



Attachment
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2017 APR 19 P 12:35

April 17, 2017

Town of Needham
Board of Selectmen
Attn: Matthew Borrelli, Chairman
1471 Highland Avenue, First Floor
Needham, MA 02492

Re: Supplement to Grant of Location Application to Install Wireless Antennas and Equipment on Existing Utility Poles in the Public Right of Way

Applicant: Cellco Partnership d/b/a Verizon Wireless

Dear Chairman Borrelli:

The purpose of this letter is to supplement grant of location materials submitted by Cellco Partnership d/b/a Verizon Wireless ("VzW") on April 7, 2017.

Accordingly, enclosed please find:

1. One (1) Radio Frequency Affidavit.

Please contact me with questions at 603-628-1362 or joshua.lanzetta@mclane.com.

Sincerely,

Joshua P. Lanzetta

JPL

Enclosure/

McLane Middleton, Professional Association
Manchester, Concord, Portsmouth, NH | Woburn, Boston, MA

McLane.com



AFFIDAVIT OF RADIO FREQUENCY ENGINEER

The undersigned, in support of the applications to install a wireless communications facility consisting of one antenna and associated radio equipment on twelve utility poles located in the Town of Needham, Massachusetts, states the following:

1. My name is Keith Vellante. I have a Bachelor of Science degree in Electrical Engineering from the University of New Hampshire and I am employed as a Radio Frequency (RF) Engineer for C Squared Systems, LLC. C Squared Systems has entered into a contract with Verizon Wireless to provide RF consulting services on behalf of Verizon Wireless. I have reviewed the proposed sites with the Radio Frequency Engineer responsible for the Verizon Wireless network design in the area of Massachusetts that includes the Town of Needham, MA.
2. Verizon Wireless is a federally licensed provider of wireless communications services with a national footprint.
3. The proposed facilities are located within areas where Verizon Wireless has identified a need to install a wireless telecommunications facility in order to provide reliable wireless service. The search area for each proposed facility was determined by the fact that wireless service needs significant improvement throughout the surrounding areas and stretches of roadway in the immediate proximity of each proposed location. Furthermore, it was determined that the areas served by each facility would interact well with those of existing and planned facilities in the surrounding area.

The following table provides details of each proposed facility:

Site Name:	Site Address:	Utility Pole Number:	Latitude:	Longitude:	Elevation (AMSL):	Antenna Height (AGL):
Needham MA SC01	20 Great Plain Terrace	168-1	42.2808	-71.2208	164'	35.5'
Needham SC03 MA	97 Melrose Avenue	14	42.2839	-71.2244	173'	41'
Needham SC04 MA	7 Stevens Road	27-0	42.2802	-71.2257	169'	41'
Needham SC05 MA	200 Harris Avenue	146/25	42.2771	-71.2254	161'	24'
Needham MA SC06	609 Webster Street	7	42.2864	-71.2302	184'	26.6'
Needham SC07 MA	443 Great Plain Avenue	67	42.2769	-71.2167	159'	28.3'
Needham SC09 MA	Corner of Dedham Avenue & South Street	97/51	42.2688	-71.2201	95'	39'
Needham MA SC10	270 Hunnewell Street	33/30	42.2993	-71.2403	160'	24.1'
Needham SC16 MA	842 Central Avenue	7-101	42.2917	-71.2499	110'	41'
Needham SC19 MA	1250 Great Plain Avenue	116-1	42.2803	-71.2454	140'	24.6'
Needham SC21 MA	33 Chestnut Place	72-3	42.2760	-71.2387	155'	36.5'
Needham W SC03 MA	1437 Great Plain Avenue	25	42.2834	-71.2524	140'	40.5'

4. A conventional Verizon Wireless LTE macro-site consists (in part) of RRH's (Remote Radio Heads) located near the antennas on a tower, rooftop, or other support structure, which are connected via fiber optic cables to a BBU (Baseband Unit) located on site in an equipment shelter or other weatherproof enclosure. The BBU performs network signal processing between the RRH's at the site, and Verizon's LTE core network.
5. C-RAN (Cloud Radio Access Network) nodes and small cells also utilize RRH's at each site; however a centralized BBU capable of supporting RRH's at multiple sites is implemented to gain certain efficiencies, both from a network and environmental standpoint. The proposed locations are twelve of the multiple C-RAN nodes and small cells planned to address capacity and coverage deficiencies in Needham and the surrounding area.
6. C-RAN and small cell deployments are intended to complement, not replace, the conventional LTE macro-network sites, and are typically used as a capacity solution targeting isolated areas of heavy network usage, a.k.a. "hot spots." In doing so, the C-RAN nodes and small cells serve to offload the demand on the existing sites serving these "hot spots." This not only improves service to the specifically targeted area, but also improves overall system performance elsewhere in the network.

7. The purpose of the proposed facilities is to provide adequate service capacity and coverage improvement to areas of Needham, where Verizon Wireless does not currently provide acceptable LTE service. These areas include, but are not limited to, Great Plain Avenue, Harris Avenue, Webster Street, Route 135 (Dedham Avenue/West Street), Hunnewell Street, Central Avenue, Chestnut Street, the Needham High School, the Pollard Middle School, and the roadways, neighborhoods, and business/retail/community areas immediately surrounding each small cell location.
8. To find a site that provides acceptable capacity and coverage improvement, the Verizon Wireless RF Design Group utilizes computer modeling to define a search area. The search area is designed such that a site located within the area and at a given height would have a high probability of completing the capacity and coverage objectives in the target areas. The RF Design Group develops the network by working off existing sites from which to build out the network.
9. Verizon Wireless' search of these areas and subsequent analysis determined that installing the proposed facilities on the subject utility poles would be the most appropriate solution to meet its network capacity and coverage objectives.
10. I have reviewed the proposed installations to be placed on the subject utility poles as well as the other existing and planned antenna site locations used in Verizon Wireless' system in and around the surrounding areas. I have analyzed the potential benefits these sites would represent to Verizon Wireless' network and its users. I employ computer simulations, which incorporate the results of field tests of existing facilities, to determine existing radio frequency (RF) coverage for Verizon Wireless' system. These simulations model characteristics such as antenna types, antenna height, output power, terrain, ground elevations and RF propagation effects of the frequency utilized.
11. The following table provides details of the surrounding Verizon Wireless macro-site telecommunications facilities used to generate the RF maps attached hereto as an exhibit to Verizon Wireless' application.

Site Name:	Latitude:	Longitude:	Street Address:	City, State:	Structure Type:	Antenna Height (AGL):	Status:
W Rox Georgetown	42.2655	-71.1520	5050 Washington Street	Boston, MA	Rooftop	46	On-Air
W Roxbury 2	42.2791	-71.1822	225 Rivermoor Street	Boston, MA	Monopole	75	On-Air
West Roxbury North	42.3026	-71.1635	50-56 Broadlawn Park	Boston, MA	Rooftop	55.3	On-Air
Dedham	42.2313	-71.1830	55 Ariadne Road	Dedham, MA	Rooftop	88	On-Air
Dedham 2	42.2550	-71.2094	200 West Street	Dedham, MA	Monopole	42	On-Air
Dedham 3	42.2559	-71.1667	5 Incinerator Road	Dedham, MA	Smokestack	105	On-Air
Dover Relo	42.2472	-71.2805	2 Dedham Street	Dover, MA	Monopole	113	On-Air
Needham	42.3033	-71.2177	141 Cabot Street	Needham, MA	Lattice	152	On-Air
Needham 2	42.2800	-71.2333	858 Great Plain Avenue	Needham, MA	Steeple	68	On-Air
Needham 5	42.2760	-71.2653	1555 Central Avenue	Needham, MA	Lattice	110	On-Air
Needham Heights	42.2911	-71.2364	460 Hillside Avenue	Needham, MA	Rooftop	49	On-Air
Brookline	42.3195	-71.1826	345 Boylston Street	Newton, MA	Rooftop	48	On-Air
Needham Cutler	42.2950	-71.2033	1 Wells Avenue	Newton, MA	Rooftop	73.3	On-Air
Newton 3	42.3284	-71.2553	2227 Washington Street	Newton, MA	Rooftop	44	On-Air
Newton 4	42.3184	-71.2109	56 Ramsdell Street	Newton, MA	Rooftop	28	On-Air
Newton Ctr Rep	42.3285	-71.1955	1320 Centre Street	Newton, MA	Rooftop	48	On-Air
Newton Waban	42.3265	-71.2311	1643 Beacon Street	Newton, MA	Rooftop	55	On-Air
Wellesley	42.2931	-71.2985	106 Central Street	Wellesley, MA	Monopole	70	On-Air
Wellesley 2	42.3175	-71.2307	20 William Street	Wellesley, MA	Rooftop	58	On-Air
Wellesley Hills	42.3102	-71.2761	332 Washington Street	Wellesley, MA	Rooftop	50	On-Air
Wellesley Hills 2	42.3090	-71.2637	125 Oakland Street	Wellesley, MA	Rooftop	68.7	On-Air
Westwood 3	42.2289	-71.2155	213 Fox Hill Street	Westwood, MA	Water Tank	76	On-Air

12. The signal propagation plots included as attachments were produced using deciBel Planner™, a Windows-based RF propagation computer modeling program and network planning tool. The software takes into account the topographical features of an area, land cover, antenna models, antenna heights, RF transmitting power and receiver thresholds to predict coverage and other related RF parameters used in site design and network expansion.
13. The RF map titled “Needham MA Small Cells – Existing 700 MHz LTE Sector Footprints” attached hereto depicts the areas primarily served by the sectors (a.k.a. signal “footprints”) of the existing “On-Air” Verizon Wireless macro sites in the area, which are shown by a unique color for each particular sector of interest. For clarity, all other sectors of less interest with respect to the proposed small cells 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 immediate area, the proposed sites are also needed to 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 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 is capable of reaching these areas does not mean that these areas experience adequate coverage. These unreliable areas of low signal level impose a significant capacity burden on the sites primarily serving the area.
14. The RF map titled “Needham MA Small Cells – Existing 700 MHz LTE Coverage” attached hereto shows the coverage provided to areas of Needham from the “On-Air” Verizon Wireless macro sites in the area. The green shaded areas represent the minimum desired level of coverage for this area, whereas the orange shaded areas represent a slightly lower signal strength. The deficient areas of coverage are defined by the unshaded or “white” areas. Areas of deficient service are characterized by poor service quality, low data throughput, and the substantial likelihood of unreliable service. As can be seen from the coverage plot, the surrounding network of Verizon Wireless sites, due in large part to the distances between the existing sites and the intervening topography, are unable to provide sufficient LTE coverage to areas of Needham. In addition to providing adequate service capacity, the proposed small cells will improve coverage to key roadways immediately surrounding each small cell location.
15. The “Needham MA Small Cells – Area Terrain Map” details the terrain features around the proposed small cells. 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.
16. As shown in the aforementioned plots, the proposed facilities are located in areas of deficient service throughout Needham, making them suitable to provide a dominant server and capacity relief to these “hot spots” of network usage. The proposed facilities will offload the sectors currently serving the area, in turn improving the overall system performance within their respective service areas.
17. I have concluded that the proposed facilities will satisfy the present capacity and coverage needs that motivated Verizon Wireless to establish search rings in this vicinity. Any reduction in the proposed antenna configuration and/or equipment would limit optimal performance of these sites, which would substantially limit each site’s effectiveness.
18. Verizon Wireless certifies that the proposed facilities 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 F, C3, and C4 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.

19. Pursuant to its Federal Communications Commission (FCC) licenses, Verizon Wireless is required to ensure that all radio equipment operating at the proposed communications facilities and the resulting radio frequency exposure levels are compliant with FCC requirements as well as federal and state health and safety standards.
20. Providing wireless communication services is a benefit to the residents of the Town of Needham, as well as to mobile customers traveling throughout the area. The proposed facilities are well suited to meet Verizon Wireless' network requirements for the intended areas. The absence of a wireless telecommunications facility at or near these immediate locations will result in the continued existence of inadequate network capacity and coverage gaps in this area. Without the proposed facilities, Verizon Wireless will be unable to provide reliable wireless communication services in this area of Needham; therefore, Verizon Wireless respectfully requests that the Town of Needham act favorably upon the proposed facilities.

Signed and sworn under the pains and penalties of perjury April 13, 2017.

Keith Vellante

Keith Vellante
Radio Frequency (RF) Engineer
C Squared Systems, LLC
65 Dartmouth Drive
Auburn, NH 03032

Plot Information
 700 MHz LTE
 FCC License: WQIQ689
 Best Server by RSRP

Symbol Key
 Existing Site
 Approved Site
 Proposed Site

Sector Footprints
 Surrounding Sectors
 Dedham 2 Alpha & Gamma
 Needham Heights Alpha, Beta, & Gamma
 Needham 2 Alpha, Beta, & Gamma
 Needham 5 Alpha
 Wellesley Hills 2 Beta

verizon

W Roxbury 2
 75 ft

Needham 5
 110 ft

Needham 2
 68.3 ft

Needham Heights
 73.3 ft

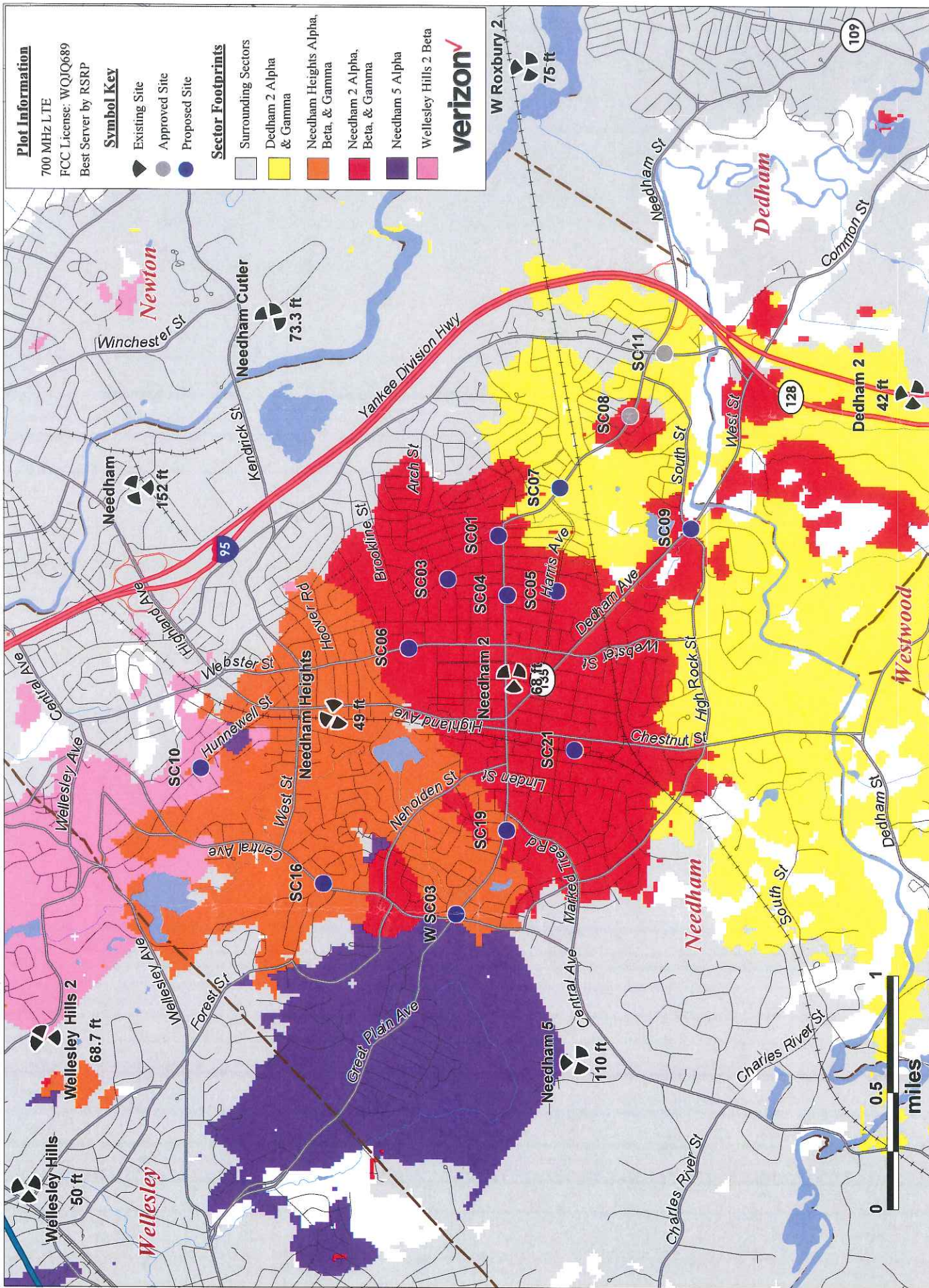
Wellesley Hills
 50 ft

Wellesley Hills 2
 68.7 ft

Needham
 152 ft

Needham 2
 42 ft

Scale: 0 0.5 1 miles



Needham MA Small Cells - Existing 700 MHz LTE Coverage

