STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

IN RE:	:	
	:	
A PETITION OF CELLCO PARTNERSHIP D/B/A VERIZON WIRELESS FOR A DECLARATORY RULING ON THE NEED TO OBTAIN A SITING COUNCIL CERTIFICATE FOR THE INSTALLATION OF A WIRELESS TELECOMMUNICATIONS FACILITY AT 7 COLBURN ROAD, CANTERBURY, CONNECTICUT	:	PETITION NO. 1315
	:	AUGUST 8, 2017

RESPONSES OF CELLCO PARTNERSHIP D/B/A VERIZON WIRELESS TO CONNECTICUT SITING COUNCIL INTERROGATORIES

On July 26, 2017, the Connecticut Siting Council ("Council") issued Interrogatories to Cellco Partnership d/b/a Verizon Wireless ("Cellco"), relating to Petition No. 1315. Below are Cellco's responses.

Question No. 1

Who owns the existing tower facility? Was the tower owner notified of the project?

Response

The property and the tower at 7 Coburn Road are owned by John Piela. Mr. Piela did receive a copy of Petition No. 1315. The owner also has an agreement with Marcus Communications ("Marcus") for its use of the tower. The location of Cellco's antennas and the relocation of certain antennas referenced on the project plans reflect the owner's need to honor its commitment to Marcus.

Question No. 2

What types of vegetation would be removed to accommodate the new access road? If trees need to be removed, provide a tree count.

Response

Existing grass, brush and 9 trees, greater than 6" diameter at breast height, will need to be removed to construct the new gravel driveway and underground utility service from Colburn Road to the cell site. (*See* Updated Project Plans included in Attachment 1).

Question No. 3

Are drainage controls necessary for the new access road? If so, provide detail.

Response

No formal drainage controls are needed or proposed for the new access driveway. The proposed driveway will maintain a gravel surface and will be constructed at existing grade. The same overland stormwater sheet flow will be maintained after construction of the new driveway is completed.

Question No. 4

How is the tower facility currently accessed? Can this existing route be maintained for future access?

Response

Access to the tower site is currently available along the owner's driveway, then through the open field between the existing house and the tower site. There is no improved access driveway to the tower site. The owner prefers to maintain a common access drive along the western property boundary so as not to limit future development of the parcel. The proposed access driveway will be constructed within the limits of an existing 25-foot utility easement serving the tower site.

Question No. 5

Would the proposed installation affect any species listed on the DEEP Natural Diversity Database?

Response

Wood Turtle (Glyptemys insculpta), a State Special Concern species afforded protection under the Connecticut Endangered Species Act, is known to occur within the vicinity of the site according to a Connecticut Department of Energy & Environmental Protection ("DEEP") Wildlife Division's May 24, 2017 NDDB Determination letter (No. 201703600); a copy of the letter is included in Attachment 2. A Wood Turtle Protection Plan has been developed that follows recommendations in DEEP's letter and is consistent with protocols developed from previous rare species consultations and state-approved protection plans. This Wood Turtle Protection Plan, a copy of which is enclosed, will be implemented by Cellco during construction of the proposed Verizon Wireless facility.

Question No. 6

Revise the radio-frequency report to include the relocated dish antenna and existing whip antenna.

Response

The revised RF report is included in Attachment 3.

Question No. 7

The tower site plan lists "future" dish and whip antennas. What entities will be installing this equipment and when? Is Cellco requesting approval of this future equipment as part of this petition?

Response

Cellco is seeking approval for its antennas and related equipment only. The future dish and whip antennas referenced on the project plans are those that will be installed by Marcus in the future.

Question No. 8

Provide a tower structural analysis for the proposed installation. (Note on Sheet A-1).

Response

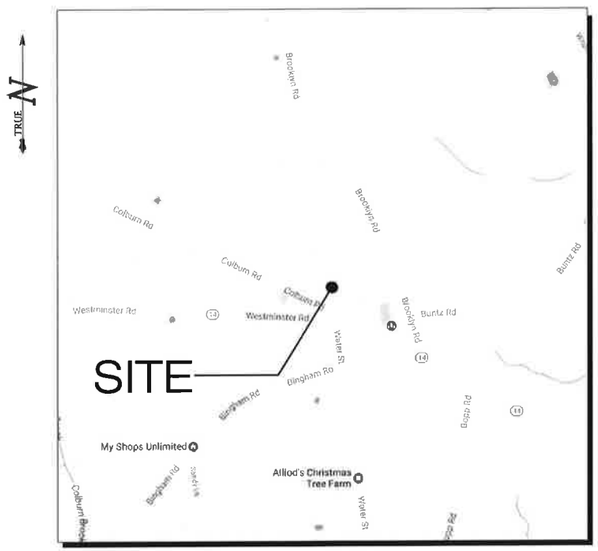
A copy of the tower structural is included in Attachment 4.

ATTACHMENT 1

verizon

WIRELESS SERVICES FACILITY

CANTERBURY WEST CT
7 COLBURN ROAD
CANTERBURY, CT 06331



LOCATION MAP
SCALE : 1" = 1000'-0"

SITE INFORMATION

SITE TYPE:	CO-LOCATION ON EXISTING GUYED TOWER
SCOPE OF WORK:	PROPOSED RF EQUIPMENT ON EXISTING GUYED TOWER AND GROUND EQUIPMENT WITHIN A PROPOSED FENCED COMPOUND EXPANSION
SITE NAME:	CANTERBURY WEST CT
SITE ADDRESS:	7 COLBURN ROAD CANTERBURY, CT 06331
ZONING JURISDICTION:	CANTERBURY, CT
COUNTY:	WINDHAM
ASSESSOR'S TAX ID#:	MAP: 24, LOT: 18
LATITUDE:	41°42'40.0243" N (41.71111786° N)
LONGITUDE:	72°01'22.0463"W (72.02279063° W)
PROPERTY OWNER:	JOHN PIELA 67 TURQUOISE AVENUE NAPLES, FL 34114
TOWER OWNER:	JOHN PIELA 67 TURQUOISE AVENUE NAPLES, FL 34114
APPLICANT:	CELLCO PARTNERSHIP d/b/a VERIZON WIRELESS 99 EAST RIVER DRIVE 9TH FLOOR EAST HARTFORD, CT 06108
LEGAL:	ROBINSON & COLE, LLP KENNETH C. BALDWIN 280 TRUMBULL STREET HARTFORD, CT 06103
SITE ENGINEER:	ALL-POINTS TECHNOLOGY CORP. 3 SADDLEBROOK DRIVE KILLINGWORTH, CT 06419 (860) 663-1697

LIST OF DRAWINGS

T-1 TITLE SHEET & INDEX

R-1 ABUTTERS MAP

A-1 COMPOUND PLAN & TOWER ELEVATION

C-1 SITE DETAILS

C-2 VERIZON EQUIPMENT DETAILS

Cellco Partnership d/b/a
verizon
99 EAST RIVER DRIVE
EAST HARTFORD, CT 06108

ALL-POINTS TECHNOLOGY CORPORATION
3 SADDLEBROOK DRIVE PHONE: (860)-663-1697
KILLINGWORTH, CT 06419 FAX: (860)-663-0935
WWW.ALLPOINTSTECH.COM

PERMITTING DOCUMENTS

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5	07/27/17	CLIENT REVISIONS: RCB
6		

DESIGN PROFESSIONALS OF RECORD

PROF: SCOTT M. CHASSE P.E.
COMP: ALL-POINTS TECHNOLOGY CORPORATION, P.C.
ADD: 3 SADDLEBROOK DRIVE KILLINGWORTH, CT 06419

VERIZON AT CANTERBURY WEST CT

SITE ADDRESS: 7 COLBURN ROAD CANTERBURY, CT 06331

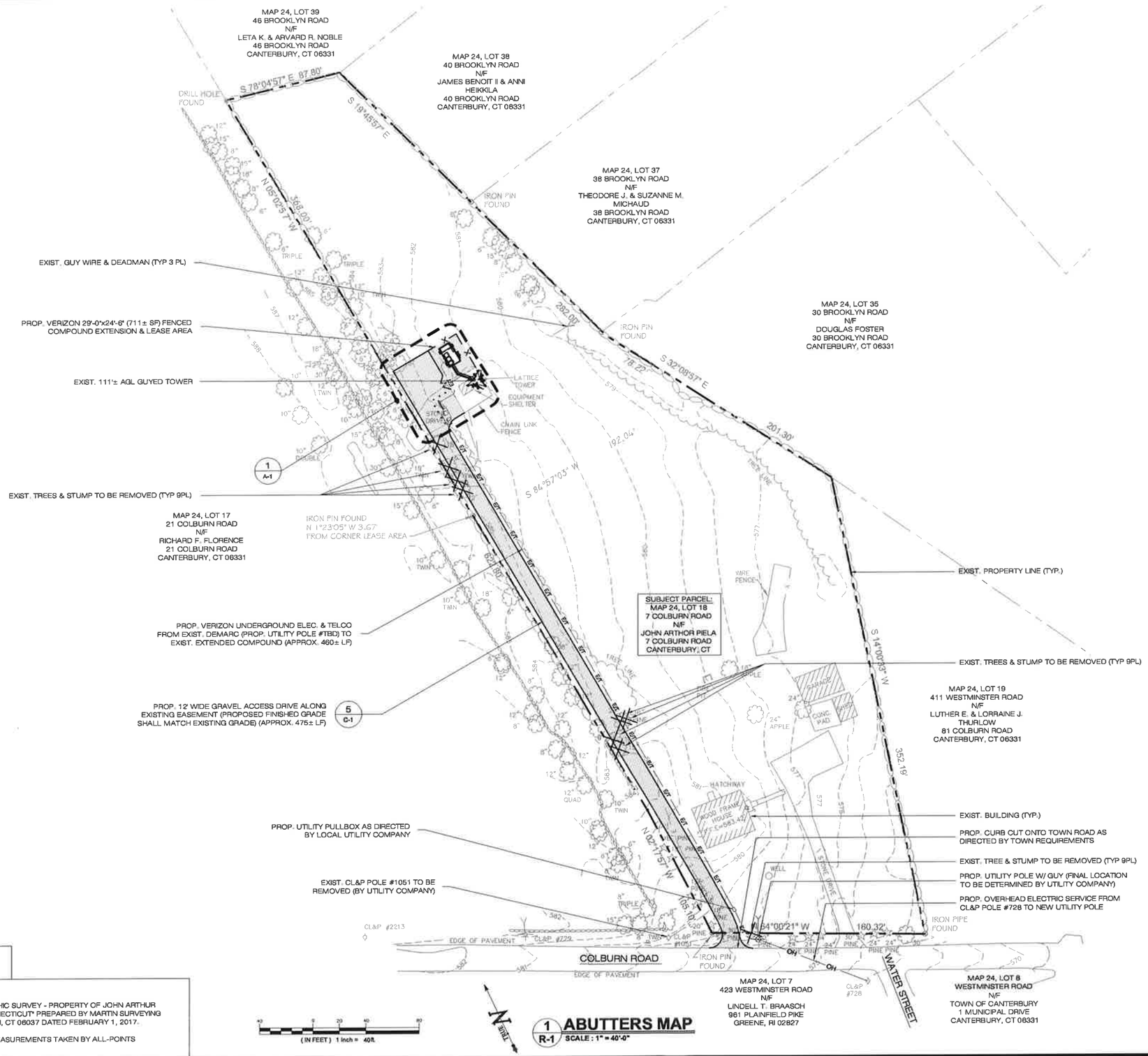
APT FILING NUMBER: CT141NB8760

DRAWN BY: CSH

DATE: 02/22/17 CHECKED BY: RCB

SHEET TITLE:
TITLE SHEET & INDEX

SHEET NUMBER:
T-1



NOTE: 9 TREES WILL BE REMOVED IN CONSTRUCTING THE FACILITY

BASE MAPPING FOR SHEETS A-1 & SP-1 FROM:

1. PLAN ENTITLED "PROPERTY AND TOPOGRAPHIC SURVEY - PROPERTY OF JOHN ARTHUR PIELA, 7 COLBURN ROAD, CANTERBURY, CONNECTICUT" PREPARED BY MARTIN SURVEYING ASSOCIATES, LLC, 201 CHRISTIAN LANE, BERLIN, CT 06037 DATED FEBRUARY 1, 2017.

2. BASE MAPPING SUPPLEMENTED W/ FIELD MEASUREMENTS TAKEN BY ALL-POINTS TECHNOLOGY CORP. ON 01-06-2017.

Cellco Partnership d/b/a

verizon

99 EAST RIVER DRIVE
EAST HARTFORD, CT 06108

ALL-POINTS TECHNOLOGY CORPORATION

3 SADDLEBROOK DRIVE
KILLINGWORTH, CT 06419
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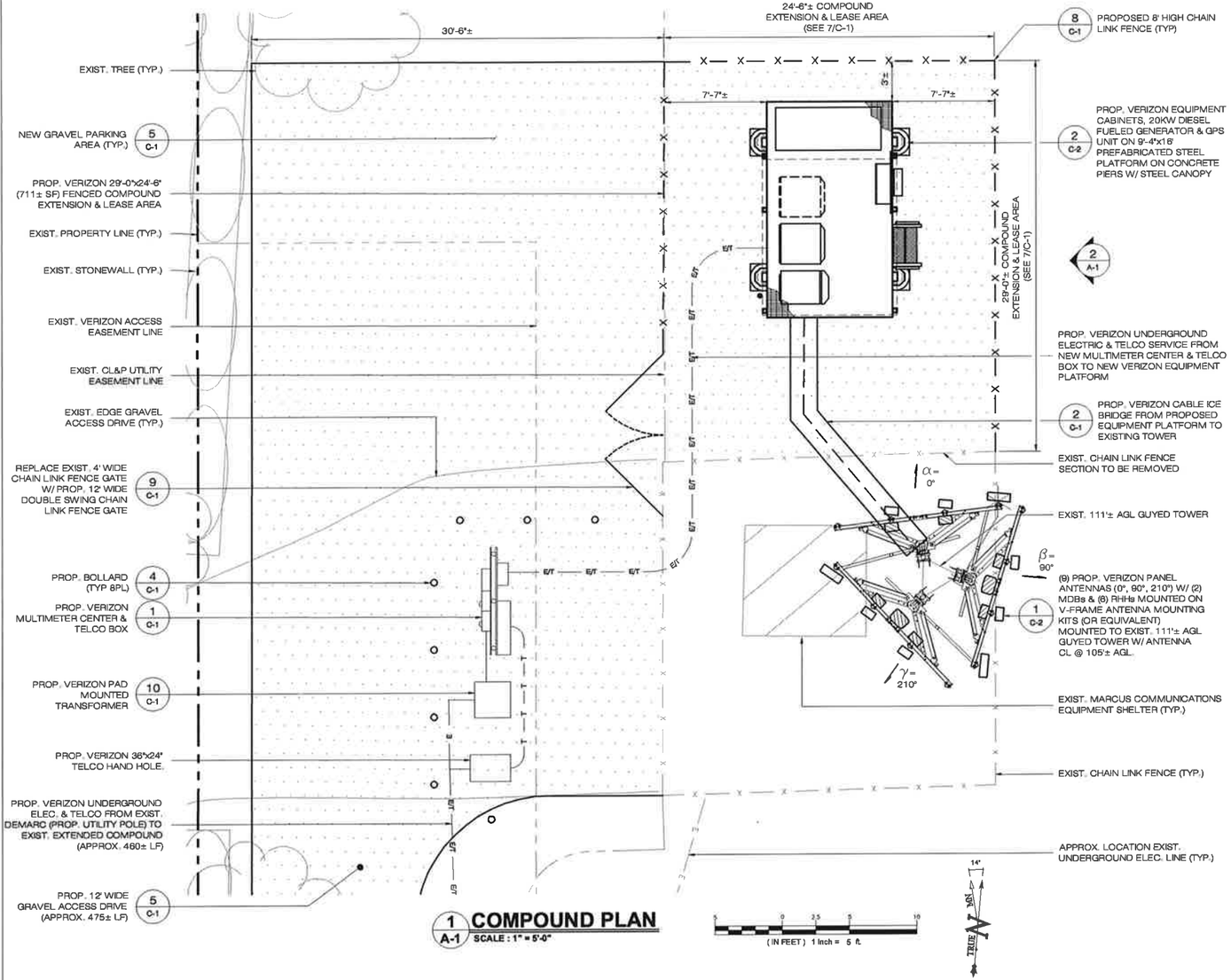
SHEET TITLE:

ABUTTERS MAP

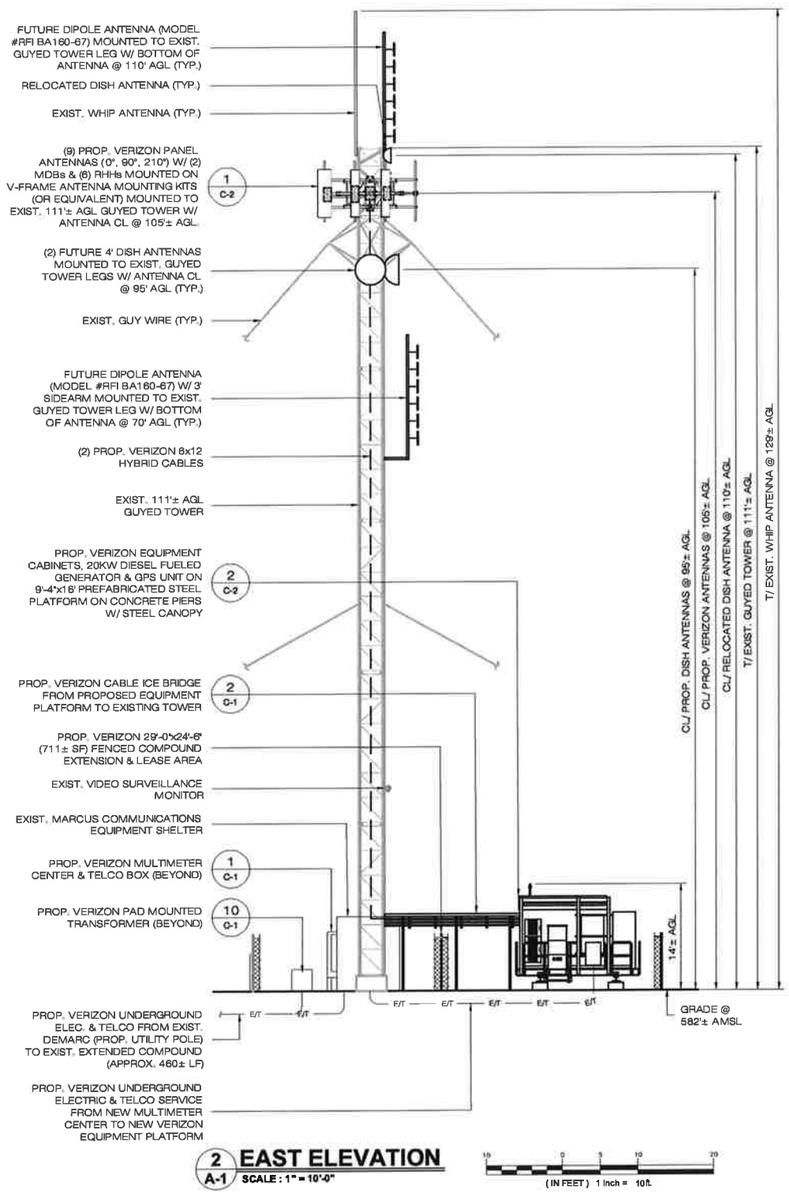
SHEET NUMBER:

R-1

STRUCTURAL NOTE:
PLEASE REFER TO STRUCTURAL ANALYSIS COMPLETED BY ALL-POINTS TECHNOLOGY CORPORATION, DATED MAY 24, 2017, AVAILABLE UNDER SEPARATE COVER.



1 A-1 COMPOUND PLAN
SCALE : 1" = 5'-0"



2 A-1 EAST ELEVATION
SCALE : 1" = 10'-0"

Cellco Partnership d/b/a

verizon

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APT FILING NUMBER: CT141NB0760

DRAWN BY: CSH

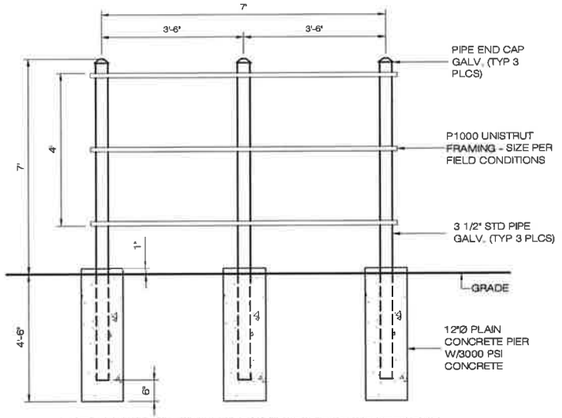
DATE: 02/22/17 CHECKED BY: RCB

SHEET TITLE:

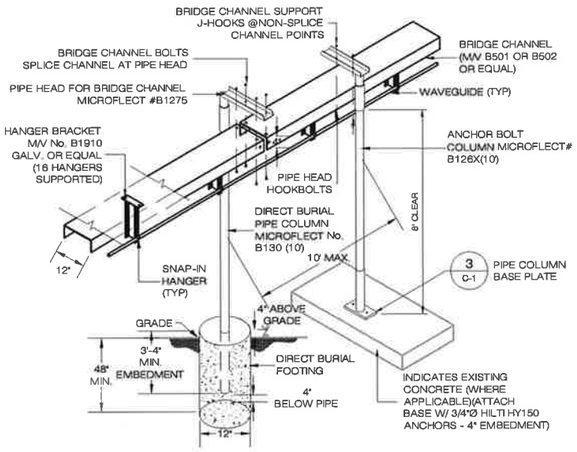
COMPOUND PLAN & TOWER ELEVATION

SHEET NUMBER:

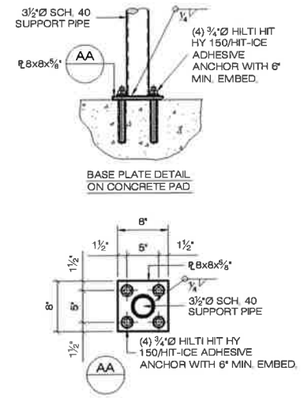
A-1



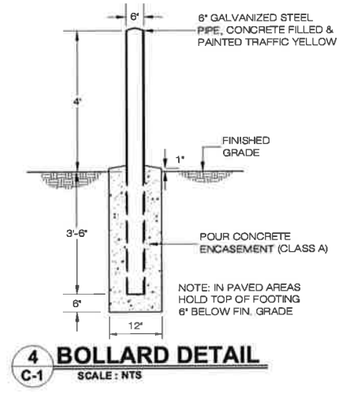
1 C-1 UTILITY BACKBOARD DETAIL
SCALE : NTS



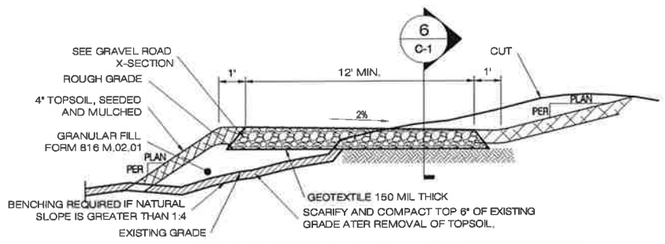
2 C-1 CABLE BRIDGE & COAX HANGER DETAIL
SCALE : NTS



3 C-1 PIPE BASE PLATE
SCALE : N.T.S.



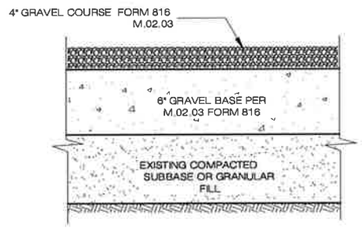
4 C-1 BOLLARD DETAIL
SCALE : NTS



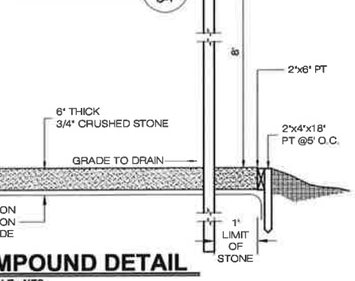
* CROSS SLOPE GRADE SHALL BE 1-2% AS SHOWN ON PROPOSED GRADING

* WHERE CUT OR FILL EMBANKMENTS ARE STEEPER THAN 3:1 USE A STAPLED IN PLACE, BIODEGRADABLE EROSION CONTROL BLANKET OR A BONDED FIBER MATRIX HYDROSEED APPLICATION.

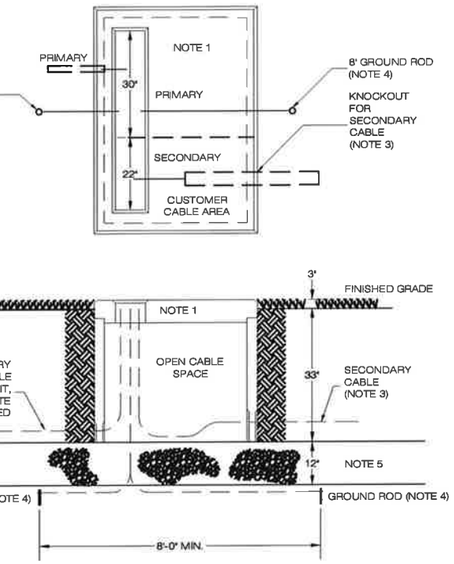
5 C-1 TYPICAL ROAD CROSS SECTION
SCALE : NTS

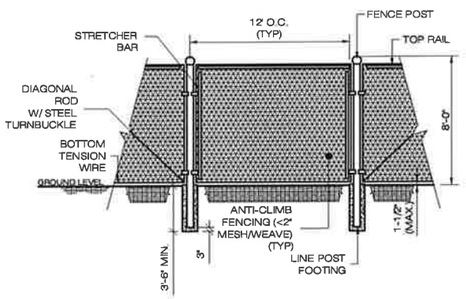


6 C-1 GRAVEL ROAD SECTION
SCALE : NTS

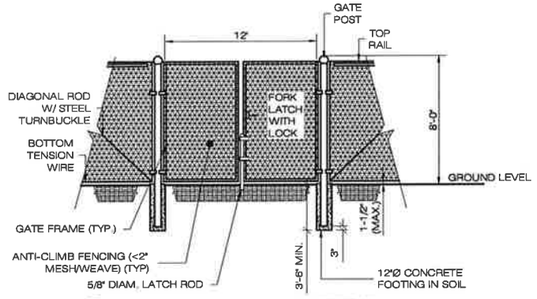


7 C-1 COMPOUND DETAIL
SCALE : NTS

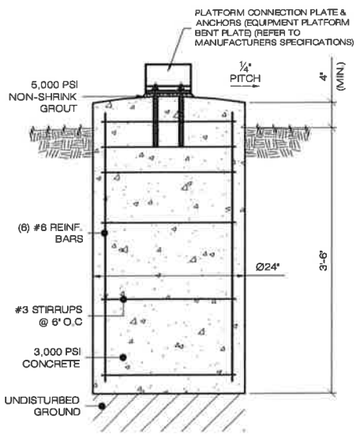




8 C-1 CHAIN-LINK FENCING DETAIL
SCALE : NTS



9 C-1 FENCE & GATE DETAIL
SCALE : N.T.S.



11 C-1 PIER DETAIL
SCALE : 1" = 1'-0"

NOTES

1. 75 - 300KVA - INSTALL 76"x54"x36" PAD AS PER SPC P-013 AND P-014. 500-2500KVA - INSTALL 76"x70"x36" PAD AS PER SPC P-015 AND P-016. (COORDINATE REQUIRED PAD SIZE FOR PROJECT WITH UTILITY COMPANY)
2. PRIMARY CABLE: BY UTILITY COMPANY
3. SECONDARY CABLE: LEAVE SLACK FOR FUTURE RECONNECTING TO TRANSFORMERS WITH HIGHER SECONDARY TERMINALS. CUSTOMER CABLE(S) SHALL ENTER FROM THE REAR AND SHALL BE CONFINED TO THE AREA DEFINED AS THE "CUSTOMER CABLE AREA".
4. GALVANIZED GROUND RODS: INSTALL IN TRENCH AND CONNECT A #2 COPPER CONDUCTOR FROM ROD THROUGH PAD OPENING AND EXTENDING 5'-0" ABOVE PAD. GROUND RODS SHALL BE A MINIMUM OF 8' FROM EACH OTHER.
5. THE EXCAVATION FOR THE PAD SHALL BE CARRIED TO A DEPTH OF 12 INCHES BELOW THE BOTTOM OF THE PAD WALLS. THE BACKFILL UNDER THE PAD WALLS SHALL BE A CLEAN GRAVEL, FREE OF FOREIGN MATTER AND CONSTRUCTION DEBRIS, AND IN ACCORDANCE WITH CONNECTICUT DOT SPEC M.02.06 GRADING "A"; BACKFILL SHALL BE PLACED IN 6 INCH LAYERS AND COMPACTED WITH MECHANICAL TAMPERS TO NOT LESS THAN 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY STANDARD COMPACTION TESTS, AASHTO T180 OR ASTM D698.
6. ALL WORK SHALL CONFORM TO EVERSOURCE TRANSFORMER PAD INSTALLATION REQUIREMENTS. REFER TO EVERSOURCE CONSTRUCTION STANDARD DTR 58.301 FOR ADDITIONAL INFORMATION.

10 C-1 UTILITY PAD TRANSFORMER DETAIL
SCALE : N.T.S.

Cellco Partnership d/b/a
verizon
99 EAST RIVER DRIVE
EAST HARTFORD, CT 06108

ALL-POINTS TECHNOLOGY CORPORATION
3 SADDLEBROOK DRIVE PHONE: (860)-663-1697
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VERIZON AT CANTERBURY WEST CT

SITE ADDRESS: 7 COLBURN ROAD CANTERBURY, CT 06331

APT FILING NUMBER: CT141NB8760

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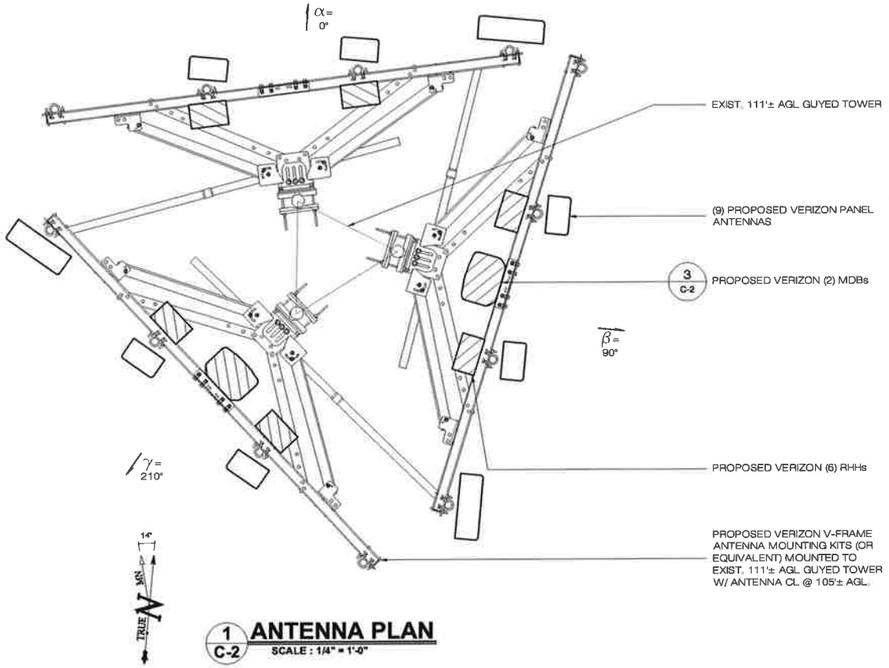
DATE: 02/22/17 CHECKED BY: RCB

SHEET TITLE:

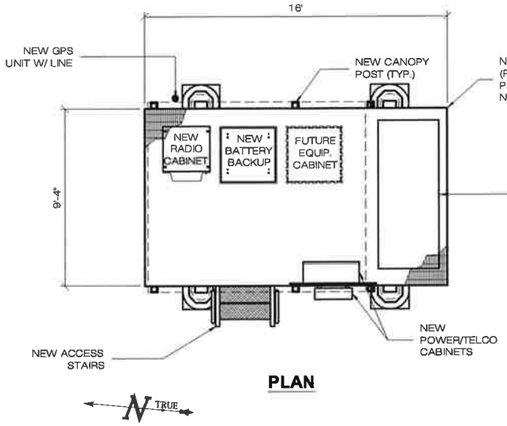
SITE DETAILS

SHEET NUMBER:

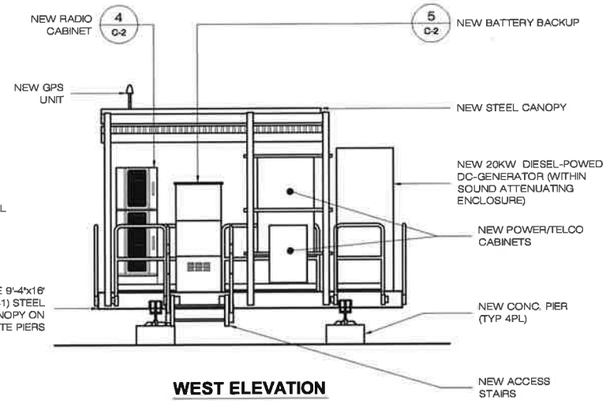
C-1



1 C-2 ANTENNA PLAN
SCALE : 1/4" = 1'-0"

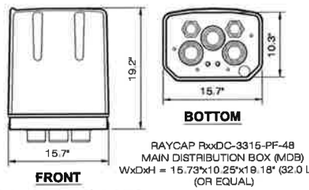


PLAN



WEST ELEVATION

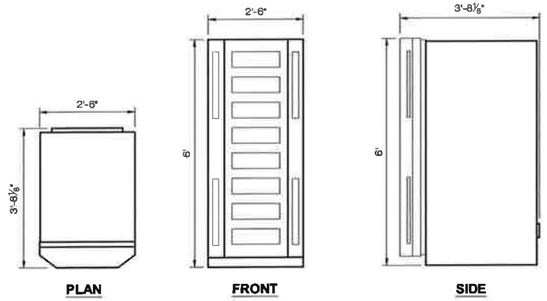
2 C-2 EQUIPMENT PLATFORM
SCALE : ¼" = 1'-0"



BOTTOM **FRONT**

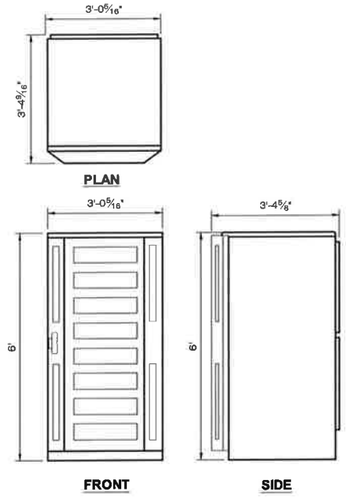
RAYCAP RxxDC-3315-PF-48
MAIN DISTRIBUTION BOX (MDB)
WxDxH = 15.73"x10.25"x19.18" (32.0 Lbs)
(OR EQUAL)

3 C-2 MAIN DISTRIBUTION BOX
SCALE: 1" = 1'-0"



PLAN **FRONT** **SIDE**

4 C-2 COMMSCOPE RBA72-30 (C-RAN) CABINET
SCALE : ½" = 1'-0"



PLAN **FRONT** **SIDE**

5 C-2 COMMSCOPE RBA72-36 BATTERY CABINET
SCALE : ½" = 1'-0"

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DRAWN BY: CSH
DATE: 02/22/17 CHECKED BY: RCB

SHEET TITLE:
VERIZON EQUIPMENT DETAILS

SHEET NUMBER:
C-2

ATTACHMENT 2

Connecticut Department of

ENERGY &
ENVIRONMENTAL
PROTECTION

May 24, 2017

Mr. Dean Gustafson
All-Points Technology Corporaton
30 Bogg Lane
Lebanon, CT 06249
dgustafson@allpointstech.com

Project: Installation of Cellular Communications Tower and Related Maintenance "Canterbury West Project "at 7 Colburn Road in Canterbury, Connecticut
NDDB Determination No.: 201703600

Dear Dean,

I have reviewed Natural Diversity Data Base maps and files regarding the area delineated on the map you provided for the proposed Installation of Cellular Communications Tower and Related Maintenance "Canterbury West Project "at 7 Colburn Road in Canterbury, Connecticut. According to our records we have known extant populations of State Special Concern *Glyptemys insculpta* (wood turtle) in the vicinity of the project site.

Wood Turtle: Habitat destruction, degradation or alteration and fragmentation all threaten Wood Turtle populations. Turtles are also particularly vulnerable to any activity that consistently reduces adult survivorship. Disturbances to stream and riparian habitats and activities that change the hydrology of the stream, the physical habitat itself and water quality are all potentially detrimental activities for the Wood Turtle. Although Wood Turtles are found within forested areas, they prefer areas that do not have a fully closed canopy cover. The greatest concern during projects occurring in wood turtle habitat are turtles being run over and crushed by mechanized equipment. Reducing the frequency that motorized vehicles enter wood turtle habitat would be beneficial in minimizing direct mortality of adults.

Recommended Protection Strategies for Turtles:
Work should occur when these turtles are active (April 1st to September 30th). Conducting land clearing while the turtle is active will allow the animal to move out of harm's way and minimize mortality to hibernating individuals. I recommend the additional following protection strategies in order to protect these turtles:

- Exclusionary practices will be required to prevent any turtle access into construction areas. These measures will need to be installed at the limits of disturbance.
- Exclusionary fencing must be at least 20 in tall and must be secured to and remain in contact with the ground and be regularly maintained (at least bi-weekly and after major weather events) to secure any gaps or openings at ground level that may let animal pass through. Do not use plastic or netted silt-fence.
- All staging and storage areas, outside of previously paved locations, regardless of the duration of time they will be utilized, must be reviewed to remove individuals and exclude them from re-entry.

- All construction personnel working within the turtle habitat must be apprised of the species description and the possible presence of a listed species, and instructed to relocate turtles found inside work areas or notify the appropriate authorities to relocate individuals.
- Any turtles encountered within the immediate work area shall be carefully moved to an adjacent area outside of the excluded area and fencing should be inspected to identify and remove access point.
- In areas where silt fence is used for exclusion, it shall be removed as soon as the area is stable to allow for reptile and amphibian passage to resume.
- No heavy machinery or vehicles may be parked in any turtle habitat.
- Special precautions must be taken to avoid degradation of wetland habitats including any wet meadows and seasonal pools.
- The Contractor must search the work area each morning prior to any work being done.
- When felling trees adjacent to brooks and streams please cut them to fall away from the waterway and do not drag trees across the waterway or remove stumps from banks.
- Avoid and limit any equipment use within 50 feet of streams and brooks.
- Any confirmed siting of box, wood or spotted turtles will be reported and documented with the NDDB (nddbrequestdep@ct.gov) on the appropriate special animal form found at (http://www.ct.gov/deep/cwp/view.asp?a=2702&q=323460&depNav_GID=1641)

If these protection strategies are followed then the proposed activities will lessen the impact on the species. This determination is good for two years. Please re-submit an NDDB Request for Review if the scope of work changes or if work has not begun on this project by May 24, 2019.

Natural Diversity Data Base information includes all information regarding critical biological resources available to us at the time of the request. This information is a compilation of data collected over the years by the Department of Energy and Environmental Protection's Natural History Survey and cooperating units of DEEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultations with the Data Base should not be substitutes for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the Data Base as it becomes available.

Please contact me if you have further questions at (860) 424-3592, or dawn.mckay@ct.gov . Thank you for consulting the Natural Diversity Data Base. A more detailed review may be conducted as part of any subsequent environmental permit applications submitted to DEEP for the proposed site.

Sincerely,

Dawn M. McKay

Dawn M. McKay
Environmental Analyst 3

WILDLIFE IN CONNECTICUT

STATE SPECIES OF SPECIAL CONCERN

Wood Turtle

Glyptemys insculpta

Background

Wood turtles may be found throughout Connecticut, but they have become increasingly rare due to their complex habitat needs. Wood turtles also have become more scarce in Fairfield County due to the fragmentation of suitable habitat by urban development.

Range

Wood turtles can be found across the northeastern United States into parts of Canada. They range from Nova Scotia through New England, south into northern Virginia, and west through the Great Lakes region into Minnesota.

Description

The scientific name of the wood turtle, *Glyptemys insculpta*, refers to the deeply sculptured or chiseled pattern found on the carapace (top shell). This part of the shell is dark brown or black and may have an array of faint yellow lines radiating from the center of each chiseled, pyramid-like segment due to tannins and minerals accumulating between ridges. These segments of the carapace, as well as those of the plastron (bottom shell), are called scutes. The carapace also is keeled, with a noticeable ridge running from front to back. The plastron is yellow with large dark blotches in the outer corners of each scute. The black or dark brown head and upper limbs are contrasted by brighter pigments ranging from red and orange to a pale yellow on the throat and limb undersides. Orange hues are most typical for New England's wood turtles. The hind feet are only slightly webbed, and the tail is long and thick at the base. Adults weigh approximately 1.5 to 2.5 pounds and reach a length of 5 to 9 inches.

Habitat and Diet

Wood turtles use aquatic and terrestrial habitats at different times of the year. Their habitats include rivers and large streams, riparian forests (adjacent to rivers), wetlands, hayfields, and other early successional habitats. Terrestrial habitat that is usually within 1,000 feet of a suitable stream or river is most likely used. Preferred stream conditions include moderate flow, sandy or gravelly bottoms, and muddy banks.

Wood turtles are omnivorous and opportunistic. They are not picky eaters and will readily consume slugs, worms, tadpoles, insects, algae, wild fruits, leaves, grass, moss, and carrion.

Life History

From late spring to early fall, wood turtles can be found roaming their aquatic or terrestrial habitats. However, once temperatures drop in autumn, the turtles retreat to rivers and large streams for hibernation. The winter

is spent underwater, often tucked away below undercut riverbanks within exposed tree roots. Dissolved oxygen is extracted from the water, allowing the turtle to remain submerged entirely until the arrival of spring. Once warmer weather sets in, the turtles will become increasingly more active, eventually leaving the water to begin foraging for food and searching for mates. Travel up or down stream is most likely, as turtles seldom stray very far from their riparian habitats.

Females nest in spring to early summer, depositing anywhere from 4 to 12 eggs into a nest dug out of soft soil, typically in sandy deposits along stream banks or other areas of loose soil. The eggs hatch in late summer or fall and the young turtles may either emerge or remain in the nest for winter hibernation. As soon as the young turtles hatch, they are on their own and receive no care from the adults.

Turtle eggs and hatchlings are heavily preyed upon by a wide variety of predators, ranging from raccoons to birds and snakes. High rates of nest predation and hatchling mortality, paired with the lengthy amount of time it takes for wood turtles to reach sexual maturity, present a challenge to maintaining sustainable populations. Wood turtles live upwards of 40 to 60 years, possibly more.

Conservation Concerns

Loss and fragmentation of habitat are the greatest threats to wood turtles. Many remaining populations in Connecticut are low in numbers and isolated from one another by human-dominated landscapes. Turtles forced to venture farther and farther from appropriate habitat to find mates and nesting sites are more likely to be run over by cars, attacked by predators, or collected by people as pets.

Other sources of mortality include entanglements in litter and debris left behind by people, as well as strikes from mowing equipment used to maintain hayfields and other early successional habitats.

The wood turtle is imperiled throughout a large portion of its range and was placed under international trade regulatory protection through the Convention on International Trade in Endangered Species (CITES) in 1992. Wood turtles also have been included on the International Union for Conservation of Nature's (IUCN) Red List as a vulnerable species since 1996. They are listed as a species of special concern in Connecticut and protected by the Connecticut Endangered Species Act.

How You Can Help

- *Conserve riparian habitat. Maintaining a buffer strip of natural vegetation (minimum of 100 feet) along the banks of streams and rivers will protect wood turtle habitat and also help improve the water quality of the stream system. Stream banks that are manicured (cleared of natural shrubby and herbaceous vegetation) or armored by rip rap or stone walls will not be used by wood turtles or most other wildlife species.*
- *Do not litter. Wood turtles and other wildlife may accidentally ingest or become entangled in garbage and die.*
- *Leave turtles in the wild. They should never be kept as pets. Whether collected singly or for the pet trade, turtles that are removed from the wild are no longer able to be a reproducing member of a population. Every turtle removed reduces the ability of the population to maintain itself.*
- *Never release a captive turtle into the wild. It probably would not survive, may not be native to the area, and could introduce diseases to wild populations.*
- *As you drive, watch out for turtles crossing the road. Turtles found crossing roads in June and July are often pregnant females. They should* ***not*** *be collected but can be helped on their way. Without creating a traffic hazard or compromising safety, drivers are encouraged to avoid running over turtles that are crossing roads. Also, still keeping safety precautions in mind, you may elect to pick up turtles from the road and move them onto the side in the direction they are headed. Never relocate a turtle to another area that is far from where you found it.*
- *Learn more about turtles and their conservation concerns, and educate others.*
- *If you see a wood turtle, leave it in the wild, take a photograph, record the location where it was seen, and contact the Connecticut Department of Environmental Protection (DEP) Wildlife Division at dep.wildlife@ct.gov, or call 860-424-3011 to report your observation.*

State of Connecticut
Department of Environmental Protection
Bureau of Natural Resources
Wildlife Division
www.ct.gov/dep

4/2011

ENVIRONMENTAL NOTES

Wood Turtle Protection Program

Wood Turtle (*Glyptemys insculpta*), a State Special Concern species afforded protection under the Connecticut Endangered Species Act, is known to occur within the vicinity of the site. The following protective measures generally conform to requirements from the Connecticut Department of Energy & Environmental Protection ("CTDEEP") Wildlife Division's May 24, 2017 NDDB Determination letter (No. 201703600) and follows protocols developed from previous rare species consultations and state-approved protection plans. This protection plan is valid for two years from the date of CTDEEP's letter, at which point if construction has not been initiated a new Natural Diversity Data Base review request from CTDEEP is required.

It is of the utmost importance that the Contractor complies with the requirement for implementation of protective measures and the education of its employees and subcontractors performing work on the project site IF work will occur during the Wood Turtle's active period (April 1st to September 30th). The month of June is particularly sensitive when turtles are active selecting nesting sites. All-Points Technology Corporation, P.C. ("APT") will serve as the Environmental Monitor for this project to ensure that these protection measures are implemented properly and will provide an education session on rare species that may be encountered and the project's proximity to sensitive wetland resources prior to the start of construction activities. The Contractor shall contact Dean Gustafson, Senior Environmental Scientist at APT, at least 5 business days prior to the pre-construction meeting. Mr. Gustafson can be reached by phone at (860) 663-1697 ext. 201 or via email at dgustafson@allpointstech.com.

The proposed Wood Turtle species protection program consists of several components: education of all contractors and sub-contractors prior to initiation of work on the site; protective measures; periodic inspection of the construction project; and, reporting.

1. **Isolation Measures & Sedimentation and Erosion Controls**

    a. Installation of sedimentation and erosion controls, required for erosion control compliance and creation of a barrier to possible migrating/dispersing turtles ("exclusionary fencing"), shall be performed by the Contractor prior to any earthwork. Exclusionary fencing must be at least 20 inches tall and must be secured to and remain in contact with the ground and be regularly maintained to secure any gaps or openings at ground level that may let animal pass through.

    b. The intent of the exclusionary fencing is to segregate the work zone's limit of disturbance and isolate it from foraging/migrating/dispersing turtles, snakes and other herpetofauna. Oftentimes complete isolation of a work zone may not be feasible due to accessibility needs and locations of staging/material storage areas, etc. In those instances, the exclusionary fencing will be positioned to deflect migrating/dispersal routes away from the work zone to minimize potential encounters with turtles, snakes and other herpetofauna.

    c. The Environmental Monitor will inspect the work zone area prior to and following erosion control barrier installation to ensure the area is free of Wood Turtle and document exclusionary fencing has been satisfactorily installed.

    d. Plastic netting used in a variety of erosion control products (i.e., erosion control blankets, fiber rolls [wattles], reinforced silt fence) has been found to entangle wildlife, including reptiles, amphibians, birds and small mammals, but particularly snakes. No permanent erosion control products or reinforced silt fence will be used on the Verizon Wireless project. Temporary erosion control products will use either erosion control blankets and fiber rolls composed of processed fibers mechanically

bound together to form a continuous matrix (netless) or netting composed of planar woven natural biodegradable fiber to avoid/minimize wildlife entanglement.

e. The Contractor is responsible for daily inspections of the sedimentation and erosion controls for tears or breeches and accumulation levels of sediment, particularly following storm events that generate a discharge. The Environmental Monitor will provide periodic inspections of the sedimentation and erosion controls throughout the duration of construction activities only as it pertains to protection of rare species and nearby wetlands. Third party monitoring of sedimentation and erosion controls will be performed by other parties, as necessary, under applicable local, state and/or federal regulations.

f. The extent of the sedimentation and erosion controls will be as shown on the site plans. The Contractor shall have additional sedimentation and erosion controls stockpiled on site should field or construction conditions warrant extending the controls as directed by the Environmental Monitor.

g. No equipment, vehicles or construction materials shall be stored outside of the exclusionary fencing or within 50 feet of wetlands or watercourses.

h. All sedimentation and erosion controls shall be removed within 30 days of completion of work and permanent stabilization of site soils so that reptile and amphibian movements are not restricted.

2. Contractor Education

a. Prior to work on site, including equipment mobilization to the site, the Contractor shall attend an educational session at the pre-construction meeting with the Environmental Monitor. This orientation and educational session will consist of an introductory meeting with the Environmental Monitor who will provide photos of Wood Turtles, emphasizing the non-aggressive nature of these turtles, the absence of need to destroy animals that might be encountered and the need to follow Protective Measures as described in Section 4 below.

b. The education session will also focus on means to discriminate between the species of concern and other native species to avoid unnecessary "false alarms". Workers will also be provided information regarding the identification of other turtle species that could be encountered. Encounters with any species of turtles will be documented.

c. The Contractor will be provided with cell phone and email contacts for the Environmental Monitor to immediately report any encounters with Wood Turtle or other turtle species. Educational poster materials will be provided by the Environmental Monitor and displayed on the job site to maintain worker awareness as the project progresses.

3. Petroleum Materials Storage and Spill Prevention

a. Certain precautions are necessary to store petroleum materials, refuel and contain and properly clean up any inadvertent fuel or petroleum (i.e., oil, hydraulic fluid, etc.) spill to avoid possible impact to nearby habitats.

b. A spill containment kit consisting of a sufficient supply of absorbent pads and absorbent material will be maintained by the Contractor at the construction site throughout the duration of the project. In addition, a waste drum will be kept on site to contain any used absorbent pads/material for proper and timely disposal off site in accordance with applicable local, state and federal laws.

c. The following petroleum and hazardous materials storage and refueling restrictions and spill response procedures will be adhered to by the Contractor.

i. Petroleum and Hazardous Materials Storage and Refueling

1. Refueling of vehicles or machinery shall occur a minimum of 100 feet from wetlands or watercourses and shall take place on an impervious pad with secondary containment designed to contain fuels.

2. Any fuel or hazardous materials that must be kept on site shall be stored on an impervious surface utilizing secondary containment a minimum of 100 feet from wetlands or watercourses.

ii. Initial Spill Response Procedures

1. Stop operations and shut off equipment.

2. Remove any sources of spark or flame.

3. Contain the source of the spill.

4. Determine the approximate volume of the spill.

5. Identify the location of natural flow paths to prevent the release of the spill to sensitive nearby waterways or wetlands.

6. Ensure that fellow workers are notified of the spill.

iii. Spill Clean Up & Containment

1. Obtain spill response materials from the on-site spill response kit. Place absorbent materials directly on the release area.

2. Limit the spread of the spill by placing absorbent materials around the perimeter of the spill.

3. Isolate and eliminate the spill source.

4. Contact the appropriate local, state and/or federal agencies, as necessary.

5. Contact a disposal company to properly dispose of contaminated materials.

iv. Reporting

1. Complete an incident report.

2. Submit a completed incident report to the Connecticut Siting Council and local, state and/or federal agencies, as necessary.

4. Turtle Protective Measures

a. Prior to the start of construction each day, the Contractor shall search the entire work area for turtles.

b. If a turtle is found, it shall be immediately moved, unharmed, by carefully grasped in both hands, one on each side of the shell, between the turtle's forelimbs and the hind limbs, and placed just outside of the isolation barrier in the same approximate direction it was walking.

c. Special care shall be taken by the Contractor during early morning and evening hours so that possible basking or foraging turtles are not harmed by construction activities.

5. Reporting

a. Daily Compliance Monitoring Reports (brief narrative and applicable photos) will be submitted by the Environmental Monitor to Verizon Wireless for compliance verification for each inspection performed. Any direct observations of turtles or reports of turtle by the Contractor will be included in the reports.

b. Following completion of the construction project, the Environmental Monitor will provide a Compliance Monitoring Summary Report to Verizon Wireless documenting implementation of the turtle protection program, monitoring and any turtle observations. Verizon Wireless will provide a copy of the Compliance Monitoring Summary Report to the Connecticut Siting Council for compliance verification.

c. Any observations of Wood Turtle will be reported to CTDEEP by Verizon Wireless, with photo-documentation (if possible) and with specific information on the location and disposition of the animal.

ATTACHMENT 3

C Squared Systems, LLC
65 Dartmouth Drive
Auburn, NH 03032
(603) 644-2800
support@csquaredsystems.com

Calculated Radio Frequency Emissions Report

verizon

Canterbury West

7 Colburn Road, Canterbury, CT 06331

August 7, 2017

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1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed installation of Verizon Wireless antenna arrays on the existing guyed tower located at 7 Colburn Road in Canterbury, CT. Marcus Communications is the only existing collocator on the tower. The coordinates of the tower are 41° 42' 40.02" N, 72° 01' 22.05" W.

Verizon is proposing to install the following:

1) Install six triband 751/1900/2100 MHz LTE antennas (two per sector);
2) Install three 875 MHz CDMA/EVDO antennas (one per sector);
3) Install nine remote radio heads (RRHs) for 751/1900/2100 MHz LTE (three per sector);
4) Relocate an existing collocator's microwave dish to a centerline of 111.0' AGL.

2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

In 1985, the FCC established rules to regulate radio frequency (RF) exposure from FCC licensed antenna facilities. In 1996, the FCC updated these rules, which were further amended in August 1997 by OET Bulletin 65 Edition 97-01. These new rules include Maximum Permissible Exposure (MPE) limits for transmitters operating between 300 kHz and 100 GHz. The FCC MPE limits are based upon those recommended by the National Council on Radiation Protection and Measurements (NCRP), developed by the Institute of Electrical and Electronics Engineers, Inc., (IEEE) and adopted by the American National Standards Institute (ANSI).

The FCC general population/uncontrolled limits set the maximum exposure to which most people may be subjected. General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Public exposure to radio frequencies is regulated and enforced in units of milliwatts per square centimeter (mW/cm^2). The general population exposure limits for the various frequency ranges are defined in the attached "FCC Limits for Maximum Permissible Exposure (MPE)" in Attachment B of this report.

Higher exposure limits are permitted under the occupational/controlled exposure category, but only for persons who are exposed as a consequence of their employment and who have been made fully aware of the potential for exposure, and they must be able to exercise control over their exposure. General population/uncontrolled limits are five times more stringent than the levels that are acceptable for occupational, or radio frequency trained individuals. Attachment B contains excerpts from OET Bulletin 65 and defines the Maximum Exposure Limit.

Finally, it should be noted that the MPE limits adopted by the FCC for both general population/uncontrolled exposure and for occupational/controlled exposure incorporate a substantial margin of safety and have been established to be well below levels generally accepted as having the potential to cause adverse health effects.

3. RF Exposure Prediction Methods

The emission field calculation results were generated using the following formula as outlined in FCC bulletin OET 65:

$$\text{Power Density} = \left(\frac{1.6^2 \times EIRP}{4\pi \times R^2} \right) \times OffBeamLoss$$

Where:

EIRP = Effective Isotropic Radiated Power

R = Radial Distance = $\sqrt{(H^2 + V^2)}$

H = Horizontal Distance from antenna in meters

V = Vertical Distance from radiation center of antenna in meters

Ground reflection factor of 1.6

Off Beam Loss factor of 10 dB (to account for directionality of antenna pattern)

These calculations assume that the antennas are operating at 100 percent capacity, that all antenna channels are transmitting simultaneously, and that the radio transmitters are operating at full power. As a result, the predicted signal levels reported below are much higher than the actual signal levels will be from the final site configuration.

4. Calculation Results

Table 1 below outlines the power density information for the site. Due to the directional nature of the proposed Verizon and existing Marcus Communications antennas, the majority of the RF power is focused out towards the horizon. As a result, there will be less RF power directed below the antennas relative to the horizon, and consequently lower power density levels around the base of the tower. Please refer to Attachments C & D for the vertical patterns of the proposed Verizon antennas and the existing Marcus Communications antennas.

There is an existing filing for Tele-Media at this site (Docket 43 – FOF). This filing is included in the table below for completeness; however, calculations are provided for the existing Marcus Communications antennas on the tower.

Carrier	Antenna Height (Feet)	Operating Frequency (MHz)	Number of Trans.	ERP Per Transmitter (Watts)	Power Density (mw/cm^2)	Limit	%MPE
Tele-Media	*105*	*N/A*	*N/A*	*N/A*	*0.0000*	*1.0000*	*0.00%*
Marcus Comm.	121.2	461.4875	2	100	0.0054	0.3077	0.18%
Marcus Comm.	111	5800	1	0.02	0.0000	1.0000	0.00%
Verizon	106	751	1	2287	0.0823	0.5007	1.64%
Verizon	106	875	9	390	0.1263	0.5833	2.16%
Verizon	106	1900	1	4889	0.1759	1.0000	1.76%
Verizon	106	2100	1	8040	0.2893	1.0000	2.89%
						Total:	**8.64%**

Table 1: Carrier Information[1]

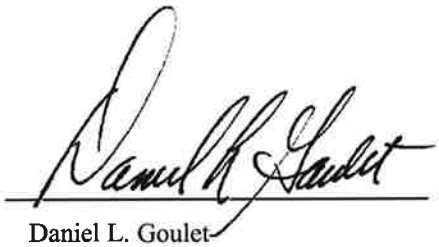
[1] Antenna heights listed for Verizon and Marcus Communications are in reference to the All-Points Technology Corporation CSC Site Plans, dated March 30, 2017.

5. Conclusion

The above analysis verifies that emissions from the proposed site configuration will be below the maximum power density levels as outlined by the FCC in the OET Bulletin 65 Ed. 97-01. The highest, cumulative expected percent of Maximum Permissible Exposure at ground level is **8.64% of the FCC Uncontrolled/General Population limit.**

6. Statement of Certification

I certify to the best of my knowledge that the statements in this report are true and accurate. The calculations follow guidelines set forth in ANSI/IEEE Std. C95.3, ANSI/IEE Std. C95.1 and FCC OET Bulletin 65 Edition 97-01.



Daniel L. Goulet
C Squared Systems, LLC

August 7, 2017
Date

Attachment A: References

OET Bulletin 65 - Edition 97-01 - August 1997 Federal Communications Commission Office of Engineering & Technology

IEEE C95.1-2005, IEEE Standard Safety Levels With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz IEEE-SA Standards Board

IEEE C95.3-2002 (R2008), IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to Such Fields, 100 kHz-300 GHz IEEE-SA Standards Board

Attachment B: FCC Limits for Maximum Permissible Exposure (MPE)

(A) Limits for Occupational/Controlled Exposure[2]

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	($900/f^2$)*	6
30-300	61.4	0.163	1.0	6
300-1500	-	-	f/300	6
1500-100,000	-	-	5	6

(B) Limits for General Population/Uncontrolled Exposure[3]

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	($180/f^2$)*	30
30-300	27.5	0.073	0.2	30
300-1500	-	-	f/1500	30
1500-100,000	-	-	1.0	30

f = frequency in MHz * Plane-wave equivalent power density

Table 2: FCC Limits for Maximum Permissible Exposure (MPE)

[2] Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

[3] General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

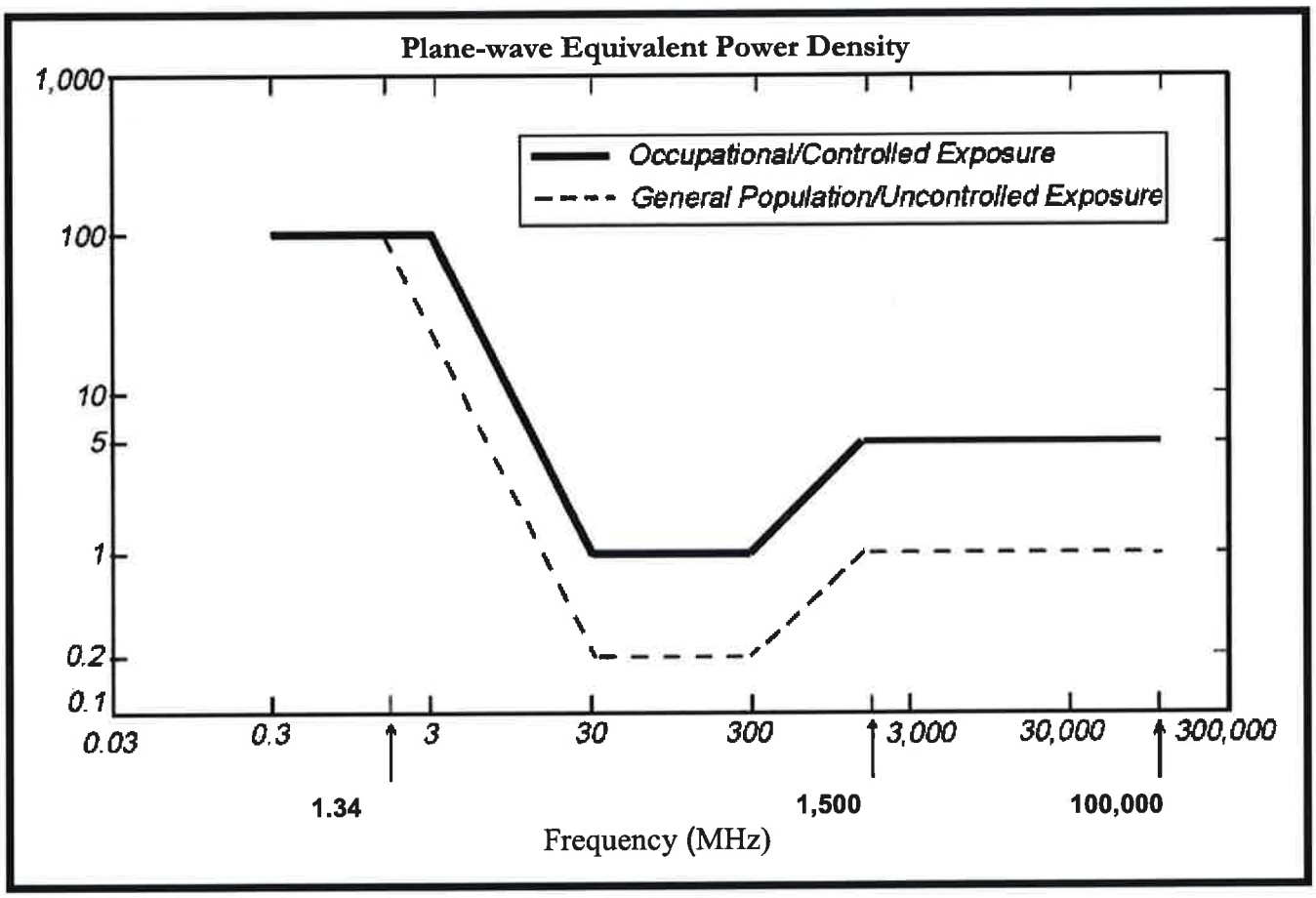
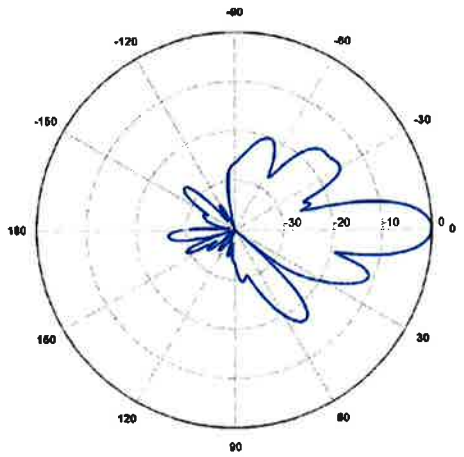


Figure 1: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

Attachment C: Verizon Wireless' Antenna Model Data Sheets and Electrical Patterns

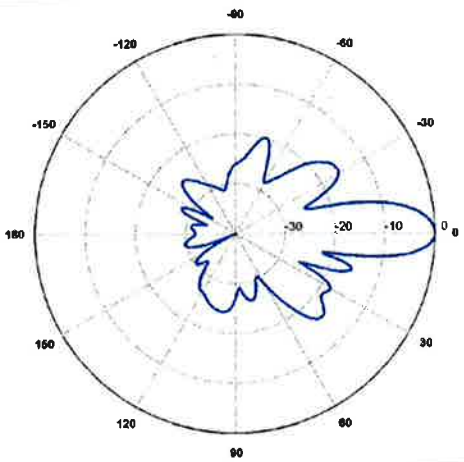
751 MHz LTE

Manufacturer:	Commscope
Model #:	SBNHH-1D65B_0
Frequency Band:	698-806 MHz
Gain:	12.8 dBd
Vertical Beamwidth:	12.1°
Horizontal Beamwidth:	68°
Polarization:	± 45°
Size L x W x D:	72.9" x 11.9" x 7.1"



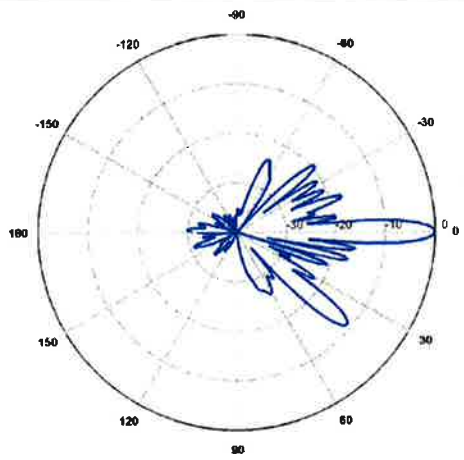
875 MHz CDMA/EVDO

Manufacturer:	Amphenol
Model #:	QUAD656C000X_0
Frequency Band:	806-900 MHz
Gain:	12.9 dBd
Vertical Beamwidth:	12.4°
Horizontal Beamwidth:	66°
Polarization:	2x ± 45°
Size L x W x D:	74.4" x 20.5" x 7.2"



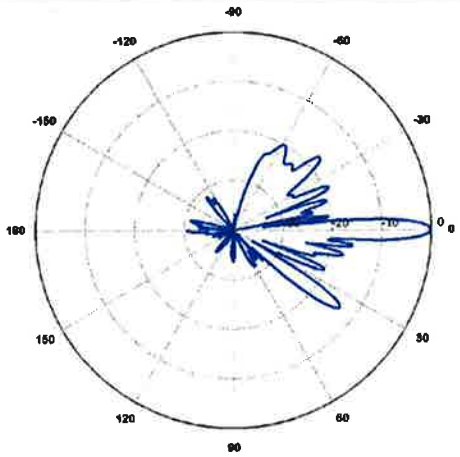
1900 MHz LTE

Manufacturer:	Commscope
Model #:	SBNHH-1D65B_0
Frequency Band:	1850-1990 MHz
Gain:	16.1 dBd
Vertical Beamwidth:	5.2°
Horizontal Beamwidth:	66°
Polarization:	± 45°
Size L x W x D:	72.9" x 11.9" x 7.1"



2100 MHz LTE

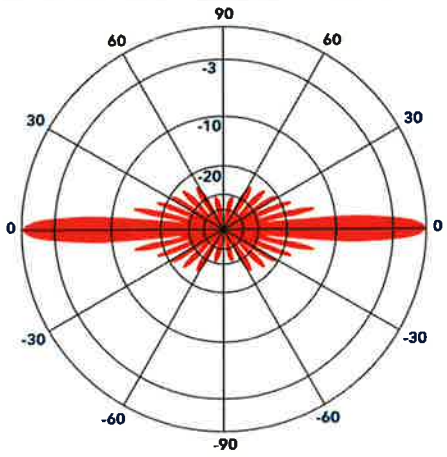
Manufacturer:	Commscope
Model #:	SBNHH-1D65B_0
Frequency Band:	1920-2200 MHz
Gain:	16.5 dBd
Vertical Beamwidth:	5.0°
Horizontal Beamwidth:	63°
Polarization:	± 45°
Size L x W x D:	72.9" x 11.9" x 7.1"



Attachment D: Marcus Communications' Antenna Model Data Sheets and Electrical Patterns

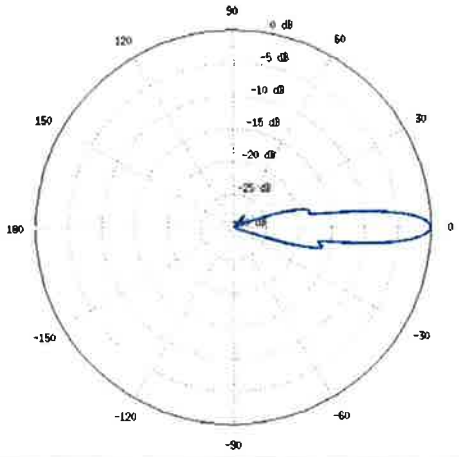
461 MHz

Manufacturer:	Telewave
Model #:	ANT450F10
Frequency Band:	430-475 MHz
Gain:	10.0 dBd
Vertical Beamwidth:	7°
Horizontal Beamwidth:	360°
Polarization:	Single
Length:	244.0"



5800 MHz

Manufacturer:	Ubiquiti Networks
Model #:	PBE-5AC-500
Frequency Band:	5150-5875 MHz
Gain:	24.9 dBd
Vertical Beamwidth:	10°
Horizontal Beamwidth:	10°
Polarization:	Dual Linear
Diameter:	20.7"



ATTACHMENT 4

ALL-POINTS
TECHNOLOGY CORPORATION

STRUCTURAL ANALYSIS REPORT
110' GUYED TOWER
CANTERBURY, CONNECTICUT

Prepared for
Marcus Communications

Site: Canterbury West

May 24, 2017

APT Project #CT122200

□ 3 SADDLEBROOK DRIVE · KILLINGWORTH, CT 06419 · PHONE 860-663-1697 · FAX 860-663-0935
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STRUCTURAL ANALYSIS REPORT
110' GUYED LATTICE TOWER
CANTERBURY, CONNECTICUT
prepared for
Marcus Communications

EXECUTIVE SUMMARY:

All-Points Technology Corporation, P.C. (APT) performed a structural analysis of this 110-foot guyed, lattice tower located in Canterbury, Connecticut. The analysis was performed for Marcus Communications' proposed installation of two 4' high performance dishes, two RFI BA160-67 dipole antennas and Verizon Wireless's proposed installation of nine panel antennas, nine remote radio heads (RRHs) and two power/fiber distribution boxes (D-boxes) at 105' as detailed below.

APT's analysis indicates the tower meets the requirements of the Connecticut State Building Code and TIA-222 Revision G with the proposed equipment.

Evaluation of the base foundation and guy anchors was performed from dimensions provided by Centek Engineering. The existing foundation and anchors were found to be adequately sized for the proposed equipment.

INTRODUCTION:

A structural analysis was performed on the above-mentioned communications tower by APT for Marcus Communications. The tower is located at 7 Colburn Road in Canterbury, Connecticut. APT visited the tower site on January 6, 2017 and viewed the tower from the ground. Tower geometry and steel information was taken from structural analysis reports provided to us.

The structure is a 110-foot, three-legged, guyed steel lattice tower designed by an unknown manufacturer. The tower consists of six vertical sections constructed of steel pipe legs and welded diagonal and horizontal bracing. The following documents were utilized:

Document	Remarks	Date	Source
Structural Analysis Report	CENTEK Project No. 15145.000,	10/26/2015	Verizon
Structural Analysis Report and Reinforcement Design	CENTEK Project No. 15145.000, Revision 1	9/2/2016	Verizon

The analysis was performed in accordance with TIA-222 Revision G using the following antenna inventory (proposed equipment shown in **bold** text):

Elev.	Antenna	Mount	Coax.
110'	18' omnidirectional whip, 2' dish [1]	Legs	(2) 1/2"
110'	**RFI BA160-67 dipole**	**Leg**	**7/8"**
105'	**(6) SBNHH-1D65B, (3) QUAD656C0000G panels, (9) RRHs, (2) D-boxes**	**(3) 12' sector mounts**	**(2) hybrid**
95'	**(2) 4' high performance dishes**	**Legs**	**(2) 3/8"**
70'	**RFI BA160-67 dipole**	**3' sideam**	**7/8"**
26'-8"	Fish-eye camera	Leg	1/4"

[1] 2' dish relocated from 105'

STRUCTURAL ANALYSIS:

Methodology:

The structural analysis was done in accordance with the Connecticut State Building Code and TIA-222, Revision G (TIA), Structural Standard for Antenna Supporting Structures and Antennas.

The analysis was conducted using a 3-second gust wind speed of 107 miles per hour with no ice and 40-mph with 1" radial ice in accordance with the TIA-222-G standard for this area of Windham County, Connecticut. The following additional design criteria were used:

Structure Class:	II
Topographic Category:	1
Exposure Category:	B

Analysis Results:

Analysis of the tower was conducted in accordance with the criteria outlined herein with antenna changes as previously described. The following table summarizes the results of the analysis based on stresses of individual leg and bracing members:

Elevation	Leg Capacity	Bracing Capacity
100'-110'	16%	57%
80'-100'	31%	22%
60'-80'	35%	32%
40'-60'	50%	37%
20'-40'	53%	16%
0'-20'	67%	23%

Splice and Anchor Bolts:

Connection bolts were evaluated under the proposed loading. All bolts were found to be adequately sized to support the proposed loads.

Guy Cables:

APT's calculations indicate the existing 3/8" guy wires are adequately sized for the proposed equipment.

Base Foundation and Guy Anchors:

Guy anchors were evaluated from anchor dimensions provided by Centek Engineering. The existing guy anchors reportedly consist of three 5' long x 2'-8" wide x 2' thick concrete anchor blocks buried 3' below existing grade. An allowable soil bearing capacity of 4750 psf was assumed. The existing anchors and base foundation were determined to be adequately sized. Factored base reactions calculated with the proposed equipment are as follows:

Location	Vertical	Horizontal	OTM
Base:	58.7 kips	1.1 kips	64.5'-k
Guy Anchor:	-11.6 kips	10.5 kips	N.A.

CONCLUSIONS AND RECOMMENDATIONS:

APT's structural analysis indicates that the 110-foot guyed, lattice tower located at 7 Colburn Road in Canterbury, Connecticut meets the requirements of the Connecticut State Building Code and TIA-222 Revision G with Marcus Communications' and Verizon Wireless's proposed equipment.

LIMITATIONS:

This report is based on the following:

1. Tower is properly installed and maintained.
2. All members are in an undeteriorated condition.
3. All required members are in place.
4. All bolts are in place and are properly tightened.
5. Tower is in plumb condition.

6. All tower members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.

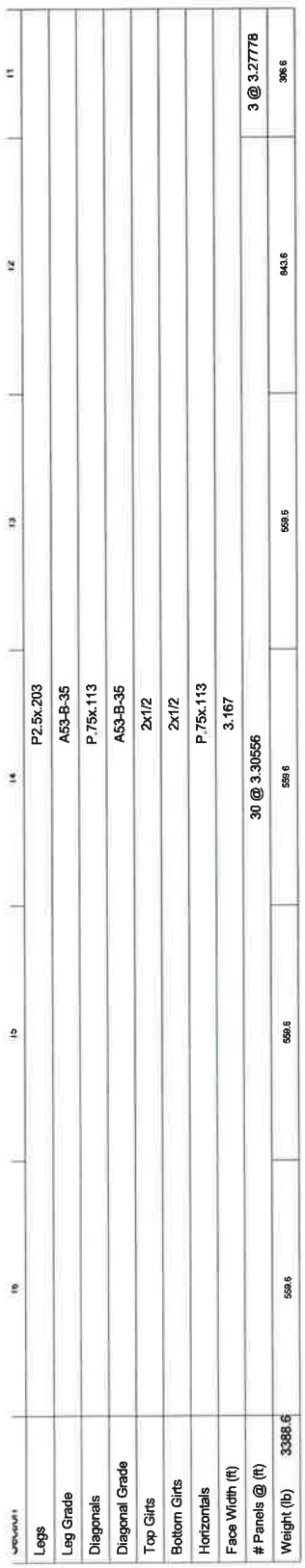
All-Points Technology Corporation, P.C. (APT) is not responsible for modifications completed prior to or hereafter which APT is not or was not directly involved. Modifications include but are not limited to:

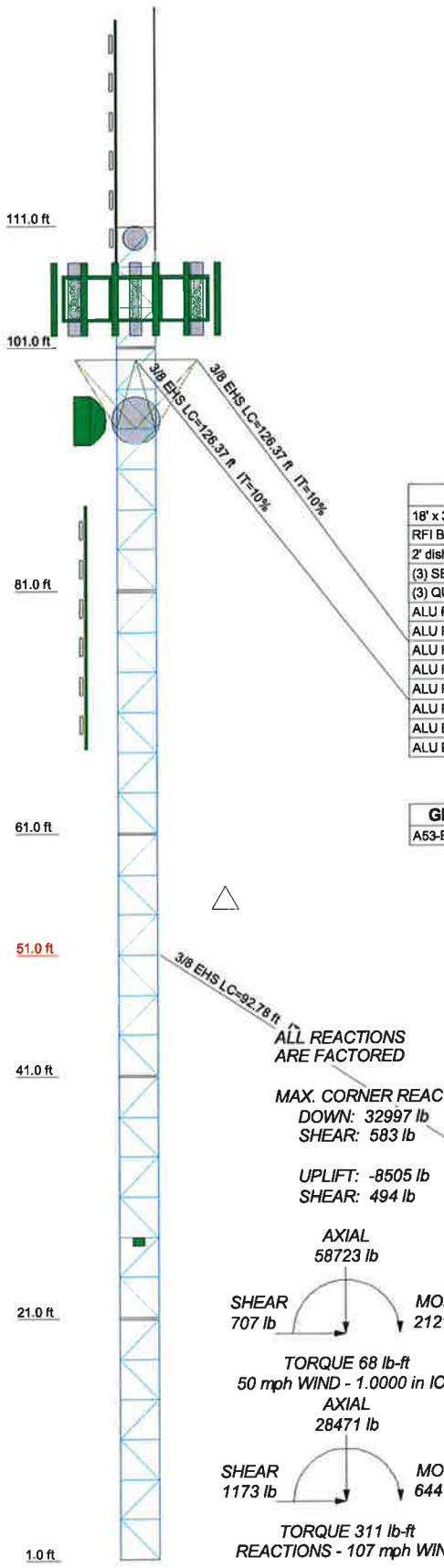
1. Replacing or strengthening bracing members.
2. Reinforcing vertical members in any manner.
3. Adding or relocating torque arms or guys.
4. Installing antenna mounting gates or side arms.

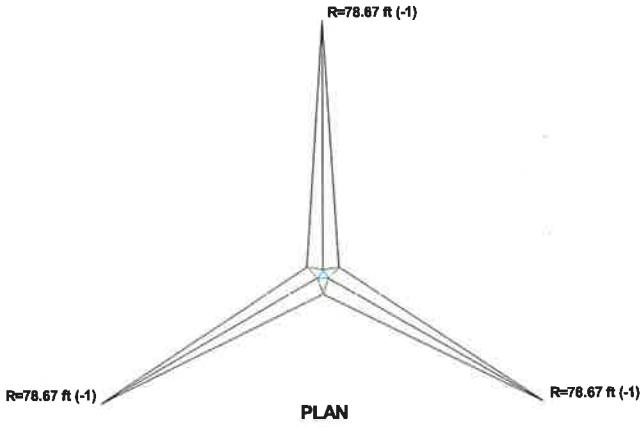
APT hereby states that this document represents the entire report and that it assumes no liability for any factual changes that may occur after the date of this report. All representations, recommendations, and conclusions are based upon the information contained and set forth herein. If you are aware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

Appendix A

Tower Schematic





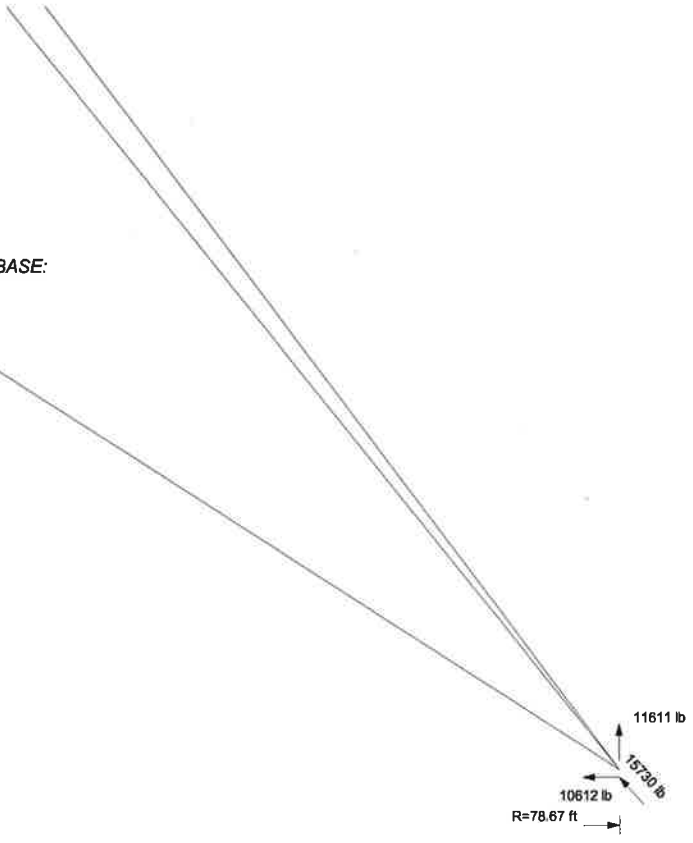


DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
18' x 3" omni whip	110	ALU B13 RRH4x30 w/bracket	105
RFI BA160-67 dipole	110	RFS DB-T1-6Z-8AB-0Z D-box	105
2' dish, no radome	110	RFS DB-T1-6Z-8AB-0Z D-box	105
(3) SBNHH-1D65B	105	12' T-frame sector mnt	105
(3) QUAD656C0000G	105	12' T-frame sector mnt	105
ALU RRH2x90-AWS w/bracket	105	12' T-frame sector mnt	105
ALU RRH2x90-AWS w/bracket	105	(3) SBNHH-1D65B	105
ALU RRH2x90-AWS w/bracket	105	4' HP dish	95
ALU RRH2x60-AWS w/bracket	105	4' HP dish	95
ALU RRH2x60-AWS w/bracket	105	RFI BA160-67 dipole	86 - 70
ALU RRH2x60-AWS w/bracket	105	3' sidearm	70
ALU B13 RRH4x30 w/bracket	105	8" fisheye camera	27.7 - 27
ALU B13 RRH4x30 w/bracket	105		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-35	35 ksi	63 ksi			



ALL REACTIONS ARE FACTORED

All-Points Technology Corporation
116 Grandview Road
Conway, NH 03818
Phone: (603) 496-5853
FAX: (603) 447-2124

Job:	110' Guyed Lattice Tower, Canterbury,
Project:	CT122200 Canterbury West
Client: Marcus Communications	Drawn by: Rob Adair App'd:
Code: TIA-222-G	Date: 05/24/17 Scale: N
Path: Z:\Shared\NH Office\Jobs\CT122200 Canterbury West\CT122200 Canterbury West.en	Dwg No.

Appendix B

Photographs

MARCUS COMMUNICATIONS
110' GUYED LATTICE TOWER
CANTERBURY, CONNECTICUT
VERIZON SITE: CANTERBURY WEST


Overview of the 110' guyed tower located in Canterbury, Connecticut.


Photos of existing equipment, guy wires & torque arm on 110' guyed tower.

Photos taken by All-Points Technology Corporation, P.C. on January 6, 2017.

MARCUS COMMUNICATIONS
110' GUYED LATTICE TOWER
CANTERBURY, CONNECTICUT
VERIZON SITE: CANTERBURY WEST

Photos of guy wire attachment at anchors.

Photos taken by All-Points Technology Corporation, P.C. on January 6, 2017.

MARCUS COMMUNICATIONS
110' GUYED LATTICE TOWER
CANTERBURY, CONNECTICUT
VERIZON SITE: CANTERBURY WEST

Photo of typical anchor head..

Photo of tower base and shelter.

Photos taken by All-Points Technology Corporation, P.C. on January 6, 2017.

MARCUS COMMUNICATIONS
110' GUYED LATTICE TOWER
CANTERBURY, CONNECTICUT
VERIZON SITE: CANTERBURY WEST

Photos of tower base and foundation pier.

Photos taken by All-Points Technology Corporation, P.C. on January 6, 2017.

Appendix C

Calculations

Tower Input Data

The main tower is a 3x guyed tower with an overall height of 111.00 ft above the ground line.
The base of the tower is set at an elevation of 1.00 ft above the ground line.
The face width of the tower is 3.17 ft at the top and 3.17 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Basic wind speed of 107 mph.
Structure Class II.
Exposure Category B.
Topographic Category 1.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Deflections calculated using a wind speed of 60 mph.
Safety factor used in guy design is 1.
Stress ratio used in tower member design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Guy Data

Guy Elevation	Guy Grade		Guy Size	Initial Tension	%	Guy Modulus	Guy Weight	L_u	Anchor Radius	Anchor Azimuth Adj.	Anchor Elevation	End Fitting Efficiency
ft				lb		ksi	plf	ft	ft	°	ft	%
100	EHS	A	3/8	1540.00	10%	21000.	0.273	126.25	78.67	0.0000	-1.00	100%
		B	3/8	1540.00	10%	21000	0.273	126.25	78.67	0.0000	-1.00	100%
		C	3/8	1540.00	10%	21000	0.273	126.25	78.67	0.0000	-1.00	100%
51	EHS	A	3/8	1540.00	10%	21000	0.273	92.70	78.67	0.0000	-1.00	100%
		B	3/8	1540.00	10%	21000	0.273	92.70	78.67	0.0000	-1.00	100%
		C	3/8	1540.00	10%	21000	0.273	92.70	78.67	0.0000	-1.00	100%

Guy Elevation	Mount Type	Torque-Arm Spread	Torque-Arm Leg Angle	Torque-Arm Style	Torque-Arm Grade	Torque-Arm Type	Torque-Arm Size
ft		ft	°				
100	Torque Arm	10.00	30.0000	Bat Ear	A36 (36 ksi)	Single Angle	L3x3x3/16
51	Corner						

Feed Line/Linear Appurtenances

Description	Face or Leg	Allow Shield	Component Type	Placement	Face Offset	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing	Width or Diameter	Perimeter	Weight
				ft	in				in	in	in	plf
1 5/8	A	No	Ar (CaAa)	106.00 - 9.00	0.0000	-0.4	2	2	0.5000	1.9800		1.04
1/2	C	No	Ar (CaAa)	110.00 - 9.00	0.0000	-0.41	1	1	0.5800	0.5800		0.25
7/8	C	No	Ar (CaAa)	110.00 - 9.00	0.0000	-0.42	1	1	1.1100	1.1100		0.54
7/8	C	No	Ar (CaAa)	70.00 - 9.00	0.0000	-0.43	1	1	1.1100	1.1100		0.54
3/8	C	No	Ar (CaAa)	95.00 - 9.00	0.0000	-0.44	1	1	0.4400	0.4400		0.08
3/8	C	No	Ar (CaAa)	95.00 - 9.00	0.0000	-0.45	1	1	0.4400	0.4400		0.08
1/2	C	No	Ar (CaAa)	91.00 - 9.00	0.0000	-0.39	2	1	0.5800	0.5800		0.25
1/4	C	No	Ar (CaAa)	27.70 - 9.00	0.0000	0.38	1	1	0.2500	0.2500		0.05

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
18' x 3" omni whip	B	From Leg	0.00 0.00 9.00	0.0000	110.00	No Ice 1/2" Ice 1" Ice	5.40 7.23 9.08	5.40 7.23 9.08	60.00 98.89 149.24
RFI BA160-67 dipole	C	From Leg	0.00 0.00 8.00	0.0000	110.00	No Ice 1/2" Ice 1" Ice	6.41 9.04 10.90	6.41 9.04 10.90	60.00 110.12 171.79
(3) SBNHH-1D65B	A	From Leg	3.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	8.08 8.53 9.00	5.34 5.79 6.26	50.00 100.05 156.20
(3) SBNHH-1D65B	B	From Leg	3.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	8.08 8.53 9.00	5.34 5.79 6.26	50.00 100.05 156.20
(3) QUAD656C0000G	C	From Leg	3.00 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	13.24 13.75 14.27	5.62 6.09 6.56	60.00 134.91 216.64
ALU RRH2x90-AWS w/bracket	A	From Face	2.50 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	2.58 2.79 3.01	1.63 1.81 2.00	80.00 100.47 124.06
ALU RRH2x90-AWS w/bracket	B	From Face	2.50 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	2.58 2.79 3.01	1.63 1.81 2.00	80.00 100.47 124.06
ALU RRH2x90-AWS w/bracket	C	From Face	2.50 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	2.58 2.79 3.01	1.63 1.81 2.00	80.00 100.47 124.06
ALU RRH2x60-AWS w/bracket	A	From Face	2.50 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	3.35 3.60 3.87	2.02 2.25 2.49	60.00 83.19 110.02
ALU RRH2x60-AWS w/bracket	B	From Face	2.50 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	3.35 3.60 3.87	2.02 2.25 2.49	60.00 83.19 110.02
ALU RRH2x60-AWS w/bracket	C	From Face	2.50 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	3.35 3.60 3.87	2.02 2.25 2.49	60.00 83.19 110.02
ALU B13 RRH4x30 w/bracket	A	From Face	2.50 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	2.16 2.35 2.55	1.80 1.98 2.17	60.00 80.73 104.49
ALU B13 RRH4x30 w/bracket	B	From Face	2.50 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	2.16 2.35 2.55	1.80 1.98 2.17	60.00 80.73 104.49
ALU B13 RRH4x30 w/bracket	C	From Face	2.50 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	2.16 2.35 2.55	1.80 1.98 2.17	60.00 80.73 104.49
RFS DB-T1-6Z-8AB-0Z D-box	A	From Face	2.50 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	4.80 5.07 5.35	2.00 2.19 2.39	45.00 81.13 121.22
RFS DB-T1-6Z-8AB-0Z D-box	B	From Face	2.50 0.00 0.00	0.0000	105.00	No Ice 1/2" Ice 1" Ice	4.80 5.07 5.35	2.00 2.19 2.39	45.00 81.13 121.22
12' T-frame sector mnt	A	None		0.0000	105.00	No Ice 1/2" Ice 1" Ice	10.20 13.80 17.40	5.10 6.90 8.70	465.00 600.00 735.00
12' T-frame sector mnt	B	None		0.0000	105.00	No Ice 1/2" Ice 1" Ice	10.20 13.80 17.40	5.10 6.90 8.70	465.00 600.00 735.00
12' T-frame sector mnt	C	None		0.0000	105.00	No Ice 1/2" Ice	10.20 13.80	5.10 6.90	465.00 600.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral / Vert	Azimuth Adjustment	Placement		C_AA_A Front	C_AA_A Side	Weight
			ft	°	ft		ft^2	ft^2	lb
						1" Ice	17.40	8.70	735.00
RFI BA160-67 dipole	C	From Leg	3.00	0.0000	86.00 - 70.00	No Ice	6.41	6.41	60.00
			0.00			1/2" Ice	9.04	9.04	110.12
			0.00			1" Ice	10.90	10.90	171.79
3' sidearm	C	None		0.0000	70.00	No Ice	1.43	0.72	30.00
						1/2" Ice	2.18	1.09	65.00
						1" Ice	2.93	1.47	105.00
8" fisheye camera	C	None		0.0000	27.00 - 27.70	No Ice	0.80	0.53	75.00
						1/2" Ice	0.91	0.63	84.24
						1" Ice	1.04	0.73	95.48

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral / Vert	Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter		Aperture Area	Weight
				ft	°	°	ft	ft		ft^2	lb
2' dish, no radome	A	Paraboloid w/o Radome	From Leg	0.50	0.0000		110.00	2.00	No Ice	3.14	50.00
				0.00					1/2" Ice	3.41	67.50
				0.00					1" Ice	3.68	85.00
4' HP dish	A	Paraboloid w/Shroud (HP)	From Leg	1.00	0.0000		95.00	4.00	No Ice	12.57	150.00
				0.00					1/2" Ice	13.10	217.33
				0.00					1" Ice	13.62	284.66
4' HP dish	C	Paraboloid w/Shroud (HP)	From Leg	1.00	0.0000		95.00	4.00	No Ice	12.57	150.00
				0.00					1/2" Ice	13.10	217.33
				0.00					1" Ice	13.62	284.66

Solution Summary

Maximum Tower Deflections - Service Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	ft	in		°	°
T1	111 - 101	1.133	11	0.0639	0.0228
T2	101 - 81	0.993	11	0.0610	0.0174
T3	81 - 61	0.747	11	0.0630	0.0228
T4	61 - 41	0.466	11	0.0642	0.0207
T5	41 - 21	0.227	10	0.0458	0.0128
T6	21 - 1	0.072	10	0.0276	0.0085

Critical Deflections and Radius of Curvature - Service Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
110.00	2' dish, no radome	11	1.118	0.0635	0.0221	91178
105.00	(3) SBNHH-1D65B	11	1.047	0.0619	0.0191	76145
100.00	Guy	11	0.980	0.0608	0.0172	55369

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
95.00	4' HP dish	11	0.917	0.0605	0.0166	104422
86.00	RFI BA160-67 dipole	11	0.810	0.0617	0.0209	94102
80.67	RFI BA160-67 dipole	11	0.743	0.0631	0.0229	55845
75.33	RFI BA160-67 dipole	11	0.670	0.0646	0.0237	87732
70.00	RFI BA160-67 dipole	11	0.594	0.0656	0.0233	429745
51.00	Guy	11	0.337	0.0563	0.0165	64174
27.70	8" fisheye camera	10	0.114	0.0341	0.0100	48920
27.35	8" fisheye camera	10	0.111	0.0337	0.0100	48688
27.00	8" fisheye camera	10	0.109	0.0334	0.0099	48459

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	111	Leg	A325N	0.7500	3	1901.42	29820.60	0.064 ✔	1	Bolt Tension
T2	101	Leg	A325N	0.7500	3	1676.53	29820.60	0.056 ✔	1	Bolt Tension
T3	81	Leg	A325N	0.7500	3	1883.73	29820.60	0.063 ✔	1	Bolt Tension
T4	61	Leg	A325N	0.7500	3	2653.15	29820.60	0.089 ✔	1	Bolt Tension
T5	41	Leg	A325N	0.7500	3	2899.21	29820.60	0.097 ✔	1	Bolt Tension
T6	21	Leg	A325N	0.7500	3	3666.34	29820.60	0.123 ✔	1	Bolt Tension

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T1	**111 - 101**	**Leg**	**P2.5x.203**	**3**	**-8065.43**	**49145.10**	**16.4**	**Pass**
		Diagonal	P.75x.113	12	-3345.31	5891.84	56.8	Pass
		Horizontal	P.75x.113	14	-1206.87	7935.26	15.2	Pass
		Top Girt	2x1/2	5	-85.36	7783.43	1.1	Pass
		Bottom Girt	2x1/2	8	-1506.50	7783.43	19.4	Pass
T2	**101 - 81**	**Leg**	**P2.5x.203**	**25**	**-15088.80**	**49071.40**	**30.7**	**Pass**
		Diagonal	P.75x.113	59	-1306.19	5862.05	22.3	Pass
		Horizontal	P.75x.113	55	-1602.57	7935.26	20.2	Pass
		Top Girt	2x1/2	28	-1722.45	7783.43	22.1	Pass
		Bottom Girt	2x1/2	31	123.96	32400.00	0.4	Pass
		Guy A@100	3/8	248	5848.57	9240.00	63.3	Pass
		Guy B@100	3/8	241	4969.06	9240.00	53.8	Pass
		Guy C@100	3/8	235	6023.96	9240.00	65.2	Pass
		Torque Arm Top@100	L3x3x3/16	237	5184.12	35316.00	14.7	Pass
		Torque Arm Bottom@100	L3x3x3/16	246	-8414.64	10879.20	77.3	Pass
T3	**81 - 61**	**Leg**	**P2.5x.203**	**69**	**-16953.60**	**49071.40**	**34.5**	**Pass**
		Diagonal	P.75x.113	76	-1874.37	5862.05	32.0	Pass
		Horizontal	P.75x.113	86	-273.09	7935.26	3.4	Pass
		Top Girt	2x1/2	71	-48.08	7783.43	0.6	Pass
		Bottom Girt	2x1/2	75	-72.94	7783.43	0.9	Pass
T4	**61 - 41**	**Leg**	**P2.5x.203**	**111**	**-24443.60**	**49071.40**	**49.8**	**Pass**
		Diagonal	P.75x.113	138	-2189.78	5862.05	37.4	Pass
		Horizontal	P.75x.113	135	2043.09	10478.00	19.5	Pass
		Top Girt	2x1/2	113	-116.42	7783.43	1.5	Pass

tnxTower	Job: 110' Guyed Lattice Tower, Canterbury, CT	Page: 5 of 5
All-Points Technology Corporation 116 Grandview Road Conway, NH 03818 Phone: (603) 496-5853 FAX: (603) 447-2124	Project: CT122200 Canterbury West	Date: 10:04:27 05/24/17
	Client: Marcus Communications	Designed by: Rob Adair

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Bottom Girt	2x1/2	116	160.77	32400.00	0.5	Pass
		Guy A@51	3/8	255	4111.36	9240.00	44.5	Pass
		Guy B@51	3/8	254	3677.19	9240.00	39.8	Pass
		Guy C@51	3/8	253	4172.97	9240.00	45.2	Pass
T5	**41 - 21**	**Leg**	**P2.5x.203**	**153**	**-26092.90**	**49071.40**	**53.2**	**Pass**
		Diagonal	P.75x.113	161	-923.93	5862.05	15.8	Pass
		Horizontal	P.75x.113	164	-443.10	7935.26	5.6	Pass
		Top Girt	2x1/2	156	166.56	32400.00	0.5	Pass
		Bottom Girt	2x1/2	158	202.63	32400.00	0.6	Pass
T6	**21 - 1**	**Leg**	**P2.5x.203**	**195**	**-32997.10**	**49071.40**	**67.2**	**Pass**
		Diagonal	P.75x.113	202	-1353.54	5862.05	23.1	Pass
		Horizontal	P.75x.113	206	-557.81	7935.26	7.0	Pass
		Top Girt	2x1/2	197	200.89	32400.00	0.6	Pass
		Bottom Girt	2x1/2	200	5886.61	32400.00	18.2	Pass
							Summary	
							Leg (T6) 67.2	Pass
							Diagonal (T1) 56.8	Pass
							Horizontal (T2) 20.2	Pass
							Top Girt (T2) 22.1	Pass
							Bottom Girt (T1) 19.4	Pass
							Guy A (T2) 63.3	Pass
							Guy B (T2) 53.8	Pass
							Guy C (T2) 65.2	Pass
							Torque Arm Top (T2) 14.7	Pass
							Torque Arm Bottom (T2) 77.3	Pass
							Bolt Checks 12.3	Pass
							RATING = 77.3	**Pass**

All-Points Technology Corp., P.C.
116 Grandview Road
Conway, NH 03818
(603) 496-5853

Client: **Marcus Communications** Site: **Canterbury West**
Job: **Canterbury, CT** Job No.: **CT122200**
Calculated By: **R. Adair** Date: **24-May-17**

References: Navy Design Manual DM 7.2, page 7.2-172
TIA-222, Structural Standards for Towers...

Deadman Anchor Analysis

Program assumes:

Unit weight of concrete =	150 pcf
Submerged unit wt of concrete =	87.5 pcf
Unit weight of soil =	100 pcf
Submerged unit weight of soil =	37.6 pcf
Kp =	3.0

Information to be provided:

phi = Angle of internal friction	phi=	30.0 degrees	(Table 1 Page 7.2-63)
H = Height from ground surface to bottom of anchor	H=	5.0 feet	
w = Depth from ground surface to water table	w=	5.0 feet	
y = Height of trial deadman block	y=	2.0 feet	
x = Width of trial deadman block	x=	2.7 feet	
z =Length of trial deadman block	z=	5.0 feet	
R_H= Horizontal reaction to be resisted	R_H=	10.5 kips	
R_V= Vertical reaction to be resisted	R_V=	11.6 kips	
S.F.= Safety factor to be used	S.F.=	1.00	

Input satisfactory

UPLIFT RESISTANCE:

Overburden Weight =	9.79 kips	
Concrete Weight =	4.01 kips	
Total Uplift Resistance =	**13.79 kips**	**Block Size Satisfactory**

HORIZONTAL RESISTANCE:

Effective stress at top of block =	900 psf	
Effective stress at G.W.T =	1500 psf	
Effective stress at bottom of block =	1500 psf	
Total Horizontal Resistance=	**12.00 kips**	**Block Size Satisfactory**

Volume of Concrete: (per anchor) **1.0 c.y.**

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Client:	**Marcus Communications**	Site:	**Canterbury West**
Job:	**Canterbury, CT**	Job No.:	**CT122200**
Calculated By:	**R. Adair**	Date:	**24-May-17**

References: TIA-222, Structural Standards for Towers
Wang & Salmon, Reinforced Concrete Design, Chapter 20

TOWER PIER/FOOTING DESIGN

Program assumes:

Footing is square in plan view.
Pier above footing is cylindrical in shape.

Unit weight of concrete =	150 pcf
Submerged unit wt of concrete =	87.6 pcf
Unit weight of soil =	100 pcf
Submerged unit weight of soil =	37.6 pcf
Concrete strength =	3000 psi
Reinforcing strength =	60000 psi

Information to be provided:

C = Compression force to be resisted	C =	58.7 kips
q = Allowable bearing capacity	q =	5.00 ksf
H = Height from ground surface to bottom of footing	H =	2.50 feet
w = depth from ground surface to water table	w =	2.50 feet
y = Height of footing	y =	3.50 feet
x = Width of footing	x =	4.00 feet
s = average size of square pier	s =	4.00 feet
S.F. = Safety factor	S.F. =	1.0

Input satisfactory

OUTPUT:

Depth of footing =	d =	38 in.	
Net Allowable Soil Pressure =		4.58 ksf	
Factored Live & Dead Loads=		73.10 kips	
Total Uplift Resistance =		3.60 kips	
Net Bearing Pressure=		4.57 ksf	SATISFACTORY
Concrete Quantity =		**1.6 c.y. per foundation**	
Tension Reinf. Req'd =		**0.00 in²**	