7461940	0.0006156	-0.0022982	1.8013863	-60.0000000	CY
0.0000353	44318.	1255024026.	17.7272647	0.0006260	-0.0023403	1.8248591	-60.0000000	CY
0.0000359	44766.	1245665183.	17.6951964	0.0006359	-0.0023828	1.8469711	-60.0000000	CY
0.0000366	45191.	1235982709.	17.6613073	0.0006457	-0.0024255	1.8686324	-60.0000000	CY
0.0000372	45615.	1226615429.	17.6288583	0.0006556	-0.0024682	1.8901134	-60.0000000	CY

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0.0000397	47149.	1188002042.	17.4895170	0.0006941	-0.0026396	1.9722926	-60.0000000	CY
0.0000422	48271.	1144190201.	17.3155478	0.0007305	-0.0028133	2.0468498	-60.0000000	CY
0.0000447	49386.	1105150803.	17.1602736	0.0007668	-0.0029869	2.1185311	-60.0000000	CY
0.0000472	50225.	1064365679.	16.9769411	0.0008011	-0.0031627	2.1833908	-60.0000000	CY
0.0000497	50897.	1024334046.	16.7906519	0.0008343	-0.0033395	2.2438121	-60.0000000	CY
0.0000522	51566.	988082978.	16.6245263	0.0008676	-0.0035162	2.3021255	-60.0000000	CY
0.0000547	52232.	955093090.	16.4758345	0.0009010	-0.0036927	2.3583080	-60.0000000	CY
0.0000572	52858.	924286894.	16.3331494	0.0009341	-0.0038697	2.4114826	-60.0000000	CY
0.0000597	53221.	891660147.	16.1542312	0.0009642	-0.0040495	2.4578764	-60.0000000	CY
0.0000622	53579.	861576171.	15.9908104	0.0009944	-0.0042293	2.5024692	-60.0000000	CY
0.0000647	53936.	833788836.	15.8416088	0.0010248	-0.0044090	2.5452952	-60.0000000	CY
0.0000672	54290.	808041305.	15.7050597	0.0010552	-0.0045886	2.5863362	-60.0000000	CY
0.0000697	54643.	784113590.	15.5798220	0.0010857	-0.0047680	2.6255734	-60.0000000	CY
0.0000722	54990.	761762128.	15.4578402	0.0011159	-0.0049479	2.6623740	-60.0000000	CY
0.0000747	55333.	740856059.	15.3420714	0.0011459	-0.0051279	2.6971012	-60.0000000	CY
0.0000772	55640.	720847299.	15.2286454	0.0011755	-0.0053083	2.7295054	-60.0000000	CY
0.0000797	55848.	700843799.	15.1047128	0.0012037	-0.0054901	2.7586159	-60.0000000	CY
0.0000822	56016.	681564350.	14.9819818	0.0012313	-0.0056724	2.7855584	-60.0000000	CY
0.0000847	56182.	663408668.	14.8675799	0.0012591	-0.0058547	2.8109915	-60.0000000	CY
0.0000872	56348.	646279842.	14.7608029	0.0012870	-0.0060368	2.8348998	-60.0000000	CY
0.0000897	56509.	630061992.	14.6569047	0.0013145	-0.0062192	2.8569709	-60.0000000	CY
0.0000922	56665.	614667400.	14.5535972	0.0013417	-0.0064021	2.8771137	-60.0000000	CY
0.0000947	56819.	600073597.	14.4567225	0.0013689	-0.0065849	2.8957918	-60.0000000	CY
0.0000972	56973.	586218611.	14.3657969	0.0013962	-0.0067676	2.9129897	-60.0000000	CY
0.0000997	57126.	573046660.	14.2803862	0.0014236	-0.0069502	2.9286917	-60.0000000	CY
0.0001022	57277.	560507415.	14.2000988	0.0014511	-0.0071327	2.9428814	-60.0000000	CY
0.0001047	57427.	548555349.	14.1245810	0.0014787	-0.0073151	2.9555422	-60.0000000	CY
0.0001072	57576.	537149180.	14.0535126	0.0015064	-0.0074974	2.9666573	-60.0000000	CY
0.0001097	57723.	526251383.	13.9866031	0.0015342	-0.0076796	2.9762092	-60.0000000	CY
0.0001122	57869.	515827773.	13.9235883	0.0015621	-0.0078617	2.9841802	-60.0000000	CY
0.0001147	58013.	505838582.	13.8639993	0.0015900	-0.0080437	2.9905466	-60.0000000	CY
0.0001172	58147.	496185281.	13.8000709	0.0016172	-0.0082266	2.9951648	-60.0000000	CY
0.0001197	58225.	486478994.	13.7254445	0.0016428	-0.0084110	2.9981044	-60.0000000	CY
0.0001222	58300.	477134679.	13.6537173	0.0016683	-0.0085954	2.9996916	-60.0000000	CY
0.0001247	58357.	468027273.	13.5814445	0.0016934	-0.0087803	2.9984403	-60.0000000	CY
0.0001272	58413.	459269787.	13.5128444	0.0017187	-0.0089651	2.9936510	-60.0000000	CY
0.0001297	58469.	450844501.	13.4475305	0.0017440	-0.0091498	2.9968435	-60.0000000	CY
0.0001322	58524.	442732472.	13.3853245	0.0017694	-0.0093344	2.9989375	-60.0000000	CY
0.0001347	58578.	434916162.	13.3260615	0.0017949	-0.0095189	2.9999205	-60.0000000	CY
0.0001372	58631.	427376298.	13.2698202	0.0018205	-0.0097033	2.9970840	-60.0000000	CY
0.0001522	58930.	387219777.	12.9774793	0.0019750	-0.0108087	2.9954598	-60.0000000	CY
0.0001672	59190.	354036066.	12.7253260	0.0021275	-0.0119162	2.9994962	-60.0000000	CY
0.0001822	59434.	326222635.	12.5293023	0.0022827	-0.0130211	2.9982419	60.0000000	CY
0.0001972	59664.	302573719.	12.3746894	0.0024401	-0.0141236	2.9877395	60.0000000	CY
0.0002122	59874.	282175766.	12.2473963	0.0025987	-0.0152250	2.9997430	60.0000000	CY
0.0002272	60023.	264200801.	12.1173222	0.0027529	-0.0163308	2.9855142	60.0000000	CY
0.0002422	60080.	248073385.	11.9608794	0.0028968	-0.0174470	2.9960697	60.0000000	CY
0.0002572	60130.	233799987.	11.8244911	0.0030411	-0.0185626	2.9993127	60.0000000	CY
0.0002722	60170.	221059170.	11.7140775	0.0031884	-0.0196753	2.9857253	60.0000000	CY
0.0002872	60207.	209644792.	11.6176298	0.0033364	-0.0207873	2.9872723	60.0000000	CY
0.0003022	60237.	199337627.	11.5385334	0.0034868	-0.0218969	2.9971285	60.0000000	CY
0.0003172	60246.	189937440.	11.4854515	0.0036430	-0.0230007	2.9976732	60.0000000	CY
0.0003322	60251.	181376556.	11.4413226	0.0038007	-0.0241031	2.9845618	60.0000000	CY

Axial Thrust Force = 21.600 kips

Bending Curvature rad/in.	Bending Moment in-kip	Bending Stiffness kip-in2	Depth to N Axis in	Max Comp Strain in/in	Max Tens Strain in/in	Max Concrete Stress ksi	Max Steel Stress ksi	Run Msg
0.000000313	2956.3712048	9460387855.	45.2925228	0.0000142	-0.0000121	0.0512837	0.4066572	
0.000000625	5897.6920740	9436307318.	43.6516912	0.0000273	-0.0000252	0.0984220	0.7835744	

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0.000000938	8823.8464189	9412102847.	43.1047751	0.0000404	-0.0000383	0.1451806	1.1604923	
0.000001250	11735.	9387867315.	42.8313357	0.0000535	-0.0000515	0.1915595	1.5374109	
0.000001563	14631.	9363619351.	42.6672869	0.0000667	-0.0000646	0.2375586	1.9143302	
0.000001875	17511.	9339365172.	42.5579336	0.0000798	-0.0000777	0.2831780	2.2912501	
0.000002188	20377.	9315107440.	42.4798348	0.0000929	-0.0000908	0.3284176	2.6681708	
0.000002500	23227.	9290847488.	42.4212703	0.0001061	-0.0001039	0.3732775	3.0450921	
0.000002813	23227.	8258531100.	19.0058900	0.0000535	-0.0001828	0.1889242	-5.2668259	C
0.000003125	23227.	7432677990.	18.8289122	0.0000588	-0.0002037	0.2075771	-5.8680673	C
0.000003438	23227.	6756979991.	18.6803758	0.0000642	-0.0002245	0.2261225	-6.4696813	C
0.000003750	23227.	6193898325.	18.5574093	0.0000696	-0.0002454	0.2446169	-7.0712067	C
0.000004063	23227.	5717444608.	18.4541143	0.0000750	-0.0002663	0.2630601	-7.6726434	C
0.000004375	23227.	5309055707.	18.3662774	0.0000804	-0.0002871	0.2814522	-8.2739910	C
0.000004688	23227.	4955118660.	18.2908091	0.0000857	-0.0003080	0.2997930	-8.8752494	C
0.000005000	23227.	4645423744.	18.2253919	0.0000911	-0.0003289	0.3180824	-9.4764182	C
0.000005313	23227.	4372163524.	18.1682539	0.0000965	-0.0003497	0.3363204	-10.0774971	C
0.000005625	23227.	4129265550.	18.1180169	0.0001019	-0.0003706	0.3545068	-10.6784860	C
0.000005938	23227.	3911935784.	18.0735927	0.0001073	-0.0003914	0.3726417	-11.2793845	C
0.000006250	23227.	3716338995.	18.0326603	0.0001127	-0.0004123	0.3906939	-11.8804553	C
0.000006563	23227.	3539370472.	17.9954377	0.0001181	-0.0004332	0.4086796	-12.4815620	C
0.000006875	23227.	3378489996.	17.9620774	0.0001235	-0.0004540	0.4266143	-13.0825733	C
0.000007188	23227.	3231599126.	17.9320772	0.0001289	-0.0004749	0.4444979	-13.6834889	C
0.000007500	23227.	3096949163.	17.9050185	0.0001343	-0.0004957	0.4623304	-14.2843085	C
0.000007813	23227.	2973071196.	17.8805496	0.0001397	-0.0005166	0.4801115	-14.8850317	C
0.000008125	23227.	2858722304.	17.8583731	0.0001451	-0.0005374	0.4978414	-15.4856586	C
0.000008438	23227.	2752843700.	17.8382354	0.0001505	-0.0005582	0.5155198	-16.0861882	C
0.000008750	23227.	2654527854.	17.8199194	0.0001559	-0.0005791	0.5331467	-16.6866206	C
0.000009063	23227.	2562992410.	17.8032378	0.0001613	-0.0005999	0.5507221	-17.2869554	C
0.000009375	23227.	2477559330.	17.7880284	0.0001668	-0.0006207	0.5682457	-17.8871924	C
0.000009688	23227.	2397638061.	17.7741497	0.0001722	-0.0006416	0.5857176	-18.4873312	C
0.0000100	23227.	2322711872.	17.7614782	0.0001776	-0.0006624	0.6031377	-19.0873714	C
0.0000103	23227.	2252326664.	17.7499052	0.0001830	-0.0006832	0.6205058	-19.6873128	C
0.0000106	23227.	2186081762.	17.7393347	0.0001885	-0.0007040	0.6378220	-20.2871550	C
0.0000109	23227.	2123622283.	17.7296820	0.0001939	-0.0007248	0.6550860	-20.8868978	C
0.0000113	23227.	2064632775.	17.7208714	0.0001994	-0.0007456	0.6722979	-21.4865407	C
0.0000116	23227.	2008831889.	17.7128358	0.0002048	-0.0007664	0.6894574	-22.0860835	C
0.0000119	23227.	1955967892.	17.7055148	0.0002103	-0.0007872	0.7065647	-22.6855258	C
0.0000122	23227.	1905814869.	17.6988545	0.0002157	-0.0008080	0.7236195	-23.2848674	C
0.0000128	23227.	1812848290.	17.6873262	0.0002266	-0.0008496	0.7575713	-24.4832467	C
0.0000134	23227.	1728529765.	17.6779154	0.0002375	-0.0008912	0.7913124	-25.6812187	C
0.0000141	23227.	1651706220.	17.6703465	0.0002485	-0.0009328	0.8248418	-26.8787806	C
0.0000147	23227.	1581420849.	17.6643909	0.0002594	-0.0009743	0.8581591	-28.0759298	C
0.0000153	23227.	1516873059.	17.6598574	0.0002704	-0.0010158	0.8912633	-29.2726633	C
0.0000159	23227.	1457387841.	17.6565848	0.0002814	-0.0010573	0.9241537	-30.4689785	C
0.0000166	23227.	1402392074.	17.6544363	0.0002924	-0.0010988	0.9568297	-31.6648723	C
0.0000172	23227.	1351395998.	17.6532952	0.0003034	-0.0011403	0.9892905	-32.8603419	C
0.0000178	23227.	1303978595.	17.6530611	0.0003144	-0.0011818	1.0215352	-34.0553843	C
0.0000184	23985.	1300891377.	17.6536473	0.0003255	-0.0012233	1.0535632	-35.2499966	C
0.0000191	24771.	1299443090.	17.6549788	0.0003365	-0.0012647	1.0853737	-36.4441758	C
0.0000197	25555.	1298053757.	17.6569897	0.0003476	-0.0013061	1.1169658	-37.6379186	C
0.0000203	26340.	1296717742.	17.6596227	0.0003587	-0.0013475	1.1483389	-38.8312222	C
0.0000209	27123.	1295430079.	17.6628273	0.0003698	-0.0013889	1.1794920	-40.0240833	C
0.0000216	27906.	1294186374.	17.6665587	0.0003809	-0.0014303	1.2104245	-41.2164987	C
0.0000222	28688.	1292982728.	17.6707776	0.0003921	-0.0014717	1.2411354	-42.4084653	C
0.0000228	29470.	1291815666.	17.6754488	0.0004032	-0.0015130	1.2716241	-43.5999797	C
0.0000234	30250.	1290682080.	17.6805409	0.0004144	-0.0015544	1.3018895	-44.7910387	C
0.0000241	31030.	1289579186.	17.6860260	0.0004256	-0.0015957	1.3319309	-45.9816388	C
0.0000247	31810.	1288504478.	17.6918789	0.0004368	-0.0016370	1.3617475	-47.1717768	C
0.0000253	32589.	1287455695.	17.6980771	0.0004480	-0.0016783	1.3913384	-48.3614491	C
0.0000259	33367.	1286430793.	17.7046003	0.0004592	-0.0017195	1.4207027	-49.5506523	C
0.0000266	34144.	1285427917.	17.7114302	0.0004705	-0.0017608	1.4498396	-50.7393829	C
0.0000272	34921.	1284445381.	17.7185500	0.0004817	-0.0018020	1.4787481	-51.9276372	C
0.0000278	35697.	1283481649.	17.7259448	0.0004930	-0.0018432	1.5074274	-53.1154116	C
0.0000284	36472.	1282535317.	17.7336009	0.0005043	-0.0018845	1.5358766	-54.3027025	C

842861.1151508 Foundation Analysis Output.txt							
0.0000291	37247.	1281605102.	17.7415059	0.0005156	-0.0019256	1.5640947	-55.4895061 C
0.0000297	38020.	1280689823.	17.7496484	0.0005269	-0.0019668	1.5920809	-56.6758187 C
0.0000303	38794.	1279788398.	17.7580182	0.0005383	-0.0020080	1.6198341	-57.8616363 C
0.0000309	39566.	1278899829.	17.7666058	0.0005497	-0.0020491	1.6473536	-59.0469551 C
0.0000316	40338.	1278023195.	17.7754025	0.0005610	-0.0020902	1.6746382	-60.0000000 CY
0.0000322	41109.	1277157644.	17.7844004	0.0005724	-0.0021313	1.7016870	-60.0000000 CY
0.0000328	41879.	1276302387.	17.7935924	0.0005839	-0.0021724	1.7284991	-60.0000000 CY
0.0000334	42632.	1274975639.	17.8007039	0.0005952	-0.0022135	1.7548940	-60.0000000 CY
0.0000341	43267.	1270223570.	17.7915565	0.0006060	-0.0022552	1.7797359	-60.0000000 CY
0.0000347	43859.	1264403804.	17.7772857	0.0006166	-0.0022971	1.8038889	-60.0000000 CY
0.0000353	44410.	1257638296.	17.7582185	0.0006271	-0.0023392	1.8273705	-60.0000000 CY
0.0000359	44861.	1248299210.	17.7260137	0.0006370	-0.0023817	1.8494915	-60.0000000 CY
0.0000366	45285.	1238569952.	17.6916557	0.0006469	-0.0024244	1.8711339	-60.0000000 CY
0.0000372	45709.	1229157449.	17.6587540	0.0006567	-0.0024671	1.8925957	-60.0000000 CY
0.0000397	47248.	1190494134.	17.5183953	0.0006953	-0.0026385	1.9747550	-60.0000000 CY
0.0000422	48369.	1146529684.	17.3428831	0.0007317	-0.0028121	2.0492358	-60.0000000 CY
0.0000447	49486.	1107369741.	17.1881211	0.0007681	-0.0029857	2.1210070	-60.0000000 CY
0.0000472	50328.	1066558915.	17.0041613	0.0008024	-0.0031614	2.1858503	-60.0000000 CY
0.0000497	51000.	1026413454.	16.8166375	0.0008356	-0.0033382	2.2461912	-60.0000000 CY
0.0000522	51669.	990059410.	16.6493990	0.0008689	-0.0035149	2.3044231	-60.0000000 CY
0.0000547	52335.	956975909.	16.4996992	0.0009023	-0.0036914	2.3605230	-60.0000000 CY
0.0000572	52962.	926118096.	16.3581335	0.0009355	-0.0038683	2.4138047	-60.0000000 CY
0.0000597	53329.	893465346.	16.1788078	0.0009657	-0.0040481	2.4601644	-60.0000000 CY
0.0000622	53687.	863306435.	16.0145024	0.0009959	-0.0042278	2.5046705	-60.0000000 CY
0.0000647	54043.	835449926.	15.8644870	0.0010262	-0.0044075	2.5474090	-60.0000000 CY
0.0000672	54398.	809638340.	15.7271871	0.0010567	-0.0045871	2.5883614	-60.0000000 CY
0.0000697	54750.	785651135.	15.6012549	0.0010872	-0.0047665	2.6275090	-60.0000000 CY
0.0000722	55098.	763259218.	15.4805322	0.0011175	-0.0049462	2.6643894	-60.0000000 CY
0.0000747	55441.	742300999.	15.3641186	0.0011475	-0.0051262	2.6990199	-60.0000000 CY
0.0000772	55750.	722267872.	15.2504548	0.0011771	-0.0053066	2.7313588	-60.0000000 CY
0.0000797	55960.	702241875.	15.1262973	0.0012054	-0.0054884	2.7604046	-60.0000000 CY
0.0000822	56127.	682918299.	15.0029893	0.0012331	-0.0056707	2.7872505	-60.0000000 CY
0.0000847	56294.	664721078.	14.8880465	0.0012608	-0.0058529	2.8125861	-60.0000000 CY
0.0000872	56459.	647553078.	14.7807615	0.0012887	-0.0060351	2.8363957	-60.0000000 CY
0.0000897	56621.	631313126.	14.6784436	0.0013165	-0.0062173	2.8585160	-60.0000000 CY
0.0000922	56777.	615883147.	14.5746452	0.0013436	-0.0064001	2.8785518	-60.0000000 CY
0.0000947	56931.	601255826.	14.4773077	0.0013708	-0.0065829	2.8971218	-60.0000000 CY
0.0000972	57085.	587369028.	14.3859455	0.0013981	-0.0067656	2.9142103	-60.0000000 CY
0.0000997	57237.	574166840.	14.3001223	0.0014255	-0.0069482	2.9298014	-60.0000000 CY
0.0001022	57388.	561598819.	14.2194449	0.0014530	-0.0071307	2.9438789	-60.0000000 CY
0.0001047	57538.	549619332.	14.1435580	0.0014807	-0.0073131	2.9564261	-60.0000000 CY
0.0001072	57687.	538187001.	14.0721400	0.0015084	-0.0074954	2.9674259	-60.0000000 CY
0.0001097	57834.	527264214.	14.0048992	0.0015362	-0.0076776	2.9768611	-60.0000000 CY
0.0001122	57980.	516816708.	13.9415702	0.0015641	-0.0078597	2.9847136	-60.0000000 CY
0.0001147	58124.	506804991.	13.8816922	0.0015921	-0.0080417	2.9909603	-60.0000000 CY
0.0001172	58261.	497161831.	13.8202465	0.0016196	-0.0082242	2.9955072	-60.0000000 CY
0.0001197	58340.	487434042.	13.7452920	0.0016451	-0.0084086	2.9983173	-60.0000000 CY
0.0001222	58415.	478076620.	13.6734955	0.0016707	-0.0085930	2.9997750	-60.0000000 CY
0.0001247	58472.	468948962.	13.6009354	0.0016959	-0.0087779	2.9979355	-60.0000000 CY
0.0001272	58528.	460172422.	13.5320326	0.0017211	-0.0089626	2.9940566	-60.0000000 CY
0.0001297	58584.	451728804.	13.4664297	0.0017464	-0.0091473	2.9971287	-60.0000000 CY
0.0001322	58638.	443599125.	13.4039476	0.0017718	-0.0093319	2.9991009	-60.0000000 CY
0.0001347	58692.	435765809.	13.3444209	0.0017973	-0.0095164	2.9999604	-60.0000000 CY
0.0001372	58745.	428209062.	13.2879651	0.0018229	-0.0097008	2.9965669	-60.0000000 CY
0.0001522	59045.	387974581.	12.9968117	0.0019780	-0.0108058	2.9948487	-60.0000000 CY
0.0001672	59305.	354719056.	12.7434801	0.0021306	-0.0119132	2.9988657	-60.0000000 CY
0.0001822	59547.	326846764.	12.5463741	0.0022858	-0.0130180	2.9985076	60.0000000 CY
0.0001972	59777.	303147530.	12.3909232	0.0024433	-0.0141204	2.9884796	60.0000000 CY
0.0002122	59987.	282709780.	12.2630443	0.0026021	-0.0152217	2.9998435	60.0000000 CY
0.0002272	60140.	264714745.	12.1366146	0.0027573	-0.0163265	2.9846854	60.0000000 CY
0.0002422	60197.	248555142.	11.9792909	0.0029012	-0.0174425	2.9966402	60.0000000 CY
0.0002572	60246.	234250718.	11.8425520	0.0030458	-0.0185580	2.9983479	60.0000000 CY
0.0002722	60285.	221484447.	11.7313345	0.0031931	-0.0196706	2.9847496	60.0000000 CY

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0.0002872	60323.	210047262.	11.6341798	0.0033412	-0.0207826	2.9883840	60.0000000	CY
0.0003022	60351.	199714364.	11.5557829	0.0034920	-0.0218917	2.9976903	60.0000000	CY
0.0003172	60359.	190295085.	11.5024036	0.0036484	-0.0229953	2.9965563	60.0000000	CY
0.0003322	60364.	181717567.	11.4577591	0.0038061	-0.0240976	2.9834276	60.0000000	CY

 Summary of Results for Nominal (Unfactored) Moment Capacity for Section 1

Moment values interpolated at maximum compressive strain = 0.003
 or maximum developed moment if pile fails at smaller strains.

Load No.	Axial Thrust kips	Nominal Mom. Cap. in-kip	Max. Comp. Strain
1	16.200	60058.723	0.00300000
2	18.000	60116.147	0.00300000
3	21.600	60230.714	0.00300000

Note note that the values of moment capacity in the table above are not factored by a strength reduction factor (phi-factor).

In ACI 318-08, the value of the strength reduction factor depends on whether the transverse reinforcing steel bars are spirals or tied hoops.

The above values should be multiplied by the appropriate strength reduction factor to compute ultimate moment capacity according to ACI 318-08, Section 9.3.2.2 or the value required by the design standard being followed.

 Summary of Pile Response(s)

Definitions of Pile-head Loading Conditions:

- Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
- Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
- Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
- Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
- Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

Load Case No.	Load Type No.	Pile-head Condition 1 V(lbs) or y(inches)	Pile-head Condition 2 in-lb, rad., or in-lb/rad.	Axial Loading lbs	Pile-head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-head Rotation radians
1	1	V = 16000.	M = 14280000.	18000.	0.07566086	14686632.	-54649.	-0.00047340
2	1	V = 25600.	M = 22848000.	21600.	0.20125940	23579015.	-95943.	-0.00184301
3	1	V = 25600.	M = 22848000.	16200.	0.20134957	23578600.	-95936.	-0.00184534

The analysis ended normally.

Base Foundation Soil Interaction = 0.07566086"/0.75" = 10.1%

```

                oooooo          o
                oo   oo          oo
    oooooo   oooooo   oo          oooooo   oo   oo   o oooooo          o oooooo
oo   o   oo   oo   oo          oo   oo   oo          oo   oo   oo   oo   oo   oo   oo   oo
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    oooooo   oo   oo   oo          oo   oo   oo          oo   oo   oo   oo   oo   oo   oo   oo
          oo   oooooo   oo          oo   oo   oo          oo   oo   oo   oo   oo   oo   oo   oo
o   oo   oo          oo   oo   oo   oo   oo   oo   oo   oo   oo   oo   oo   oo   oo   oo
oooooo   oo          oooooo   oooooo   ooo   oooooo o   oo   oo   oo   oo   oo   oo (TM)

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General Information:
 =====

File Name: \\Bngk-mpdc-01\bngk data\Departments\Telecom\Public\2016\E...\842861.1151508 spColumn.col
 Project: 182896 (842861.1151508)
 Column: Engineer: JUL
 Code: ACI 318-05 Units: English
 Run Option: Investigation Slenderness: Not considered
 Run Axis: X-axis Column Type: Structural

Material Properties:
 =====

f'c = 3 ksi fy = 60 ksi
 Ec = 3122.02 ksi Es = 29000 ksi
 Ultimate strain = 0.003 in/in
 Beta1 = 0.85

Section:
 =====

Circular: Diameter = 84 in
 Gross section area, Ag = 5541.77 in^2
 Ix = 2.44392e+006 in^4 Iy = 2.44392e+006 in^4
 rx = 21 in ry = 21 in
 Xo = 0 in Yo = 0 in

Reinforcement:
 =====

Bar Set: ASTM A615

Size	Diam (in)	Area (in^2)	Size	Diam (in)	Area (in^2)	Size	Diam (in)	Area (in^2)
# 3	0.38	0.11	# 4	0.50	0.20	# 5	0.63	0.31
# 6	0.75	0.44	# 7	0.88	0.60	# 8	1.00	0.79
# 9	1.13	1.00	# 10	1.27	1.27	# 11	1.41	1.56
# 14	1.69	2.25	# 18	2.26	4.00			

Confinement: Tied; #3 ties with #10 bars, #4 with larger bars.
 phi(a) = 0.8, phi(b) = 0.9, phi(c) = 0.65

Layout: Circular
 Pattern: All Sides Equal (Cover to longitudinal reinforcement)
 Total steel area: As = 27.94 in^2 at rho = 0.50% (Note: rho < 1.0%)
 Minimum clear spacing = 9.51 in

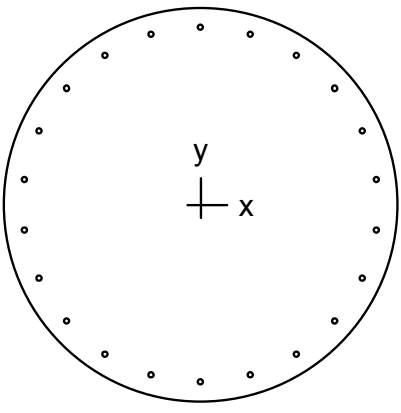
22 #10 Cover = 3.5 in

Factored Loads and Moments with Corresponding Capacities:
 =====

No.	Pu kip	Mux k-ft	PhiMnx k-ft	PhiMn/Mu NA	depth in	Dt depth in	eps_t	Phi
1	21.60	1964.92	4479.28	2.280	12.46	79.87	0.01623	0.900
2	16.20	1964.88	4465.39	2.273	12.42	79.87	0.01629	0.900

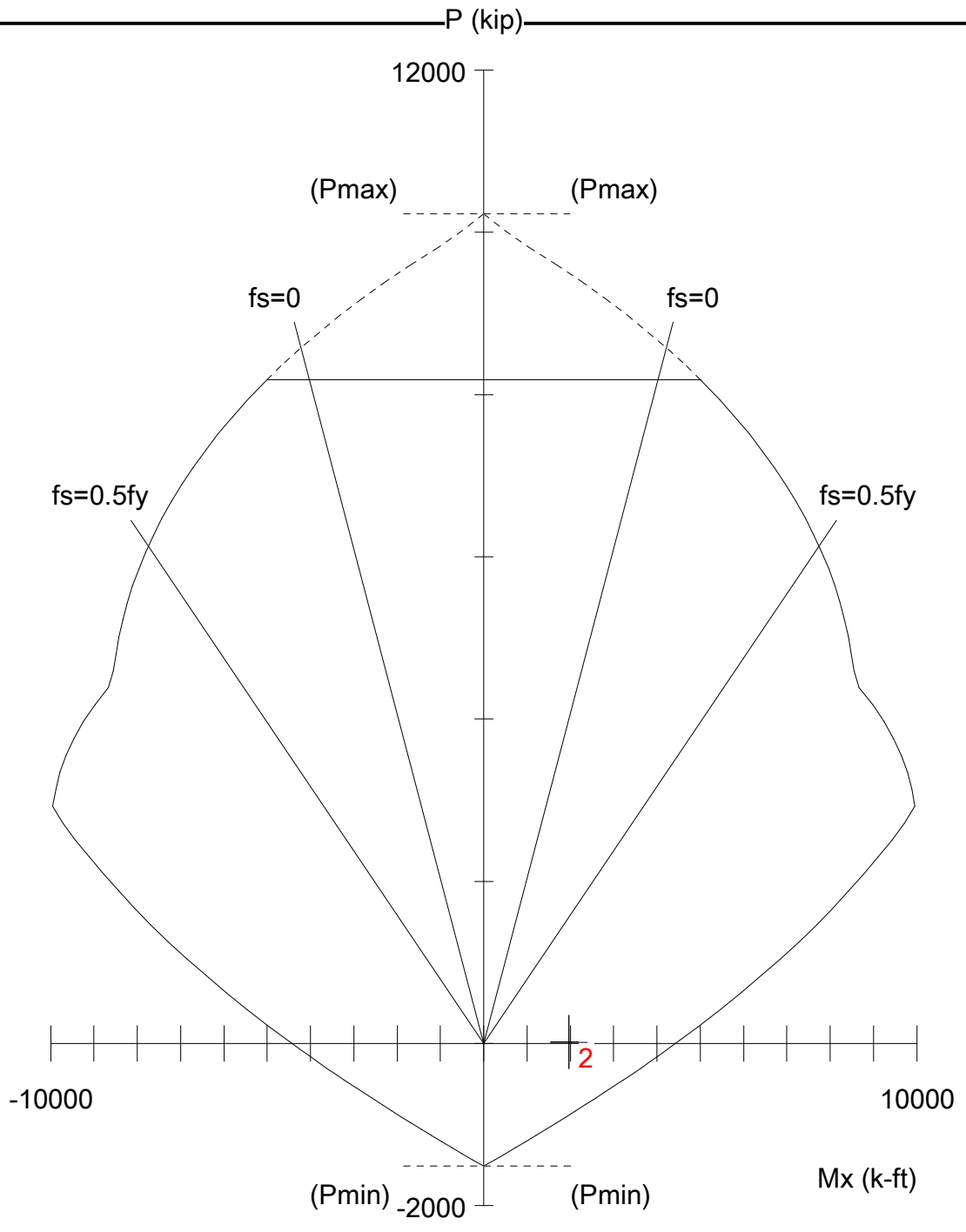
*** End of output ***

SR = 1/2.273 = 44.0%



84 in diam.

Code: ACI 318-05
 Units: English
 Run axis: About X-axis
 Run option: Investigation
 Slenderness: Not considered
 Column type: Structural
 Bars: ASTM A615
 Date: 01/06/16
 Time: 11:27:56



spColumn v4.81. Licensed to: Black & Veatch. License ID: 62342-1042289-4-29254-1A1AB

File: \\Bngk-mpdc-01\bngk_data\Departments\Telecom\Public\2016\Engineering\Tower Analy...\842861.1151508 spColumn.col
 Project: 182896 (842861.1151508)

Column:	Engineer: JUL		
f'c = 3 ksi	fy = 60 ksi	Ag = 5541.77 in ²	22 #10 bars
Ec = 3122 ksi	Es = 29000 ksi	As = 27.94 in ²	rho = 0.50%
fc = 2.55 ksi	Xo = 0.00 in	lx = 2.44392e+006 in ⁴	
e_u = 0.003 in/in	Yo = 0.00 in	ly = 2.44392e+006 in ⁴	
Beta1 = 0.85	Min clear spacing = 9.51 in	Clear cover = 3.50 in	
Confinement: Tied			
phi(a) = 0.8, phi(b) = 0.9, phi(c) = 0.65			

RADIO FREQUENCY EMISSIONS ANALYSIS REPORT
EVALUATION OF HUMAN EXPOSURE POTENTIAL
TO NON-IONIZING EMISSIONS

AT&T Existing Facility

Site ID: CTU5126

East Hartford Hochanum
223 Brainard Road
Hartford, CT 06114

February 11, 2016

EBI Project Number: 6216000629

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	34.17 %

February 11, 2016

AT&T Mobility – New England
Attn: Cameron Syme, RF Manager
550 Cochituate Road
Suite 550 – 13&14
Framingham, MA 06040

Emissions Analysis for Site: **CTU5126 – East Hartford Hochanum**

EBI Consulting was directed to analyze the proposed AT&T facility located at **223 Brainard Road, Hartford, CT**, for the purpose of determining whether the emissions from the Proposed AT&T Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01 and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter ($\mu\text{W}/\text{cm}^2$). The number of $\mu\text{W}/\text{cm}^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General population/uncontrolled exposure limits apply to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general public would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu\text{W}/\text{cm}^2$). The general population exposure limits for the 700 and 850 MHz Bands are approximately $467 \mu\text{W}/\text{cm}^2$ and $567 \mu\text{W}/\text{cm}^2$ respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 2300 MHz (WCS) bands is $1000 \mu\text{W}/\text{cm}^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed AT&T Wireless antenna facility located at **223 Brainard Road, Hartford, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since AT&T is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6 foot person standing at the base of the tower.

For all calculations, all equipment was calculated using the following assumptions:

- 1) 2 LTE channels (700 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.
- 2) 2 LTE channels (PCS Band – 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.
- 3) 2 GSM channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.
- 4) 2 GSM channels (PCS Band – 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel
- 5) 2 UMTS channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.
- 6) 2 UMTS channels (PCS Band – 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

- 7) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation 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) For the following calculations the sample point was the top of a six foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications minus 10 dB was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.
- 9) The antennas used in this modeling are the **CCI HPA-65R-BUU-H6 and the Powerwave 7770.00** for transmission in the 700 MHz, 850 MHz and 1900 MHz (PCS) frequency bands. This is based on feedback from the carrier with regards to anticipated antenna selection. Maximum gain values for all antennas are listed in the Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.
- 10) The antenna mounting height centerline of the proposed antennas is **101 feet** above ground level (AGL).
- 11) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

All calculations were done with respect to uncontrolled / general public threshold limits.

AT&T Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	1	Antenna #:	1	Antenna #:	1
Make / Model:	CCI OPA-65R-BUU-H6	Make / Model:	CCI OPA-65R-BUU-H6	Make / Model:	CCI OPA-65R-BUU-H6
Gain:	11.95 / 14.75 dBd	Gain:	11.95 / 14.75 dBd	Gain:	11.95 / 14.75 dBd
Height (AGL):	101 feet	Height (AGL):	101 feet	Height (AGL):	101 feet
Frequency Bands	700 MHz / 1900 MHz (PCS)	Frequency Bands	700 MHz / 1900 MHz (PCS)	Frequency Bands	700 MHz / 1900 MHz (PCS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	240	Total TX Power(W):	240	Total TX Power(W):	240
ERP (W):	5,462.56	ERP (W):	5,462.56	ERP (W):	5,462.56
Antenna A1 MPE%	3.03	Antenna B1 MPE%	3.03	Antenna C1 MPE%	3.03
Antenna #:	2	Antenna #:	2	Antenna #:	2
Make / Model:	Powerwave 7770.00	Make / Model:	Powerwave 7770.00	Make / Model:	Powerwave 7770.00
Gain:	11.4 / 13.4 dBd	Gain:	11.4 / 13.4 dBd	Gain:	11.4 / 13.4 dBd
Height (AGL):	101 feet	Height (AGL):	101 feet	Height (AGL):	101 feet
Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	120	Total TX Power(W):	120	Total TX Power(W):	120
ERP (W):	2,140.89	ERP (W):	2,140.89	ERP (W):	2,140.89
Antenna A2 MPE%	1.10	Antenna B2 MPE%	1.10	Antenna C2 MPE%	1.10
Antenna #:	3	Antenna #:	3	Antenna #:	3
Make / Model:	Powerwave 7770.00	Make / Model:	Powerwave 7770.00	Make / Model:	Powerwave 7770.00
Gain:	11.4 / 13.4 dBd	Gain:	11.4 / 13.4 dBd	Gain:	11.4 / 13.4 dBd
Height (AGL):	101 feet	Height (AGL):	101 feet	Height (AGL):	101 feet
Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	120	Total TX Power(W):	120	Total TX Power(W):	120
ERP (W):	2,140.89	ERP (W):	2,140.89	ERP (W):	2,140.89
Antenna A3 MPE%	1.10	Antenna B3 MPE%	1.10	Antenna C3 MPE%	1.10

Site Composite MPE%	
Carrier	MPE%
AT&T – Max per sector	5.24 %
Verizon Wireless	28.59 %
Clearwire	0.34 %
Site Total MPE %:	34.17 %

AT&T Sector 1 Total:	5.24 %
AT&T Sector 2 Total:	5.24 %
AT&T Sector 3 Total:	5.24 %
Site Total:	34.17 %

AT&T _ Per Sector	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu\text{W}/\text{cm}^2$)	Frequency (MHz)	Allowable MPE ($\mu\text{W}/\text{cm}^2$)	Calculated % MPE
AT&T 700 MHz LTE	2	940.05	101	7.49	700	467	1.60 %
AT&T 1900 MHz (PCS) LTE	2	1791.23	101	14.27	1900	1000	1.43 %
AT&T 850 MHz UMTS	2	414.12	101	3.30	850	567	0.58 %
AT&T 1900 MHz (PCS) UMTS	2	656.32	101	5.23	1900	1000	0.52 %
AT&T 850 MHz GSM	2	414.12	101	3.30	850	567	0.58 %
AT&T 1900 MHz (PCS) GSM	2	656.32	101	5.23	1900	1000	0.52 %
						Total:	5.24 %

Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general public exposure to RF Emissions.

The anticipated maximum composite contributions from the AT&T facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general public exposure to RF Emissions are shown here:

AT&T Sector	Power Density Value (%)
Sector 1:	5.24%
Sector 2:	5.24%
Sector 3 :	5.24%
AT&T Maximum Total (per sector):	5.24%
Site Total:	34.17 %
Site Compliance Status:	COMPLIANT

The anticipated composite MPE value for this site assuming all carriers present is **34.17%** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite values calculated were well within the allowable 100% threshold standard per the federal government.



Scott Heffernan
RF Engineering Director

EBI Consulting
21 B Street
Burlington, MA 01803