

Certified by Town Clerk:

Filing Fee:
(\$135.00)

Case #

COMMONWEALTH OF MASSACHUSETTS - TOWN OF TISBURY

PETITION TO THE ZONING BOARD OF APPEALS

1. *Petitioner/Appellant (Owner)*
(Please See #8 below)

Name: Geoghan Coogan Esq.
Mailing Address: P.O. Box 1639
Vineyard Haven, MA 02568

Email: cooganlaw@gmail.com
Home #: 508-693-3200
Work #:

Signature:

2. *Property:*

Registry of Deeds, Book 242 Page 589, or Land Court # _____
Tisbury Assessor Parcel # 3 Map 14A
Location (Street & Number) 228 Edgartown Rd.
(Brief directions to property)

3. *Property Owner:*

Name and Address: Verizon New England Inc.
125 High St., Oliver Tower, 7th Floor
Boston, MA 02110

Signature:
(By signing this petition, the property owner also authorizes the Board's entry to the property for inspection purposes.)

4. *Nature of Application (Circle one and complete):*

(a) I am requesting a special permit for: see attached

or

(b) I am requesting a variance from:

or

(c) I am appealing the decision of the Building/Zoning Inspector or Board

Dated _____ for _____

5. Petition is made under the Zoning By-law, Section(s) 04.03.01, 07.01.03, 09.02.04
10.06.01

6. Attorney Name, phone # & email: (if applicable): Geoghan E. Coogan Esq.

7. Agent Name, Address, phone & email (if applicable): same

8. ****If petitioner is not the property owner (i.e. renter in a leased building), written authorization from the property owner must be submitted in writing with this application. Contractors, surveyors, etc. are to be listed under #7 (Agent).**

9. Petitioner is advised that proceedings and requirements of the ZBA are governed by statutes of the Commonwealth, Tisbury Zoning By-law, and Board of Appeals' Rules and Regulations (copies available for inspection at the Town Clerk's office). Consult those documents for information and requirements. Under the Tisbury Zoning By-law, Special Permits and Variances are "exceptions," and the petitioner must evidence exceptional and appropriate circumstance(s) to warrant consideration.

Verizon Tower Height Extension Project

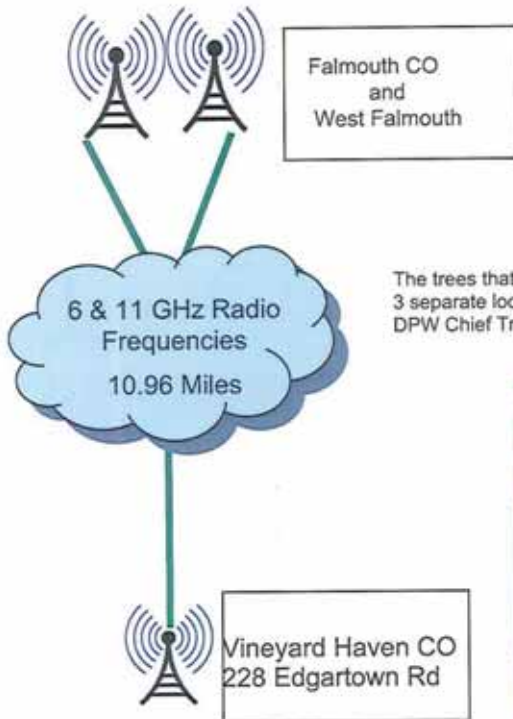
Vineyard Haven (228 Edgartown Road)

- Verizon landline calls to and from Nantucket and Martha's Vineyard are handled via a microwave radio loop: Hyannis <-> Nantucket <-> Edgartown <-> Vineyard Haven <-> Falmouth (see slide)
- Tower is used to transmit Verizon landline calls and internet access via narrow width microwave beam between Vineyard Haven and Falmouth (also handles traffic to/from Nantucket) – approx. 11 miles away
 - These calls include police, fire department, EMS, E911 calls
- This microwave signal travels in a straight line and is interrupted by any obstructions it encounters
- A number of trees in the Vineyard Haven area are approaching or are already at a height at which they will obstruct this transmission (see slide). Some of these trees are on private property, whose owners will not agree to permit Verizon to trim or remove the trees. Others are on public property and have been classified by the Town Chief Tree Warden as shade trees which cannot be trimmed or removed.
- Verizon anticipates that these trees (and, likely, others in the future as they grow) will cause service interruptions
- Verizon goal is to get as close to 100% annual two-way reliability as possible
- By increasing the tower height in Vineyard Haven, the tower will be able to transmit signals to/receive signals from a higher altitude which will enable its signal to clear the trees, thereby reducing service interruptions
- Proposed Project
 - Tower height will be increased from 77'± above ground level to 130'± above ground level
 - Only one new piece of equipment will be installed on the tower – 8' dish at elevation 125'± above ground level
 - Existing equipment on the tower will be moved
 - 6' dish at elevation 55'± above ground level will be re-installed at an elevation of 95'± above ground level
 - 6' dish at elevation 65'± above ground level will be re-installed at an elevation of 102'± above ground level
 - 8' dish at elevation 75'± above ground level will be re-installed at an elevation of 128'± above ground level

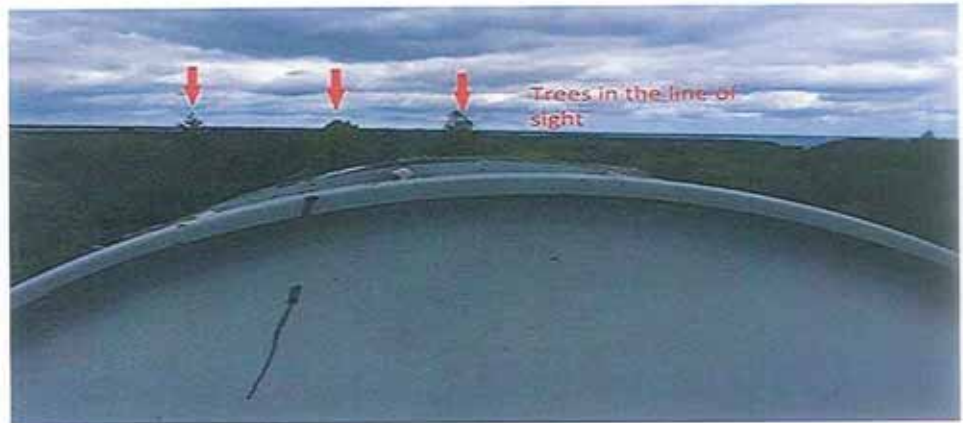


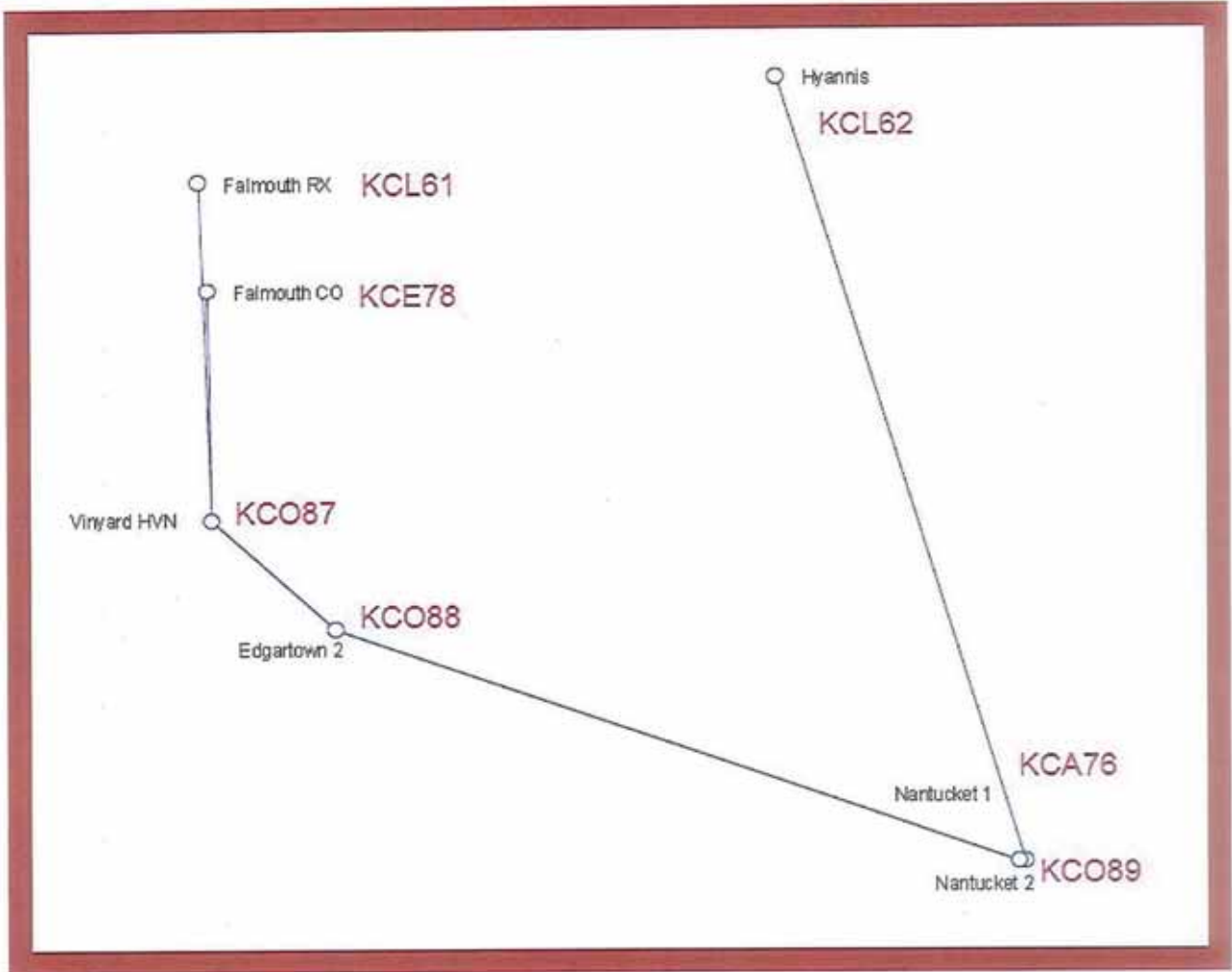
Martha's Vineyard – Massachusetts Proposal for Tower Height Increase

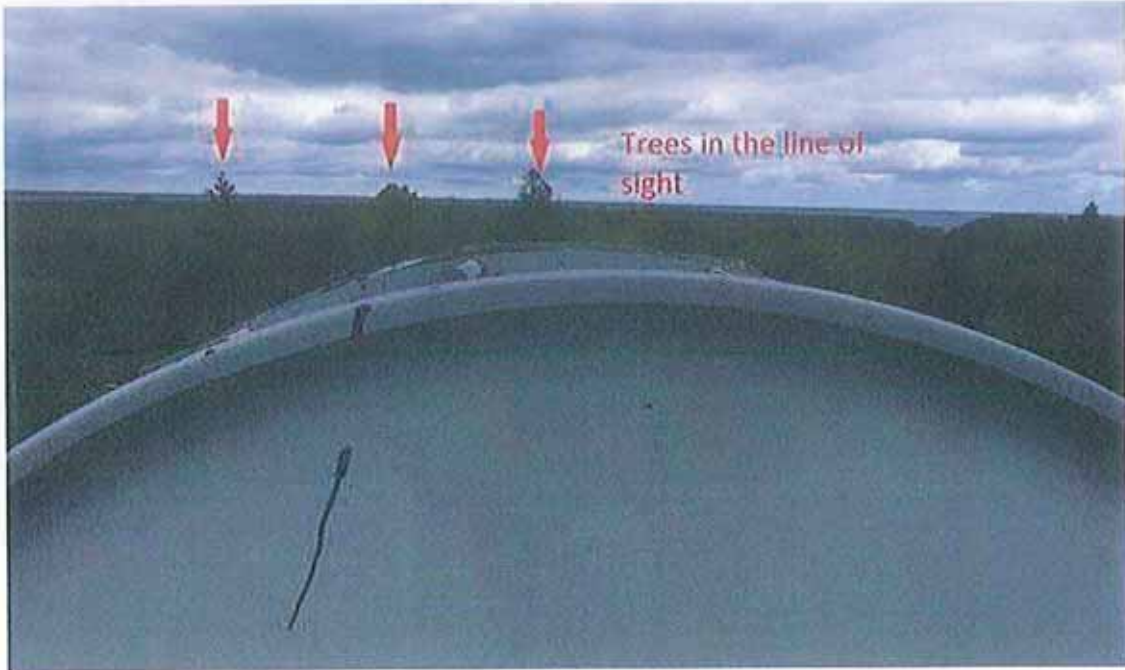
2016 towers was found not structurally sound to support the height increase – new location or hybrid tower solution is required.



The trees that are in question sit on private property. External Affairs has approached the town to discuss the four trees at 3 separate locations to explained that the trees are interfering with the microwave path. The Town Administrator and the DPW Chief Tree Warden classified them as shade trees and will not allow them to be removed.









Mail Processing Center
 Federal Aviation Administration
 Southwest Regional Office
 Obstruction Evaluation Group
 10101 Hillwood Parkway
 Fort Worth, TX 76177

Aeronautical Study No.
 2016-ANE-4701-OE

Issued Date: 05/02/2017

Radio Engineer
 Verizon New England, Inc.
 79 High Street
 Wareham, MA 02571

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure: Antenna Tower Vineyard Haven CO
 Location: Tisbury, MA
 Latitude: 41-26-40.00N NAD 83
 Longitude: 70-36-30.00W
 Heights: 121 feet site elevation (SE)
 254 feet above ground level (AGL)
 375 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure would have no substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on the operation of air navigation facilities. Therefore, pursuant to the authority delegated to me, it is hereby determined that the structure would not be a hazard to air navigation provided the following condition(s) is(are) met:

As a condition to this Determination, the structure is to be marked/lighted in accordance with FAA Advisory circular 70/7460-1 L Change 1, Obstruction Marking and Lighting, a med-dual system - Chapters 4,8(M-Dual),&12.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

- At least 10 days prior to start of construction (7460-2, Part 1)
- Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

As a result of this structure being critical to flight safety, it is required that the FAA be kept appraised as to the status of the project. Failure to respond to periodic FAA inquiries could invalidate this determination.

This aeronautical study included evaluation of a structure that exists at this time. Action will be taken to ensure aeronautical charts are updated to reflect the most current coordinates, elevation and height as indicated in the case description.

See attachment for additional condition(s) or information.

Any height exceeding 254 feet above ground level (375 feet above mean sea level), will result in a substantial adverse effect and would warrant a Determination of Hazard to Air Navigation.

This determination expires on 11/02/2018 unless:

- (a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
- (b) extended, revised, or terminated by the issuing office.
- (c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is subject to review if an interested party files a petition that is received by the FAA on or before June 01, 2017. In the event a petition for review is filed, it must contain a full statement of the basis upon which it is made and be submitted to the Manager, Airspace Policy & Regulation, Federal Aviation Administration, 800 Independence Ave, SW, Room 423, Washington, DC 20591.

This determination becomes final on June 11, 2017 unless a petition is timely filed. In which case, this determination will not become final pending disposition of the petition. Interested parties will be notified of the grant of any review. For any questions regarding your petition, please contact Airspace Regulations & ATC Procedures Group via telephone -- 202-267-8783 - or facsimile 202-267-9328.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

This aeronautical study considered and analyzed the impact on existing and proposed arrival, departure, and en route procedures for aircraft operating under both visual flight rules and instrument flight rules; the impact on all existing and planned public-use airports, military airports and aeronautical facilities; and the cumulative impact resulting from the studied structure when combined with the impact of other existing or proposed structures. The study disclosed that the described structure would have no substantial adverse effect on air navigation.

An account of the study findings, aeronautical objections received by the FAA during the study (if any), and the basis for the FAA's decision in this matter can be found on the following page(s).

A copy of this determination will be forwarded to the Federal Communications Commission (FCC) because the structure is subject to their licensing authority.

If we can be of further assistance, please contact Darin Clipper, at (404) 305-6531. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2016-ANE-4701-OE.

Signature Control No: 311737175-330355128

(DNH)

Mike Helvey

Manager, Obstruction Evaluation Group

Attachment(s)

Additional Information

Case Description

Frequency Data

Map(s)

cc: FCC

Additional information for ASN 2016-ANE-4701-OE

The existing antenna tower with a proposed forty-eight foot height increase not to exceed a height of 254 feet (ft.) above ground level (AGL), 375 ft. above means sea level (AMSL), is located approximately 3.07 nautical miles (NM) north of Martha's Vineyard Airport's (MVY) airport reference point (ARP), Tisbury, MA. The proposal has been identified as an obstruction under the standards of Title 14, Code of Federal Regulations (CFR), Part 77, as applied to MVY as follows:

Section 77.17 (a) (2): A height that is 200 ft. AGL, or above the established airport elevation, whichever is higher, within 3 NM of the established ARP, excluding heliports, with its longest runway more than 3,200 ft. in actual length, and that height increases in the proportion of 100 ft. for each additional NM from the airport up to a maximum of 499 ft. The proposed increase was shown to exceed by up to 48 ft.

The proposal was not circularized for public comment because current FAA obstruction evaluation policy does not require circularization of those proposals that only exceed Section 77.17 (a) (2) and are not located within an airport's visual flight rules (VFR) traffic pattern airspace.

The proposal would have no effect on any existing or proposed arrival, departure, or en route instrument flight rule (IFR) operations, minimum flight altitudes, minimum vectoring altitudes (MVA), aeronautical procedures, or on any aeronautical facilities as it relates to either current or future runway extensions or proposals at any known public-use, joint-use, or military airports. Information on the proposal shall be forwarded for appropriate aeronautical charting.

Study for possible visual flight rules (VFR) effect disclosed the proposal exceeds 77.17 (a) 2 as noted above, but would have no effect on any existing or proposed arrival or departure VFR operations or procedures. The proposal would not conflict with any airspace required to conduct normal VFR traffic pattern and/or visual approach operations at MVY or at any other public-use, joint-use, or military airport. The proposal would not require a VFR aircraft to change its regular flight course or altitude, restrict VFR operations in any way, or create a dangerous situation during a critical phase of flight while operating under VFR conditions. Therefore, at a height of up to 254 ft. AGL, the proposal would have no substantial adverse effects on any existing or proposed VFR arrival, VFR departure, en route, minimum flight altitudes, or VFR helicopter routes in the vicinity of this location.

A medium dual lighting system is recommended to make the antenna tower more conspicuous to airmen should circumnavigation be necessary due to the proposed height increase.

The cumulative impact of the proposal, when combined with other proposed and existing structures, is not considered to be significant. Study did not disclose any adverse effects on existing or proposed public-use or military airports or navigational facilities, nor does the proposal affect the capacity of any known existing or planned public-use or military airport.

Therefore, it is determined that the proposal would not have a substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on any air navigation facility and would not be a hazard to air navigation as long as all conditions written within this determination are met.

Frequency Data for ASN 2016-ANE-4701-OE

LOW FREQUENCY	HIGH FREQUENCY	FREQUENCY UNIT	ERP	ERP UNIT
5900	6000	MHz	70	dBm
10000	11000	MHz	73.5	dBm

TOPO Map for ASN 2016-ANE-4701-OE







(RF) Power Density Calculations

Proposed Microwave System Relocation Vineyard Haven (KCO87)

Prepared for

Verizon

May 2017

TABLE OF CONTENTS

SECTION 1 Introduction and Background

- 1.1 Introduction
- 1.2 Background

SECTION 2 Methodology

- 2.1 Near-Field Distance Calculation
- 2.2 Far-Field and Transition-Zone Distance Calculations
- 2.3 Calculation of the Power Density in the Near-Field
- 2.4 Calculation of the Power Density in the Transition-Zone
- 2.5 Calculation of the Power Density in the Far-Field and Off-Axis

SECTION 3 Data Presentation

- 3.1 Calculation Results

SECTION 4 Conclusions and Recommendations

CERTIFICATION

SECTION 1

INTRODUCTION AND BACKGROUND

1.1 Introduction

The purpose of this report is to describe and document the results of radio frequency (RF) power density calculations performed on behalf of Verizon by Comsearch for two microwave antenna relocations on a communications tower at a facility near Falmouth, MA. The site name is Vineyard Haven with an FCC call sign of KCO87. Verizon is proposing to relocate four (4) antennas on this tower to higher elevations to obtain path clearance. Only two (2) of these antennas are transmitting and are the focus of this report. Figure 1 is a Google aerial image showing the microwave antennas location. Parameters for the proposed system are in the table below.

Evaluated System Parameters		
	Antenna 1	Antenna 2
Latitude	41° 26' 40.0" N	41° 26' 40.0" N
Longitude	70° 36' 30.0" W	70° 36' 30.0" W
Antenna Azimuth (°)	358.9	357.8
Elevation (ft)	234.55	234.55
Antenna model	UHX8-107	SRD8-59ASE
Antenna gain (dBi)	46.5	41
Antenna diameter (ft)	8	8
Antenna height (ft)	128	125
TX power (dBm)	30	32
TX power (Watt)	1	1.58
Frequency (GHz)	11	6

The calculations in this project were performed to define the RF radiation conditions in and around the microwave installation at ground level. There are 252 data points designated for the calculations at or near to the Verizon facility. The data points are arranged in concentric circles around the facility every 10 meters to a distance of 100 meters. The calculations in this project determine the power density radiated from the relocated Microwave antennas.

The calculated power density levels presented in this report have been compiled and aggregated for the purpose of evaluating whether the proposed Microwave installation will be in compliance with the most recent human exposure guidelines for radio frequency radiation as adopted by the Federal Communications Commission (FCC). The guidelines referenced by the FCC are intended to apply to both occupational (workers at the site) exposures as well as general public exposures to radio frequency radiation. Therefore, the data presented in this report can be used to determine potential non-ionizing radiation hazards, which may affect persons working at or living near this site.



Figure 1 - Aerial Image Showing Location/Azimuth of Microwave Antennas

1.2 Background

The possible adverse effects from exposure to non-ionizing (radio frequency) radiation has become a growing concern in recent years. In light of this concern, research by several organizations has shown that exposure to high levels of RF radiation can be harmful. This research has concluded that the ability of RF energy to heat biological tissues rapidly is one concern deserving attention. It has been shown that the extent of the biological heating is dependent upon several factors including the following:

- A) Specific radiated frequency
- B) Size, shape, and orientation of the exposed object
- C) Duration of exposure to RF radiation
- D) Surrounding environmental conditions
- E) Efficiency of heat dissipation

These factors along with other health considerations concerning human exposure to RF radiation prompted the Federal Communications Commission (FCC) to consider its responsibility in developing policies controlling RF radiation emissions from FCC licensed and regulated facilities. Following several public notices and inquiries to other government agencies, the Commission determined that a FCC regulated facility should be required to comply with established guidelines concerning the potential biological effects and hazards of RF radiation. Therefore, the FCC issued a report in March of 1985 that in effect amended the Commission's rules and provided for an environmental analysis in regard to human exposure to RF radiation. The exposure guidelines for the FCC radiation policy were placed in effect on January 1, 1986.

The FCC has adopted limits for maximum permissible exposure generally based on the exposure guidelines set forth in NCRP Report No. 86 (1986). In the frequency range from 100 MHz to 1500 MHz, exposure limits for field strength and power density are also generally based on those contained in the ANSI/IEEE report (C95.1-1992). These guidelines were chosen because they are scientifically based, widely accepted, and applicable to the general population as well as to workers. The currently adopted FCC standard establishes exposure limits for controlled as well as uncontrolled environments. The FCC has continuously updated the guidelines since 1996, mainly with Notices in 2003 (ET Docket No. 03-137) and 2013 (ET Docket No. 13-84). Although the Notices have been issued with useful information pertaining to safety, the safety criteria have remained the same. In the Notice of 2013 the FCC did state their intention to change the guidelines with respect to safety signage after a period of time during which the telecommunication industry and other interested parties would be allowed to comment on the changes proposed. In 2003 and 2013 the area most discussed was categorical exemption for certain classes of equipment either because of their remote positioning or their low-power of operation.

Controlled environments are locations where there is exposure that may be incurred by persons who are aware of the potential for exposure as a circumstance of employment or by other cognizant persons. Uncontrolled environments are locations where there is the exposure of individuals who have no knowledge or control over their exposure. The frequencies in use at the facility correspond to exposure limits of 1 milliW/cm² for uncontrolled environments, and 5mW/cm² for controlled environments (see Figure 2 or Table 1). Table 1 is an excerpt from FCC

47CFR1.1310 which can be found at: <http://www.ecfr.gov/cgi-bin/text-idx?SID=c1917e1abc228f9473d648dbc9ecda79&mc=true&node=sec47.1.1.11310&rgn=div8>

Compliance to the FCC's RF radiation safety policy is generally through a process of self-certification. Therefore, at the request of Verizon, power density calculations were performed to ensure compliance with the FCC safety standard regarding RF radiation levels present in and around the proposed Microwave facility.

For additional information, please see FCC Office of Engineering and Technology (OET) Bulletin #65 (Edition 97-01) at: www.fcc.gov/oet/rfsafety, which provides full details regarding FCC guidelines for human exposure to radio frequency electromagnetic fields. Also, in the FCC 2013 Notice, the FCC stated that it was their plan to put the latest information with regard to radiation safety into their Knowledge Data Base (KDB) instead of addendum to OET Bulletin 65.

Table 1 Limits for Maximum Permissible Exposure (MPE)

(A) Limits for Occupational/Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (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

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (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

NOTE 1: 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.

NOTE 2: 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.

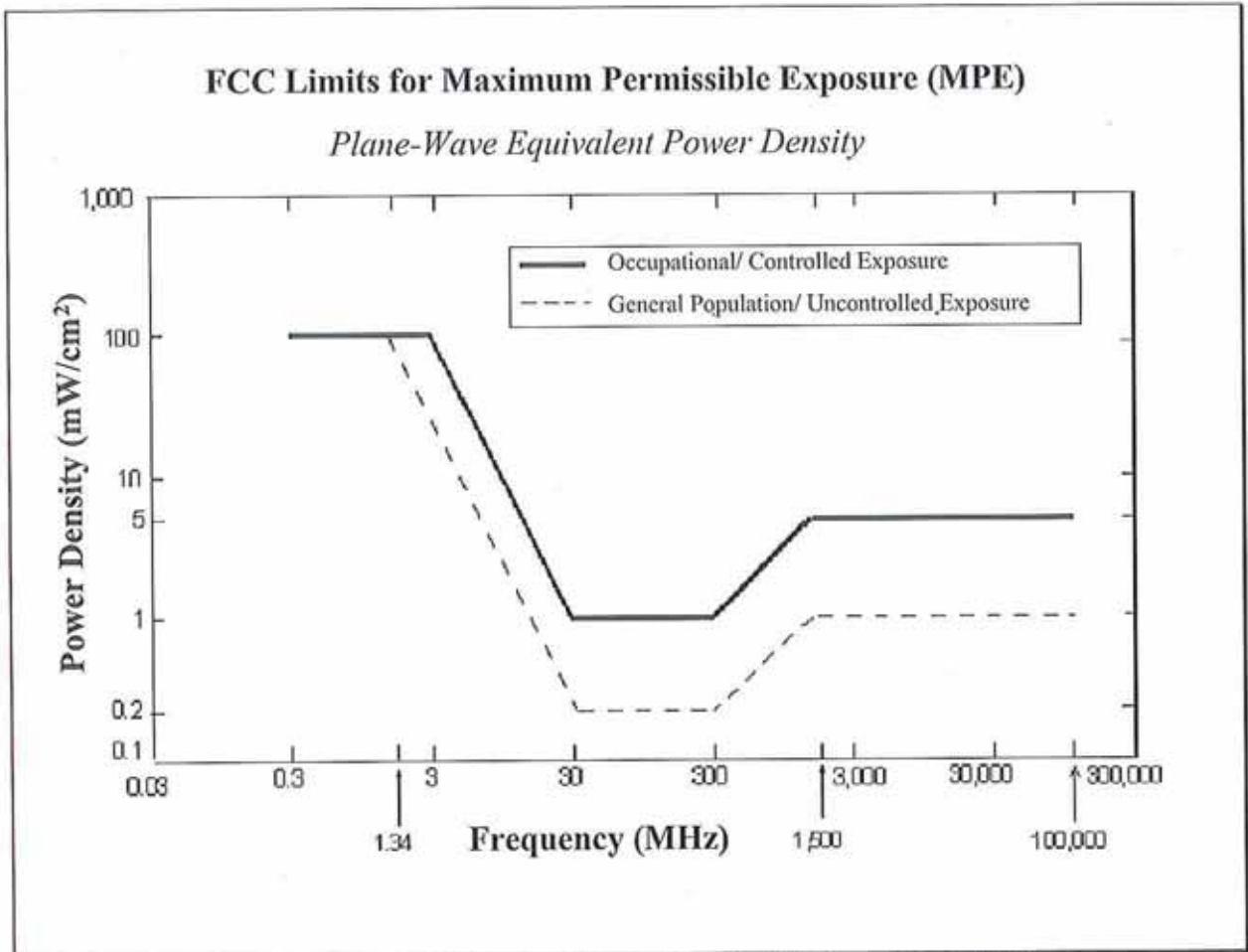


Figure 2 FCC Limits for Maximum Permissible Exposure (MPE)

SECTION 2

METHODOLOGY

The methods used for the calculations and analysis in this radiation safety effort are those described in the FCC Office of Science and Technology (OET) Bulletin No. 65, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields, Revision 97-01," August 1997. The FCC adopted limits for the maximum permissible exposure for areas occupied by personnel in their R&O (FCC 96-326) released 1 August 1996. Power density was calculated using the Bulletin No. 65 methods at 252 site points within and around the boundaries of the Microwave installation site to define the radiation conditions.

As shown in Table 1 and Figure 2 the FCC Safety limits vary with frequency. And there are two sets of limits one for the controlled zones and the other for the uncontrolled zones. Generally the controlled zone limits apply to RF radiation knowledgeable workers and the uncontrolled zone applies to all other workers and the general public. For the frequency band utilized by the proposed microwave systems the radiation safety limit is 1 milliWatt/cm² for uncontrolled zones and 5 milliWatts/cm² for controlled zones.

To carry out the calculations the parameters for the microwave transmitting system were taken from information provided by Verizon for their relocated microwave systems. Table 2 contains the data for the microwave transmitting system at the site. For this project the transmit power, antenna characteristics, antenna center-line, and system frequency of operation are listed in the data table as these parameters are used in the calculations.

In the following table the parameters used for the power density calculations for the proposed transmitting microwave systems is presented.

Table 2 Microwave Transmit Systems

Evaluated System Parameters		
	Antenna 1	Antenna 2
Wavelength (m)	0.026785714	0.047281324
Transmit Power (W)	1	1.58
Antenna Gain (dBi)	28.8	38.8
EIRP	73.5	70
Antenna Model	UHX8-107	SRD8-59ASE
Largest Antenna Dimension (m)	2.438	2.438
Height of Antenna Center-Line (ft)	128	125
Antenna Area (m ²)	4.669	4.669
Antenna Effective Area (m ²)	2.5468	2.2365
Antenna Efficiency (%)	54.64	47.98

2.1 Near-Field Distance Calculation

The formula for determining the Near-Field of an antenna system is given by the following formula.

$$NF = 0.62 * \sqrt{D^3 / \lambda}$$

Where,

NF = Near-Field Distance, meters

D = Largest Antenna Dimension, meters

λ = Wavelength, meters

Near field distance for the Microwave Antenna 1 is found to be 14.42 meters, or 47.3 feet.

Near field distance for the Microwave Antenna 2 is found to be 10.85 meters, or 35.6 feet.

2.2 Far-Field and Transition-Zone Distance Calculations

The formula for determining the Far-Field of an Antenna System is given by the following formula.

$$FF = 2 * D^2 / \lambda$$

Far field distance for the Microwave Antenna 1 is found to be 443.81 meters, or 1456.1 feet.

Far field distance for the Microwave Antenna 2 is found to be 251.42 meters, or 824.9 feet.

And,

The Transition-Zone is the area between the beginning of the Far-Field and the end of the Near-Field. So the formula for the Transition-Zone is given by the following formula.

$$TZ = FF - NF$$

Where,

TZ = Transition-Zone, meters

FF = Far-Field, meters

Transition Zone for the Microwave Antenna 1 goes from 14.42 - 443.81 meters, or 47.3 - 1456.1 feet.

Transition Zone for the Microwave Antenna 2 goes from 10.85 - 251.42 meters, or 35.6 - 824.9 feet.

2.3 Calculation of the Power Density in the Near-Field

The power density of an antenna in the Near-Field is the highest power density level that the system will radiate. All other power densities radiated from the antenna will be lower. Therefore, if a radiation hazard condition does not exist in the Near-Field it will not occur at any other point of radiation. The Power Density in the Near-Field is constant throughout the entire zone. The zone is directly in front of the antenna and extends out in the shape of a cylinder. The Near-Field does not apply to azimuths away from the front of the antenna. The formula used for calculation the power density in the Near-Field follows.

$$P_{nf} = 0.1 * 4 * P * \epsilon / A$$

Where,

P_{nf} - Power Density in the near field, milliWatts/cm²
P - Transmit Power of the Microwave System, Watts
A - Physical Area of the Microwave Antenna, meter²
 ϵ - Antenna Efficiency, number = A_e/A
 A_e - Effective Area of Antenna, meter²

And,

$$A_e = G * \lambda^2 / 4 * \Pi$$

Where,

Π - 3.1415

The power density calculated in the near field of the Antenna 1 is 0.046731 milliWatts/cm².
The power density calculated in the near field of the Antenna 2 is 0.064839 milliWatts/cm².

2.4 Calculation of the Power Density in the Transition-Zone

The Power Density in the Transition-Zone is inversely proportional to the increase in distance. The value is a function of the Power Density in the Near-Field and the distance between the end of the Near-Field and the beginning of the Far-Field. The following formula is used to calculate the Power Density in the Transition-Zone.

$$P_{tz} = P_{nf} * NF / T$$

Where,

P_{tz} - Power Density in the Transition Zone, Watts/meter²
T - Distance from Antenna in the Transition-Zone, meters

The power density in the transition Zone Antenna 1 will vary from 0.046731 – 0.001518 milliWatts/cm².

The power density in the transition Zone Antenna 2 will vary from 0.064839 – 0.002799 milliWatts/cm².

2.5 Calculation of the Power Density in the Far-Field and Off-Axis

The Power Density in the Far-field is calculated with the following formula. This formula is also applied to the calculation of off-axis radiation from the microwave antennas. The Gain of the antenna is a function of the angle off-set (Θ).

$$P_d = 0.1 * P_t * G(\Theta) / (4 * \Pi) * R^2$$

$$\%Pd = 100 * P_d / 1 \text{ milliWatt/cm}^2$$

And,

$$\%Limit = \%P_{d1} + \%P_{d2}$$

Where,

W_d = Radiated power density at the calculation point (point of interest) from the Other transmitting systems in the area, milliWatt/cm²

P_d = Radiated power density from the transmitting microwave at the calculation point (point of interest), milliWatt/cm²

P_t = Transmit power of microwave system, Watts

$G_n(\Theta)$ = Gain of the microwave antenna in the direction of the calculation point

R_n = Distance to the calculation point (point of interest) from microwave or other system antennas, meters

0.1 = Factor that converts Watts/meter² to milliWatts/cm²

$\%Limit$ = Limit percentage must be less than 100% for safe condition, %

SECTION 3

DATA PRESENTATION

Using the formulas presented in Section 2 the power density calculations were performed. The results of the calculations are presented in this section.

3.1 Calculation Results

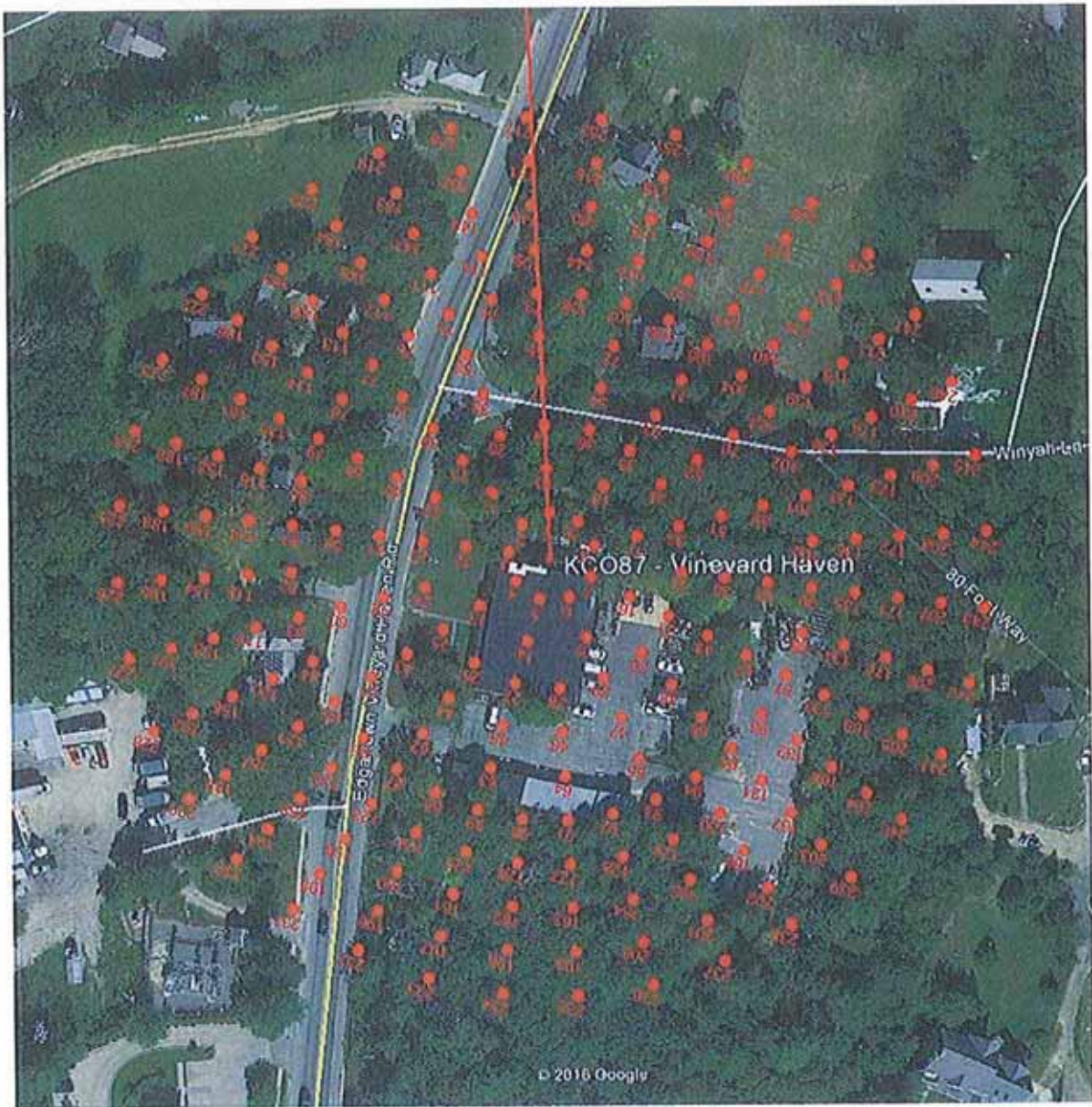


Figure 3 - Microwave Antenna Location and 252 Calculation Points

SECTION 4

CONCLUSIONS

Based on the calculations performed it is concluded that the radiated power density levels will not exceed the FCC MPE Limit safety criteria for uncontrolled areas around Verizon's microwave installation. There antennas are located on the tower (128ft/125ft above ground level) in the controlled zone of the microwave facility and should only be accessible to Designated personnel. The Designated personnel should be cautioned that if maintenance on the antennas is to be performed they should have a procedure that locks out the transmitter before the antenna maintenance is undertaken. The other company workers and general public can only gain admittance to the controlled zone when accompanied by an assigned Designated worker.

RECOMMENDATIONS

No action is required based upon the calculation contained in this report.

While not required (due to calculated values), signs can be posted at the Verizon facility when the Microwave antennas are installed. The purpose of the signs is to inform the general public and Designated personnel that there are systems operating in the area that are producing radiated RF signals. The fence around the controlled zone could have signage on it calling attention to the transmitting antennas.

Certification: I have prepared this report and I certify that the information and results reported are accurate and in conformance with the FCC safety requirements.



Rhett Butler May 2, 2017
Manager, Engineering
Comsearch
703-726-5767



MARTHA'S VINEYARD



70 HIGH STREET
MARBLEHEAD, MASSACHUSETTS 01947

SITE

MARTHA'S VINEYARD

SCALE
TURNING MILL
CONSULTANTS, INC.
DEVELOPMENT ENGINEERS AND
CONSTRUCTION MANAGERS
228 EDGARTOWN ROAD
TISBURY, MASSACHUSETTS 01462
TEL: (978) 884-0000 • FAX: (978) 884-0001
WWW.TURNINGMILLCONSULTANTS.COM

SITE ADDRESS

228 EDGARTOWN ROAD
TISBURY, MA 02558

SUBMITTALS

NO.	DATE	DESCRIPTION
1	08/22/17	ISSUE FOR RFP
2	08/23/17	ISSUE FOR RFP, C/A
3	11/14/18	ISSUE FOR BIDDING

PROFESSIONAL STAMP

DESIGNED BY: [Signature]

CHECKED BY: [Signature]

TITLE SHEET

SHEET NUMBER

T-1



CONSULTANTS

TURNING MILL CONSULTANTS, INC.
DEVELOPMENT ENGINEERS AND CONSTRUCTION MANAGERS
60 TURNER ROAD, UNIT 3
PO BOX 1110, MARBLEHEAD, MA 01947
TEL: (978) 884-0000 • FAX: (978) 884-0001
WWW.TURNINGMILLCONSULTANTS.COM

SCALE
AS NOTED

PROJECT SUMMARY

SITE NAME:
MARTHA'S VINEYARD

SITE ADDRESS:
228 EDGARTOWN ROAD
TISBURY, MA 02558

PROPERTY OWNER:
WORLDWIDE HOLDINGS INC.
10000 WOODLAND ROAD
MOUNTAIN VIEW, TEXAS 78150

DESIGNED BY:
TURNING MILL CONSULTANTS, INC.
70 HIGH STREET
MARBLEHEAD, MASSACHUSETTS 01947

CONSTRUCTION:
SAC: 47' 00" x 30' 00" x
L&L: 110' 00" x 30' 00" x

SITE DESCRIPTION:
WORLDWIDE HOLDINGS INC. HAS APPLIED FOR A PERMIT TO CONSTRUCT A 1.5 MW SOLAR PANEL ARRAY ON THE 110' x 30' LOT.

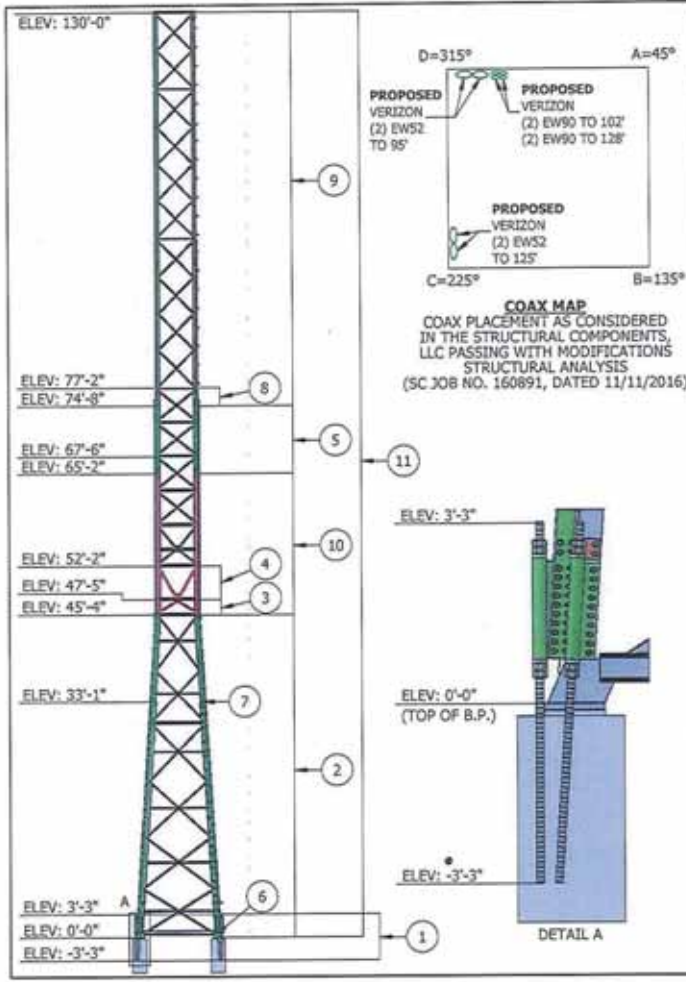
APPROVALS

OFFICE	DATE
ET, ENCLERD	[Signature]
CONSTRUCTION	[Signature]
LANDING & ZONING	[Signature]
VERDIN	[Signature]

THE ABOVE NAMED ENGINEER APPROVES AND ASSURES THAT HE/HAS SHE HAS EXAMINED THE SUBMITTALS IN ACCORDANCE WITH THE PROFESSIONAL ENGINEERING ACT AND REGULATIONS AND IS SATISFIED THAT THE SAME COMPLY WITH ALL APPLICABLE REQUIREMENTS AND STANDARDS. THIS APPROVAL IS VALID FOR ONE YEAR FROM THE DATE OF ISSUANCE OF THIS APPROVAL.

SHEET INDEX

NO.	DESCRIPTION	REV.	DATE
T-1	TITLE SHEET	0	
S-1	SITE PLAN	0	
S-2	DECISION/PROPOSED TOWER ELEVATION	0	



TOWER SPECIFICATIONS	
MANUFACTURER	UNKNOWN
HEIGHT / TOWER TYPE	77'-2" TOWER EXTENDED TO 130'-0" / (4) LEG S.S.T.

CURRENT STRUCTURAL ANALYSIS	
COMPANY	STRUCTURAL COMPONENTS, LLC
AUTHOR / FILE # / DATE	WESLEY CULVER, P.E. / 160891 / 11-11-2016

DESIGN SPECIFICATIONS	
CODE	TIA-222-G (IBC 2009) DUKES COUNTY, MA MA AMENDMENTS TO IBC
WIND SPEED (BARE)	120 MPH 3-SECOND GUST
WIND SPEED (ICED)	40 MPH 3-SECOND GUST
ICE THICKNESS	3/4" RADIAL
SERVICEABILITY BASIC WIND SPEED	60 MPH 3-SECOND GUST
EXPOSURE CATEGORY	C
TOPOGRAPHIC CATEGORY	1
STRUCTURE CLASS	II
SEISMIC SITE CLASS	D, $S_p=0.179$, $S_i=0.051$
SEISMIC DESIGN CATEGORY	B

TOWER MODIFICATION SCHEDULE				
ITEM	DESCRIPTION	ELEVATION		DWG. NO.
		BOTTOM	TOP	
1	INSTALL ANGLE-X ANCHOR ROOFS.	-3' - 3"	3' - 3"	D-2 & D-3
2	INSTALL 5x5x1/2" ANGLE-X REINFORCEMENT.	0' - 0"	45' - 4"	D-1, D-2, D-4, D-5, D-13, & D-14
3	SWAP OUT THE EXISTING DIAGONALS WITH NEW 2x2x3/8" DIAGONALS.	45' - 4"	47' - 5"	D-1 & D-6
4	SWAP OUT THE EXISTING DIAGONALS WITH NEW 2-1/2x2-1/2x5/16" DIAGONALS.	47' - 5"	52' - 2"	D-1 & D-6
5	INSTALL 5x5x1/2" ANGLE-X REINFORCEMENT.	65' - 2"	74' - 8"	D-1, D-7, D-13, & D-14
6	REPLACE THE LEG SPLICE BOLTS AT THE BASE WITH NEW 5/8" A490 BOLTS.	0' - 0"	0' - 0"	D-1 & D-8
7	REPLACE THE LEG SPLICE BOLTS AT 33' - 1" WITH NEW 5/8" A325 BOLTS.	33' - 1"	33' - 1"	D-1 & D-8
8	FIELD CUT THE LEGS AT THE TOP OF THE TOWER.	74' - 8"	77' - 2"	D-1 & D-9
9	INSTALL THE TOWER EXTENSION.	74' - 8"	130' - 0"	D-1, D-10, D-11, D-13, & D-14
10	INSTALL 5x5x1/2" ANGLE-X REINFORCEMENT.	45' - 4"	65' - 2"	D-1, D-12, D-13, & D-14
11	INSTALL THE SAFETY CLIMB SYSTEM.	0' - 0"	130' - 0"	D-15 & D-16

SEE STRUCTURAL COMPONENTS, LLC PASSING WITH MODIFICATIONS STRUCTURAL ANALYSIS (SC JOB NO. 160891, DATED 11/11/2016) FOR TOWER LOADING DETAILS AND ANALYSIS ASSUMPTIONS.

TURNING MILL CONSULTANTS, INC.
 11411 E 91ST AVE
 DENVER, CO 80231
 (303) 399-7500
 FAX: (303) 399-7501
 www.turningmill.com

Structural Components
 11411 E 91ST AVE
 DENVER, CO 80231
 (303) 399-7500
 JOB #: 150891

PRELIMINARY, NOT FOR CONSTRUCTION

The information contained in this set of drawings is preliminary in nature and is not intended to be used for construction unless otherwise noted in writing.

NO.	DATE	BY	CHK	DESCRIPTION

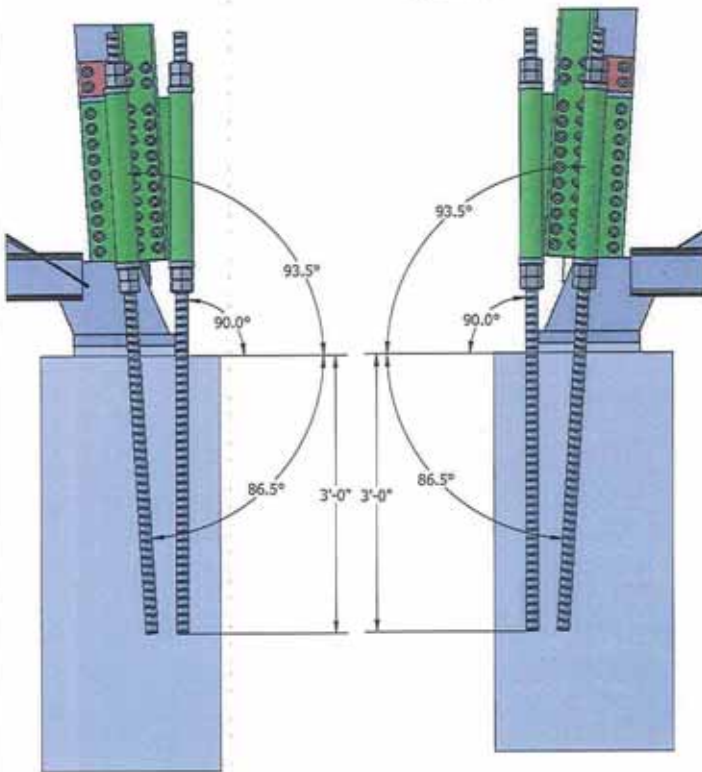
20 EQUATION FOLD-OUT SHEETS, ALL SIZE

S.S.T. REINFORCEMENT

SPECIFICATIONS

S-1 0

ANGLE-X REINFORCEMENT BASE DETAILS (CONT'D)



NOTE: THE ANGLE-X ANCHOR RODS FOLLOW THE TAPER OF THE TOWER LEG IN ONE DIRECTION. DO A MOCK FIT UP OF THE ANGLE-X TO CHECK THE ANCHOR ROD ALIGNMENT AND LOCATION.

ANCHOR ROD INSTALL NOTES:

1. ANCHOR ROD HOLES MAY BE DRILLED OR CORED. IF CORED, AN APPROVED ROUGHENING METHOD MUST BE USED.
2. HOLES SHALL BE FREE OF DEBRIS AND MOISTURE; CLEAN HOLES WITH A VACUUM IF NECESSARY.
3. USE HIT-RE 500 V3 TO BOND THE ANCHOR RODS TO THE FOUNDATION.
4. REFER TO THE MANUFACTURES INSTRUCTIONS FOR ALLOWABLE INSTALLATION TEMPERATURE RANGE.
5. FOLLOW ALL MANUFACTURES PREPARATION AND INSTALLATION INSTRUCTIONS.
6. AFTER DRILLING / CORING IS FINISHED COMPLETE TAPE DROPS WITH PHOTOS FOR EACH HOLE. INSTALL ANCHOR ROD INTO HOLE TO ENSURE THERE ARE NO OBSTRUCTIONS, REMOVE, INSTALL EPOXY AND REINSTALL ANCHOR ROD.
7. APPROXIMATE EPOXY NEEDED = 1/4 GAL. PER ANCHOR ROD, 2 GAL. TOTAL

TURNING MILL CONSULTANTS, INC.
 11811 E 51ST AVE
 DENVER, CO 80239
 (303) 386-7622
 JOB #: 160891

Structural Components
 11811 E 51ST AVE
 DENVER, CO 80239
 (303) 386-7622
 JOB #: 160891

STATUS:
**PRELIMINARY,
 NOT FOR
 CONSTRUCTION**

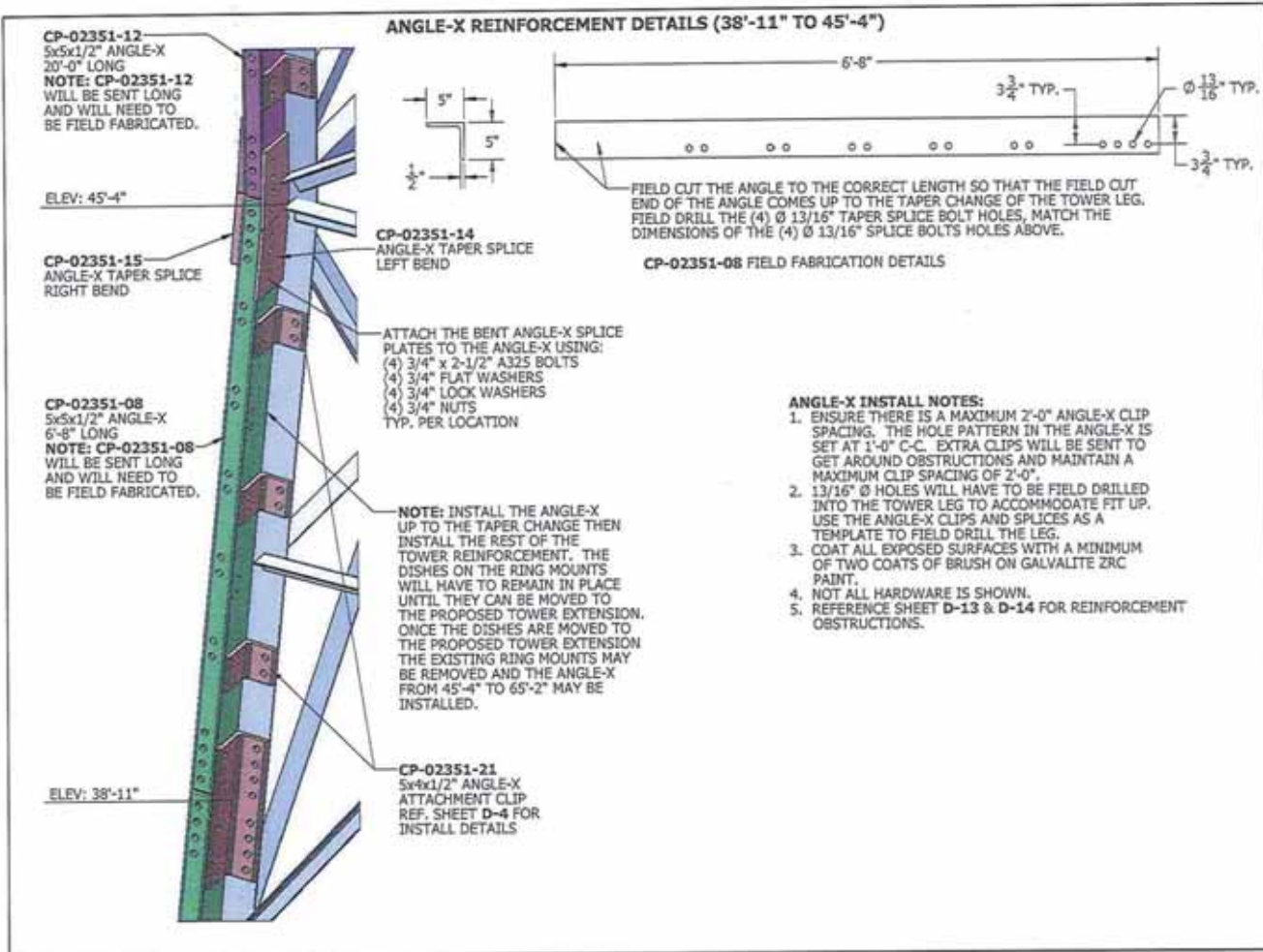
The information contained in this set of documents is preliminary for future use and is not to be used for construction without the approval of the design engineer.

NO.	DATE	DESCRIPTION	BY	CHK

THE DESIGNER HAS REVIEWED THESE AND APPROVES

S.S.T. REINFORCEMENT

REINFORCEMENT DETAILS (CONT'D)



**TURNING MILL
CONSULTANTS, INC.**
11011 E 51ST AVE
DENVER, CO 80238
(303) 386-7632
JOB #: 150891

Structural Components
11011 E 51ST AVE
DENVER, CO 80238
(303) 386-7632
JOB #: 150891

**PRELIMINARY,
NOT FOR
CONSTRUCTION**

ANGLE-X INSTALL NOTES:

1. ENSURE THERE IS A MAXIMUM 2'-0" ANGLE-X CLIP SPACING. THE HOLE PATTERN IN THE ANGLE-X IS SET AT 1'-0" C-C. EXTRA CLIPS WILL BE SENT TO GET AROUND OBSTRUCTIONS AND MAINTAIN A MAXIMUM CLIP SPACING OF 2'-0".
2. 13/16" Ø HOLES WILL HAVE TO BE FIELD DRILLED INTO THE TOWER LEG TO ACCOMMODATE FIT UP. USE THE ANGLE-X CLIPS AND SPLICES AS A TEMPLATE TO FIELD DRILL THE LEG.
3. COAT ALL EXPOSED SURFACES WITH A MINIMUM OF TWO COATS OF BRUSH ON GALVALITE ZRC PAINT.
4. NOT ALL HARDWARE IS SHOWN.
5. REFERENCE SHEET D-13 & D-14 FOR REINFORCEMENT OBSTRUCTIONS.

NO.	DATE	BY	CHK	APP

200 EQUUMOUNT ROAD
WINDY HILLS, WY 82250

S.S.T.
REINFORCEMENT

REINFORCEMENT
DETAILS (CONT'D)

D-5 0