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**APPLICATION FOR VARIANCE**

**TowerNorth Development, LLC  
c/o Centerline Communications, LLC  
750 W. Center Street, Suite 301  
West Bridgewater, MA 02379**

**c/o Daniel D. Klasnick, Esquire  
Duval & Klasnick LLC  
P.O Box 254  
Boxford, MA 01921**

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**Property Location:**

**73 Eastern Avenue and  
65 Eastern Avenue  
Essex, MA 01929**

**Assessor's Lot I.D.: 127, Lot 22 and Map 127, Lot 23**

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**Prepared by:**

**Daniel D. Klasnick, Esquire  
Duval & Klasnick LLC  
Telephone: 781-873-0021  
Email: [dklasnick@dkt-legal.com](mailto:dklasnick@dkt-legal.com)**

**Dated: March 1, 2021**

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**Daniel D. Klasnick**  
*Licensed in Massachusetts, New Hampshire and New York*  
Desk: (781) 873-0021 - Mobile: (774) 249-2814  
dklasnick@dkt-legal.com

March 1, 2021

Town of Essex  
Zoning Board of Appeals  
Essex Town Hall  
30 Martin Street  
Essex, Massachusetts 01929

**Re: Application for Variance – TowerNorth Development LLC  
Proposed Free Standing Monopole Tower to be located at  
73 Eastern Avenue and 65 Eastern Avenue**

Dear Board Members:

Enclosed please find an Application for Variance (“Application”) for the installation of a Free Standing Monopole Tower to be located at 73 Eastern Avenue with access and utility service over the property at 65 Eastern Avenue.

In accordance with the Application requirements, please find enclosed the following:

- Application for Variance;
- Brief in Support of Application;
- Check for the application fee of \$600.00 payable to the Town of Essex;
- Certified Abutters Notification List;
- Deeds and Property Owner authorizing letter for Application Submission;
- 5-11” x 17” Stamped Project Plans;
- Photo Simulations; and
- Supporting Documentation.

The Applicant would be happy to provide any additional information that you may require and would appreciate reasonable notice of any additional information you require in time to provide such information for the public hearing.

Should you require any additional information, please don't hesitate to contact me at (781) 873-0021. Thank you very much for your cooperation.

Very truly yours,  
DUVAL & KLASNICK LLC  


By: Daniel D. Klasnick  
Attorney at Law

cc: Amy E. Kwesell, Esq. (w/enclosures electronically)

**TOWN OF ESSEX  
ZONING BOARD OF APPEALS  
APPLICATION FOR VARIANCE**

<b><u>FOR OFFICE USE ONLY</u></b>
Building Permit Denied by _____
Reason Denied _____
Date Denied _____
Date Initial ZBA Application Received _____

Time Stamp by Town Clerk's Office
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**PART A: NAME AND ADDRESS OF RECORD PROPERTY OWNER**

Name PMC Realty Trust and Gateway II Trust of 1997

Property Address 65 and 73 Eastern Avenue MAP# 127 LOT# 23  
127 22

Title Reference Book 10239, Page 095 and Book 36996, Page 402

(Unregistered Land) Essex County Register of Deeds, Book 10239/36996 Page 095/402

(Registered Land) Land Court Certificate of Title No. \_\_\_\_\_ Book \_\_\_\_\_ Page \_\_\_\_\_

Property Owners Mailing Address 239 Western Avenue, Essex, MA 01929

Property Owners Telephone Number \_\_\_\_\_ Mobile \_\_\_\_\_

Property Owner's E-Mail \_\_\_\_\_

**PART B: NAME OF APPLICANT, IF DIFFERENT FROM OWNER**

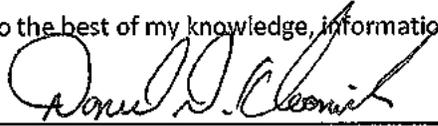
Name TowerNorth Development, LLC

Applicant's Mailing Address c/o Duval & Klasnick LLC, P.O. Box 254, Boxford, MA 01921

Applicant's Telephone Number (781) 873-0021 Mobile (774) 249-2814

Applicant's E-Mail dklasnick@dkl-legal.com

**PART C: APPLICANT'S CERTIFICATION**

<b>OWNER AUTHORIZATION</b> To Be Completed When Owner's Agent Applies	
I, <u>PMC Realty Trust and Gateway II Trust of 1997</u> , as Owner of the subject property	
hereby authorize <u>Daniel D. Klasnick as attorney for TowerNorth Development, LLC</u> (Person's Name)	
to act on my behalf in all matters relative to this application.	
<u>See attached Letter of Authorization</u>	
Signature of Owner	Date
<b>OWNER OR AUTHORIZED AGENT DECLARATION</b>	
I, <u>Daniel D. Klasnick as attorney for TowerNorth Development, LLC</u> , as Owner or Authorized Agent	
hereby declare that the statements and information on the foregoing application are true and accurate	
to the best of my knowledge, information and belief.	
	<u>3-1-2021</u>
Signature of Owner or Authorized Agent	Date

**PART D: BRIEF DESCRIPTION OF PROPOSED WORK**

Install 150' Free Standing Monopole Tower with Verizon Wireless antennas designed to accommodate 3  
additional wireless service providers within area of approximately 2,647 square feet of ground space for the Facility  
that will be surrounded by a 6 foot high chain link fence with barbed wire and a 12-foot wide locked entrance gate.  
*(Please see attached Project Brief and exhibits for a detailed description)*

Applicable Section(s) of the Zoning By-laws for which relief is sought Sections 6-3.4.5.c; 6-3.4.5.e;  
6-3.4.5.g and 6-3.4.5.h

Date of Denial by either Building Inspector or Planning Board Not Applicable  
(Note: Any appeal must be made within thirty days from the date of denial by either the Building Inspector or Planning Board)

**DIMENSIONAL REQUIREMENTS FOR WHICH RELIEF IS REQUESTED**

Note: Only the dimensional relief requested on this form can be considered by the Zoning Board of Appeals. If, in the course of the Zoning Board of Appeals hearing it appears that further relief is required, notice of your application will have to be republished and your case rescheduled.

<b><u>VARIANCES</u></b>	<b>A. Required Dimension</b>	<b>B. Existing or Proposed Dimension</b>	<b>A minus B equals Relief Requested</b>
Lot Area (Square feet)			
Lot Area per Dwelling (Square Feet)			
Lot Width			
Lot Frontage			
Front Yard			
Left Side Yard			
Right Side Yard			
Rear Yard			
% of Impervious Coverage			
Lot Coverage (%) of Buildings			
Lot Depth			
Building Height			
Other	Please see below		

**Section 6-3.4.5.c** No Tower shall be located closer than two (2) miles from any other Tower. The existing telecommunications tower located at 16 Treehill Lane in the Town of Essex is located approximately 1.7 miles from the Tower to be located at 73 Eastern Avenue.

**Section 6-3.4.5.e** Towers shall be setback from the front, rear and side property lines a distance equal to at least one hundred twenty-five (125) percent of the height of the Tower. The height of the proposed Tower is 150-feet and the nearest property line is 121-feet. The requested relief is to reduce the 187.5-foot setback (150' x 1.25) by 66.5-feet to allow the Tower at a distance of 121-feet from the nearest property line.

**Section 6-3.4.5.g** All Towers shall be located a minimum of five hundred (500) feet from the nearest residential structure. The nearest residential structure is located at a distance of 379-feet from the location of the Tower. The request is to reduce the 500-foot setback distance by 121-feet to allow the Tower at a distance of 379-feet to the nearest residence.

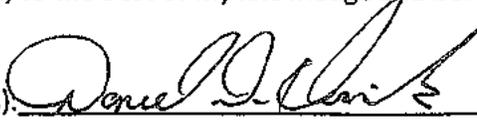
**Section 6.3.4.5.h** Accessory building shall be set back from the front, rear and side property lines a minimum of fifty (50) feet. Accessory building shall be of a common design and color. A maximum of ten (10) accessory buildings, each limited to four hundred (400) square feet in area and a maximum of ten (10) feet in height may be permitted per Tower. Multiple buildings shall be connected by a common wall. TowerNorth respectfully requests a variance from the requirements of this provision that multiple buildings shall be connected by a common wall.

The Applicant must supply a list, certified by the Board of Assessors, of current abutters, owners of land directly opposite on any public or private street or way, and abutters to the abutters within three hundred (300) feet of the property line of the petitioner as they appear on the most recent tax list. PLEASE ATTACH LIST TO THE APPLICATION.

Applicant is to supply five (5) archival quality copies of the plot plan with this application.

I hereby request a hearing before the Appeals Board of the Town of Essex in reference to the above noted application and certify that the information and all supporting documentation submitted herewith is true, to the best of my knowledge and belief.

Signature(s) of Applicant(s):



Received from the above applicant the sum of \$ \_\_\_\_\_ to apply against advertising costs. Payment for any additional costs for expenses must be remitted prior to any decision being rendered.

Date: \_\_\_\_\_ Time: \_\_\_\_\_ Check Number: \_\_\_\_\_ Amount: \_\_\_\_\_

Town Clerk: \_\_\_\_\_

## **SUPPORTING DOCUMENTATION REQUIRED FOR ALL APPLICATIONS**

1. The relevant Assessor's map(s) showing your lot, abutting lots and lots that abut abutting lots
2. List of names and addresses of owners of abutting lots and lots that abut abutting lots as certified by the Assessor's Office
3. Site or Plot Plan drawn to scale of not less than 1-inch equals 20-feet and showing:
  - a. A north arrow
  - b. The name of the owner(s) and the street address of the property
  - c. The name and address of person preparing plan, if different from owner
  - d. Date of plan
  - e. All bordering street names, if applicable
  - f. The dimensions of the property lines and lot area (in square feet) of the lot to be built upon
  - g. The locations and dimensions, including the square footage, of all existing and proposed buildings and other structures on the lot
  - h. The distance to the nearest property line(s) from all buildings and other structures on the lot
  - i. The distance between all buildings and other structures on the lot
  - j. Percentage of lot coverage of all existing and proposed buildings and other structures on the lot
  - k. All required setback distances
  - l. All existing and proposed entrances and exits to both the lot and the buildings on the lot
  - m. The location of the subsurface disposal system, if any
  - n. The location of all topographical features affecting the siting of buildings and structures on the lot

### **ALL OF THE PROPOSED WORK MUST BE HIGHLIGHTED IN RED**

#### **The final application submitted to the Town Clerk should include:**

1. Original application
2. Assessor's map
3. Certified list of names and addresses of abutters
4. Site or plot plan (5 copies) containing information as noted above
5. Photograph of subject property/structure, if available

## SUPPORTING STATEMENT – STATUTORY FINDINGS

Petitioner TowerNorth Development, LLC seeks

A Variance from Section(s) Sections 6-3.4.5.c; 6-3.4.5.e; 6-3.4.5.g and 6-3.4.5.h

of the Zoning By-Law for property located at 73 Eastern Avenue and 65 Eastern Avenue

and presents the following findings of fact in accordance with the provisions of M.G.L. 40A, s. 10:

1. The following circumstances relating to the soil conditions, shape, or topography especially affect the land or structure(s) in question, but do not affect generally the zoning district in which the land or structure(s) are located.

**Due principally to the shape of the lot, topography, tree coverage and the location of the existing wetlands on the property, it is necessary to install the telecommunications tower at the proposed location and height to allow for adequate service to the residents, businesses and public safety officials of the Town of Essex. Because TowerNorth is applying for zoning approval for the installation of equipment that provides wireless services, the application is subject to §704 of the federal Telecommunications Act of 1996 (“TCA”), codified at 47 U.S.C. §332(c)(7)(B). The TCA is a federal law enacted to establish national standards that apply to siting of wireless facilities to prevent the prohibition of service. (Please see attached project brief and exhibits for further details of compliance)**

2. Owing to the circumstances described above, a literal enforcement of the provision of the Zoning By-Law would involve substantial hardship, financial or otherwise, to the undersigned for the following reasons.

**TowerNorth and Verizon Wireless would suffer substantial hardship if the provisions of the Zoning Bylaws were literally enforced to preclude the proposed installation of the wireless communications Facility at this property. Verizon Wireless requires a Facility to: (a) address a significant gap in wireless service in the Town of Essex, and (b) to satisfy the mandate of, and realize the rights granted by, its respective federal licenses to provide wireless services. The courts of the First Circuit have found that the need for closing a significant gap in coverage, in order to avoid an effective prohibition of wireless services, constitutes another unique circumstance of hardship where a zoning variance is required. (Please see attached project brief and exhibits for further details of compliance)**

3. Relief may be granted without substantial detriment to the public good for the following reasons.

**The requested variances will not be a detriment to the public, and in fact, will benefit the public by increasing Verizon Wireless’ service coverage in the Town of Essex and the surrounding community and providing for future collocation. The proposed wireless communications Facility is designed to be unobtrusive and sited to minimize visibility from adjoining properties as well as reasonably possible, and will reduce any alleged adverse visual impacts by installing a telecommunications tower at a commercially developed area of the Town on a heavily wooded portion of the lot that is substantially separated from area residences. The variance request is also consistent with the Telecommunications Act of 1996 whose purpose is “[t]o promote competition and reduce regulation in order to secure lower prices and higher quality services for American telecommunications consumers and encourage the rapid deployment of new telecommunications technologies.” The proposed site is the most appropriate due to its location with respect to the area needing service and the height and configuration of the proposed tower. Verizon Wireless does not have coverage in the area of the Town that will be provided by operations from the property and installation of the telecommunications tower is an integral part of Verizon Wireless’ network of telecommunications facilities necessary to provide adequate coverage to those persons living in Essex. (Please see attached project brief and exhibits for further details of compliance)**

4. Relief may be granted without nullifying or substantially derogating from the intent or purpose of the Zoning By-Law for the following reasons.

By allowing the proposed installation of the multi-user telecommunications tower at this property the intent of the Bylaw to encourage collocation and limit the number of new towers will be met. The proposed wireless communications facility is designed to be unobtrusive and sited to minimize visibility from nearby properties as well as reasonably possible, and will reduce any alleged adverse visual impacts by installing a telecommunications tower in developed business area of Town on an area of the lot that is heavily wooded and substantially separated from area residences. There are no existing wireless communication facilities in the Town that will accommodate the facility to provide the service that the proposed telecommunications tower will provide. There are no other tall structures from which coverage in the targeted area could be provided for in the Town. *(Please see attached project brief and exhibits for further details of compliance)*

**NOTE:** The law does not permit the Board of Appeals to grant a variance unless all of the legal requirements are satisfied. Each one of the above findings must be answered in detail.

The rights authorized by a variance expire one year from the date the decision is filed with the Town Clerk, unless exercised or extended in accordance with the terms of M.G.L. 40A, Section 10.

Date 3-2-2021

SIGNATURE   
(Petitioner/Agent)

Address P.O Box 254, Boxford, Massachusetts 01921

Tel. No. (781) 873-0021

*Please attach additional sheets if space provided is insufficient*



THIS MAP IS FOR ASSESSMENT PURPOSES. IT IS NOT VALID FOR LEGAL DESCRIPTION OR CONVEYANCE.

THE HORIZONTAL DATUM IS THE MASSACHUSETTS STATE PLANE COORDINATE SYSTEM, NAD 83.

PHOTOGRAPHY DATE: APRIL 13, 2010

COMPLETION DATE: SEPTEMBER 30, 2014

PRODUCED IN 2014 BY

**CAI Technologies**

11 Pleasant Street, Littleton, NH 03561  
603.222.4540 - www.cai-tech.com

**LEGEND**

AREA SURVEYED	Ac
AREA CALCULATED	Ac
RECORD DIMENSION	100'
SCALED DIMENSION	1000'
MATCH LINE	M.L.
WATER	W.

EXEMPT PROPERTY	(E)
SUBDIVISION LOT NO.	(L)
BUILDING	(B)
RIGHT OF WAY/ACCESS	(R)
COMMON OWNERSHIP	(C)
WETLANDS	(W)

SCALE: 1" = 100'

FEET: 0 50 100 200 300

METERS: 0 12.5 25 50 75

REVISED TO: JANUARY 1, 2016

PROPERTY MAPS

**ESSEX**

MASSACHUSETTS

**INDEX DIAGRAM**

120	121	122
126	127	128
136	137	138

MAP NO.

**127**



# 300 foot Abutters List Report

Essex, MA  
December 20, 2020

## Subject Property:

Parcel Number: 127-022-000  
CAMA Number: 127-022-000-000-0000  
Property Address: 73 EASTERN AVE

Mailing Address: COUGHLIN, JOHN E & JOSEPH P TR  
239 WESTERN AVE  
ESSEX, MA 01929

## Abutters:

Parcel Number: 126-001-000  
CAMA Number: 126-001-000-000-0000  
Property Address: 82 EASTERN AVE

Mailing Address: ESSEX COUNTY GREENBELT ASSOC  
82 EASTERN AVE  
ESSEX, MA 01929

Parcel Number: 126-045-000  
CAMA Number: 126-045-000-000-0000  
Property Address: 6 GOODWIN CT

Mailing Address: JERNEGAN HEATHER  
6 GOODWIN CT  
ESSEX, MA 01929

Parcel Number: 126-051-000  
CAMA Number: 126-051-000-000-0000  
Property Address: 81 EASTERN AVE

Mailing Address: WOOLAVER, JAMES T *+ Elaine Woolaver*  
81R EASTERN AVE  
ESSEX, MA 01929

Parcel Number: 126-052-000  
CAMA Number: 126-052-000-000-0000  
Property Address: 79 EASTERN AVE

Mailing Address: MAGERS, RONALD G  
79 EASTERN AVE  
ESSEX, MA 01929

Parcel Number: 126-053-000  
CAMA Number: 126-053-000-000-0000  
Property Address: 77 EASTERN AVE

Mailing Address: ROBERTS, NANCY E  
P O BOX 954  
ESSEX, MA 01929

Parcel Number: 126-053-000  
CAMA Number: 126-053-000-001-0001  
Property Address: 77 EASTERN AVE

Mailing Address: ROBERTS, NANCY E  
P O BOX 954  
ESSEX, MA 01929

Parcel Number: 126-053-000  
CAMA Number: 126-053-000-001-0002  
Property Address: 77 EASTERN AVE

Mailing Address: ROBERTS, NANCY E  
P O BOX 954  
ESSEX, MA 01929

Parcel Number: 126-053-000  
CAMA Number: 126-053-000-001-0003  
Property Address: 77 EASTERN AVE

Mailing Address: PARKOS, JENNIFER TR *Jennifer Parkos Living Trust*  
77 EASTERN AVE, UNIT #3  
ESSEX, MA 01229

Parcel Number: 126-054-000  
CAMA Number: 126-054-000-000-0000  
Property Address: 77 EASTERN AVE

Mailing Address: WILDES, GORDON J *Life Estate*  
77R EASTERN AVE  
ESSEX, MA 01929

Parcel Number: 127-013-000  
CAMA Number: 127-013-000-000-0000  
Property Address: 7 WATER ST

Mailing Address: PERKINS LYDIA TR *Lydia S. Perkins Real Estate Trust*  
7 WATER ST  
ESSEX, MA 01929



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# 300 foot Abutters List Report

Essex, MA  
December 20, 2020

Parcel Number: 127-014-000 CAMA Number: 127-014-000-000-0000 Property Address: 60 EASTERN AVE	Mailing Address: GLYNOS, GEORGE 6 PINE RIDGE RD ESSEX, MA 01929
Parcel Number: 127-015-000 CAMA Number: 127-015-000-000-0000 Property Address: 62 EASTERN AVE	Mailing Address: ROBERTS, CARTER 62 EASTERN AVE ESSEX, MA 01929
Parcel Number: 127-016-000 CAMA Number: 127-016-000-000-0000 Property Address: 64 EASTERN AVE	Mailing Address: <del>CARPENTER, JULIA F TR</del> <i>Lahey, William L</i> <del>2449 ZACKS FORK RD</del> <i>Lahey, Lisa L</i> <del>LENOIR, NC 28645</del> <i>64 Eastern Ave</i> <i>ESSEX, MA 01929</i>
Parcel Number: 127-019-000 CAMA Number: 127-019-000-000-0000 Property Address: 74 EASTERN AVE	Mailing Address: CALDER, JONATHAN D <i>Cynthia F. Calder</i> 126 STATE ST BROOKLYN, NY 11202
Parcel Number: 127-021-000 CAMA Number: 127-021-000-000-0000 Property Address: 75 EASTERN AVE	Mailing Address: VOYAGER MARINE PROPERTIES LLC 25 LUFKIN ST ESSEX, MA 01929
Parcel Number: 127-023-000 CAMA Number: 127-023-000-000-0000 Property Address: 65 EASTERN AVE	Mailing Address: COUGHLIN, JOHN T TRUSTEE <i>Gateway Realty Trust</i> 239 WESTERN AVE ESSEX, MA 01929
Parcel Number: 127-024-000 CAMA Number: 127-024-000-000-0000 Property Address: 63 EASTERN AVE	Mailing Address: DM REALTY LLC 26 LUFKIN POINT LN ESSEX, MA 01929
Parcel Number: 136-036-000 CAMA Number: 136-036-000-000-0000 Property Address: 56 EASTERN AVE	Mailing Address: HILL, KIMBERLY ANN <i>Harold G. Allen III</i> 56 EASTERN AVE ESSEX, MA 01929
Parcel Number: 136-037-000 CAMA Number: 136-037-000-000-0000 Property Address: 0 ESSEX REACH RD	Mailing Address: OWNER UNKNOWN
Parcel Number: 136-038-000 CAMA Number: 136-038-000-000-0000 Property Address: 7 ESSEX REACH RD	Mailing Address: PRINCE BRETT <i>Elizabeth Prince</i> 7 ESSEX REACH RD ESSEX, MA 01929
Parcel Number: 136-039-000 CAMA Number: 136-039-000-000-0000 Property Address: 1 ESSEX REACH RD	Mailing Address: Essex Reach Condominium 1-6 ESSEX REACH RD ESSEX, MA 01929
Parcel Number: 136-039-000 CAMA Number: 136-039-000-001-0001 Property Address: 1 ESSEX REACH RD	Mailing Address: COOPER VIRGINIE E 1 ESSEX REACH RD ESSEX, MA 01929



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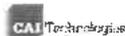
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# 300 foot Abutters List Report

Essex, MA  
December 20, 2020

Parcel Number: 136-039-000 CAMA Number: 136-039-000-002-0002 Property Address: 2 ESSEX REACH RD	Mailing Address: HEUSER, RICHARD R 2 ESSEX REACH RD ESSEX, MA 01929
Parcel Number: 136-039-000 CAMA Number: 136-039-000-002-0003 Property Address: 3 ESSEX REACH RD	Mailing Address: QUILL, KATHLEEN A TR 3 ESSEX REACH RD ESSEX, MA 01929 <i>Kathleen Ann Quill Revocable Trust</i>
Parcel Number: 136-039-000 CAMA Number: 136-039-000-003-0004 Property Address: 4 ESSEX REACH RD	Mailing Address: HEMBERGER, KARL 4 ESSEX REACH RD ESSEX, MA 01929 <i>+ Dorothy Wang</i>
Parcel Number: 136-039-000 CAMA Number: 136-039-000-004-0005 Property Address: 5 ESSEX REACH RD	Mailing Address: BAKER, KAREN GOULD TRUSTEE 5 ESSEX REACH RD ESSEX, MA 01929 <i>Gould Family Trust</i>
Parcel Number: 136-039-000 CAMA Number: 136-039-000-004-0006 Property Address: 6 ESSEX REACH RD	Mailing Address: ESSEX REACH ROAD LLC 849 BLACKSHIRE LN HOUSTON, TX 77055
Parcel Number: 136-040-000 CAMA Number: 136-040-000-000-0000 Property Address: 8 ESSEX REACH RD	Mailing Address: WALDER, ANTHONY J 8 ESSEX REACH RD ESSEX, MA 01929 <i>+ Carina E. Walder</i>
Parcel Number: 136-041-000 CAMA Number: 136-041-000-000-0000 Property Address: 57 EASTERN AVE	Mailing Address: LARSON, CHRISTOPHER DAVID 57 EASTERN AVE ESSEX, MA 01929 <i>+ Kristin K. Larson</i>
Parcel Number: 136-042-000 CAMA Number: 136-042-000-000-0000 Property Address: 51 EASTERN AVE	Mailing Address: LAWLER, THOMAS F & CAROLYN 51 EASTERN AVE ESSEX, MA 01929 <i>+ Lawler, Ken</i>
Parcel Number: 136-053-000 CAMA Number: 136-053-000-000-0000 Property Address: 24 GROVE ST	Mailing Address: OBRIEN, BARRY B 24 GROVE ST ESSEX, MA 01929-0007 <i>+ Suzanne B. Farrell</i>
Parcel Number: 136-054-000 CAMA Number: 136-054-000-000-0000 Property Address: 6 COGSWELL CT	Mailing Address: MELLO, BRUCE TR 6 COGSWELL CT ESSEX, MA 01929 <i>RLM Realty Trust</i>
Parcel Number: 136-055-000 CAMA Number: 136-055-000-000-0000 Property Address: 10 COGSWELL CT	Mailing Address: DRAKE, JOHN T 10 COGSWELL CT ESSEX, MA 01929 <i>+ Kimberly Drake</i>
Parcel Number: 136-056-000 CAMA Number: 136-056-000-000-0000 Property Address: 12 COGSWELL CT	Mailing Address: WARNER, DAVID C IV 12 COGSWELL CT ESSEX, MA 01929 <i>+ Naomi J. Chapman</i>



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# 300 foot Abutters List Report

Essex, MA  
December 20, 2020

Parcel Number: 136-057-000 CAMA Number: 136-057-000-000-0000 Property Address: 15 COGSWELL CT	Mailing Address: BEATON, RICHARD R 15 COGSWELL CT ESSEX, MA 01929 <i>+ Mary Ann Beaton</i>
Parcel Number: 137-025-000 CAMA Number: 137-025-000-000-0000 Property Address: 32 HASKELL CT	Mailing Address: MILLS, DANIEL QUINN TR P O BOX 927 ESSEX, MA 01929 <i>Revocable Trust Agreement</i>
Parcel Number: 137-026-000 CAMA Number: 137-026-000-000-0000 Property Address: 29 HASKELL CT	Mailing Address: FOSS, CHARLES L P O BOX 473 ESSEX, MA 01929 <i>+ Deryl C. Foss</i>
Parcel Number: 137-027-000 CAMA Number: 137-027-000-000-0000 Property Address: 25 HASKELL CT	Mailing Address: GALLIVAN CAROLINE W R PO BOX 361 ESSEX, MA 01929
Parcel Number: 137-028-000 CAMA Number: 137-028-000-000-0000 Property Address: 11 HASKELL CT	Mailing Address: GERTSCH, EMIL A & KARIN M, TRS 11 HASKELL CT ESSEX, MA 01929 <i>Gertsch Realty Trust</i>
Parcel Number: 137-032-000 CAMA Number: 137-032-000-000-0000 Property Address: 109 EASTERN AVE	Mailing Address: 109 EASTERN AVE ESSEX MA LLC 564 CABOT ST BEVERLY, MA 01915 <i>c/o Frank Kaminski</i>
Parcel Number: 137-033-000 CAMA Number: 137-033-000-000-0000 Property Address: 107 EASTERN AVE	Mailing Address: PARATORE, DOMINIC A 107 R EASTERN AVE ESSEX, MA 01929 <i>+ Jeanne B. Paratore</i>
Parcel Number: 137-034-000 CAMA Number: 137-034-000-000-0000 Property Address: 83 EASTERN AVE	Mailing Address: DUDLEY, BENJAMIN A 83R EASTERN AVE ESSEX, MA 01929 <i>+ Madeline E. Dudley c/o Nancy Dudley P.O. Box 86, Essex</i>
Parcel Number: 137-035-000 CAMA Number: 137-035-000-000-0000 Property Address: 0 COGSWELL CT	Mailing Address: ESSEX CONSERVATION TRUST COGSWELL CT ESSEX, MA 01929
Parcel Number: 137-036-000 CAMA Number: 137-036-000-000-0000 Property Address: 16 COGSWELL CT	Mailing Address: PEYLA, MARIE-CATHERINE 234 WESTERN AVE ESSEX, MA 01929 <i>+ Christian C. Peyla</i>
Parcel Number: 137-037-000 CAMA Number: 137-037-000-000-0000 Property Address: 0 GROVE ST	Mailing Address: JENKINS, PRESTON 9 SOUTHERN AVE ESSEX, MA 01929 <i>+ William Allen Tax Title, TOWN of ESSEX</i>

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BOARD OF ASSESSORS

DEC 21 2020  
*Michael Cataldo*  
ASSESSOR



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**ADDITONAL ABUTTERS**

**Subject Property:**

Parcel Number:	127-022-000	Mailing Address:	COUGHLIN, JOHN E & JOSEPH P TR
CAMA Number:	127-022-000-000-0000		239 WESTERN AVE
Property Address:	73 EASTERN AVE		ESSEX, MA 01929

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**Abutters:**

Parcel Number:	126-050-000	Mailing address:	ENOS, DONALD P
CAMA Number:	126-050-000-000-0000		JOAN M ENOS
Property Address:	81 EASTERN AVE		81 EASTERN AVE
			ESSEX, MA 01929

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Parcel Number:	127-018-000	Mailing address:	TWOMBLY TODD W
CAMA Number:	127-018-000-000-0000		CHRISTINE M TWOMBLY
Property Address:	76 EASTERN AVE		76 EASTERN AVE
			ESSEX, MA 01929

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DEC 21 2020

*Michael Cotab*  
ASSESSOR

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# 300 foot Abutters List Report

Essex, MA  
December 20, 2020

## Subject Property:

Parcel Number: 127-023-000  
CAMA Number: 127-023-000-000-0000  
Property Address: 65 EASTERN AVE

Mailing Address: COUGHLIN, JOHN T TRUSTEE  
239 WESTERN AVE  
ESSEX, MA 01929

## Abutters:

Parcel Number: 126-051-000  
CAMA Number: 126-051-000-000-0000  
Property Address: 81 EASTERN AVE

Mailing Address: WOOLAVER, JAMES T *+ Elaine Woolaver*  
81R EASTERN AVE  
ESSEX, MA 01929

Parcel Number: 126-053-000  
CAMA Number: 126-053-000-000-0000  
Property Address: 77 EASTERN AVE

Mailing Address: ROBERTS, NANCY E  
P O BOX 954  
ESSEX, MA 01929

Parcel Number: 126-053-000  
CAMA Number: 126-053-000-001-0001  
Property Address: 77 EASTERN AVE

Mailing Address: ROBERTS, NANCY E  
P O BOX 954  
ESSEX, MA 01929

Parcel Number: 126-053-000  
CAMA Number: 126-053-000-001-0002  
Property Address: 77 EASTERN AVE

Mailing Address: ROBERTS, NANCY E  
P O BOX 954  
ESSEX, MA 01929

Parcel Number: 126-053-000  
CAMA Number: 126-053-000-001-0003  
Property Address: 77 EASTERN AVE

Mailing Address: PARKOS, JENNIFER *JTR*  
77 EASTERN AVE, UNIT #3 *Jennifer Parkos Living Trust*  
ESSEX, MA 01229

Parcel Number: 126-054-000  
CAMA Number: 126-054-000-000-0000  
Property Address: 77 EASTERN AVE

Mailing Address: WILDES, GORDON J *Life Estate*  
77R EASTERN AVE  
ESSEX, MA 01929

Parcel Number: 127-014-000  
CAMA Number: 127-014-000-000-0000  
Property Address: 60 EASTERN AVE

Mailing Address: GLYNOS, GEORGE  
6 PINE RIDGE RD  
ESSEX, MA 01929

Parcel Number: 127-015-000  
CAMA Number: 127-015-000-000-0000  
Property Address: 62 EASTERN AVE

Mailing Address: ROBERTS, CARTER  
62 EASTERN AVE  
ESSEX, MA 01929

Parcel Number: 127-016-000  
CAMA Number: 127-016-000-000-0000  
Property Address: 64 EASTERN AVE

Mailing Address: ~~CARPENTER, JULIA F TR~~ *Lahay, William L.*  
~~2449 ZACKS FORK RD~~ *Lahay, Lisa L.*  
~~LENOIR, NC 28645~~ *64 Eastern Ave*  
*Essex, MA 01929*

Parcel Number: 127-019-000  
CAMA Number: 127-019-000-000-0000  
Property Address: 74 EASTERN AVE

Mailing Address: CALDER, JONATHAN D *+ Cynthia F. Calder*  
126 STATE ST  
BROOKLYN, NY 11202



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# 300 foot Abutters List Report

Essex, MA  
December 20, 2020

Parcel Number: 127-021-000  
CAMA Number: 127-021-000-000-0000  
Property Address: 75 EASTERN AVE

Mailing Address: VOYAGER MARINE PROPERTIES LLC  
25 LUFKIN ST  
ESSEX, MA 01929

Parcel Number: 127-022-000  
CAMA Number: 127-022-000-000-0000  
Property Address: 73 EASTERN AVE

Mailing Address: COUGHLIN, JOHN E & JOSEPH P TR  
239 WESTERN AVE  
ESSEX, MA 01929 *Gateway II Trust of 1997*

Parcel Number: 127-024-000  
CAMA Number: 127-024-000-000-0000  
Property Address: 63 EASTERN AVE

Mailing Address: DM REALTY LLC  
26 LUFKIN POINT LN  
ESSEX, MA 01929

Parcel Number: 136-037-000  
CAMA Number: 136-037-000-000-0000  
Property Address: 0 ESSEX REACH RD

Mailing Address: OWNER UNKNOWN

Parcel Number: 136-038-000  
CAMA Number: 136-038-000-000-0000  
Property Address: 7 ESSEX REACH RD

Mailing Address: PRINCE BRETT & Elizabeth Prince  
7 ESSEX REACH RD  
ESSEX, MA 01929

Parcel Number: 136-039-000  
CAMA Number: 136-039-000-000-0000  
Property Address: 1 ESSEX REACH RD

Mailing Address: Essex Reach Condominium  
1-6 ESSEX REACH RD  
ESSEX, MA 01929

Parcel Number: 136-039-000  
CAMA Number: 136-039-000-001-0001  
Property Address: 1 ESSEX REACH RD

Mailing Address: COOPER VIRGINIE E  
1 ESSEX REACH RD  
ESSEX, MA 01929

Parcel Number: 136-039-000  
CAMA Number: 136-039-000-002-0002  
Property Address: 2 ESSEX REACH RD

Mailing Address: HEUSER, RICHARD R  
2 ESSEX REACH RD  
ESSEX, MA 01929

Parcel Number: 136-039-000  
CAMA Number: 136-039-000-002-0003  
Property Address: 3 ESSEX REACH RD

Mailing Address: QUILL, KATHLEEN A TR  
3 ESSEX REACH RD  
ESSEX, MA 01929 *Kathleen Ann Quill Revocable Trust*

Parcel Number: 136-039-000  
CAMA Number: 136-039-000-003-0004  
Property Address: 4 ESSEX REACH RD

Mailing Address: HEMBERGER, KARL & Dorothy Wang  
4 ESSEX REACH RD  
ESSEX, MA 01929

Parcel Number: 136-039-000  
CAMA Number: 136-039-000-004-0005  
Property Address: 5 ESSEX REACH RD

Mailing Address: BAKER, KAREN GOULD TRUSTEE  
5 ESSEX REACH RD  
ESSEX, MA 01929 *Gould Family Trust*

Parcel Number: 136-039-000  
CAMA Number: 136-039-000-004-0006  
Property Address: 6 ESSEX REACH RD

Mailing Address: ESSEX REACH ROAD LLC  
849 BLACKSHIRE LN  
HOUSTON, TX 77055



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# 300 foot Abutters List Report

Essex, MA  
December 20, 2020

Parcel Number: 136-040-000  
CAMA Number: 136-040-000-000-0000  
Property Address: 8 ESSEX REACH RD

Mailing Address: WALDER, ANTHONY J +  
8 ESSEX REACH RD *Carina E. Walder*  
ESSEX, MA 01929

Parcel Number: 136-041-000  
CAMA Number: 136-041-000-000-0000  
Property Address: 57 EASTERN AVE

Mailing Address: LARSON, CHRISTOPHER DAVID +  
57 EASTERN AVE *Kristin K. Larson*  
ESSEX, MA 01929

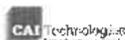
Parcel Number: 137-034-000  
CAMA Number: 137-034-000-000-0000  
Property Address: 83 EASTERN AVE

Mailing Address: DUDLEY, BENJAMIN A + *Maddeline E.*  
83R EASTERN AVE *c/o Nancy Dudley*  
ESSEX, MA 01929 *83R Eastern Ave*  
*PO Box 86*  
*Essex, MA 01929*

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DEC 21 2020

*Michael Cataldo*  
ASSESSOR



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12/20/2020

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**ADDITIONAL ABUTTERS**

**Subject Property:**

Parcel Number:	127-023-000	Mailing Address:	COUGHLIN, JOHN T TRUSTEE
CAMA Number:	127-023-000-000-0000		239 WESTERN AVE
Property Address:	65 EASTERN AVE		ESSEX, MA 01929

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**Abutters:**

Parcel Number:	126-050-000	Mailing address:	ENOS, DONALD P
CAMA Number:	126-050-000-000-0000		JOAN M ENOS
Property Address:	81 EASTERN AVE		81 EASTERN AVE
			ESSEX, MA 01929

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Parcel Number:	127-018-000	Mailing address:	TWOMBLY TODD W
CAMA Number:	127-018-000-000-0000		CHRISTINE M TWOMBLY
Property Address:	76 EASTERN AVE		76 EASTERN AVE
			ESSEX, MA 01929

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BOARD OF ASSESSORS**

DEC 21 2020

*Michael Cataldo*  
ASSESSOR

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# TOWN OF ESSEX

## BRIEF IN SUPPORT OF APPLICATION FOR VARIANCE

**APPLICANT:** TowerNorth Development, LLC

**CO-LOCATOR:** Cellco Partnership d/b/a Verizon Wireless

**TOWER SITE ADDRESS:** 73 Eastern Avenue, Essex, MA  
**ACCESS ADDRESS:** 65 Eastern Avenue, Essex, MA

**ASSESSOR'S LOT I.D.:** Map 127, Lot 22 and Map 127, Lot 23

This statement in support of an application for dimensional variances, *all rights reserved*, and all other required relief pursuant to the Town of Essex, Zoning Bylaws, Massachusetts General Laws chapter 40A, and, the federal Telecommunications Act of 1996 for a Free Standing Monopole Tower (“Facility”) is respectfully submitted by TowerNorth Development, LLC with its co-locating tenant Cellco Partnership d/b/a Verizon Wireless to the Town of Essex, Board of Appeals (the “Board”). This application includes with the Facility the collocation of antennas and installation of ground equipment of Cellco Partnership d/b/a Verizon Wireless that will be installed at the Facility.

*See Exhibit 1, Verizon Wireless Letter of Intent.*

### DESCRIPTION OF THE APPLICANT

TowerNorth Development LLC (“TowerNorth” or “Applicant”) is a developer of wireless infrastructure. TowerNorth engineers, deploys, owns and operates technologically advanced shared wireless infrastructure, including an extensive network of towers.

**Representative:** Daniel D. Klasnick, Esquire  
(781) 873-0021  
[dklasnick@dkt-legal.com](mailto:dklasnick@dkt-legal.com)

### THE PROPERTY

The project area consists of the approximate 22.3 acre property located at 73 Eastern Avenue with the exception of the area toward the front the parcel developed with commercial storage buildings and the already cleared area that will contain the proposed Facility the property is heavily wooded with primarily deciduous wooded vegetation surrounding the area where the Facility compound will be located. The property to be

utilized for vehicle access and connection to utility services at 65 Eastern Avenue consists of approximately 3.04 acres and is developed with the South Village Center shopping center with a parking area.

John E. Coughlin & Joseph P. Coughlin, Trustees of the Gateway II Trust of 1997 leased a portion of subject property located at 73 Eastern Avenue, being shown on the Tax Map of the Town of Essex as Map 127, Lot 22 with rights for access/utilities granted by the John T. Coughlin, Trustee of PMC Realty Trust over the property at 65 Eastern Avenue, being shown on the Tax Map of the Town of Essex as Map 127, Lot 23 for the installation of the proposed Facility. The property owners have given the Applicant full authority to file all applications for the necessary approvals for the installation of a personal wireless service facility at this site.

*See Exhibit 2, Property Deeds.*

*See Exhibit 3, Property Owner Authorization Letters.*

### **BALLOON TEST**

On Friday, August 28, 2020, TowerNorth's representative conducted a balloon test on the 73 Eastern Avenue property. A balloon test is conducted to be used as the visual reference for site observations from locations throughout the study area. The balloon test consists of flying a helium filled balloon to the top elevation of the proposed tower. In this case, a balloon was flown at approximately 150 feet above ground level to simulate the height of the proposed tower.

Drive-by visual reconnaissance of the study area is then conducted. Locations where the balloon is visible and not visible are photo documented and tracked. The photos document the necessary location and bearing data to ensure the accuracy of simulation location. Photographs were taken of the balloon from various vantage points surrounding the proposed tower and photographic simulations of the proposed tower and antennas were produced at the 150 foot height. The photo simulations are created using a combination of modeling and photo rendering software.

*See Exhibit 4, Photo Simulations.*

### **PROJECT DESCRIPTION**

TowerNorth proposes the following regarding its proposal to locate a telecommunications tower with Verizon Wireless' tower equipment and ground equipment on the property located at 73 Eastern Avenue with access and utilities over property located at 65 Eastern Avenue, Essex, Massachusetts.

*See Exhibit 5, Stamped Project Plans.*

**a. The Proposed Free Standing Monopole Tower**

TowerNorth proposes to construct a self-supporting multi-user one hundred fifty (150) foot Monopole Tower that is designed to accommodate the equipment of 4 wireless service providers (“Tower”).

**b. The Proposed Ground Space of the Facility**

Within the 75-foot by 75-foot leased area, TowerNorth is proposing to enclose an area of approximately 2,647 square feet of ground space for the Facility that will be surrounded by a six (6) foot high chain link fence with barbed wire that will have a twelve (12) foot wide locked entrance gate.

The proposed ground space for the Facility will accommodate the area necessary to house the telecommunications tower, equipment of Verizon Wireless and the equipment for three (3) future collocators at the property. The installation includes a 15’ x 20’ turnaround/parking area immediately adjacent to the fenced area.

The fenced ground space will be screened by existing vegetation and distance from the nearest public way and abutting properties. This will provide an effective screen of the fenced ground space area.

**c. The Proposed Access to the Facility**

Over existing paved driveway and parking area on both 65 Eastern Avenue and 73 Eastern Avenue from Eastern Avenue to the gravel access road that connects to the locked swing gate measuring 12’ wide, as shown and described in the Plans.

After construction of the Facility is complete, the only traffic to the Facility will be for routine monthly service by Verizon Wireless and other carriers of the Facility to ensure that the telecommunications equipment remains in good working order.

Verizon Wireless and the future wireless service providers will not have any permanent employees or customers at the Facility.

**d. The Proposed Electric and Telephone Utilities**

Electric and telephone lines will run underground from the Facility and will be connected to existing electric and telephone service at a utility pole located on the property at 65 Eastern Avenue in accordance with the requirements of the servicing utility company.

**e. The Proposed Verizon Wireless Tower Installed Equipment**

Verizon Wireless proposes to install six (6) antennas at a centerline mount height of one hundred forty six (146) feet with remote radio heads. Verizon Wireless’ panel

antennas will be installed on the triangular mount attached to the Tower to provide 360° of coverage. The antennas will be mounted in three separate arrays of two antennas per sector. The cabling will run from the antennas inside the monopole tower to a cable bridge to the proposed equipment cabinets.

Coaxial cabling will connect the antennas located on the monopole tower to the switching and power equipment located inside the equipment cabinet located at the base of the proposed monopole.

*See Exhibit 6, Verizon Panel Antenna and Remote Radio Head Specifications.*

**f. Verizon Wireless Proposed Equipment Cabinet**

Verizon Wireless will install an equipment cabinet(s) inside of the fenced area on a concrete pad. Verizon Wireless will install a covered safety light on its equipment ice canopy for illumination during service visits. There will be no other exterior lights at the Facility.

*See Exhibit 7, Verizon Equipment Cabinet Specifications.*

**g. Verizon Wireless Proposed Emergency Power Source**

A propane powered emergency generator will be located on a concrete pad inside of the fenced area. The emergency generator will only be used for back-up power and only in the event of an emergency. Verizon Wireless will maintain the emergency generator.

*See Exhibit 8, Generator Specifications.*

**h. Proposed Maintenance Schedule of the Facility**

The site is unmanned and when operational, will not generate substantial amounts of traffic. Trips to and from the Facility will be limited to once or twice a month, on average, by maintenance personnel.

The Tower proposed for construction is a monopole.

The Verizon Wireless equipment is largely maintenance free. However, in the event that maintenance of the its equipment becomes necessary, Verizon Wireless shall perform necessary maintenance to its equipment.

TowerNorth agrees to maintain the leased area including the driveway/turnaround parking area and ground space within the two thousand six hundred forty seven (2,647) square foot area surrounded by a six (6) foot high chain link fence. TowerNorth agrees to maintain the Tower, utility infrastructure, and the chain link fence for the duration of the use of the property.

## REQUESTED VARIANCES

**Section 6-3.4.5 Radio, Telecommunications, Cellular and Television Facilities, Including Free Standing Tower Type Structures.** TowerNorth respectfully requests (with all rights reserved) a variance from the following:

**Section 6-3.4.5.c No Tower shall be located closer than two (2) miles from any other Tower.**

The existing telecommunications tower located at 16 Treehill Lane in the Town of Essex is located approximately 1.7 miles from the Tower to be located at 73 Eastern Avenue. Verizon Wireless currently operates a wireless facility similar to the proposed facility at 16 Treehill Lane. Due in large part to distances between this site, the intervening topography, and volume of traffic in the area, the existing facility does not provide sufficient coverage and capacity to portions of the Town of Essex and surrounding area. Specifically, Verizon Wireless determined that portions of Essex are without reliable service in the following areas and town roads, including but not limited to Route 133 (Main/Eastern/Essex Avenue), Downtown Essex and surrounding roads, neighborhoods, retail, dining, business, and community areas within proximity of the proposed site and the downtown area. The installation of Verizon Wireless' equipment at the proposed Facility to be located at 73 Eastern Avenue is necessary to address a significant gap in coverage and capacity. For the foregoing reasons and as the request satisfies the standards for a grant of a variance as hereinafter provided and to avoid a prohibition of wireless service in violation of the standards Telecommunications Act of 1996, TowerNorth hereby respectfully requests a variance from dimensional standard that no Tower be located closer than 2 miles from any other Tower.

**Section 6-3.4.5.e Towers shall be setback from the front, rear and side property lines a distance equal to at least one hundred twenty-five (125) percent of the height of the Tower.**

As certified by a stamped engineer's letter, the monopole has been designed to accommodate a theoretical fall radius of 48'-9". In the unlikely event of structural failure, the tower would yield/buckle allowing for a swing down radius completely within the existing property line. The height of the proposed Tower is 150-feet and the nearest property line is 121-feet. The requested relief is to reduce the 187.5-foot setback (150' x 1.25) by 66.5-feet to allow the Tower at a distance of 121-feet from the nearest property line.

Due principally to the shape of the lot, topography and the location of the existing wetlands on the property, it is necessary to install the telecommunications tower at the proposed location to allow for adequate service to the residents, businesses and public safety officials of the Town of Essex. Verizon Wireless has determined that the installation of the proposed wireless communication facility is required at this location to allow for adequate transmission or receipt of a wireless signal, or for the interruption or disconnection of a wireless connection to close their gap in coverage, and has identified

the subject property as suitable for this purpose. While the proposed Facility at this location does in fact meet all of the traditional criteria under Massachusetts General Laws Chapter 40A, Section 10 for the granting of a variance, the Telecommunications Act provides an additional avenue under which a wireless service provider may request relief in the form of a variance.

When considering the permitting of a wireless communications Facility, a local board must also consider the provisions of Section 704 of the Telecommunications Act of 1996 (“TCA”), codified at 47 U.S.C. §332. Any decision by the municipality “shall not prohibit or have the effect of prohibiting the provision of personal wireless service.” 47 U.S.C. §332(c)(7)(B). TowerNorth through this application and presentation at the public hearing will demonstrate that Verizon Wireless has a service gap in this area of Essex and that the requested variance is necessary to fill that gap. Without the installation of the proposed Verizon Wireless equipment, there will continue to be significant gaps in wireless service in this area of Essex.

*See Exhibit 9, Engineer’s Stamped Letter.*

**Section 6-3.4.5.g All Towers shall be located a minimum of five hundred (500) feet from the nearest residential structure. This paragraph shall not apply to radio, telecommunications, cellular, PCS and television facilities, located inside an existing structure**

The nearest residential structure is located at a distance of 379-feet from the location of the Tower. Because of wetlands, topographical features and existing vegetation, there is no available location on the property that would satisfy the setback distance of 500 feet. The request is to reduce the 500-foot setback distance by 121-feet to allow the Tower at a distance of 379-feet to the nearest residence.

The proposed tower at 150-feet is more than 379-feet from any existing building. As certified by a stamped engineer’s letter and depicted in stamped tower design drawings, the monopole has been designed to accommodate a theoretical fall radius of 48’-9”. Even without the design feature to accommodate the yield/buckle allowing for a lesser swing down radius, the 150-foot tower is more than 379-feet from the nearest building.

Due principally to the shape of the lot, topography and the location of the existing wetlands on the property, it is necessary to install the telecommunications tower at the proposed location to allow for adequate service to the residents, businesses and public safety officials of the Town of Essex. Verizon Wireless has determined that the installation of the proposed wireless communication facility is required at this location to allow for adequate transmission or receipt of a wireless signal, or for the interruption or disconnection of a wireless connection to close their gap in coverage, and has identified the subject property as suitable for this purpose. While the proposed Facility at this location does in fact meet all of the traditional criteria under Massachusetts General Laws Chapter 40A, Section 10 for the granting of a variance, the Telecommunications Act

provides an additional avenue under which a wireless service provider may request relief in the form of a variance.

When considering the permitting of a wireless communications Facility, a local board must also consider the provisions of Section 704 of the Telecommunications Act of 1996 (“TCA”), codified at 47 U.S.C. §332. Any decision by the municipality “shall not prohibit or have the effect of prohibiting the provision of personal wireless service.” 47 U.S.C. §332(c)(7)(B). TowerNorth through this application and presentation at the public hearing will demonstrate that Verizon Wireless has a service gap in this area of Essex and that the requested variance is necessary to fill that gap. Without the installation of the proposed Verizon Wireless equipment, there will continue to be significant gaps in wireless service in this area of Essex.

**Section 6.3.4.5.h Accessory building shall be set back from the front, rear and side property lines a minimum of fifty (50) feet. Accessory building shall be of a common design and color. A maximum of ten (10) accessory buildings, each limited to four hundred (400) square feet in area and a maximum of ten (10) feet in height may be permitted per Tower. Multiple buildings shall be connected by a common wall.**

The typical wireless service provider does not utilize “Accessory building” but rather deploys equipment inside of small cabinets that are located on concrete pads that will be located within the fenced area. Similarly, Verizon Wireless will install its equipment cabinet, backup battery cabinet, backup generator on concrete pads located in the fenced area. TowerNorth respectfully requests (with all rights reserved) that the Town of Essex Board of Appeals grant a variance from the requirements of this provision and that multiple buildings shall be connected by a common wall. The size and type of the cabinets to be installed on the concrete pads will comply with the number, size and height requirements specified in the zoning bylaws. In fact, they will be significantly smaller in size and height than the requirements specified in the bylaw. Without the relief requested, Verizon Wireless would be unable to provide adequate coverage by filling existing significant gap in coverage, thereby creating a hardship recognized by federal and state courts interpreting the Telecommunications Act.

*See Exhibit 7, Verizon Equipment Cabinet Specifications.*

#### **SATISFACTION OF VARIANCE STANDARDS**

Pursuant to Section 6-9.3.2 Variances of the Town of Essex Zoning Bylaws, the Board of Appeals may grant variances after application, notice and hearing required by state statute.

The proposed Facility will address service coverage and capacity gaps in the Town of Essex. The addressing of gaps of service coverage and capacity in the Town of Essex is desirable to the public convenience for personal use of wireless services and for community safety in times of public crisis and natural disaster. In addition, the requested

use will not create excess traffic, overload any municipal system, or impair the integrity of the community.

**A. The proposed Facility is necessary to meet current and expected demand for the services supported by the wireless communications services facility for Verizon Wireless' network.**

*Site Selection Process.* TowerNorth and Verizon Wireless are committed to working with local communities in siting and construction of wireless communication facilities. The wireless communications system being developed by Verizon Wireless has been designed utilizing sophisticated computer engineering models that simultaneously evaluate topography, population patterns, and land use concerns to identify specific geographic regions to be serviced by the communications facility in the network. As a result, a limited search area is identified by the Radio Frequency Engineer ("RF Engineer") as the necessary location for a wireless facility to ensure the most complete coverage to area residents, businesses, and public safety officials.

Verizon Wireless' RF Engineer has reviewed call attempts, ineffective call attempts, and dropped calls in the search area in which the subject parcel is located. This research has confirmed that a "significant gap" in wireless coverage exists, requiring the installation of a personal wireless service facility in the search area. Verizon Wireless' RF Engineer has further determined that an installation on the proposed telecommunications tower would enable Verizon Wireless to close gaps in its wireless coverage.

*Justification of Need.* A gap in coverage is evidenced by the inability to adequately transmit or to receive calls, or by the interruption or disconnection of calls. Verizon Wireless currently has a significant gap in coverage in the Town of Essex. The gap in coverage that exists in the Town prevents Verizon Wireless from providing uninterrupted wireless service to current and future public and private users of its wireless communications system.

The location of the Facility is an integral part of Verizon Wireless' network of telecommunications facilities necessary to provide adequate coverage to those persons living in Essex, as well as those persons commuting through the Essex area on the various roadways. Following a thorough analysis, Verizon Wireless submits that it can fulfill its significant coverage gaps by locating its equipment on the proposed Tower.

If Verizon Wireless is permitted to install the equipment detailed herein, this Facility will aid in reaching Verizon Wireless' goal to provide enhanced service and communications in the Town of Essex, the Commonwealth of Massachusetts, and the United States as a whole.

***See Exhibit 10, RF Report.***

***See Exhibit 11, Alternative Site Analysis.***

**B. The proposed Facility conforms to all applicable federal, state and local standards and regulations.**

TowerNorth and Verizon Wireless are in compliance with all federal and state regulations, standards and mandates including regulations governing radio frequency emissions. The proposed Facility will be designed in compliance with all applicable federal and state regulations, including the state building code, Massachusetts Department of Public Health regulations, and Federal Aviation Administration (“FAA”) regulations. In addition, Verizon Wireless operates in compliance with all of the rules and regulations promulgated by the Federal Communications Commission (“FCC”) as required by its licensing.

*See Exhibit 12, FCC Licenses to Operate.*

*See Exhibit 13, Environmental Sound Assessment.*

*See Exhibit 14, Radio Frequency Exposure Report.*

*See Exhibit 15, FAA Determination.*

**C. The proposed Facility is designed and will be constructed in a manner which minimizes its visual impact to the extent practical.**

The Facility has been sited and designed in a manner that minimizes its visibility from neighboring residences and streets. TowerNorth is proposing to locate its proposed Facility in a remote area that is buffered by vegetation and substantially separated from existing residential and commercial structures, which will minimize any adverse impact on adjacent properties.

The Facility will be unmanned and will only require a technician to service the equipment approximately once a month. TowerNorth, Verizon Wireless and future wireless service providers will utilize the existing access from Eastern Avenue over the existing parking area on 65 Eastern Avenue property and paved driveway to the Tower. The utilities will be obtained from existing service and then underground to the Facility.

**D. The proposed Facility is an appropriate site within the technically feasible area for the location of the wireless communications services facility.**

As detailed herein, the proposed site is an ideal location for the Town. In addition, the proposed Tower will provide for collocation, which will reduce the number of additional new tower facilities required within the Town in the future. While satisfying the Town’s requirement for siting of wireless facilities, the proposed Facility is also technically appropriate to meet the service coverage needs of Verizon Wireless.

**E. The proposed Facility satisfies the standards for granting a variance from the dimensional provisions of the Town of Essex Zoning Bylaws.**

**There are conditions especially affecting the site but not generally affecting the district.**

In compliance with the requirements of M.G.L. c. 40A and the Town of Essex, Zoning Bylaws, there are circumstances relating to the soil, shape or topography of the lot or structures especially affecting such land or structures but not affecting generally the zoning district that justify the requested variance. The site's location in relation to Verizon Wireless' regional network needs is unique. Due principally to the topography of the land in the vicinity of the site and wetland resource areas, it is necessary to install the Facility at the proposed location and height to allow for adequate service to the residents, businesses and public safety officials of the Town of Essex. The site conditions and location allows for the installation of the Tower providing sufficient height for wireless communications coverage and is a suitable location for the installation. The proposed facility is the least intrusive means by which Verizon Wireless can fill its existing significant gap in coverage. The Facility has been sited and designed in a manner that minimizes its visibility from neighboring residences and streets.

The Telecommunications Act of 1996 ("TCA") provides that a local zoning authority may not deny a request for relief if in so doing it would effectively prohibit wireless services.<sup>1</sup> The proposed location of the Facility serves the needs of Verizon Wireless' customers to close a significant gap in coverage on its network. The courts of the First District have found that the need for closing a significant gap in coverage, in order to avoid an effective prohibition of wireless services, constitutes another unique circumstance when a zoning variance is required.<sup>2</sup> Federal law allows a zoning board to grant whatever relief is required to allow a wireless provider to close significant gaps in coverage. This point was aptly stated in the case of *Nextel Communications of the Mid-Atlantic v. Town of Wayland*, 231 F.Supp.2d 396 (D. Mass 2002):

Under the Telecommunications Act, the Board cannot deny the variance if in so doing it would have the effect of prohibiting wireless services. In other words, the need for closing a significant gap in coverage, in order to avoid an effective prohibition of wireless services, constitutes another unique circumstance when a zoning variance is required.<sup>3</sup>

Section 253(a) provides that "[n]o State or local statute or regulation, or other State or local legal requirement, may prohibit or have the effect of prohibiting the ability of any entity to provide any interstate or intrastate telecommunications service."<sup>4</sup> Courts have observed that Section 253 represents a "broad preemption of laws that inhibit

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<sup>1</sup> 47 USC § 332(c)(7)(B)(i) provides in part:

- (i) The regulation of the placement, construction, and modification of personal wireless service facilities by any State or local government or instrumentality thereof-
  - (I) shall not unreasonably discriminate among providers of functionally equivalent services; and
  - (II) shall not prohibit or have the effect of prohibiting the provision of personal wireless services.

<sup>2</sup> 2003 WL 21497159 (D. Mass.); *Nextel Communications of the Mid-Atlantic, Inc. d/b/a Nextel Communications v. The Town of Provincetown* 2003 WL 21497159.

<sup>3</sup> *Nextel Communications v. Town of Wayland*, 231 F.Supp.2d 396, 408-409 (D.Mass. 2001).

<sup>4</sup> 47 U.S.C. § 253(a).

competition.”<sup>5</sup>

The Federal Communications Commission in its Declaration Ruling and Third Report and Order clarified that under Section 253(a) or 332(c)(7)(B)(i)(II), “an effective prohibition [of service] occurs where a state or local legal requirement materially inhibits a provider’s ability to engage in any of a variety of activities related to its provision of a covered service.” By this ruling, the FCC makes it clear that a state or local legal requirement effectively prohibits the provision of wireless services if it inhibits or limits a provider “not only when filling a coverage gap but also when densifying a wireless network, introducing new services or otherwise improving service capabilities.” The FCC also makes clear that an effective prohibition includes inhibiting a provider from deploying the “performance characteristics” of its choosing. Under this standard, preventing an existing provider from delivering service to a new area, restricting the entry of a new provider in a given area, or materially inhibiting the introduction of new service or the improvement of existing services all create an unlawful “effective prohibition” of service.

Verizon Wireless has determined that a Facility is required at this location to close its gap in coverage and address capacity requirements, and has identified the subject property as suitable for this purpose. While the proposed Facility at this location does in fact meet all of the traditional criteria under Massachusetts General Laws Chapter 40A, Section 10 for the granting of a variance as enumerated above, the TCA provides an additional avenue under which a wireless service provider may request relief in the form of a variance. The TCA provides in part that any decision by the municipality “shall not prohibit or have the effect of prohibiting the provision of personal wireless service.”<sup>6</sup>

The location of the Facility near a commercially developed portion of Essex at 65 and 73 Eastern Avenue is the only feasible location by which Verizon Wireless could close the significant gap in wireless coverage. This creates a substantial hardship and the requested relief can be provided without detriment to the community. As such, TowerNorth respectfully requests the listed dimensional variances from the zoning Bylaw requirement for the proposed Facility.

Because of these circumstances related to the unique characteristics of the area of Essex in respect to Verizon Wireless’ network requirements and the availability for the installation of a Tower at the height required to address a significant gap in coverage, there are conditions relating to the site that does not generally affect the district thereby warranting the grant of the requested variances.

**A literal enforcement of the Bylaws would involve a substantial hardship.**

TowerNorth and Verizon Wireless would suffer a substantial hardship if the provisions of the Zoning Bylaws were literally enforced to preclude the use of this property for the installation of the Facility. Verizon Wireless requires a wireless

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<sup>5</sup> *Puerto Rico Tel. Co. v. Telecomm. Reg. Bd. of Puerto Rico*, 189 F.3d 1, 11 n.7 (1st Cir. 1999).

<sup>6</sup> 47 U.S.C. 332(c)(7)(B)(i)(II).

communications facility at the property to: (a) address a significant gap in wireless service in the Town of Essex, (b) to address a disadvantage resulting from the current coverage offered in this area of Essex by competitors and (c) to satisfy the mandate of, and realize the rights granted by, its federal licenses to provide wireless services.

There are no existing wireless communication facilities in the Town that provide the service that the Facility will provide. There are no other tall structures within the area from which coverage in the targeted area could be provided for the Town. The proposed site is the most appropriate due to its location with respect to the area needing service and the height and configuration of the Tower. Verizon Wireless does not have coverage in the area of the Town that will be provided by operations from the Facility and the location of a Facility is an integral part of Verizon Wireless' network of telecommunications facilities necessary to provide adequate coverage to those persons living in Essex, as well as those persons commuting through the Essex area on the various roadways.

Verizon Wireless' RF Engineer has reviewed call attempts, ineffective call attempts, and dropped calls in the search area in which the subject parcel is located. This research has confirmed that a "significant gap" in wireless coverage exists, requiring the installation of a personal wireless service facility in the search area. Verizon Wireless' RF Engineer has further determined that an installation on the proposed Tower would enable Verizon Wireless to close gaps in its wireless coverage.

When considering the permitting of a wireless communications facility, a local board must also consider the provisions of Section 704 of the Telecommunications Act of 1996 ("TCA"), codified at 47 U.S.C. §332. Any decision by the municipality may not "unreasonably discriminate against providers of functionally equivalent services and "shall not prohibit or have the effect of prohibiting the provision of personal wireless service." 47 U.S.C. §332(c)(7)(B). Through this application and presentation at the public hearing, it will be demonstrated that a significant gap in coverage and capacity exists in this area of Essex and that the requested variances are necessary to fill that gap. Without the Facility, there will continue to be significant gaps in coverage and capacity in this area of Essex.

Because of these circumstances, the literal enforcement of the bylaw requirements would involve a substantial hardship to TowerNorth and Verizon Wireless, the Town, and the public and may require the location of a wireless communications tower in a more intrusive area.

**A variance may be granted without substantial detriment to the public good and without nullifying or substantially derogating from the intent or purpose of the Zoning Bylaws.**

The requested variances will not be a detriment to the public, and in fact, will benefit the public by providing a location for the installation of wireless equipment and increasing Verizon Wireless' service coverage and capacity in the Town of Essex and the

surrounding community. The proposed Facility is designed to be unobtrusive and sited to minimize visibility from nearby properties as well as reasonably possible, and will reduce any alleged adverse visual impacts by locating to the rear of the lot in a wooded area.

The proposed Facility will be regularly maintained by qualified technicians to assure that the equipment operates at optimal condition so that no threat of explosion, fire or other danger to life or property occurs. A series of security measures are built into the facility to prevent accidental damage or vandalism: (a) the facility is enclosed by a fence, (b) the facility is equipped with a series of alarms which immediately notify a network alarm center of any equipment malfunction, and (c) prompt emergency response is available on a twenty-four (24) hour a day, seven (7) day a week basis. The Facility will comply in all respects with the applicable Radio Frequency Emissions standards established by the Federal Communications Commission.

The availability of wireless communications service enhances community safety, and is increasingly relied upon by civil defense and other safety officers as well as the general public in times of crisis, natural disaster, bad storms or similar circumstances. Wireless communications service also provides a convenience to residents, and is an attractive feature and service to businesses. The proposed Facility, by providing these services to the Town, will promote the health, safety, convenience and general welfare of the inhabitants of the Town of Essex.

In locating a Facility in an area that is recognized as a suitable by the Town, this proposal protects aesthetics, encourages use of property that minimizes the number of properties that are utilized for a telecommunications tower facility and minimizes the adverse impacts on the residents of Essex. The Facility will generate no objectionable noise, vibration, smoke, dust, odors, heat, glare or other effects.

Telecommunication activity is passive by nature. It will have no appreciable effects on surrounding uses or property. Minimal on-site activity will have no discernible impact on traffic and will not cause a change in the established character of the area. Verizon Wireless will not have any permanent employees or customers at the wireless service facility. After construction of the Facility is complete, the only traffic to the wireless service facility will be for routine monthly service by Verizon Wireless and future wireless service providers.

***See Exhibit 16, Real Estate Valuation Report.***

The Federal Government has endeavored to fulfill the mandate to facilitate competition in the telecommunications industry by the passage of the Telecommunications Act of 1996. Specifically, Section 704(a) of the 1996 Act provides among other things that wireless communications facilities may not be prohibited in any particular area and that denial of zoning relief must be based on substantial evidence. Accordingly, a denial of the foregoing Application would be contrary to the public interest that would effectively prohibit Verizon Wireless from providing adequate service

to this area in the Town of Essex and thus would be contrary to the purpose and intent of the 1996 Act.

Given all of the above-listed reasons, TowerNorth submits that the requested variances may be granted without substantial detriment to the public good and without nullifying or substantially derogating from the intent or purpose of the Town of Essex, Zoning Bylaws.

### **COMPLIANCE WITH TELECOMMUNICATIONS ACT OF 1996**

Because TowerNorth is applying for zoning approval for the installation of equipment that provides wireless services, the application is subject to §704 of the federal Telecommunications Act of 1996 (“TCA”), codified at 47 U.S.C. §332(c)(7)(B). By way of background, the TCA is a federal law enacted in 1996 whose purpose is “[t]o promote competition and reduce regulation in order to secure lower prices and higher quality services for American telecommunications consumers and encourage the rapid deployment of new telecommunications technologies.”<sup>7</sup> To further this purpose, the TCA established national standards that apply to zoning applications for wireless facilities. These standards preempt inconsistent state and local laws, so they must be considered by zoning boards in making decisions on applications for wireless facilities.

Without the relief requested, Verizon Wireless would be unable to provide adequate coverage by filling existing significant gap in coverage and capacity, thereby creating a hardship recognized by federal and state courts interpreting the TCA. The property is located within the limited geographic area whereby Verizon Wireless' radio frequency engineers determined that a wireless facility is required. Federal courts interpreting the TCA have held that where an applicant for the installation of wireless communications facilities to provide communications services seeks zoning relief as required by the municipal zoning ordinance, federal law imposes substantial restrictions affecting the standard for granting the requested relief. The TCA provides that: no laws or actions by any local government or planning or zoning board may prohibit, or have the effect of prohibiting, the placement, construction, or modification of communications towers, antennas, or other wireless facilities in any particular geographic area, see 47 U.S.C. §332(c)(7)(B)(i); local government or planning or zoning boards may not unreasonably discriminate among providers of functionally equivalent services, see 47 U.S.C. §332(c)(7)(B)(i); health concerns may not be considered so long as the emissions comply with the applicable standards of the FCC, see 47 U.S.C. §332(c)(7)(B)(iv); and, decisions must be rendered within a reasonable period of time, see 47 U.S.C. §332(c)(7)(B)(ii) and the FCC’s Declaratory Ruling commonly referred to as the “shot clock”.

Specifically, the TCA reflects Congress's intent to expand wireless services and increase competition among providers by preempting state and municipal regulations inconsistent with infrastructure development. *Rancho Palos Verdes*, 544 U.S. at 115; *Omnipoint Holdings*, 586 F.3d at 47; *Sprint Spectrum L.P. v. Town of Swansea*, 574

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<sup>7</sup> *Telecommunications Act of 1996*, Pub. L. No. 104-104, 110 Stat. 56 (1996).

F.Supp. 2d 227, 235 (D. Mass. 2008). Although the TCA does not preempt all local zoning laws, it expressly preempts rules and laws attempting to regulate the "placement, construction, and modification of personal wireless service facilities that effectively prohibit the provision of personal wireless services." *City of Roswell, Ga.*, 135 S.Ct. at 814 (citing *Rancho Palos Verdes*, 544 U.S. at 115; 47 U.S.C. § 332(c)(7)(B)(i)(II)); *Green Mountain Realty Corp. v. Leonard*, 750 F.3d 30, 38 (1st Cir. 2014); *Town of Swansea*, 574 F.Supp. at 235; *Nextel Communications of the Mid-Atlantic, Inc. v. Town of Provincetown*, 2003 WL 21497159, \*8 (D. Mass. 2003). "Accordingly, the TCA significantly limits the ability of state and local authority to apply zoning regulations to wireless telecommunications." *Telecorp Realty, LLC v. Town of Edgartown*, 81 F.Supp.2d 257, 259 (D. Mass. 2000); *Town of Swansea*, 574 F.Supp. at 235; 47 U.S.C. §332(c)(7)(B)(i)(II).

The Federal Communications Commission in its Declaration Ruling and Third Report and Order clarified that under Section 253(a) or 332(c)(7)(B)(i)(II), "an effective prohibition [of service] occurs where a state or local legal requirement materially inhibits a provider's ability to engage in any of a variety of activities related to its provision of a covered service." By this ruling, the FCC makes it clear that a state or local legal requirement effectively prohibits the provision of wireless services if it inhibits or limits a provider "not only when filling a coverage gap but also when densifying a wireless network, introducing new services or otherwise improving service capabilities." The FCC also makes clear that an effective prohibition includes inhibiting a provider from deploying the "performance characteristics" of its choosing.

Through the evidence submitted, Verizon Wireless has demonstrated that significant gaps exist in its network in this area of Essex and the Facility is the only feasible means reasonably available to Verizon Wireless to fill their significant gaps in coverage.

## **CONCLUSION**

The availability of wireless communications service enhances community safety, and is increasingly relied upon by civil defense and other safety officers as well as the general public in times of crisis, natural disaster, bad storms or similar circumstances. Wireless communications service also provides a convenience to residents, and is an attractive feature and service to businesses. The proposed Facility, by providing these services, will promote the health, safety, convenience and general welfare of the inhabitants of the Town of Essex.

The proposed installation meets all of the standards for a dimensional variance pursuant to the Massachusetts General Laws Chapter 40A and the Town of Essex Zoning Bylaws. The installation will have minimal visual impact on the community and will comply with all applicable laws and regulations.

Based upon all of the above reasons as well as to satisfy the mandate of the Federal Government to facilitate competition in the telecommunications industry as set

forth in the Telecommunications Act of 1996, TowerNorth therefore requests that the Board grant its application for dimensional variances for the installation of the Free Standing Monopole Tower facility.

**TOWN OF ESSEX  
BOARD OF APPEALS**

**TABLE OF CONTENTS –EXHIBITS**

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Stamped Project Plans	Exhibit 5
Antenna and RRH Specifications	Exhibit 6
Equipment Cabinet Specifications	Exhibit 7
Generator Specifications	Exhibit 8
Engineer Stamped Letter	Exhibit 9
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FCC Licenses to Operate	Exhibit 12
Environmental Sound Assessment	Exhibit 13
Radio Frequency Exposure Report	Exhibit 14
FAA Determination	Exhibit 15
Real Estate Valuation Report	Exhibit 16

**EXHIBIT 1**  
**VERIZON WIRELESS**  
**LETTER OF INTENT**

September 15, 2020

Town of Essex  
Essex Town Hall  
30 Martin Street  
Essex, Massachusetts 01929

**Re: Letter of Intent to Collocate on Proposed Tower – 73 Eastern Avenue,  
Essex, Massachusetts**

To Whom it May Concern:

This letter is submitted in support of the application for a new free standing telecommunications tower facility at 73 Eastern Avenue in the Town of Essex, Massachusetts. Cellco Partnership d/b/a Verizon Wireless (“Verizon Wireless”) is under agreement with the Applicant, Tower North Development, LLC (“Tower North”), to collocate on the proposed tower upon approval. Verizon Wireless has signed a confidential Site Lease Agreement with Tower North.

The proposed facility will be an essential part of Verizon Wireless’ network. Verizon Wireless has provided Tower North with its coverage plots and RF Report that will be filed with Tower North’s application in support of the proposed tower. Verizon Wireless’ RF Engineer will be present at any required public hearings to testify and answer any questions that may arise.

Sincerely,

A handwritten signature in black ink, appearing to read 'Timothy Parks', with a long horizontal flourish extending to the right.

Timothy Parks

Network Engineering

**EXHIBIT 2**  
**PROPERTY DEEDS**

29  
BK010239PG095

QUITCLAIM DEED

I, PHILIP D. BUDROSE, Trustee of OLDE ESSEX VILLAGE REALTY TRUST u/d/t dated August 9, 1984 and recorded with the Essex South District Registry of Deeds in Book 7490, Page 284, in consideration of TWO MILLION SEVENTY-FIVE THOUSAND AND 00/100 (\$2,075,000.00) DOLLARS grant to JOHN T. COUGHLIN, Trustee of PMC REALTY TRUST u/d/t dated May 8, 1979 and recorded with the Essex South District Registry of Deeds in Book 6590, Page 669, of 239 Western Avenue, Essex, Massachusetts, the following parcel of land in Essex, Essex County, Massachusetts, with QUITCLAIM COVENANTS, together with the buildings thereon, if any, as follows:

A certain parcel of land shown as Lot 2 on "Subdivision Plan-Essex, Mass. Owned by Laurel Realty Trust, John W. Parsons, Registered Land Surveyor, Scale 1" = 30', dated July 23, 1984" and recorded with the Essex South District Registry of Deeds in Plan Book 189, Plan 68, said parcel more particularly bounded and described as follows:

NORTHERLY by Eastern Avenue, two hundred sixty-four and 98/100 (264.98) feet;  
EASTERLY by land now or formerly of Lufkin, two hundred one and 33/100 (201.33) feet;  
SOUTHERLY by land now or formerly of Burnham, one hundred seventy-five (175) feet;  
SOUTHWESTERLY and WESTERLY in various courses as shown on said plan by land now or formerly of John F. Kane, a total of two hundred twenty-seven and 10/100 (227.10) feet.

Said parcel containing 48,700 square feet of land more or less.

Subject to and with the benefit of non-exclusive easements for pedestrian and vehicular traffic described in deed of John F. Kane, Trustee, dated August 9, 1984 and recorded with the Essex South District Registry of Deeds in Book 7490, Page 290.

Subject to and with the benefit of all rights, easements, agreements and restrictions of record so far as same may now be in force and applicable.

Being the same premises conveyed to the Grantor herein by deed of John F. Kane, Trustee, dated August 9, 1984 and recorded with the Essex South District Registry of Deeds in Book 7490, Page 290.

Executed as a sealed instrument this 22nd day of November, 1989.

OLDE ESSEX VILLAGE REALTY TRUST

By Philip D. Budrose Trustee  
PHILIP D. BUDROSE, Trustee

Premises conveyed: 65 Eastern Avenue, Essex, MA

1989 NOV 22 PM 12:02

000241

REC-10  
ESSEX SOUTH  
11/22/89  
CANCELLED

9462.00  
TAX  
9462.00  
CASH

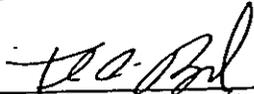
6023A000 11:58  
EXCISE TAX

COMMONWEALTH OF MASSACHUSETTS

ESSEX, SS.

November 22, 1989

Then personally appeared the above-named PHILIP D. BUDROSE, Trustee aforesaid, and acknowledged the foregoing instrument to be his free act and deed, before me

  
\_\_\_\_\_  
THEODORE C. REGANTE, Notary Public

My Commission Expires: December 29, 1989

NR  
(2)

105

**Confirmatory Quitclaim Deed**



I, John T. Coughlin, of

for consideration paid and in full consideration of less than one hundred dollars

do hereby grant to John E. Coughlin and Joseph P. Coughlin, Trustees of Gateway II Trust of 1997, a Declaration of Trust recorded with the Essex South Registry of Deeds at Book 14393, Page 399, of

with QUITCLAIM COVENANTS,

the following parcel of real estate in the Town of Essex, Essex County, Massachusetts:

SEE EXHIBIT A ATTACHED HERETO AND INCORPORATED HEREIN.

This property has a street address of 73 Eastern Avenue, Essex, MA.

Meaning and intending to convey and hereby conveying the same premises as were conveyed to me by deed of Gordon L. Thompson, Jr., and Martha E. Thompson dated 12/4/1989 and recorded with the Essex South Registry of Deeds at Book 10254, Page 370. This Confirmatory Deed is granted to confirm a deed dated 10/1/1998 and recorded at Book 15243, Page 337, in which the grantor of this deed conveyed as a trustee but not individually (the parcel hereby conveyed having been owned individually at the time).

IN WITNESS WHEREOF, I, the said John T. Coughlin, have hereunto set my hand and seal this 28<sup>th</sup> day of Aug, 2018.

  
\_\_\_\_\_  
John T. Coughlin

JK

COMMONWEALTH OF MASSACHUSETTS

County: Essex, ss

On the 28<sup>th</sup> day of August, 2018, before me, the undersigned authority, personally appeared the above-named John T. Coughlin, proved to me through satisfactory evidence of identification, which was a driver's license or (other form of identification

Personally known)

to be the person whose name is signed on this document, and acknowledged to me that he or she signed it voluntarily for its stated purpose.

  
\_\_\_\_\_  
Notary Public  
My commission expires: 9/16/2022

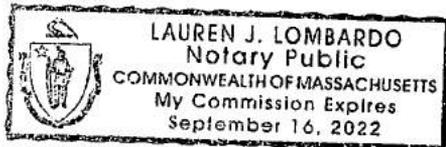


EXHIBIT A

DESCRIPTION OF PREMISES

to the confirmatory deed dated Aug. 28, 2018, by and between John T. Coughlin, an individual, as grantor, and John E. Coughlin and Joseph P. Coughlin, Trustees of Gateway II Trust of 1997, a Declaration of Trust recorded with the Essex South Registry of Deeds at Book 14393, Page 399, as grantees.

The property is legally described as follows:

Parcel ID#: 127-22

Coordinates: Latitude: 42.629136 / Longitude: -70.763423

Ground Elevation: 21 Feet AMSL

Property, address: 73 Eastern Avenue, Essex, Essex County, Massachusetts, 01929.

A certain parcel of land with the buildings thereon situated on the southerly side of Eastern Avenue in Essex, Essex County, Massachusetts, and bounded and described as follows:

Beginning at a stone post at the NORTHEASTERLY corner of the granted premises on Eastern Avenue;

Thence running SOUTHWESTERLY by land now or formerly of J. DeCoste, one hundred forty-six and 50/100 (146.50) feet to a corner in the wall;

Thence running NORTHWESTERLY by the wall, six (6) feet to a point;

Thence running SOUTHERLY by the wall and said land of DeCoste, forty-four (44) feet to land now or formerly of Edward D. Burnham;

Thence running by said Burnham land WESTERLY, eighty-two (82) feet to land now or formerly of Joseph C. Lenos, et. al.;

Thence running NORTHEASTERLY by said Lenos et. al., land, one hundred ninety-nine (199) feet to said Eastern Avenue;

Thence running SOUTHEASTERLY by said Eastern Avenue, ninety-two and 30/100 (92.30) feet to the stone post and point of beginning.

The above described premises are shown as Lot B on Plan entitled "Plan of Land in Essex, Mass., June 22, 1936", Robert C. Kennessy and Paul A. Polisson, Surveyors; which plan is recorded with Essex South District Registry of Deeds, Plan Book 65, Plan 80.

Being the same premises conveyed to us by deed of John F. Kane and Mirjan L. Kane, dated August 28, 1984, recorded with the Essex South District Registry of Deeds, Book 7506, Page 055

ESSEX DEC-4 PM 2:42

000589

RECEIVED  
12/14/89

**EXHIBIT 3**  
**LETTER OF AUTHORIZATION**



**LETTER OF AUTHORIZATION**

**SITE ID: MA-044**

**SITE NAME: Essex**

**ADDRESS: 73 Eastern Avenue**

**PARCEL ID: 127-022-000-000**

**TOWN: Essex      COUNTY: Essex      STATE: Massachusetts**

Gateway II Trust of 1997, owner of the above-described property, authorize TowerNorth Development, LLC ("TowerNorth) and/or their agent, to act as our nonexclusive agent for the sole purpose of filing and consummating any, zoning, land use or building permit application(s) necessary to obtain approval for the installation of a new wireless communications facility and related telecommunications equipment on the above-described property.

We understand that this application may be denied, modified or approved with conditions, and that any such conditions of approval or modifications will be the sole responsibility of the TowerNorth Development, LLC and will be complied with prior to issuance of a building permit.

Signature:   
Print Name: John E. Coughlin

Title: Trustee



**LETTER OF AUTHORIZATION**

**SITE ID: MA-044**

**SITE NAME: Essex**

**ADDRESS: 65 Eastern Avenue**

**PARCEL ID: 127-023-000-000**

**TOWN: Essex      COUNTY: Essex      STATE: Massachusetts**

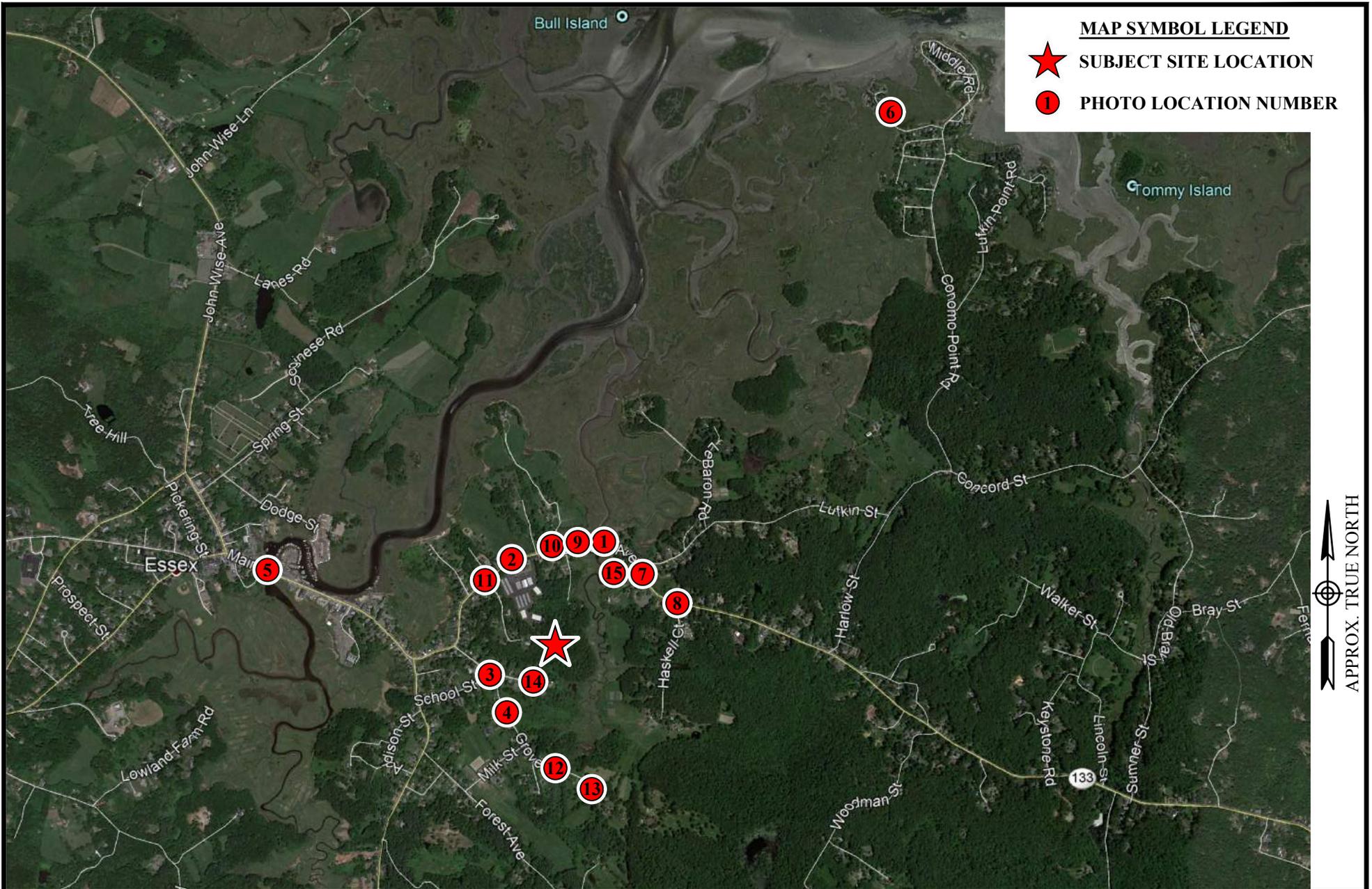
*PMC JTC*  
~~Gateway~~ Realty Trust, owner of the above-described property, authorize TowerNorth Development, LLC ("TowerNorth) and/or their agent, to act as our nonexclusive agent for the sole purpose of filing and consummating any, zoning, land use or building permit application(s) necessary to obtain approval for the installation of a new wireless communications facility and related telecommunications equipment on the above-described property.

We understand that this application may be denied, modified or approved with conditions, and that any such conditions of approval or modifications will be the sole responsibility of the TowerNorth Development, LLC and will be complied with prior to issuance of a building permit.

Signature: *John T. Coughlin*  
Print Name: John T. Coughlin

Title: Trustee

**EXHIBIT 4**  
**PHOTO SIMULATIONS**



PREPARED FOR:  
  
**CENTERLINE COMMUNICATIONS**  
 95 RYAN DRIVE, SUITE 1  
 RAYNHAM, MA 02767

PREPARED BY:  
  
**ADVANCED ENGINEERING GROUP, P.C.**  
 Civil Engineering - Site Development  
 Surveying - Telecommunications  
 500 NORTH BROADWAY  
 EAST PROVIDENCE, 02914  
 PH: (401) 354-2403  
 FAX: (401) 633-6354

SITE NO: MA-044  
 SITE NAME: ESSEX  
 ADDRESS: 73 EASTERN AVENUE  
 ESSEX, MA 01929

KEY MAP OF PHOTOS

PAGE: MAP-1  
 DATE: 10/13/2020  
 DRAWN BY: MR  
 REVISION: 0



BALLOON @ 150'  
A.G.L.

PREPARED FOR:  
  
**CENTERLINE COMMUNICATIONS**  
 95 RYAN DRIVE, SUITE 1  
 RAYNHAM, MA 02767

PREPARED BY:  
  
**ADVANCED ENGINEERING GROUP, P.C.**  
 Civil Engineering - Site Development  
 Surveying - Telecommunications  
 500 NORTH BROADWAY  
 EAST PROVIDENCE, 02914  
 PH: (401) 354-2403  
 FAX: (401) 633-6354

SITE NO: MA-044  
 SITE NAME: ESSEX  
 ADDRESS: 73 EASTERN AVENUE  
 ESSEX, MA 01929

**VIEW #1**  
 EXISTING VIEW FROM THE  
 NORTHEAST, ON EASTERN AVENUE

PAGE: V-1E  
 DATE: 10/13/2020  
 DRAWN BY: MR  
 REVISION: 0



PROPOSED 150'  
MONOPOLE

PREPARED FOR:



**CENTERLINE COMMUNICATIONS**  
95 RYAN DRIVE, SUITE 1  
RAYNHAM, MA 02767

PREPARED BY:



**ADVANCED ENGINEERING GROUP, P.C.**  
Civil Engineering - Site Development  
Surveying - Telecommunications  
500 NORTH BROADWAY  
EAST PROVIDENCE, 02914  
PH: (401) 354-2403  
FAX: (401) 633-6354

**SITE NO:** MA-044

**SITE NAME:** ESSEX

**ADDRESS:** 73 EASTERN AVENUE  
ESSEX, MA 01929

**VIEW #1**  
PROPOSED VIEW FROM THE  
NORTHEAST, ON EASTERN AVENUE

**PAGE:** V-1P

**DATE:** 10/13/2020

**DRAWN BY:** MR

**REVISION:** 0



BALLOON @ 150'  
A.G.L.

PREPARED FOR:  
  
**CENTERLINE COMMUNICATIONS**  
 95 RYAN DRIVE, SUITE 1  
 RAYNHAM, MA 02767

PREPARED BY:  
  
**ADVANCED ENGINEERING GROUP, P.C.**  
 Civil Engineering - Site Development  
 Surveying - Telecommunications  
 500 NORTH BROADWAY  
 EAST PROVIDENCE, 02914  
 PH: (401) 354-2403  
 FAX: (401) 633-6354

**SITE NO:** MA-044  
**SITE NAME:** ESSEX  
**ADDRESS:** 73 EASTERN AVENUE  
 ESSEX, MA 01929

**VIEW #2**  
 EXISTING VIEW FROM THE  
 NORTHWEST, ON EASTERN AVENUE

**PAGE:** V-2E  
**DATE:** 10/13/2020  
**DRAWN BY:** MR  
**REVISION:** 0



PROPOSED 150'  
MONOPOLE

PREPARED FOR:

 **CENTERLINE**  
COMMUNICATIONS  
CENTERLINE COMMUNICATIONS  
95 RYAN DRIVE, SUITE 1  
RAYNHAM, MA 02767

PREPARED BY:

 **ADVANCED**  
ENGINEERING GROUP, P.C.  
Civil Engineering - Site Development  
Surveying - Telecommunications  
500 NORTH BROADWAY  
EAST PROVIDENCE, 02914  
PH: (401) 354-2403  
FAX: (401) 633-6354

SITE NO: MA-044

SITE NAME: ESSEX

ADDRESS: 73 EASTERN AVENUE  
ESSEX, MA 01929

**VIEW #2**  
PROPOSED VIEW FROM THE  
NORTHWEST, ON EASTERN AVENUE

PAGE: V-2P

DATE: 10/13/2020

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BALLOON @ 150'  
A.G.L.

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Civil Engineering - Site Development  
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SITE NO: MA-044

SITE NAME: ESSEX

ADDRESS: 73 EASTERN AVENUE  
ESSEX, MA 01929

**VIEW #3**

EXISTING VIEW FROM THE WEST, NEAR  
THE INTERSECTION OF GROVE STREET  
AND COGSWELL COURT

PAGE: V-3E

DATE: 10/13/2020

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PROPOSED 150'  
MONOPOLE

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SITE NO: MA-044

SITE NAME: ESSEX

ADDRESS: 73 EASTERN AVENUE  
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**VIEW #3**

PROPOSED VIEW FROM THE WEST, NEAR  
THE INTERSECTION OF GROVE STREET  
AND COGSWELL COURT

PAGE: V-3P

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 Surveying - Telecommunications  
 500 NORTH BROADWAY  
 EAST PROVIDENCE, 02914  
 PH: (401) 354-2403  
 FAX: (401) 633-6354

**SITE NO:** MA-044  
**SITE NAME:** ESSEX  
**ADDRESS:** 73 EASTERN AVENUE  
 ESSEX, MA 01929

**VIEW #4**  
 EXISTING VIEW FROM THE SOUTHWEST,  
 ON GROVE STREET

**PAGE:** V-4E  
**DATE:** 10/13/2020  
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Surveying - Telecommunications  
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EAST PROVIDENCE, 02914  
PH: (401) 354-2403  
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SITE NO: MA-044

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ADDRESS: 73 EASTERN AVENUE  
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**VIEW #4**

PROPOSED VIEW FROM THE SOUTHWEST,  
ON GROVE STREET

PAGE: V-4P

DATE: 10/13/2020

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**VIEW #5**  
 EXISTING VIEW FROM THE WEST,  
 ON MAIN STREET

**PAGE:** V-5E  
**DATE:** 10/13/2020  
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**VIEW #5**  
PROPOSED VIEW FROM THE WEST,  
ON MAIN STREET

PAGE: V-5P

DATE: 10/13/2020

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BALLOON @ 150'  
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PH: (401) 354-2403  
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**VIEW #6**  
EXISTING VIEW FROM THE NORTHEAST,  
ON ROBBINS ISLAND ROAD

PAGE: V-6E  
DATE: 10/13/2020  
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MONOPOLE

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**SITE NAME:** ESSEX  
**ADDRESS:** 73 EASTERN AVENUE  
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**VIEW #6**  
 PROPOSED VIEW FROM THE NORTHEAST,  
 ON ROBBINS ISLAND ROAD

**PAGE:** V-6P  
**DATE:** 10/13/2020  
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BALLOON @ 150'  
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**VIEW #7**  
EXISTING VIEW FROM THE NORTHEAST,  
ON EASTERN AVENUE

PAGE: V-7E

DATE: 10/13/2020

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**VIEW #8**

EXISTING VIEW FROM THE NORTHEAST,  
ON EASTERN AVENUE AT THE  
INTERSECTION OF HASKELL COURT

PAGE: V-8E

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**VIEW #9**  
EXISTING VIEW FROM THE NORTH,  
ON EASTERN AVENUE

PAGE: V-9E

DATE: 10/13/2020

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SITE NAME: ESSEX

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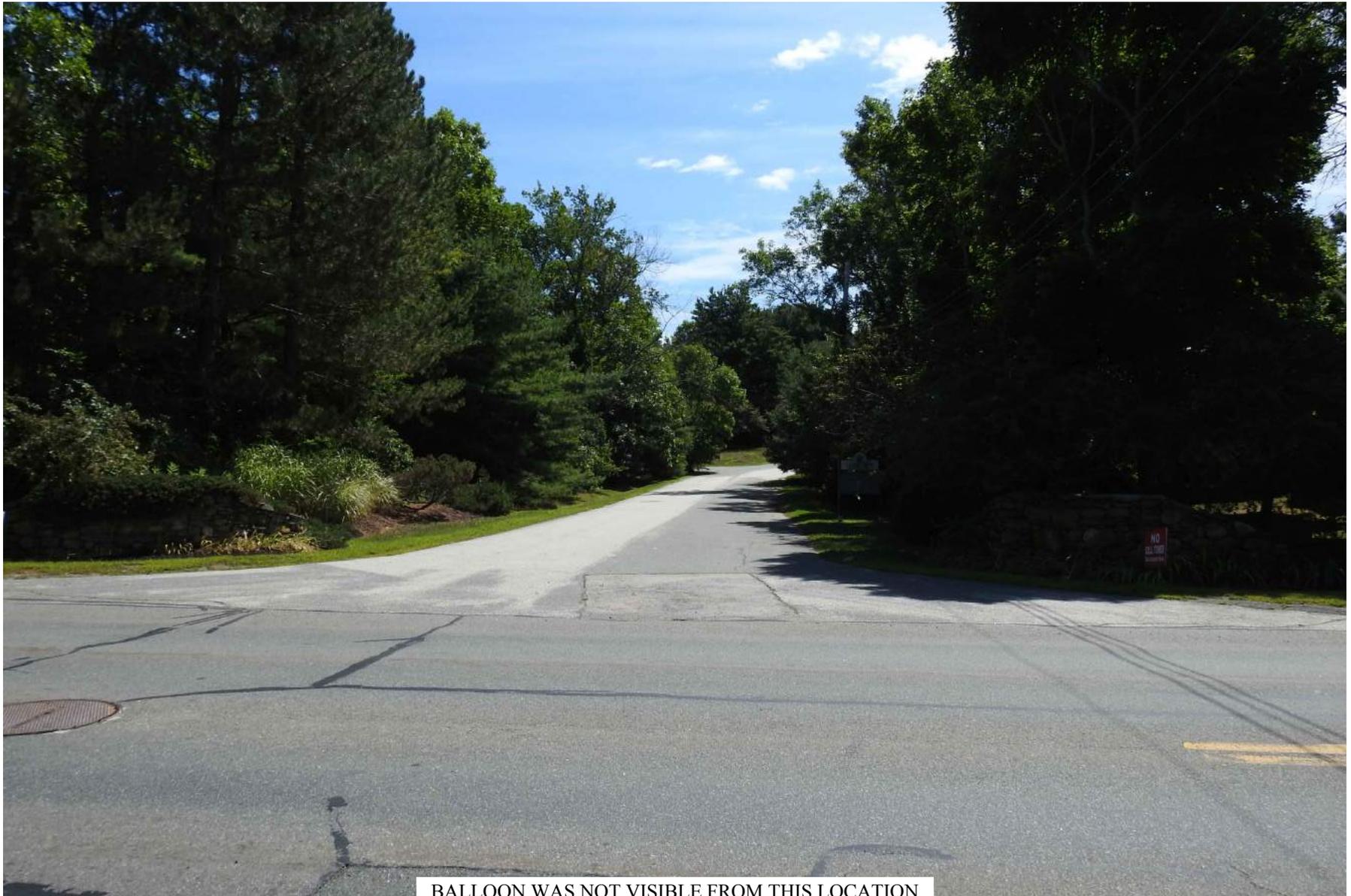
VIEW #10  
EXISTING VIEW FROM THE NORTH,  
ON EASTERN AVENUE

PAGE: V-10E

DATE: 10/13/2020

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SITE NO: MA-044

SITE NAME: ESSEX

ADDRESS: 73 EASTERN AVENUE  
ESSEX, MA 01929

VIEW #11

EXISTING VIEW FROM THE NORTHWEST,  
ON EASTERN AVENUE AT THE PRIVATE  
DRIVEWAY ENTRANCE TO "ESSEX REACH"

PAGE: V-11E

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Surveying - Telecommunications  
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EAST PROVIDENCE, 02914  
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VIEW #12  
EXISTING VIEW FROM THE SOUTH,  
ON GROVE STREET AT THE  
EBBEN CREEK CROSSING

PAGE: V-12E

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Civil Engineering - Site Development  
Surveying - Telecommunications  
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EAST PROVIDENCE, 02914  
PH: (401) 354-2403  
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SITE NO: MA-044

SITE NAME: ESSEX

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VIEW #13

EXISTING VIEW FROM THE SOUTHEAST,  
ON GROVE STREET AT THE END OF  
PUBLIC RIGHT OF WAY

PAGE: V-13E

DATE: 10/13/2020

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EAST PROVIDENCE, 02914  
PH: (401) 354-2403  
FAX: (401) 633-6354

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VIEW #14  
EXISTING VIEW FROM THE SOUTHWEST,  
ON COGSWELL COURT

PAGE: V-14E

DATE: 10/13/2020

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Surveying - Telecommunications  
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EAST PROVIDENCE, 02914  
PH: (401) 354-2403  
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ADDRESS: 73 EASTERN AVENUE  
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VIEW #14  
EXISTING VIEW FROM THE NORTHEAST,  
AT THE END OF GOODWIN COURT

PAGE: V-15E

DATE: 10/13/2020

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**EXHIBIT 5**  
**STAMPED PROJECT PLANS**



## GENERAL NOTES

1. THE CONTRACTOR SHALL GIVE ALL NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY, MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS, AND LOCAL AND STATE JURISDICTIONAL CODES BEARING ON THE PERFORMANCE OF THE WORK. THE WORK PERFORMED ON THE PROJECT AND THE MATERIALS INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES.

2. THE ARCHITECT/ENGINEER HAVE MADE EVERY EFFORT TO SET FORTH IN THE CONSTRUCTION AND CONTRACT DOCUMENTS THE COMPLETE SCOPE OF WORK. THE CONTRACTOR BIDDING THE JOB IS NEVERTHELESS CAUTIONED THAT MINOR OMISSIONS OR ERRORS IN THE DRAWINGS AND OR SPECIFICATIONS SHALL NOT EXCUSE SAID CONTRACTOR FROM COMPLETING THE PROJECT AND IMPROVEMENTS IN ACCORDANCE WITH THE INTENT OF THESE DOCUMENTS.

3. THE CONTRACTOR OR BIDDER SHALL BEAR THE RESPONSIBILITY OF NOTIFYING (IN WRITING) THE LESEE/LICENSEE REPRESENTATIVE OF ANY CONFLICTS, ERRORS, OR OMISSIONS PRIOR TO THE SUBMISSION OF CONTRACTOR'S PROPOSAL OR PERFORMANCE OF WORK. IN THE EVENT OF DISCREPANCIES THE CONTRACTOR SHALL PRICE THE MORE COSTLY OR EXTENSIVE WORK, UNLESS DIRECTED IN WRITING OTHERWISE.

4. THE SCOPE OF WORK SHALL INCLUDE FURNISHING ALL MATERIALS, EQUIPMENT, LABOR AND ALL OTHER MATERIALS AND LABOR DEEMED NECESSARY TO COMPLETE THE WORK/PROJECT AS DESCRIBED HEREIN.

5. THE CONTRACTOR SHALL VISIT THE JOB SITE PRIOR TO THE SUBMISSION OF BIDS OR PERFORMING WORK TO FAMILIARIZE HIMSELF WITH THE FIELD CONDITIONS AND TO VERIFY THAT THE PROJECT CAN BE CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

6. THE CONTRACTOR SHALL OBTAIN AUTHORIZATION TO PROCEED WITH CONSTRUCTION PRIOR TO STARTING WORK ON ANY ITEM NOT CLEARLY DEFINED BY THE CONSTRUCTION DRAWINGS / CONTRACT DOCUMENTS.

7. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS ACCORDING TO THE MANUFACTURER'S / VENDOR'S SPECIFICATIONS UNLESS NOTED OTHERWISE OR WHERE LOCAL CODES OR ORDINANCES TAKE PRECEDENCE.

8. THE CONTRACTOR SHALL PROVIDE A FULL SET OF CONSTRUCTION DOCUMENTS AT THE SITE UPDATED WITH THE LATEST REVISIONS AND ADDENDUMS OR CLARIFICATIONS AVAILABLE FOR THE USE BY ALL PERSONNEL INVOLVED WITH THE PROJECT.

9. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE PROJECT DESCRIBED HEREIN. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES AND FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.

10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL NECESSARY CONSTRUCTION CONTROL SURVEYS, ESTABLISHING AND MAINTAINING ALL LINES AND GRADES REQUIRED TO CONSTRUCT ALL IMPROVEMENTS AS SHOWN HEREIN.

11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS WHICH MAY BE REQUIRED FOR THE WORK BY THE ARCHITECT/ENGINEER, THE STATE, COUNTY OR LOCAL GOVERNMENT AUTHORITY.

12. THE CONTRACTOR SHALL MAKE NECESSARY PROVISIONS TO PROTECT EXISTING IMPROVEMENTS, EASEMENTS, PAVING, CURBING, ETC. DURING CONSTRUCTION. UPON COMPLETION OF WORK, THE CONTRACTOR SHALL REPAIR ANY DAMAGE THAT MAY HAVE OCCURRED DUE TO CONSTRUCTION ON OR ABOUT THE PROPERTY.

13. THE CONTRACTOR SHALL KEEP THE GENERAL WORK AREA CLEAN AND HAZARD FREE DURING CONSTRUCTION AND DISPOSE OF ALL DIRT, DEBRIS, RUBBISH AND REMOVE EQUIPMENT NOT SPECIFIED AS REMAINING ON THE PROPERTY. PREMISES SHALL BE LEFT IN CLEAN CONDITION AND FREE FROM PAINT SPOTS, DUST, OR SMUDGES OF ANY NATURE.

14. THE CONTRACTOR SHALL COMPLY WITH ALL OSHA REQUIREMENTS AS THEY APPLY TO THIS PROJECT.

15. THE CONTRACTOR SHALL NOTIFY THE LESEE/LICENSEE REPRESENTATIVE WHERE A CONFLICT OCCURS ON ANY OF THE CONTRACT DOCUMENTS. THE CONTRACTOR IS NOT TO ORDER MATERIAL OR CONSTRUCT ANY PORTION OF THE WORK THAT IS IN CONFLICT UNTIL CONFLICT IS RESOLVED BY THE LESEE/LICENSEE REPRESENTATIVE.

16. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS, PROPERTY LINES, ETC. ON THE JOB.

17. ALL UNDERGROUND UTILITY INFORMATION WAS DETERMINED FROM SURFACE INVESTIGATIONS AND EXISTING PLANS OF RECORD. THE CONTRACTOR SHALL LOCATE ALL UNDERGROUND UTILITIES IN THE FIELD PRIOR TO ANY SITE WORK. CALL THE FOLLOWING FOR ALL PRE-CONSTRUCTION NOTIFICATION 72-HOURS PRIOR TO ANY EXCAVATION ACTIVITY: DIG SAFE SYSTEM (MA, ME, NH, RI, VT): 1-888-344-7233 CALL BEFORE YOU DIG (CT): 1-800-922-4455

18. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL NECESSARY CONSTRUCTION CONTROL SURVEYS AND MAINTAINING ALL LINES AND GRADES REQUIRED TO CONSTRUCT ALL IMPROVEMENTS SHOWN HEREIN.

19. ALL DIMENSIONS SHOWN THUS ± ARE APPROXIMATE. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND ELEVATIONS WHICH EFFECT THE CONTRACTORS WORK. CONTRACTOR TO VERIFY ALL DIMENSIONS WITH PROJECT OWNER PRIOR TO CONSTRUCTION.

20. NORTH ARROW SHOWN ON PLANS REFERS TO APPROXIMATE TRUE NORTH. PRIOR TO THE START OF CONSTRUCTION, ORDERING OR FABRICATING OF ANTENNA MOUNTS, CONTRACTOR SHALL CONSULT WITH PROJECT OWNER'S RF ENGINEER AND FIELD VERIFY ALL ANTENNA SECTOR LOCATIONS AND ANTENNA AZIMUTHS.

21. THE CONTRACTOR AND OR HIS SUB CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS WHICH MAY BE REQUIRED FOR THE WORK BY THE ARCHITECT/ENGINEER, THE STATE, COUNTY OR LOCAL GOVERNMENT AUTHORITY.

22. ANTENNA INSTALLATION SHALL BE CONDUCTED BY FIELD CREWS EXPERIENCED IN THE ASSEMBLY AND ERECTION OF RADIO ANTENNAS, TRANSMISSION LINES AND SUPPORT STRUCTURES.

23. COAXIAL CABLE CONNECTORS AND TRANSMITTER EQUIPMENT SHALL BE PROVIDED BY THE PROJECT OWNER AND IS NOT INCLUDED IN THESE CONSTRUCTION DOCUMENTS. A SCHEDULE OF PROJECT OWNER SUPPLIED MATERIALS IS ATTACHED TO THE BID DOCUMENTS (SEE EXHIBIT 3). ALL OTHER HARDWARE TO BE PROVIDED BY THE CONTRACTOR. CONNECTION HARDWARE SHALL BE STAINLESS STEEL.

24. WHEN "PAINT TO MATCH" IS SPECIFIED FOR ANTENNA CONCEALMENT, PAINT PRODUCT FOR ANTENNA RADOME SHALL BE SHERWIN WILLIAMS COROTHANE II. SURFACE PREPARATION AND APPLICATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND PROJECT OWNER'S GUIDELINE'S.

25. COORDINATION, LAYOUT, AND FURNISHING OF CONDUIT, CABLE AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.

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

27. ALL (E)ACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES, AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY ENGINEERS. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR PIER DRILLING AROUND OR NEAR UTILITIES. CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW.

28. ALL (E)INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF UTILITY COMPANY ENGINEERING. THE AREAS OF THE PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE EQUIPMENT, DRIVEWAY OR

29. GRAVEL, SHALL BE GRADED TO A UNIFORM SLOPE, FERTILIZED, SEEDED AND COVERED WITH MULCH UNLESS OTHERWISE NOTED. THE CONTRACTOR SHALL ESTABLISH AND MAINTAIN SOIL EROSION AND SEDIMENTATION CONTROLS AT ALL TIMES

30. DURING CONSTRUCTION. PER FCC MANDATE, ENHANCED EMERGENCY (E911) SERVICE IS REQUIRED TO MEET NATIONWIDE STANDARDS

31. FOR WIRELESS COMMUNICATIONS SYSTEMS. PROJECT OWNER'S IMPLEMENTATION REQUIRES DEPLOYMENT OF EQUIPMENT AND ANTENNAS GENERALLY DEPICTED ON THIS PLAN, ATTACHED TO OR MOUNTED IN CLOSE PROXIMITY TO THE BTS RADIO CABINETS. PROJECT OWNER RESERVES THE RIGHT TO MAKE REASONABLE MODIFICATIONS TO E911 EQUIPMENT AND LOCATION AS TECHNOLOGY EVOLVES TO MEET REQUIRED SPECIFICATIONS.

32. SUBCONTRACTOR'S WORK SHALL COMPLY WITH THE LATEST EDITION OF THE FOLLOWING STANDARDS:

AMERICAN CONCRETE INSTITUTE (ACI) 318; BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE;

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

MANUAL OF STEEL CONSTRUCTION, ASD, NINTH EDITION;

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA) 222-H, STRUCTURAL STANDARDS FOR STEEL

ANTENNA TOWER AND ANTENNA SUPPORTING STRUCTURES; REFER TO ELECTRICAL DRAWINGS FOR SPECIFIC ELECTRICAL STANDARDS.

FOR ANY CONFLICTS BETWEEN SECTIONS OF LISTED CODES AND STANDARDS REGARDING MATERIAL, METHODS OF CONSTRUCTION, OR OTHER REQUIREMENTS, THE MOST RESTRICTIVE REQUIREMENT SHALL GOVERN. WHERE THERE IS CONFLICT BETWEEN A GENERAL REQUIREMENT AND A SPECIFIC REQUIREMENT, THE SPECIFIC REQUIREMENT SHALL GOVERN.

APPLICABLE BUILDING CODES:  
SUBCONTRACTOR'S WORK SHALL COMPLY WITH ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES AS ADOPTED BY THE LOCAL AUTHORITY HAVING JURISDICTION (AHJ) FOR THE LOCATION. THE EDITION OF THE AHJ ADOPTED CODES AND STANDARDS IN EFFECT ON THE DATE OF CONTRACT AWARD SHALL GOVERN THE DESIGN.

BUILDING CODE:

MASSACHUSETTS STATE BUILDING CODE 780 CMR, 9TH EDITION  
ELECTRICAL CODE: MASSACHUSETTS 527 CMR 12.00 (NEC 2020)  
NFPA 780, 2017

## ELECTRICAL AND GROUNDING NOTES

1. ALL ELECTRICAL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC) AS WELL AS APPLICABLE STATE AND LOCAL CODES.

2. ALL ELECTRICAL ITEMS SHALL BE U.L. APPROVED OR LISTED AND PROCURED PER SPECIFICATION REQUIREMENTS.

3. THE ELECTRICAL WORK INCLUDES ALL LABOR AND MATERIAL DESCRIBED BY DRAWINGS AND SPECIFICATION INCLUDING INCIDENTAL WORK TO PROVIDE COMPLETE OPERATING AND APPROVED ELECTRICAL SYSTEM.

4. GENERAL CONTRACTOR SHALL PAY FEES FOR PERMITS, AND IS RESPONSIBLE FOR OBTAINING SAID PERMITS AND COORDINATION OF INSPECTIONS.

5. ELECTRICAL AND TELCO WIRING OUTSIDE A BUILDING AND EXPOSED TO WEATHER SHALL BE IN WATER TIGHT GALVANIZED RIGID STEEL CONDUITS OR SCHEDULE 80 PVC (AS PERMITTED BY CODE) AND WHERE REQUIRED IN LIQUID TIGHT FLEXIBLE METAL OR NONMETALLIC CONDUITS.

6. BURIED CONDUIT SHALL BE SCHEDULE 40 PVC.

7. ELECTRICAL WIRING SHALL BE COPPER WITH TYPE XHHW, THWN, OR THHN INSULATION.

8. RUN ELECTRICAL CONDUIT OR CABLE BETWEEN ELECTRICAL UTILITY DEMARCATION POINT AND PROJECT OWNER CELL SITE PPC AS INDICATED ON THIS DRAWING. PROVIDE FULL LENGTH PULL ROPE. COORDINATE INSTALLATION WITH UTILITY COMPANY.

9. RUN TELCO CONDUIT OR CABLE BETWEEN TELEPHONE UTILITY DEMARCATION POINT AND PROJECT OWNER CELL SITE TELCO CABINET AND BTS CABINET AS INDICATED ON THIS DRAWING. PROVIDE FULL LENGTH PULL ROPE AND GREENLEE CONDUIT MEASURING TAPE IN EACH INSTALLED TELCO CONDUIT.

10. WHERE CONDUIT BETWEEN BTS AND PROJECT OWNER CELL SITE PPC AND BETWEEN BTS AND PROJECT OWNER CELL SITE TELCO SERVICE CABINET ARE UNDERGROUND USE PVC, SCHEDULE 40 CONDUIT. ABOVE THE GROUND PORTION OF THESE CONDUITS SHALL BE PVC CONDUIT.

11. ALL EQUIPMENT LOCATED OUTSIDE SHALL HAVE NEMA 3R ENCLOSURE.

12. PPC SUPPLIED BY PROJECT OWNER.

13. GROUNDING SHALL COMPLY WITH NEC ART. 250.

14. GROUND COAXIAL CABLE SHIELDS MINIMUM AT BOTH ENDS USING MANUFACTURERS COAX CABLE GROUNDING KITS SUPPLIED BY PROJECT OWNER.

15. USE #6 COPPER STRANDED WIRE WITH GREEN COLOR INSULATION FOR ABOVE GRADE GROUNDING (UNLESS OTHERWISE SPECIFIED) AND #2 SOLID TINNED BARE COPPER WIRE FOR BELOW GRADE GROUNDING AS INDICATED ON THE DRAWING.

16. ALL GROUND CONNECTIONS TO BE BUNDY HYGROUND COMPRESSION TYPE CONNECTORS OR CADWELD EXOTHERMIC WELD. DO NOT ALLOW BARE COPPER WIRE TO BE IN CONTACT WITH GALVANIZED STEEL.

17. ROUTE GROUNDING CONDUCTORS ALONG THE SHORTEST AND STRAIGHTEST PATH POSSIBLE, EXCEPT AS OTHERWISE INDICATED. GROUNDING LEADS SHOULD NEVER BE BENT AT RIGHT ANGLE. ALWAYS MAKE AT LEAST 12" RADIUS BENDS. #6 WIRE CAN BE BENT AT 6" RADIUS WHEN NECESSARY. BOND ANY METAL OBJECTS WITHIN 6 FEET OF PROJECT OWNER EQUIPMENT OR CABINET TO MASTER GROUND BAR OR GROUNDING RING.

18. CONNECTIONS TO GROUND BARS SHALL BE MADE WITH TWO HOLE COMPRESSION TYPE COPPER LUGS. APPLY OXIDE INHIBITING COMPOUND TO ALL LOCATIONS.

19. BOND ANTENNA MOUNTING BRACKETS, COAXIAL CABLE GROUND KITS, AND ALNA TO EGB PLACED NEAR THE ANTENNA LOCATION.

20. APPLY OXIDE INHIBITING COMPOUND TO ALL COMPRESSION TYPE GROUND CONNECTIONS.

21. CONTRACTOR SHALL PROVIDE AND INSTALL OMNI DIRECTIONAL ELECTRONIC MARKER SYSTEM (EMS) BALLS OVER EACH GROUND ROD AND BONDING POINT BETWEEN EXISTING TOWER/ (E) MONOPOLE GROUNDING RING AND EQUIPMENT GROUNDING RING.

22. CONTRACTOR SHALL TEST COMPLETED GROUND SYSTEM AND RECORD RESULTS FOR PROJECT CLOSE-OUT DOCUMENTATION. 5 OHMS MAXIMUM RESISTANCE REQUIRED.

23. CONTRACTOR SHALL CONDUCT ANTENNA, COAX, AND LNA RETURN-LOSS AND DISTANCE- TO-FAULT MEASUREMENTS (SWEEP TESTS) AND RECORD RESULTS FOR PROJECT CLOSE OUT.



CENTERLINE COMMUNICATIONS  
95 RYAN DRIVE, SUITE 1  
RAYNHAM, MA 02767



AEG PROJECT #: 2019-0027

DRAWN BY: AAB

CHECKED BY: SNA

SUBMITTALS		
REV#	DATE	DESCRIPTION
0	02/19/20	ISSUED FOR REVIEW
1	03/13/20	ISSUED FOR CONSTRUCTION
2	09/11/20	REVISED
3	02/10/21	REVISED
4	02/22/21	REVISED
5	02/23/21	REVISED
6	02/26/21	REVISED

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MA-044 ESSEX

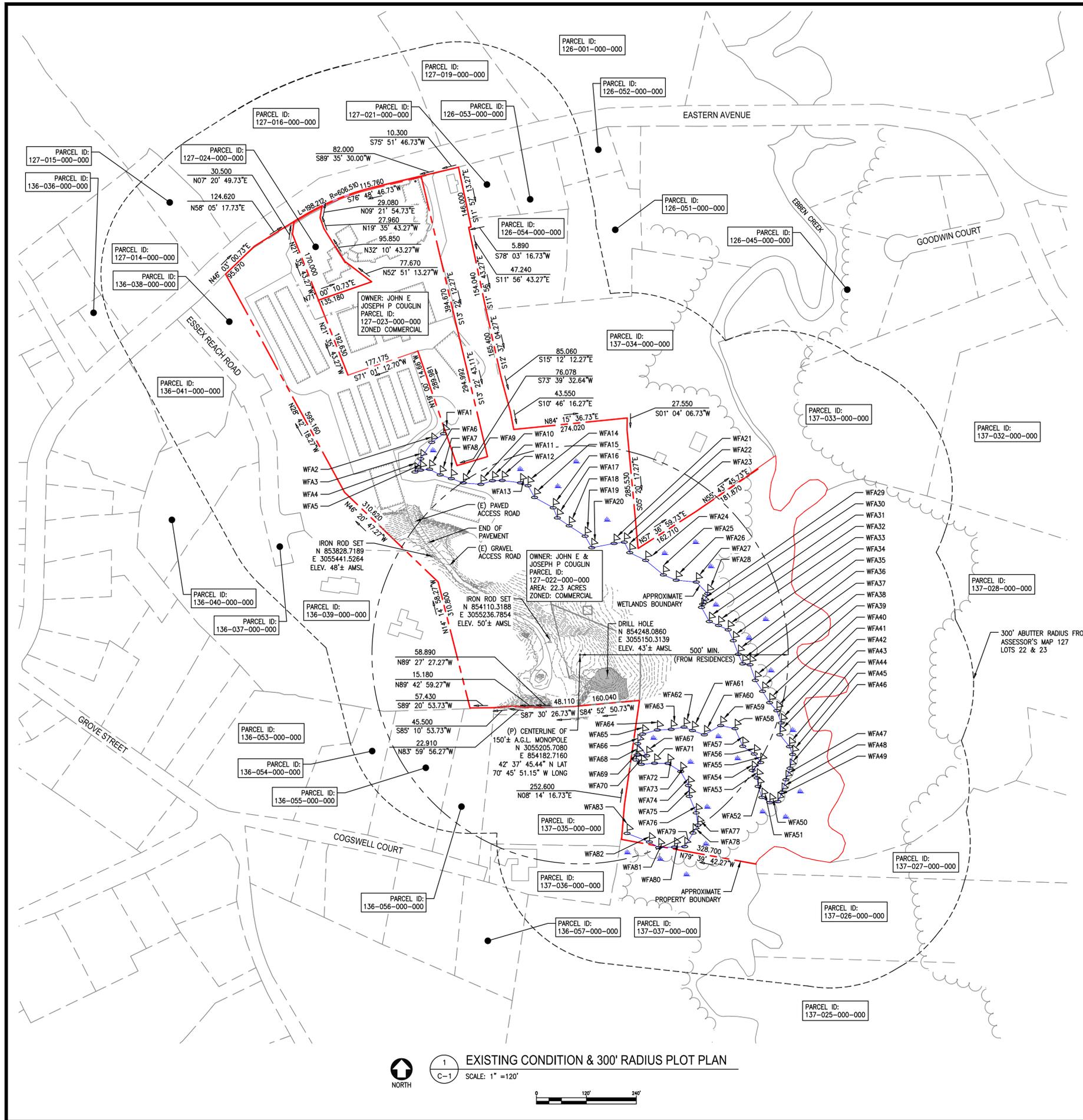
65 & 73 EASTERN AVENUE  
ESSEX, MA 01929  
ESSEX COUNTY

SHEET TITLE

GENERAL NOTES

SHEET NUMBER

GN-1



EXISTING CONDITION & 300' RADIUS PLOT PLAN  
 SCALE: 1" = 120'  
 NORTH

**GENERAL NOTES:**

- FIELD SURVEY DATE: DECEMBER 23, 2019
- VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)
- HORIZONTAL DATUM: NORTH AMERICAN DATUM OF 1983 (NAD83)
- CENTER OF PROPOSED TOWER: LAT: 42° 37' 45.44" N  
LONG: 70° 45' 51.15" W  
ELEV: 150' ± A.G.L. (196' ± AMSL)
- PROPERTY OWNER: COUGLIN, JOHN E. & JOSEPH P. TR  
GATEWAY II TRUST OF 1997  
239 WESTERN AVENUE  
ESSEX, MA 01929
- SITE NUMBER: MA-044
- SITE ADDRESS: 73 EASTERN AVENUE ESSEX, MA 01929  
65 EASTERN AVENUE ESSEX, MA 01929
- APPLICANT, LESSEE/LICENSEE & PROJECT OWNER: NORTHTOWER DEVELOPMENT LLC  
95 RYAN DRIVE SUITE 1  
RAYNHAM, MA 02767
- JURISDICTION: TOWN OF ESSEX
- TAX ID: MAP: 127 LOT: 022  
MAP: 127 LOT: 023
- DEED REFERENCE: BOOK: 36996 PAGE: 402
- PLAN REFERENCES: TOWN OF ESSEX ASSESSORS MAPS & PLAN REFERENCES AS INDICATED BELOW
- ZONING JURISDICTION: TOWN OF ESSEX COMMERCIAL-BUSINESS
- ALL UNDERGROUND UTILITY INFORMATION WAS DETERMINED FROM SURFACE INVESTIGATIONS AND EXISTING PLANS OF RECORD. THE CONTRACTOR SHALL LOCATE ALL UNDERGROUND UTILITIES IN THE FIELD PRIOR TO ANY SITE WORK. CALL THE FOLLOWING FOR ALL PRE-CONSTRUCTION NOTIFICATION 72-HOURS PRIOR TO ANY EXCAVATION ACTIVITY: DIG SAFE SYSTEM (MA, ME, NH, RI, VT): 1-888-344-7233  
CALL BEFORE YOU DIG (CT): 1-800-922-4455
- PROPERTY LINE INFORMATION IS COMPILED FROM ASSESSORS PLANS, DEEDS, AND PLANS OF RECORD AND IS NOT TO BE CONSTRUED AS HAVING BEEN OBTAINED AS THE RESULT OF A FIELD BOUNDARY SURVEY, AND IS SUBJECT TO CHANGE AS AN ACCURATE FIELD SURVEY MAY DISCLOSE. A FULL BOUNDARY SURVEY WAS NOT PERFORMED.
- REFERENCE TITLE REPORT ENTITLED: "MEMORANDUM OF OPTION AND LAND LEASE" BY WENDY CARRICK OF SBA NETWORK SERVICES, LLC DATED 06/28/16.
- THE PURPOSE OF THIS SURVEY IS TO SUPPORT THE DESIGN AND CONSTRUCTION OF A TELECOMMUNICATION FACILITY. USE OF THIS SURVEY BY ANYONE OTHER THAN CENTERLINE, AND USE OF THIS SURVEY FOR ANY PURPOSE NOT RELATED TO THE DESIGN OF THE INTENDED FACILITY IS STRICTLY PROHIBITED.
- BEARING SYSTEM OF THIS PLAN IS BASED ON TRUE NORTH. TRUE NORTH WAS ESTABLISHED FROM GPS READINGS ON 12/23/19.
- PROPERTY LIES WITHIN ZONE AE: LIMIT OF WORK AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN AS SHOWN ON FLOOD INSURANCE RATE MAP ESSEX COUNTY, TOWN OF ESSEX COMMUNITY PANEL NUMBER 25009C02946, EFFECTIVE DATE JULY 16, 2014
- WETLANDS WERE NOT OBSERVED WITHIN 100' OF THE LIMIT OF WORK. WETLAND DELINEATION PERFORMED IN FIELD BY ECOTEC, INC. ON DECEMBER 5, 2019
- IN THE EVENT THAT BENCHMARKS (TBM'S), ESTABLISHED FOR THIS PROJECT AND PUBLISHED ON THIS SURVEY, ARE DESTROYED, NOT RECOVERABLE OR A DISCREPANCY IS FOUND, THE USER SHOULD NOTIFY THIS FIRM IN WRITING PRIOR TO COMMENCING OR CONTINUING ANY WORK.
- THE PROPERTY LINES SHOWN ON THIS PLAN ARE THE LINES DIVIDING EXISTING OWNERSHIPS, AND THE LINES OF STREETS AND WAYS SHOWN ARE THOSE OF PUBLIC OR PRIVATE STREETS OR WAYS ALREADY ESTABLISHED, AND NO NEW LINES FOR DIVISION OF EXISTING OWNERSHIP OR FOR NEW WAYS ARE SHOWN.

**LEGEND**

- PROPERTY LINE
- ABUTTING PROPERTY LINE
- EXIST. R.O.W. LAYOUT
- PROP. EASEMENT/LEASE AREA
- EXIST. ZONING BOUNDARY
- EXIST. CHAIN LINK FENCE
- EXIST. TREE LINE
- EXIST. CONTOUR
- EXIST. OVERHEAD UTILITIES
- EXIST. UNDERGROUND UTILITIES
- (E) FEMA FLOODPLAIN LINE (FROM FEMA .Q3 DATA)
- MASS. D.E.P. WETLAND LINE (FROM MASSGIS)
- UTILITY POLE
- HYDRANT
- DRILL HOLE
- STONE/CONC. BOUND
- TELCO MANHOLE
- SEWER MANHOLE
- WATER MANHOLE
- DRAINAGE MANHOLE
- CATCH BASIN
- GAS VALVE
- WATER VALVE

**ADVANCED ENGINEERING GROUP, P.C.**  
 Civil Engineering - Site Development  
 Surveying - Telecommunications  
 500 North Broadway  
 East Providence, RI 02914  
 Tel: (401) 354-2403  
 Fax: (401) 635-6354

**CENTERLINE COMMUNICATIONS**  
 CENTERLINE COMMUNICATIONS  
 95 RYAN DRIVE, SUITE 1  
 RAYNHAM, MA 02767

**SCOTT H. ADAMS CIVIL ENGINEER**  
 REGISTERED PROFESSIONAL ENGINEER  
 No. 46006  
 State of Massachusetts

AEG PROJECT #: 2019-0027

DRAWN BY: AAB

CHECKED BY: SNA

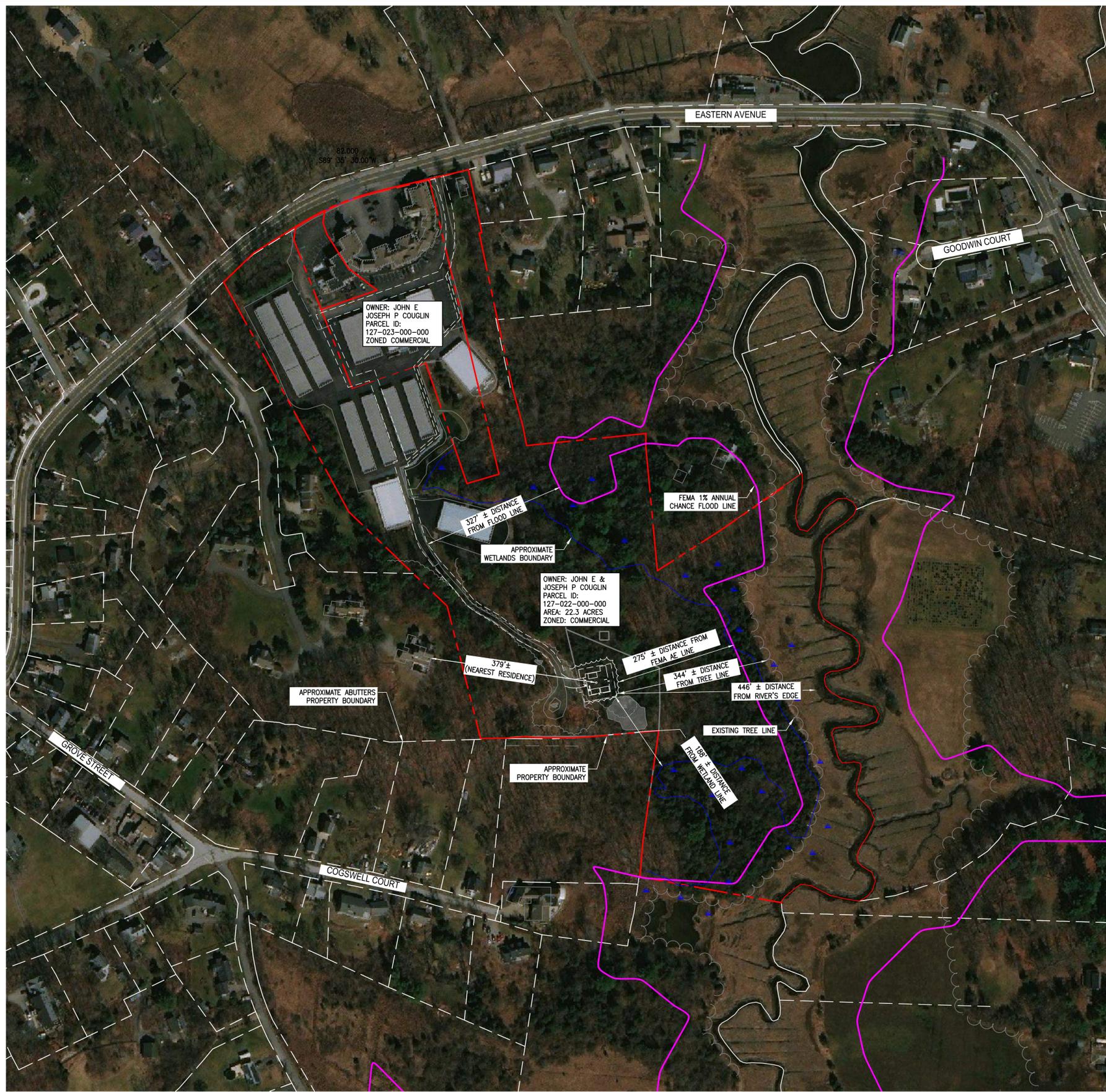
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**MA-044 ESSEX**  
 65 & 73 EASTERN AVENUE  
 ESSEX, MA 01929  
 ESSEX COUNTY

SHEET TITLE  
 EXISTING CONDITION & 300' RADIUS PLOT PLAN

SHEET NUMBER  
**C-1**



**EXISTING CONDITION & 300' RADIUS PLOT PLAN**  
 SCALE: 1" = 120'

**W.C.F. SUMMARY TABLE**

	REQUIRED	PROVIDED	RELIEF
HEIGHT OF TOWER:	150 FT MAX.	150 FT	0 FT
TO PROPERTY LINE	187.5 FT	121± FT	66.5± FT
TO NEAREST RESIDENCE	500 FT	379± FT	121± FT
TO NEAREST WETLAND	150 FT	188± FT	0± FT
SETBACK FROM THE FENCE LINE	50 FT	94 ± FT	0± FT

PER ZONING REGULATIONS, THE LOCATION OF THE PROPOSED TOWER IS GREATER THAN 500 FEET (500') AWAY FROM ANY HISTORIC DISTRICT, SCHOOL, PLAYGROUND, RECREATION CENTER, MEDICAL FACILITY OR NURSING HOME.

PER ZONING REGULATIONS, THE LOCATION OF THE PROPOSED TOWER IS GREATER THAN 150 FEET (150') AWAY FROM ALL WETLANDS, WATER BODIES OR AREAS DESIGNED UNDER "WETLAND DISTRICT DELINEATION".

**LEGEND**

	PROPERTY LINE		UTILITY POLE
	ABUTTING PROPERTY LINE		HYDRANT
	EXIST. R.O.W. LAYOUT		DRILL HOLE
	PROP. EASEMENT/LEASE AREA		STONE/CONC. BOUND
	EXIST. CHAIN LINK FENCE		TELCO MANHOLE
	EXIST. TREE LINE		SEWER MANHOLE
	PROP. TREE LINE		WATER MANHOLE
	EXIST. CONTOUR		DRAINAGE MANHOLE
	EXIST. OVERHEAD UTILITIES		CATCH BASIN
	EXIST. UNDERGROUND UTILITIES		GAS VALVE
	(E) FEMA FLOODPLAIN LINE (FROM FEMA .Q3 DATA)		WATER VALVE
	WETLAND LINE		

**AEG ADVANCED ENGINEERING GROUP, P.C.**  
 Civil Engineering - Site Development  
 Surveying - Telecommunications  
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 East Providence, RI 02914  
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 Fax: (401) 635-6354

**CENTERLINE COMMUNICATIONS**  
 95 RYAN DRIVE, SUITE 1  
 RAYNHAM, MA 02767

SCOTT H. ADAMS  
 CIVIL  
 No. 46006  
 REGISTERED PROFESSIONAL ENGINEER

AEG PROJECT #: 2019-0027

DRAWN BY: AAB

CHECKED BY: SNA

**SUBMITTALS**

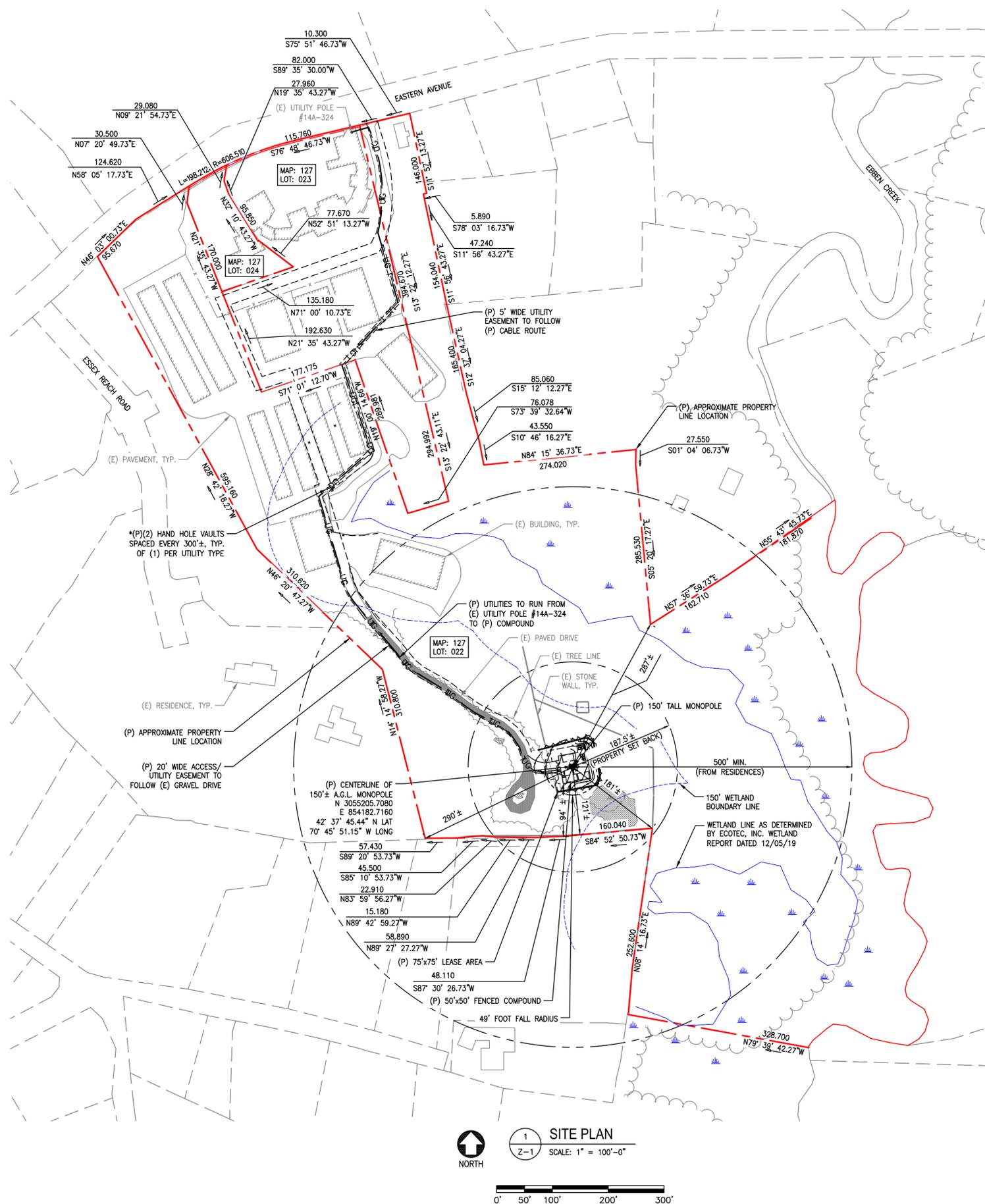
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**MA-044 ESSEX**  
 65 & 73 EASTERN AVENUE  
 ESSEX, MA 01929  
 ESSEX COUNTY

SHEET TITLE  
**ORTHO PLAN**

SHEET NUMBER  
**C-2**



**NOTE:**  
 1. LENGTH OF PROPOSED ACCESS DRIVE FROM EASTERN AVENUE TO PROPOSED COMPOUND: 1655'±  
 2. LENGTH OF PROPOSED UTILITY RUN FROM EXISTING UTILITY POLE ON EASTERN ROAD TO PROPOSED COMPOUND: 1655'±

**ZONING SUMMARY TABLE**

ZONING DISTRICT: COMMERCIAL-BUSINESS		
ASSESSORS ID: MAP: 127 LOT: 22		
PROPOSED USE: WIRELESS COMMUNICATION FACILITY		
DIMENSION:	REQUIRED MINIMUM	PROVIDED
FRONT YARD SETBACK*	N/A	1200± FT
SIDE YARD SETBACK*	N/A	285± FT
REAR YARD SETBACK*	N/A	121± FT
AREA (SQUARE FEET)	N/A	971,388 S.F.
FRONTAGE	N/A	300± FT

\* DIMENSIONS MEASURED FROM FACE OF TOWER TO THE NEAREST PROPERTY LINE

**W.C.F. SUMMARY TABLE**

	REQUIRED	PROVIDED	RELIEF
HEIGHT OF TOWER:	150 FT MAX.	150 FT	0 FT
TO PROPERTY LINE	187.5 FT	121± FT	66.5± FT
TO NEAREST RESIDENCE	500 FT	379± FT	121± FT
TO NEAREST WETLAND	150 FT	188± FT	0± FT
SETBACK FROM THE FENCE LINE	50 FT	94 ± FT	0± FT

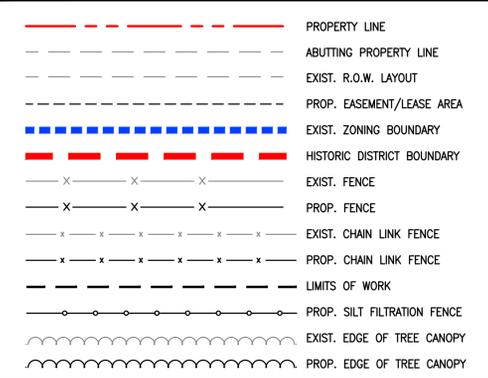
PER ZONING REGULATIONS, THE LOCATION OF THE PROPOSED TOWER IS GREATER THAN 500 FEET (500') AWAY FROM ANY HISTORIC DISTRICT, SCHOOL, PLAYGROUND, RECREATION CENTER, MEDICAL FACILITY OR NURSING HOME.

PER ZONING REGULATIONS, THE LOCATION OF THE PROPOSED TOWER IS GREATER THAN 150 FEET (150') AWAY FROM ALL WETLANDS, WATER BODIES OR AREAS DESIGNED UNDER "WETLAND DISTRICT DELINEATION".

**GENERAL NOTES:**

1. THE TYPE, DIMENSIONS, MOUNTING HARDWARE, AND POSITIONS OF ALL PROJECT OWNER'S EQUIPMENT ARE SHOWN IN ILLUSTRATIVE FASHION. THESE DRAWINGS ARE NOT INTENDED FOR CONSTRUCTION. ACTUAL HARDWARE DETAILS AND FINAL LOCATIONS MAY DIFFER SLIGHTLY FROM WHAT IS SHOWN.
2. THE PROJECT OWNER'S PCS FACILITY IS AN UNMANNED PRIVATE AND SECURED EQUIPMENT INSTALLATION. IT IS ONLY ACCESSED BY TRAINED TECHNICIANS FOR PERIODIC ROUTINE MAINTENANCE AND THEREFORE DOES NOT REQUIRE ANY WATER OR SANITARY SEWER SERVICE. THE FACILITY IS NOT GOVERNED BY REGULATIONS REQUIRING PUBLIC ACCESS PER ADA REQUIREMENTS.
3. THE PROJECT OWNER'S BASE TRANSMISSION STATION (BTS) CABINET IS A VANDAL RESISTANT STEEL CABINET CONTAINING RECTIFIERS, AMPLIFIERS, RADIOS, AND OTHER INTEGRATED ELECTRONIC CONTROL EQUIPMENT. BATTERY BACKUP FOR EMERGENCY STANDBY POWER IS CONTAINED WITHIN A SEPARATE BATTERY RACK CONTAINING 12-VOLT, CLOSED-CELL DC BATTERIES. THE BATTERIES ARE LEAD-ACID RECHARGEABLE STANDBY INDUSTRIAL POWER CELLS MANUFACTURED TO MEET ENVIRONMENTAL QUALITY AND RUGGEDNESS STANDARDS OF THE INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA). THE BATTERY CHARGING SYSTEM IS COMPUTER-CONTROLLED AND THE EQUIPMENT CABINET IS REMOTELY MONITORED AT PROJECT OWNER'S NETWORK OPERATIONS CONTROL CENTER 24-HOURS A DAY, 7 DAYS A WEEK FOR FAULTS AND ALARMS.
4. THE DESIGN OF THE ANTENNA MOUNTING HARDWARE AND STRUCTURAL REINFORCEMENT OF EXISTING BUILDING ROOF/FLOOR (IF NECESSARY) TO SUPPORT THE BTS EQUIPMENT CABINETS WILL MEET THE ANSI/EIA/TIA-222-G STANDARDS FOR STRUCTURAL STEEL ANTENNA SUPPORTING STRUCTURES AND STATE BUILDING CODE REQUIREMENTS. DETAILED CONSTRUCTION DRAWINGS AND STRUCTURAL CALCULATIONS WILL BE PREPARED BY A REGISTERED PROFESSIONAL ENGINEER AND SUBMITTED WITH A BUILDING PERMIT APPLICATION FOR REVIEW AND APPROVAL BY THE LOCAL BUILDING CODE ENFORCEMENT OFFICIAL.
5. ONCE THE FACILITY BECOMES FULLY OPERATIONAL, NORMAL AND ROUTINE MAINTENANCE BY PROJECT OWNER'S TECHNICIANS WILL BE PERFORMED ON A MONTHLY BASIS. THEREFORE, THE ESTIMATED VEHICLE TRIP GENERATION RATE IS 2 TRIPS PER MONTH. THE AVERAGE DAILY TRIP GENERATION RATE (ADT) IS 0.07.
6. PER FCC MANDATE, ENHANCED EMERGENCY (E911) SERVICE IS REQUIRED TO MEET NATIONWIDE STANDARDS FOR WIRELESS COMMUNICATIONS SYSTEMS. PROJECT OWNER'S IMPLEMENTATION REQUIRES DEPLOYMENT OF EQUIPMENT AND ANTENNAS GENERALLY DEPICTED ON THIS PLAN, ATTACHED TO OR MOUNTED IN CLOSE PROXIMITY TO THE BTS RADIO CABINETS. RESERVES THE RIGHT TO MAKE REASONABLE MODIFICATIONS TO E911 EQUIPMENT AND LOCATION AS TECHNOLOGY EVOLVES TO MEET REQUIRED SPECIFICATIONS.
7. APPLICANT: TOWNORTH DEVELOPMENT LLC  
95 RYAN DRIVE SUITE 1  
RAYNHAM, MA 02767
8. OWNER (BOTH PARCELS): COUGHLIN, JOHN E & JOSEPH P TR  
239 WESTERN AVENUE  
ESSEX, MA 01929
9. ZONING DISTRICT: COMMERCIAL-BUSINESS
10. JURISDICTION: TOWN OF ESSEX  
MAP: 127 LOT: 022
11. TAX ID: MAP: 127 LOT: 023
12. ALL MEASUREMENTS ARE SHOWN IN FEET ± UNLESS OTHERWISE NOTED.
13. PLOT PLAN MEASUREMENTS ARE APPROXIMATE AND BASED ON SCALED ASSESSORS MAPS AND OTHER AVAILABLE INFORMATION.
14. ALL SETBACKS SHOWN FROM PROPOSED ANTENNAS TO THE EDGE OF THE ROOF ARE APPROXIMATE AND SHOULD BE USED FOR REFERENCE ONLY.

**LEGEND**



- NOTES:**
1. FINAL UTILITY CONDUIT ROUTES SUBJECT TO LANDLORD APPROVAL.
  2. PLOT PLAN BASED ON TAX ASSESSOR'S MAPS FROM THE TOWN OF ESSEX, MASSACHUSETTS. DIGITAL PARCEL DATA, AND RECORD PLANS NOTED. A METES AND BOUNDS SURVEY WAS NOT CONDUCTED BY ADVANCED ENGINEERING GROUP, P.C.
  3. WETLANDS DELINEATION PERFORMED BY ECOTEC, INC ON 12/05/19.
  4. 49' TOWER FALL ZONE BASED ON TOWER FALL LETTER PROVIDED BY SABRE INDUSTRIES DATED FEBRUARY 23, 2021



AEG PROJECT #: 2019-0027

DRAWN BY: AAB

CHECKED BY: SNA

**SUBMITTALS**

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**MA-044 ESSEX**

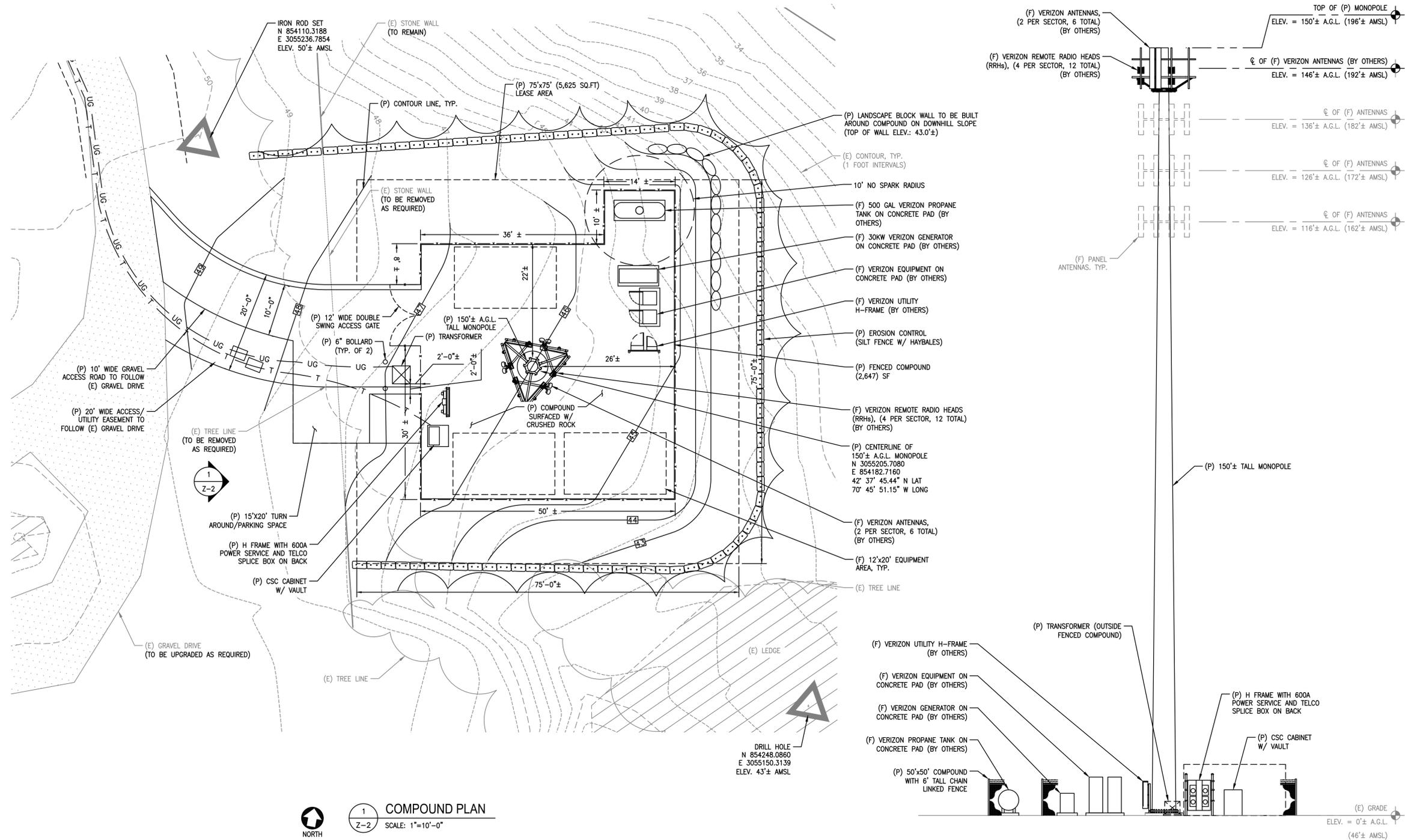
65 & 73 EASTERN AVENUE  
 ESSEX, MA 01929  
 ESSEX COUNTY

SHEET TITLE

SITE PLAN

SHEET NUMBER

**Z-1**



**1**  
Z-2  
NORTH  
COMPOUND PLAN  
SCALE: 1"=10'-0"

**2**  
Z-2  
ELEVATION  
SCALE: 1"=10'-0"



AEG PROJECT #: 2019-0027

DRAWN BY: AAB

CHECKED BY: SNA

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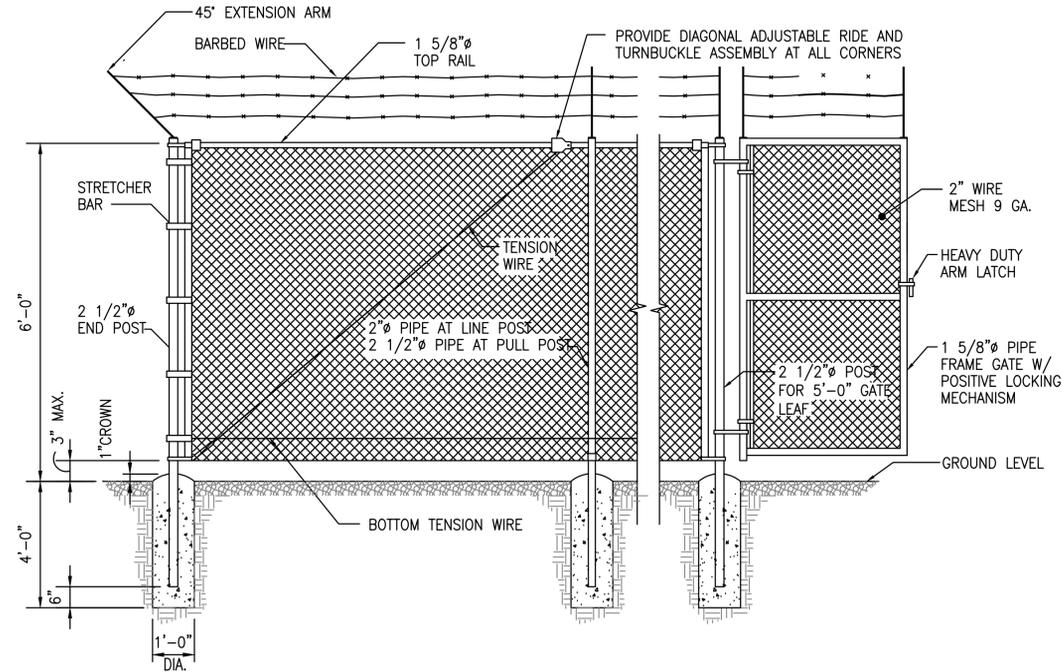
**MA-044 ESSEX**  
65 & 73 EASTERN AVENUE  
ESSEX, MA 01929  
ESSEX COUNTY

SHEET TITLE  
COMPOUND PLAN & ELEVATION

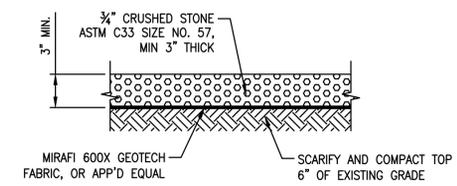
SHEET NUMBER  
**Z-2**

FENCE NOTES:

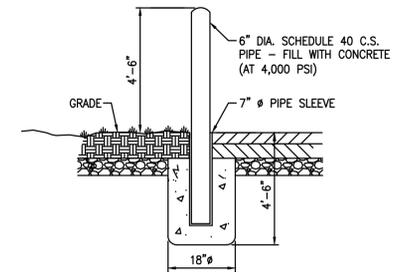
1. INSTALL FENCING PER ASTM F-567, SWING GATE PER ASTM F-900.
2. ALL END POSTS, LINE POSTS, PULL POSTS, POSTS FOR GATE LEAF, PIPES FOR GATE FRAME AND TOP RAILS SHALL BE SCHEDULE 40 PIPE PER ASTM F-1083.
3. FABRIC SHALL BE 12 GA. CORE WIRE SIZE 2" MESH CONFORMING TO ASTM A-392.
4. TENSION WIRE SHALL BE 7 GA. GALV. STEEL.
5. TIE WIRE SHALL BE 11 GA. GALV. STEEL (MIN.) AT POSTS AND RAILS. A SINGLE WRAP FABRIC TIE AT TENSION WIRE BY HOG RINGS SPACED MAX. OF 24" INTERVALS
6. BARBED WIRE SHALL BE DOUBLE STRAND 12 1/2" O.D. TWISTED WIRE TO MATCH W/FABRIC 14 GA., 4 PT. BARBS SPACES AT APPROXIMATELY 5" O.C.
7. COMPLY WITH LOCAL ORDINANCES OF BARBED WIRE PERMIT REQUIREMENTS, IF REQUIRED.
8. STEEL FENCE SYSTEM SHALL INCLUDE THE FENCE POSTS, FABRIC, GATE SYSTEM AND ALL NECESSARY ERECTION ACCESSORIES, FITTINGS AND FASTENINGS. ALL FENCE SYSTEM COMPONENTS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153. GATES SHALL BE SWING GATES WITH 5'-0" LEAF. REFER TO TYPICAL FENCE DETAIL FOR ADDITIONAL INFORMATION. INSTALL FENCE AFTER CONCRETE HAS ATTAINED 75% OF 28 DAY DESIGN STRENGTH.
9. SCREENING SLATS SHALL BE INSTALLED ON PROPOSED FENCING (COLOR: GREEN OR AS DET'S BY PROJECT OWNER)



1 FENCE DETAILS  
Z-3 SCALE: 1" = 8'-0"

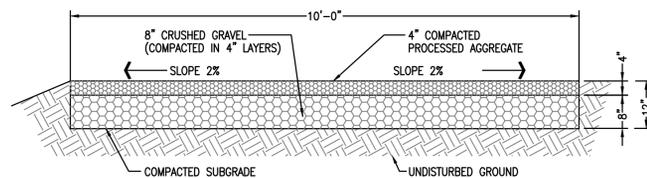


2 GRAVEL COMPOUND DETAIL  
Z-3 SCALE: N.T.S.

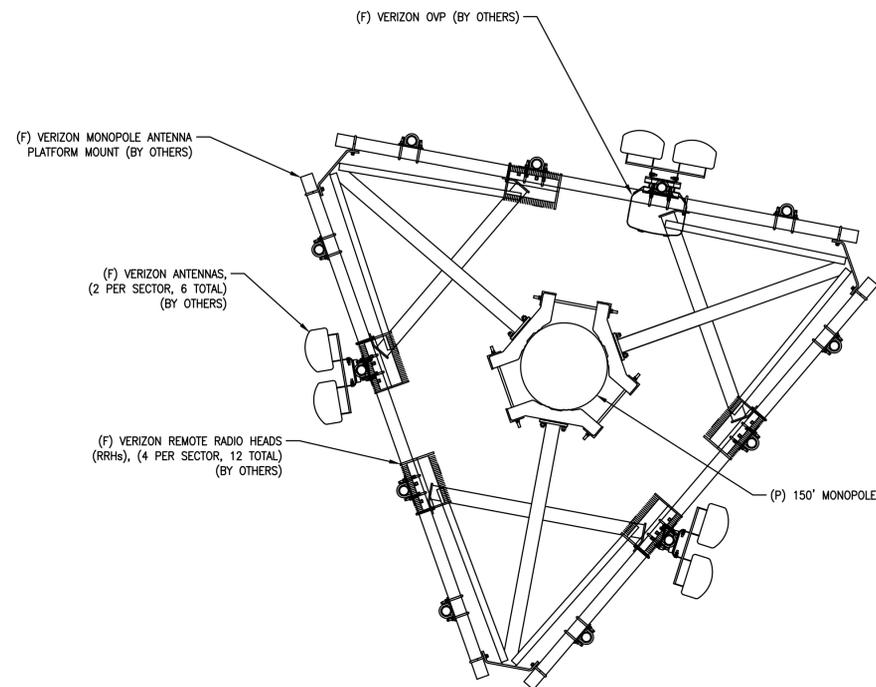


3 BOLLARD DETAIL  
Z-3 SCALE: N.T.S.

CRUSHED GRAVEL		PROCESSED AGGREGATE	
SIEVE	% PASSING BY WEIGHT	SIEVE	% PASSING BY WEIGHT
5"	100	2 1/4"	100
3 1/2"	90-100	2"	95-100
1 1/2"	55-95	3/4"	50-75
1 1/4"	25-60	1/4"	25-45
#10	15-45	#40	5-20
#40	5-25	#100	2-12
#100	0-10		
#200	0-5		



4 GRAVEL ACCESS CROSS SECTION  
Z-3 SCALE: 1/2" = 1'-0"



5 ANTENNA PLAN  
Z-3 SCALE: 1/2" = 1'-0"

LEGEND

- (F) = FUTURE
- (E) = EXISTING
- PROP. = PROPOSED
- (AGL) = ABOVE GROUND LEVEL



AEG PROJECT #: 2019-0027

DRAWN BY: AAB

CHECKED BY: SNA

SUBMITTALS

REV#	DATE	DESCRIPTION
0	02/19/20	ISSUED FOR REVIEW
1	03/13/20	ISSUED FOR CONSTRUCTION
2	09/11/20	REVISED
3	02/10/21	REVISED
4	02/22/21	REVISED
5	02/23/21	REVISED
6	02/26/21	REVISED

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MA-044 ESSEX

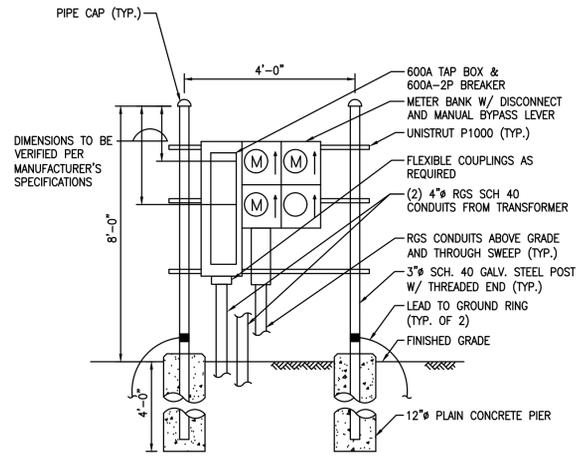
65 & 73 EASTERN AVENUE  
ESSEX, MA 01929  
ESSEX COUNTY

SHEET TITLE

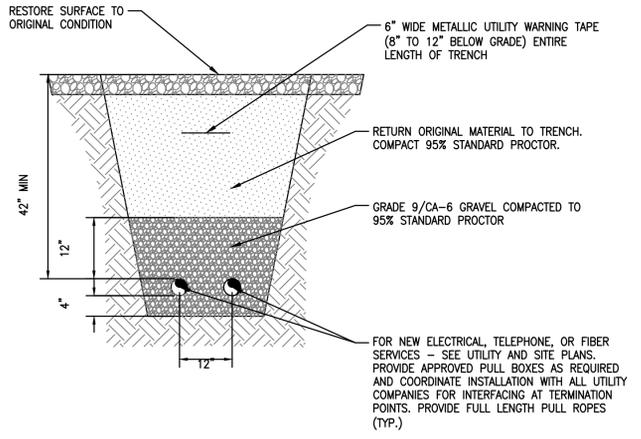
DETAILS

SHEET NUMBER

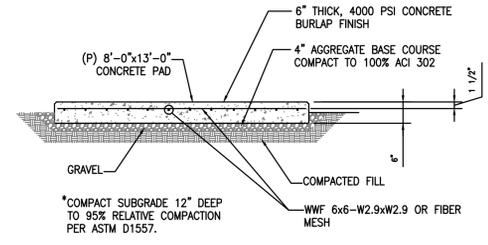
Z-3



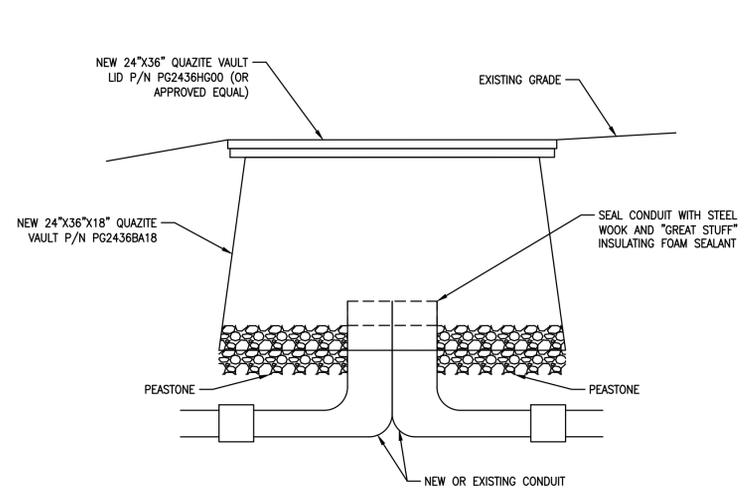
1 METER BOARD DETAIL  
Z-4 SCALE: N.T.S.



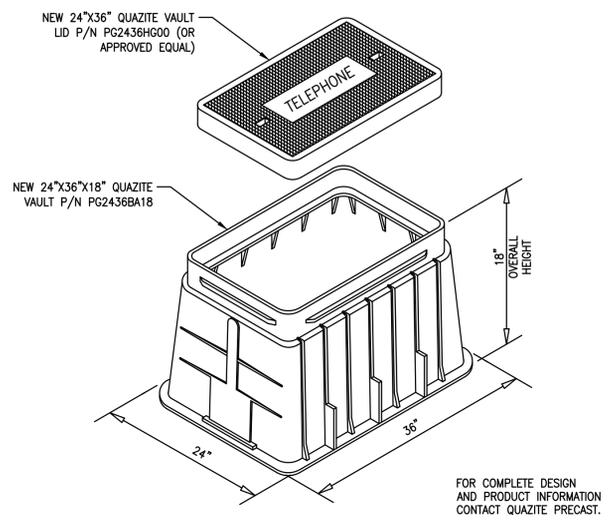
2 TRENCH DETAIL AT ACCESS CROSSING  
Z-4 SCALE: N.T.S.



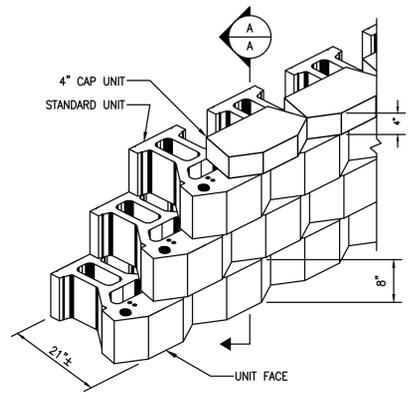
5 CONCRETE PAD DETAIL  
Z-4 SCALE: N.T.S.



3 TELCO HANDHOLE WITH LID DETAIL  
Z-4 SCALE: N.T.S.



4 TELCO HANDHOLE ISOMETRIC  
Z-4 SCALE: N.T.S.



5 RETAINING WALL DETAIL  
Z-4 SCALE: N.T.S.



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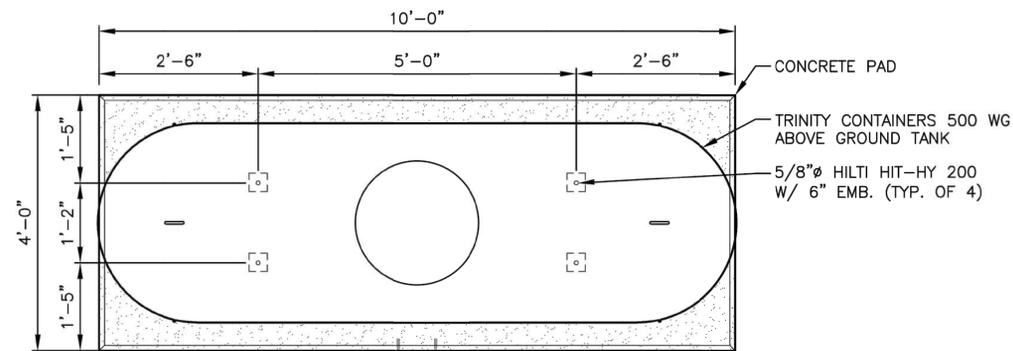
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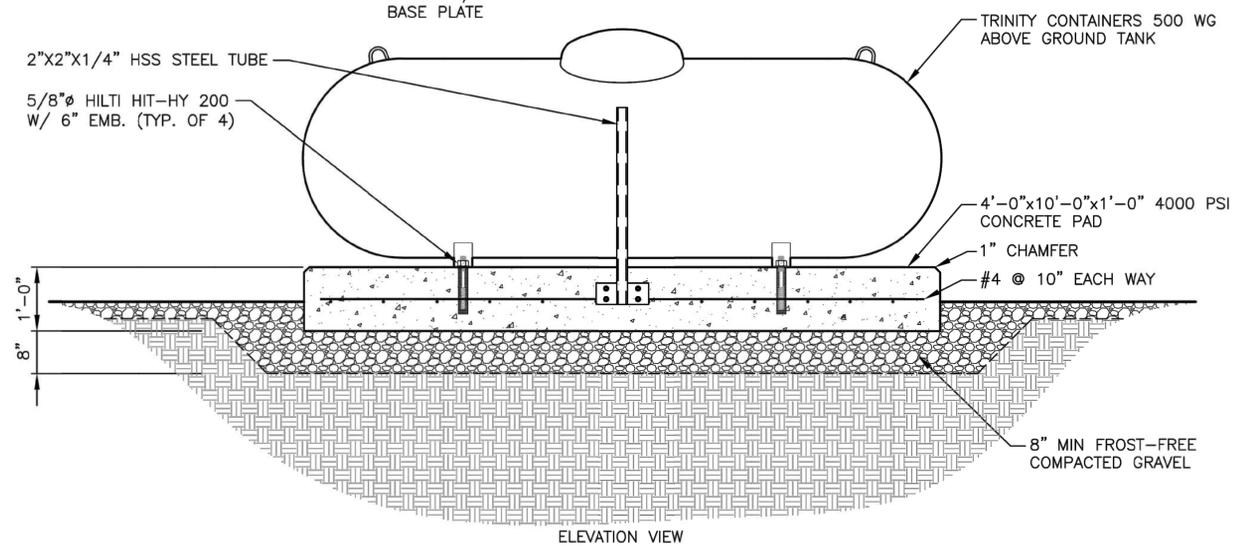
**MA-044 ESSEX**  
65 & 73 EASTERN AVENUE  
ESSEX, MA 01929  
ESSEX COUNTY

**LEGEND**  
(F) = FUTURE  
(E) = EXISTING  
PROP. = PROPOSED  
(AGL) = ABOVE GROUND LEVEL

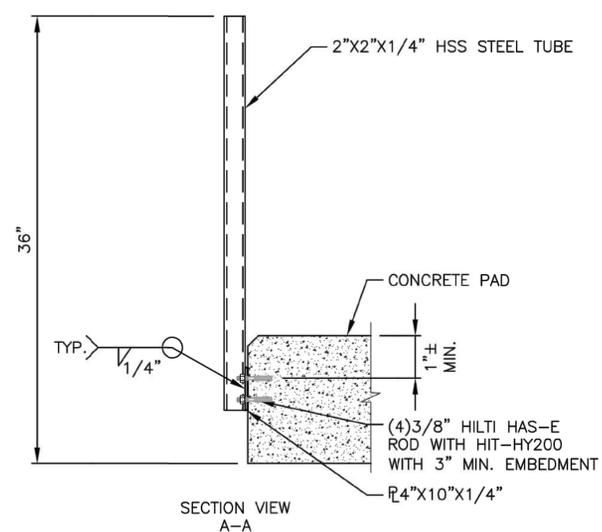
SHEET TITLE  
DETAILS  
SHEET NUMBER  
**Z-4**



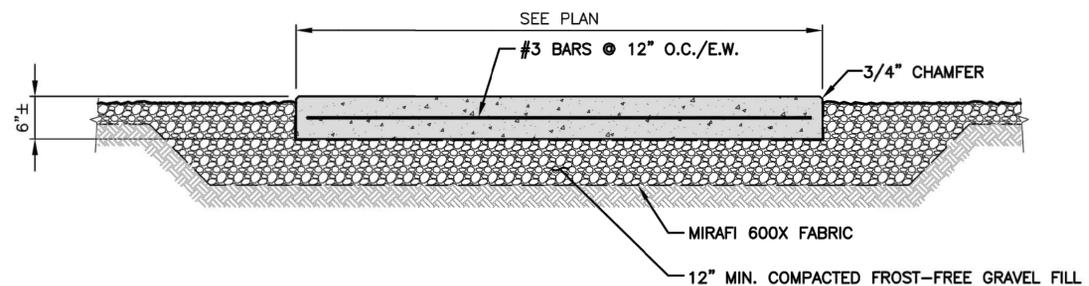
PLAN VIEW  
2"X2"X1/4" HSS STEEL TUBE WITH 4"X10"X1/4" BASE PLATE



ELEVATION VIEW



SECTION VIEW A-A  
1 PROPANE TANK MOUNTING DETAIL  
SCALE: N.T.S.



2 CONCRETE PAD DETAIL  
SCALE: N.T.S.

FOUNDATION NOTES & CONCRETE SPECIFICATIONS:

- FOUNDATION AREA SHALL BE EXCAVATED TO THE DEPTH AND DIMENSIONS SHOWN ON THE PLANS. EXISTING LEDGE AND ALL OTHER EXISTING UNSUITABLE MATERIAL SHALL BE REMOVED AND LEGALLY DISPOSED OF OFF-SITE. THE SUBGRADE SHALL BE ROLLED WITH A 1-TON, VIBRATORY, WALK-BEHIND ROLLER AT A SPEED OF LESS THAN 2 FPS, 6 PASSES MINIMUM, TO PROVIDE UNYIELDING SURFACE.
- UNDERCUT SOFT OR "WEAVING" AREAS A MINIMUM OF 12 INCHES DEEP. BACKFILL UNDERCUT AREA WITH FILL MEETING THE SPECIFICATIONS OF STRUCTURAL FILL.
- CONCRETE TO HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH ( $f'c$ )=4000 psi. CONCRETE TO BE AIR ENTRAINED, DESIRED AIR CONTENT TO BE 6% (PLUS OR MINUS 2%)
- REINFORCING BAR TO BE ASTM A615 GRADE 60.
- WELDED WIRE FABRIC TO CONFORM TO THE REQUIREMENTS OF ASTM A185. WIRES FOR FABRIC TO CONFORM TO THE REQUIREMENTS OF ASTM A82.
- ALL REINFORCING TO HAVE MINIMUM CONCRETE COVER PER ACI SPECIFICATIONS.
- ALL CONCRETE MATERIALS AND WORKMANSHIP SHALL CONFORM TO LATEST EDITION OF ACI 318 AND APPLICABLE STATE BUILDING CODE.

DRAWING REFERENCE NOTE:  
(F) CONCRETE PAD AND PROPANE TANK DETAILS HAVE BEEN DESIGNED BY OTHERS. FOR MORE INFORMATION, SEE VERIZON DESIGN DRAWINGS BY HUDSON DESIGN GROUP, LLC, DATED 07/22/2020.



AEG PROJECT #: 2019-0027

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CHECKED BY: SNA

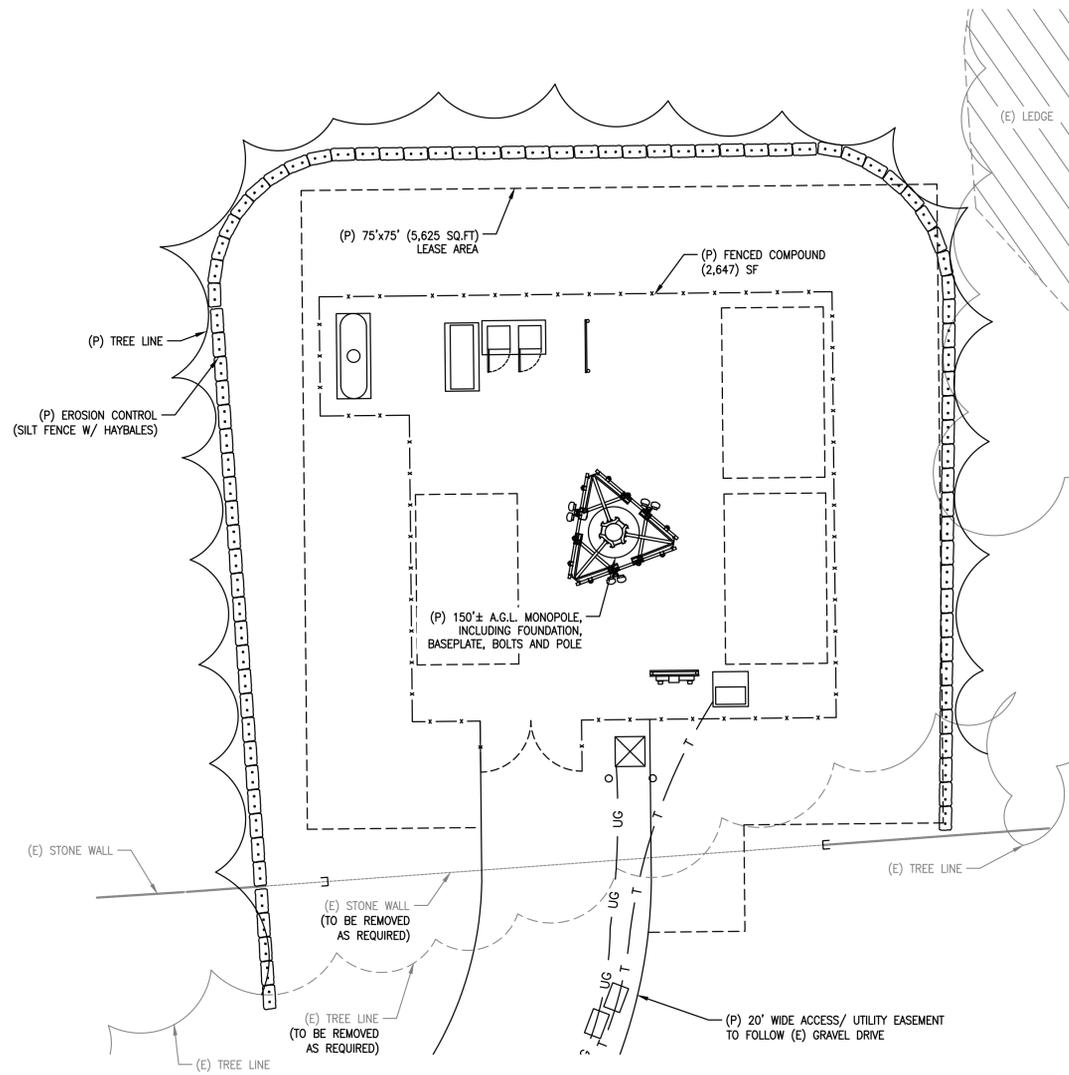
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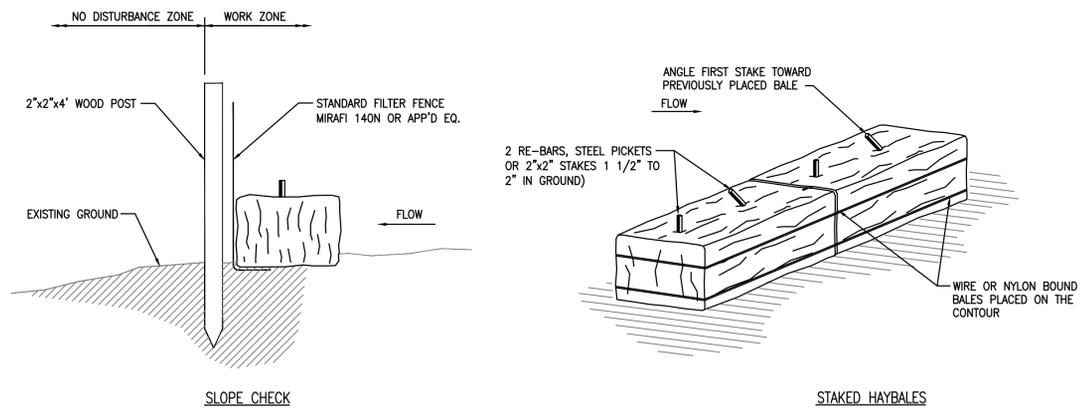
MA-044 ESSEX  
65 & 73 EASTERN AVENUE  
ESSEX, MA 01929  
ESSEX COUNTY

SHEET TITLE  
DETAILS

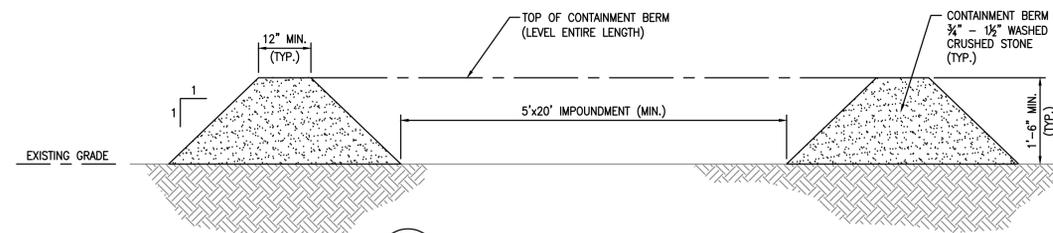
SHEET NUMBER  
Z-5



**1 EROSION CONTROL PLANS**  
 EC-1 SCALE: 1"=10'-0"



**3 SILT FENCE/HAYBALE BARRIER DETAILS**  
 EC-1 SCALE: NTS



**2 TEMPORARY STILLING BASIN DETAIL**  
 EC-1 SCALE: NTS

**PROJECT DESCRIPTION AND ENVIRONMENTAL DATA**

- CENTERLINE PROPOSES TO CONSTRUCT A CELLULAR TELECOMMUNICATIONS FACILITY. IMPROVEMENTS CONSIST OF: CONSTRUCTION OF A PROPOSED 2,647 SQ. FT. CHAIN LINK FENCED COMPOUND SURFACED WITH CRUSHED STONE, CONCRETE EQUIPMENT MOUNTING PAD, RADIO CABINETS, LIGHTNING PROTECTION GROUND RING, ELECTRIC & TELEPHONE CONDUITS FROM EXISTING SERVICE POINTS AND COAXIAL CABLES RUN TO ANTENNAS ON THE PROPOSED TOWER.
- THE PHASING AND SEQUENCING OF THE WORK FOR THE SITE PREPARATION FOR THE TELECOMMUNICATIONS EQUIPMENT INSTALLATION CONSISTS OF INSTALLING TEMPORARY EROSION AND SEDIMENTATION CONTROL BARRIERS; LIMITED CLEARING AS SHOWN ON PLANS, GRUBBING AND ROUGH GRADING OF THE EQUIPMENT COMPOUND; EXCAVATION OF EQUIPMENT/TOWER MOUNTING PAD FOUNDATION; FOUNDATION WORK; EXCAVATION FOR UTILITIES; BACK FILL FOUNDATION AND UTILITY TRENCHES; INSTALL EQUIPMENT ON TOWER AND IN COMPOUND; FENCING; GROUNDING AND LIGHTNING PROTECTION; FINAL GRADING AND STABILIZATION OF EQUIPMENT COMPOUND; LOAM AND SEED DISTURBED AREAS OUTSIDE COMPOUND; FINAL CLEANUP AND EQUIPMENT TESTING. THE ESTIMATED TIME FOR COMPLETION OF THE WORK IS APPROXIMATELY EIGHT (8) WEEKS.
- THE COMPOUND ENCLOSURE IS SURFACED WITH CRUSHED STONE UNDERLAIN BY A WEED-BLOCK SYNTHETIC FILTER FABRIC. DRAINAGE PATTERNS, RUNOFF VOLUMES AND PEAK FLOW RATES WILL NOT BE ALTERED BY THE PROPOSED CONSTRUCTION. MATERIAL REMOVED FOR THE COMPOUND GRADING WILL BE TEMPORARILY STOCKPILED ON SITE IN THE DESIGNATED AREA. MATERIAL WILL BE RE-USED OFF SITE AS DETERMINED BY THE CONTRACTOR.
- FLAT SLOPES MAINTAINED WITHIN THE EQUIPMENT COMPOUND AND THE CRUSHED STONE SURFACE WILL PROMOTE INFILTRATION. RUNOFF FROM THE COMPOUND WILL BE DIFFUSE, NON-POINT SOURCE SHEET FLOW. NO NEW STORM WATER CONVEYANCES ARE CREATED BY THE INTENDED SITE ALTERATIONS AND THEREFORE THE PROJECT IS EXEMPT FROM THE DEP STORM WATER MANAGEMENT POLICY ADOPTED NOVEMBER 18, 1996.

**SILTATION AND EROSION CONTROL NOTES**

- TEMPORARY HAYBALE/SILT FENCE EROSION CONTROL BARRIER SHALL BE MAINTAINED THROUGHOUT SITE CONSTRUCTION. STOCK PILE ON SITE 50 HAY BALES AND 100 FT. OF SILT FENCE FOR EMERGENCY USE. TEMPORARY EROSION BARRIERS SHALL REMAIN IN PLACE UNTIL PERMANENT VEGETATIVE GROUND COVER IS ESTABLISHED.
- NO WORK MAY TAKE PLACE UNTIL ALL EROSION AND SEDIMENTATION CONTROL MEASURES ARE IN PLACE AND APPROVED BY THE COMMISSION OR ITS AGENTS. UPON THE INITIAL INSPECTION OF THESE CONTROL MEASURES, THE COMMISSION MAY REQUIRE INSTALLATION OF ADDITIONAL EROSION AND SEDIMENTATION CONTROL MEASURES AND/OR MEASURES DEEMED NECESSARY BY THE COMMISSION TO PROTECT THE RESOURCE.
- ALL DISTURBED AREAS OUTSIDE THE LIMITS OF THE LEASE AREA AND ACCESS ROADWAY SHALL BE PERMANENTLY ESTABLISHED WITH A VEGETATIVE GROUND COVER. GRADED AREAS SHALL BE PROTECTED WITH STRAW MULCH UNTIL A GOOD VEGETATIVE COVER IS ESTABLISHED.
- STILLING BASIN SHALL BE UTILIZED FOR ANY DEWATERING DISCHARGE WHICH MAY OCCUR DURING CONSTRUCTION OPERATIONS.
- PROPOSED CONSTRUCTION IMPACTS AND PERMANENT IMPROVEMENTS SHALL NOT SIGNIFICANTLY IMPACT STORM WATER RUNOFF PATTERNS, VOLUME OR PEAK FLOW RATES. THE FLAT GRADE OF THE EQUIPMENT COMPOUND AND STONE SURFACE WILL PROMOTE STORM WATER INFILTRATION.
- DEBRIS, WHICH INCLUDES BUT IS NOT LIMITED TO CONSTRUCTION WASTE, BRUSH, AND EXCESS SOILS, MAY NOT BE STOCKPILED, STORED OR DISPOSED OF WITHIN WETLAND RESOURCE AREAS.
- DO NOT DISTURB VEGETATION AND TOPSOIL BEYOND THE PROPOSED LIMIT OF SILT FENCE ACTIVITIES.
- THE CONTRACTOR SHALL REMOVE TEMPORARY SILT FENCE AND HAYBALE DIKES AND ALL ACCUMULATED SILT AND DEBRIS AFTER COMPLETION OF CONSTRUCTION OPERATIONS.

**STAKED HAYBALE NOTES**

- BALES SHALL BE PLACED IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
- EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF 4".
- BALES SHALL BE SECURELY ANCHORED IN PLACE BY STAKES OR RE-BARS DRIVEN THROUGH THE BALES. THE FIRST STAKE IN EACH BALE SHALL BE ANGLED TOWARD PREVIOUSLY PLACED BALE TO FORCE THE BALES TOGETHER.
- INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY.



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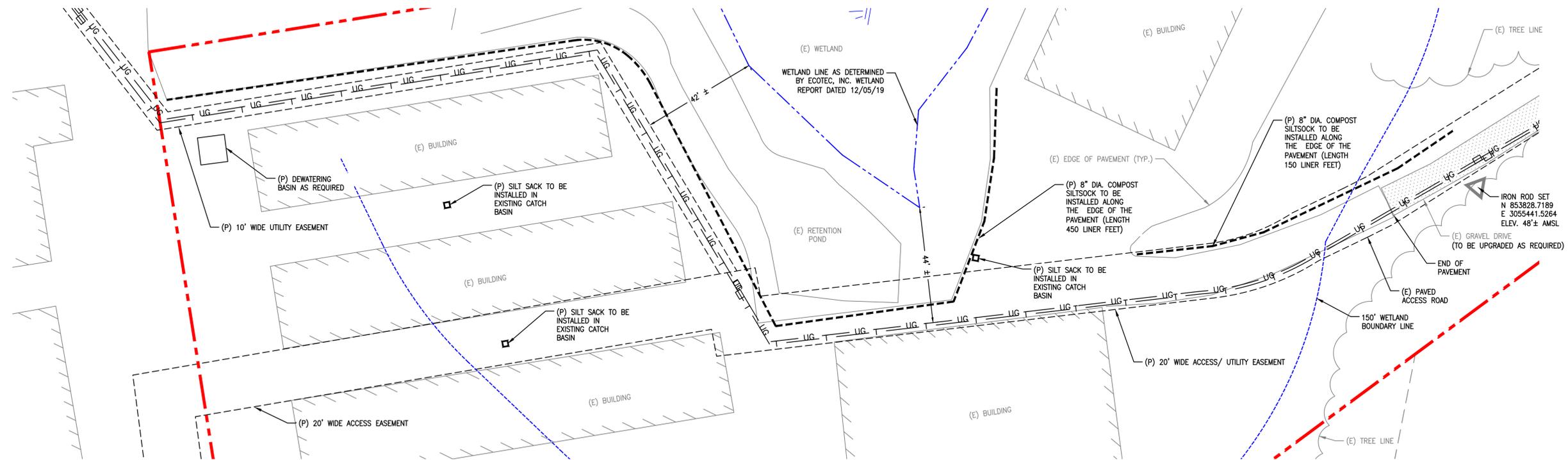
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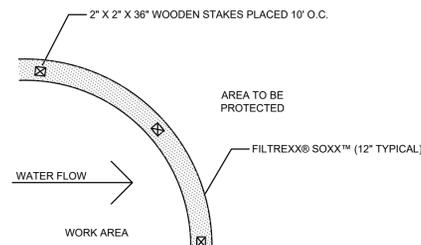
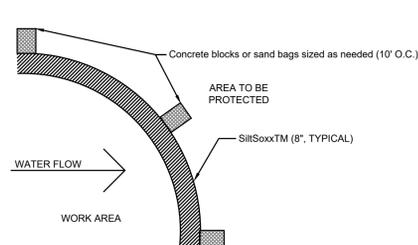
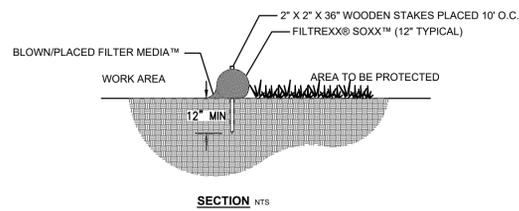
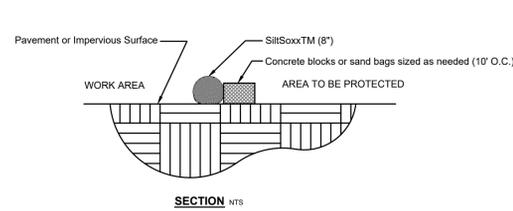
**MA-044 ESSEX**  
 65 & 73 EASTERN AVENUE  
 ESSEX, MA 01929  
 ESSEX COUNTY

SHEET TITLE  
 EROSION CONTROL PLAN

SHEET NUMBER  
**EC-1**

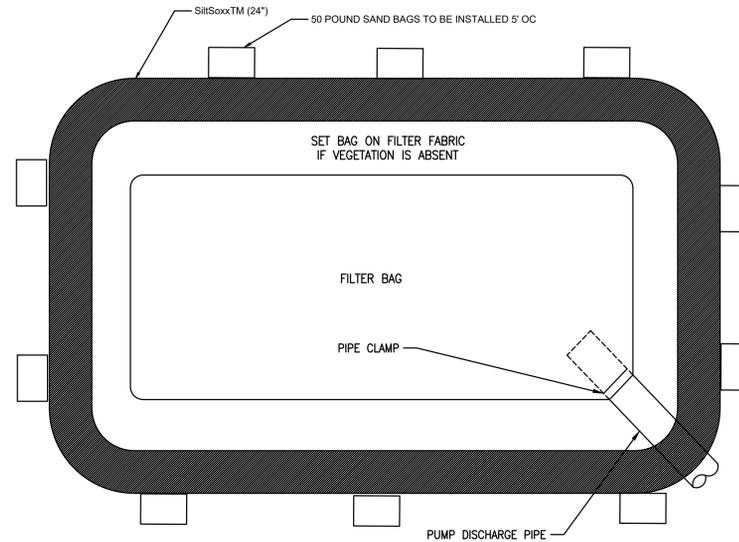


**1 EROSION CONTROL PLANS**  
 SCALE: 1"=20'-0"  
 NORTH



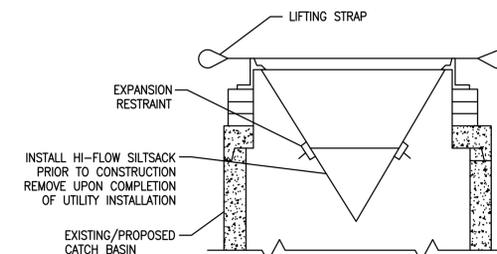
- NOTES:**  
 1. ALL MATERIAL TO MEET SPECIFICATIONS.  
 2. FILTER MEDIA TO MEET APPLICATION REQUIREMENTS.  
 3. FILTER MEDIA TO BE DISPERSED ON SITE, AS DETERMINED BY ENGINEER.

**2 FILTREXX BIOSOXX DETAIL**  
 SCALE: N.T.S.



- NOTES:**  
 1. ENSURE DISCHARGE AREA IS COVERED BY STABLE VEGETATION.  
 2. USE DIFFUSER NOZZLE OR LOW DISCHARGE RATE TO PREVENT SCOURING.  
 3. TO BE PLACED AT AN UPLAND LOCATION THAT WILL ALLOW WATER TO DRAIN TO THE GROUND.  
 4. THE SIZE OF THE STRAW BALE ENCLOSURE TO BE 10' X 10' AND CAN BE ADJUSTED BASED ON WATER VOLUME.  
 5. ADDITIONAL STRAW BALES CAN BE USED TO INCREASE RETENTION & FILTRATION.

**3 DEWATERING BASIN DETAIL**  
 SCALE: N.T.S.



**4 SILT SACK DETAIL**  
 SCALE: N.T.S.

**AEG ADVANCED ENGINEERING GROUP, P.C.**  
 Civil Engineering - Site Development  
 Surveying - Telecommunications  
 500 North Broadway  
 East Providence, RI 02914  
 Tel: (401) 354-2403  
 Fax: (401) 635-6354

**CENTERLINE COMMUNICATIONS**  
 CENTERLINE COMMUNICATIONS  
 95 RYAN DRIVE, SUITE 1  
 RAYNHAM, MA 02767



AEG PROJECT #: 2019-0027

DRAWN BY: AAB

CHECKED BY: SNA

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**MA-044 ESSEX**  
 65 & 73 EASTERN AVENUE  
 ESSEX, MA 01929  
 ESSEX COUNTY

SHEET TITLE  
 EROSION CONTROL PLAN

SHEET NUMBER  
**EC-2**

**EXHIBIT 6**  
**ANTENNA AND RRH SPECIFICATIONS**

## BSAMNT-SBS-1-2

**Side-By-Side Mounting Kit to mount two 65 or 85 deg antennas with 301mm width side by side on a pipe with 2.4 - 4.5 inch (60 – 115 mm) diameter**

- Supports SBNHH and NHH 65° and 85° antennas

### General Specifications

---

Application	Outdoor
Includes	Brackets   Hardware
Package Quantity	1

### Mechanical Specifications

---

Color	Silver
Material Type	Galvanized steel

### Dimensions

---

Compatible Diameter, maximum	114.3 mm		4.5 in
Compatible Diameter, minimum	61.0 mm		2.4 in
Net Weight	11.5 kg		25.4 lb

### Regulatory Compliance/Certifications

---

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system



### Included Products

---

BSAMNT-4 — Wide Profile Antenna Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.



## BSAMNT-4

**Wide Profile Antenna Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.**

### General Specifications

Application	Outdoor
Includes	Brackets   Hardware
Package Quantity	1

### Mechanical Specifications

Color	Silver
Material Type	Galvanized steel

### Dimensions

Compatible Diameter, maximum	115.0 mm   4.5 in
Compatible Diameter, minimum	60.0 mm   2.4 in
Net Weight	6.6 kg   14.6 lb

### Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system



# NHH-65C-R2B



6-port sector antenna, 2x 698–896 and 4x 1695–2360 MHz, 65° HPBW, 2x RET. Both high bands share the same electrical tilt.

- Interleaved dipole technology providing for attractive, low wind load mechanical package
- Internal SBT on low and high band allow remote RET control from the radio over the RF jumper cable
- Separate RS-485 RET input/output for low and high band
- One RET for low band and one RET for both high bands to ensure same tilt level for 4x Rx or 4x MIMO

## Electrical Specifications

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain, dBi	16.0	16.1	17.3	17.7	18.3	18.2
Beamwidth, Horizontal, degrees	65	62	74	66	62	59
Beamwidth, Vertical, degrees	9.0	7.9	5.6	5.2	4.9	4.5
Beam Tilt, degrees	0–11	0–11	0–7	0–7	0–7	0–7
USLS (First Lobe), dB	21	18	19	20	22	18
Front-to-Back Ratio at 180°, dB	35	31	33	29	29	30
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	30	30	30	30
VSWR   Return Loss, dB	1.5   14.0	1.5   14.0	1.5   14.0	1.5   14.0	1.5   14.0	1.5   14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port, maximum, watts	400	400	350	350	350	300
Polarization	±45°	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm					

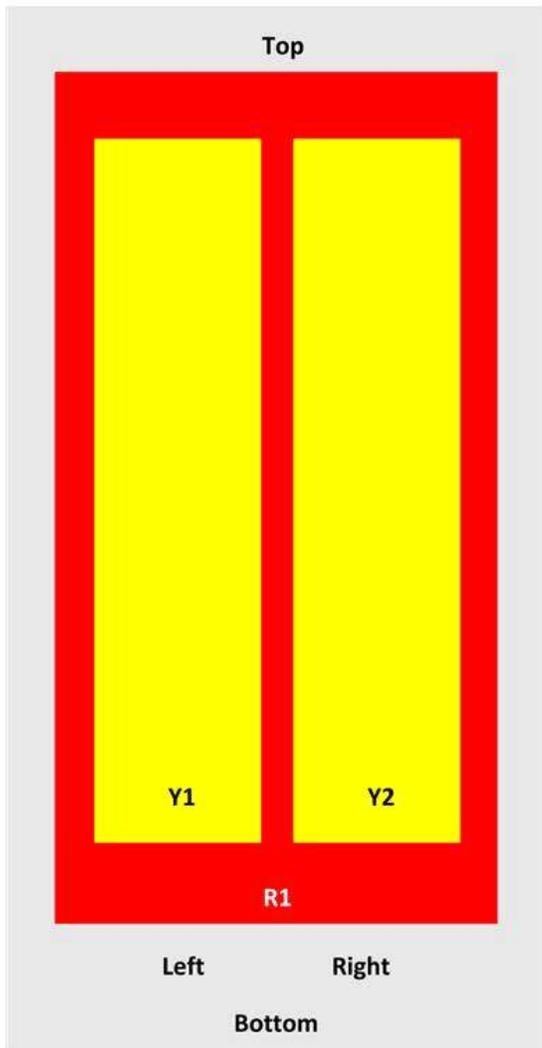
## Electrical Specifications, BASTA\*

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2200	2300–2360
Gain by all Beam Tilts, average, dBi	15.8	15.9	16.9	17.5	18.0	17.9
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.4	±0.4	±0.3	±0.6	±0.4
Gain by Beam Tilt, average, dBi	0 °   15.9 5 °   15.9 11 °   15.5	0 °   15.8 5 °   16.0 11 °   15.7	0 °   16.9 4 °   17.0 7 °   16.9	0 °   17.4 4 °   17.5 7 °   17.4	0 °   17.9 4 °   18.0 7 °   18.0	0 °   17.8 4 °   17.9 7 °   17.9
Beamwidth, Horizontal Tolerance, degrees	±1.2	±1.6	±5.3	±3.4	±6	±3.1
Beamwidth, Vertical Tolerance, degrees	±0.6	±0.4	±0.3	±0.2	±0.2	±0.2
USLS, beampeak to 20° above beampeak, dB	15	14	17	16	17	15
Front-to-Back Total Power at 180° ± 30°, dB	26	24	28	25	25	24
CPR at Boresight, dB	18	26	20	25	20	17
CPR at Sector, dB	15	9	11	10	8	2

\* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, [download the whitepaper Time to Raise the Bar on BSAs.](#)

## Array Layout

**NHH**



Array	Freq (MHz)	Conns	RET (SRET)	AISG RET UID
R1	698-896	1-2	1	ANXXXXXXXXXXXXXXXXX1
Y1	1695-2360	3-4	2	ANXXXXXXXXXXXXXXXXX2
Y2	1695-2360	5-6		

View from the front of the antenna  
 (Sizes of colored boxes are not true depictions of array sizes)

## General Specifications

**Operating Frequency Band**

1695 – 2360 MHz | 698 – 896 MHz

**Antenna Type**

Sector

# NHH-65C-R2B

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<b>Band</b>	Multiband
<b>Performance Note</b>	Outdoor usage
<b>Total Input Power, maximum</b>	500 W @ 50 °C

## Mechanical Specifications

<b>RF Connector Quantity, total</b>	6
<b>RF Connector Quantity, low band</b>	2
<b>RF Connector Quantity, high band</b>	4
<b>RF Connector Interface</b>	7-16 DIN Female
<b>Color</b>	Light gray
<b>Grounding Type</b>	RF connector body grounded to reflector and mounting bracket
<b>Radiator Material</b>	Copper   Low loss circuit board
<b>Radome Material</b>	Fiberglass, UV resistant
<b>Reflector Material</b>	Aluminum
<b>RF Connector Location</b>	Bottom
<b>Wind Loading, frontal</b>	393.0 N @ 150 km/h 88.3 lbf @ 150 km/h
<b>Wind Loading, lateral</b>	330.0 N @ 150 km/h 74.2 lbf @ 150 km/h
<b>Wind Loading, maximum</b>	757.0 N @ 150 km/h 170.2 lbf @ 150 km/h
<b>Wind Speed, maximum</b>	241 km/h   150 mph

## Dimensions

<b>Length</b>	2438.0 mm   96.0 in
<b>Width</b>	301.0 mm   11.9 in
<b>Depth</b>	180.0 mm   7.1 in
<b>Net Weight, without mounting kit</b>	23.4 kg   51.6 lb

## Remote Electrical Tilt (RET) Information

<b>Input Voltage</b>	10–30 Vdc
<b>Internal Bias Tee</b>	Port 1   Port 3
<b>Internal RET</b>	High band (1)   Low band (1)
<b>Power Consumption, idle state, maximum</b>	2 W
<b>Power Consumption, normal conditions, maximum</b>	13 W
<b>Protocol</b>	3GPP/AISG 2.0 (Single RET)
<b>RET Interface</b>	8-pin DIN Female   8-pin DIN Male
<b>RET Interface, quantity</b>	2 female   2 male

## Packed Dimensions

# NHH-65C-R2B

---

<b>Length</b>	2561.0 mm   100.8 in
<b>Width</b>	409.0 mm   16.1 in
<b>Depth</b>	299.0 mm   11.8 in
<b>Shipping Weight</b>	36.1 kg   79.6 lb

## Regulatory Compliance/Certifications

### Agency

RoHS 2011/65/EU

ISO 9001:2015

China RoHS SJ/T 11364-2014

### Classification

Compliant by Exemption

Designed, manufactured and/or distributed under this quality management system

Above Maximum Concentration Value (MCV)



## Included Products

BSAMNT-1 — Wide Profile Antenna Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

## \* Footnotes

### Performance Note

Severe environmental conditions may degrade optimum performance

# BSAMNT-1

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Wide Profile Antenna Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

## General Specifications

<b>Application</b>	Outdoor
<b>Includes</b>	Brackets   Hardware
<b>Package Quantity</b>	1

## Mechanical Specifications

<b>Color</b>	Silver
<b>Material Type</b>	Galvanized steel

## Dimensions

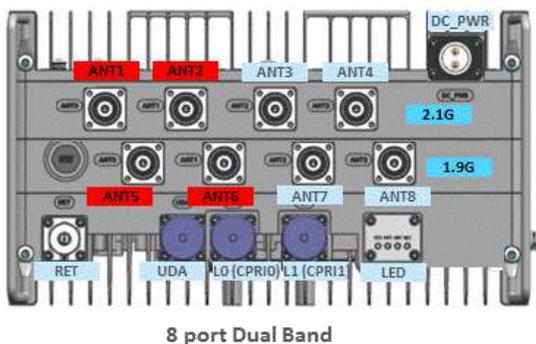
<b>Compatible Diameter, maximum</b>	115.0 mm   4.5 in
<b>Compatible Diameter, minimum</b>	60.0 mm   2.4 in
<b>Net Weight</b>	6.0 kg   13.3 lb

## Regulatory Compliance/Certifications

<b>Agency</b>	<b>Classification</b>
RoHS 2011/65/EU	Compliant by Exemption
ISO 9001:2015	Designed, manufactured and/or distributed under this quality management system
CE	Compliant with the relevant CE product directives
China RoHS SJ/T 11364-2014	Above Maximum Concentration Value (MCV)

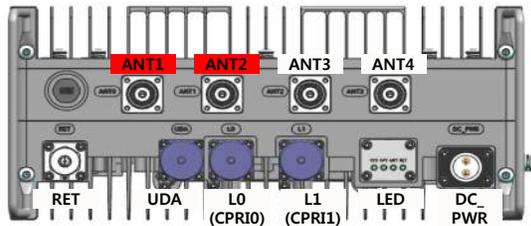


# PCS+AWS Dual Band RRH(Model : RFV01U-D1A)



Item	Specification	
Band	Band2 (1.9GHz)	Band66 (2.1GHz)
Frequency	DL : 1930~1990MHz	DL : 2110~2180MHz
	UL : 1850~1910MHz	UL : 1710~1780MHz
IBW	60MHz	70MHz
OBW	20MHz	30MHz
Carrier Bandwidth	5MHz, 10MHz, 15MHz, 20MHz	
# of carriers	2 carriers	3 carriers
Total # of carriers	4 carriers	
RF Chain	4T4R, 2T4R, 2T2R (SW configurable)	
RF Output Power	Total : 320W (for OBW 40MHz)	
	4 x 40W or 2 x 60W	4 x 60W or 2 x 90W
Spectrum Analyzer	TX/RX Support	
Noise Figure	Less than 3.0 dB	
RX Sensitivity	Typical : -105dBm @1Rx (25RBs 5MHz)	
Modulation	256QAM support	
Input Power	-48VDC (-38VDC to -57VDC)	
Power Consumption	About 1,270 Watt @ 100% RF load, typical conditions (w/ BAS OOB)+TMA/RET	
Size (WHD)	380 x 380 x 255 mm (15.0" x 15.0" x 10.0") (w/ BAS OOB)	
Volume	36.8 L	
Weight	38.3 kg( 84.4 lb) w/o solar shield(finger guard) & mount bracket	
	44.2 kg (97.5 lb) with solar shield(finger guard) & mount bracket	
Operating Temperature	-40°C (-40°F) ~ 55°C (131°F) (Without solar load)	
Cooling	Natural convection	
Unwanted Emission	3GPP 36.104 Category A	3GPP 36.104 Category A,
	[B2] : FCC 47 CFR 24.238	[B66] : FCC 47 CFR 27.53 h)
CPRI Cascade	Not supported	
Optic Interface	20km, 2 ports (9.8Gbps x 2), SFP, single mode, Duplex	
RET & TMA Interface	AISG 2.2	
Bias-T	4 ports (2 ports per band) (Max. 49W)	
Mounting Options	Pole, wall, tower, side by side, back to back	
NB-IoT	Support	
PIM Cancellation	Support	
# of antenna port	4	4
External Alarm	4	

# 700+850MHz Dual Band RRH(Model : RFV01U-D2A)



Item	Specification	
Band	Band13 (700MHz)	Band5 (850MHz)
Frequency	DL : 746~756MHz	DL : 869~894MHz
	UL : 777~787MHz	UL : 824~849MHz
IBW	10MHz	25MHz
OBW	10MHz	25MHz
Carrier Bandwidth	10MHz	5MHz, 10MHz
# of carriers	1 carrier	3C
Total # of carriers	4C	
RF Chain	4T4R, 2T4R, 2T2R (SW configurable)	
RF Output Power	Total : 320W	
	4 x 40W or 2 x 60W	4 x 40W or 2 x 60W
Spectrum Analyzer	TX/RX Support	
Noise Figure	Less than 3.0 dB	
RX Sensitivity	Typical : -105dBm @1Rx (25RBs 5MHz)	
Modulation	256QAM support	
Input Power	-48VDC (-38VDC to -57VDC)	
Power Consumption	About 1,106Watt @ 100% RF load, typical conditions + TMA/RET	
Size (WHD)	380 x 380 x 207 mm (15.0" x 15.0" x 8.1")	
Volume	29.9 L	
Weight	31.9 kg(70.3 lb) w/o solar shield(finger guard) & mount bracket	
	37.2 kg(82.0 lb) with solar shield(finger guard) & mount bracket	
Operating Temperature	-40°C (-40°F) ~ 55°C (131°F) (Without solar load)	
Cooling	Natural convection	
Unwanted Emission	3GPP 36.104 Category A,	3GPP 36.104 Category A
	FCC 47 CFR 27.53 c), f)	FCC 47 CFR 22.917
CPRI Cascade	Not supported	
Optic Interface	20km, 2 ports (9.8Gbps x 2), SFP, single mode, Duplex	
RET & TMA Interface	AISG 2.2	
Bias-T	2 ports (Max. 49W)	
Mounting Options	Pole, wall, tower, side by side, back to back	
NB-IoT	Support	
PIM Cancellation	Support	
# of antenna port	4	
External Alarm	4	

**EXHIBIT 7**  
**EQUIPMENT CABINET SPECIFICATIONS**

## Customer Service Information

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- Technical support  
Call: 1-800-255-1479 (Option3 / Wireless Products) – Web: [www.commscope.com/wisupport](http://www.commscope.com/wisupport).

## Safety Agency Statements and Safety Precautions

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### Safety Agency Statements:

- Only qualified personnel are to install and maintain the cabinet.
- Install cabinet within a restricted access location where access is by use of a tool, lock and key or other means of security; and controlled by the authority responsible for the location.
- The cabinet is only suitable for mounting on a concrete or other noncombustible surface.
- Maximum ambient temperature (Tma) of 46° C (115° F) permitted by manufacturer specification.
- All conduit hubs must be of Type 3R or equivalent to maintain the cabinet as *Rainproof*.
- It is essential to connect the cabinet to earth ground before connecting supply, high leakage current.
- All cabinet equipment cabling is to meet applicable NEC<sup>1</sup> and network communications standards.

### Safety Precautions:

**Note:** *In areas that utilize joint buried plant, and per company practice, test and verify that voltage is not present on the cable shield. If voltage is present on the shield, stop work and notify supervision.*

- Follow all product warnings and instructions as specified in this document, cabinet and equipment labels inside the cabinet to reduce risk of fire, electric shock, and injury.
- Install all equipment and supplied hardware as specified in this document.
  - Install only approved devices in the cabinet and do not drill, saw, or cut inside the cabinet.
  - Never install cable, connectors, jacks in a wet location unless designed for wet locations.
  - Never install electrical equipment during a thunderstorm, there is risk of electric shock.
  - Never touch uninsulated live power wires or terminals, always disconnect from power first.
  - It is mandatory to use insulated tools using power and hand tools.
- Do not transport or lift cabinet with the batteries installed, or store batteries inside cabinet.
- All personnel must wear standard safety headgear, eye protection, and insulated gloves (if required).
- At all times, keep bystanders away from all work operations.

### WARNING:

**Do not drill or punch any holes in the cabinet. Use only the provided knockouts in the cabinet for cable ingress and cable egress. Drilling or punching holes in any other location will immediately void the warranty. No exemptions.**

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<sup>1</sup> Registered trademark of the National Fire Protection Association.

## Section 1. Overview and Specifications

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This guide provides instruction on how to install an RBA84-32 base cabinet with a heat exchanger or air conditioner door onto a concrete pad or steel structure; along with power turn-up and battery installation.

- 760237150 – RBA84-32 base cabinet with heat exchange (HX) door - standard
- 760237152 – RBA84-32 base cabinet with 12,000 BTU VDC air conditioner door- standard
- 760237697 – RBA84-32 base cabinet with 10,000 BTU VAC air conditioner door - standard
- 760239141 – RBA84-32 base cabinet with 10,000 BTU VDC air conditioner door - standard

**Note:** Customer may order any base cabinet and configure it with specific equipment as determined for operation.

All base models use the same types of items attributable to cabinet design. Some external or internal features will vary per customer equipment configuration. Typical cabinet features include the following internal and external items.

### Interior Features

- AC power blocks 12 and 3-position right rear wall - Figure 7
- Alarm blocks, upper left wall and top front - 10-pos and 66-type - Figure 7, Figure 40
- Door intrusion switch (alarm), left upper front opening - Figure 6
- Ground bars (12-pos each), left and right walls - Figure 7
- Fuse alarm panel (FAP) with over temperature (OT), upper right wall (760237150 only) - Figure 7
- GFCI outlet (20 A), upper right wall - Figure 7
- LED convenience light, upper front opening - Figure 6
- Battery shelves and equipment racks - Figure 6

### Exterior Features

- Door handle with hasp - Figure 2
- Kickplate, bottom front - Figure 6
- Main earth ground lugs, bottom rear - Figure 39
- Removable panels, cabinet rear - each with two 1/4-turn latches and lockable hasps - Figure 3
- Non-removable upper and lower rear conduit knockout panels - Figure 34
- Solar shield, top - Figure 2
- Side wall and rear knockouts for cable ingress/egress - Figure 34

## ► Reference Documents and Manuals

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Make sure to have these documents provided with the cabinet in hand at time of installation and refer to them as needed.

- **Installation Guide 860636883** – This document
- **Schematic Drawing (SD)** – Covers power, alarm, and equipment connections, equipment placement, and grounding for the specific cabinet configuration.
- **Equipment Manuals** – Vendor manuals pertaining to equipment installed in the cabinet, such as a power system, overvoltage unit, fuse panel, fiber termination panels, or remote monitoring units.

## ► Cabinet Weights (approximate range)

- **Empty Weight (no batteries, with or without equipment):** 525-755 lbs. (238-342 Kgs)
  - Add 350 lbs. for integrated load center (ILC)
- **Weight with Pallet (no batteries, with or without equipment):** 655-885 lbs. (297-401 Kgs)
- **With Batteries (after installation):**
  - With two strings of VRLA: 1875-1955 lbs. (851-887 Kgs)

## ► DC Electrical Ratings

For electrical and DC output cabinet ratings, refer to the nameplate label in the cabinet. You can find the label on the upper right wall just below the GFCI electrical output; Figure 1, Figure 7.

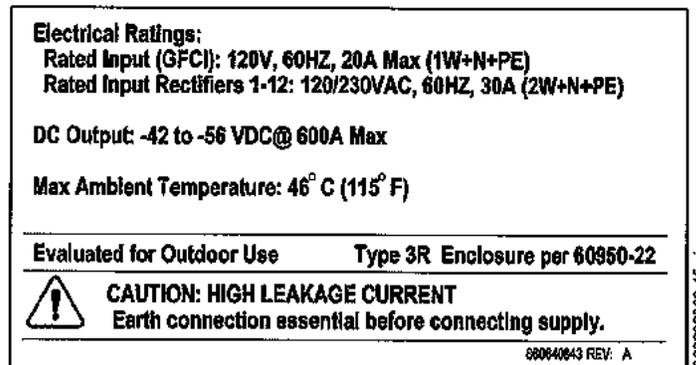


Figure 1. Cabinet Nameplate Label Example

## ► Cabinet Views with Dimensions and Item Locations

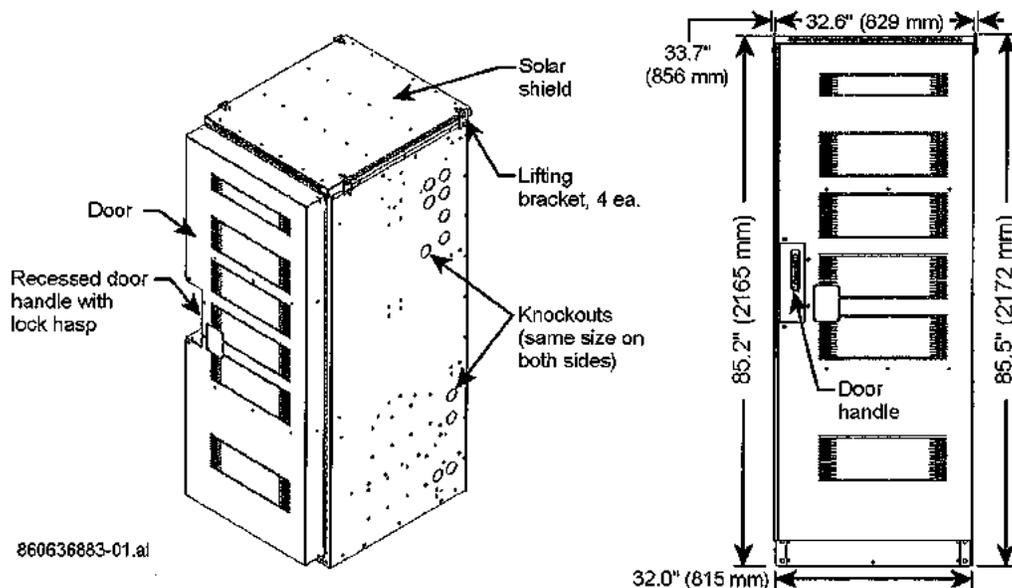


Figure 2. External Front Views, 760237150, 760237697, 760239141

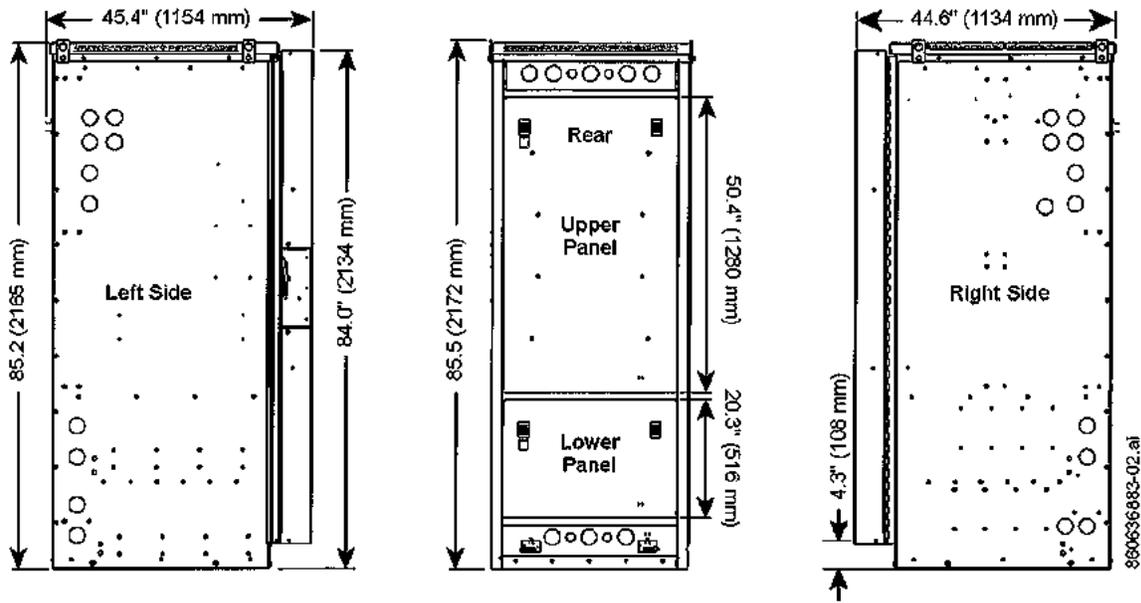


Figure 3. External Left Side, Rear, and Right Side Views, 760237150, 760237697, 760239141

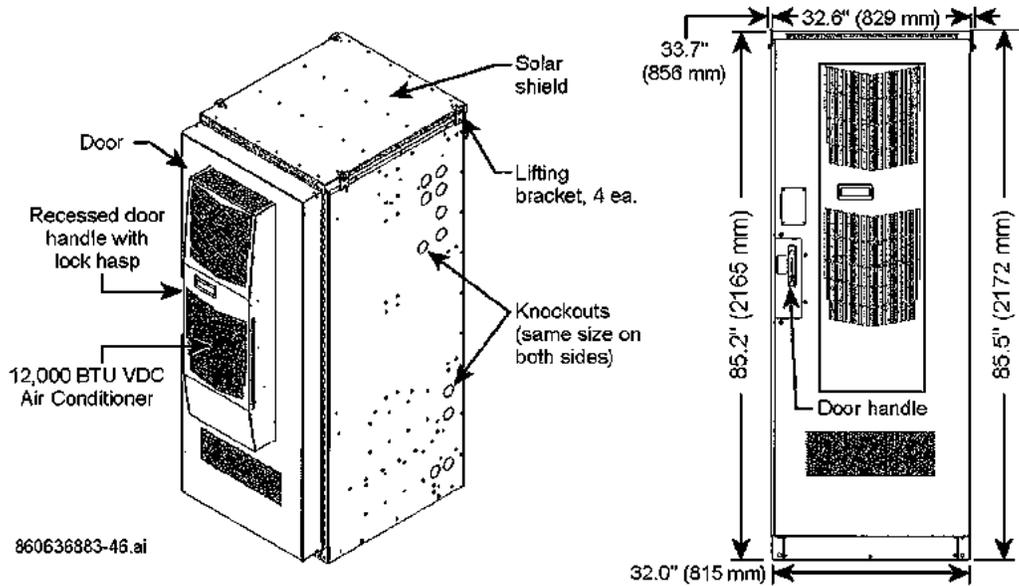


Figure 4. External Front View, 760237152

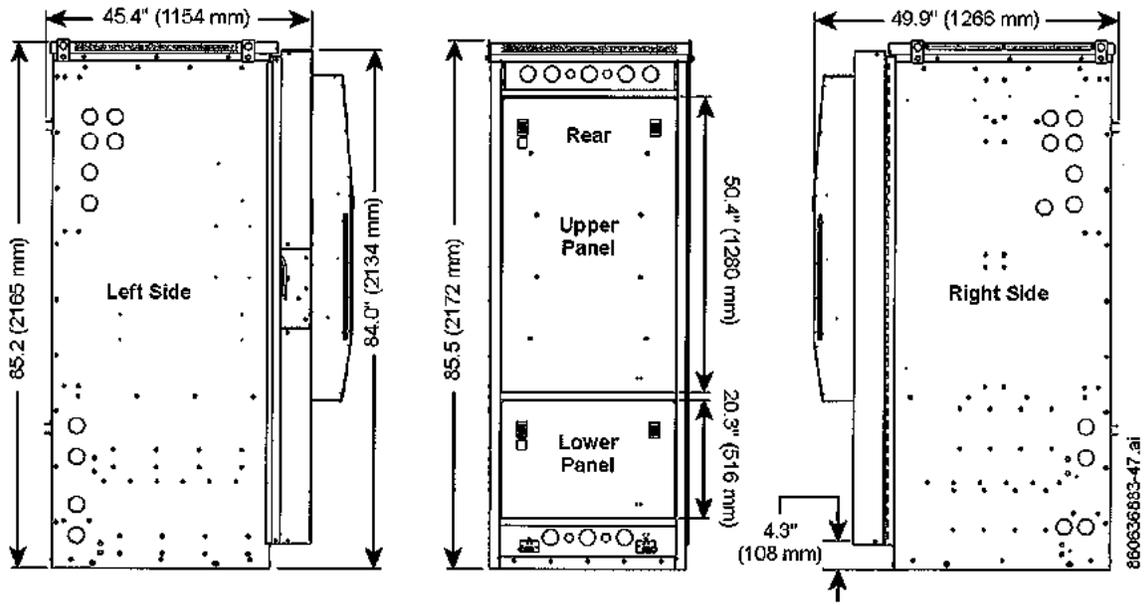


Figure 5. External Left Side, Rear, and Right Side Views, 760237152

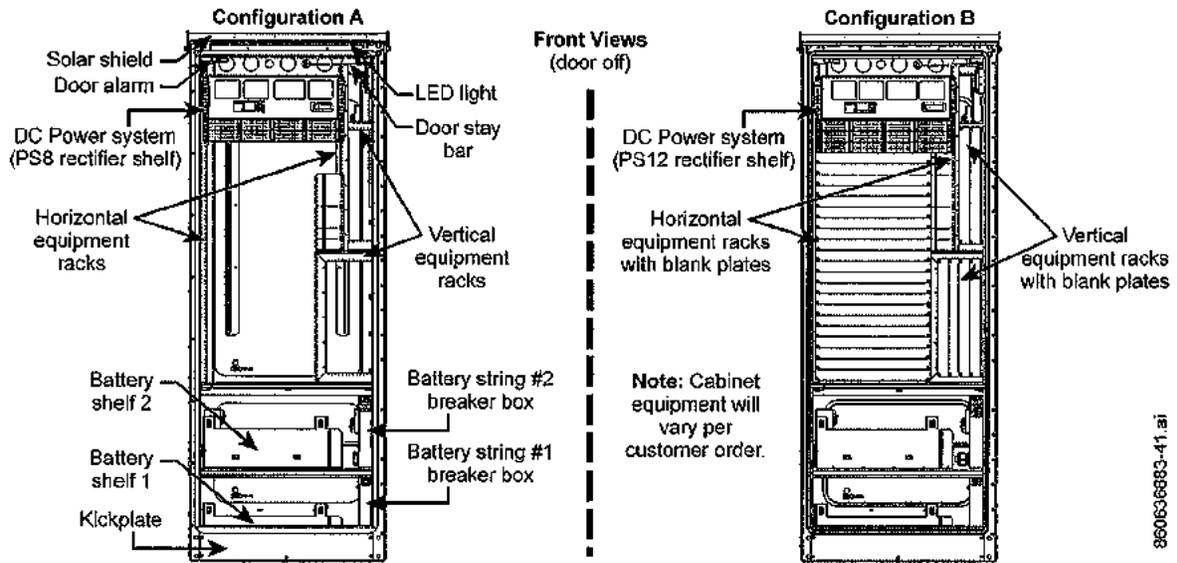


Figure 6. Internal Item Locations, Front Views, Example Configurations

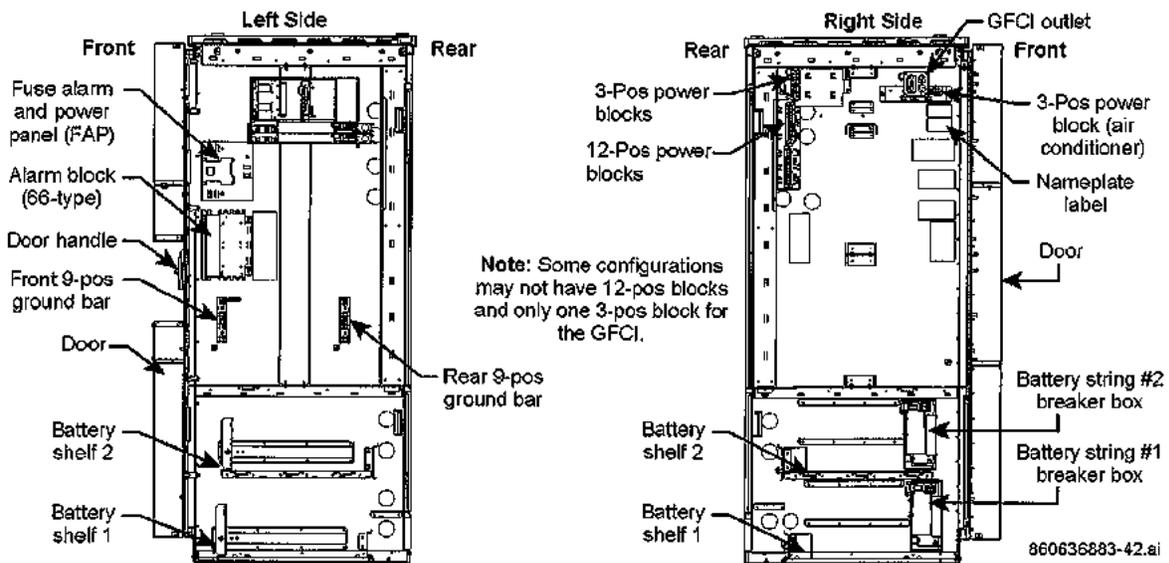


Figure 7. Internal Item Locations, Side Views, 760237150, 760237152, 760237697, 760239141

## ► Mounting Footprint

Fasten cabinet to a concrete pad or steel structure from cabinet front and rear internal holes per Figure 8. CommScope requires use of all four mounting holes. For some concrete pad applications, install a steel structure onto the concrete pad and fasten cabinet to structure (recommended).

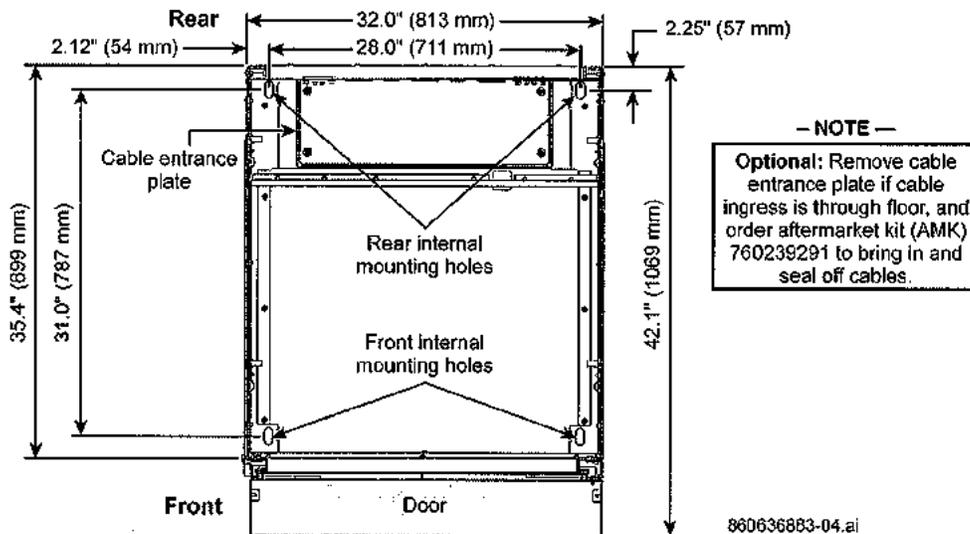


Figure 8. Top View, Cabinet Mounting Footprint

**EXHIBIT 8**  
**GENERATOR SPECIFICATIONS**



**EPA-Certified for Stationary  
Emergency Applications**

## Ratings Range

Standby:	kW	60 Hz
	kVA	30
		30-38



## The Kohler® Advantage

- High Quality Power**  
 Kohler generators provide advanced voltage and frequency regulation along with ultra-low levels of harmonic distortion for excellent generator power quality to protect your valuable electronics.
- Extraordinary Reliability**  
 Kohler is known for extraordinary reliability and performance and backs that up with a premium five-year or 2000 hour limited warranty.
- All-Aluminum Sound Enclosure**  
 Durable aluminum sound-attenuating enclosure.

## Generator Set Ratings

Alternator	Voltage	Ph	Hz	Natural Gas 130°C Rise		LP Gas 130°C Rise	
				Standby Rating kW/kVA	Amps	Standby Rating kW/kVA	Amps
4D8.3	120/208	3	60	30/38	106	30/38	106
	127/220	3	60	30/38	100	30/38	100
	120/240	3	60	30/38	92	30/38	92
	120/240	1	60	30/30	125	30/30	125
	139/240	3	60	30/38	92	30/38	92
	220/380	3	60	30/38	58	30/38	58
	277/480	3	60	30/38	46	30/38	46
	347/600	3	60	30/38	37	30/38	37
4P7BX	120/208	3	60	30/38	106	30/38	106
	127/220	3	60	30/38	100	30/38	100
	120/240	3	60	30/38	92	30/38	92
	120/240	1	60	30/30	125	30/30	125
	139/240	3	60	30/38	92	30/38	92
	220/380	3	60	30/38	58	30/38	58
	277/480	3	60	30/38	46	30/38	46
4E8.3	120/240	1	60	30/30	125	30/30	125
4Q7BX	120/240	1	60	30/30	125	30/30	125

RATINGS: All three-phase units are rated at 0.8 power factor. All single-phase units are rated at 1.0 power factor. *Standby Ratings:* The standby rating is applicable to varying loads for the duration of a power outage. There is no overload capability for this rating. Ratings are in accordance with ISO-8528-1 and ISO-3046-1. Obtain technical information bulletin (TIB-101) for ratings guidelines, complete ratings definitions, and site condition derates. The generator set manufacturer reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.

## Standard Features

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The generator set accepts rated load in one step.
- A five-year/2000 hour limited warranty covers all generator set systems and components. A five-year extended comprehensive limited warranty is also available.
- Engine Features
  - Powerful and reliable 2.2 L turbocharged liquid-cooled engine
  - Electronic engine management system.
  - Simple field conversion between natural gas and LPG fuels while maintaining emission certification.
- Innovative Cooling System
  - Electronically controlled fan speeds minimize generator set sound signature.
- Alternator features:
  - Kohler's wound field excitation system with its unique PowerBoost™ design delivers great voltage response and short-circuit capability.
  - The unique Fast-Response® X excitation system delivers excellent voltage response and short-circuit capability using a rare-earth, permanent magnet (PM)-excited alternator.
  - The brushless, rotating-field alternator has broadrange reconnectability.
- Kohler designed controller for one-source system integration and remote communication. See Controller on page 3.
- Certifications
  - The generator set engine is certified by the Environmental Protection Agency (EPA) to conform to the New Source Performance Standard (NSPS) for stationary spark-ignited emissions.
  - UL 2200/cUL listing is available.
  - The generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
  - CSA certification is available.
  - Accepted by the Massachusetts Board of Registration of Plumbers and Gas Fitters.
- Approved for stationary standby applications in locations served by a reliable utility source.

# Alternator Specifications

Specifications	Alternator
Manufacturer	Kohler
Exciter type	Brushless, Wound-Field
Leads: quantity, type	
4D	12, Reconnectable
4E	4, 110-120/220-240 V
4PX	12, Reconnectable
4QX	4, 110-120/220-240 V
Voltage regulator	Solid State, Volts/Hz
Insulation:	NEMA MG1
Material	Class H
Temperature rise	130°C, Standby
Bearing: quantity, type	1, Sealed
Coupling	Flexible Disc
Amortisseur windings	Full
Voltage regulation, no-load to full-load	Controller Dependent
One-step load acceptance	100% of Rating
Unbalanced load capability	100% of Rated Standby Current
Peak motor starting kVA:	(35% dip for voltages below)
480 V      4D8.3 (12 lead)	120
240 V      4E8.3 (4 lead)	74
480 V      4P7BX (12 lead)	180
240 V      4Q7BX (4 lead)	113

- NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting.
- Sustained short-circuit current enabling downstream circuit breakers to trip without collapsing the alternator field.
- Self-ventilated and dripproof construction.
- Windings are vacuum-impregnated with epoxy varnish for dependability and long life.
- Superior voltage waveform from a two-thirds pitch stator and skewed rotor.

## Application Data

### Engine

Engine Specifications	
Manufacturer	Kohler
Engine: model, type	KG2204T, 2.2 L, 4-Cycle Turbocharged
Cylinder arrangement	In-line 4
Displacement, L (cu. in.)	2.2 (134.25)
Bore and stroke, mm (in.)	91 x 86 (3.5 x 3.4)
Compression ratio	10.5:1
Piston speed, m/min. (ft./min.)	340 (1016)
Main bearings: quantity, type	5, plain alloy steel
Rated rpm	1800
Max power at rated RPM, kW (HP)	
LPG	47.8 (64.1)
Natural Gas	47.6 (63.9)
Cylinder head material	Cast Iron
Piston type and material	High Silicon Aluminum
Crankshaft material	Nodular Iron
Valve (exhaust) material	Forged Steel
Governor type	Electronic
Frequency regulation, no-load to full-load	Isochronous
Frequency regulation, steady state	±1.0%
Frequency	Fixed
Air cleaner type, all models	Dry

### Engine Electrical

Engine Electrical System	
Ignition system	Electronic
Battery charging alternator:	
Ground (negative/positive)	Negative
Volts (DC)	14
Ampere rating	90
Starter motor rated voltage (DC)	12
Battery, recommended cold cranking amps (CCA):	
Qty., rating for -18°C (0°F)	One, 630
Battery voltage (DC)	12
Battery group size	24

### Exhaust

Exhaust System	
Exhaust manifold type	Dry
Exhaust temperature at rated kW, dry exhaust, °C (°F)	610 (1130)
Maximum allowable back pressure, kPa (in. Hg)	7.5 (2.2)

### Fuel

Fuel System	
Fuel type	Natural Gas or LPG
Fuel supply line inlet	1 NPTF
Natural gas fuel supply pressure, kPa (in. H <sub>2</sub> O)	1.24-2.74 (5-11)
LPG vapor withdrawal fuel supply pressure, kPa (in. H <sub>2</sub> O)	1.24-2.74 (5-11)

Fuel Composition Limits *	Nat. Gas	LP Gas
Methane, % by volume	90 min.	—
Ethane, % by volume	4.0 max.	—
Propane, % by volume	1.0 max.	85 min.
Propene, % by volume	0.1 max.	5.0 max.
C <sub>4</sub> and higher, % by volume	0.3 max.	2.5 max.
Sulfur, ppm mass	25 max.	
Lower heating value, MJ/m <sup>3</sup> (Btu/ft <sup>3</sup> ), min.	33.2 (890)	84.2 (2260)

\* Fuels with other compositions may be acceptable. If your fuel is outside the listed specifications, contact your local distributor for further analysis and advice.

# Application Data

## Lubrication

### Lubricating System

Type	Full Pressure
Oil pan capacity, L (qt.) ‡	4.2 (4.4)
Oil added during oil change (on average), L (qt.) ‡	3.3 (3.5)
Oil pan capacity with filter, L (qt.) ‡	8.5 (9.0)
Oil filter: quantity, type ‡	1, Cartridge
‡ Kohler recommends the use of Kohler Genuine oil and filters.	

## Cooling

### Radiator System

Ambient temperature, °C (°F)	50 (122)
Engine jacket water capacity, L (gal.)	2.65 (0.7)
Radiator system capacity, including engine, L (gal.)	13.2 (3.5)
Engine jacket water flow, Lpm (gpm)	62 (16.4)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	22.5 (1280)
Water pump type	Centrifugal
Fan diameter, including blades, mm (in.)	qty. 3 @ 406 (16)
Fan power requirements (powered by engine battery charging alternator)	12 VDC, 18 amps each

## Operation Requirements

### Air Requirements

Radiator-cooled cooling air, m <sup>3</sup> /min. (scfm) ‡	51 (1800)
Combustion air, m <sup>3</sup> /min. (cfm)	1.6 (57)
Air over engine m <sup>3</sup> /min. (cfm)	25 (883)
† Air density = 1.20 kg/m <sup>3</sup> (0.075 lbm/ft <sup>3</sup> )	

### Fuel Consumption ‡

Natural Gas, m <sup>3</sup> /hr. (cfh) at % load	Standby Ratings
100%	11.9 (421)
75%	10.0 (355)
50%	8.2 (289)
25%	6.3 (223)
0%	4.5 (158)

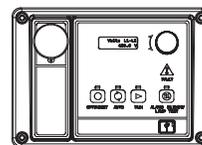
LP Gas, m <sup>3</sup> /hr. (cfh) at % load	Standby Ratings
100%	4.6 (164)
75%	3.7 (131)
50%	2.8 (99)
25%	1.9 (66)
0%	1.0 (34)

‡ Nominal fuel rating: Natural gas, 37 MJ/m<sup>3</sup> (1000 Btu/ft.<sup>3</sup>)  
LP vapor, 93 MJ/m<sup>3</sup> (2500 Btu/ft.<sup>3</sup>)

LP vapor conversion factors:

- 8.58 ft.<sup>3</sup> = 1 lb.
- 0.535 m<sup>3</sup> = 1 kg.
- 36.39 ft.<sup>3</sup> = 1 gal.

## Controller



### APM402 Controller

Provides advanced control, system monitoring, and system diagnostics for optimum performance and compatibility.

- Digital display and menu control provide easy local data access
  - Measurements are selectable in metric or English units
  - Remote communication thru a PC via network or serial configuration
  - Controller supports Modbus® protocol
  - Integrated hybrid voltage regulator with ±0.5% regulation
  - Built-in alternator thermal overload protection
  - NFPA 110 Level 1 capability
- Refer to G6-161 for additional controller features and accessories.

Modbus® is a registered trademark of Schneider Electric.

## Sound Enclosure

- Durable aluminum, sound-attenuating enclosure with quiet operation of 57 dB(A) log average @ 7 m (23 ft.) at no load.
- Internally mounted silencer.
- Fade-, scratch, and corrosion-resistant Kohler® Power Armor™ automotive-grade textured finish.
- Acoustic insulation that meets UL 94 HF1 flammability classification and repels moisture absorption.

## Standard Features

- Alternator Protection
- Aluminum Sound Enclosure with Enclosed Silencer
- Battery Rack and Cables
- Flexible Fuel Line
- Gas Fuel System (includes fuel mixer, electronic secondary gas regulator, gas solenoid valve, and flexible fuel line between the engine and the skid-mounted fuel system components)
- Integral Vibration Isolation
- Local Emergency Stop Switch
- Low Fuel Pressure Switch (with NFPA fuel module)
- Oil Drain Extension
- Operation and Installation Literature
- Standard 5-Year Limited Warranty

## Available Options

### Approvals and Listings

- CSA Certified
- UL 2200 Listing

### Controller

- 15-Relay Dry Contact Board
- Communication Products
- Input/Output Module (2 inputs, 5 outputs)
- Lockable Emergency Stop (lockout/tagout)
- Low Fuel Pressure Warning Switch
- Manual Key Switch
- Manual Speed Adjust
- Remote Annunciator Panel
- Remote Emergency Stop
- Run Relay

### Enclosure Accessories

- Enclosure Doors for 291 kph (181 mph) Wind load

### Starting Aids\*

- Block Heater, 110-120 V
- Block Heater, 220-240 V

### Oil Pan Heater\*

- Oil Pan Heater, 110-120 V
- Oil Pan Heater, 190-240 V

\* One block heater or oil pan heater is required for ambient temperatures below 0°C (32°F). At temperatures below -18°C (0°F) installation of both heaters is required.

### Electrical System

- Alternator Strip Heater
- Battery
- Battery Charger, 6 Amp
- Battery Charger, 10 Amp w/Alarms
- Battery Heater
- Temperature Compensation for 10 Amp Battery Charger

### Miscellaneous

- Certified Test Report
- Engine Fluids Added
- Maintenance Kit (filters, spark plugs, oil)
- Rated Power Factor Testing

### Literature

- General Maintenance
- NFPA 110
- Overhaul
- Production

### Warranty

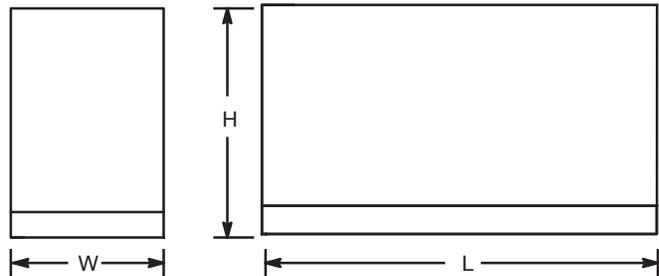
- Optional Extended 5-Year/2000 Hour Comprehensive Limited Warranty

### Other Options

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

## Dimensions and Weights

Overall Size, L x W x H, mm (in.): 2280 x 830 x 1182  
 (89.8 x 32.7 x 46.5)  
 Weight, with engine fluids, kg (lb.): 635 (1432)



NOTE: This drawing is provided for reference only and should not be used for planning. Contact your local distributor for more detailed information.

**DISTRIBUTED BY:**

**EXHIBIT 9**  
**ENGINEER STAMPED LETTER**

February 23, 2021

Liz Rutkowski  
Site Development Manager  
750 W Center St, Floor 3  
West Bridgewater, MA 02379

RE: Proposed 150' Sabre Monopole for Essex MA-044, MA

Dear Ms. Rutkowski ,

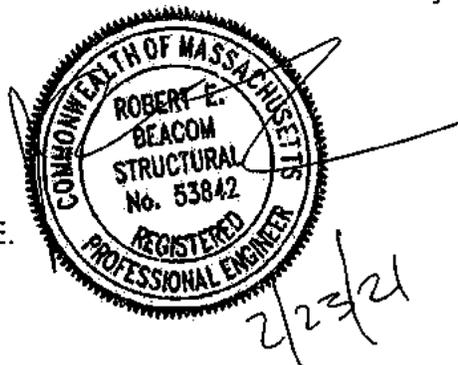
Upon receipt of order, we propose to design and supply a 150' monopole and foundation for the above referenced site. The monopole and foundation will be designed for a basic wind speed of 127 mph without ice and 50 mph with 1" ice, Risk Category II, Exposure Category C and Topographic Category 1, in accordance with ANSI/TIA-222-H.

When designed according to this standard, the wind pressures and steel strength capacities include several safety factors. Therefore, it is highly unlikely that the monopole will fail structurally in a wind event where the design wind speed is exceeded within the range of the built-in safety factors.

Should the wind speed increase beyond the capacity of the built-in safety factors, to the point of failure of one or more structural elements, the most likely location of the failure would be within the monopole shaft, above the base plate. Assuming that the wind pressure profile is similar to that used to design the monopole, the monopole will buckle at the top of the upper spliced connection which is located a distance of 48'-9" below the top of the pole. This would result in the top 48'-9" of the monopole leaning over and remaining in a permanently deformed condition. Please note that this letter only applies to the above referenced monopole designed and manufactured by Sabre Industries. This would effectively result in a fall radius of 48'-9" at ground level.

Sincerely,

Robert E. Beacom, P.E., S.E.  
Engineering Supervisor





**Structural Design Report**  
150' Monopole  
Site: Essex, MA  
Site Number: MA-044

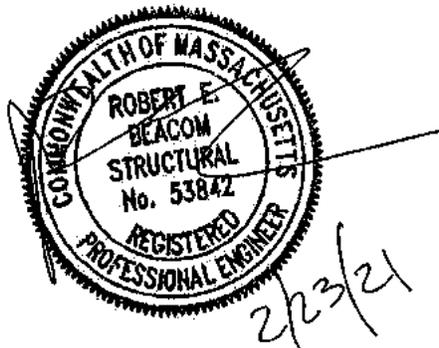
Prepared for: TOWNORTH DEVELOPMENT, LLC  
by: Sabre Industries™

Job Number: 21-4721-RFV

**February 23, 2021**

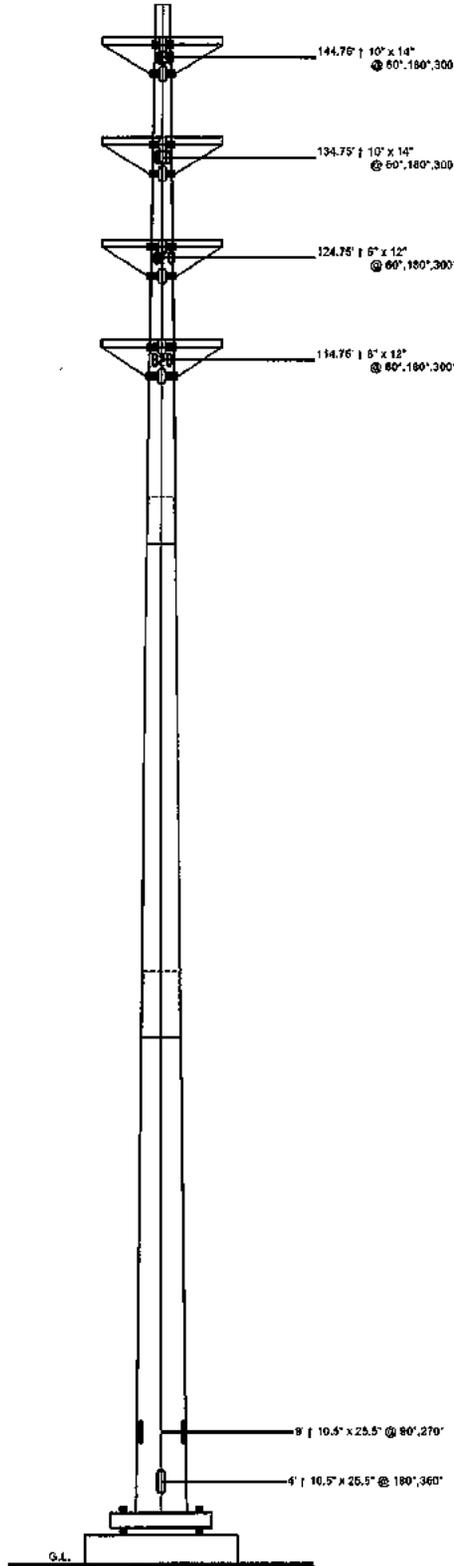
**Monopole Profile**..... 1

**Pole Calculations**..... 2-12



Digitally Signed By Robert Beacom  
DN: c=US, st=Texas, l=Alvarado, o=SABRE INDUSTRIES, INC., cn=Robert Beacom, email=rebeacom@sabreindustries.com Date: 2021.02.23 13:33:26

Length (ft)	53'-3"	53'-6"	18
Number Of Sides	4	4	4
Thickness (in)	7/16"	5/16"	4"-8"
Lap Splice (ft)	6'-6"	17'-5"	33'-68"
Top Diameter (in)	44.61"	31.44"	0.2965
Bottom Diameter (in)	60.52"	47.43"	A572-85
Teper (in/ft)			10451
Grade			149
Weight (lbs)	15974		
Overall Street Height (ft)			5259



### Designed Appurtenance Loading

Elev	Description	Tx-Line
146	Platform - 12' w/ Enhanced Support Rail	
146	(1) 30,000 sq. in. antenna loading (at top)	(20) 1 5/8"
136	Platform - 12' w/ Enhanced Support Rail	
136	(1) 25,000 sq. in. antenna loading (below top)	(20) 1 5/8"
126	Platform - 12' w/ Enhanced Support Rail	
126	(1) 20,000 sq.in. antenna loading (below top)	(12) 1 5/8"
116	Platform - 12' w/ Enhanced Support Rail	
116	(1) 15,000 sq.in. antenna loading (below top)	(12) 1 5/8"

### Design Criteria - ANSI/TIA-222-H

Wind Speed (No Ice)	127 mph
Wind Speed (Ice)	50 mph
Design Ice Thickness	1.00 in
Risk Category	II
Exposure Category	C
Topographic Factor Procedure	Method 1 (Simplified)
Topographic Category	I
Ground Elevation	45 ft

### Load Case Reactions

Description	Axial (kips)	Shear (kips)	Moment (ft-k)	Deflection (ft)	Sway (deg)
3s Gusted Wind	68.99	52.85	6418.55	12.3	9.65
3s Gusted Wind 0.9 Dead	51.77	52.85	6309.7	12.01	9.3
3s Gusted Wind&Ice	85.6	12.33	1488.11	2.83	2.16
Service Loads	57.54	10.55	1276.96	2.49	1.91

### Base Plate Dimensions

Shape	Width	Thickness	Bolt Circle	Bolt Qty	Bolt Diameter
Square	67"	2.75"	67.5"	20	2.25"

### Anchor Bolt Dimensions

Length	Diameter	Hole Dismeter	Weight	Type	Finish
84"	2.25"	2.625"	2422	A615-75	Galv

### Notes

- 1) Antenna Feed Lines Run Inside Pole
- 2) All dimensions are above ground level, unless otherwise specified.
- 3) Weights shown are estimates. Final weights may vary.
- 4) Full Height Step Bolts
- 5) This tower design and, if applicable, the foundation design(s) shown on the following page(s) also meet or exceed the requirements of the 2015 International Building Code.
- 6) Tower Rating: 99.8%

 <p><b>Sabre Industries</b> INNOVATION DELIVERED</p>	<p>Sabre Industries 7101 Southbridge Drive P.O. Box 858 Sioux City, IA 51102-0858 Phone: (712) 258-6690 Fax: (712) 279-0814</p>	<p>Job: 21-4721-RFV Customer: TOWNORTH DEVELOPMENT, LLC Site Name: Essex, MA MA-044 Description: 150' Monopole Date: 2/23/2021</p>
	<p>Information contained herein is the sole property of Sabre Communications Corporation, constitutes a trade secret as defined by Iowa Code Ch. 563 and shall not be reproduced, copied or used in whole or part for any purpose whatsoever without the prior written consent of Sabre Communications Corporation.</p>	<p>By: REB</p>

=====

(USA 222-H) - Monopole Spatial Analysis (c)2017 Guymast Inc.

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Sabre Towers and Poles on: 23 feb 2021 at: 13:30:38

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150' Monopole / Essex, MA

\* All pole diameters shown on the following pages are across corners.  
See profile drawing for widths across flats.

=====

POLE GEOMETRY

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ELEV ft	SECTION NAME	No. SIDE	OUTSIDE DIAM in	THICK -NESS in	RESISTANCES ♦*Pn ♦*Mn kip ft-kip	SPLICE TYPE	...OVERLAP... LENGTH ft	RATIO	w/t
149.0	A	18	17.77	0.312	1266.6 443.4				8.8
100.2	A/B	18	32.55	0.312	2305.9 1502.7	SLIP	4.75	1.73	
95.5	B	18	33.38	0.438	3346.0 2220.0				12.4
53.2	B/C	18	46.17	0.438	4550.5 4207.5	SLIP	6.50	1.68	
46.7	C	18	47.28	0.438	4631.1 4387.1				17.9
0.0			61.46	0.438	5535.5 6845.0				

=====

POLE ASSEMBLY

=====

SECTION NAME	BASE ELEV ft	BOLTS NUMBER	TYPE	AT BASE DIAM in	OF SECTION STRENGTH ksi	THREADS IN SHEAR PLANE	CALC BASE ELEV ft
A	95.500	0	A325	0.00	92.0	0	95.500
B	46.750	0	A325	0.00	92.0	0	46.750
C	0.000	0	A325	0.00	92.0	0	0.000

=====

POLE SECTIONS

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SECTION NAME	No. of SIDES	LENGTH ft	OUTSIDE DIAMETER BOT * in	TOP * in	BEND RAD in	MAT- ERIAL ID	FLANGE ID BOT	TOP	FLANGE WELD ..GROUP.ID.. BOT	TOP
A	18	53.50	34.00	17.77	0.625	1	0	0	0	0
B	18	53.50	48.16	31.93	0.625	2	0	0	0	0
C	18	53.25	61.46	45.30	0.625	3	0	0	0	0

\* - Diameter of circumscribed circle

=====

MATERIAL TYPES

=====

TYPE OF SHAPE	TYPE NO	NO OF ELEM.	ORIENT	HEIGHT	WIDTH	.THICKNESS. WEB FLANGE	IRREGULARITY .PROJECTION. % OF ORIENT
------------------	------------	----------------	--------	--------	-------	---------------------------	---

21-4721-RFV

		& deg	in	in	in	in	AREA	deg	
PL	1	1	0.0	34.00	0.31	0.312	0.312	0.00	0.0
PL	2	1	0.0	48.16	0.44	0.438	0.438	0.00	0.0
PL	3	1	0.0	61.45	0.44	0.438	0.438	0.00	0.0

& - with respect to vertical

MATERIAL PROPERTIES

=====

MATERIAL TYPE NO.	ELASTIC MODULUS ksi	UNIT WEIGHT pcf	.. STRENGTH .. Fu ksi	Fy ksi	THERMAL COEFFICIENT /deg
1	29000.0	490.0	80.0	65.0	0.00001170
2	29000.0	490.0	80.0	65.0	0.00001170
3	29000.0	490.0	80.0	65.0	0.00001170

\* Only 3 condition(s) shown in full

\* Some concentrated wind loads may have been derived from full-scale wind tunnel testing

LOADING CONDITION A

127 mph wind with no ice. Wind Azimuth: 0°

LOADS ON POLE

=====

LOAD TYPE	ELEV ft	APPLY.. RADIUS ft	LOAD.. AT AZI	LOAD AZI	..... FORCES .....		..... MOMENTS .....	
					HORIZ kip	DOWN kip	VERTICAL ft-kip	TORSNAL ft-kip
C	145.000	0.00	0.0	0.0	0.0000	3.6192	0.0000	0.0000
C	145.000	0.00	0.0	0.0	13.8452	7.5013	0.0000	0.0000
C	145.000	0.00	0.0	0.0	0.0430	0.0168	0.0000	0.0000
C	135.000	0.00	0.0	0.0	0.0000	3.3696	0.0000	0.0000
C	135.000	0.00	0.0	0.0	9.6010	6.7009	0.0000	0.0000
C	135.000	0.00	0.0	0.0	0.0424	0.0168	0.0000	0.0000
C	125.000	0.00	0.0	0.0	0.0000	1.8720	0.0000	0.0000
C	125.000	0.00	0.0	0.0	7.8578	5.9017	0.0000	0.0000
C	125.000	0.00	0.0	0.0	0.0417	0.0168	0.0000	0.0000
C	115.000	0.00	0.0	0.0	0.0000	1.7222	0.0000	0.0000
C	115.000	0.00	0.0	0.0	6.1596	5.1013	0.0000	0.0000
C	115.000	0.00	0.0	0.0	0.0410	0.0168	0.0000	0.0000
C	105.000	0.00	0.0	0.0	0.0402	0.0168	0.0000	0.0000
C	95.000	0.00	0.0	0.0	0.0394	0.0168	0.0000	0.0000
C	85.000	0.00	0.0	0.0	0.0385	0.0168	0.0000	0.0000
C	75.000	0.00	0.0	0.0	0.0375	0.0168	0.0000	0.0000
C	65.000	0.00	0.0	0.0	0.0363	0.0168	0.0000	0.0000
C	55.000	0.00	0.0	0.0	0.0351	0.0168	0.0000	0.0000
C	45.000	0.00	0.0	0.0	0.0336	0.0168	0.0000	0.0000
C	35.000	0.00	0.0	0.0	0.0319	0.0168	0.0000	0.0000
C	25.000	0.00	0.0	0.0	0.0297	0.0168	0.0000	0.0000
C	15.000	0.00	0.0	0.0	0.0267	0.0168	0.0000	0.0000
D	149.000	0.00	180.0	0.0	0.0623	0.0797	0.0000	0.0000
D	132.750	0.00	180.0	0.0	0.0623	0.0797	0.0000	0.0000
D	132.750	0.00	180.0	0.0	0.0756	0.0992	0.0000	0.0000
D	116.500	0.00	180.0	0.0	0.0756	0.0992	0.0000	0.0000
D	116.500	0.00	180.0	0.0	0.0878	0.1186	0.0000	0.0000
D	100.250	0.00	180.0	0.0	0.0878	0.1186	0.0000	0.0000
D	100.250	0.00	180.0	0.0	0.0950	0.3114	0.0000	0.0000
D	95.500	0.00	180.0	0.0	0.0950	0.3114	0.0000	0.0000
D	95.500	0.00	180.0	0.0	0.0993	0.1961	0.0000	0.0000
D	81.417	0.00	180.0	0.0	0.0993	0.1961	0.0000	0.0000
D	81.417	0.00	180.0	0.0	0.1073	0.2197	0.0000	0.0000
D	67.333	0.00	180.0	0.0	0.1073	0.2197	0.0000	0.0000
D	67.333	0.00	180.0	0.0	0.1137	0.2433	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.1137	0.2433	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.1172	0.5169	0.0000	0.0000
D	46.750	0.00	180.0	0.0	0.1172	0.5169	0.0000	0.0000

21-4721-RFV								
D	46.750	0.00	180.0	0.0	0.1169	0.2716	0.0000	0.0000
D	35.062	0.00	180.0	0.0	0.1169	0.2716	0.0000	0.0000
D	35.062	0.00	180.0	0.0	0.1170	0.2912	0.0000	0.0000
D	23.375	0.00	180.0	0.0	0.1170	0.2912	0.0000	0.0000
D	23.375	0.00	180.0	0.0	0.1127	0.3109	0.0000	0.0000
D	11.687	0.00	180.0	0.0	0.1127	0.3109	0.0000	0.0000
D	11.687	0.00	180.0	0.0	0.1147	0.3305	0.0000	0.0000
D	0.000	0.00	180.0	0.0	0.1147	0.3305	0.0000	0.0000

LOADING CONDITION M

127 mph wind with no ice. Wind Azimuth: 0°

LOADS ON POLE

LOAD TYPE	ELEV ft	APPLY.. RADIUS ft	LOAD.. AZI	AT AZI	.....FORCES.....		.....MOMENTS.....	
					HORIZ kip	DOWN kip	VERTICAL ft-kip	TORSNAL ft-kip
C	145.000	0.00	0.0	0.0	0.0000	2.7144	0.0000	0.0000
C	145.000	0.00	0.0	0.0	13.8452	5.6260	0.0000	0.0000
C	145.000	0.00	0.0	0.0	0.0430	0.0126	0.0000	0.0000
C	135.000	0.00	0.0	0.0	0.0000	2.5272	0.0000	0.0000
C	135.000	0.00	0.0	0.0	9.6010	5.0257	0.0000	0.0000
C	135.000	0.00	0.0	0.0	0.0424	0.0126	0.0000	0.0000
C	125.000	0.00	0.0	0.0	0.0000	1.4040	0.0000	0.0000
C	125.000	0.00	0.0	0.0	7.8578	4.4263	0.0000	0.0000
C	125.000	0.00	0.0	0.0	0.0417	0.0126	0.0000	0.0000
C	115.000	0.00	0.0	0.0	0.0000	1.2917	0.0000	0.0000
C	115.000	0.00	0.0	0.0	6.1596	3.8260	0.0000	0.0000
C	115.000	0.00	0.0	0.0	0.0410	0.0126	0.0000	0.0000
C	105.000	0.00	0.0	0.0	0.0402	0.0126	0.0000	0.0000
C	95.000	0.00	0.0	0.0	0.0394	0.0126	0.0000	0.0000
C	85.000	0.00	0.0	0.0	0.0385	0.0126	0.0000	0.0000
C	75.000	0.00	0.0	0.0	0.0375	0.0126	0.0000	0.0000
C	65.000	0.00	0.0	0.0	0.0363	0.0126	0.0000	0.0000
C	55.000	0.00	0.0	0.0	0.0351	0.0126	0.0000	0.0000
C	45.000	0.00	0.0	0.0	0.0336	0.0126	0.0000	0.0000
C	35.000	0.00	0.0	0.0	0.0319	0.0126	0.0000	0.0000
C	25.000	0.00	0.0	0.0	0.0297	0.0126	0.0000	0.0000
C	15.000	0.00	0.0	0.0	0.0267	0.0126	0.0000	0.0000
D	149.000	0.00	180.0	0.0	0.0623	0.0598	0.0000	0.0000
D	132.750	0.00	180.0	0.0	0.0623	0.0598	0.0000	0.0000
D	132.750	0.00	180.0	0.0	0.0756	0.0744	0.0000	0.0000
D	116.500	0.00	180.0	0.0	0.0756	0.0744	0.0000	0.0000
D	116.500	0.00	180.0	0.0	0.0878	0.0889	0.0000	0.0000
D	100.250	0.00	180.0	0.0	0.0878	0.0889	0.0000	0.0000
D	100.250	0.00	180.0	0.0	0.0950	0.2336	0.0000	0.0000
D	95.500	0.00	180.0	0.0	0.0950	0.2336	0.0000	0.0000
D	95.500	0.00	180.0	0.0	0.0993	0.1471	0.0000	0.0000
D	81.417	0.00	180.0	0.0	0.0993	0.1471	0.0000	0.0000
D	81.417	0.00	180.0	0.0	0.1073	0.1648	0.0000	0.0000
D	67.333	0.00	180.0	0.0	0.1073	0.1648	0.0000	0.0000
D	67.333	0.00	180.0	0.0	0.1137	0.1825	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.1137	0.1825	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.1172	0.3876	0.0000	0.0000
D	46.750	0.00	180.0	0.0	0.1172	0.3876	0.0000	0.0000
D	46.750	0.00	180.0	0.0	0.1169	0.2037	0.0000	0.0000
D	35.062	0.00	180.0	0.0	0.1169	0.2037	0.0000	0.0000
D	35.062	0.00	180.0	0.0	0.1170	0.2184	0.0000	0.0000
D	23.375	0.00	180.0	0.0	0.1170	0.2184	0.0000	0.0000
D	23.375	0.00	180.0	0.0	0.1127	0.2332	0.0000	0.0000
D	11.687	0.00	180.0	0.0	0.1127	0.2332	0.0000	0.0000
D	11.687	0.00	180.0	0.0	0.1147	0.2479	0.0000	0.0000
D	0.000	0.00	180.0	0.0	0.1147	0.2479	0.0000	0.0000

LOADING CONDITION Y

50 mph wind with 1 ice. Wind Azimuth: 0°

LOADS ON POLE

LOAD TYPE	ELEV ft	APPLY RADIUS ft	LOAD AT AZI	LOAD AZI	FORCES		MOMENTS	
					HORIZ kip	DOWN kip	VERTICAL ft-kip	TORSNAL ft-kip
C	145.000	0.00	0.0	0.0	0.0000	3.6192	0.0000	0.0000
C	145.000	0.00	0.0	0.0	2.7679	10.2745	0.0000	0.0000
C	145.000	0.00	0.0	0.0	0.0372	0.0288	0.0000	0.0000
C	135.000	0.00	0.0	0.0	0.0000	3.3696	0.0000	0.0000
C	135.000	0.00	0.0	0.0	1.9718	9.0720	0.0000	0.0000
C	135.000	0.00	0.0	0.0	0.0364	0.0288	0.0000	0.0000
C	125.000	0.00	0.0	0.0	0.0000	1.8720	0.0000	0.0000
C	125.000	0.00	0.0	0.0	1.6294	7.8706	0.0000	0.0000
C	125.000	0.00	0.0	0.0	0.0356	0.0288	0.0000	0.0000
C	115.000	0.00	0.0	0.0	0.0000	1.7222	0.0000	0.0000
C	115.000	0.00	0.0	0.0	1.2846	6.6775	0.0000	0.0000
C	115.000	0.00	0.0	0.0	0.0347	0.0288	0.0000	0.0000
C	105.000	0.00	0.0	0.0	0.0338	0.0288	0.0000	0.0000
C	95.000	0.00	0.0	0.0	0.0329	0.0288	0.0000	0.0000
C	85.000	0.00	0.0	0.0	0.0318	0.0288	0.0000	0.0000
C	75.000	0.00	0.0	0.0	0.0307	0.0288	0.0000	0.0000
C	65.000	0.00	0.0	0.0	0.0294	0.0288	0.0000	0.0000
C	55.000	0.00	0.0	0.0	0.0280	0.0288	0.0000	0.0000
C	45.000	0.00	0.0	0.0	0.0264	0.0288	0.0000	0.0000
C	35.000	0.00	0.0	0.0	0.0246	0.0288	0.0000	0.0000
C	25.000	0.00	0.0	0.0	0.0223	0.0288	0.0000	0.0000
C	15.000	0.00	0.0	0.0	0.0192	0.0288	0.0000	0.0000
D	149.000	0.00	180.0	0.0	0.0188	0.1100	0.0000	0.0000
D	132.750	0.00	180.0	0.0	0.0188	0.1100	0.0000	0.0000
D	132.750	0.00	180.0	0.0	0.0223	0.1359	0.0000	0.0000
D	116.500	0.00	180.0	0.0	0.0223	0.1359	0.0000	0.0000
D	116.500	0.00	180.0	0.0	0.0255	0.1616	0.0000	0.0000
D	100.250	0.00	180.0	0.0	0.0255	0.1616	0.0000	0.0000
D	100.250	0.00	180.0	0.0	0.0274	0.3583	0.0000	0.0000
D	95.500	0.00	180.0	0.0	0.0274	0.3583	0.0000	0.0000
D	95.500	0.00	180.0	0.0	0.0285	0.2455	0.0000	0.0000
D	81.417	0.00	180.0	0.0	0.0285	0.2455	0.0000	0.0000
D	81.417	0.00	180.0	0.0	0.0306	0.2739	0.0000	0.0000
D	67.333	0.00	180.0	0.0	0.0306	0.2739	0.0000	0.0000
D	67.333	0.00	180.0	0.0	0.0323	0.3019	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.0323	0.3019	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.0331	0.5784	0.0000	0.0000
D	46.750	0.00	180.0	0.0	0.0331	0.5784	0.0000	0.0000
D	46.750	0.00	180.0	0.0	0.0330	0.3343	0.0000	0.0000
D	35.062	0.00	180.0	0.0	0.0330	0.3343	0.0000	0.0000
D	35.062	0.00	180.0	0.0	0.0329	0.3561	0.0000	0.0000
D	23.375	0.00	180.0	0.0	0.0329	0.3561	0.0000	0.0000
D	23.375	0.00	180.0	0.0	0.0315	0.3767	0.0000	0.0000
D	0.000	0.00	180.0	0.0	0.0319	0.3937	0.0000	0.0000

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Sabre Towers and Poles on: 23 feb 2021 at: 13:30:38

150' Monopole / Essex, MA

MAXIMUM POLE DEFORMATIONS CALCULATED(w.r.t. wind direction)

MAST ELEV ft	DEFLECTIONS (ft)			ROTATIONS (deg)		
	HORIZONTAL ALONG	ACROSS	DOWN	TILT ALONG	ACROSS	TWIST
149.0	12.30D	-0.01W	1.45C	9.55D	0.00H	0.00T
132.7	9.68D	-0.01W	1.02C	9.24D	0.00H	0.00T

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116.5	7.26D	-0.01W	0.65C	8.12D	0.00H	0.00T
100.2	5.21D	0.00W	0.38C	6.54D	0.00W	0.00T
95.5	4.69D	0.00W	0.32C	6.18D	0.00W	0.00T
81.4	3.32D	0.00H	0.19C	5.07D	0.00W	0.00T
67.3	2.21D	0.00H	0.10C	4.03D	0.00H	0.00X
53.2	1.34D	0.00H	0.05C	3.06D	0.00H	0.00X
46.7	1.02D	0.00H	0.03C	2.65D	0.00H	0.00X
35.1	0.56D	0.00H	0.01C	1.90D	0.00H	0.00X
23.4	0.24D	0.00H	0.00C	1.22D	0.00H	0.00X
11.7	0.06D	0.00H	0.00C	0.58D	0.00H	0.00E
0.0	0.00A	0.00A	0.00A	0.00A	0.00A	0.00A

MAXIMUM POLE FORCES CALCULATED(w.r.t. to wind direction)

MAST ELEV ft	TOTAL AXIAL kip	SHEAR.w.r.t. ALONG kip	WIND.DIR ACROSS kip	MOMENT.w.r.t. ALONG ft-kip	WIND.DIR ACROSS ft-kip	TORSION ft-kip
149.0	0.01 N	0.00 R	0.00 C	0.00 E	0.00 C	0.00 F
132.7	28.18 Z	24.53 R	0.00 C	-221.83 C	0.03 L	0.03 L
116.5	40.16 Y	33.65 T	0.00 W	-752.83 H	0.12 L	-0.10 T
100.2	51.24 AB	41.31 T	-0.01 K	-1472.31 H	0.27 L	-0.20 T
95.5	52.94 AB	41.82 M	0.08 X	-1688.87 H	0.45 L	-0.20 T
81.4	56.46 AB	43.37 U	0.07 I	-2341.81 D	-0.99 I	-0.33 T
67.3	60.34 AG	44.91 U	0.08 H	-3010.56 D	1.82 W	-0.39 T
53.2	64.65 AG	46.58 U	0.08 Q	-3694.86 D	-2.87 H	0.45 X
46.7	68.41 AG	47.34 U	0.08 Q	-4016.30 D	-3.35 H	0.48 X
35.1	72.35 AG	48.76 U	-0.08 W	-4603.13 D	4.25 W	0.51 X
23.4	76.56 AG	50.19 U	0.07 I	-5199.41 D	-4.94 H	0.54 X
11.7	81.05 AG	51.53 U	0.07 I	-5804.84 D	-5.67 H	0.56 E
	85.60 AG	52.88 U	0.07 I	-6418.55 D	-6.44 H	0.56 E

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base reaction	85.60 AG	-52.88 U	-0.07 I	6418.55 D	6.44 H	-0.56 E
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COMPLIANCE WITH 4.8.2 & 4.5.4

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ELEV ft	AXIAL	BENDING	SHEAR + TORSIONAL	TOTAL	SATISFIED	D/t(w/t)	MAX ALLOWED
149.00	0.00N	0.00E	0.00R	0.00E	YES	8.82A	45.2
	0.02Z	0.30C	0.03R	0.32C	YES	11.56A	45.2
132.75	0.02Y	0.30H	0.03H	0.32H	YES	11.56A	45.2
	0.02Y	0.69H	0.03T	0.71H	YES	14.30A	45.2
116.50	0.02AB	0.69H	0.03H	0.71H	YES	14.30A	45.2
	0.02AB	0.98H	0.04T	1.00H	YES	17.04A	45.2
100.25	0.02AB	0.70I	0.03M	0.71I	YES	12.07A	45.2
	0.02AB	0.73H	0.02M	0.75H	YES	12.64A	45.2
95.50	0.02AB	0.76H	0.03U	0.77H	YES	12.39A	45.2
	0.01AB	0.83D	0.02U	0.84D	YES	14.08A	45.2
81.42	0.01AG	0.83D	0.02U	0.84D	YES	14.08A	45.2
	0.01AG	0.85D	0.02U	0.86D	YES	15.78A	45.2
67.33	0.01AG	0.85D	0.02U	0.86D	YES	15.78A	45.2
	0.01AG	0.88D	0.02U	0.89D	YES	17.48A	45.2
53.25	0.01AG	0.88D	0.02U	0.89D	YES	17.48A	45.2
	0.01AG	0.89D	0.02U	0.90D	YES	18.26A	45.2
46.75	0.01AG	0.92D	0.02U	0.93D	YES	17.91A	45.2
	0.01AG	0.93D	0.02U	0.94D	YES	19.31A	45.2
35.06	0.01AG	0.93D	0.02U	0.94D	YES	19.31A	45.2
	0.01AG	0.93D	0.02U	0.94D	YES	20.72A	45.2
23.37	0.01AG	0.93D	0.02U	0.94D	YES	20.72A	45.2
	0.02AG	0.94D	0.02U	0.95D	YES	22.13A	45.2
11.69	0.02AG	0.94D	0.02U	0.95D	YES	22.13A	45.2
	0.02AG	0.94D	0.02U	0.95D	YES	23.54A	45.2
0.00							

MAXIMUM LOADS ONTO FOUNDATION(w.r.t. wind direction)

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DOWN kip	SHEAR.w.r.t.WIND.DIR ALONG kip	ACROSS WIND.DIR kip	MOMENT.w.r.t.WIND.DIR ALONG ft-kip	ACROSS WIND.DIR ft-kip	TORSION ft-kip
85.60 AG	52.88 U	0.07 I	-6418.55 D	-6.44 H	0.56 E

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 Sabre Towers and Poles on: 23 feb 2021 at: 13:30:49

150' Monopole / Essex, MA

\*\*\*\*\*  
 \*\*\*\*\* Service Load Condition \*\*\*\*\*  
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\* Only 1 condition(s) shown in full  
 \* Some concentrated wind loads may have been derived from full-scale wind tunnel testing

LOADING CONDITION A =====

60 mph wind with no ice. Wind Azimuth: 0°

LOADS ON POLE  
 =====

LOAD TYPE	ELEV ft	APPLY. RADIUS ft	LOAD AZI	AT AZI	FORCES		MOMENTS	
					HORIZ kip	DOWN kip	VERTICAL ft-kip	TORSNAL ft-kip
C	145.000	0.00	0.0	0.0	0.0000	3.0160	0.0000	0.0000
C	145.000	0.00	0.0	0.0	2.7650	6.2511	0.0000	0.0000
C	145.000	0.00	0.0	0.0	0.0086	0.0140	0.0000	0.0000
C	135.000	0.00	0.0	0.0	0.0000	2.8080	0.0000	0.0000
C	135.000	0.00	0.0	0.0	1.9174	5.5841	0.0000	0.0000
C	135.000	0.00	0.0	0.0	0.0085	0.0140	0.0000	0.0000
C	125.000	0.00	0.0	0.0	0.0000	1.5600	0.0000	0.0000
C	125.000	0.00	0.0	0.0	1.5693	4.9181	0.0000	0.0000
C	125.000	0.00	0.0	0.0	0.0083	0.0140	0.0000	0.0000
C	115.000	0.00	0.0	0.0	0.0000	1.4352	0.0000	0.0000
C	115.000	0.00	0.0	0.0	1.2301	4.2511	0.0000	0.0000
C	115.000	0.00	0.0	0.0	0.0082	0.0140	0.0000	0.0000
C	105.000	0.00	0.0	0.0	0.0080	0.0140	0.0000	0.0000
C	95.000	0.00	0.0	0.0	0.0079	0.0140	0.0000	0.0000
C	85.000	0.00	0.0	0.0	0.0077	0.0140	0.0000	0.0000
C	75.000	0.00	0.0	0.0	0.0075	0.0140	0.0000	0.0000
C	65.000	0.00	0.0	0.0	0.0073	0.0140	0.0000	0.0000
C	55.000	0.00	0.0	0.0	0.0070	0.0140	0.0000	0.0000
C	45.000	0.00	0.0	0.0	0.0067	0.0140	0.0000	0.0000
C	35.000	0.00	0.0	0.0	0.0064	0.0140	0.0000	0.0000
C	25.000	0.00	0.0	0.0	0.0059	0.0140	0.0000	0.0000
C	15.000	0.00	0.0	0.0	0.0053	0.0140	0.0000	0.0000
D	149.000	0.00	180.0	0.0	0.0125	0.0664	0.0000	0.0000
D	132.750	0.00	180.0	0.0	0.0125	0.0664	0.0000	0.0000
D	132.750	0.00	180.0	0.0	0.0151	0.0826	0.0000	0.0000
D	116.500	0.00	180.0	0.0	0.0151	0.0826	0.0000	0.0000
D	116.500	0.00	180.0	0.0	0.0175	0.0988	0.0000	0.0000
D	100.250	0.00	180.0	0.0	0.0175	0.0988	0.0000	0.0000
D	100.250	0.00	180.0	0.0	0.0190	0.2595	0.0000	0.0000
D	95.500	0.00	180.0	0.0	0.0190	0.2595	0.0000	0.0000
D	95.500	0.00	180.0	0.0	0.0198	0.1634	0.0000	0.0000
D	81.417	0.00	180.0	0.0	0.0198	0.1634	0.0000	0.0000
D	81.417	0.00	180.0	0.0	0.0214	0.1831	0.0000	0.0000
D	67.333	0.00	180.0	0.0	0.0214	0.1831	0.0000	0.0000
D	67.333	0.00	180.0	0.0	0.0227	0.2027	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.0227	0.2027	0.0000	0.0000
D	53.250	0.00	180.0	0.0	0.0234	0.4307	0.0000	0.0000
D	46.750	0.00	180.0	0.0	0.0234	0.4307	0.0000	0.0000
D	46.750	0.00	180.0	0.0	0.0233	0.2263	0.0000	0.0000
D	35.062	0.00	180.0	0.0	0.0233	0.2263	0.0000	0.0000
D	35.062	0.00	180.0	0.0	0.0234	0.2427	0.0000	0.0000
D	23.375	0.00	180.0	0.0	0.0234	0.2427	0.0000	0.0000
D	23.375	0.00	180.0	0.0	0.0225	0.2591	0.0000	0.0000
D	11.687	0.00	180.0	0.0	0.0225	0.2591	0.0000	0.0000
D	11.687	0.00	180.0	0.0	0.0229	0.2754	0.0000	0.0000
D	0.000	0.00	180.0	0.0	0.0229	0.2754	0.0000	0.0000

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MAXIMUM POLE DEFORMATIONS CALCULATED(w.r.t. wind direction)

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MAST ELEV ft	DEFLECTIONS (ft)			ROTATIONS (deg)		
	HORIZONTAL ALONG	ACROSS	DOWN	TILT ALONG	ACROSS	TWIST
149.0	2.49D	0.00K	0.06D	1.91D	0.00K	0.00F
132.7	1.96D	0.00K	0.04D	1.85D	0.00K	0.00F
116.5	1.46D	0.00K	0.03D	1.62D	0.00K	0.00F
100.2	1.04D	0.00K	0.02D	1.31D	0.00K	0.00B
95.5	0.94D	0.00K	0.02D	1.23D	0.00K	0.00B
81.4	0.66D	0.00K	0.01D	1.01D	0.00K	0.00B
67.3	0.44D	0.00K	0.01D	0.80I	0.00K	0.00B
53.2	0.27D	0.00K	0.00D	0.61I	0.00K	0.00B
46.7	0.20D	0.00K	0.00D	0.53D	0.00K	0.00B
35.1	0.11D	0.00K	0.00D	0.38D	0.00K	0.00B
23.4	0.05D	0.00K	0.00D	0.24D	0.00K	0.00B
11.7	0.01D	0.00K	0.00D	0.12D	0.00K	0.00B
0.0	0.00A	0.00A	0.00A	0.00A	0.00A	0.00A

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MAXIMUM POLE FORCES CALCULATED(w.r.t. to wind direction)

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MAST ELEV ft	TOTAL AXIAL kip	SHEAR,w.r.t.WIND.DIR		MOMENT,w.r.t.WIND.DIR		TORSION ft-kip
		ALONG kip	ACROSS kip	ALONG ft-kip	ACROSS ft-kip	
149.0	0.00 A	0.00 L	0.00 L	0.00 I	0.00 K	0.00 K
132.7	18.77 F	4.90 A	0.00 L	-44.59 E	0.00 F	0.00 F
116.5	26.60 C	6.73 D	0.00 B	-150.89 D	0.01 F	0.00 F
100.2	33.92 B	8.26 E	0.00 B	-294.27 D	0.01 F	0.01 F
95.5	35.15 A	8.35 A	-0.01 B	-337.33 D	0.05 F	0.01 F
81.4	37.48 K	8.66 D	0.02 K	-467.14 D	-0.22 K	0.01 F
67.3	40.07 B	8.96 I	0.02 K	-599.69 F	-0.46 K	0.01 B
53.2	42.96 B	9.30 F	0.02 K	-735.43 F	-0.69 K	0.01 B
46.7	45.75 B	9.45 F	0.02 K	-799.21 F	-0.82 K	0.01 B

21-4721-RFV

35.1	48.41 B	9.73 D	0.02 K	-915.55 F	-1.02 K	0.01 B
	48.43 B	9.74 D	0.02 K	-915.55 F	-1.02 K	0.01 B
23.4	51.28 B	10.02 D	0.02 K	-1034.04 D	-1.20 K	0.01 B
	51.28 B	10.02 D	0.02 B	-1034.04 D	-1.20 K	0.02 B
11.7	54.32 B	10.28 D	0.02 B	-1154.57 D	-1.37 K	0.02 B
	54.32 B	10.28 D	0.02 B	-1154.57 D	-1.37 K	0.02 B
	57.54 B	10.55 D	0.02 B	-1276.96 D	-1.54 K	0.02 B
base reaction	57.54 B	-10.55 D	-0.02 B	1276.96 D	1.54 K	-0.02 B

COMPLIANCE WITH 4.8.2 & 4.5.4

ELEV ft	AXIAL	BENDING	SHEAR + TORSIONAL	TOTAL	SATISFIED	D/t(w/t)	MAX ALLOWED
149.00	0.00A	0.00I	0.00L	0.00I	YES	8.82A	45.2
132.75	0.01F	0.06E	0.01A	0.07E	YES	11.56A	45.2
	0.01C	0.06A	0.01D	0.07A	YES	11.56A	45.2
116.50	0.01C	0.14D	0.01D	0.15D	YES	14.30A	45.2
	0.01B	0.14D	0.01E	0.15D	YES	14.30A	45.2
100.25	0.01B	0.20D	0.01E	0.21D	YES	17.04A	45.2
	0.01A	0.14D	0.01A	0.15D	YES	12.07A	45.2
95.50	0.01A	0.15D	0.00A	0.16D	YES	12.64A	45.2
	0.01K	0.15D	0.00D	0.16D	YES	12.39A	45.2
81.42	0.01K	0.16D	0.00D	0.17D	YES	14.08A	45.2
	0.01B	0.16D	0.00I	0.17D	YES	14.08A	45.2
67.33	0.01B	0.17F	0.00I	0.18F	YES	15.78A	45.2
	0.01B	0.17F	0.00F	0.18F	YES	15.78A	45.2
53.25	0.01B	0.17F	0.00F	0.18F	YES	17.48A	45.2
	0.01B	0.17F	0.00F	0.18F	YES	17.48A	45.2
46.75	0.01B	0.18F	0.00F	0.19F	YES	18.26A	45.2
	0.01B	0.18F	0.00D	0.19F	YES	17.91A	45.2
35.06	0.01B	0.18F	0.00D	0.19F	YES	19.31A	45.2
	0.01B	0.18F	0.00D	0.19F	YES	19.31A	45.2
23.37	0.01B	0.19D	0.00D	0.20D	YES	20.72A	45.2
	0.01B	0.19D	0.00D	0.20D	YES	20.72A	45.2
11.69	0.01B	0.19D	0.00D	0.20D	YES	22.13A	45.2
	0.01B	0.19D	0.00D	0.20D	YES	22.13A	45.2
0.00	0.01B	0.19D	0.00D	0.20D	YES	23.54A	45.2

MAXIMUM LOADS ONTO FOUNDATION(w.r.t. wind direction)

DOWN	SHEAR.w.r.t.WIND.DIR		MOMENT.w.r.t.WIND.DIR		TORSION
	ALONG	ACROSS	ALONG	ACROSS	
kip	kip	kip	ft-kip	ft-kip	ft-kip
57.54	10.55	0.02	-1276.96	-1.54	0.02
B	D	B	D	K	B

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## Square Base Plate and Anchor Rods per ANSI/TIA 222-H

### Pole Data

Diameter: 60.520 in (flat to flat)  
Thickness: 0.4375 in  
Yield (Fy): 65 ksi  
# of Sides: 18 "0" IF Round  
Strength (Fu): 80 ksi

### Reactions

Moment, Mu: 6418.55 ft-kips  
Axial, Pu: 68.99 kips  
Shear, Vu: 52.85 kips

### Anchor Rod Data

Quantity: 20 (multiple of 4)  
Diameter: 2.25 in  
Rod Material: A615  
Strength (Fu): 100 ksi  
Yield (Fy): 75 ksi  
BC Diam. (in): 67.5 BC Override:  
Rod Spacing: 6 in

### Plate Data

Width (in): 67 Width Override:  
Thickness: 2.75 in  
Yield (Fy): 50 ksi  
Eff. Width: 34.23 in  
Corner Clip: 15.00 in  
Drain Hole: 2.625 in. diameter  
Drain Location: 28 in. center of pole to center of drain hole  
Center Hole: 48 in. diameter

### Anchor Rod Results

(per 4.9.9)

Maximum Put: 225.63 Kips  
 $\Phi t^*Rnt$ : 243.75 Kips  
Vu: 2.64 Kips  
 $\Phi v^*Rnv$ : 149.10 Kips  
Tension Interaction Ratio: 0.86  
Maximum Puc: 231.66 Kips  
 $\Phi c^*Rnc$ : 268.39 Kips  
Vu: 2.64 Kips  
 $\Phi c^*Rncv$ : 120.77 Kips  
Compression Interaction Ratio: 0.86  
Maximum Interaction Ratio: **86.4% Pass**

### Base Plate Results

Base Plate (Mu/Z): 42.6 ksi  
Allowable  $\Phi^*Fy$ : 45 ksi (per AISC)  
Base Plate Interaction Ratio: **94.6% Pass**

**EXHIBIT 10**  
**RADIO FREQUENCY REPORT**

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## RF Report

Proposed Wireless Facility  
73 Eastern Avenue Route 133  
Essex, MA 01929

The Verizon logo, consisting of the word 'verizon' in a bold, black, lowercase sans-serif font, with a red checkmark symbol positioned to the right of the 'n'.

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November 6, 2020

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- Attachment B: Essex Rt 133 – 700 MHz & 2100 MHz LTE Coverage with Proposed Site
- Attachment C: Essex Rt 133 – Existing/Approved 700 MHz LTE Sector Footprints
- Attachment D: Essex Rt 133 – 700 MHz LTE Sector Footprints with Proposed Site
- Attachment E: Essex Rt 133 – Area Topography Map

## 1. Overview

This RF Report has been prepared on behalf of Verizon Wireless in support of TowerNorth Development, LLC's ("TowerNorth") proposal to the Town of Essex for the installation and operation of a wireless facility located at 73 Eastern Avenue. Verizon Wireless' component of the proposed facility would consist of ground-based equipment cabinets along with antennas and associated equipment mounted on the proposed 150' monopole.

This report concludes that the proposed site will fill in coverage gaps and provide additional capacity to Essex in order to improve deficient service areas along Route 133 and the surrounding roads, neighborhoods, businesses, and community areas in the proximity of the proposed site.

Included in this report is: a brief summary of the site's objectives, maps showing Verizon Wireless' current network plan, and modeled Radio Frequency coverage of the subject site and the surrounding sites in Verizon Wireless' network.

## 2. Introduction

Verizon Wireless provides digital voice and data communications services using 3rd Generation (3G) CDMA/EVDO technology in the Cellular (800 MHz) and PCS (1900 MHz) frequency bands, and is in the midst of deploying advanced 4th Generation (4G) voice and data services over LTE technology in the 700 MHz, Cellular, PCS, and AWS (2100 MHz) frequency bands as allocated by the FCC. These networks are used by mobile devices for fast web browsing, media streaming, and other applications that require broadband connections. The mobile devices that benefit from these advanced networks are not limited to basic handheld phones, but also include devices such as smartphones, PDA's, tablets, and laptop air-cards. With the evolving rollout of 4G LTE services and devices, Verizon Wireless customers will have even faster connections to people, information, and entertainment.

As explained within this report, Verizon Wireless has identified the need to add a new facility to its existing network of sites in the area to improve coverage and capacity to a significant gap in service that exists in Essex, in order to support reliable communications and meet the growing demand in the area.

To maintain a reliable and robust communications system for the individuals, businesses, public safety workers and others who use its network, Verizon Wireless deploys a network of cell sites (also called wireless communications facilities) throughout the areas in which it is licensed to provide service. These cell sites consist of antennas mounted on structures, such as buildings and towers, supported by radio and power equipment. The receivers and transmitters at each of these sites process signals within a limited geographic area known as a "cell."

Mobile subscriber handsets and wireless devices operate by transmitting and receiving low power radio frequency signals to and from these cell sites. Handset signals that reach the cell site are transferred through land lines (or other means of backhaul transport) and routed to their destinations by sophisticated electronic equipment. In order for Verizon Wireless' network to function effectively, there must be adequate overlapping coverage between the "serving cell" and adjoining cells. This not only allows a user to access the network initially, but also allows for the transfer or "hand-off" of calls and data transmissions from one cell to another, and prevents unintended disconnections or "dropped calls."

Verizon Wireless' antennas also must be located high enough above ground level to allow transmission (a.k.a. propagation) of the radio frequency signals above trees, buildings, and other natural or man-made structures that may obstruct or diminish the signals. Areas without adequate radio frequency coverage have substandard service, characterized by dropped and blocked calls, slow data connections, or no wireless service at all, and are commonly referred to as coverage gaps.

The size of the area potentially served by each cell site depends on several factors including the number of antennas used, the height at which the antennas are deployed, the topography of the surrounding land, vegetative cover, and natural or man-made obstructions in the area. The actual service area at any given time also depends on the number of customers who are on the network in range of that cell site. As customers move throughout the service area, the transmission from the phone or other device is automatically transferred to the Verizon Wireless facility with the best reception, without interruption in service, provided that there is overlapping coverage between the cells.

Each cell site must be primarily designed to strike a balance between the overall geographic coverage area it will serve, and the site's capacity to support the usage within the coverage footprint. In rural areas, cell sites are generally designed to have broader coverage footprints because the potential traffic is sparser and distributed over a larger area. In more densely populated suburban and urban environments, the capacity to handle calls and data transmissions is of increasing concern, and cell sites must limit their coverage footprint to an area where the offered network traffic can be supported by the radio equipment and resources. Due to the aggressive historical and projected growth of mobile usage, particularly for mobile data (82% in 2017-2018 in the U.S.<sup>1</sup>), instances arise where the usage demand can no longer be supported by the site(s) serving an area, and new facilities must be integrated to provide capacity relief to the overloaded sites.

We have concluded that by installing the proposed wireless communication facility at 73 Eastern Avenue at an antenna centerline height of 146' AGL (above ground level), Verizon Wireless will be able to provide improved coverage and capacity to residents, businesses, and traffic corridors within Essex that are currently located within a gap in service of Verizon Wireless' network.

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<sup>1</sup> "2019 Annual Survey Highlights", June 20, 2019, CTIA.  
<https://www.ctia.org/news/2019-annual-survey-highlights>

### 3. The Proposed Facility

Verizon Wireless' plan for this proposed facility would consist principally of the following elements:

- 1) An equipment lease area within TowerNorth's 50' x 50' proposed fenced compound;
- 2) Telecommunication equipment cabinets with utility connections to the proposed H-frame and other utility sources within the proposed compound;
- 3) Six (6) panel antennas (two per sector) mounted on the proposed 150' monopole, at a centerline elevation of 146' AGL;
- 4) Remote Radio Heads (RRH) with accessory junction boxes and surge suppressors mounted alongside the antennas.

## 4. Coverage and Capacity Objectives

As mentioned above, Verizon Wireless is in the process of rolling out its 4G LTE high-speed wireless broadband system in the 700 MHz, Cellular, PCS, and AWS frequency bands, in accordance with its licenses from the FCC. In order to expand and enhance their wireless services throughout New England, Verizon Wireless must fill in existing coverage gaps and address capacity, interference, and high-speed broadband issues. As part of this effort, Verizon Wireless has determined that significant gaps in service exist in and around sections of Essex, MA, as described further below.

Verizon Wireless currently operates wireless facilities similar to the proposed facility within Essex and the surrounding cities/towns. Due in large part to the distances between the existing sites, the intervening topography, and volume of user traffic in the area, these existing facilities do not provide sufficient coverage and capacity to portions of town. Specifically, Verizon Wireless determined that portions of Essex are without reliable service in the following areas and town roads<sup>2</sup>, including but not limited to:

- Route 133 (Main/Eastern/Essex Avenue);
  - Serves ~ 13,000 vehicles/day, as measured on Essex Avenue, north of ramp to Route 128 SB (2019);
- Downtown Essex;
- The surrounding roads, neighborhoods, retail, dining, business, and community areas within the proximity of the proposed site and the downtown area.

The proposed site located at 73 Eastern Avenue (“Essex Rt 133”) is needed to fill in these targeted gaps in service, in order to improve network quality and reliability for Verizon Wireless subscribers traveling along these roads, as well as to the numerous residents, businesses, and visitors in this area.

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<sup>2</sup> Traffic counts are sourced from the MA Department of Transportation, Transportation Data Management System.

## 5. Site Search and Selection Process

To find a site that provides acceptable coverage, adequate capacity, and fills the gaps in service, computer modeling software is used to define a search area. The search ring identifies the area within which a site could be located (assuming sufficient height is considered) that would have a high probability of addressing the significant coverage gap and/or meeting the capacity objectives established by the Verizon Wireless RF (Radio Frequency) engineers.

Once a search ring is determined, Verizon Wireless' real estate specialists search within the proximity of the defined area for existing buildings, towers, and other structures of sufficient height that would meet the defined objectives. If none are found, then the focus shifts to "raw land" sites. A suitable site must satisfy the technical requirements identified by the RF engineers, must be available for lease, and must have access to a road and be otherwise suitable for constructing a cell site of the required size and height. Every effort is made to use existing structures before pursuing a "raw land" build to minimize the number of new towers throughout the cities and towns being served.

Since no suitable existing structures in the area have been identified, Verizon Wireless determined that the proposed wireless communications facility at 73 Eastern Avenue is necessary to address the targeted coverage and capacity objectives with respect to its network requirements.

## 6. Pertinent Site Data

Table 1 below details the site-specific information for the existing (on-air), approved, and proposed Verizon Wireless sites used to perform the coverage analysis and generate the coverage plots provided herein.

Site Name	Address	City/Town	Location		Structure Type	Antenna Height (ft AGL)	Status
			Latitude	Longitude			
Beverly 2	Yankee Division Highway	Beverly	42.5753	-70.8667	Self-support	160	On-Air
Beverly 9	Yankee Division Highway	Beverly	42.5804	-70.8255	Monopole	75	On-Air
Essex 2	16 Treehill Lane	Essex	42.6397	-70.7932	Monopole	110	On-Air
Gloucester	13 Kondelin Road	Gloucester	42.5934	-70.7240	Guyed	232	On-Air
Gloucester 2	1 Great Republic Drive	Gloucester	42.6287	-70.6485	Water Tank	104	On-Air
Gloucester 3	37 Causeway Street	Gloucester	42.6261	-70.7056	Rooftop	32.5 / 32.5 / 35.5	On-Air
Gloucester DT	180 E Main Street	Gloucester	42.6134	-70.6614	Rooftop	61.3	On-Air
Hamilton	434 Asbury St (off Morris Ave)	Hamilton	42.6292	-70.8910	Monopole	106	On-Air
Hamilton 3	577 Bay Road	Hamilton	42.6193	-70.8535	Monopole	105	Approved
Ipswich	31 North Main Street	Ipswich	42.6806	-70.8356	Steeple	88	On-Air
Ipswich S	Topsfield Road	Ipswich	42.6628	-70.8943	Monopole	130	On-Air
Manchester	Moss Hill Firetower off School Street	Manchester	42.6014	-70.7589	Self-support	68	On-Air
Manchester 2	Pine Street	Manchester	42.5866	-70.7811	Water Tank	73	On-Air
Manchester 3	17 Ashland Street	Manchester	42.5718	-70.7734	Flagpole	76	On-Air
Prides Crossing	255 Grapevine Road	Wenham	42.5911	-70.8222	Rooftop	107.5	On-Air
Wenham	1 Arbor Street	Wenham	42.6050	-70.8871	Steeple	76	On-Air
Essex Rt 133	73 Eastern Avenue	Essex	42.6293	-70.7642	Monopole	146	Proposed

**Table 1: Verizon Wireless Site Information Used in Coverage Analysis<sup>3</sup>**

<sup>3</sup> Some sites listed in this table are outside the plot view but are included for completeness of information.

## 7. Coverage Analysis and Propagation Plots

The signal propagation plots provided in this report were produced using deciBel Planner™, a Windows-based RF propagation computer modeling program and network planning tool. The software considers the topographical features of an area, land cover, antenna models, antenna heights, RF transmitting power and receiver thresholds to model coverage and other related RF parameters used in site design and network expansion.

The coverage plots included as attachments show coverage based on RSRP signal strengths of -95 dBm and above. All other areas (depicted in white) fall within coverage areas characterized by poor service quality, low data throughput, and the substantial likelihood of unreliable service.

Attachments A - E are discussed below:

**Attachment A** titled “*Essex Rt 133 – Existing/Approved 700 MHz & 2100 MHz LTE Coverage*” shows the coverage provided to areas of Essex from the “On-Air” and “Approved” macro-sites listed in Table 1. “On-Air” sites are existing Verizon Wireless facilities, and “Approved” sites are defined as those that are in the final stages of permitting or construction and are expected to be turned on-air soon.. The green and yellow shaded areas represent the minimum desired level of coverage for most of this area for the 700 MHz and 2100 MHz network layers, respectively. Because of the superior propagation characteristics of 700 MHz relative to 2100 MHz, the 2100 MHz coverage areas (yellow) are generally contained within the 700 MHz coverage areas (green). As such, the deficient areas of 700 MHz coverage are defined by the unshaded areas, whereas the deficient areas of 2100 MHz coverage consist of both the green and white areas. As shown in this plot and described in the Coverage and Capacity Objectives section of this report, portions of Essex are in areas of deficient coverage. These coverage gaps, particularly at 2100 MHz, include Route 133, downtown Essex and the surrounding roads, neighborhoods, and retail/dining/business establishments.

**Attachment B** titled “*Essex Rt 133 - 700 MHz & 2100 MHz LTE Coverage with Proposed Site*” shows the composite coverage with the proposed “Essex Rt 133” facility. As shown by the additional areas of coverage, the proposed facility will provide coverage to:

- ~ 0.5 mi (700 MHz) and 1.2 mi (2100 MHz) along Route 133;
- ~ 0.5 mi (700 MHz) along Western Avenue;
- ~ 335 (700 MHz) and ~ 490 (2100 MHz) additional residents<sup>4</sup>;
- ~ 70 (700 MHz) and ~ 240 (2100 MHz) additional employees<sup>5</sup>;
- ~ 260 (700 MHz) and ~ 415 (2100 MHz) additional structures<sup>6</sup>;

<sup>4</sup> Residential population counts referenced here and elsewhere in this report are based upon the 2010 U.S. Census data.

<sup>5</sup> Employee population counts referenced in this report are based upon the 2017 U.S. Census Bureau LEHD database.

<sup>6</sup> Structure counts referenced here in this report are based upon “roofprint” data sourced from MassGIS (Bureau of Geographic Information). The dataset contains two-dimensional roof outlines for all buildings larger than 150 ft<sup>2</sup> and may not necessarily include only dwellings. For additional information, refer to <https://docs.digital.mass.gov/dataset/massgis-data-building-structures-2-d>

**Attachment C** titled “*Essex Rt 133 – Existing/Approved 700 MHz LTE Sector Footprints?*” depicts the areas primarily served by the sectors (a.k.a. signal “footprints”) of the surrounding Verizon Wireless macro sites in the area, which are shown by the unique color for each particular sector of interest. For clarity, all other sectors of less interest with respect to the proposed site are shown in grey. As demand for wireless voice and data services continues to grow, Verizon Wireless manages the footprint of each sector so that it can support the demand within the area it is primarily serving. In addition to improving coverage to the area, the proposed site will also serve existing and anticipated demand in the vicinity and thereby offload some of the burden experienced by the surrounding sites. In that way, those sites will be able to more adequately serve the demand for service in the areas nearer to those surrounding sites. Please note that the outer parts of each sector footprint may include areas that presently have signal strength below the targeted value required for reliable service to Verizon Wireless’ customers. The fact that low-level signal may reach these areas does not mean that these areas experience adequate coverage. These unreliable areas of low signal level can impose a significant capacity burden on the sites primarily serving the area.

**Attachment D** titled “*Essex Rt 133 - 700 MHz LTE Sector Footprints with Proposed Site?*” shows the composite coverage with the overall footprint of the proposed facility in green. As shown in this map, the proposed “Essex Rt 133” facility is an effective solution to provide capacity relief to the area, particularly to the “Essex 2” alpha sector (red), and the “Manchester” alpha sector (orange). The proposed facility is centrally located in a busy area of deficient coverage making it particularly suited to distribute the traffic load across multiple sectors and provide a dominant server to this pocket of heavy usage. Table 2 below details the capacity relief based on the sector footprints shown in Attachments C and D.

Sector	Current			With "Essex Rt 133"			Offload Summary		
	Employee Pops	Residential Pops	Structures	Employee Pops	Residential Pops	Structures	Total Employee Pops Offloaded	Total Residential Pops Offloaded	Structures Offloaded
Essex 2 Alpha	710	3469	2718	325	1644	1267	385 ( 54.2%)	1825 ( 52.6%)	1451 ( 53.4%)
Manchester Alpha	95	322	153	46	158	60	49 ( 51.6%)	164 ( 50.9%)	93 ( 60.8%)

**Table 2: Capacity Offload Summary**

**Attachment E** titled “*Essex Rt 133 – Area Topography Map?*” details the topographical features around the proposed “Essex Rt 133” site. These terrain features play a key role in dictating both the unique coverage areas served from a given location, and the coverage gaps within the network. This map is included to provide a visual representation of the terrain variations that must be considered when determining the appropriate location and design of a proposed wireless facility. The blue and green shades correspond to lower elevations, whereas the orange, red, gray and white shades indicate higher elevations.

## 8. Certification of Non-Interference

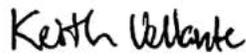
Verizon Wireless certifies that the proposed facility will not cause interference to any lawfully operating emergency communication system, television, telephone or radio, in the surrounding area. The FCC has licensed Verizon Wireless to transmit and receive in the Upper C-Block of the 700 MHz band, B Block of the Cellular (850 MHz) band, the C3, E, and F Blocks of the PCS (1900 MHz) band, and the A and B Blocks of the AWS (2100 MHz) band of the RF spectrum. As a condition of the FCC licenses, Verizon Wireless is prohibited from interfering with other licensed devices that are being operated in a lawful manner. Furthermore, no emergency communication system, television, telephone, or radio is licensed to operate on these frequencies, and therefore interference is highly unlikely.

## 9. Summary

In undertaking its build-out of 4G LTE service in Essex County, Verizon Wireless has determined that an additional facility is needed to provide reliable service and additional capacity throughout areas of Essex, MA. Verizon Wireless determined that the proposed wireless communications facility at 73 Eastern Avenue in Essex at an antenna centerline height of 146 feet (AGL) will provide additional coverage and capacity needed in the targeted coverage areas including key roadways such as Route 133, downtown Essex, and the surrounding roads, neighborhoods, and retail/dining/business establishments in the proximity of the proposed site. Without the installation of the proposed site, Verizon Wireless will be unable to improve and expand their existing 4G LTE wireless communication services in this area of Essex; therefore, Verizon Wireless respectfully requests that the town of Essex act favorably upon the proposed facility.

## 10. Statement of Certification

I certify to the best of my knowledge that the statements in this report are true and accurate.



Keith Vellante  
RF Engineer  
C Squared Systems, LLC

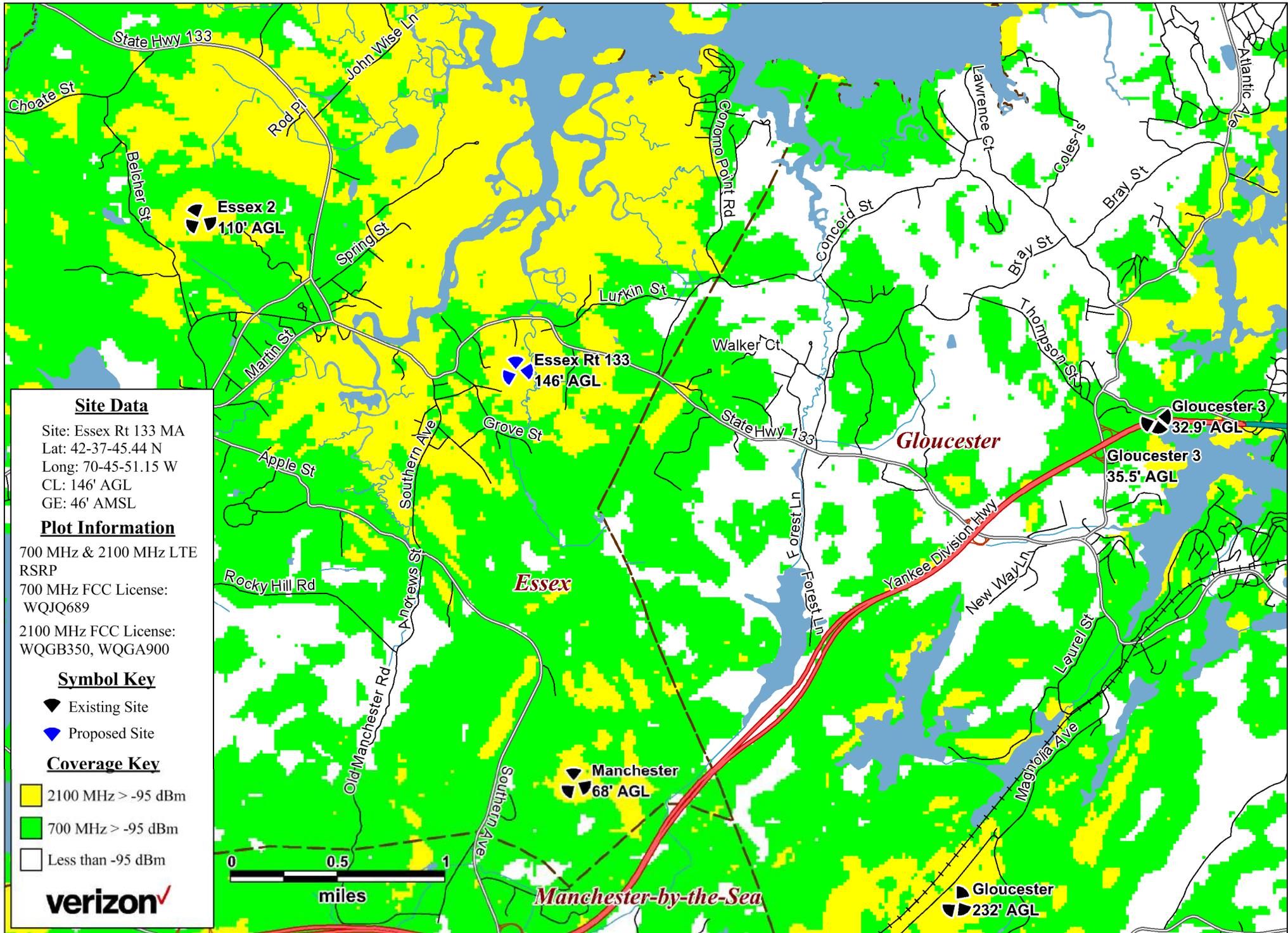
November 06, 2020

Date

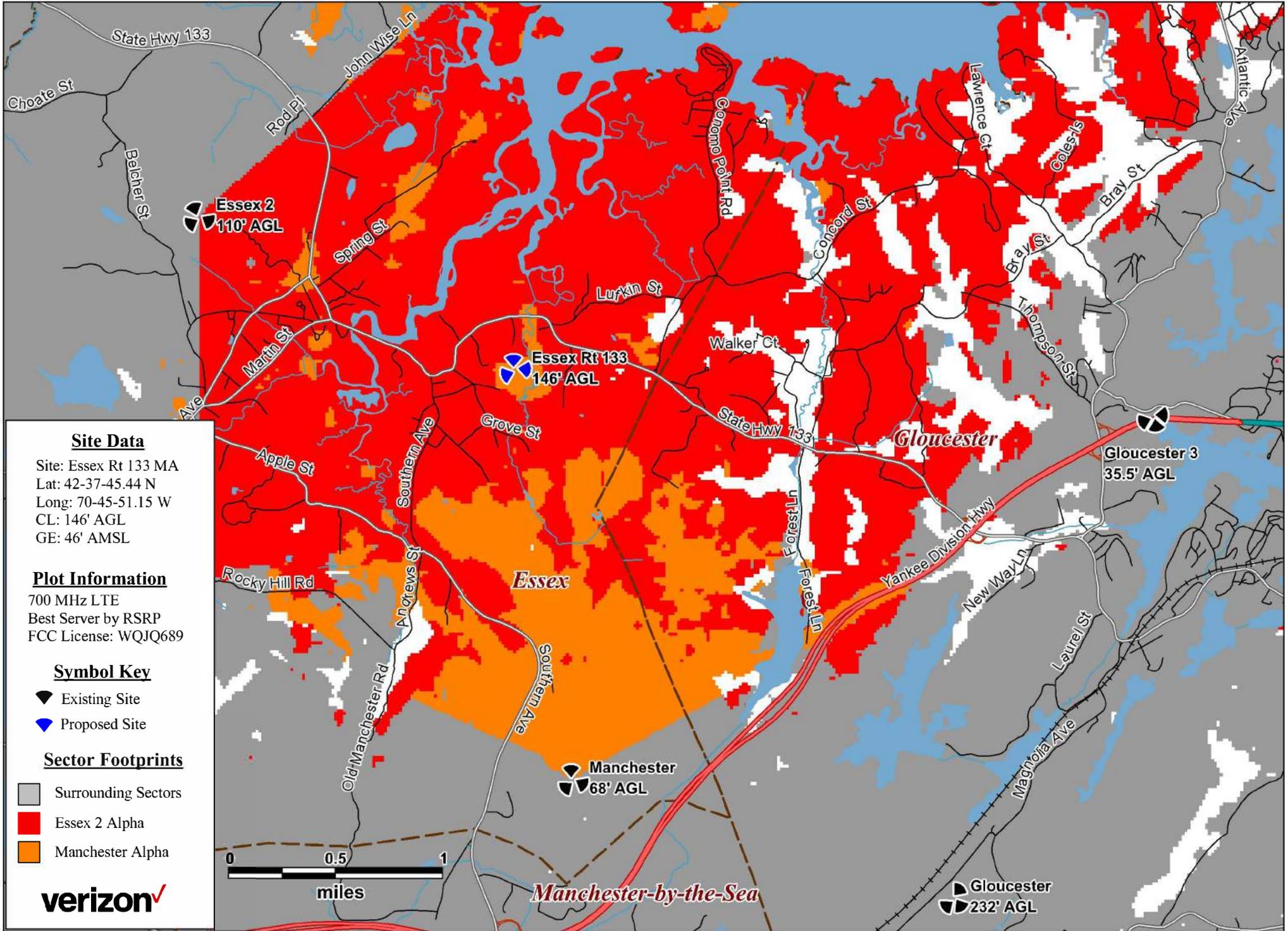
## 11. Attachments



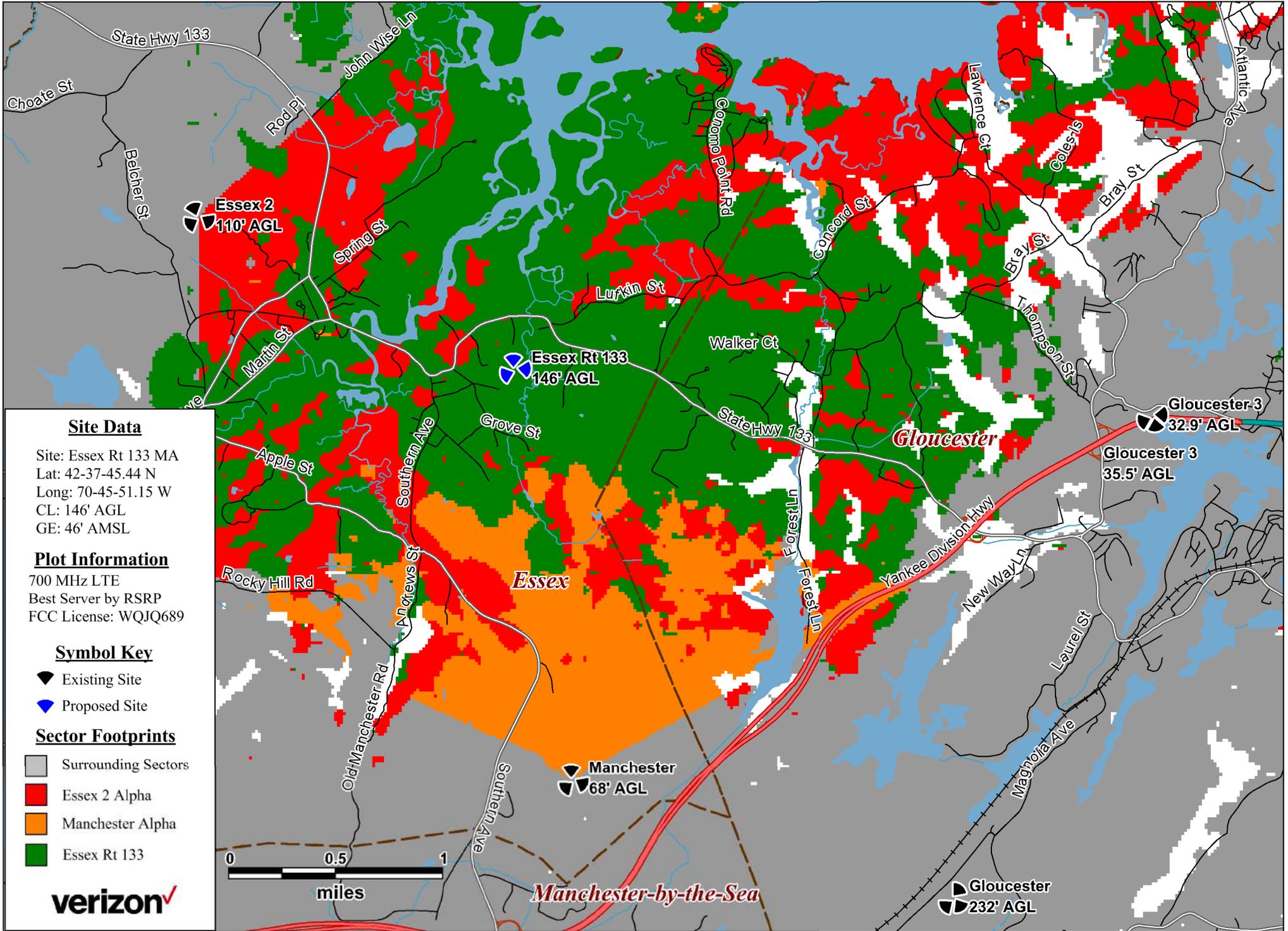
**Attachment B:**  
**Essex Rt 133 - 700 & 2100 MHz LTE Coverage with Proposed Site**



**Attachment C:**  
**Essex Rt 133 - Existing/Approved 700 MHz LTE Sector Footprints**



**Attachment D:**  
**Essex Rt 133 - 700 MHz LTE Sector Footprints with Proposed Site**



**Site Data**

Site: Essex Rt 133 MA  
 Lat: 42-37-45.44 N  
 Long: 70-45-51.15 W  
 CL: 146' AGL  
 GE: 46' AMSL

**Plot Information**

700 MHz LTE  
 Best Server by RSRP  
 FCC License: WQJQ689

**Symbol Key**

- Existing Site
- Proposed Site

**Sector Footprints**

- Surrounding Sectors
- Essex 2 Alpha
- Manchester Alpha
- Essex Rt 133



*Manchester-by-the-Sea*

Gloucester  
 232' AGL

Manchester  
 68' AGL

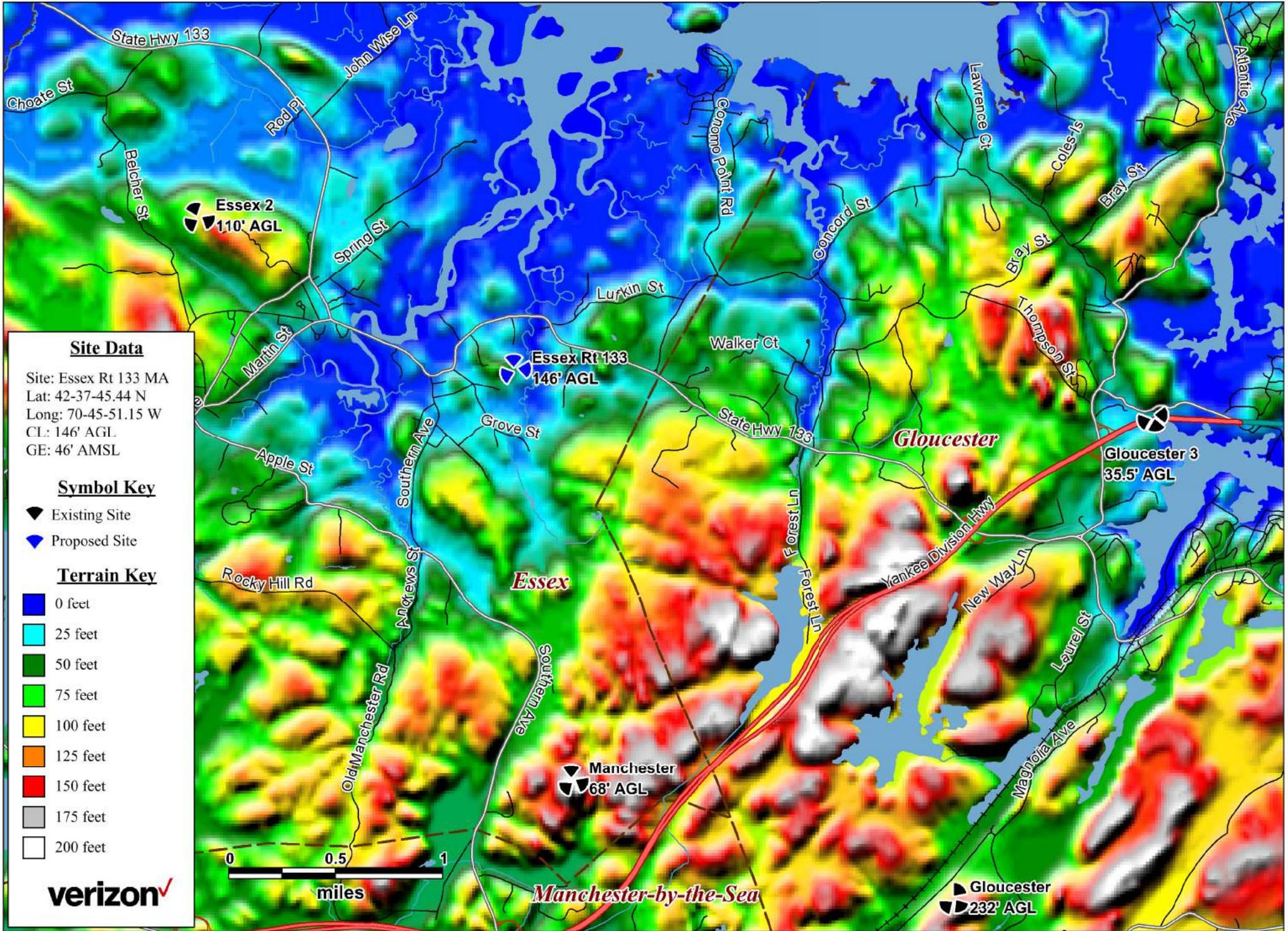
Gloucester 3  
 35.5' AGL

Gloucester-3  
 32.9' AGL

Essex Rt 133  
 146' AGL

Essex 2  
 110' AGL

**Attachment E:  
Essex Rt 133 - Area Topography Map**



**EXHIBIT 11**  
**ALTERNATIVE SITE ANALYSIS**

# **ALTERNATIVE SITE ANALYSIS**

**73 Eastern Avenue  
Essex, MA**

## BACKGROUND

The radiofrequency (“RF”) spectrum is an allotment of frequencies used for the transmission of radio waves over long distances.<sup>1</sup> These radio waves carry data to and from devices used in television, AM and FM radio, XM/Sirius satellite radio, DirecTV, LoJack, radar, garage door openers, baby monitors, walkie talkies, cordless phones, and remote controls. This spectrum is also utilized by wireless carriers like Verizon Wireless to provide a wide variety of services such as phone, internet, email, video and music clips, mobile television, text messaging, games, and software applications.

Like visible light, radio waves require a clear “line of sight” in order to function properly. That is, there must be a clear, unobstructed path between the transmitter and the receiver. If there are any obstacles in this path, such as trees or buildings, the radio waves can be *attenuated*. Attenuation is a reduction in signal strength of radio waves. The closer that the obstruction is to the transmitter or receiver, the greater that the signal will be disrupted.

When designing a wireless site, a Radio Frequency Design Engineer must consider the locations of the existing network cell sites, the coverage and capacity needs of the area, the surrounding topography and land use, and overall height of the wireless site. Sites located too close will result in unacceptable network interference. If sites are too far apart, service will significantly degrade in the area where the signal does not reach, ultimately resulting in dropped calls or ineffective attempts to connect. If wireless sites are too low in height, they will be unable to adequately interact with the user in a seamless manner, leaving gaps in service between the wireless sites.

## SUMMARY

TowerNorth Development, LLC (“TowerNorth”) has prepared this Alternative Site Analysis in order to describe the process for evaluating potential sites for a wireless facility in Essex, Massachusetts.

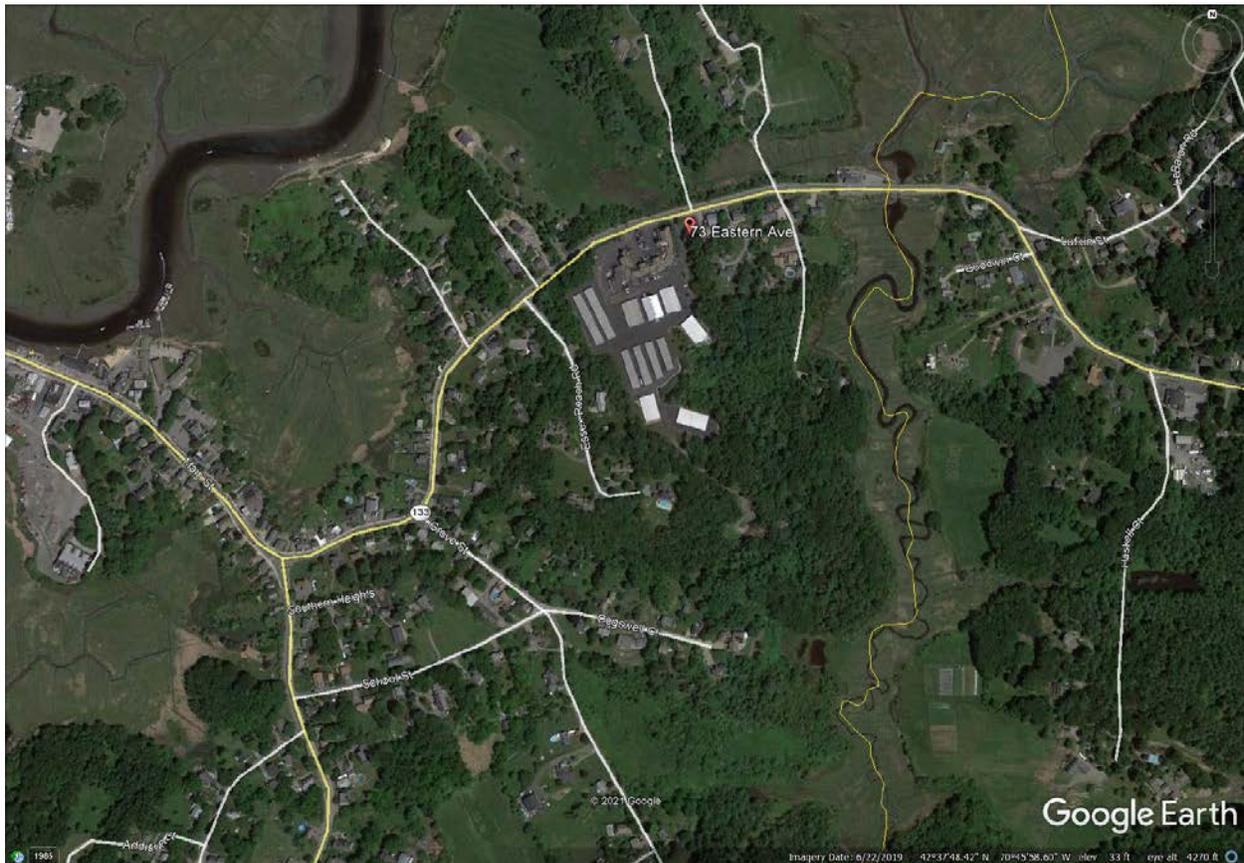
The process of identifying a technologically appropriate location, as well as the need for this communications facility is provided in the **RF Report** as prepared by **C Squared Systems, LLC** on November 6, 2020. As certified in that report, Verizon Wireless has identified the need to add a new facility to its existing network of sites in this area of Essex to improve coverage and capacity to a gap in service that now exists in areas along Route 133 and the surrounding neighborhoods, businesses and community in the proximity of the proposed site. To maintain a reliable and robust communications system for the individuals, businesses, public safety workers and others who use its network, Verizon Wireless deploys a network of cell sites (also called wireless communications facilities) throughout the areas in which it is licensed to provide service. Due to technological constraints, there is limited flexibility as to where

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<sup>1</sup> The RF spectrum is just one part of the electromagnetic spectrum. The electromagnetic spectrum contains all frequencies of electromagnetic radiation, which includes visible light, x-rays, microwaves, infrared and ultraviolet radiation, and gamma rays.

a new facility can be located and still function properly. The goal of the search area is to define the permissible location for placement of a cell site that will provide adequate service in the subject cell, and also work properly as part of the overall network.

The area of the significant gap in coverage and capacity in this area of Essex consists primarily of residential properties. Verizon Wireless performed an extensive search of all existing structures within the “search ring” in order to find an appropriate site for a wireless facility. There were no existing structures in the area that were suitable for attachment of wireless equipment to close Verizon Wireless’ significant gap in coverage.



**Aerial Photo Showing Area**

While not within the search area, there are three (3) existing towers identified in the Town of Essex shown below. There is an existing tower to the north located at 16 Treehill Lane, another tower to the west, off of Scott's Way and a final tower to the south, at the MA DCR Fire Tower off of Southern Avenue. As noted, none of the existing towers are within the identified search area and therefore they would not address Verizon Wireless’ network objectives to provide coverage and capacity service

to the areas along Route 133, Downtown Essex and surrounding roadways, neighborhoods, retail, dining, business and community areas.

With consideration of the Town's Bylaw requirements specifying a two mile distance between towers, there are very limited area to place a new tower that would satisfy the bylaw standard; concentrated in the marsh area north of Eastern Avenue which is not viable due to topography (shaded yellow on the map).



**Aerial Photo Showing Existing Towers two Mile Radius**

Verizon Wireless' radiofrequency engineers performed technical studies that identified a gap due in large part to the distances between its existing sites, the intervening topography and volume of traffic in the area, which results in these existing facilities not providing sufficient coverage and capacity to portions of Essex. Specifically, Verizon Wireless determined that portions of Essex are without reliable service along Route 133, Downtown Essex and surrounding roads, neighborhoods, retail, dining, business and community areas within the proximity of the proposed site and the downtown area. In order to close that gap, it is necessary to install a wireless facility to address the network requirements.

### **SITE IDENTIFICATION PROCESS**

Using the search area identified by Verizon Wireless' radio frequency engineer, TowerNorth then attempted to locate a commercial property within the search ring for the construction of a new wireless facility. The only commercially used lot in the area

that was of sufficient area, satisfied lot coverage requirement, and offered a vegetative screening is the property at 73 Eastern Avenue. TowerNorth reviewed numerous properties within the designated search area. Almost all other lots in the area are used for residential purposes that are too small, too crowded, lacked vegetative screening and were therefore ruled out as feasible alternatives.

TowerNorth did locate five sites that were potentially viable options and reviewed a further requested location on Rocky Hill Road. After a careful investigation of those sites, it was determined that the identified sites would not be feasible alternatives. This Analysis concludes that the site on the 73 Eastern Avenue property is the most suitable site to support the necessary facility to close Verizon Wireless' significant gap in coverage and address network capacity requirements.

Because Verizon Wireless' agents were unable to find an existing structure that would close its significant gap in wireless coverage, it was necessary to find a "raw land" site and construct a tower in order to close the gap. TowerNorth's Site acquisition specialists analyzed numerous properties within the search ring to find a site that would meet the following criteria:

- Sufficient ground space to permit construction of a wireless facility;
- Sufficient and unobstructed airspace to allow for the installation and maintenance of the tower, and effective propagation of wireless signals;
- Sufficient setback from lot lines, public ways, and residential structures;
- Adequate screening between proposed facility and residential areas;
- Topography that does not prevent the effective propagation of wireless signals;
- Avoidance of locations with zoning restrictions;
- Avoidance of locations within or close to historical structures or districts;
- Avoidance of locations within wetlands or other environmentally sensitive areas;
- Lack of adverse title conditions in land records for the property;
- Lack of environmental contamination at the site and in the surrounding area;
- Appropriate separation from airports, heliports, instrument approach area, or other aviation structure or area as required by the Federal Aviation Administration;
- Proper soil conditions to ensure that the tower foundation will be secure;

- Ability to bring utilities (power and telephone) onto the property;
- Unobstructed vehicle access to the area of the proposed facility; and
- Ability to secure a lease with the landowner on commercially reasonable terms.

In considering the location for the wireless communications facility, TowerNorth also considered compliance with Town of Essex Zoning Bylaws. The Bylaws impose standards for vegetative screening, height and setback distances. When considering locations for the proposed wireless communications facility, TowerNorth endeavored to find a property that would allow for compliance with the provisions and intent of the Town of Essex Zoning Bylaws.

### **ANALYSIS OF ALTERNATIVE SITES**

Most residentially used lots within the search ring are small lots that had very little free space due to building coverage. Almost none of them had any vegetative screening. For those reasons, the vast majority of residentially used lots within the search ring were ruled out as viable candidates.

Site acquisition specialists were able to identify some sites that required further investigation.

<b>PROPOSED SITE</b>		
<b>Site ID</b>	<b>Address</b>	<b>Description</b>
MA-044 Essex	65 and 73 Eastern Avenue (Map 127, Lots 22 & 23)	Commercially used properties for self storage facility and South Village Center shopping center

Six other sites were considered by TowerNorth, but ultimately rejected as feasible alternatives.

<b>REJECTED SITES</b>			
<b>Site ID</b>	<b>Address</b>	<b>Description</b>	<b>Reason for Rejection</b>
Rejected 1	147 Eastern Avenue (Map 137, Lot 14)	Specialized Auto	(a) Wetlands located on lot limiting access and utilities (b) Closer Proximity to Residences (c) Lack of developable location for wireless facility
Rejected 2	32 Haskell Court (Map 137, Lot 25)	Parcel to the rear of Specialized Auto	(a) Owner Not Interested (b) No response

Rejected 3	121 Eastern Avenue (Map 137, Lot 22)	Inlet Cafe	(a) Owner Not Interested (b) No response
Rejected 4	143 Eastern Avenue (Map 137, Lot 15)	Essex Seafood	(a) Owner Not Interested (b) No response
Rejected 5	119 Main Street (Map 136, Lot 133)	Woodman's of Essex	(a) Owner Not Interested (b) No response
Rejected 6	102 Rocky Hill Road (Map 152, Lot 23)		(a) Outside of designated search area (b) Does not adequately address Verizon Wireless' coverage and capacity gaps

### **CONCLUSION**

Based on the requirements of the Town of Essex Zoning Bylaws, the existing conditions and land use, numerous locations were identified for consideration. For the above listed reasons as well as the results of the review and analysis, the location at 65 and 73 Eastern Avenue is the only feasible location for the proposed facility.

**EXHIBIT 12**  
**FCC LICENSES TO OPERATE**

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Federal Communications Commission
Wireless Telecommunications Bureau

RADIO STATION AUTHORIZATION

LICENSEE: CELLCO PARTNERSHIP

ATTN: REGULATORY
CELLCO PARTNERSHIP
5055 NORTH POINT PKWY, NP2NE NETWORK ENGINEERING
ALPHARETTA, GA 30022

Table with Call Sign (KNLH242), File Number (0007716969), and Radio Service (CW - PCS Broadband).

FCC Registration Number (FRN): 0003290673

Table with columns: Grant Date, Effective Date, Expiration Date, Print Date, Market Number, Channel Block, Sub-Market Designator, Market Name, 1st Build-out Date, 2nd Build-out Date, 3rd Build-out Date, 4th Build-out Date.

Waivers/Conditions:

This authorization is subject to the condition that, in the event that systems using the same frequencies as granted herein are authorized in an adjacent foreign territory (Canada/United States), future coordination of any base station transmitters within 72 km (45 miles) of the United States/Canada border shall be required to eliminate any harmful interference to operations in the adjacent foreign territory and to ensure continuance of equal access to the frequencies by both countries.

This authorization is conditioned upon the full and timely payment of all monies due pursuant to Sections 1.2110 and 24.716 of the Commission's Rules and the terms of the Commission's installment plan as set forth in the Note and Security Agreement executed by the licensee. Failure to comply with this condition will result in the automatic cancellation of this authorization.

Conditions:

Pursuant to §309(h) of the Communications Act of 1934, as amended, 47 U.S.C. §309(h), this license is subject to the following conditions: This license shall not vest in the licensee any right to operate the station nor any right in the use of the frequencies designated in the license beyond the term thereof nor in any other manner than authorized herein. Neither the license nor the right granted thereunder shall be assigned or otherwise transferred in violation of the Communications Act of 1934, as amended. See 47 U.S.C. § 310(d). This license is subject in terms to the right of use or control conferred by §706 of the Communications Act of 1934, as amended. See 47 U.S.C. §606.

This license may not authorize operation throughout the entire geographic area or spectrum identified on the hardcopy version. To view the specific geographic area and spectrum authorized by this license, refer to the Spectrum and Market Area information under the Market Tab of the license record in the Universal Licensing System (ULS). To view the license record, go to the ULS homepage at http://wireless.fcc.gov/uls/index.htm?job=home and select "License Search". Follow the instructions on how to search for license information.

**Licensee Name:** CELLCO PARTNERSHIP

**Call Sign:** KNLH242

**File Number:** 0007716969

**Print Date:** 06-06-2017

**700 MHz Relicensed Area Information:**

<b>Market</b>	<b>Market Name</b>	<b>Buildout Deadline</b>	<b>Buildout Notification</b>	<b>Status</b>
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Federal Communications Commission
Wireless Telecommunications Bureau

RADIO STATION AUTHORIZATION

LICENSEE: CELLCO PARTNERSHIP

ATTN: REGULATORY
CELLCO PARTNERSHIP
5055 NORTH POINT PKWY, NP2NE NETWORK ENGINEERING
ALPHARETTA, GA 30022

Table with Call Sign (WQGA900), File Number, and Radio Service (AW - AWS (1710-1755 MHz and 2110-2155 MHz)).

FCC Registration Number (FRN): 0003290673

Table with columns: Grant Date, Effective Date, Expiration Date, Print Date, Market Number, Channel Block, Sub-Market Designator, Market Name, 1st Build-out Date, 2nd Build-out Date, 3rd Build-out Date, 4th Build-out Date.

Waivers/Conditions:

This authorization is conditioned upon the licensee, prior to initiating operations from any base or fixed station, making reasonable efforts to coordinate frequency usage with known co-channel and adjacent channel incumbent federal users operating in the 1710-1755 MHz band whose facilities could be affected by the proposed operations.

AWS operations must not cause harmful interference across the Canadian or Mexican Border. The authority granted herein is subject to future international agreements with Canada or Mexico, as applicable.

Conditions:

Pursuant to §309(h) of the Communications Act of 1934, as amended, 47 U.S.C. §309(h), this license is subject to the following conditions: This license shall not vest in the licensee any right to operate the station nor any right in the use of the frequencies designated in the license beyond the term thereof nor in any other manner than authorized herein.

This license may not authorize operation throughout the entire geographic area or spectrum identified on the hardcopy version. To view the specific geographic area and spectrum authorized by this license, refer to the Spectrum and Market Area information under the Market Tab of the license record in the Universal Licensing System (ULS).

**Licensee Name:** CELLCO PARTNERSHIP

**Call Sign:** WQGA900

**File Number:**

**Print Date:**

**700 MHz Relicensed Area Information:**

<b>Market</b>	<b>Market Name</b>	<b>Buildout Deadline</b>	<b>Buildout Notification</b>	<b>Status</b>
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Federal Communications Commission  
Wireless Telecommunications Bureau

RADIO STATION AUTHORIZATION

LICENSEE: CELLCO PARTNERSHIP

ATTN: REGULATORY  
CELLCO PARTNERSHIP  
5055 NORTH POINT PKWY, NP2NE NETWORK ENGINEERING  
ALPHARETTA, GA 30022

<b>Call Sign</b> WQGB266	<b>File Number</b>
<b>Radio Service</b> AW - AWS (1710-1755 MHz and 2110-2155 MHz)	

FCC Registration Number (FRN): 0003290673

<b>Grant Date</b> 11-29-2006	<b>Effective Date</b> 11-01-2016	<b>Expiration Date</b> 11-29-2021	<b>Print Date</b>
<b>Market Number</b> CMA006	<b>Channel Block</b> A	<b>Sub-Market Designator</b> 0	
<b>Market Name</b> Boston-Lowell-Brockton-Lawrenc			
<b>1st Build-out Date</b>	<b>2nd Build-out Date</b>	<b>3rd Build-out Date</b>	<b>4th Build-out Date</b>

Waivers/Conditions:

This authorization is conditioned upon the licensee, prior to initiating operations from any base or fixed station, making reasonable efforts to coordinate frequency usage with known co-channel and adjacent channel incumbent federal users operating in the 1710-1755 MHz band whose facilities could be affected by the proposed operations. See, e.g., FCC and NTIA Coordination Procedures in the 1710-1755 MHz Band, Public Notice, FCC 06-50, WTB Docket No. 02-353, rel. April 20, 2006.

Conditions:

Pursuant to §309(h) of the Communications Act of 1934, as amended, 47 U.S.C. §309(h), this license is subject to the following conditions: This license shall not vest in the licensee any right to operate the station nor any right in the use of the frequencies designated in the license beyond the term thereof nor in any other manner than authorized herein. Neither the license nor the right granted thereunder shall be assigned or otherwise transferred in violation of the Communications Act of 1934, as amended. See 47 U.S.C. § 310(d). This license is subject in terms to the right of use or control conferred by §706 of the Communications Act of 1934, as amended. See 47 U.S.C. §606.

This license may not authorize operation throughout the entire geographic area or spectrum identified on the hardcopy version. To view the specific geographic area and spectrum authorized by this license, refer to the Spectrum and Market Area information under the Market Tab of the license record in the Universal Licensing System (ULS). To view the license record, go to the ULS homepage at <http://wireless.fcc.gov/uls/index.htm?job=home> and select "License Search". Follow the instructions on how to search for license information.

**Licensee Name:** CELLCO PARTNERSHIP

**Call Sign:** WQGB266

**File Number:**

**Print Date:**

The license is subject to compliance with the provisions of the January 12, 2001 Agreement between Deutsche Telekom AG, VoiceStream Wireless Corporation, VoiceStream Wireless Holding Corporation and the Department of Justice (DOJ) and the Federal Bureau of Investigation (FBI), which addresses national security, law enforcement, and public safety issues of the FBI and the DOJ regarding the authority granted by this license. Nothing in the Agreement is intended to limit any obligation imposed by Federal law or regulation including, but not limited to, 47 U.S.C. Section 222(a) and (c)(1) and the FCC's implementing regulations. The Agreement is published at VoiceStream-DT Order, IB Docket No. 00-187, FCC 01-142, 16 FCC Rcd 9779, 9853 (2001).

Reference Copy

**Licensee Name:** CELLCO PARTNERSHIP

**Call Sign:** WQGB266

**File Number:**

**Print Date:**

**700 MHz Relicensed Area Information:**

<b>Market</b>	<b>Market Name</b>	<b>Buildout Deadline</b>	<b>Buildout Notification</b>	<b>Status</b>
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Federal Communications Commission
Wireless Telecommunications Bureau

RADIO STATION AUTHORIZATION

LICENSEE: CELLCO PARTNERSHIP

ATTN: REGULATORY
CELLCO PARTNERSHIP
5055 NORTH POINT PKWY, NP2NE NETWORK ENGINEERING
ALPHARETTA, GA 30022

Table with Call Sign (WQJQ689), File Number, and Radio Service (WU - 700 MHz Upper Band (Block C)).

FCC Registration Number (FRN): 0003290673

Table with columns: Grant Date, Effective Date, Expiration Date, Print Date, Market Number, Channel Block, Sub-Market Designator, Market Name, 1st Build-out Date, 2nd Build-out Date, 3rd Build-out Date, 4th Build-out Date.

Waivers/Conditions:

If the facilities authorized herein are used to provide broadcast operations, whether exclusively or in combination with other services, the licensee must seek renewal of the license either within eight years from the commencement of the broadcast service or within the term of the license had the broadcast service not been provided, whichever period is shorter in length. See 47 CFR §27.13(b).

This authorization is conditioned upon compliance with section 27.16 of the Commission's rules

Conditions:

Pursuant to §309(h) of the Communications Act of 1934, as amended, 47 U.S.C. §309(h), this license is subject to the following conditions: This license shall not vest in the licensee any right to operate the station nor any right in the use of the frequencies designated in the license beyond the term thereof nor in any other manner than authorized herein. Neither the license nor the right granted thereunder shall be assigned or otherwise transferred in violation of the Communications Act of 1934, as amended. See 47 U.S.C. § 310(d). This license is subject in terms to the right of use or control conferred by §706 of the Communications Act of 1934, as amended. See 47 U.S.C. §606.

This license may not authorize operation throughout the entire geographic area or spectrum identified on the hardcopy version. To view the specific geographic area and spectrum authorized by this license, refer to the Spectrum and Market Area information under the Market Tab of the license record in the Universal Licensing System (ULS). To view the license record, go to the ULS homepage at http://wireless.fcc.gov/uls/index.htm?job=home and select "License Search". Follow the instructions on how to search for license information.

**Licensee Name:** CELLCO PARTNERSHIP

**Call Sign:** WQJQ689

**File Number:**

**Print Date:**

**700 MHz Relicensed Area Information:**

<b>Market</b>	<b>Market Name</b>	<b>Buildout Deadline</b>	<b>Buildout Notification</b>	<b>Status</b>
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**Federal Communications Commission  
Wireless Telecommunications Bureau**

**RADIO STATION AUTHORIZATION**

LICENSEE: CELLCO PARTNERSHIP

ATTN: REGULATORY  
CELLCO PARTNERSHIP  
5055 NORTH POINT PKWY, NP2NE NETWORK ENGINEERING  
ALPHARETTA, GA 30022

<b>Call Sign</b> KNKA201	<b>File Number</b>
<b>Radio Service</b> CL - Cellular	
<b>Market Numer</b> CMA006	<b>Channel Block</b> B
<b>Sub-Market Designator</b> 0	

**FCC Registration Number (FRN):** 0003290673

<b>Market Name</b> Boston-Lowell-Brockton-Lawrenc
--

<b>Grant Date</b> 08-26-2014	<b>Effective Date</b> 11-01-2016	<b>Expiration Date</b> 10-01-2024	<b>Five Yr Build-Out Date</b>	<b>Print Date</b>
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**Site Information:**

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
1	42-38-26.3 N	070-36-25.2 W	36.3	35.7	

**Address:** (Rockport) Thatcher Road

**City:** Rockport **County:** ESSEX **State:** MA **Construction Deadline:**

**Antenna: 5**

<b>Maximum Transmitting ERP in Watts:</b>	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
<b>Antenna Height AAT (meters)</b>	70.400	34.100	34.100	34.100	70.400	67.800	55.200	61.300
<b>Transmitting ERP (watts)</b>	246.920	325.500	33.310	0.940	0.820	0.820	1.210	20.070

**Antenna: 6**

<b>Maximum Transmitting ERP in Watts:</b>	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
<b>Antenna Height AAT (meters)</b>	70.400	34.100	34.100	34.100	70.400	67.800	55.200	61.300
<b>Transmitting ERP (watts)</b>	0.820	3.330	54.020	373.730	191.670	10.780	0.820	0.820

**Antenna: 7**

<b>Maximum Transmitting ERP in Watts:</b>	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
<b>Antenna Height AAT (meters)</b>	70.400	34.100	34.100	34.100	70.400	67.800	55.200	61.300
<b>Transmitting ERP (watts)</b>	3.330	0.820	0.820	0.820	7.810	126.630	409.780	89.650

**Conditions:**

Pursuant to §309(h) of the Communications Act of 1934, as amended, 47 U.S.C. §309(h), this license is subject to the following conditions: This license shall not vest in the licensee any right to operate the station nor any right in the use of the frequencies designated in the license beyond the term thereof nor in any other manner than authorized herein. Neither the license nor the right granted thereunder shall be assigned or otherwise transferred in violation of the Communications Act of 1934, as amended. See 47 U.S.C. § 310(d). This license is subject in terms to the right of use or control conferred by §706 of the Communications Act of 1934, as amended. See 47 U.S.C. §606.

Licensee Name: CELLCO PARTNERSHIP

Call Sign: KNKA201

File Number:

Print Date:

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
4	42-08-56.4 N	071-24-55.2 W	75.6	44.2	

Address: 113 Main Street

City: Medway County: NORFOLK State: MA Construction Deadline:

Antenna: 4

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	59.500	66.700	61.200	46.900	23.900	39.300	13.900	12.300
Transmitting ERP (watts)	81.280	89.130	24.550	1.120	0.200	0.200	0.420	16.600

Antenna: 5

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	59.500	66.700	61.200	46.900	23.900	39.300	13.900	12.300
Transmitting ERP (watts)	0.200	2.000	33.800	95.500	67.610	10.700	0.200	0.200

Antenna: 6

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	59.500	66.700	61.200	46.900	23.900	39.300	13.900	12.300
Transmitting ERP (watts)	3.890	0.200	0.200	0.200	6.760	57.540	100.000	44.670

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
9	42-11-42.4 N	070-49-10.2 W	57.9	56.1	

Address: (Scituate) OFF CLAPP RD

City: SCITUATE County: PLYMOUTH State: MA Construction Deadline:

Antenna: 7

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	105.300	106.100	93.800	85.900	95.600	76.500	81.800	104.300
Transmitting ERP (watts)	172.400	167.230	26.990	1.190	0.960	0.960	1.720	28.870

Antenna: 8

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	105.300	106.100	93.800	85.900	95.600	76.500	81.800	104.300
Transmitting ERP (watts)	0.980	3.910	54.020	409.780	200.700	15.220	0.980	0.980

Antenna: 9

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	105.300	106.100	93.800	85.900	95.600	76.500	81.800	104.300
Transmitting ERP (watts)	4.490	0.980	0.980	1.300	10.060	123.750	449.320	96.060

Licensee Name: CELLCO PARTNERSHIP

Call Sign: KNKA201

File Number:

Print Date:

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
10	42-52-57.3 N	071-16-28.2 W	163.0	58.2	

Address: (Derry) 46 FLOYD ROAD

City: DERRY County: ROCKINGHAM State: NH Construction Deadline:

Antenna: 4

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	82.200	129.400	144.500	155.100	136.800	127.900	126.200	118.100
Transmitting ERP (watts)	31.810	146.820	102.310	15.410	1.000	1.000	1.000	1.130

Antenna: 5

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	82.200	129.400	144.500	155.100	136.800	127.900	126.200	118.100
Transmitting ERP (watts)	1.000	1.000	4.660	82.110	250.350	80.300	3.790	1.000

Antenna: 6

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	80.200	129.400	144.500	155.100	136.800	127.900	126.200	118.100
Transmitting ERP (watts)	32.480	1.680	1.000	1.000	1.000	13.740	107.220	143.470

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
12	41-52-08.3 N	070-52-56.1 W	29.6	58.2	

Address: (Middleboro) E. GROVE ST.

City: MIDDLESBORO County: PLYMOUTH State: MA Construction Deadline:

Antenna: 7

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	57.600	32.400	40.200	47.600	44.900	41.300	50.300	52.600
Transmitting ERP (watts)	277.330	364.730	40.890	2.250	0.960	0.960	2.410	20.640

Antenna: 8

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	57.600	32.400	40.200	47.600	44.900	41.300	50.300	52.600
Transmitting ERP (watts)	0.960	3.730	61.620	418.280	215.780	13.090	1.700	0.960

Antenna: 9

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	57.600	32.400	40.200	47.600	44.900	41.300	50.300	52.600
Transmitting ERP (watts)	5.070	1.130	0.610	1.600	5.050	89.040	278.490	66.210

Licensee Name: CELLCO PARTNERSHIP

Call Sign: KNKA201

File Number:

Print Date:

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
14	42-28-06.3 N	071-27-16.2 W	102.1	54.0	

Address: Main Street

City: South Acton County: MIDDLESEX State: MA Construction Deadline:

Antenna: 4

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	69.000	79.000	105.500	96.200	72.600	76.300	47.400	58.700
Transmitting ERP (watts)	65.200	77.960	20.970	2.400	0.200	0.200	2.000	13.720

Antenna: 5

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	69.000	79.900	105.500	96.200	72.600	76.300	47.400	58.700
Transmitting ERP (watts)	0.200	3.880	23.800	59.780	43.360	10.290	0.830	0.200

Antenna: 6

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	76.400	65.500	105.500	96.200	72.600	76.300	47.400	58.700
Transmitting ERP (watts)	5.010	0.420	0.200	0.740	6.570	43.660	91.210	34.920

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
15	42-30-08.4 N	070-55-02.2 W	39.6	46.3	

Address: 12 First Street

City: Salem County: ESSEX State: MA Construction Deadline:

Antenna: 7

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	63.400	62.100	62.800	77.900	77.500	70.500	40.900	50.900
Transmitting ERP (watts)	49.150	56.730	19.190	2.360	0.200	0.200	1.930	12.920

Antenna: 8

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	63.400	62.100	62.800	77.900	77.500	70.500	40.900	50.900
Transmitting ERP (watts)	0.100	1.550	9.520	23.920	17.350	4.120	0.330	0.100

Antenna: 9

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	63.400	62.100	62.800	77.900	77.500	70.500	40.900	50.900
Transmitting ERP (watts)	5.010	0.380	0.200	0.680	6.510	35.500	64.630	29.380

Licensee Name: CELLCO PARTNERSHIP

Call Sign: KNKA201

File Number:

Print Date:

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
16	42-16-51.4 N	071-02-04.2 W	5.2	53.0	

Address: 100 HANCOCK STREET

City: QUINCY County: NORFOLK State: MA Construction Deadline:

Antenna: 5

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	43.000	44.100	42.200	29.000	8.300	14.800	12.100	31.500
Transmitting ERP (watts)	7.170	6.480	6.790	0.320	0.100	0.100	0.160	5.630

Antenna: 6

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	40.900	41.900	40.000	26.800	6.200	12.600	9.900	29.300
Transmitting ERP (watts)	0.100	0.340	3.140	2.480	2.970	1.500	0.100	0.100

Antenna: 7

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	43.000	44.100	42.200	29.000	8.300	14.800	12.100	31.500
Transmitting ERP (watts)	0.100	0.100	0.100	0.120	2.640	2.770	2.720	2.360

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
21	42-30-36.4 N	070-51-21.2 W	23.2	47.2	

Address: Tioga Way

City: Marblehead County: ESSEX State: MA Construction Deadline:

Antenna: 2

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	44.200	46.700	37.200	60.400	60.400	54.600	28.000	43.700
Transmitting ERP (watts)	0.100	0.130	3.130	7.860	6.600	1.220	0.100	0.100

Antenna: 3

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	44.200	46.700	37.200	60.400	60.400	54.600	28.000	43.700
Transmitting ERP (watts)	0.410	0.100	0.100	0.100	0.530	5.070	8.210	4.870

Antenna: 4

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	44.200	46.700	37.200	60.400	60.400	54.600	28.000	43.700
Transmitting ERP (watts)	6.780	7.760	2.800	0.100	0.100	0.100	0.100	1.540

Licensee Name: CELLCO PARTNERSHIP

Call Sign: KNKA201

File Number:

Print Date:

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
22	42-51-55.4 N	070-56-13.2 W	94.5	50.9	

Address: (Amesbury) 10 DENNET WAY

City: AMESBURY County: ESSEX State: MA Construction Deadline:

Antenna: 4

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	117.000	123.800	125.500	137.800	126.100	109.800	94.200	100.300
Transmitting ERP (watts)	178.880	225.190	34.880	0.860	0.860	0.860	0.860	10.780

Antenna: 5

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	117.000	123.800	125.500	137.800	126.100	109.800	94.200	100.300
Transmitting ERP (watts)	0.860	1.240	35.690	258.560	148.780	12.380	0.860	0.860

Antenna: 6

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	117.000	123.800	125.500	137.800	126.100	109.800	94.200	100.300
Transmitting ERP (watts)	3.110	0.830	0.860	0.860	3.110	89.650	270.740	81.760

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
24	42-03-31.4 N	071-17-29.2 W	105.5	59.1	

Address: (Wrentham) 415 Washington St. - Route 1

City: WRENTHAM County: NORFOLK State: MA Construction Deadline:

Antenna: 4

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	99.900	78.700	94.600	120.300	114.800	77.800	71.700	95.700
Transmitting ERP (watts)	2.580	85.500	401.990	363.280	54.920	1.060	0.850	0.850

Antenna: 5

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	99.900	78.700	94.600	120.300	114.800	77.800	71.700	95.700
Transmitting ERP (watts)	0.850	0.850	0.850	8.930	146.240	311.250	197.740	18.980

Antenna: 6

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	99.900	78.700	94.600	120.300	114.800	77.800	71.700	95.700
Transmitting ERP (watts)	352.500	136.390	5.560	0.980	0.980	0.980	39.210	263.760

Licensee Name: CELLCO PARTNERSHIP

Call Sign: KNKA201

File Number:

Print Date:

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
25	43-10-34.3 N	071-12-24.2 W	335.3	31.4	

Address: (Northwood) SADDLEBACK MOUNTAIN

City: NORTHWOOD County: ROCKINGHAM State: NH Construction Deadline:

Antenna: 4

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	152.900	213.700	260.100	268.500	234.000	215.400	150.700	173.600
Transmitting ERP (watts)	45.240	219.790	199.540	31.860	1.550	1.000	1.000	2.360

Antenna: 5

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	152.900	213.700	260.100	268.500	234.000	215.400	150.700	173.600
Transmitting ERP (watts)	1.000	1.000	6.160	105.350	236.610	142.220	7.190	1.780

Antenna: 6

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	152.900	213.700	260.100	268.500	234.000	215.400	150.700	173.600
Transmitting ERP (watts)	55.630	1.980	1.000	1.000	2.260	8.170	110.540	141.320

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
27	41-41-13.4 N	070-48-25.1 W	22.9	59.4	

Address: (Mattapoisett) Industrial Drive

City: Mattapoisett County: PLYMOUTH State: MA Construction Deadline:

Antenna: 4

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	61.700	76.400	79.200	79.900	80.600	75.400	56.100	60.600
Transmitting ERP (watts)	217.540	281.390	29.930	2.050	0.980	0.980	2.340	21.270

Antenna: 5

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	61.700	76.400	79.300	79.900	80.600	75.400	56.100	60.600
Transmitting ERP (watts)	0.980	10.610	118.800	349.190	74.510	4.550	0.980	0.980

Antenna: 6

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	61.700	76.400	79.200	79.900	80.600	75.400	56.100	60.600
Transmitting ERP (watts)	2.220	0.980	0.980	2.540	27.640	252.570	253.110	22.510

Licensee Name: CELLCO PARTNERSHIP

Call Sign: KNKA201

File Number:

Print Date:

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
29	41-55-21.0 N	070-39-05.0 W	39.6	77.4	1021869

Address: (Plymouth) CALEB ST

City: Plymouth County: PLYMOUTH State: MA Construction Deadline:

Antenna: 4

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	94.600	84.200	79.500	67.900	61.400	63.600	52.500	63.200
Transmitting ERP (watts)	252.450	246.240	37.800	1.470	0.940	0.940	2.080	39.370

Antenna: 5

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	94.600	84.200	79.500	67.900	61.400	63.600	52.500	63.200
Transmitting ERP (watts)	1.000	3.000	53.330	346.500	184.150	15.870	1.000	1.000

Antenna: 6

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	94.600	84.200	79.500	67.900	61.400	63.600	52.500	63.200
Transmitting ERP (watts)	4.660	1.000	1.000	1.000	5.610	128.480	425.450	99.740

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
31	42-14-40.0 N	071-30-38.0 W	142.6	102.0	1009024

Address: 1.25 MI NNE

City: HOPKINTON County: MIDDLESEX State: MA Construction Deadline:

Antenna: 4

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	107.800	138.000	130.800	126.800	101.200	85.900	73.000	97.500
Transmitting ERP (watts)	23.200	21.890	16.370	2.550	0.130	0.100	1.640	13.250

Antenna: 5

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	107.800	138.000	130.800	126.800	101.200	85.900	73.000	97.500
Transmitting ERP (watts)	0.940	9.100	53.990	96.320	78.580	26.320	3.730	0.460

Antenna: 6

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	107.800	138.000	130.800	126.800	101.200	85.900	73.000	97.500
Transmitting ERP (watts)	13.400	1.700	0.620	2.340	18.300	72.460	95.170	63.740

Licensee Name: CELLCO PARTNERSHIP

Call Sign: KNKA201

File Number:

Print Date:

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
34	42-23-29.5 N	071-07-22.9 W	7.9	26.8	

Address: 2067 MASSACHUSETTS AVENUE

City: CAMBRIDGE County: SUFFOLK State: MA Construction Deadline:

Antenna: 4

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	-3.400	5.800	21.700	28.600	13.000	-2.600	-14.400	-21.300
Transmitting ERP (watts)	6.780	7.760	2.800	0.100	0.100	0.100	0.100	1.540

Antenna: 5

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	-3.400	5.800	21.700	28.600	13.000	-2.600	-14.400	-21.300
Transmitting ERP (watts)	0.100	0.130	3.130	7.860	6.600	1.220	0.100	0.100

Antenna: 6

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	-3.400	5.800	21.700	28.300	13.000	-2.600	-14.400	-21.300
Transmitting ERP (watts)	0.410	0.100	0.100	0.100	0.530	5.070	8.210	4.870

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
35	42-39-16.7 N	071-44-12.3 W	192.6	51.2	

Address: 84 Bayberry Hill Road

City: Townsend County: MIDDLESEX State: MA Construction Deadline:

Antenna: 2

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	57.900	139.500	149.200	136.100	102.200	42.700	-79.000	-25.700
Transmitting ERP (watts)	0.580	7.080	42.660	95.500	77.620	22.390	2.820	0.460

Antenna: 4

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	51.300	146.600	148.900	136.600	101.300	25.000	-79.700	-22.300
Transmitting ERP (watts)	35.060	35.620	17.670	2.660	0.200	0.150	1.860	13.500

Antenna: 5

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	51.300	146.600	148.900	136.600	101.300	25.000	-79.700	-22.300
Transmitting ERP (watts)	5.360	0.690	0.250	0.930	7.320	28.980	38.070	25.500

Licensee Name: CELLCO PARTNERSHIP

Call Sign: KNKA201

File Number:

Print Date:

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
38	42-38-45.8 N	071-05-37.7 W	117.3	52.4	

Address: 5 Boston Hill Road

City: North Andover County: ESSEX State: MA Construction Deadline:

Antenna: 4

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	96.900	98.200	110.000	111.300	110.000	101.700	90.300	106.200
Transmitting ERP (watts)	83.180	87.100	23.990	2.290	0.200	0.200	1.820	20.420

Antenna: 5

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	96.900	98.100	110.000	111.300	110.000	101.700	90.200	106.200
Transmitting ERP (watts)	0.240	4.170	38.020	97.720	66.070	11.750	1.050	0.200

Antenna: 6

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	96.900	98.200	110.000	111.300	110.000	101.700	90.200	106.200
Transmitting ERP (watts)	5.250	0.340	0.200	0.830	9.770	60.262	100.000	42.660

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
39	42-18-13.0 N	071-13-05.0 W	44.8	96.0	1018331

Address: 140 CABOT ST

City: NEEDHAM County: NORFOLK State: MA Construction Deadline:

Antenna: 1

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	44.200	68.400	58.900	48.800	36.300	40.300	44.100	41.600
Transmitting ERP (watts)	30.340	35.650	9.380	0.920	0.100	0.100	0.610	6.050

Antenna: 2

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	44.200	68.400	58.900	48.800	36.300	40.300	44.100	41.600
Transmitting ERP (watts)	0.100	1.230	10.440	23.990	19.000	4.420	0.370	0.100

Antenna: 3

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	44.200	68.400	58.900	48.800	36.300	40.300	44.100	41.600
Transmitting ERP (watts)	2.200	0.190	0.100	0.300	2.700	19.270	35.660	16.260

Licensee Name: CELLCO PARTNERSHIP

Call Sign: KNKA201

File Number:

Print Date:

Location	Latitude	Longitude	Ground Elevation (meters)	Structure Hgt to Tip (meters)	Antenna Structure Registration No.
41	42-22-16.6 N	071-05-49.6 W	6.3	18.6	

Address: (Cambridge Donnelly Field site) 284 Norfolk Street

City: Cambridge County: MIDDLESEX State: MA Construction Deadline: 07-03-2014

**Antenna: 1**

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	-11.600	16.500	20.700	21.000	2.200	-20.400	2.300	-16.900
Transmitting ERP (watts)	48.150	197.980	63.920	1.080	0.680	0.680	0.680	0.850

**Antenna: 2**

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	-11.600	16.500	20.700	21.000	2.200	-20.400	2.300	-16.900
Transmitting ERP (watts)	0.670	0.670	18.990	128.120	74.750	3.300	0.670	0.670

**Antenna: 3**

Maximum Transmitting ERP in Watts:	140.820							
Azimuth(from true north)	0	45	90	135	180	225	270	315
Antenna Height AAT (meters)	-10.600	17.600	21.700	22.000	3.200	-19.400	3.400	-15.900
Transmitting ERP (watts)	28.690	0.650	0.650	0.650	0.650	5.700	114.450	208.740

**Control Points:**

**Control Pt. No. 3**

Address: 500 W. Dove Rd.

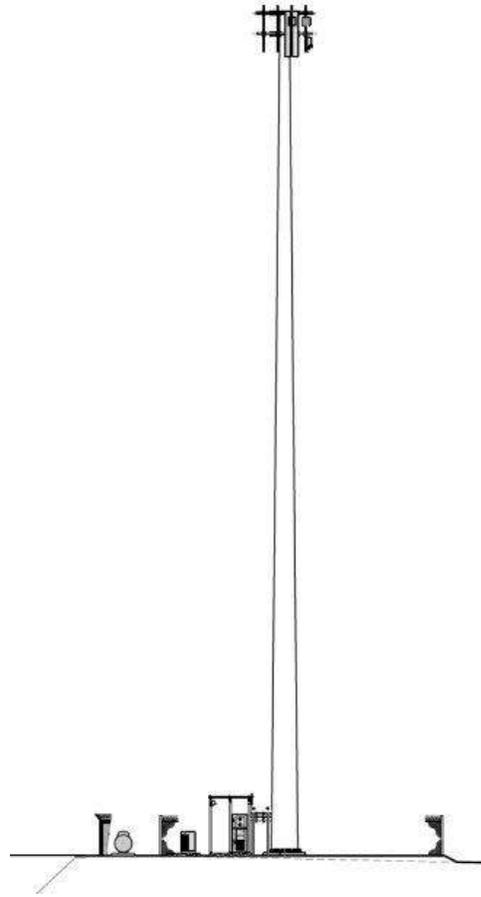
City: Southlake County: TARRANT State: TX Telephone Number: (800)264-6620

**Waivers/Conditions:**

THE FOLLOWING CELLULAR GEOGRAPHIC SERVICE AREAS HAVE BEEN COMBINED (LISTED BY CALL SIGN, MARKET NUMBER AND BLOCK, AND MARKET NAME): KNKA201 6B BOSTON, MASSACHUSETTS KNKA251 76B

**EXHIBIT 13**  
**ENVIRONMENTAL SOUND ASSESSMENT**

# Environmental Sound Assessment



Wireless Communications Facility  
*73 Eastern Avenue Route 133*  
*Essex, Massachusetts 01929*

January 22, 2021

Prepared For:

**Verizon Wireless**  
118 Flanders Road  
Westborough, MA 01581



Prepared By:

**Modeling Specialties**  
30 Maple Road  
Westford, MA 01886



## **ENVIRONMENTAL SOUND ASSESSMENT**

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Verizon Wireless proposes to build and operate a wireless telecommunications facility in Essex, MA to support wireless communication in the area. The installation includes antennas mounted inside a 150-foot monopole. Supporting equipment is located in a fenced compound at the foot of the pole. Verizon Wireless will install electronics and utilities in the new compound area to support their antennas on the pole. Verizon Wireless' equipment will include an emergency generator within its own sound enclosure. The fenced compound will be expanded by an area of 4'6" by 14 feet to accommodate the propane tank. Their generator will operate only during emergencies and for routine daytime testing of about one-half hour per week.

This report addresses the sources related to the Verizon wireless installation and an evaluation of corresponding sound levels at nearest residences in representative directions. The equipment configuration and siting were designed specifically to minimize environmental effects.

### **Overview of Project and Site Vicinity**

The project is located at 73 Eastern Avenue in Essex. The equipment compound is about 375 feet from the nearest residence to the west. This analysis will consider facility sounds at the nearest residences to the east, south and west. The host facility and Route 133 are to the north.

The Essex By-Laws were reviewed to identify any quantitative standards for facility sounds. Section 4-3.3 addresses various annoyances but without specific standards. Section 6-3.4.2.e identifies telecommunications facilities as a use requiring special permit. Performance standards for such facilities are provided in Section 6-3.4.5 but don't include specific sound levels. The MDEP standards are based on existing ambient levels. Ambient levels have been measured off Rte 133 in the site area finding daytime levels in the mid 40's dBA and nighttime levels in the low 30's dBA. These levels are typical of sites within a thousand feet of a secondary arterial with a major highway (I-95) within two miles. An appropriate project goal for daytime sources would in the 50's dBA. The goal of 50 dBA will be used to identify sound levels in keeping with the existing character of the area.

The Verizon Wireless equipment sound was estimated using vendor data and measurements made at similar installations. The corresponding levels expected at the sensitive locations were estimated using noise modeling techniques prescribed in acoustical literature. Plans and equipment details were provided by Verizon Wireless to support this evaluation of sounds. This conservative study is based on the highest sound levels that the equipment is expected to make even though it makes that sound only a small fraction of the time. Figure 1 is a Google Earth aerial image that is annotated to show the orientation of the proposed equipment and surrounding area. The property boundaries and nearest residences can be seen on the figure.



**Figure 1:** Project Area Showing the Site and Nearest Receptors in Representative Directions

## Discussion of General Noise Analysis Methods

There are a number of ways in which sound (noise) levels are evaluated. All of them use the logarithmic decibel (dB) scale. Following is a brief introduction to the environmental noise terminology used in this assessment.

### *Noise Metrics*

The sounds in our environment usually vary with time, so they cannot always be described with a single number. Two methods are used for describing variable sounds. These are *exceedance levels* and *equivalent level*. Both are derived from a large number of moment-to-moment A-weighted sound level measurements. For example:

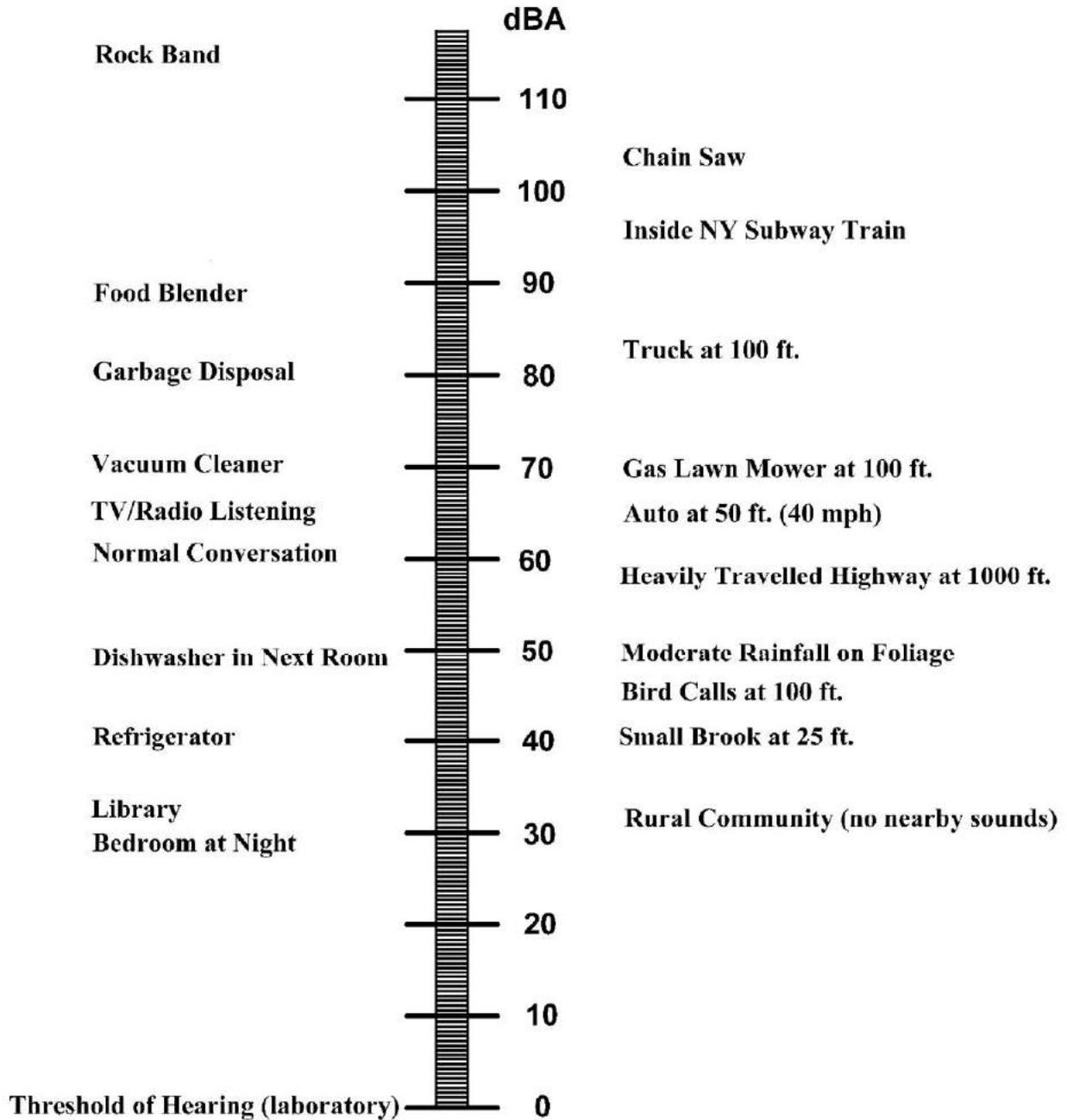
- ◆  $L_{90}$  is the sound level in dBA exceeded 90 percent of the time during the measurement period. The  $L_{90}$  is close to the lowest sound level observed. It is essentially the same as the *residual* sound level, which is the sound level observed when there are no loud, transient noises.
- ◆  $L_{50}$  is the median sound level in dBA exceeded 50 percent of the time during the measurement period.
- ◆  $L_{10}$  is the sound level in dBA exceeded only 10 percent of the time. It is close to the maximum level observed during the measurement period. The  $L_{10}$  is sometimes called the *intrusive* sound level because it is caused by occasional louder noises like those from passing motor vehicles.
- ◆  $L_{eq}$  or the *equivalent level* is the level of a hypothetical steady sound that has the same energy as the actual fluctuating sound observed. The equivalent level is designated  $L_{eq}$  and is also A-weighted. The equivalent level is strongly influenced by occasional loud, intrusive noises.

By using exceedance levels, it is possible to separate prevailing, steady sounds ( $L_{90}$ ) from occasional, louder sounds ( $L_{10}$ ) in the environment. When a steady sound is observed, all of the  $L_n$  and  $L_{eq}$  are equal. This assessment is intended to be a conservative estimate of sound that has the potential to be emitted outside the host site. Receptors were located at the nearest part of the site property line. Because sound levels are reduced with distance, sound levels at more distant locations would be less than identified here.

This conservative study is based on measuring the sound level at nearest property line at a moment when all Verizon Wireless sources operate together (which may never happen). It is also based on having no other ambient sounds present (which never happens). As a reference, Figure 2 illustrates typical sound levels produced by various sources that are familiar to most people. The most significant sound that will be added to this site is the Verizon Wireless emergency generator that will routinely be tested for one half-hour per week. Substantially less sound will come from the cabinet ventilation fans but it is included in the study.

### Common Indoor Sounds

### Common Outdoor Sounds



**Figure 2:**  
Typical Sound Levels from Everyday Experience

## Expected Sounds from the Proposed Facility Expansion

Most of the equipment planned for this facility has no potential of emitting sound. Cabling, antennas and substructure have no sound producing sources. Utilities will be underground. Only one steady source and two occasional sources are planned for this facility and are quantified below.

The only routine Verizon Wireless sound source at this facility is their electronics cabinet fan. The small fan on the front door of the cabinet draws ambient air into the unit. It has a smooth broadband character that produces about 50 dBA at 3 feet from the unit. The fan on the electronics cabinet will operate continuously, so there will be no variation from moment-to-moment or cycling from equipment startup. The field image to the right shows the cooling unit on the front door of the cabinet.



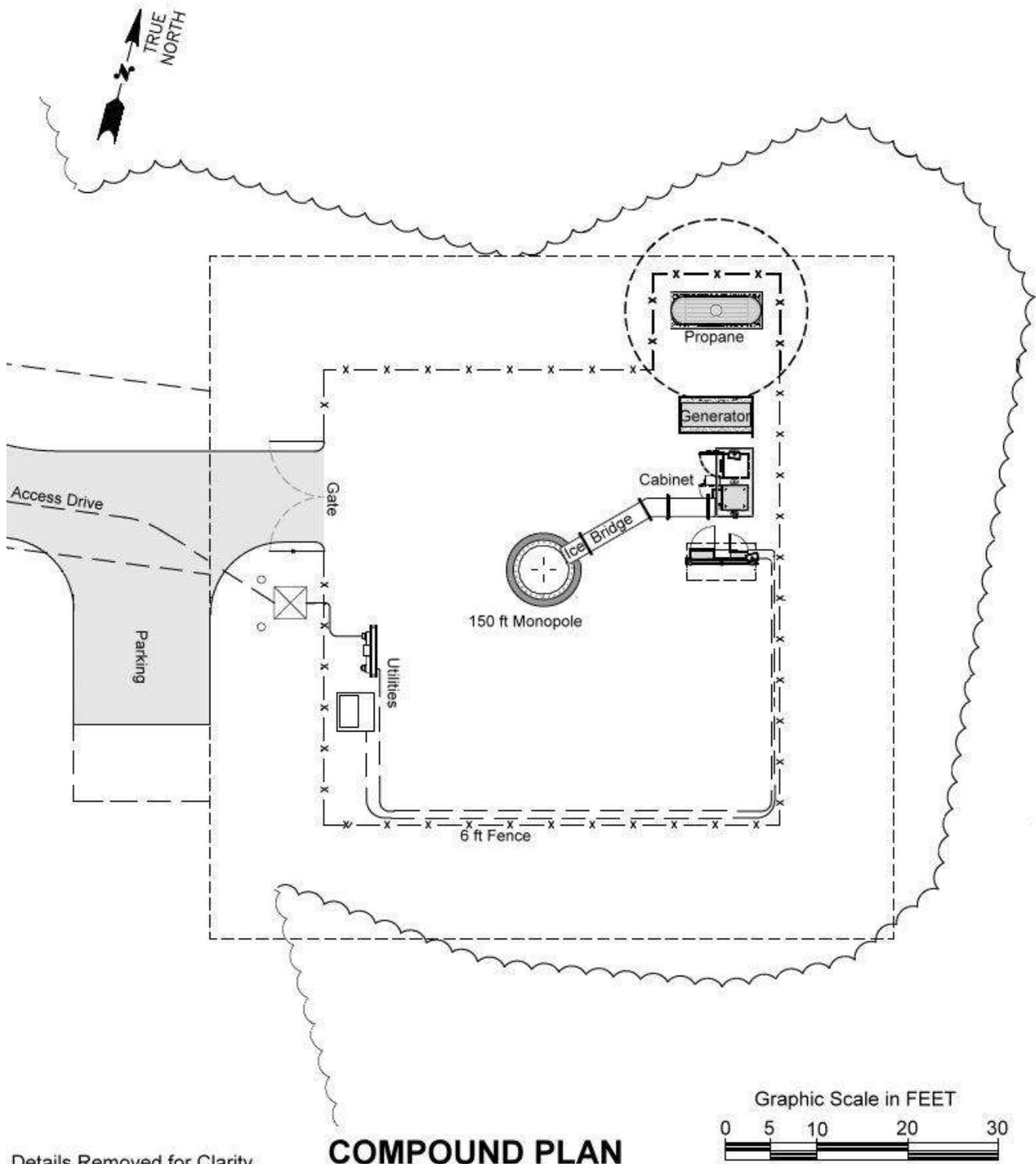
### *Non-Routine Sound Emissions*

The electronics equipment in the cabinets is temperature sensitive. When the cabinet exceeds a safe temperature even with the fan, a heat pump (cooler) mounted on the cabinet door will provide additional cooling to protect the equipment. The cabinet cooler is expected to operate only in the hottest summer days with high ambient temperature (usually above 90° F). The cabinets are outdoors but are shaded by an overhead ice-shield. During its infrequent operation, the cooler produces 50 dBA at 23 feet from the face of the unit.

The facility will include a generator installed inside a sound reducing enclosure. The unit will never provide routine power to the facility. It will operate only under two conditions. It will occasionally be tested to assure its availability for emergency backup. If utility power is lost, the generator will be launched to power the facility. In this way, the facility will provide continuous service even in an extended power outage.



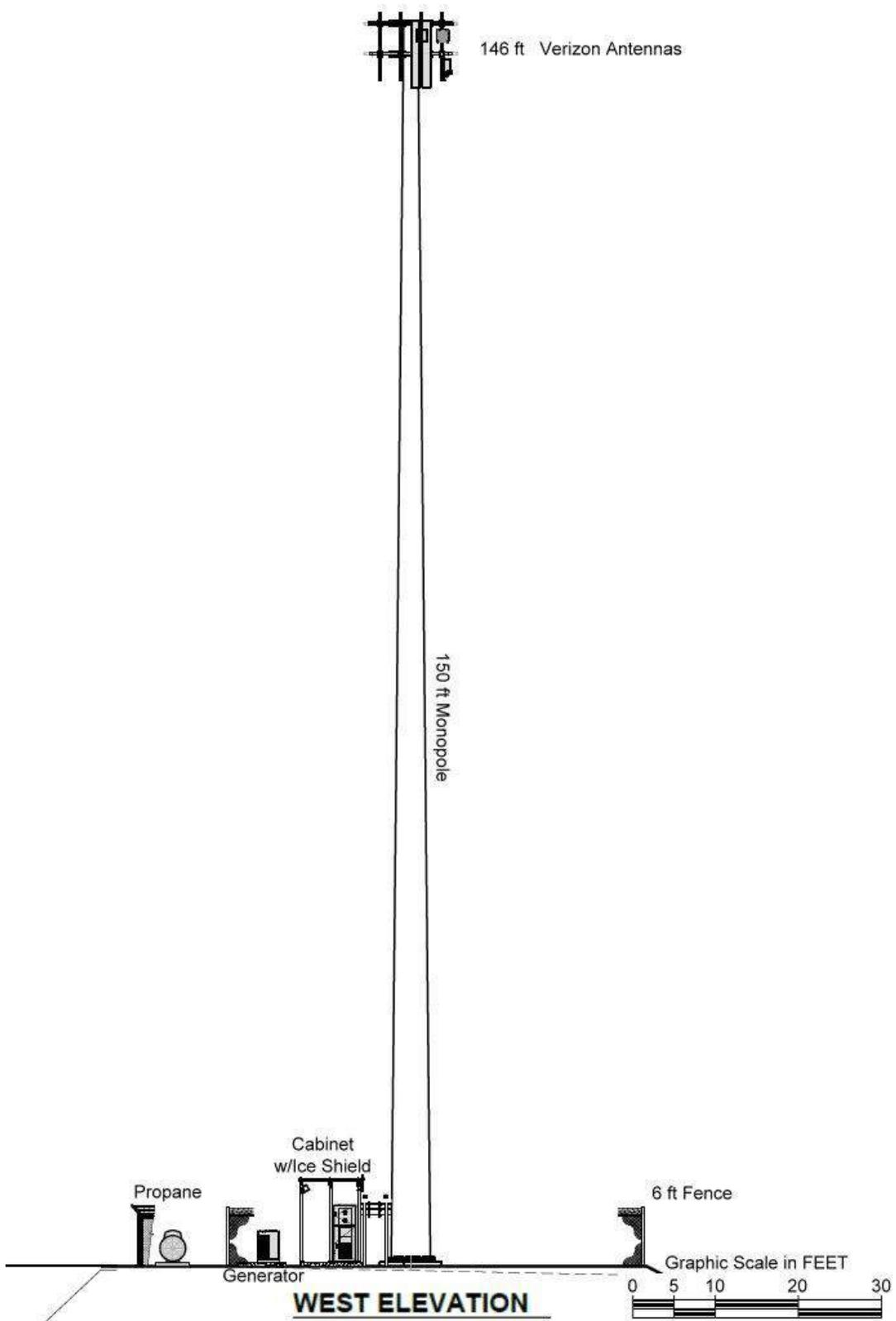
The generator that is planned for this site is rated at 30 kW and will be powered by propane. The Kohler 30CCM has a rated sound level of 57 dBA at 23 feet during a no-load test of the system. The unit is one of the quietest available in its power range. For reference, a typical residential gasoline generator rated at 4,000 Watts is usually rated at over 70 dBA at the reference distance. The proposed system is over 7 times the power output but is much quieter due to its high level of mitigation by the full enclosure and quiet design. The Verizon Wireless system will be monitored remotely and tested regularly – about one half hour each week during the daytime. The equipment layout is shown in Figure 3 and the elevation sketch is shown in Figure 4.



Details Removed for Clarity

### COMPOUND PLAN

**Figure 3:** Plan Showing the Details of the Proposed Equipment Compound Expansion



**Figure 4:** Elevation Plan Showing the Proposed Monopole and Ground Equipment

### ***Modeling Details***

Noise prediction modeling was performed using CADNA software under downwind weather conditions as assumed in the standard ISO 9613-2. Table 2 summarizes the modeling input parameters.

**Table 2: Modeling Input Parameters**

<b>Item</b>	<b>Modeling Input and Description</b>
Terrain	Flat Terrain assumed
Temperature	10°C
Relative Humidity	70%
Weather Condition	6.5 mph, directly from facility to receptor*
Ground Attenuation	0.2, hard surface (0.5 = soft ground, 0.0 = pure reflection)
Atmospheric Inversion	CONCAWE – Category F**
# of Sound Reflections	2
Receptor Height	1.5 meter above ground level

\* Propagation calculations incorporate the adverse effects of certain atmospheric and meteorological conditions on sound propagation, such as gentle breeze of 1 to 5 m/s (ISO 1996-2: 1987) from source to receiver.

\*\* Category F represents a stable atmosphere that promotes noise propagation.

### ***Sound Level Modeling Results***

The worst-case sound levels from the cabinets will be when the cooler unit is operating to protect the electronics from overheating. It produces about 50 dBA at 23 feet toward the west or about 22 dBA at the nearest residence 375 feet to the northwest of the equipment. As noted, the cooler is expected to operate exclusively during the daytime hours when ambient levels are highest. But it is quiet enough to operate at night if it were needed.

Infrequently, the generator will be tested. To establish a worst-case Verizon sound scenario, the sound of the routine tests (one half hour or less during only the daytime) was added to the sound from cabinet sources and modeled at the receptors. The combination of the cooler plus the generator test represents a daytime worst-case. The resulting levels were estimated at the sensitive locations. Table 3 provides a summary of the worst-case modeling results. The summary results are also provided graphically in Figure 5.

**Table 3: Summary of Modeling Results of Worst-Case Verizon Sound Levels**

<b>Receptor Location</b>	<b>Distance (Ft)</b>	<b>Criteria Day (dBA)</b>	<b>All VZW Sounds (dBA)</b>	<b>Less than 50 dBA?</b>
Residence1, Northwest	375	50	28	yes
Residence1, Southwest	575	50	25	yes
Residence2, Southwest	535	50	27	yes
Residence, South	500	50	29	yes
Residence, Northeast	568	50	28	yes

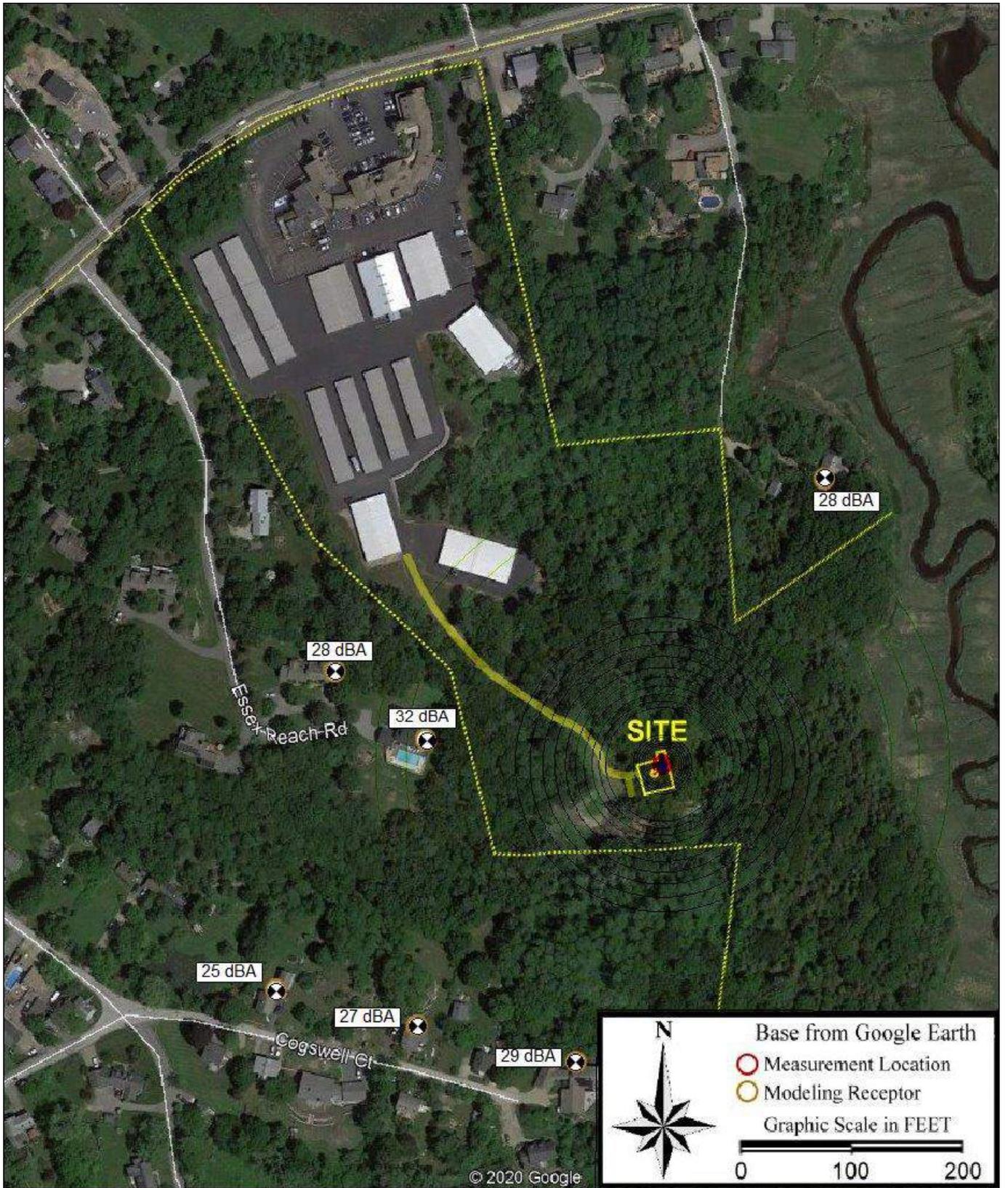
The worst-case scenario (cooler + generator) is expected to produce 32 dBA or less at the nearest residence which is well below the common project goal of wireless facilities of 50 dBA and is also well below the area's daytime ambient sound level.

## **Conclusions**

The potential sound from the proposed Verizon Wireless equipment was evaluated using numerical modeling methods. Equipment operating sound levels were quantified using vendor estimates confirmed by representative field measurement at other installations. Most of the time, the proposed equipment will produce essentially no sound. The cabinet cooler is expected to operate only under summer daytime high ambient temperature conditions but it was included in this study as a continuous source. The results indicate that the routine operation of the facility plus the cooler will be 22 dBA at the nearest residence.

Infrequently, for one half hour per week, the proposed facility sounds will include the daytime testing of the emergency generator. During those daytime tests, the combined sound from all the Verizon Wireless equipment is expected to be 32 dBA or less at the nearest residences. This represents the facility worst-case sound and is well below the daytime ambient sound level in this area. Sound levels decrease with increased distance, so the worst-case facility sound will be even less at more distant receptors than those modeled here.

A common goal of wireless facilities is to meet 50 dBA at the receptors. The analysis shows that the facility sources will remain far below this goal at 32 dBA during the infrequent daytime half-hour generator test each week.



**Figure 5:** Graphical Summary of the Facility Sound Modeling for Verizon Wireless Sources

**EXHIBIT 14**  
**RADIO FREQUENCY EXPOSURE REPORT**



C Squared Systems, LLC  
65 Dartmouth Drive  
Auburn, NH 03032  
(603) 644-2800

[support@csquaredsystems.com](mailto:support@csquaredsystems.com)

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## Calculated Radio Frequency Exposure Report



Essex Rt. 133 MA

73 Eastern Avenue, Essex, MA 01929

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November 10, 2020

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## 1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the installation of Verizon Wireless antenna arrays on the proposed TowerNorth Development, LLC monopole tower at 73 Eastern Avenue in Essex, MA. The coordinates of the site are 42-37-45.44 N, 70-45-51.15 W.

Verizon Wireless' installation would consist of six (6) antennas to support their 4G LTE network (2 on each sector).

This report uses the planned antenna configuration for Verizon Wireless' proposed installation to derive the resulting % MPE (Maximum Permissible Exposure).

## 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 ( $\text{mW}/\text{cm}^2$ ). 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 Calculation Methods

The calculated ground-level power density results displayed in the following figures were generated using the following formula as outlined in FCC bulletin OET 65:

$$\text{Power Density} = \left( \frac{\text{EIRP}}{\pi \times R^2} \right) \times \text{Off Beam Loss}$$

Where:

EIRP = Effective Isotropic Radiated Power

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

H = Horizontal Distance from antenna

V = Vertical Distance from radiation center of antenna

Off Beam Loss is determined by the selected antenna patterns

Ground reflection factor of 2.0

These calculations assume that the antennas are operating at full power and 100 percent capacity, and that all antenna channels are transmitting simultaneously. Obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. The calculations also assume even terrain in the area of study and do not take consider terrain elevations which could further attenuate the signal. As a result, the calculated power density and corresponding % MPE levels reported below are much higher than the actual signal levels will be from the final antenna configuration.

The percent of MPE values presented in this report reflect levels that one may encounter from one sector of a carrier's antennas. Most carriers use multiple sectors per site with azimuths approximately 90-120 degrees apart; therefore, one could not be standing in the main beam of any two different sectors at the same time. In cases where antenna models and downtilts are not uniform across all sectors, the antenna model with the highest gain and downtilt was used for the calculations. This results in a conservative or "worst case" assumption for percent of MPE calculations.

#### 4. Proposed Antenna Inventory

Table 1 below outlines Verizon’s planned antenna configuration on the subject site. The associated data sheets and antenna patterns for these specific antenna models are included in Attachment C.

Operator	Sector	TX Freq (MHz)	Power at Antenna (Watts)	Ant Gain (dBi)	Power EIRP (Watts)	Antenna Model	Beam Width	Mech. Downtilt	Length (ft)	Antenna Centerline Height (ft)
Verizon	Alpha	751	80	16.0	3185	NHH-65C-R2B	65	0	8.0	146
		885	80	16.1	3259		62			
		1900	160	17.7	9421		66			
		751	80	16.0	3185	NHH-65C-R2B	65			
		885	80	16.1	3259		62			
		2100	240	18.3	16226		62			
	Beta	751	80	16.0	3185	NHH-65C-R2B	65	0	8.0	146
		885	80	16.1	3259		62			
		1900	160	17.7	9421		66			
		751	80	16.0	3185	NHH-65C-R2B	65			
		885	80	16.1	3259		62			
		2100	240	18.3	16226		62			
	Gamma	751	80	16.0	3185	NHH-65C-R2B	65	1	8.0	146
		885	80	16.1	3259		62			
		1900	160	17.7	9421		66			
		751	80	16.0	3185	NHH-65C-R2B	65			
		885	80	16.1	3259		62			
		2100	240	18.3	16226		62			

**Table 1: Proposed Antenna Inventory<sup>1 2</sup>**

<sup>1</sup> Transmit power assumes 0 dB of cable loss.

<sup>2</sup> Antenna heights are in reference to the Verizon RFDS, dated April 10, 2020.

## 5. Calculated % MPE Results

The calculated % MPE results for the proposed antenna configuration are shown in Figure 1 below. Each frequency band and technology is calculated as well as the resulting cumulative percent of MPE. For completeness, the calculations for this analysis range from 0 feet horizontal distance (directly below the antennas) to a value of 3,000 feet horizontal distance from the antennas. In addition to the other worst-case scenario considerations that were previously mentioned, the % MPE calculations to each horizontal distance point away from the antennas were completed using a local maximum off beam antenna gain (within  $\pm 5$  degrees of the true mathematical angle) to incorporate a realistic worst-case scenario.

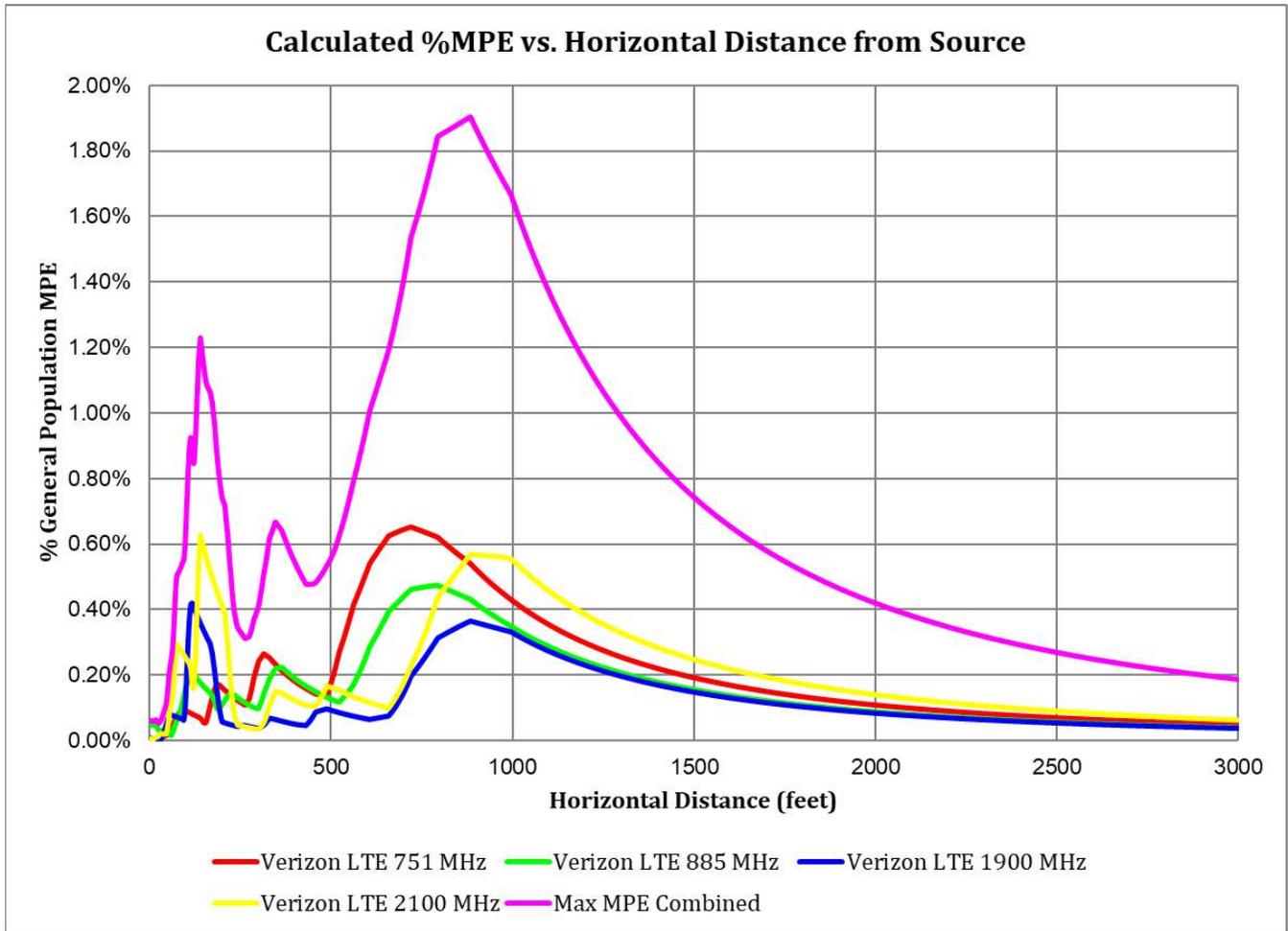


Figure 1: Graph of Percent of MPE vs. Distance

The highest percent of MPE (1.90%) is calculated to occur at a horizontal distance of 884 feet from the antennas. Please note that the percent of MPE calculations close to the site take into account off beam loss, which is determined from the vertical pattern of the antennas used. Therefore, RF power density levels may increase as the distance from the site increases. At distances of approximately 1,000 feet and beyond, one would now be in the main beam of most antenna patterns and off beam loss is no longer considered. Beyond this point, RF levels become calculated solely on distance from the site, and the percent of MPE decreases significantly as distance from the site increases.

Table 2 below lists the calculated percent of MPE values as well as the associated parameters that were included in the calculations. As stated in Section 3, all calculations assume that the antennas are operating at full power and 100 percent capacity, and that all antenna channels are transmitting simultaneously. Obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. Additionally, a six-foot height offset was considered in this analysis to account for average human height standing at ground level. As a result, the calculated % MPE levels are significantly higher than the actual levels will be from the final installation. The results presented in Figure 1 and Table 2 assume level ground elevation from the base of the building out to the horizontal distances calculated.

Carrier	Number of Trans.	Power out of Base Station Per Transmitter (Watts)	Antenna Height (Feet)	Distance to the Base of Antennas (Feet)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	%MPE
Verizon LTE 1900 MHz	1	160.0	146.0	884	0.003648	1.000	0.36%
Verizon LTE 2100 MHz	1	240.0	146.0	884	0.005679	1.000	0.57%
Verizon LTE 751 MHz	1	160.0	146.0	884	0.002705	0.501	0.54%
Verizon LTE 885 MHz	1	160.0	146.0	884	0.002545	0.590	0.43%
						<b>Total</b>	<b>1.90%</b>

**Table 2: Maximum Percent of Exposure Values<sup>3 4 5</sup>**

<sup>3</sup> Transmit power assumes 0 dB of cable loss.

<sup>4</sup> Frequencies listed in Table 2 are representative of the operating band of Verizon Wireless and are not the carriers' specific operating frequency.

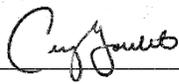
<sup>5</sup> The total % MPE listed is a summation of each unrounded contribution. Therefore, summing each rounded value may not reflect the total value listed in the table.

## 6. Conclusion

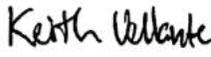
The above analysis concludes that RF exposure at ground level from the proposed site will be below the maximum permissible levels as outlined by the FCC in the OET Bulletin 65 Ed. 97-01. Using the conservative calculation methods and parameters detailed above and assuming level ground around the proposed site, the maximum cumulative percent of MPE is calculated to be **1.90% of the FCC limit (General Population/Uncontrolled)**. This maximum percent of MPE value is calculated to occur 884 feet away from the site.

## 7. 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 FCC OET Bulletin 65 Edition 97-01, IEEE Std. C95.1, and IEEE Std. C95.3.

  
\_\_\_\_\_  
Report Prepared By: Cory Goulet  
Associate RF Engineer  
C Squared Systems, LLC

November 10, 2020  
Date

  
\_\_\_\_\_  
Reviewed/Approved By: Keith Vellante  
Director – RF Services  
C Squared Systems, LLC

November 10, 2020  
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 Std 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<sup>6</sup>**

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f <sup>2</sup> )*	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<sup>7</sup>**

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f <sup>2</sup> )*	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 3: FCC Limits for Maximum Permissible Exposure**

<sup>6</sup> 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.

<sup>7</sup> 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.

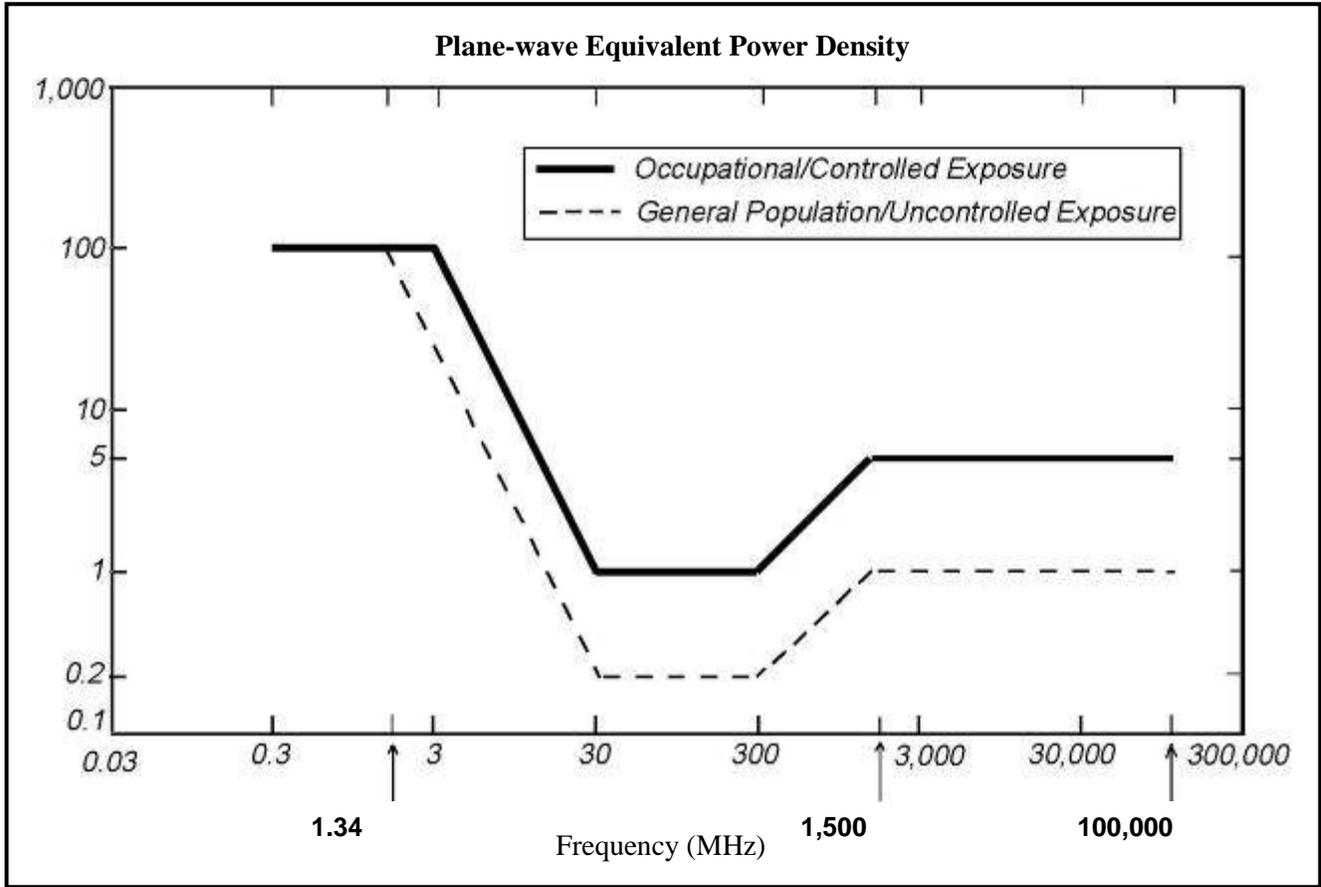
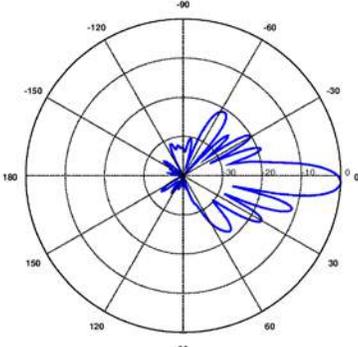
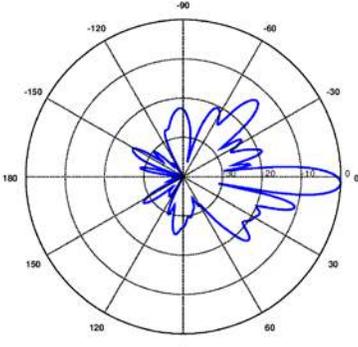
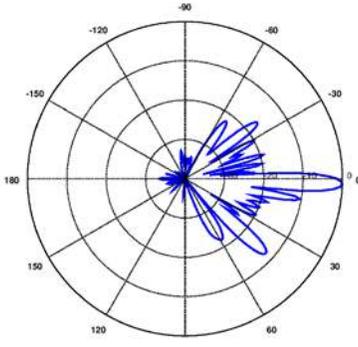


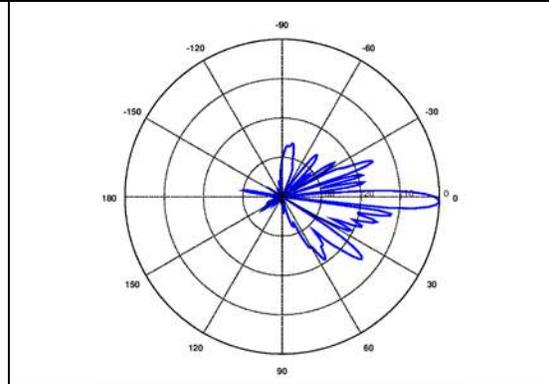
Figure 2: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

### Attachment C: Antenna Model Data Sheets and Electrical Patterns

<p><b>751 MHz</b></p> <p>Manufacturer: Commscope            Model #: NHH-65C-R2B            Frequency Band: 698 - 806 MHz            Gain: 16.0 dBi            Vertical Beamwidth: 9.0°            Horizontal Beamwidth: 65°            Polarization: ±45°            Size L x W x D: 96.0" x 11.9" x 7.1"</p>	 <p>A polar plot showing the radiation pattern for 751 MHz. The plot is circular with concentric rings representing gain levels and radial lines representing angles from 0 to 180 degrees. The main lobe is centered at 0 degrees, extending to approximately 30 degrees on either side. There are several smaller side lobes, with the most prominent ones at approximately ±45 degrees.</p>
<p><b>885 MHz</b></p> <p>Manufacturer: Commscope            Model #: NHH-65C-R2B            Frequency Band: 806–896 MHz            Gain: 16.1 dBi            Vertical Beamwidth: 7.9°            Horizontal Beamwidth: 62°            Polarization: ±45°            Size L x W x D: 96.0" x 11.9" x 7.1"</p>	 <p>A polar plot showing the radiation pattern for 885 MHz. The plot is circular with concentric rings representing gain levels and radial lines representing angles from 0 to 180 degrees. The main lobe is centered at 0 degrees, extending to approximately 30 degrees on either side. There are several smaller side lobes, with the most prominent ones at approximately ±45 degrees.</p>
<p><b>1900 MHz</b></p> <p>Manufacturer: Commscope            Model #: NHH-65C-R2B            Frequency Band: 1850 - 1990 MHz            Gain: 17.7 dBi            Vertical Beamwidth: 5.2°            Horizontal Beamwidth: 66°            Polarization: ±45°            Size L x W x D: 96.0" x 11.9" x 7.1"</p>	 <p>A polar plot showing the radiation pattern for 1900 MHz. The plot is circular with concentric rings representing gain levels and radial lines representing angles from 0 to 180 degrees. The main lobe is centered at 0 degrees, extending to approximately 30 degrees on either side. There are several smaller side lobes, with the most prominent ones at approximately ±45 degrees.</p>

**2100 MHz**

Manufacturer: Commscope  
Model #: NHH-65C-R2B  
Frequency Band: 1920 - 2200 MHz  
Gain: 18.3 dBi  
Vertical Beamwidth: 4.9°  
Horizontal Beamwidth: 62°  
Polarization: ±45°  
Size L x W x D: 96.0" x 11.9" x 7.1"



**EXHIBIT 15**  
**FAA DETERMINATION**



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

Aeronautical Study No.  
2020-ANE-1476-OE

Issued Date: 03/24/2020

Garrett Conroy  
Centerline Communications (GC)  
750 W Center Street, Suite 301  
W Bridgewater, MA 02379

**\*\* 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 Essex MA-044  
Location: Gloucester, MA  
Latitude: 42-37-45.44N NAD 83  
Longitude: 70-45-51.15W  
Heights: 46 feet site elevation (SE)  
154 feet above ground level (AGL)  
200 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 L Change 2.

This determination expires on 09/24/2021 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 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, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, effective 21 Nov 2007, 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 includes all previously filed frequencies and power for this structure.

If construction or alteration is dismantled or destroyed, you must submit notice to the FAA within 5 days after the construction or alteration is dismantled or destroyed.

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.

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 our office at (817) 222-5922, or [debbie.cardenas@faa.gov](mailto:debbie.cardenas@faa.gov). On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2020-ANE-1476-OE.

**Signature Control No: 432330613-434375122**

( DNE )

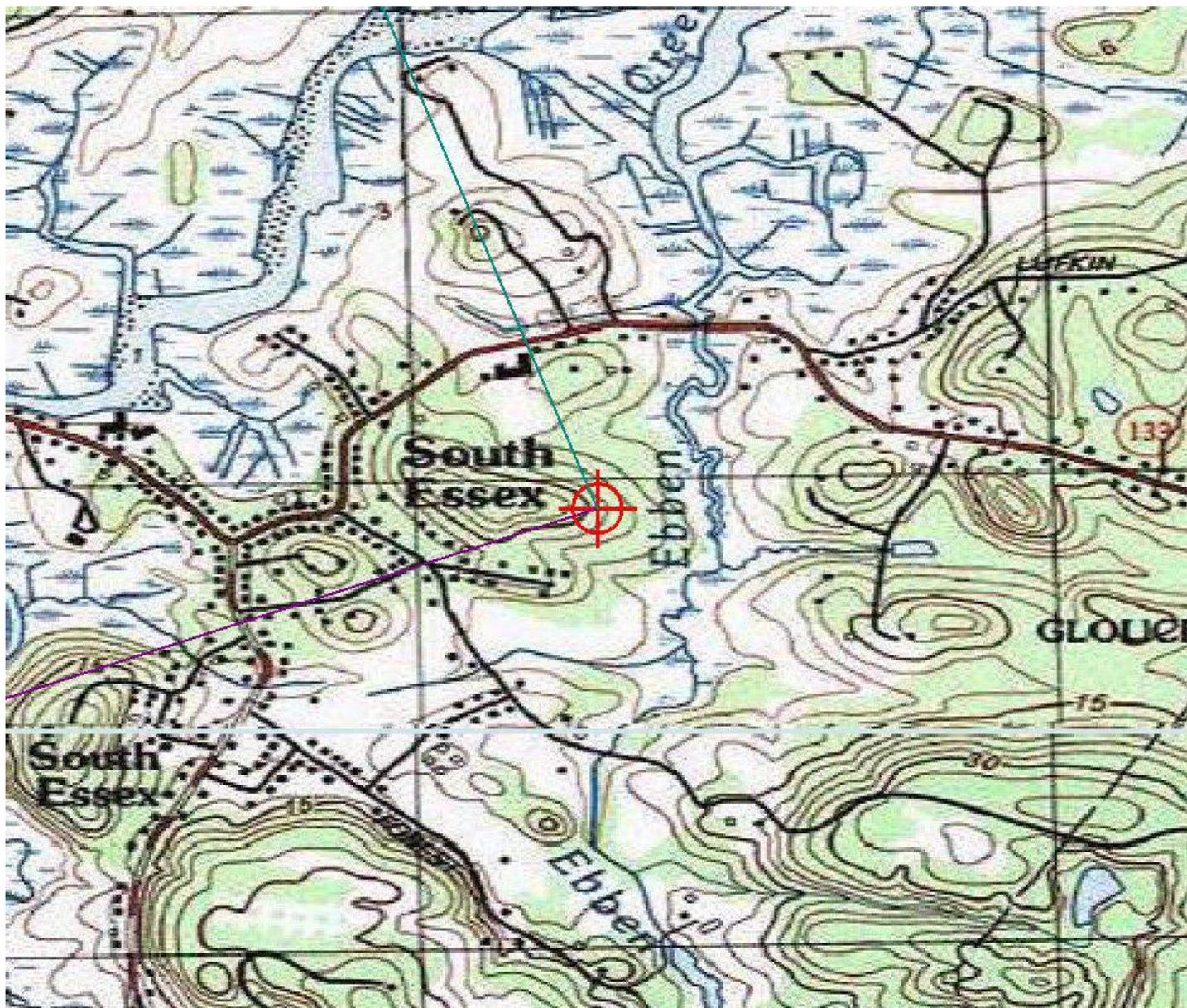
Debbie Cardenas  
Technician

Attachment(s)  
Frequency Data  
Map(s)

cc: FCC

**Frequency Data for ASN 2020-ANE-1476-OE**

<b>LOW FREQUENCY</b>	<b>HIGH FREQUENCY</b>	<b>FREQUENCY UNIT</b>	<b>ERP</b>	<b>ERP UNIT</b>
6	7	GHz	55	dBW
6	7	GHz	42	dBW
10	11.7	GHz	55	dBW
10	11.7	GHz	42	dBW
17.7	19.7	GHz	55	dBW
17.7	19.7	GHz	42	dBW
21.2	23.6	GHz	55	dBW
21.2	23.6	GHz	42	dBW
614	698	MHz	1000	W
614	698	MHz	2000	W
698	806	MHz	1000	W
806	901	MHz	500	W
806	824	MHz	500	W
824	849	MHz	500	W
851	866	MHz	500	W
869	894	MHz	500	W
896	901	MHz	500	W
901	902	MHz	7	W
929	932	MHz	3500	W
930	931	MHz	3500	W
931	932	MHz	3500	W
932	932.5	MHz	17	dBW
935	940	MHz	1000	W
940	941	MHz	3500	W
1670	1675	MHz	500	W
1710	1755	MHz	500	W
1850	1910	MHz	1640	W
1850	1990	MHz	1640	W
1930	1990	MHz	1640	W
1990	2025	MHz	500	W
2110	2200	MHz	500	W
2305	2360	MHz	2000	W
2305	2310	MHz	2000	W
2345	2360	MHz	2000	W
2496	2690	MHz	500	W



**EXHIBIT 16**  
**REAL ESTATE VALUATION REPORT**

Daniel D. Klasnick, Esq.  
Duval & Klasnick, LLC  
210 Broadway #204  
Lynnfield, MA 01940

RE: Proposed Wireless Communication Facility  
Site: MA-044 Essex  
73 Eastern Avenue  
Essex, MA 01929

December 28, 2020

Atty. Klasnick,

I have completed a market study investigating the potential impact that cellular towers may have on adjacent residential property values.

The intended user of this report is the Essex, MA Land Use Permitting Boards in their deliberations relative to the applications submitted for your client.

The purpose of this study is to provide substantive data to answer the following question: *Will the granting of the application diminish the value of surrounding properties?*

This letter contains a summary of my research into this question and the rationale used to arrive at my conclusions.

The work consists of a viewing of the area around the tower site, a review of the materials relating to the proposed tower and research into sales of properties throughout the region that are located in close proximity or have visual exposure to a cellular communication tower.

Also included in this report are the results of a national survey of appraisers regarding this question and information obtained from other appraisers known to have researched this same question.

It is my opinion that the proposed tower will have no measurable impact on surrounding property values due to proximity or visibility.

Sincerely,



Mark Correnti, SRA  
New Hampshire NHCR #460  
Massachusetts # 103752

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Copyright

This report is copyrighted. ALL RIGHTS RESERVED. It is only for the use of the Essex, Massachusetts Land Use Permitting Boards. No part of this document may be reproduced, stored or transmitted in any form, for any reason or by any means, whether re-drawn, enlarged or otherwise altered including mechanical, photocopy, digital storage & retrieval or otherwise, without the prior written permission from FairMarket Advisors, LLC., the copyright owner. The text, layout and designs presented in this document, as well as the document in its entirety, are protected by the copyright laws of the United States (17 U.S.C. 101 et seq.) and similar laws in other countries.

Assumptions and Limiting Conditions

This report is written subject to the following assumptions and limiting conditions. Because a proper understanding of the analysis and conclusions contained in this report requires an awareness of these assumptions and limiting conditions, parties using this report are asked to carefully review and consider them when reading the report.

This report is written with the understanding and intention that it is to be used *only* in conjunction with the request before the Essex, Massachusetts Land Use Permitting Boards.

The information contained in this report is specific to the needs of the client and for the intended use stated in the report. Parties using this report for any purpose other than that stated herein must assume full responsibility and do so at their own risk. I cannot accept any responsibility for any damages suffered by third parties because of the unauthorized or inappropriate use of this report.

This report is prepared for the exclusive use of the client identified in this report. The report is based upon the data available to me at the time of preparation of this document.

Distances estimated from the sales to the towers are based upon GIS technology, not physical measurements by the author.

Because of this report, I am not required to give further consultation, testimony, depositions, or be in attendance for any legal proceeding regarding the subject property unless prior arrangements have been previously made.

Information contained herein that has been obtained from third parties is assumed to be correct and reliable.

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General comment

A commonly held opinion is that the value of a home is negatively affected if it is close to a cell tower or a cell tower can be seen from the property.

Randall Bell, PhD. MAI has written extensively about property damages: in his work Real Estate Damages: An Analysis of Detrimental Conditions<sup>1</sup>, makes the following statement:

“The most significant issue in assessing the consequences of a detrimental condition on residential property values is the general predisposition of people to believe that detrimental conditions affect residential property values...*If market value is going to be affected, then this particular detrimental condition has to be given enough weight in the decision process of buyers and sellers to have a material effect on the price.*

In other words, the detrimental condition issue has to be important relative to all the other variables that influence the home purchase decision, (public safety, quality of schools, access to employment ... special features of the home, affordability, etc.)”

Appraisers can examine data to determine if a detrimental condition affects value by application of sensitivity analysis which is a method used to isolate the effect of individual variables on value.

The two most common types of sensitivity analysis used in general real estate practice are:

1. Paired sales by which two properties - One with cell tower influence is matched to a similar property without cell tower influence to see if there is a price difference that can be attributed to the cell tower.
2. Grouped data analysis which matches a property with cell tower influence to the median price paid for groups of sales of similar properties without the cell tower influence. Again, to see if there is a price difference attributable to the cell tower. Similar properties are properties a buyer would find to be acceptable alternatives to the property with the cell tower influence (similar style, size, etc.).

Due to the diversity of home styles in New England, most appraisers use grouped data analysis.

Buyers are the *market makers*; only through their buying decisions can it be determined if and to what extent the presence or absence of a neighborhood attribute has an effect on value.

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<sup>1</sup> Bell, Randall, Real Estate Damages: An Analysis of Detrimental Conditions, Chicago: Appraisal Institute 1999, page 38.

Data limitations – Scarcity

Whenever possible there is an attempt to obtain local data first, however sales with a view of a tower are scarce. In considering properties for comparison in this assignment, they must have sold and have visibility of a tower. There is a limited number of cell towers in Essex with a limited number of single-family residences that include a cell tower in its view shed. This scarcity of sales is why local data is supplemented with sales from other communities.

This report contains information on four single-family residences that have sold as well as a qualitative analysis of a 55+ condominium unit development. Two are located in Essex, two are located in Gloucester, and the condo development is located in Hamilton.

The view from each sale included in this report is different and depends on topography, distance, tree cover and home orientation to the tower.

Certification

The undersigned certifies that, to the best of my knowledge and belief:

The statements of fact contained in this report are true and correct.

The reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions, are my personal, impartial, and unbiased professional analyses, opinions, conclusions and recommendations.

I have provided the following valuation<sup>2</sup> services on the property within the preceding three years from the date of this letter: None.

I have no present or prospective interest in the subject property, I have no personal interest with respect to the parties and have no bias with respect to the subject property or to the parties involved with this assignment.

My engagement in this assignment was not contingent upon developing or reporting predetermined results.

My compensation for completing this assignment is not contingent upon the reporting of a predetermined value or direction in value that favors the cause of the client, the amount of the value opinion, the attainment of a stipulated result, or the occurrence of a subsequent event directly related to the intended use of this information.

My analyses, opinions and conclusions were developed, and this letter has been prepared in conformity with the Uniform Standards of Professional Appraisal Practice.

I have inspected the subject property. I have studied the plans, reviewed the community GIS data and municipal records about the property. I have also discussed the property with the client and believe I have a sufficient understanding of the attributes unique to the property.



Mark Correnti, SRA  
New Hampshire NHCR #460  
Massachusetts # 103752

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<sup>2</sup> Listing, selling, repairs, maintenance, appraisal, consulting, review, property inspections, tax abatements

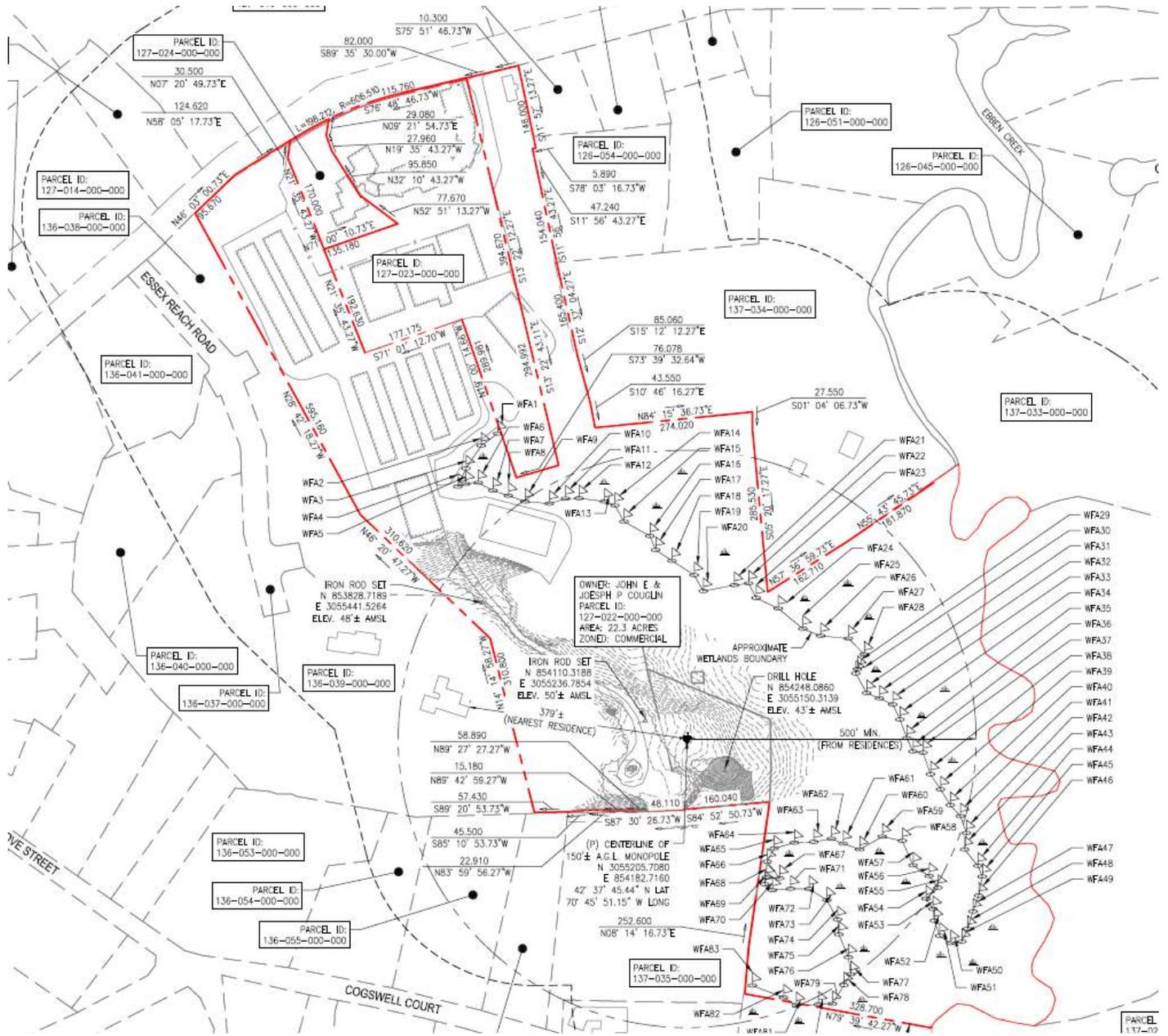
Property Description: 73 Eastern Avenue, Essex MA

Proposed Site

The proposed tower is to be located at Latitude: 42 degrees 37 minutes 45.44 seconds north and Longitude 70 degrees 45 minutes 51.15 seconds west.



The lot is identified in the Essex assessment records as tax map 127 lot 22 and is in the Commercial-Business zoning district. The site is located on MA Route 133 approximately a third of a mile east of Main Street.



The site is approximately 22 acres in size and is improved with a small office building and self-storage units.



*Location of the proposed site*

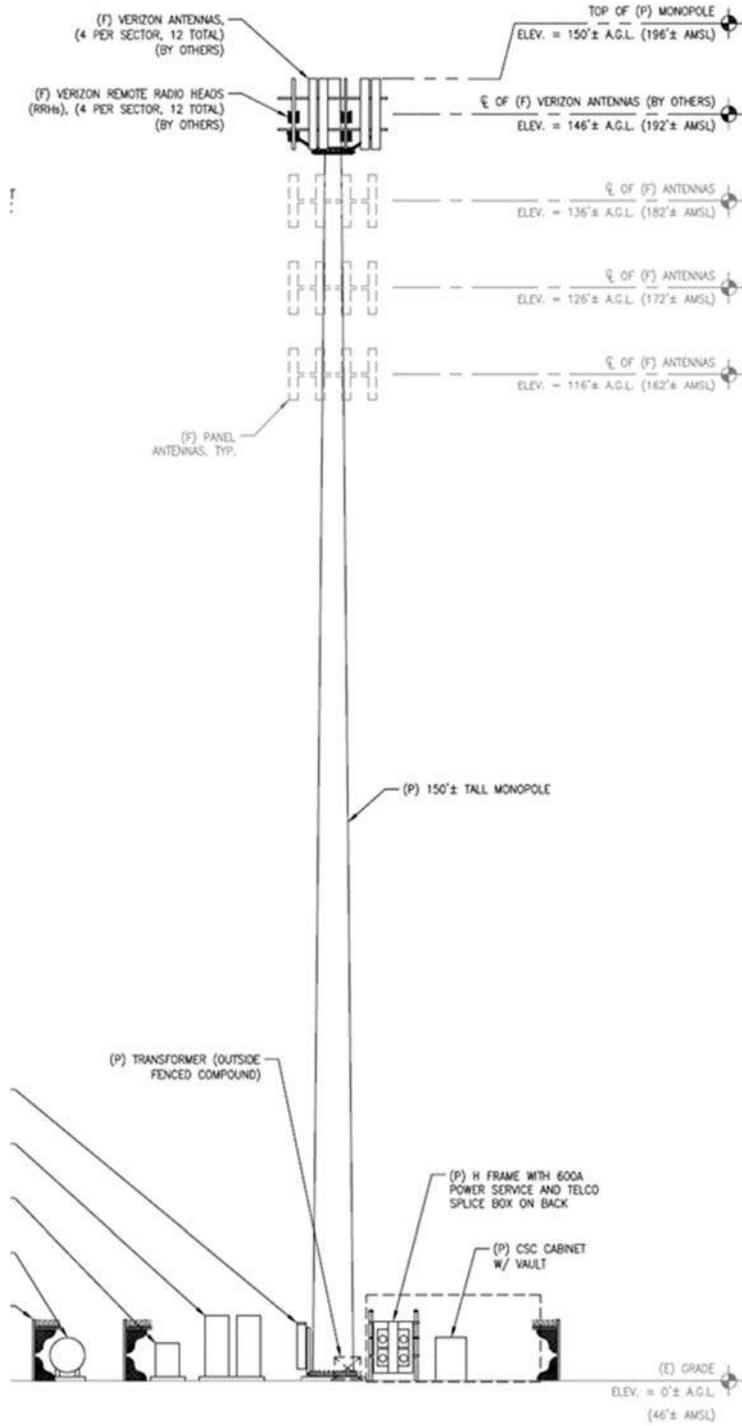


Surrounding land uses on MA Route 133 are a mix of small commercial and retail (small restaurants, stores, multi-tenant storefront, self-storage) and single-family residential.



*Neighborhood composition*

The leased area will be 75' x 75' that will include a tower compound of 50' x 50' in size and will be accessed by a 20' wide access drive that will extend off of Eastern Drive and through the existing self-storage parking lot. The proposed tower will be 150' in height. The schematic below is representative of what will be placed on site.



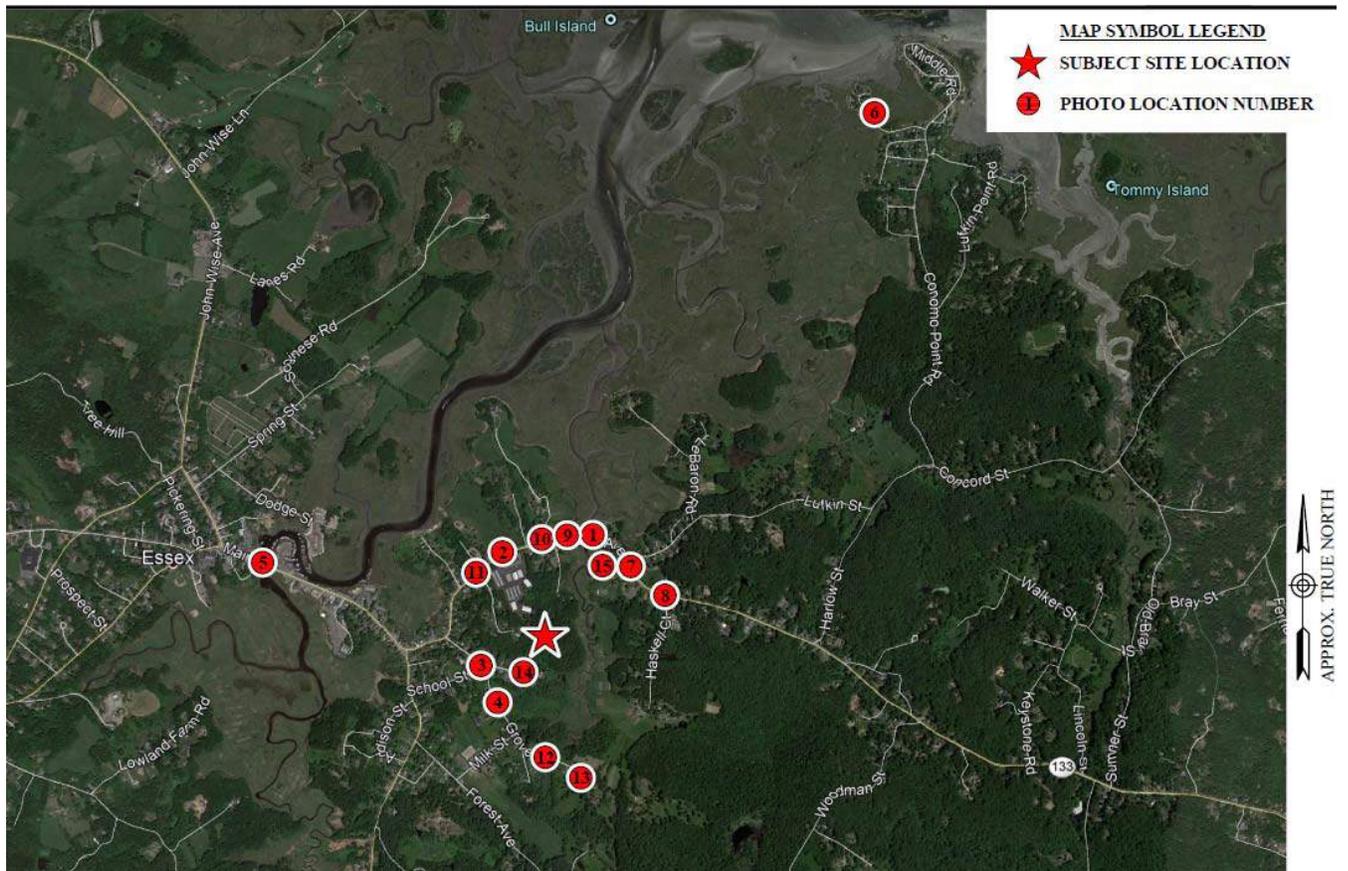
2 ELEVATION  
Z-2 SCALE: 1"=10'-0"

Simulated Proposed Tower Pictures

In this instance, the applicant has commissioned a “balloon simulation” to assist the Board in visualizing the proposed tower as it relates to surrounding properties.

Below is a map showing the locations from where photos were taken. The red star shows the proposed tower location, red dots represent where photo simulations were taken. Those photos showing no view of the proposed tower are not included in this report.

The reader must keep in mind that every property is unique just as every tower is unique; as a result, the visual impact of the proposed tower to surrounding properties will not be identical to the examples contained herein. However, the examples illustrate a wide range of visual exposure which can be related to the simulations presented for the proposed tower.





*From Eastern Drive*



*From Eastern Drive*



*Near the intersection of Grove St and Cogswell Ct.*



*From Grove St*



*From Main Street*



*From Robbins Island Rd*



*From Eastern Ave*

**Community based research**

Over the past several years FairMarket Advisors, LLC. has researched the issue of residential property values and cell towers throughout New England, the primary focus being in New Hampshire and Massachusetts.

The research consists of identifying recent sales of homes having either proximity to or a view of a communication tower with the community considering the development of a new tower. Often data from surrounding communities is researched and included to supplement local data.

For each analysis, a comparison grid is presented. Each property sale is shown in ***bold italics*** underneath each are the medians calculated for the competitive sales examined. The data (from left to right) is: the number of competitive sales, the size range examined, the median lot size in acres, listing price, sale price, percent variance between the list and sale price, room, bedroom, bath count, garage size and average days on market.

This type of comparison enables identification of sales with substantial deviation from the median. If a sale presents a substantial deviation from the median further review is done to determine the reason for the deviation. An explanation for the deviation is provided as needed.

This row is the median sale price for the entire town for the given year

count	Street	Acres	Style	Yr Built	Closed	List	Sale	Spread	SqFt Fin	Rms	BR	Baths	Gar.	DOM
129	Median	0.90		1955	≥ 6 months ≤	\$425,000	\$409,000	96%	1,860	6	3	2.0	1	65
<b><i>Viz</i></b>	<b><i>123 Sample Rd</i></b>	<b><i>1.5</i></b>	<b><i>Cape</i></b>	<b><i>1990</i></b>	<b><i>11/15/2018</i></b>	<b><i>\$450,000</i></b>	<b><i>\$435,000</i></b>	<b><i>97%</i></b>	<b><i>2,250</i></b>	<b><i>7</i></b>	<b><i>3</i></b>	<b><i>2.5</i></b>	<b><i>2</i></b>	<b><i>45</i></b>
8		1.40		1986	≥ 6 months ≤	\$445,900	\$437,000	98%	2,435	8	4	2.5	2	52

Sample Comparison Grid

This row shows one property that is proximate to a cell tower

The bottom row shows similar properties, but are not proximate to a cell tower

The top row shows all sales sold in a given year in the community. The middle row shows a property that is proximate to a cell tower. The bottom row shows properties that are similar to 123 Sample Rd in most respects with the exception that none of the sales are proximate to a cell tower.

A comparison can be made between the middle row (proximate to a cell tower) and the bottom row (not proximate to a cell tower) to infer if there was a difference in price reduction, price paid, or extended days on market (marketability).

In reviewing the data a reader should note the following:

- Sales included in the analysis are those sales that had open market exposure to the general public. All of the sales in the analysis had market exposure through the statewide MLS system.

- There is no comparison being made between the sales seen in the analysis and today's real estate market. The comparison being made is between a sale that was proximate to a cell tower and those sales that sold in the same year (six months prior and six months after).
- The top row shows the median sales price for the community and it includes all sales that occurred no matter their location, condition of sale, or unique features. Having the median sales price for a community allows the reader to understand what is typical for the market.

### Essex, Massachusetts market research

There is a 135' cell pole at 12 Scott's Way in Essex. The cell pole is at the back of a small commercial lot off of MA Route 22. The commercial lot abuts a residential neighborhood with Blueberry Ln terminating as a dead-end street. The majority of Blueberry Ln is in Hamilton, MA however, the last two lots on Blueberry Ln are located in Essex or partially located in Essex.

The two closest single-family residences are 128 and 130 Blueberry Lane. 128 Blueberry Lane has the residence and 0.71 acres located in Hamilton, and the backyard which is comprised of 0.91 acres located in Essex. The house and land at 130 Blueberry Ln are entirely located in the town of Essex.



128 and 130 Blueberry Ln are 675' and 630' respectively from the 135' cell pole. Both residences have obstructed seasonal views of the cell pole.



128 Blueberry Ln on the left, 130 Blueberry Ln on the right. 135' cell pole noted.

Since 2018 both 130 Blueberry and 128 Blueberry have sold. Both sales are proximate and have views of the nearby cell pole. Both sales are analyzed below.

count	Street	Acres	Style	Yr Built	Closed	List	Sale	Spread	SqFt Fin	Rms	BR	Baths	Gar.	DOM
50	Median	0.80		1954	12/27/19-12/27/20	\$699,000	\$710,000	102%	2,208	7	3	2.0	1	24
<b>Viz</b>	<b>130 Blueberry Ln</b>	<b>0.94</b>	<b>Ranch</b>	<b>1965</b>	<b>8/21/2020</b>	<b>\$649,900</b>	<b>\$625,500</b>	<b>96%</b>	<b>1,424</b>	<b>7</b>	<b>3</b>	<b>2.0</b>	<b>2</b>	<b>10</b>
9	≥ 1,000 sf - 2,000 sf≤	0.34		1960	12/27/19-12/27/20	\$469,000	\$462,500	99%	1,272	6	3	1.0	0	27

130 Blueberry Ln sold in August 2020 and was under agreement relatively quick in ten days. The residence had been significantly updated with new kitchen and baths and sold significantly above residences similar in size, age, and functional utility – those residences that it directly competed against. Days on market and sales to list ratio are comparable or better than the community and comparable median values. 130 Blueberry Ln’s median sales price is well above the median of residences similar in size and age which can be attributed to its updated interior.

128 Blueberry Ln is a single-family residence that has a house and 0.71 acres in Hamilton and a 0.91 acre backyard that is located in Essex. The property is referred to as map 144 lot 29 in the Essex tax assessment records as '0 Western Ave Rear'.

128 Blueberry Ln sold in July 2018 in five days for \$577,000 which was above its asking price of \$569,000. The residence is 675' from the aforementioned cell pole.

count	Street	Acres	Style	Yr Built	Closed	List	Sale	Spread	SqFt Fin	Rms	BR	Baths	Gar.	DOM
90	Median	0.99		1961	≥ 6 months ≤	\$597,000	\$606,650	102%	2,329	7	4	2.1	2	18
<b>Viz</b>	<b>128 Blueberry Ln</b>	<b>1.62</b>	<b>Cape</b>	<b>1972</b>	<b>7/18/2018</b>	<b>\$569,000</b>	<b>\$577,000</b>	<b>101%</b>	<b>2,067</b>	<b>8</b>	<b>3</b>	<b>2.0</b>	<b>2</b>	<b>5</b>
16	≥ 1,500 sf - 2,500 sf ≤	1.00		1966	≥ 6 months ≤	\$566,950	\$554,500	98%	2,019	8	3	2.5	2	33

128 Blueberry sold with a comparable sale to list ratio and in less time. The median sales price is slightly above to other residences similar in age, size, and appeal.

The marketing material for both 128 and 130 Blueberry Lane described a desirable dead end or cul-de-sac neighborhood. In viewing the days on market, sales to list prices, and median sales price to that of other residences that were similar, it does not appear that the proximity to the 135' cell pole was averse to the marketability of either property.

### **Gloucester, Massachusetts market research**

There is a 230' lighted, lattice cell tower at 18 Kondelin Rd in Gloucester. The tower is at the edge of a commercial area that is at the top of a hill that overlooks a residential neighborhood to the east.

5 and 7 Westbrook are 1,070' and 1,380' respectively from the 230' cell tower. Because both of these residences are located on a private road, a view of the cell tower could not be confirmed. However, the cell tower is clearly visible at the base of the road at the corner of Pinecrest and Magnolia Ave which is 2,000' from the tower.

Although not independently verified, it is highly probable that the 230' lighted tower that is visible 2,000' away would also be visible at distances of 1,070' and 1,380'.



*View of the 230' cell tower 2,000' away at the corner of Magnolia and Pinecrest*



Aside from the high-end materials for both 5 and 7 Westbrook a marketable feature is also the unobstructed views of the neighborhood below as well as distant views of the ocean that both residences have.

count	Street	Acres	Style	Yr Built	Closed	List	Sale	Spread	SqFt Fin	Rms	BR	Baths	Gar.	DOM
223	Median	0.26		1937	≥ 6 months ≤	\$399,000	\$393,000	98%	1,653	7	3	2.0	0	26
<b>Viz</b>	<b>5 Westbrook Ln</b>	<b>7.65</b>	<b>Contemporary</b>	<b>2005</b>	<b>9/9/2016</b>	<b>\$1,399,000</b>	<b>\$1,125,000</b>	<b>80%</b>	<b>4,651</b>	<b>12</b>	<b>4</b>	<b>4.5</b>	<b>2</b>	<b>65</b>
27	≥ 3,000 sf - 6,000 sf ≤	1.06		1966	≥ 6 months ≤	\$995,000	\$875,000	88%	3,709	11	5	3.5	2	86

5 Westbrook Ln has more than 4,500-sf of living area, well appointed, and has a clear view of the ocean which is more than a mile away. As with other high-end, luxury properties, there is an extended marketing time for this select sub-market. In the above analysis 5 Westbrook sold with similar days on market and sales to list ratio. The median sales price was above that of other luxury and view properties most likely due to its relatively young age and size.

count	Street	Acres	Style	Yr Built	Closed	List	Sale	Spread	SqFt Fin	Rms	BR	Baths	Gar.	DOM
226	Median	0.25		1929	≥ 6 months ≤	\$429,450	\$426,750	99%	1,681	7	3	2.0	0	23
<b>Viz</b>	<b>7 Westbrook Ln</b>	<b>4.15</b>	<b>Contemporary</b>	<b>2007</b>	<b>3/23/2017</b>	<b>\$965,000</b>	<b>\$960,000</b>	<b>99%</b>	<b>3,168</b>	<b>9</b>	<b>4</b>	<b>3.5</b>	<b>2</b>	<b>144</b>
25	≥ 2,600 sf - 3,500 sf ≤	0.71		1975	≥ 6 months ≤	\$799,000	\$784,000	98%	2,966	9	4	3.0	2	71

The above analysis reports that 7 Westbrook had a total of 144 days on market. 7 Westbrook Ln listed for sale on 08/16/16 at \$965,000 and was under agreement in 72 days. However, that transaction fell through and the property was placed back on the market on 12/06/16. A second agreement of sale was made 63 days later which settled on 03/23/2017 for \$960,000. The first list to offer was 71 days, the second was 63 days. Both of which are comparable to what is typical for similar high-end properties in Gloucester.

Both 5 and 7 Westbrook Lane are proximate to, and most likely have a view of the 230' lighted, lattice tower at the top of the hill. Both 5 and 7 Westbrook were marketed as high-end view properties. The above data does not indicate that an external influence such as the nearby cell tower had an adverse effect on the marketability of either property.

New Construction at the Village at Canter Brook Farm

The prior four examples provide a quantitative approach, whereas the new construction at Canter Brook Farm provides a qualitative approach to this assignment.

In early 2017 a 120' cell tower was built at 434 Asbury St Hamilton, MA.



*Google Maps April 2018*

In 2018 a developer purchased 13.99 acres directly across the street for \$2.6 million.



*Google Maps June 2019*

New construction answers a fundamental principle in real estate valuation: What is the highest and best use of land? Market forces (supply and demand) can transform land to its highest and best use. In the case of Canter Brook Farm 13.99 acres was purchased by a developer in 2018 for \$2.6 million and transformed into twenty-three 55+ condominium units with new construction commencing in 2016.

As of the date of this report all but six units have been sold. Sales price have ranged from a low of \$650,013 to a high of \$1,039,947. Units are currently being offered at a list price of \$924,900.



*Foreground: Units at the Village at Canter Brook Farm. Background: 120' cell tower*

The residential development at Village at Canter Brook Farm is unique in this assignment as it represents a tower that predates the construction of nearby residential houses. Considering the economic risks, a developer would not subject investment to a negative external influence that would put capital at risk.

The listing agent, Wendy McGrath for Canter Brook Farm commented that the cell tower across the street has not been an issue for any prospective buyer and that in some circumstances, buyers have found it to be a convenience relative to cell phone signal strength.

In the case of the 23 houses proposed (or already built) at Canter Brook, the proximity and view to a cell tower has not hindered or impacted the build out of the sub-division.

---

Summary and Conclusion

Based upon the national e-mail survey of appraisers and assessors, research into properties located close to or having visual exposure to communication towers that have sold in Massachusetts, data obtained from other appraisers researching this same issue and a review of numerous reports prepared by other qualified appraisers; I was unable to find any data or proof to support the contention that there is a measurable impact on home values due to the proximity of a communication tower, or that property values are diminished due to the ability to see a tower from a property.

Objection to site development for cell towers usually comes from a change in the view from an abutting property. This change causes surrounding landowners to assume that their property will lose value because the of a view of a tower reduces value. This report contains sale data of homes with a view of a cell tower that have sold; these sales do not support the value loss assumption

Therefore, it is my opinion that the construction of the tower at the proposed location identified in this report will have no measurable impact on surrounding property values.

---

ADDENDUM

General market research

A national e-mail survey of appraisers and assessors was initiated. The purpose of this survey is to obtain input from appraisal and assessment professionals from a broader perspective to see what other professionals have observed. On the following pages is an explanation of how the survey was conducted, quotations received from some of the respondents and a tabular summary of the communities covered by the responses.

The survey information is followed by statements and conclusions from reports prepared by other appraisers who have completed site-specific analysis or general market research in order to determine if verifiable market data exists supporting the opinion that the presence of a cell tower has a deleterious impact on surrounding property values.

---

National Survey of Appraisers & Assessors

A national e-mail survey of appraisers and assessors was initiated in 2009. The purpose of this survey is to obtain input from appraisal and assessment professionals from a broader perspective to see what other professionals have observed.

A total of 172 replies were received from 146 communities in 15 states with a total population more than 13,500,000 people. The communities range in size from Waterville Valley NH population 257 to Seattle WA population 3,554,760. This is a very diverse mix of communities with differences in socio-economic and geographic influences.

The survey solicited responses to the follow three questions:

1. ***Have you observed or are you aware of any loss in residential property value due to the presence of a cell tower? YES / NO***
2. ***Have you observed or are you aware of any appeals filed in the last two years claiming property value loss due to the presence of a cell tower? YES / NO***
3. ***Have you observed or are you aware of any property value loss due to the ABILITY to see ANY part of a cell tower from a residential property, regardless of distance? YES / NO.***

**All the respondents answered “NO” to each of the above three questions.**

Some of the respondents simply replied “no” without additional comment while others expanded their answers to include local information and experience. The expanded comments start on the following page. The survey data tabulated by State, Community and Population follow the comments.

Jason R. Streebel, MAA  
Director of Assessing  
Mashpee, MA  
October 3, 2018 in a public letter to Mashpee town manager

*"...in sixteen years, not one homeowner, property appraiser, or resident has suggested to this office that the nearby cell towers were a detriment to their property value or purchase price."*

---

Dick Harriman,  
CEO/Assessor  
Town of Orrington

*"I have one tower and no problems or complaints"*

---

Michelle Boisjoly,  
Assessor  
Dayton, Ohio

*"No to all three questions; we have 2 towers in town with several sales near 1 of them. Dayton is rural with 1.5-3 acre minimum house lots."*

---

Marlene Tepper  
Certified Residential Appraiser  
Westchester, NY

*"My experience results in a "no" on all three questions"*

---

Leland T Bookhout MAI, SRA  
Rhinebeck, NY

*"New buyers tell me in interviews that I have conducted that they did not pay less because of cell towers. I recognize that existing property owners feel they have been invaded thus scream and yell that the world has come to an end.*

*The bigger issue is that the potential pool of buyers for any home today is so sophisticated that they will use the issue of a nearby cell tower to get the purchase price down but when they resell in a few years - no reduction in asking price to list their property! Those who really do not want to live near a cell tower, or any other conceivable excuse, will go elsewhere, they have choices. We lose sight of the fact that any pool of potential buyers has choices. Ask any developer the question and they will almost always say that a particular buyer backed away from the purchase but someone came along to buy at the full price.*

*Part of the reaction by buyers is different in a sellers market vs. a buyers market. In the latter the alternatives are greater and the buyers can be picky."*

---

Duane P. Willenbring CGB :GMB: CGP  
Willenbring Const. Inc  
St. Cloud, MN

*"I am a Builder, Developer and Realtor and I serve on the Rockville, Mn. City Council. The answer to all three questions is No. I have not heard of any adverse opinions regarding cell towers"*

---

Melinda Fonda  
Assessor  
Stratford, CT

1. *Have you observed or are you aware of any loss in residential property value due to the presence of a cell tower? "NO"*
2. *Have you observed or are you aware of any appeals filed in the last two years claiming property value loss due to the presence of a cell tower? "NO we have not had any appeals regarding loss in value due to cell towers"*
3. *Have you observed or are you aware of any property value loss due to the ABILITY to see ANY part of a cell tower from a residential property, regardless of distance? "I have had people claim their value is affected because they have an obstructed view. I have not seen this affect value."*

---

From: Orban Winton  
Socorro, NM

*"I have not had the opportunity to appraise or be associated with questions 1 and 2. The majority of our small town can see a part of a cell tower and have not noted any reduction in sale prices".*

---

Carl Brinegar, SRA, SRPA  
San Angelo, TX

*"Sorry I can't help much. Answer is no. For all of the properties that can see cell towers in this area, I have never noted any reduction in price, nor had a seller or Realtor tell me that there was a reduction in price due to that situation & some towers are quite visible from new moderate priced residential property subdivisions & builders are continuing to build closer & closer to the towers, apparently without any ill pricing effects yet at least."*

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Linda Truitt, MAI  
Springfield, MO

*"Hi - I am not aware of any reduction in value to properties near a cell tower. I know a local appraiser that an assignment to appraise a rural property with a small house before and after a cell tower was installed on their 10 acres. It was his opinion that the property was actually worth more with the tower because of the land lease income. Not much help I'm afraid."*

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Ned Farrone, MAI  
Larchmont, NY

*"The answer is "NO" to all three questions. We have been doing ongoing studies of neighborhoods with cell towers for more than 10 years. Never once have we found that there was a diminution in value due to being able to see a cell tower."*

Survey of New Hampshire, Massachusetts and Vermont Assessors

All assessors were asked the follow three questions:

1. *Have you observed or are you aware of any loss in residential property value due to the presence of a cell tower?*
2. *Have you observed or are you aware of any appeals filed in the last two years claiming property value loss due to the presence of a cell tower?*
3. *Have you observed or are you aware of any property value loss due to the ABILITY to see ANY part of a cell tower from a residential property, regardless of distance?*

In New Hampshire twenty-six communities with populations from 2,000 to 110,000 responded. **All twenty-six communities answered “NO” to each of the above three questions.**

Population	Town	Population	Town	Population	Town	Population	Town
2,042	Newbury	5,620	Hopkinton	13,040	Durham	28,486	Dover
2,215	Andover	6,561	Newport	13,388	Claremont	29,558	Salem
2,460	Plainfield	7,098	Stratham	15,450	Hampton	42,336	Concord
3,537	Gilmananton	7,322	Belmont	17,060	Laconia	87,321	Nashua
4,463	New London	8,020	Bow	22,778	Keene	109,691	Manchester
4,867	Henniker	8,434	Seabrook	24,568	Hudson		
4,880	New Boston	11,156	Hanover	24,837	Londonderry		

Massachusetts assessor results

Andover	<i>Never seen an abatement for that</i>	Chelmsford	<i>Nothing</i>
Bedford	<i>No</i>	Lexington	<i>None to my knowledge</i>
Belmont	<i>Haven't seen any</i>	Lowell	<i>There were none</i>
Billerica	<i>No haven't seen anything yet</i>	Reading	<i>No</i>
Carlisle	<i>Not in this town</i>	Waltham	<i>Have not had any</i>
		Woburn	<i>No</i>

Vermont assessors / lister results

Bethel	<i>No; Our tower is 2 yrs old, no immediate neighbors; can be seen form Rte 107 &amp; 12.</i>		
Cabot	<i>No; We have 2 towers</i>	Poultney	<i>No</i>
Charoltte	<i>No; not aware of any grievances re cell towers</i>		
So Burlington	<i>No; never had anyone broach the subject</i>	Dover	<i>No</i>
Weathersfield	<i>No to all 3 questions</i>	Mount Tabor	<i>No</i>
Royalton	<i>No; We have 2 towers in remote locations</i>		

The following statements and the conclusions are from reports by other appraisers who have completed site-specific analysis or general market research in order to determine if verifiable market data exists supporting the opinion that the presence of a cell tower has a deleterious impact on surrounding property values.

Edward J. Ferrarone, MAI – September 2008 – Danbury, CT

As you see from the data, the sales prices and price per square foot (a recognized unit of comparison) for those residences situated near a communication facility site are consistent with, and in some cases higher than, the prices achieved in the neighborhood further away from the communication facility site.

I have been conducting surveys of sales prices such as these for the last decade. The areas covered include Westchester, Rockland, Putnam, Dutchess, Orange, and Ulster Counties. In no instance have I ever found that values have been reduced by the presence of communications facilities such as those which are proposed for this site.

As a result of the foregoing analysis, it is our conclusion the installation, presence and/or operation of the proposed Facility on the subject Property, will not result in the diminution of real estate values of nearby properties or reduce the marketability of properties in the immediate area.

U.S. District Court Judge Charles L. Brieant, in a decision dated January 25, 2001, agreed with the conclusion "that the actual experience with similar wireless facilities within ... other communities has not supported a conclusion that these antennae have reduced the value of nearby property." Judge Brieant further states that "generalized concerns about a potential decrease in property values stemming from the construction of the proposed communications antenna, especially in light of the expert reports contained in this record before the Court, are not adequate to support the conclusion that a special use permit should be denied."

See U.S. District Court Southern District of New York (White Plains)  
Civil Docket for case #: 7:00-CV-04828-CLB Sprint Spectrum, LP v Cestone et al.

Bill Pastuszek, Jr. SRA, MAI, MRA – December 2007 – Pepperell, Massachusetts

*Summary.* The preceding analysis demonstrates that cellular telecommunications facilities in competitive residential locations do not affect real estate prices adversely. Research and analysis in other areas supports this conclusion: there is no measurable impact on residential sales prices due to the presence of such facilities. *Conclusion.* Based upon my inspection of the subject site and neighborhood, of comparable sites, my detailed review of the proposed project, and my review of pertinent empirical studies, it is my professional opinion that the construction and operation of the project will not have any adverse effect upon the property values of any real estate located near the site.

Vern J. Gardner Jr., SRA, MAI – February 2007 – Londonderry, New Hampshire

Based upon the material presented herein it is this appraiser's opinion that the Market Value of the Fee Simple Title to any of the properties in the vicinity of the proposed cell tower will experience no diminution in value resulting from its construction as of February 05, 2007.

Patricia Amadon, MAI - October 2006 – Falmouth ME

In terms of marketing time, I researched sales in the general area to investigate the number of days on the market for residential properties. The marketing time ranged from 0 days to 371 days. When the maximum and minimum values were eliminated, this range narrowed from 11 days to 134 days. The sales of the two properties in proximity to towers took 66 and 72 days to sell, selling times well within the range of residential properties within the area. Therefore, marketing time does not appear to be affected.

Based on my investigation summarized above, I have concluded the following:

The nearest property has sufficient natural coverage and distance from the proposed tower to significantly diminish visibility.

The addition of the proposed tower and associated equipment will have no measurable adverse impact on the value of surrounding property.

From a valuation perspective, the proposed tower is the most appropriate location for a telecommunications facility in the area.

Robert G. Bramley, MAI - May 2006 - Cornish NH

In summary, while the existing tower, if constructed, may be visible at a distance, I know of no instance where local property values in rural locations such as the subject will diminish with the construction of said facilities nor will the region be impacted, except in a positive way, from said facilities because of improved communication facilities.

J. Nathan Godfrey Appraiser October 2002 – West Tisbury, Ma

“The surrounding neighborhood area will be unchanged by the introduction if the proposed wireless communications facility. The equipment shelter and base of the pole will not be visible from Old Courthouse Road and there will be no change to the overall character of the site. My research and investigations have concluded that there would be no diminution of value or difficulty in marketing a residence in the immediate area around the proposed installation.”

Donald E. Watson, Certified General Appraiser – June 1998 – 5 communities in Southern NH

The study of sales in Bedford, Nashua, Merrimack, Candia, and Manchester did not indicate any discernible trends or variations in the sale prices of properties in the vicinity of telecommunications towers or similar structures in relation to the overall sales ratios found in each community. The lack of any trend would indicate that in fact there is no diminution of value of properties near these structures. Given federally mandated guidelines, I am of the opinion that as more telecommunications tower are constructed, their presence will become more common, similar to the existing telephone-poles. If any diminution of value were to occur, it would be evident during the early stages of placement of telecommunications towers.

Michael P. Wicker, MAI - April 1994 - Sullivan, New York

At your request, we have performed a detailed analysis of the effects of radio communication towers on surrounding property values. It is the conclusion of this analysis that the subject's proposed cell site to contain a 180-foot guyed tower and a 293 square foot prefabricated concrete shelter will have no effect upon surrounding property values. The location, nature, and height of buildings, walls, and fences will not discourage the appropriate development and use of adjacent land and buildings or impair their value.

Enclosed please find the results of this analysis which support the above conclusion.

Robert G. Bramley, MAI - August 1990 - Candia NH

demand. In short, diminution in value of surrounding property was not found in nearby areas of Chester or Candia and, as a matter of fact, in areas surrounding tower sites in more densely populated areas of Hudson and Merrimack, New Hampshire. Conversation with residents in periphery areas suggests that the sites are not objectionable from an aesthetic viewpoint and may in fact contribute somewhat to retaining the undeveloped or sparsely developed character of the area, unless of course development pressures are greater, in which case housing development appears to take place without any real measurable detriment to price or value. Safety is also not a detriment since towers are constructed to withstand hurricane force winds.

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Robert H. McKennon, CRE, MAI - Wilmington, Delaware

Robert has researched the impact of telecommunications towers on residential property values in his area. The following summarizes the results of his research.

To all who took the time to respond to my AI forum request for info on the impact of telecommunications towers on residential property values: -Thanks very much for your input.

I looked this time at a potential tower site in a heavily developed and desirable residential area that was slated for a monopole installation behind a supermarket at a major commercial intersection.

**After reviewing 8 tower sites in residential locations with varying price ranges, I was unable to find any evidence that there is a measurable impact on value due to the proximity of a tower.**

For example: A Toll Brothers development currently underway has three contiguous towers that loom over the residential lots currently being sold. These are being developed with \$700,000 homes that are selling at a similar absorption pace to other similar Toll communities in the area. The site manager indicated that the towers were not a factor in pricing or marketing. The developer did not provide extra buffers, larger lots, or open space nearby to alleviate any potential impact the towers might have.

Another area development has an unsightly latticework tower nearby that can be seen from various points in the development. **There is absolutely no difference in pricing of similar model homes that can see the tower as opposed to those that cannot.** The sales agent who sold the project noted that the tower had no impact on sales. Another agent who has sold several homes in the neighborhood indicated that her daughter lives in the neighborhood, that she has been in the neighborhood many times over the years and had never noticed it during her walks with her granddaughter, and that it was not a factor with buyers.