

STATE OF CONNECTICUT
SITING COUNCIL

DOCKET NO. 502 - Cellco Partnership d/b/a Verizon Wireless application for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance, and operation of a telecommunications facility located at 118 Newton Road, Woodbridge, Connecticut

WOODBIDGE NEWTON NEIGHBORHOOD ENVIRONMENTAL TRUST LATE FILE
WITNESS AND EXHIBIT LIST

WNNET intends to call the following witnesses and present exhibits in response to inquiries by the Council at the previous hearing session:

1. David Maxson, WCP of Isotrope, LLC (pre-filed testimony submitted)

Exhibits:

C. Isotrope Response to Council Inquiries (information on DAS installations, CW drive test for 15 Meetinghouse Lane of Sept 9, 2021 with Appendix of photographs of 120/150ft tower at alternate location)

2. Mitchell Smooke, Yale University, Strathcona Professor of Mechanical Engineering & Materials Science & Applied Physics, (Appendix of photographs to Isotrope report of 15 Meetinghouse visual impact)

A. CV/Resume of Mitchell Smook

Respectfully Submitted,

Woodbridge Newton Neighborhood Environmental Trust,

By Keith R. Ainsworth

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CERTIFICATE OF SERVICE

This is to certify that a true copy of the foregoing was deposited in the United States mail, first-class, postage pre-paid this 14th day of September, 2021 and/or hand delivered to:

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Response to Inquiries of Connecticut Siting Council at Meeting of August 31, 2021 on Docket 502



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Thinking outside the sphere

Response to Inquiries of Connecticut Siting Council at Meeting of August 31, 2021 on Docket 502

Foreword

At the August 31, 2021 session of the hearing on Docket 502, the Connecticut Siting Council (“Council”) asked for more information on coverage from the alternative location at 15 Meetinghouse Lane and for a list of some locations where distributed antenna systems (“DAS”) are operated in suburban residential areas.

Executive Summary

The first part of this report contains examples of DAS networks in residential areas across the USA. A Verizon small-cell network is also mentioned. It must be understood that these are a limited collection of examples gleaned from conversations, personal experience and media. If the Connecticut Siting Council desires a complete list, it would be more appropriate to request the carriers to provide the information, as they utilize these systems across the country, both as tenants of neutral hosts and builders/owners of their own systems.

The second part of this report demonstrates that in this proceeding, Verizon’s coverage analysis is highly variable, inconsistent, and contradictory. Based on this, Verizon’s coverage maps are unreliable, including any new ones submitted to the record. Comparing our new CW drive test data (reported herein) and Verizon’s CW drive test data confirms the alternative location at 15 Meetinghouse Lane satisfies the coverage objective while being significantly less impactful on the community.

The analysis provided by Verizon leads to one conclusion: the proposed facility is not intended to serve Routes 63 or 67 north of the junction of the two. The primary coverage objective is south of and not including Rt 67, but including the High School, Route 114, Alice Newton Street Memorial Park, and the government/institutional/recreational activities at and near Meetinghouse Lane. The alternative at 15 Meetinghouse Lane is a better location for meeting the coverage objective and for environmental compatibility.

The third part of this report provides drive test evidence of the effectiveness of using the alternative location at 15 Meetinghouse Lane. Considering that a properly completed drive test provides actual field data (along roads), it provides real-world results for the record.



Conclusion: The Alternative is Better Overall

The residents have proposed a location that will provide a significant degree of improvement of service in Woodbridge, substantially the same as, and comparable in magnitude to, that of the proposed facility. The alternative is more than 500 wooded feet from the nearest residence, is located on a large pair of parcels that are in industrial and institutional use, and has good co-location potential for additional carriers.

I am the author of this report, hereby respectfully submitted,

David Maxson, WCP
September 14, 2021



DAS in Residential Areas

I spoke with a field agent employed by Extenet, a well-known DAS operator. While he is not aware of all the assets owned and operated by his employer, he volunteered several he was aware of that provide general coverage in residential settings.

Table 1 - Extenet Residential DAS Examples

Location	# Nodes	Location	# Nodes
Hull, MA	12 (incl 3 just installed)	Nantucket	39
Milton, MA	11	Franklin/Bloomfield, MI	About 25
Andover MA	9	New Town Square, PA	2
Memorial Village, Houston TX	About 80		

In a 2011 presentation to Penderbrook, VA,¹ DAS operator Crown Castle listed the then-existing DAS networks across the USA, many of which are in residential settings. They are shown in Figure 1. Figure 2 is a photosimulation of a proposed Penderbrook DAS node in a residential setting.

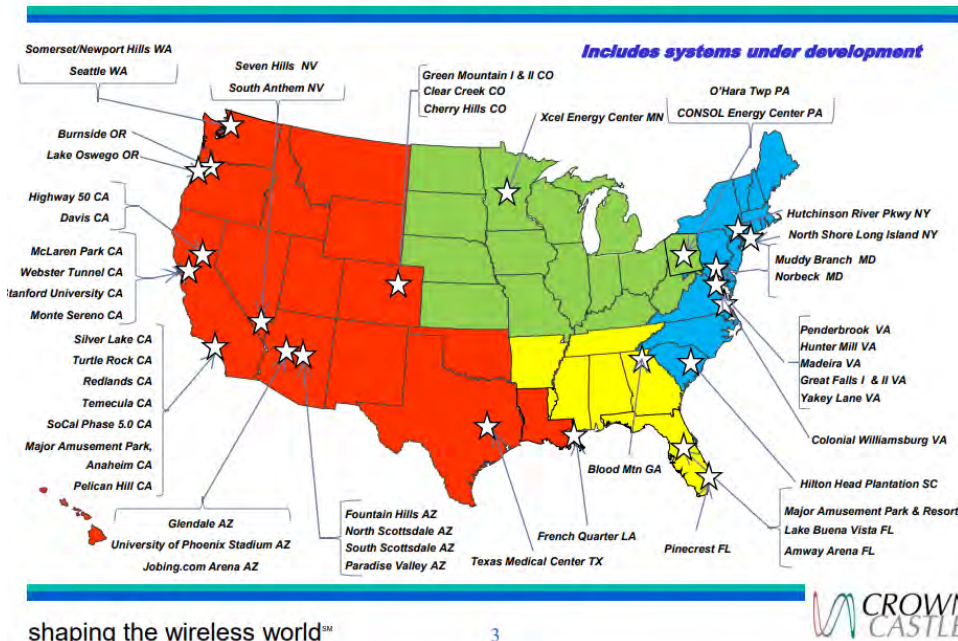
We mentioned Lower Merion, PA. Figure 3 is a snippet from a report² on adding Verizon to the existing 10-node DAS there in 2016. Also, Verizon has deployed CRAN small cells extensively in the USA, including among many others, a 24-node network in suburban North Andover, MA. Of course, this list only scratches the surface. Wireless providers fully know where they are using DAS and CRAN small cells and could be asked for information on where they are deployed.

¹ http://www.sullydistrict.org/lut/sdclut_201103-CrownCastlePenderbrookODAS.pdf

² <https://www.lowermerion.org/home/showpublisheddocument/13037/636045462594530000>



Crown Castle DAS Operations



shaping the wireless world™ 3
Figure 1 - Crown Castle DAS Promotion 2011



Figure 2 - Crown Castle Penderbrook DAS Photosimulation

Lower Merion, PA

Verizon Upgrade

25 May 2016

List of 10 DAS Node Facilities

Jurisdiction: Lower Merion, PA: 10 DAS NODE FACILITIES

1. N003 – 641 Righters Mill Road, Narberth, PA
 – Existing PECO wood utility pole to remain
2. N011m1 – 315 N Bowman Ave, Merion Station, PA
 – Existing PECO wood utility pole to remain
3. N012 – 7 Iona Ave, Narberth, PA
 – Existing PECO wood utility pole to be replaced
4. N016m1 – 321 N Ithan Ave, Bryn Mawr, PA
 – Existing Verizon wood utility pole to remain
5. N092 – 205 McClenaghan Mill Rd, Lower Merion, PA
 – Existing PECO wood utility pole to be replaced
6. N099 – 932 Waverly Rd, Bryn Mawr, PA
 – Existing Verizon wood utility pole to remain
7. N107 – 611 Merion Sq Rd, Gladwyne, PA
 – Existing PECO wood utility pole to be replaced
8. N189 – Friends Central School, Wynnewood, PA
 – Existing PECO wood utility pole to be replaced
9. N208 – 1615 Monk Rd, Gladwyne, PA
 – Existing Verizon wood utility pole to remain
10. HAV1B-004m1 – 530 Twin Oaks Rd, Havertown, PA
 – Existing PECO wood utility pole to remain

Figure 3 - Lower Merion, PA Verizon DAS Node List



15 Meetinghouse Lane Alternative Location

The Siting Council sought more information on the alternative location at 15 Meetinghouse Lane. Verizon is reportedly producing a coverage map of existing plus the alternative location (“Alternative Coverage Map”).³

Without even having viewed it yet, we can caution the Council that the Verizon Alternative Coverage Map is unreliable. This conclusion is based on the variable, inconsistent, and contradictory evidence Verizon has submitted to date. We do not expect their submission will cure the discrepancies. In summary the Verizon analysis has included:

1. Existing coverage map⁴ submitted to the Town in the Technical Report (“Report’s Existing Coverage”).
 - a. Showing very good overall coverage in Woodbridge (blue and green), including the area around the Rt 63/67 junction, with only patches of less than in-vehicle service (yellow).
 - b. Showing no coverage in the target area that is less than outdoor (yellow).
2. Existing coverage map submitted with the Application (“Application’s Existing Coverage”).
 - a. Showing more pessimistic coverage, with less in-vehicle service (green) and more outdoor (yellow), especially around the Rt 63/67 junction.
 - b. Showing no gaps where the coverage is less than outdoor coverage.
3. A Scan Test⁵ that is far more pessimistic than the computer-estimated coverage, showing 75% of the included data points more than 3 dB below outdoor coverage threshold, fully contradicting the existing coverage maps generated by computer.
4. The Scan Test thresholds and color scheme are different from that of the computer coverage maps, bringing into question Verizon’s use of the -85/-95/-105 dBm thresholds on the coverage maps for in-building/in-vehicle and outdoor service (respectively), compared to the Scan Test -95/-102/-108/-115/<-115 thresholds. It appears that Verizon uses a different scheme for evaluating the provision of service internally than the scheme it shows to the public.

³ WNNET provided Verizon with coordinates of a potential location on the DPW paved lot.

⁴ We refer to the 700 MHz band coverage maps because these represent where service is or is not available. The maps showing higher frequency coverage relate to the ability of a site to provide capacity where it is needed most. Capacity is not a prime objective as stated in the application.

⁵ The Scan Test is explained below.



In the following analysis, we reveal the differences among Verizon’s various analytical submissions.

Goal of the application

The stated goal of the application is “These wireless service deficiencies exist particularly along portions of Route 63 (Amity Road), Route 67 (Seymour Road) and Route 114 (Center Road), and in the area surrounding the Property, including the Amity Regional High School parcel and the Alice Newton Street Memorial Park.”⁶ The history of the site search began with the area around the Rt 63/67 junction, but it was shifted to include targets around Route 114. The application is for this broader target.

The applicant stated the design objective to be “reliable service... [at] levels greater than or equal to -95 dBm RSRP.” This level is indicated as “vehicular” and “in building” and is green and blue, respectively, on the Verizon computer coverage maps.

The Verizon CW⁷ Test submission of August 17, 2021 in response to interrogatories of WNNET (Figure 4), confirms that Verizon has shifted the goal to the south. The CW test shows that in the area of the Rt 63/67 junction, and to points north, there is no reception above -95 dBm from the proposed site. It confirms the proposed facility has nothing to do with obtaining -95 dBm coverage on Rt 67 and Rt 63 north of their junction. This explains why Verizon has said it is considering using CRAN small cells to provide coverage there as needed.⁸

⁶ Application Section B.1.

⁷ Recent discussion with the Council suggests an inadvertent conflation of the two distinct types of “drive test.” The continuous wave test, or “CW Test,” is used to evaluate prospective antenna locations and heights. Using a test signal transmitted from a crane, the CW Test measures the coverage that would be obtained from the hypothetical facility. It does not account for existing coverage from operating cell sites. The “Scan Test” measures existing coverage, and at its most basic, it measures the signal strength from the best available cell site at each measurement point.

⁸ We do not expect that it would be the Council’s duty to solve this gap area in this proceeding, as the applicant has proposed a facility that does not materially serve the area north of the Route 63/67 junction.

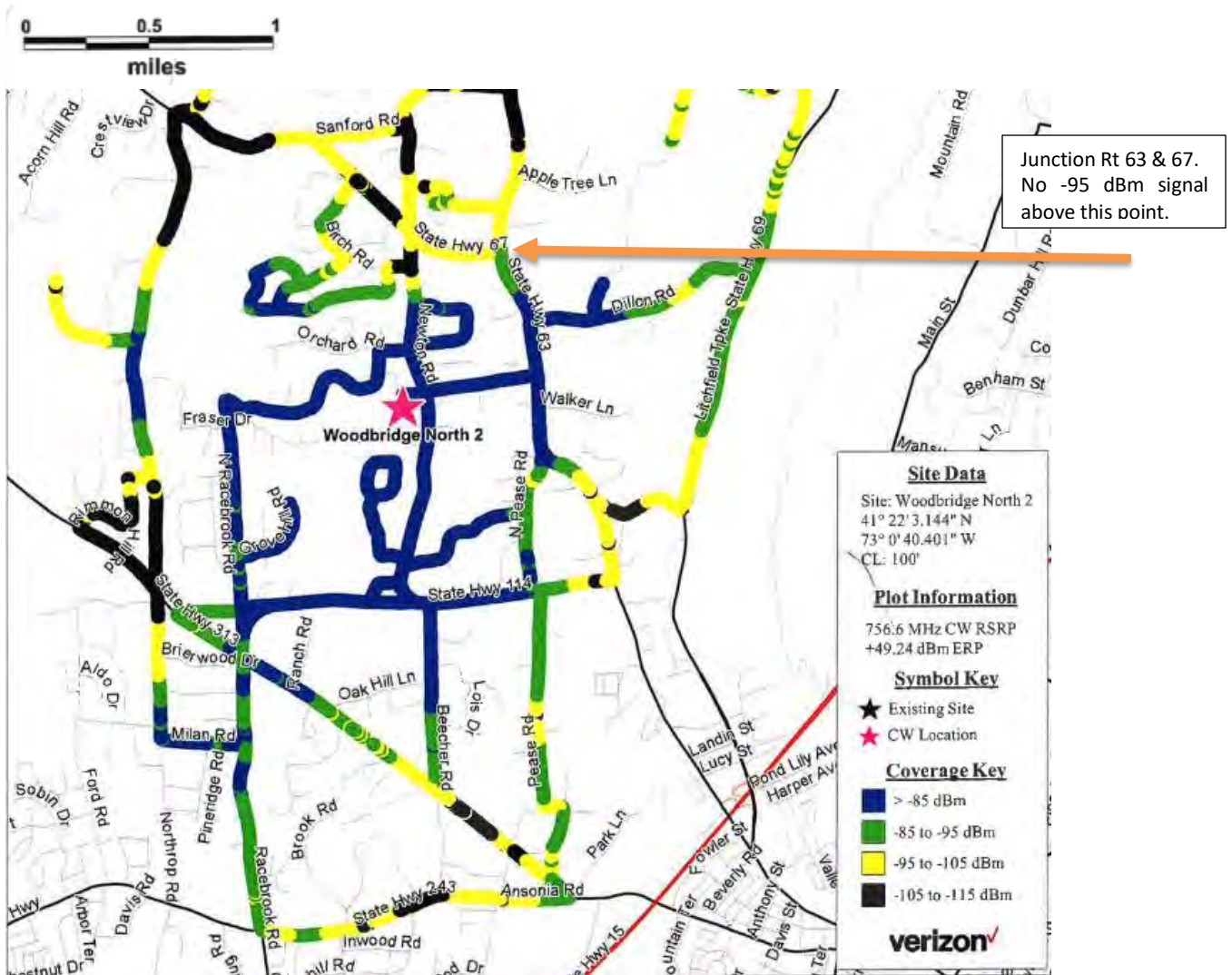


Figure 4 – Verizon CW Test from 118 Newton Rd

Conflict between the Technical Report and the Application

What Verizon presented to the Town in the consultation conflicts with what it provided the Council in the Application. The existing coverage maps in the Technical Report and the Application are contradictory.

In Isotrope Exhibit A (Figure 5), I reproduce the Verizon 700 MHz existing coverage map submitted to the Town in the Technical Report (“Report’s Existing Coverage”). Recall that it showed existing



coverage but with the Hamden site turned off, because in Docket 486 Verizon announced Hamden is planned for decommissioning. The replacement for Hamden is the Hamden Relo site, which is at much lower elevation and provides no material coverage to Woodbridge.

To illustrate the significant differences between the settings Verizon used to produce the Report's Existing Coverage and the Application's Existing Coverage, I have marked them with arrows, a circle, and a rectangle. Isotrope Exhibit B (Figure 6) is Verizon's 700 MHz existing coverage map submitted as Exhibit 6 with the Application ("Application's Existing Coverage"). It has Hamden turned on.

One would expect these two exhibits to be the same, except that the one with Hamden turned on would show more coverage in Woodbridge.⁹ Comparing the two maps, however, it is the one without Hamden that shows more existing coverage in Woodbridge. At the location of the double-headed arrow, the Report's Existing Coverage has more good coverage (blue/green) and less yellow coverage (the least desirable color) than the Application's Existing Coverage. At the location of the orange circle, Isotrope Exhibit A (Report) shows higher coverage levels with much less green and more blue coverage than Isotrope Exhibit B (Application).

The wrong map is showing better existing coverage. Focusing on the inset box near the center of Isotrope Exhibits A & B, this observation is confirmed, as the Report's Existing Coverage also shows substantially better existing coverage around the Rt 63/67 junction than the Application's Existing Coverage does.

⁹ See Docket 486 for detailed testimony of the reduction in service to Woodbridge when shutting off Hamden after commissioning Hamden Relo.

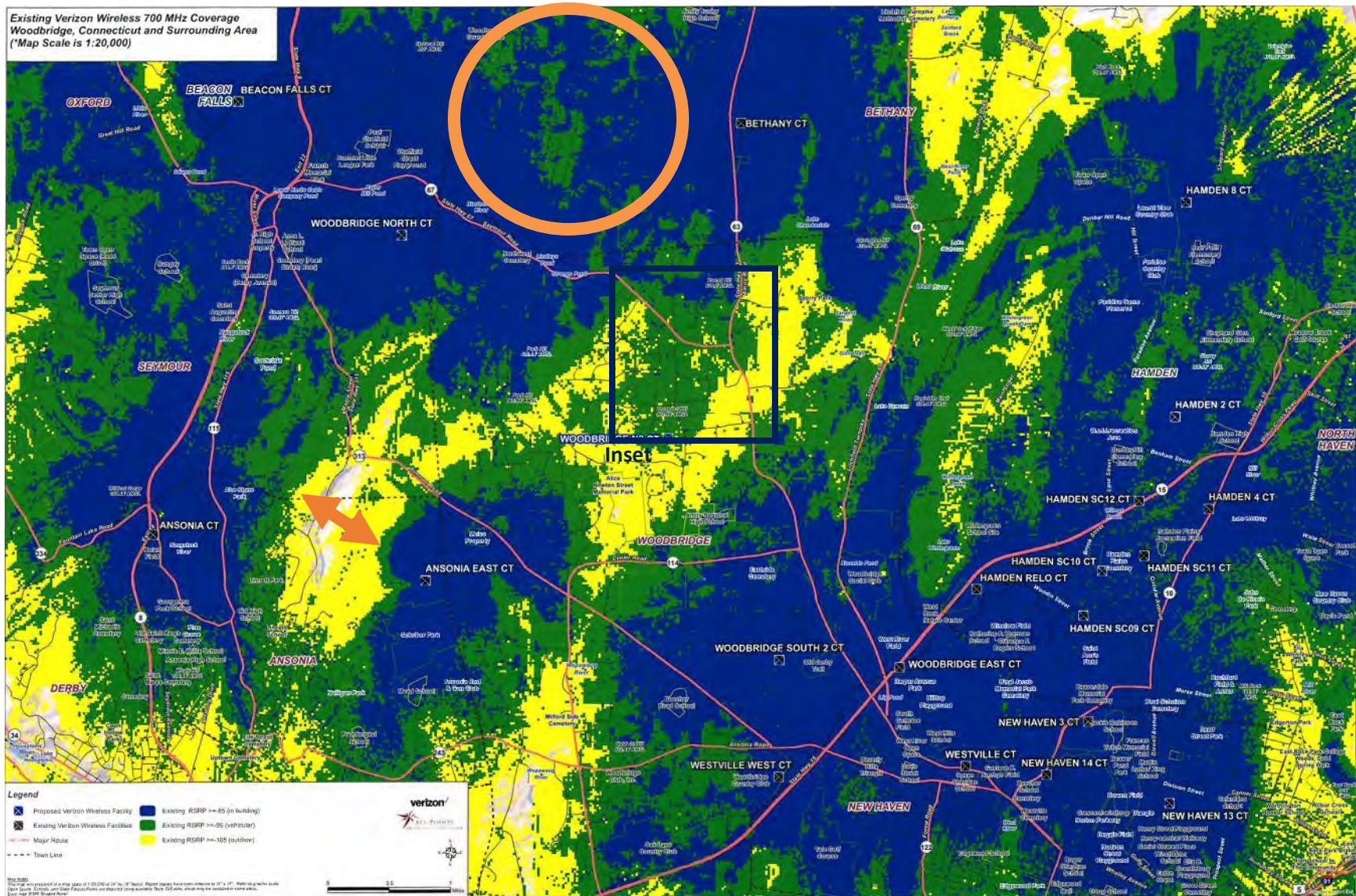


Figure 5 – Isotrope Exhibit A – Verizon’s Technical Report’s Existing Coverage (Isotrope annotations)

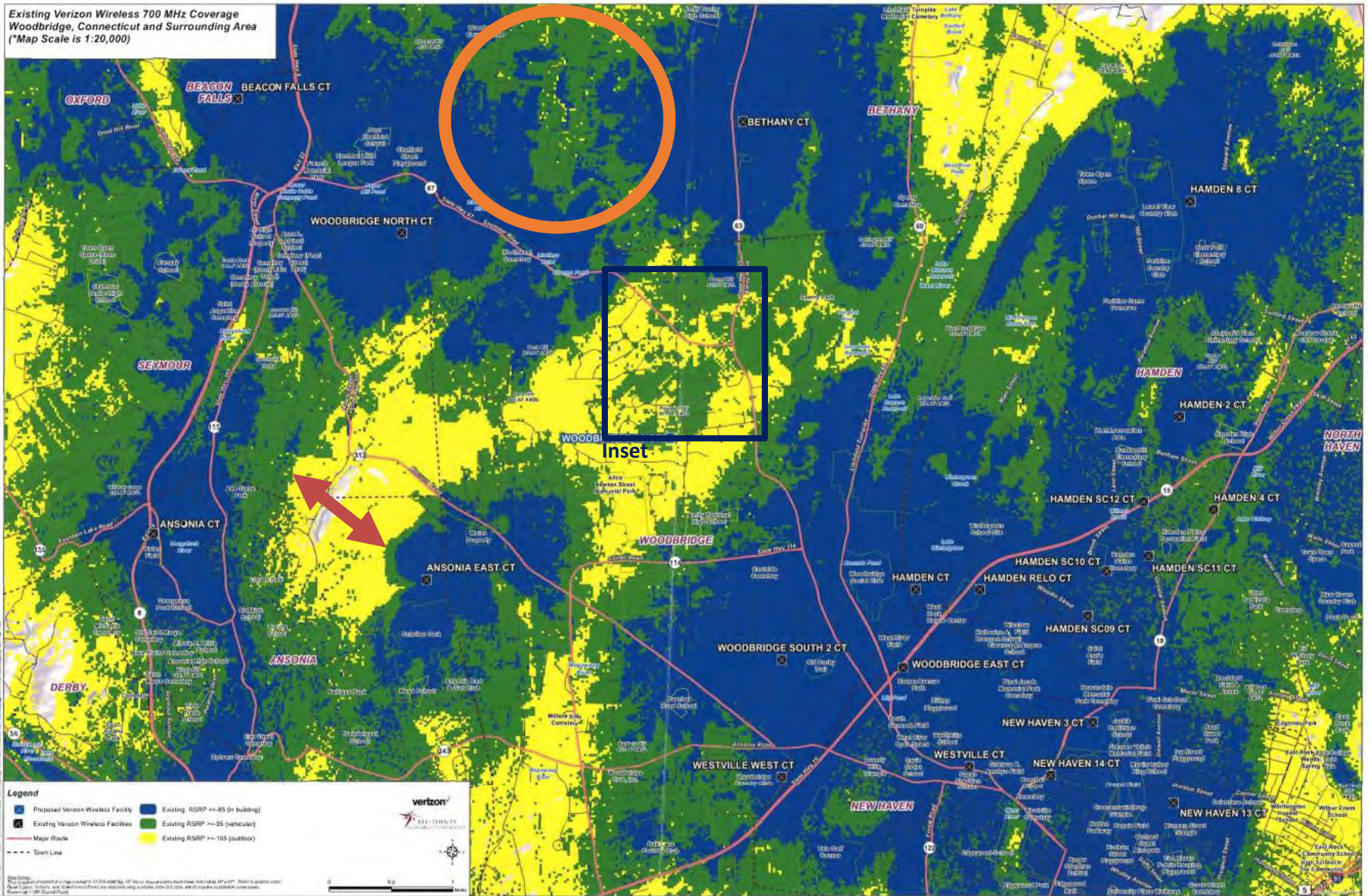


Figure 6 – Isotrope Exhibit B – Verizon’s Application’s Existing Coverage (Isotrope annotations)



Based on the foregoing analysis, the situation presented to the Town during the consultation was less dire than the situation presented to the Council. The extremely optimistic coverage model and Verizon's narrative made it appear to the Town that the proposed tower would completely fill in a gap in the corridors of Rt 63 & 67 near their junction. To illustrate this, compare the before and after images from the Technical Report and the Application.

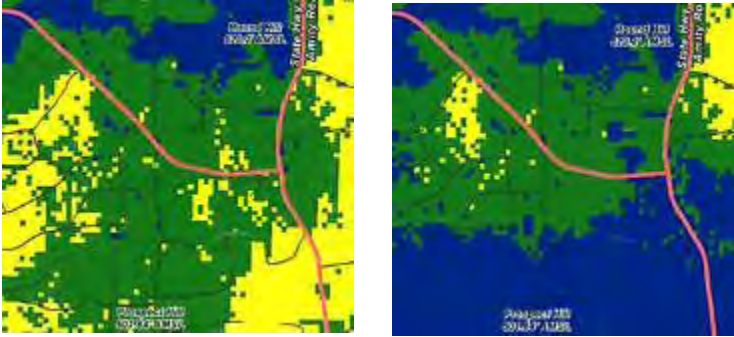


Figure 7 – Technical Report Existing (left) near 63/67 Jct and with Proposed (right)

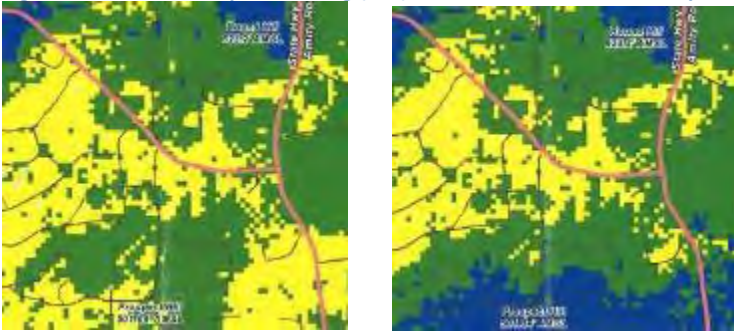


Figure 8 – Application Existing (left) near 63/67 jct and with Proposed (right)

As shown to the Town (Figure 7), existing coverage in the Rt 63/67 junction area is already substantially more than the -95 dBm target. The yellow gaps are small. The Town's review of potential alternatives was based on this faulty premise that the area north of the Junction of Routes 63 & 67 was a real and achievable objective with the proposed facility (120-ft height).¹⁰ It

¹⁰ The Verizon proposed coverage for the Town Technical Report is based on a 120-foot tower while the Verizon maps provided to the Council used a 100-foot tower. As we have already shown that the maps for the Town have a significantly more optimistic setting, the minor difference between coverage from 120 and 100 feet at the proposed site is immaterial. Verizon confirms this by accepting the minor difference in coverage between the originally proposed 120 feet and the applied-for 100 feet.



is not. The presentation diverted the Town’s attention from the real objective along Route 114 and the High School, to the area above the Rt 63/67 junction.

As shown to the Council (Figure 8), the target signal level of -95 dBm (green) is substantially lacking primarily along Rt 67. This area still appears to have outdoor service (yellow). However, this gap is shown to be untouched by the proposed facility (100 ft height).

These discrepancies in coverage mapping demonstrate that the map makers can manipulate settings when making maps. There is a substantial degree of subjectivity that is not disclosed when the computer-generated maps are produced. Moreover, the CW test data disclosed by the applicant (Figure 4) shows the proposed site completely fails to add the desired -95 dBm service to the area above the junction of Rt 63/67.

Looking ahead to Verizon’s expected new coverage map from the alternative site at 15 Meetinghouse Lane, because of the flagrant variability of the coverage mapping techniques in this process, it cannot be known what subjectivity may have been injected into the production of the new one.

The inconsistencies in Verizon’s analysis are compounded by material submitted with the explanation about their initial search. The Council asked: “Question No. 22 What indicators did Cellco use to identify substandard service within the proposed service area? Provide supporting data if available.” Verizon responded: “Cellco’s drive test [scan test] measurements show very weak to unusable signal on CT Route 63 and CT Route 67 near the intersection of the two and on the neighboring roads (See the drive test map included in Exhibit 4).”

Verizon’s June 30, 2021 Exhibit 4 (the “Prior Scan Test”) shows almost completely unusable coverage in this area of Woodbridge. In Figure 9, the junction of Rts 63 and 67 is marked with an arrow added for convenience. This contradicts both existing coverage maps generated by Verizon.

The color scheme of the Prior Scan Test is inconsistent with that of the materials in the Technical Report and the Application. While there is a -95 dBm threshold in common, unfortunately, they did not use the -105 dBm threshold on the Scan Test as they do in their coverage maps.

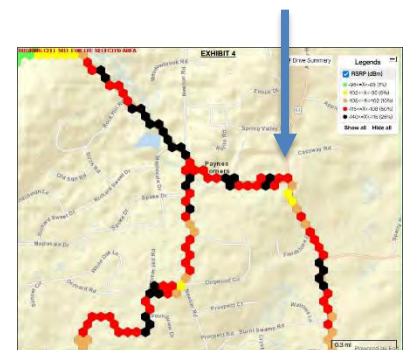


Figure 9 - Prior Scan Test (see Exhibit C)



Nevertheless, their statistics show fully 75% of the data points are red and black, indicating they are less than -108 dBm.¹¹

To compare the Prior Scan Test with the two existing coverage maps, Isotrope overlaid the coverage maps on the scan test map. Isotrope Exhibit D (Figure 11) overlays the Application's Existing Coverage map on the Prior Scan Test. 100% of the data points on the coverage map are above -105 dBm. This contradicts the results of the scan test, three quarters of which are less than -108 dBm.

Turning to Isotrope Exhibit E (Figure 12), the Report's Existing Coverage is overlaid on the Prior Scan Test. Since the Report's Existing Coverage shows better coverage than the Application's Existing Coverage, the Report's Existing Coverage is even more in conflict with the Prior Scan test. The Technical Report predicted there was a substantial amount of green -95 dBm in-building coverage already present around Rts 63 and 67, and Newton Road. The consultation with the Town was based on this impression that there was pretty good coverage around Rt 63 and 67, with some less desirable yellow coverage on a part of Rt 63.

¹¹ The signal levels are negative numbers, such that -105 dBm is a stronger signal than -108 dBm.

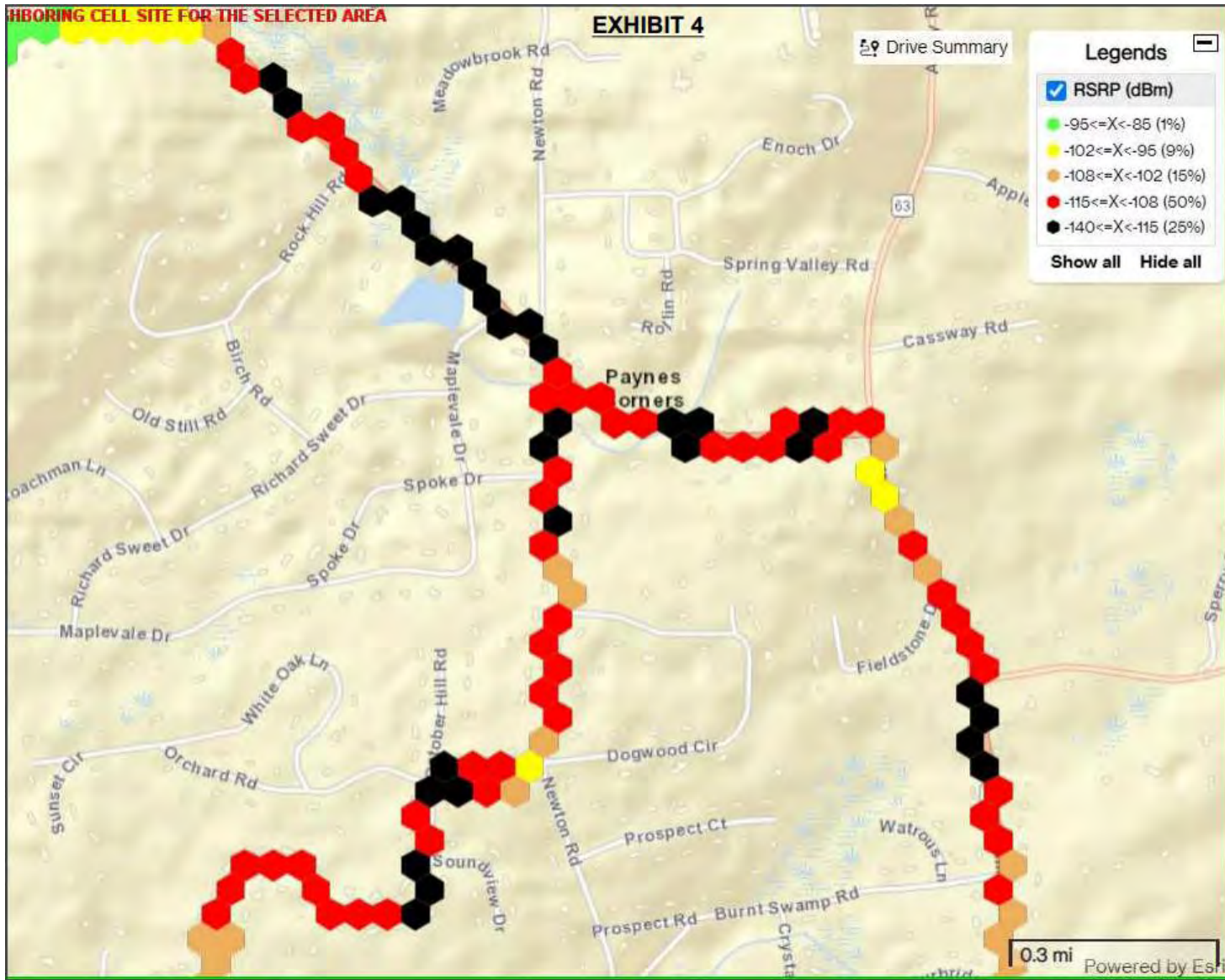


Figure 10 – Isotrope Exhibit C – The Prior Scan Test - Verizon Interrogatory response June 30, 2021 Exhibit 4

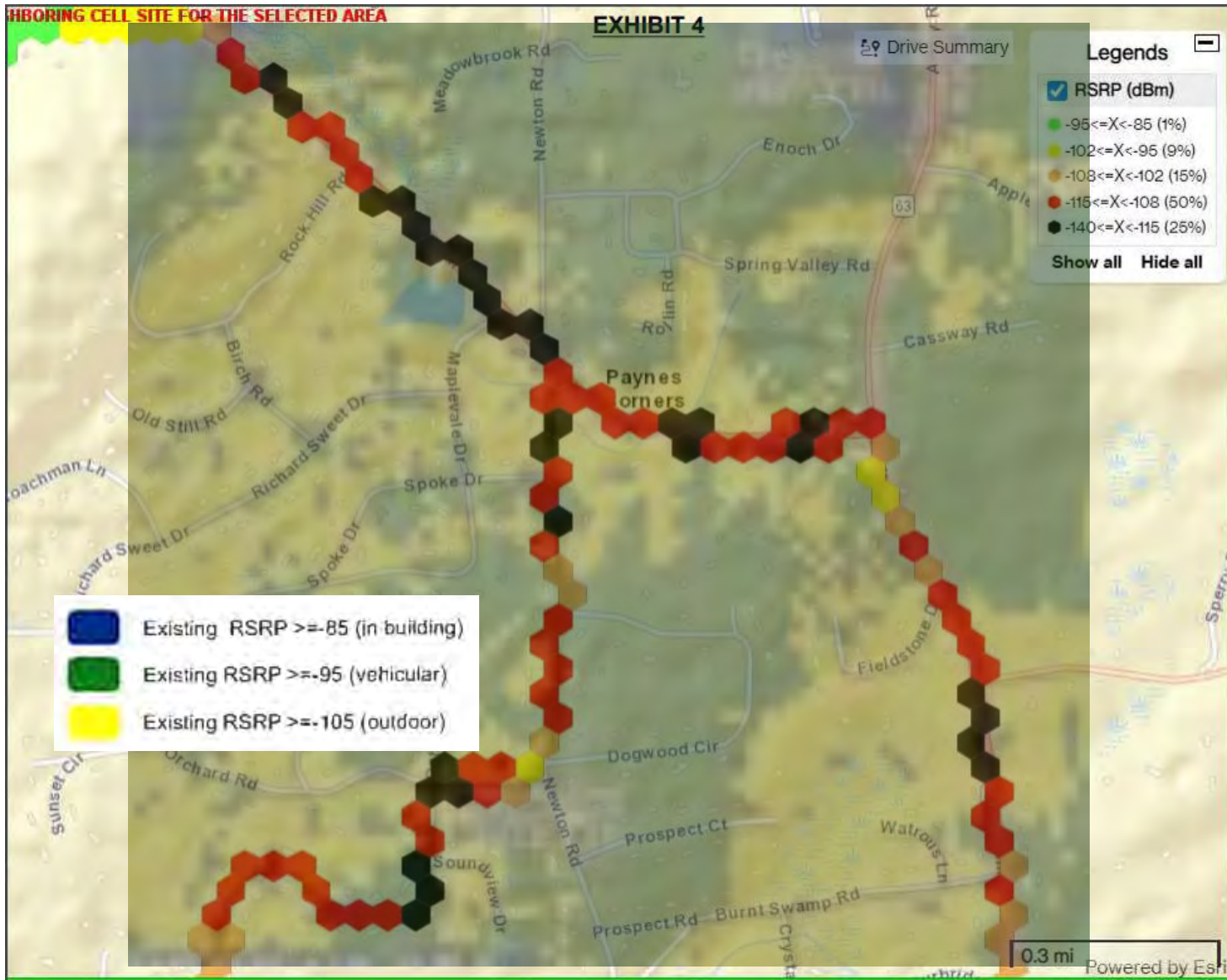


Figure 11 – Isotrope Exhibit D – Prior Scan Test with Application Existing Coverage overlay

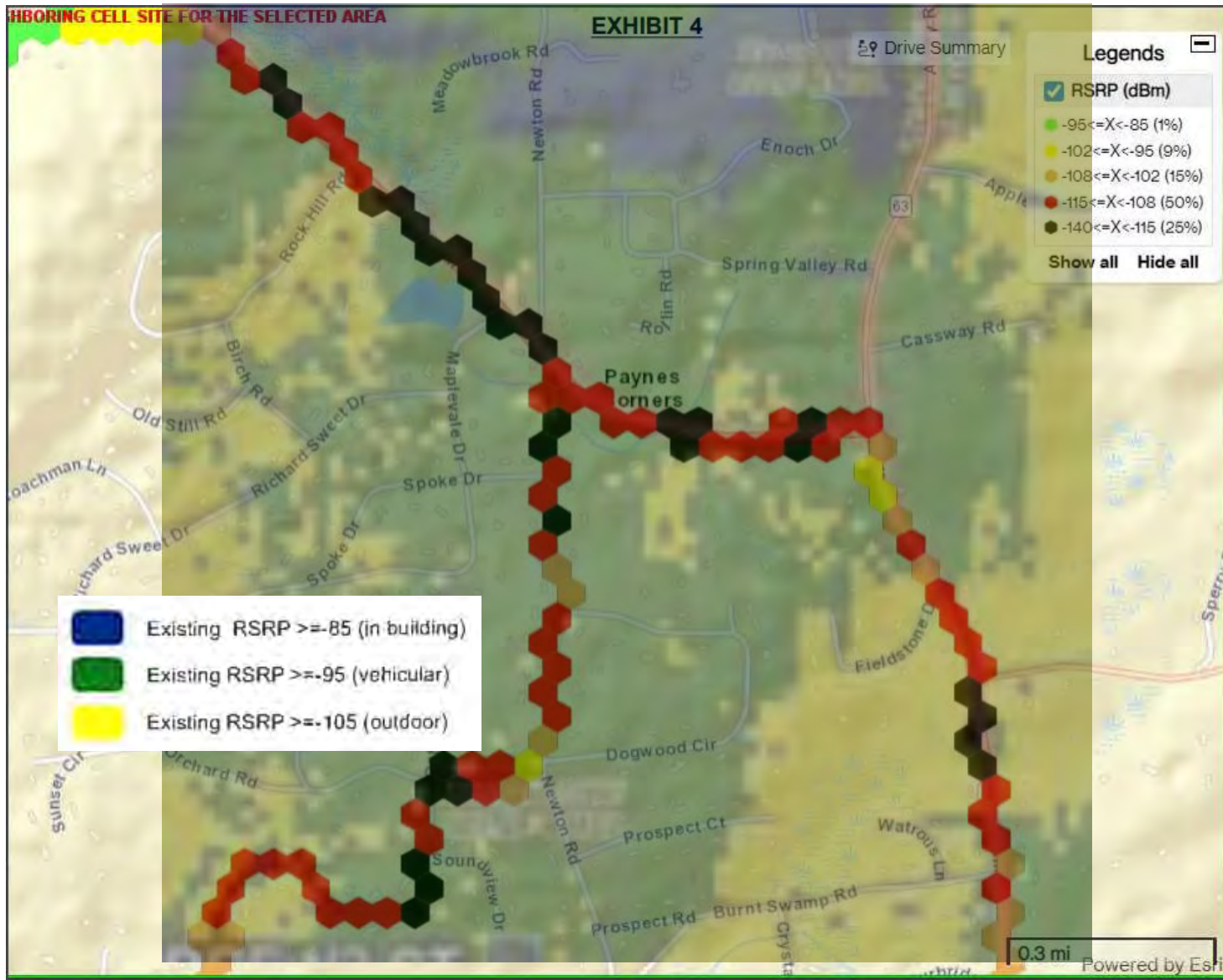


Figure 12 – Isotrope Exhibit E – Prior Scan Test with Technical Report Existing Coverage overlay



CW Test from 15 Meetinghouse Lane

WNNET engaged Isotrope to conduct a CW test (“Isotrope CW Test”) from the alternative location at 15 Meetinghouse Lane (“Alternative Location”). A crane with a built-for-purpose drive test basket was hired. On September 9, 2021, Isotrope conducted the Isotrope CW Test from two heights at the Alternative Location. The drive test was conducted using well-established practices and settings to match the Verizon CW Test. The results of the two Isotrope CW tests, one each at 120 and 150 feet above ground, are presented in Isotrope Exhibits F (Figure 14) and G (Figure 15).

Moving the Goal Posts

Verizon’s coverage analysis has been a moving target. Their two computer predictions of the same conditions resulted in widely different assessments. The scan test data is far more pessimistic than either of the computer predictions. There is no certainty that the scan test data is any more representative of the existing conditions than either of the existing coverage maps are. A careful inspection of the methodology of each output from Verizon would be necessary to resolve or explain the differences between them.

Verizon has abandoned using the proposed facility to address coverage issues north of the Rt 63/67 junction. The Verizon CW Test shows their proposed facility would not reach north of the Rt 63/67 junction with the desired -95 dBm coverage. As for the little bit of yellow >-105 dBm outdoor coverage it seems to offer on Rt 67, CW tests do not show how the measurement relates to existing coverage. These yellow segments are irrelevant.

Because the Verizon CW Test indicates the -95 dBm objective stated in the application is not achieved on Rts 63 & 67 north of their junction, Verizon has accepted that the new facility will not be effective there. Verizon is contemplating other ways to get coverage there.

The objective stated in the application included Rts 63/67 plus the intensity of activity along Rt 114 and at the High School. However, the Rts 63/67 goal is a red herring, as the proposed facility fails at this. It may be an issue for Verizon, but it is not relevant to the present proceeding and the remaining objectives Verizon listed.

The lesson from this exercise is there is a supreme degree of uncertainty and variability in just Verizon’s analysis. The Council should not rely on their data to split hairs over what is the best solution. The problem is so ill-defined by the existing coverage maps (computer and drive test)



that one can only speak to generalities of how the proposal or any alternatives address the network performance in Woodbridge in general. It should not be a basis for a decision to rely on miniscule differences between a proposal and an alternative, especially considering the substantial uncertainty each bit of analysis. To reiterate, the CW test provided by Verizon in response to the interrogatories shows that the proposed facility will fail to deliver -95 dBm service to the Rt 67 and 63 corridor north of the junction.

Clarified Statement of the Goal

The goal, better stated, is to serve areas south of but not including Rt 67, including the concentrations of human activity from the municipal and institutional and recreational uses along Rt 114, and at the High School. The alternative succeeds at this.

Environmental Compatibility

Resident Mitchell Smooke, a Professor of Mechanical Engineering & Materials Science & Applied Physics at Yale, took photographs of the Isotrope CW Test crane from a variety of locations of interest. He has prepared a photographic report, which is included in Appendix 1. The alternative site at 15 Meetinghouse Lane is an excellent location for a new cell tower because it has almost no visibility to residential uses. Figure 13 is an aerial photo with parcel lines, showing a 500-foot radius from the test location. The nearest homes are at least 500 feet away, to the northeast through heavily wooded land. See also the photos and photo maps in Professor Smooke's report.

The Alternative is Better Overall

The residents have proposed a location that will provide a significant degree of improvement of wireless service in Woodbridge, comparable in magnitude to that of the proposed facility. A tower at the alternative site at 15 Meetinghouse Lane can be more than 500 wooded feet from the nearest residence and is located on a large pair of parcels that are in industrial and institutional use. At the Alternative Location, a substantial number of wireless co-locators can be accommodated.

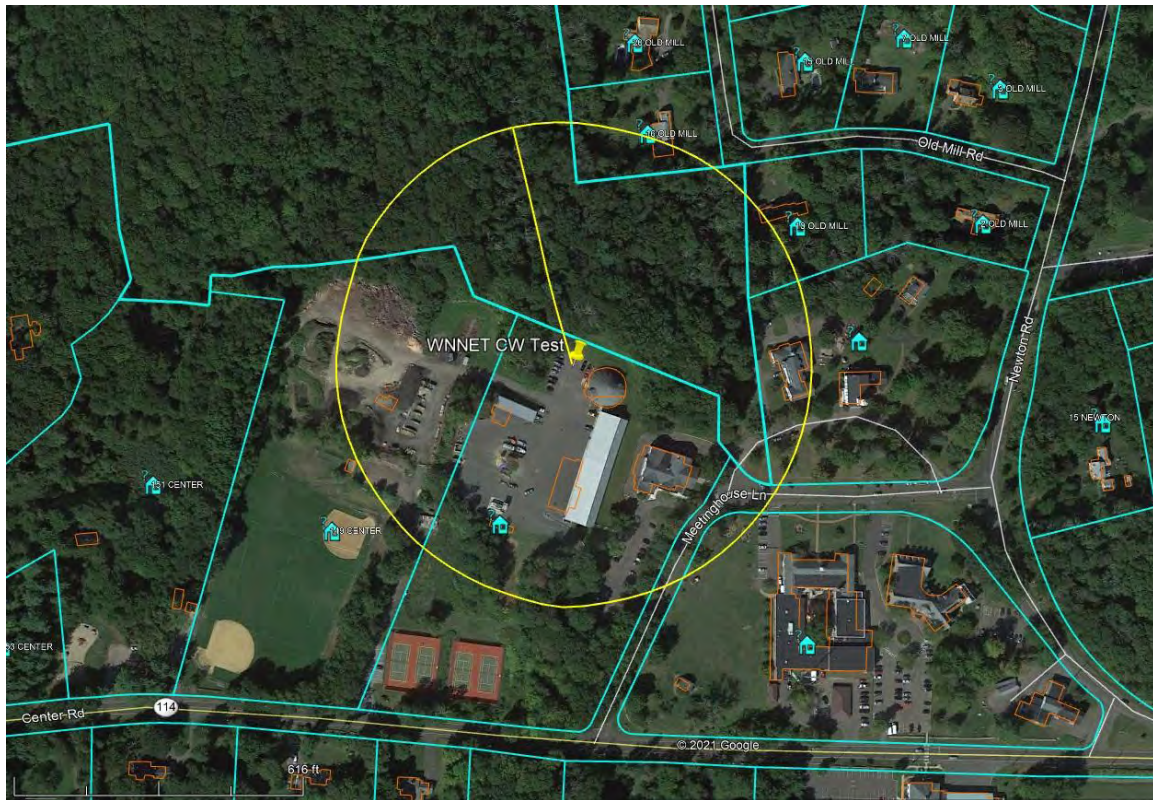


Figure 13 – Isotrope CW Test Location with 500-ft Radius

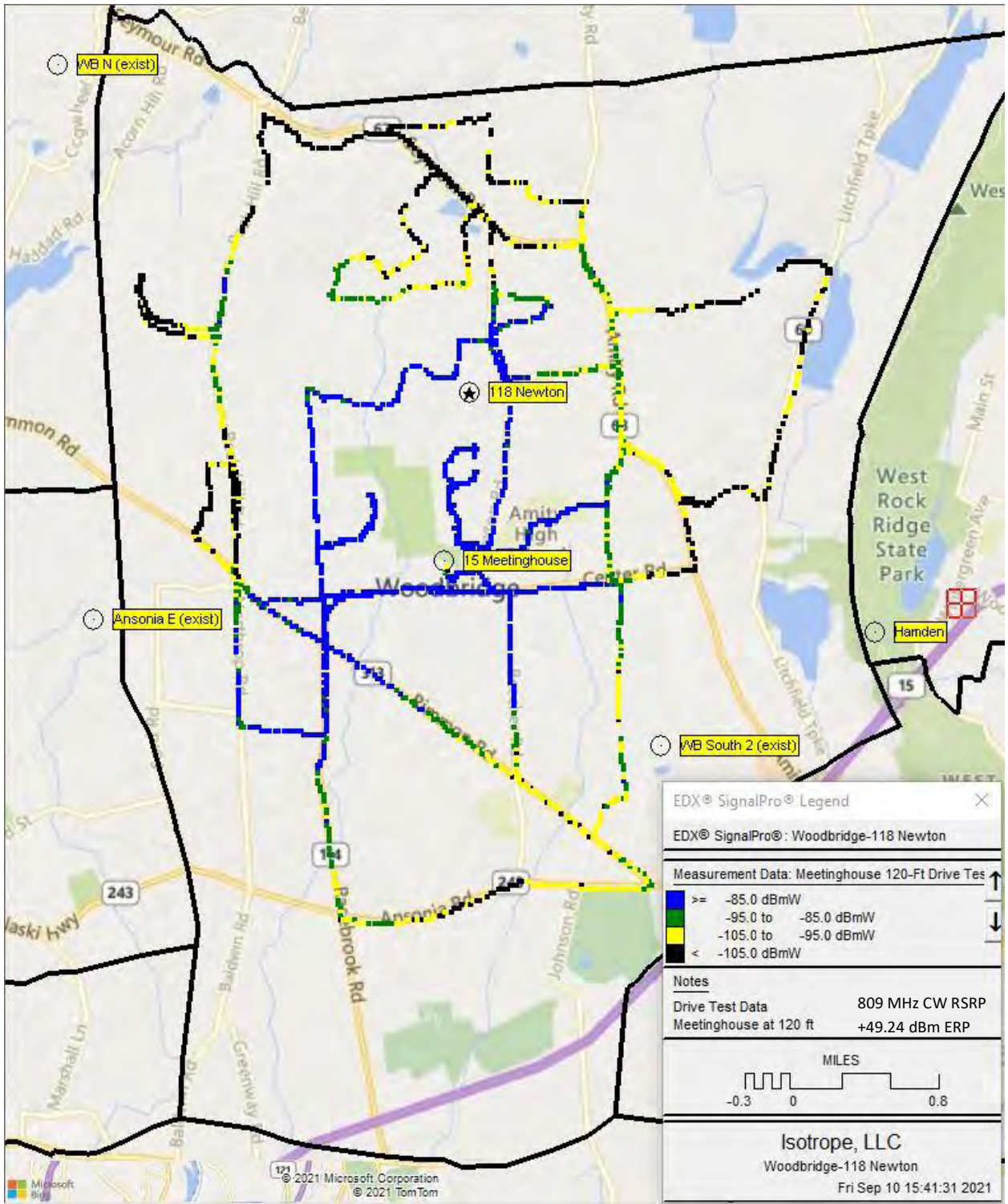


Figure 14 – Isotrope Exhibit F – Isotrope CW Test at 120 feet above Alternative Location on 15 Meetinghouse Lane

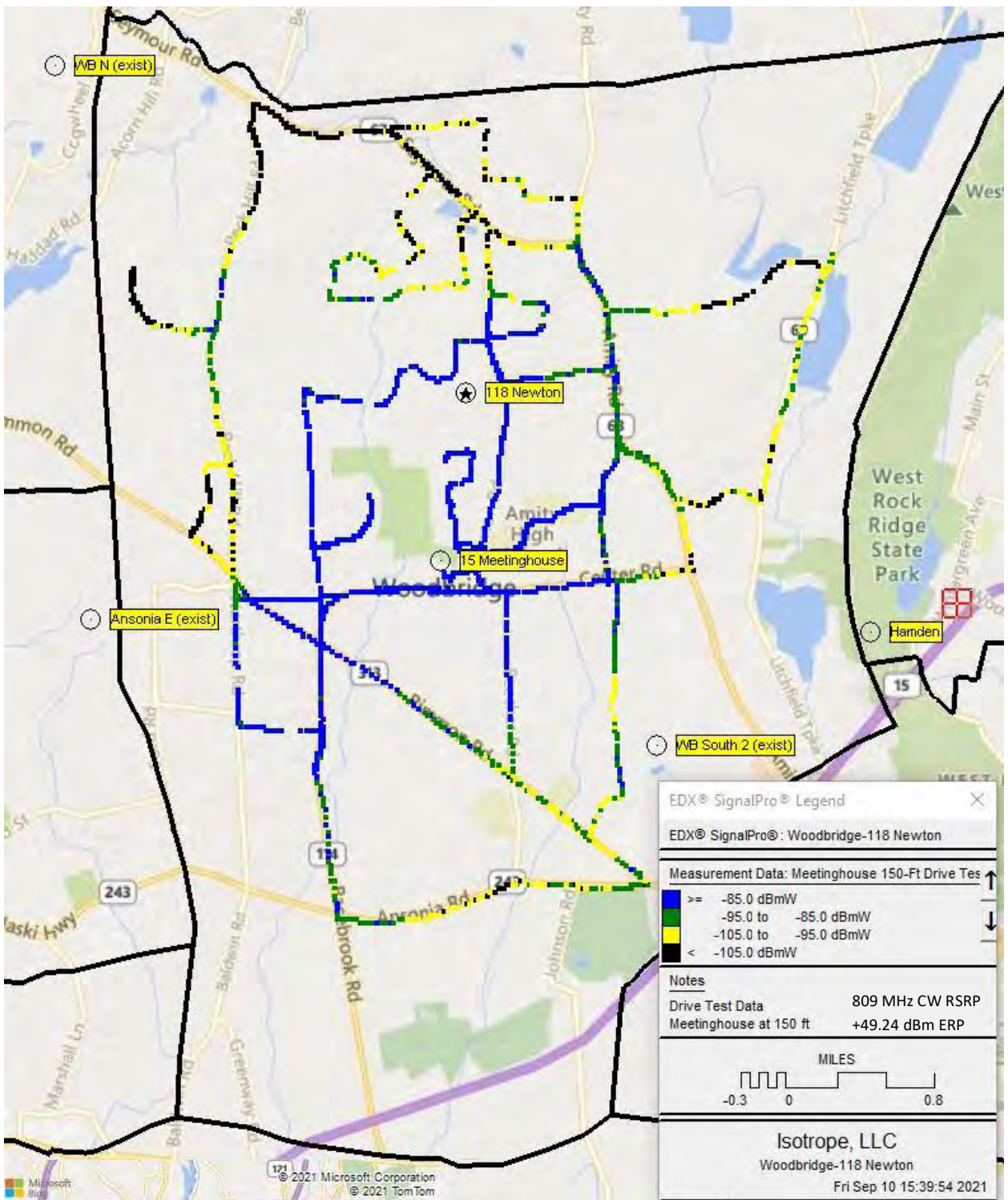


Figure 15 – Isotrope Exhibit G – Isotrope CW Test at 150 feet above Alternative Location on 15 Meetinghouse Lane

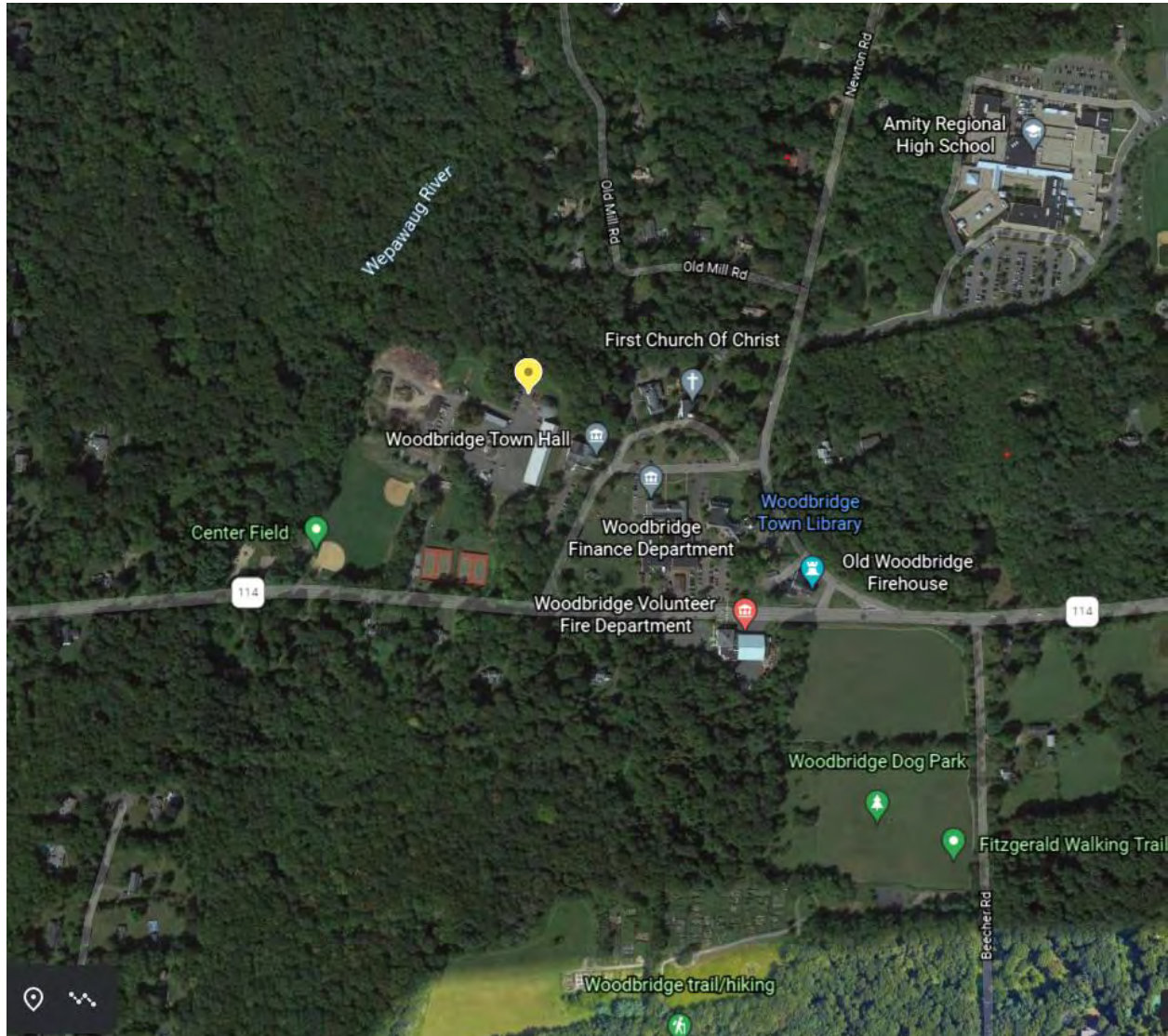


Isotrope, LLC

Appendix 1 – Photographic Report on Isotrope CW Test

Appendix Drive Test Photos

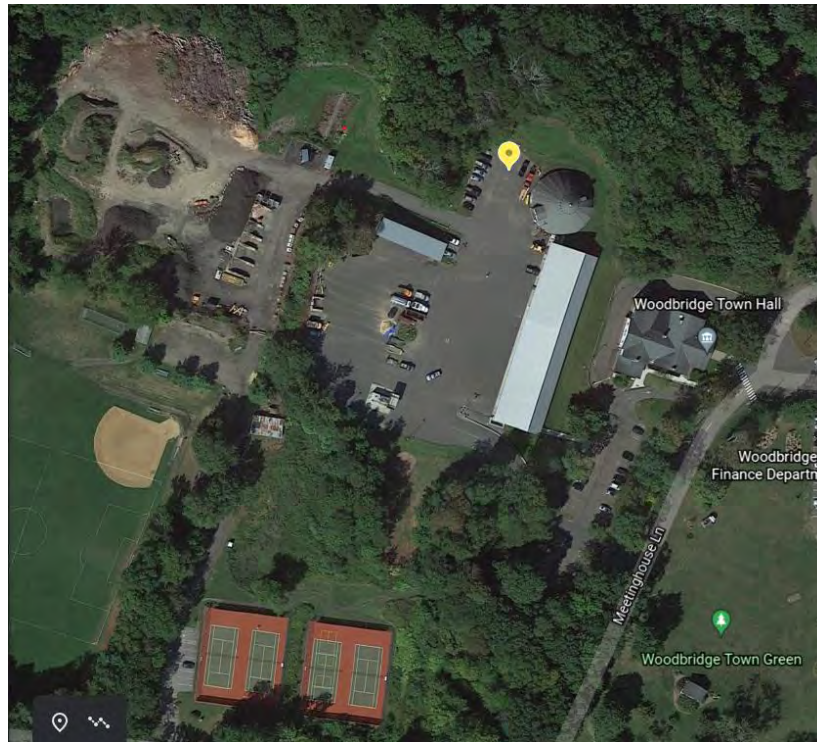
The pictures in this document illustrate the views one has of the 120 ft. and the 150 ft. crane used in the WNNET cell phone tower drive test. The crane was positioned behind the Town of Woodbridge's Public Works building, indicated by the yellow icon.



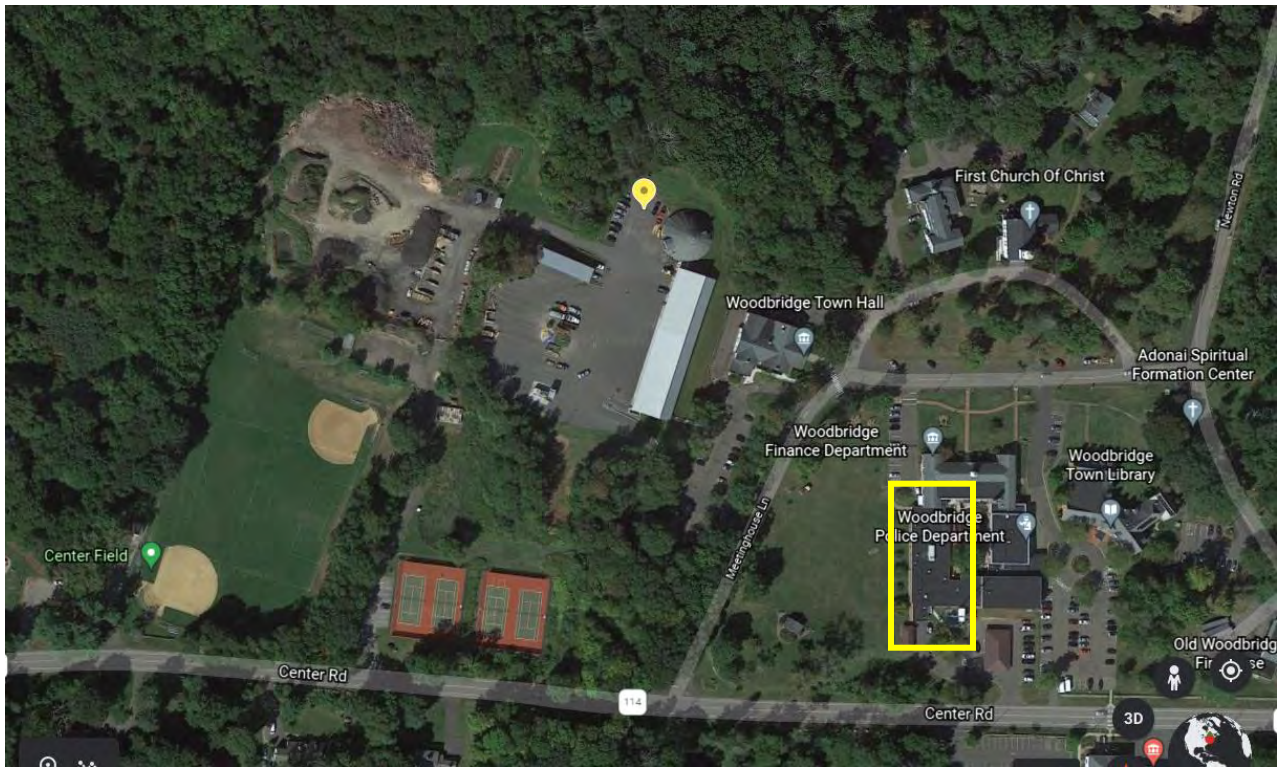
The pictures are from various locations around the center of Woodbridge. They include the town center, Center Road, Newton Road, Beecher Road and several side streets. The pictures were captured by Mitchell Smooke using the camera on an iPhone 12, with the lens set at 52 mm equivalent focal length. The maps are from Google Earth.

120 ft. Crane

- 1) **Crane Set-Up** (location behind Department of Public Works) (picture facing NE)



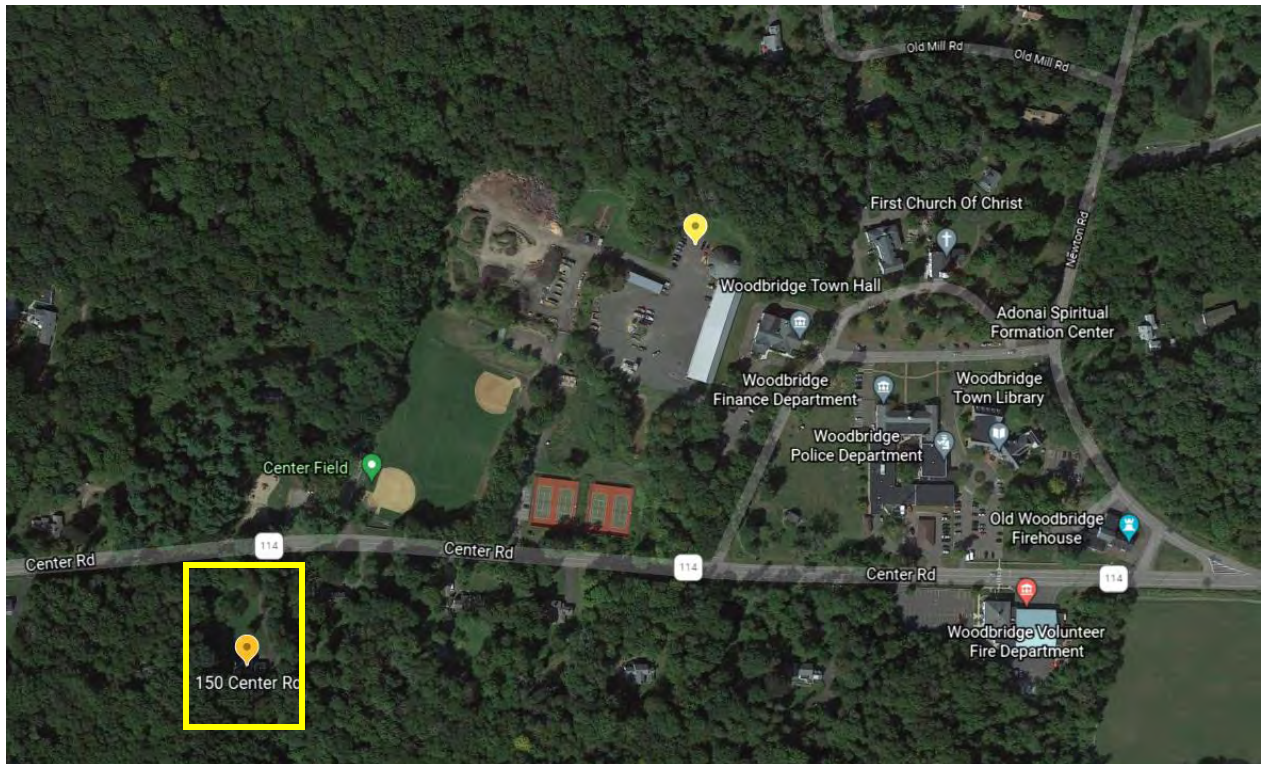
2) **View from Police Department** (picture taken facing NE; visible year round)



3) **View from Center Road Baseball Field Parking Lot** (picture taken facing NE; visible year round although seasonal use of field)



4) View from 150 Center Road Mailbox (picture taken facing NE; not visible)



5) View from 146 Center Road Mailbox (picture taken facing NE; visible)



6) View from 134 Center Road Mailbox (picture taken facing NE; not visible)



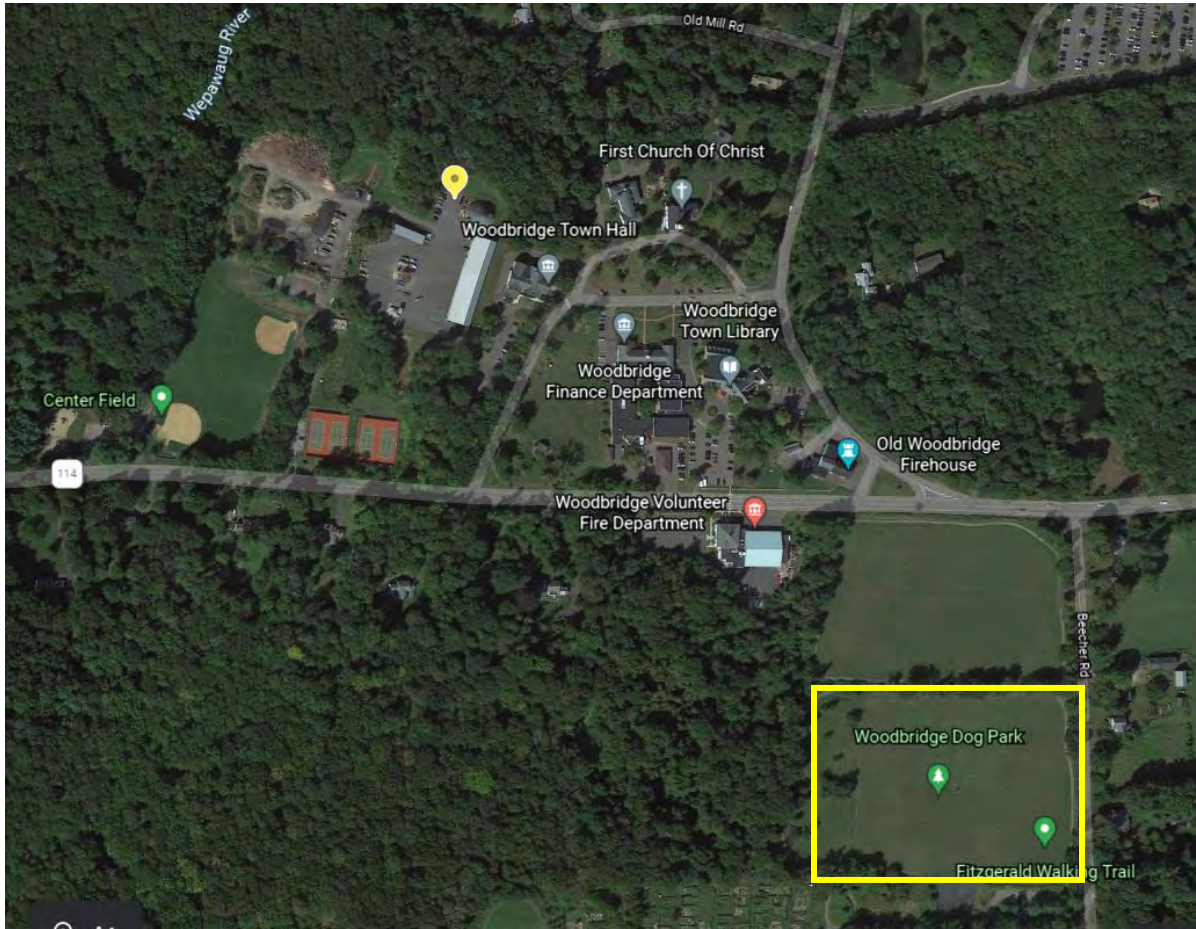
7) View from 124 Center Road Mailbox (not visible to NW; photo taken NE of very clear view of 4 Meetinghouse Lane existing police station monopole tower)



8) View from Fire Department Parking Lot (picture taken facing NW; visible behind very clear view of 4 Meetinghouse Lane existing police station monopole tower)



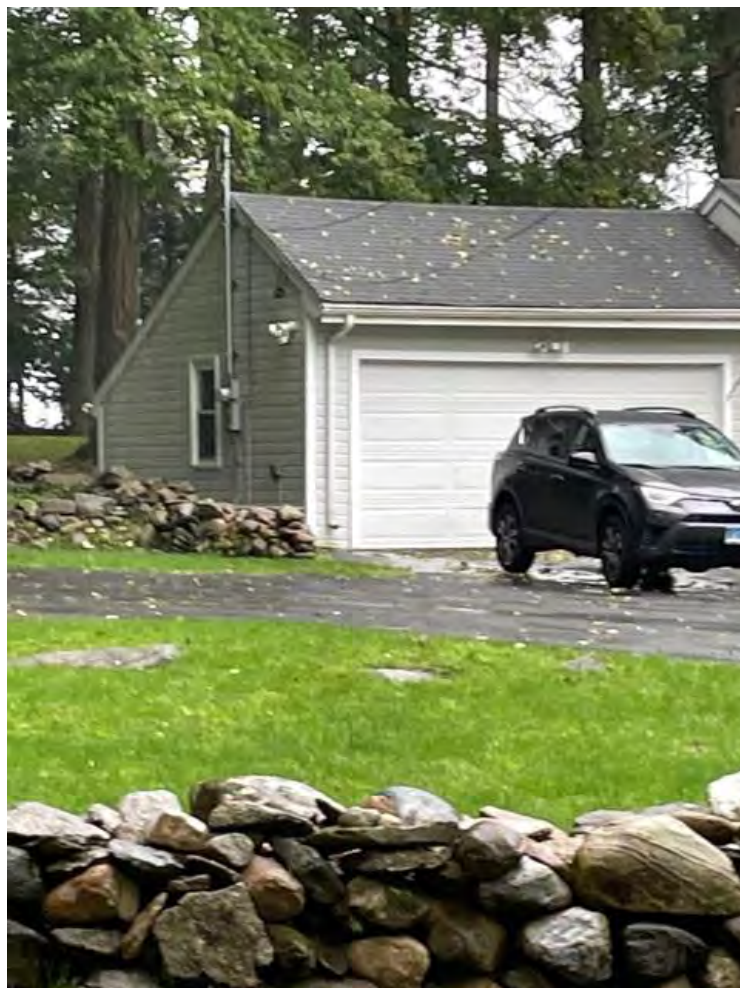
9) View from Fitzgerald Fitness Trail (Dog Park) (picture taken facing NW; visible)



10) View from 15 Newton Road Mailbox (picture taken facing WNW; not visible)



11) View from 10 Old Mill Road Mailbox (picture taken facing SW; not visible)



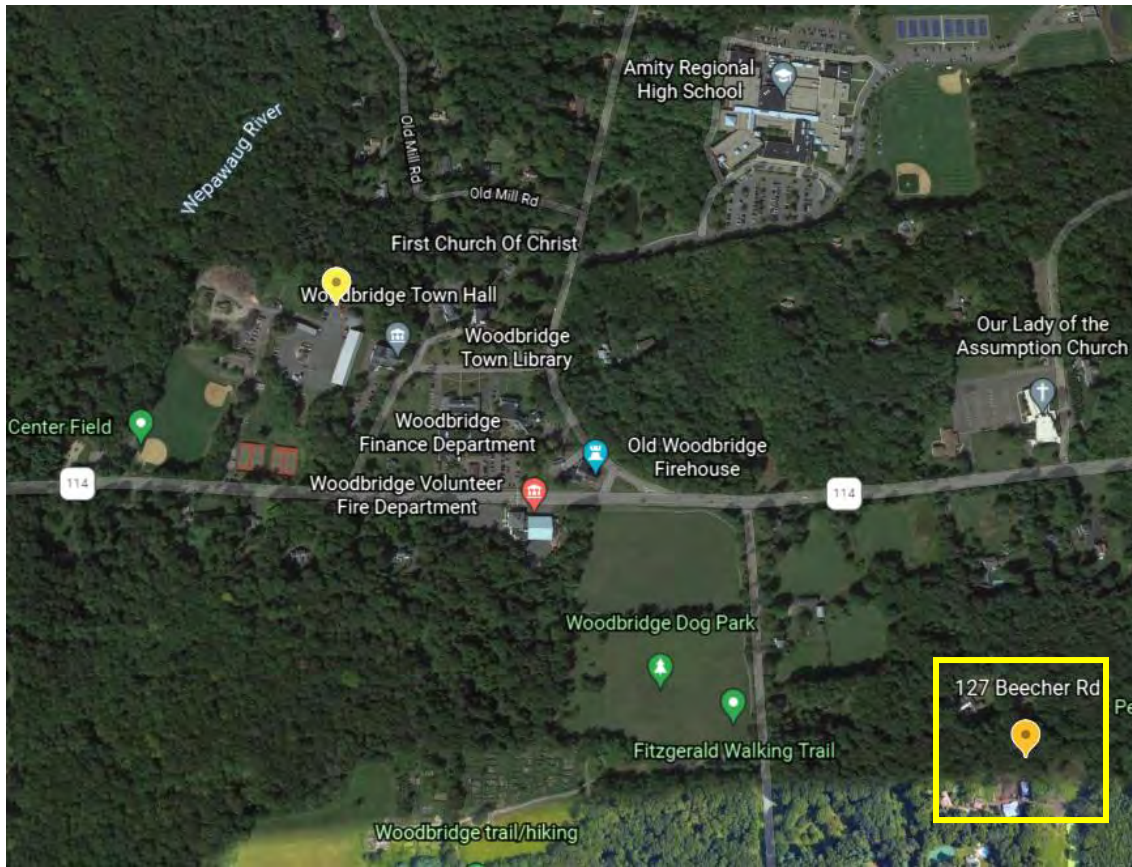
12) View from 162 Center Road Mailbox (picture taken facing NE; not visible)



13) View from 140 Center Road Mailbox (picture taken facing NE; not visible)



14) View From 127 Beecher Road Mailbox (picture taken facing NW; not visible)



15) View From 139 Beecher Road Mailbox (picture taken facing NW; not visible)



16) View from Corner of Beecher and Center Roads (picture taken facing NW; not visible)

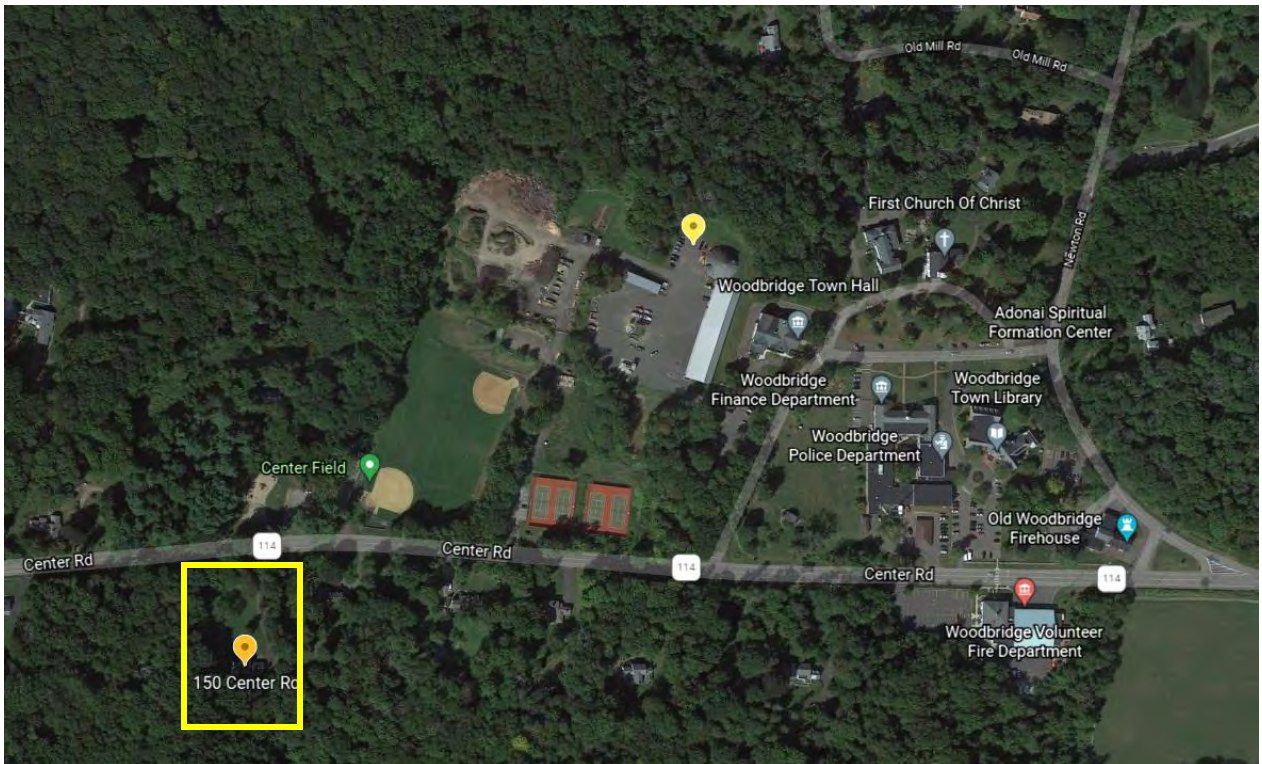


150 Ft. Crane

1) **View from Center Road Baseball Field Parking Lot** (picture taken facing NE; visible year round although seasonal use of field)



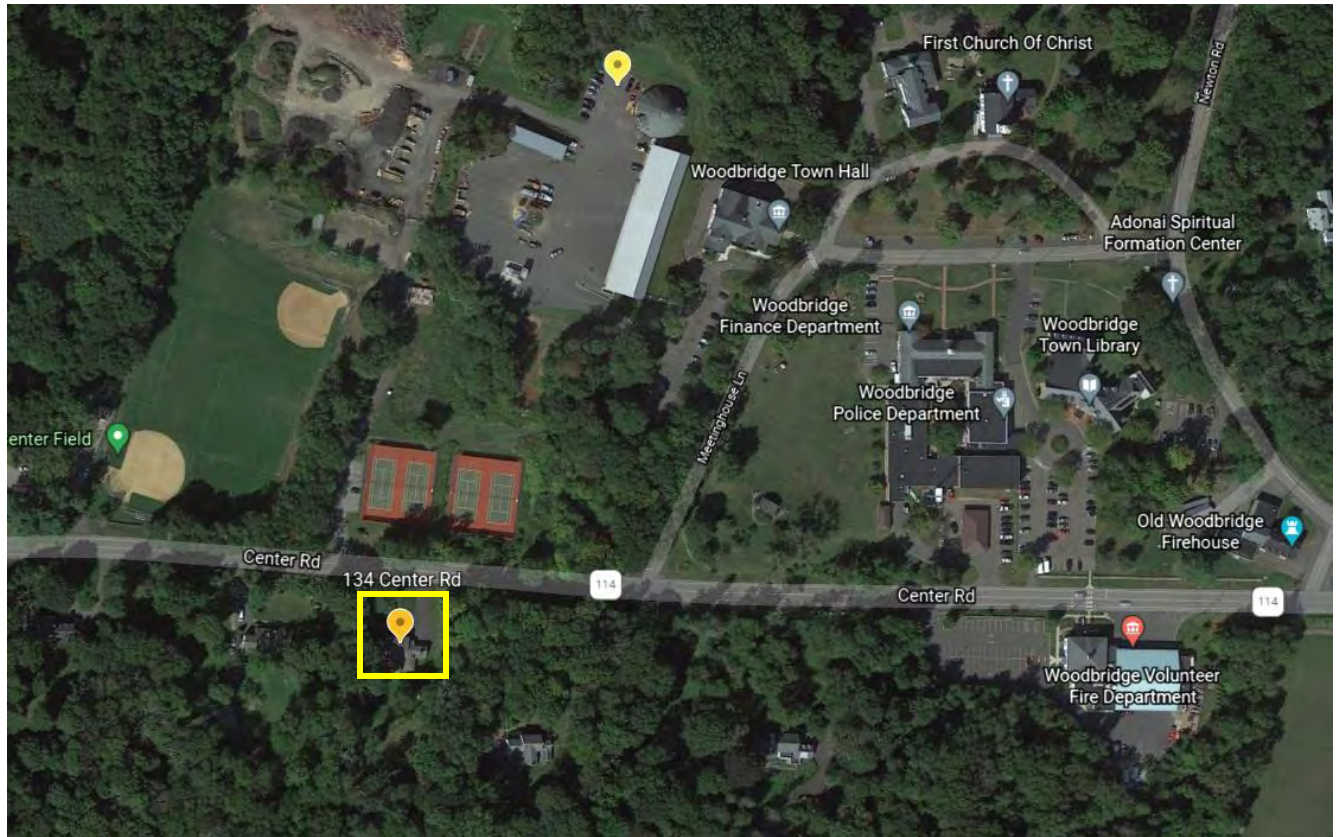
2) View from 150 Center Road Mailbox (picture taken facing NE; not visible)



3) View from 146 Center Road Mailbox (picture taken facing NE; visible)



4) View from 134 Center Road Mailbox (picture taken facing NE; not visible)



5) View from 124 Center Road Mailbox (not visible NW; photo taken NE of very clear view of 4 Meetinghouse Lane existing police station monopole tower)



6) View from Fire Department Parking Lot (picture taken facing NW; visible; very clear view of 4 Meetinghouse Lane existing police station monopole tower)



7) View from Fitzgerald Fitness Trail (Dog Park) (picture taken facing NW; visible)



8) View from 15 Newton Road Mailbox (picture taken facing WNW; not visible)



9) View from 10 Old Mill Road Mailbox (picture taken facing SW; not

visible)



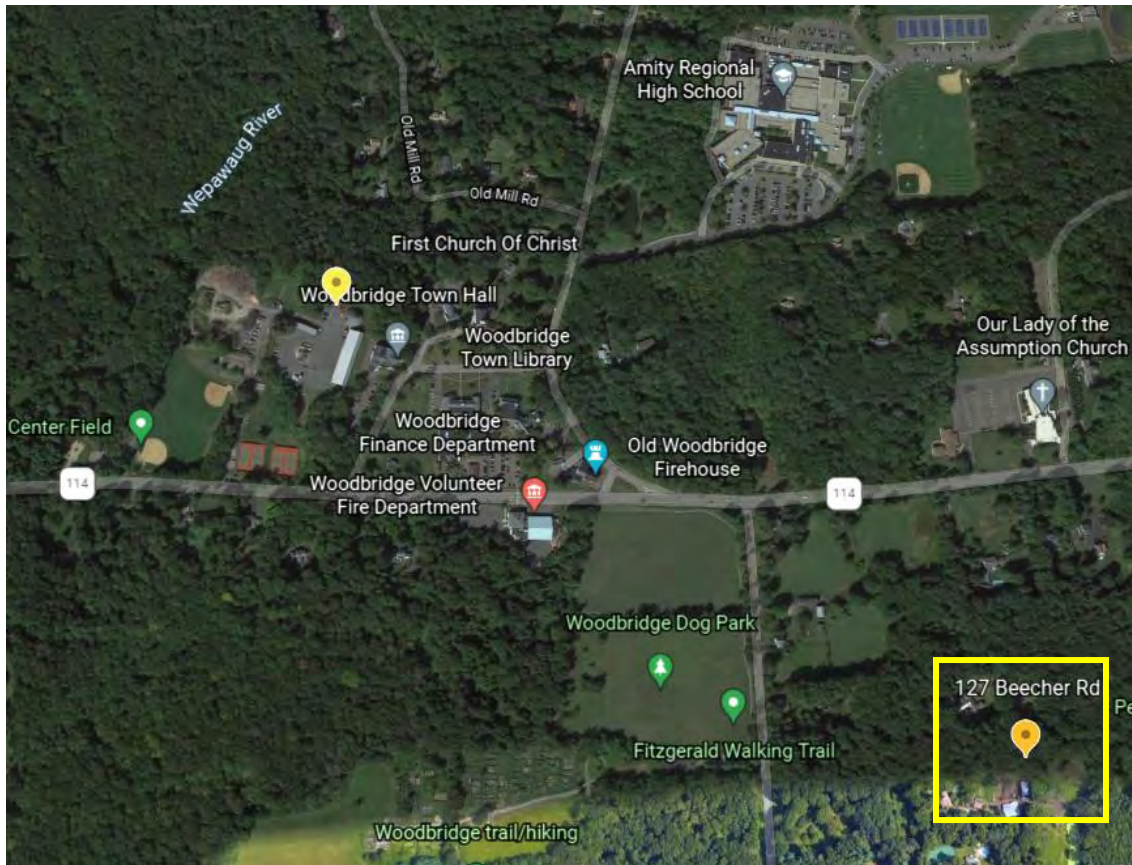
10) View from 162 Center Road Mailbox (picture taken facing NE; not visible)



11) View from 140 Center Road Mailbox (picture taken facing NE; not visible)



12) View From 127 Beecher Road Mailbox (picture taken facing NW; not visible)



13) View From 139 Beecher Road Mailbox (picture taken facing NW; not visible)



14) View from Corner of Beecher and Center Roads (picture taken facing NW; not visible)



Mitchell D. Smooke

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Responsibilities:

Chair, Department of Mechanical Engineering & Materials Science

Research Interests:

Smooke's primary research interests lie in the areas of computational combustion, chemical vapor deposition, and the numerical solution of ordinary and partial differential equations.

Current research projects involve computational studies of NO_x and soot formation in flames, the modeling of multidimensional premixed and nonpremixed flames on parallel supercomputers, flamelet models for turbulent reacting flows, and microgravity combustion.

ACADEMIC & EMPLOYMENT HISTORY

- Strathcona Professor of Mechanical Engineering (1995-Present)
- Professor of Mechanical Engineering (1993-1995)
- Associate Professor with Tenure (1990-1993)
- Associate Professor on Term (1986-1990)
- Assistant Professor (1984-1986)
- Staff Scientist, Sandia National Laboratories, Livermore, CA (1978-1984)

SCIENTIFIC & PROFESSIONAL SOCIETIES

- The Combustion Institute
- Institute of Physics (IOP)
- American Institute of Aeronautics and Astronautics (AIAA)
- Society of Industrial and Applied Mathematics (SIAM)
- American Society of Mechanical Engineers (ASME)

RECENT INSTITUTIONAL SERVICE

- Acting Dean of Engineering, Yale University (Fall, 2000)
- Chairman, Mechanical Engineering, Yale University (1994-2000, 2006-Present)
- Director of Undergraduate Studies, Mechanical Engineering (1985-1994, 2000-2006)
- Director of Graduate Studies, Yale Engineering (2002-2003)

- Yale University Tenure Committee for the Physical Sciences and Engineering (2000-2002, 2005-2006)
- Yale University HPC Focus Group (Chair, 2010-Present)
- Yale University ITS Advisory Committee (2010-Present)
- Yale University Science Council (Member 2004-2005, 2008-Present, Chair 2005-2008)
- Yale University Budget Committee, (1998-2000, 2005-2007)
- Yale University Physical and Biological Sciences Degree Committee (2002-Present)
- Yale University Junior Faculty Fellowship Committee for the Physical Sciences and Engineering (2001-2007)
- Yale University Committee for the Economic Status of the Faculty (1992-1994, Chair 1996-1998)
- Yale University Scholar Awards Committee (2005-2009)
- Yale University Institute for Nanoscience and Quantum Engineering Ad Hoc Committee (2005-Present)
- Yale University Committee on Cooperative Research (1996-2000)

RECENT PROFESSIONAL SERVICE

- Chair, National Academies Committee on Cyberinfrastructure for Combustion, (2008-Present)
- Coeditor-In-Chief, Combustion Theory and Modeling (1996-Present)
- Editor, Theoretical and Computational Fluid Dynamics (2001-2005)
- Program Co-Chair, 32nd International Combustion Symposium (2008)
- Member of the Board of Directors, The Combustion Institute, (2006-Present)
- Executive Committee, Eastern States Section of the Combustion Institute (2005-2007)
- Chair, Eastern States Section of the Combustion Institute (2003-2005)
- Vice-Chair, Eastern States Section of the Combustion Institute (2001-2003)
- Program Chair, Eastern States Section of the Combustion Institute (1996-1997)
- Paper Chair, Eastern States Section of the Combustion Institute (1994-1995)
- Colloquium Co-Chair, 23rd, 26th and 27th International Combustion Symposium, (1990, 1996, 1998)
- Member of the Engineering Advisory Board, Fairfield University (2005-Present)
- Member of the External Advisory Board, Department of Mechanical Engineering, U. of Connecticut (2006-Present)
- Department of Energy Workshop on Clean and Efficient Transportation Fuels for the 21st Century (2006)
- Department of Energy Workshop on Multiscale Modeling (2005)
- Propellant and Combustion Technical Program Chair, ASM AIAA, Reno, (2005)
- Propellant and Combustion Technical Committee, AIAA, (2001-Present)
- Co-Organizer, 12th International Conference on Numerical Combustion, SIAM (2008)
- Co-Organizer, 10th International Conference on Numerical Combustion, SIAM (2004)
- Co-Organizer, 8th International Conference on Numerical Combustion, SIAM (2000)
- Co-Organizer, 6th International Conference on Numerical Combustion, SIAM (1996)
- Co-Organizer, 4th International Conference on Numerical Combustion, SIAM (1991)
- University of Utah ASCI Review Committee (2001)
- NASA Microgravity Combustion Discipline Working Group (1992-present)

