Expert RF Report of Joseph Menio

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I. Background.

1. I am a Senior Radio Frequency Engineer for the Northeast region of T-Mobile Northeast, LLC ("T-Mobile") employed through PierCon Solutions L.L.C ("PierCon"). I have specific training, experience and education in the design of advanced digital wireless networks, including T-Mobile's Second Generation ("2G")[1] network based on GSM, GPRS and EDGE technologies, T-Mobile's advanced wireless networks including its Third Generation ("3G") network based on UMTS (Universal Mobile Telecommunications System) technologies, and its Fourth Generation ("4G")[2] network using HSPA+ and LTE technology; all networks are operated by T-Mobile in Pelham, NY. T-Mobile's 2G and 3G/4G networks are used to provide personal wireless services. For this exercise we will be focusing on 3G/4G network requirements. A copy of my *curriculum vitae* is attached hereto as Appendix 1.

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[1] 2G mobile networks include the GSM (Global System for Mobile Communications) standard that T-Mobile operates with today. Three primary benefits of 2G networks over their predecessors are: (1) phone conversations are digitally encrypted, which protects the security of such communications; (2) 2G systems are significantly more "spectrally efficient," which allows for greater number of users, and for communication of much higher quantities of data using the same amount of radio frequency spectrum; and (3) 2G introduces data services for mobile devices, starting with SMS ("Short Message Service") text messages. Later enhancements to the GSM standard include GPRS ("General Packet Radio Service") and EDGE ("Enhanced Data for GSM Evolution") data services. As a point of reference for the sake of comparison, GPRS is capable of rates up to 80kbps (kilobits per second), while EDGE is capable of rates up to 240kbps, using most compatible handsets. After 2G was launched, the previous mobile telephone systems were retrospectively dubbed 1G. Radio signals on 1G networks are analog and radio signals on 2G networks are digital.

[2] 3G/4G technologies offer voice services and more advanced services than 2G while achieving greater network capacity through improved spectral efficiency. Current rates of up to 14.4Mbps are supported by T-Mobile's 3G network and T- Mobile's 4G network utilizing HSPA+ technology with fiber backhaul is currently capable of rates up to 42Mbps (1,000kb = 1 Mb) on the downlink (i.e., transmission of data to mobile devices) and up to 5.8Mbps on the uplink (from mobile device to cell site).

References in this Report to the "Pelham" are to the Village of Pelham within Westchester County, New York. References in this report to the "Site" refer to the DAS network located in the Village of Pelham, New York, and the location of the wireless facility in this matter. References in this report to the "Facility" refer to the transmission equipment located on the three (3) existing wood electric poles and associated cables and ground equipment. The purpose of this report is to explain and demonstrate T-Mobile's significant gap in service and the need for the Site to provide in-building residential coverage that support reliable voice and data services in Pelham. In this report I provide signal propagation coverage maps, known as coverage maps, actual drive test data maps known as drive test maps to scientifically and reliably demonstrate T-Mobile's significant gap in reliable service without the existing Facility in accordance with accepted industry methodology and practices.

II. T-Mobile Would Have a Significant Gap In Reliable Wireless Service Without the Facility.

2. T-Mobile would have a significant gap in reliable wireless service in the area without the Facility. A gap in reliable in-building service would exist in the vicinity of the Site without the Facility.

T-Mobile's significant gap without the Facility includes, without limitation, the following areas:

3G/4G In-Building gap without the Facility:

- Highbrook Ave 1.1 miles, from north of Randal Pl to North of Harmon Ave
- First St , 0.3 miles, from Pelhamdale Ave to Corona
- Washington Ave, 0.15 miles, from Highbrook Ave to east of Storer Ave
- Boulevard, 0.6 Miles from Corlies Ave to Corlies Ave
- Pelhamdale Ave, 0.3 miles from Boulevard to North of Pelhamdale Ave

There is also a significant gap in in-vehicle coverage along Holbrook Avenue for approximately 1.9 miles.

This lack of coverage would prevent T-Mobile customers from reliably initiating, receiving, and maintaining mobile phone calls and data transmissions within a residential buildings in the areas listed above and within vehicles along Holbrook Avenue.

The deficiency in coverage is graphically represented in the attached exhibits located at the end of this report:

- Exhibit 1: Existing Reliable 3G/4G Coverage without the Facility
- Exhibit 2: Existing Reliable 3G/4G Scan test without the Facility
- Exhibit 3: Existing Reliable 3G/4G Coverage with the Facility
- Exhibit 4: Existing Reliable 3G/4G Scan test with the Facility
- Exhibit 5: Existing Reliable 3G/4G Coverage without the Facility overlaid on Village of Pelham Zoning Map

3. A gap in reliable wireless service, which includes voice and/or data, can occur if there is: (i) a lack of reliable signal, including poor signal quality; and/or (ii) a lack of system capacity. Since T-Mobile operates on a limited number of radio frequencies licensed by the Federal Communications Commission, each wireless facility is capable of handling only a limited number of wireless users at any given time.

4. Providing quality in-building voice and data services, with sufficient system capacity and high-speed data rates, is critical to T-Mobile's customers and is essential to T-Mobile's ability to compete effectively with its functionally equivalent competitors.

5. T-Mobile strives to provide all customers with a positive wireless voice and data experience. Simply put, a positive wireless experience includes the customer connecting to the network on their first try, staying connected throughout the call or data transmission, and the customer ending the call or data session when they are

ready. For data connections (e.g., internet browsing) the speed is as fast as the technology allows. A gap in reliable service causes a negative experience: customers cannot place calls when they want to; when they are connected voice call quality does not meet customer expectations or they do not choose when to end the call; or, the call simply drops off (disconnects) without notice. The data experience is not instantaneous or is much slower than the customer requires. This overall customer experience is negative and it is inconsistent with the level of service T-Mobile strives to achieve. Gaps in service such as those that would be present in the Village of Pelham without the Facility are usually associated with poor or unreliable coverage, and thus result in a negative customer experience.

A. T-Mobile Would Have a Significant Gap in Reliable Wireless Coverage Without the Facility.

6. T-Mobile would have a significant gap in service in the vicinity of the Site caused by a lack of reliable in-building and in-vehicle coverage without the Facility. I was able to confirm that T-Mobile would have a significant gap in reliable wireless coverage by reviewing advanced computer propagation modeling and actual drive test data.

7. Computer propagation modeling and actual drive test data are routinely used by T-Mobile, and the wireless industry, to reliably determine whether there is a gap in service to support the need for a facility.

1. T-Mobile's Significant Gap Without the Facility has been Verified by Computer Propagation Modeling.

8. I was able to confirm T-Mobile's significant gap in reliable coverage in the vicinity of the Site without the Facility through the use of Aircom International's coverage planning tool, which is known as Asset. Aircom International products are used in 135 countries and by the world's top 20 wireless carriers. Asset is a wireless coverage planning tool that T-Mobile uses for wireless network planning. The Asset tool is used to create T-Mobile's propagation coverage maps ("Coverage Maps").

9. Asset Coverage Maps predict the radio frequency ("RF") coverage and signal strengths that can be expected over a geographic area based on certain input parameters. These parameters include, without limitation, factors such as: the frequency of the RF signal; the height, gain and orientation of the antennas; the terrain over which the RF signals are being propagated; and the strength of the RF signals. Thus, Coverage Maps predict the RF signal strength over geographic areas on a map.

10. The Asset planning tool is utilized by T-Mobile RF engineers to evaluate and plan coverage throughout the country. The Coverage Maps produced by T-Mobile using Asset are highly reliable and scientifically based for the purpose of demonstrating T-Mobile's current and proposed wireless coverage in Village of Pelham, and elsewhere.

11. Federally licensed wireless carriers such as T-Mobile have licensed additional FCC spectrum to construct 3G/4G networks to increase system capacity and to meet consumer demand for advanced wireless services, including internet access, the transmission of emails, text messages, photographs, video, video conferencing and other forms of data in a mobile environment. It is necessary for T-Mobile to provide 3G/4G services throughout its federally licensed coverage area in order to provide consumers with the wireless services they demand, and to remain competitive with T-Mobile's functionally equivalent competitors. The ability of T-Mobile customers to make an E-911 call from a mobile device is of critical importance for public safety. Reliable 3G/4G service is critical even in cases where some 2G service is present. For example, a customer using a 3G/4G mobile device may not be able to make a call, including an E-911 call, if there is unreliable 3G/4G service. In the event the signal strength is strong enough for the customer's 3G/4G mobile device to lock onto the 3G/4G network, but the signal quality is insufficient to support a call, the network will be unable to support a 3G/4G call and will not hand the call down to the 2G network even if there is reliable 2G service available. Accordingly, it is necessary for T-Mobile to have reliable 3G/4G service in areas that may already have 2G service.

12. When designing and operating 3G/4G networks; signal quality is of great importance because the same frequencies are used at each adjoining site. Operating efficient 3G/4G networks requires that signal interference among adjoining sites be strictly controlled.

13. Attached hereto as Exhibit 1 is an Asset generated Coverage Map that indicates T-Mobile's existing areas of reliable 3G/4G wireless coverage from existing sites adjacent to the Site, and demonstrates that T-Mobile would have has a significant gap in reliable 3G/4G wireless coverage without the Facility. The areas of green represent reliable 3G/4G voice coverage at a "receive signal code power" level of greater than or equal to –90 dBm and -12dB Ec/Io, which represents T-Mobile's design criteria for reliable 3G/4G in-building residential voice coverage. The quality of a 3G/4G voice signal is referenced by the relative strength of the strongest "pilot signal" in relation to the entire wideband signal interference it encounters (Pilot + Noise). Wideband signal interference noise is generated by other sites within the network including its own signal, and this relative signal quality threshold is referred to as Ec/Io (defined as the energy per chip over the noise floor density). All of the areas on the map that are white represent areas that would not have reliable 3G/4G in-building voice coverage. Exhibit 1 clearly demonstrates T-Mobile's significant gap in reliable in-building residential in the vicinity of the Site without the Facility.

14. Attached hereto as Exhibit 3 is an Asset Coverage Map that indicates T-Mobile's existing 3G/4G reliable voice coverage, together with the 3G/4G reliable voice coverage that the Facility at the Site provides. The areas of green represent reliable 3G/4G voice coverage at a "receive signal code power" level of greater than or equal to –90 dBm and -12dB Ec/Io, which represents T-Mobile's design criteria for reliable 3G/4G in-building residential voice coverage. Exhibit 3 demonstrates that the Facility helps to remedy T-Mobile's significant gap in reliable 3G/4G in-building coverage in the vicinity of the Site.

15. Based on the foregoing Coverage Maps, it is my opinion that T-Mobile would have a significant gap in reliable wireless service without the Facility and that the Facility is needed to help remedy T-Mobile's gap in service in the vicinity of the Site.

2. T-Mobile's Significant Gap Without the Facility has Been Verified by Actual Drive Test Data.

16. Coverage Maps are routinely used by federally licensed wireless carriers to predict areas of reliable coverage over large geographic areas. Coverage Maps are very accurate and reliable, and offer the benefit of predicting existing and proposed areas of coverage over an entire geographic area. Scan tests are another means to evaluate existing coverage and to evaluate the reliability of Coverage Maps. Scan tests are used to produce maps ("Drive Test Maps"), which demonstrate actual signal levels from existing coverage along roadways that are traveled by specially equipped scan test vehicles. In a scan test, the signals from the surrounding on-air sites are collected by a receive antenna mounted to the roof of the scan test vehicle. The data collected by the receive antenna is then processed by computer equipment within the scan test vehicle. The coordinates and signal strength of each collection point is recorded by the computer equipment and ultimately depicted on a Drive Test Map. Literally thousands of data points are collected during a scan test over the roadways driven by the scan test vehicle to ensure that a complete and statistically relevant number of data points can be evaluated. It is not technically reasonable or feasible to collect signal data within buildings because the amount of data collected would be diminished to the point of being statistically insufficient. Moreover, collecting data within buildings can be easily manipulated to provide false results. For example, the signal level within a building may vary significantly from areas close to windows, in basements, towards the center of the building, and in stairwells. In my professional opinion, collecting in-building data is an unreliable methodology subject to manipulation. The accepted practice is to collect data as described above with a scan test vehicle. The design criteria then accounts for the myriad of building losses throughout a given area without the danger of data manipulation based on insufficient

data collection or data collection location prejudices (e.g. data only collected near windows and not throughout the building or collected only within wood structures and not concrete or metal structures). Moreover, collecting data with a hand held phone, as opposed to with a scan test vehicle, also results in unreliable data as each hand held phone and its position, will affect the collected signal level results.

17. Attached hereto as Exhibit 2 and Exhibit 4 are Drive Test Maps that demonstrate the results of a scan test T-Mobile preformed for the purposes of confirming existing 3G/4G voice coverage in the area of the Site. The green circles represent reliable 3G/4G voice coverage at a "receive signal code power" level of greater than or equal to –90 dBm and -12dB Ec/Io, which represents T-Mobile's design criteria for reliable 3G/4G in-building residential voice coverage. The yellow circles represent reliable 3G/4G voice coverage at a "receive signal code power" level of greater than or equal to –98 dBm and -12dB Ec/Io, which represents T-Mobile's design criteria for reliable 3G/4G in-vehicle voice coverage. The red circles represent areas with a receive signal level of less than -98 dBm or -12dB Ec/Io, which represents unreliable coverage. Areas without red, green or yellow circles were not tested. The 3G/4G Drive Test Map attached as Exhibit 2 confirms that T-Mobile would have a significant gap in reliable 3G/4G in-building residential and in-vehicle coverage in the vicinity of the Site without the Facility. The 3G/4G Drive Test Map attached as Exhibit 4 confirms that the Facility will help to remedy T-Mobile's significant gap in reliable 3G/4G in-building residential and in-vehicle coverage in the vicinity of the Site.

18. I have also studied the Drive Test Maps to further evaluate the reliability of the Coverage Maps. Coverage Maps predict coverage over large geographic areas and the Drive Test Maps demonstrate existing coverage by way of illustrating actual data measured along roadways. Taken together, Coverage Maps and Drive Test Maps provide a reliable method to evaluate whether there is a significant gap in coverage. Based upon my review of the Coverage Maps and the Drive Test Maps, it is my opinion that they are highly consistent with one another, and thus, the Coverage Maps very accurately predict T-Mobile's existing and proposed coverage throughout the

area surrounding the Site. Moreover, it is my opinion that the Coverage Maps and the Drive Test Maps support my conclusion that T-Mobile has a significant gap in service in the vicinity of the Site, and that the Facility helps to remedy T-Mobile's significant gap in coverage. All prior maps that are not consistent with the design criteria set forth herein should be disregarded.

19. T-Mobile currently operates existing wireless facilities in and around the proposed Site. Attached hereto as Exhibit 5 is a base map with zoning map that depicts the area surrounding the Facility. The Exhibit 5 map identifies the locations of existing T-Mobile facilities (marked with black dots) and the 3 antenna nodes comprising the Facility (marked with 3 blue dots). This exhibit also shows existing coverage overlaid onto The Village of Pelham zoning map and demonstrates that the Facility cannot be relocated to non-residential zoning districts.

B. T-Mobile's Antenna Height is the Minimum Height Necessary to Help Remedy the Significant Gap in Reliable Wireless Coverage

T-Mobile's existing Facilities are mounted on utility telephone poles. This existing structure height is at tree level, thus being the minimum height necessary to remedy T-Mobile's significant gaps in reliable service in the surrounding areas.

III. Village Code

20. Section 87-8A: Please refer to Exhibits 1 and 3 which demonstrate T-Mobile's significant gap in service without the Facility.

21. Section 87-8B: The Facility consists of antennas attached to two existing telephone pole support structures and one new telephone pole support structure within the public right-of-way. These 3 antenna nodes are at the lowest possible height and are just at tree level. The proposed design is the least intrusive method to provide coverage to the gap within the Village of Pelham. The area of need mostly resides in

residentially zoned areas, thus making commercially zoned properties not a feasible option.

IV. Conclusions.

22. It is my opinion that T-Mobile would have a gap in service caused by a lack of reliable coverage in the area surrounding the proposed Site without the Facility. It is also my opinion that the gap in service would be significant based on a number of relevant factors existing in the area surrounding the proposed Site, including the number of residents that live in the gap area, the size of the gap, and the roads that traverse the gap area. The Facility at the Site helps to remedy T-Mobile's significant gap in service in the Village and cannot be re-located to commercial areas.

Joseph Menio

Senior RF Engineer
PierCon Solutions

Sworn to before me this 22nd

day of October 2014

Notary Public

TRACY ADKINS
Commission # 2289974
Notary Public, State of New Jersey
My Commission Expires
November 08, 2017

APPENDIX 1

Joseph Menio Curriculum Vitae

Joseph Carmen Menio

SUMMARY

Joseph Menio has over 10 years of wireless engineering experience in the telecommunications industry. Joe's experience includes over two years of System Engineering services for Motorola in the NYC market supporting projects for the New York City Police Department. His experiences include Lead Engineer for a Digital Microwave DS3 Expansion Project, support for the NYPD Dispatch Relocation Project and extensive audio routing and cross connect documentation.

Joe has performed point to point microwave system designs and participated in field surveys for line of sight verification for T-Mobile.

Joe has also provided RF design and zoning preparation services to local carriers. Duties included; search area release, candidate search, alternate site analysis, drive test analysis, candidate approval, candidate final justification, site design, review of zoning drawings and construction drawings. Services such as these have been provided to Sprint PCS, T-Mobile, Verizon Wireless and Nextel.

STRENGTHS

- Audio routing design and review
- Construction drawing and zoning drawing review and analysis
- Intermodulation and MPE Reports
- RF sweep test analysis
- Cell site testing and planning
- Expert RF testimony and design

RELEVANT EXPERIENCE

PierCon Solutions (Jul. 03 – Present)
Senior RF Engineer

Consultant to T-Mobil (Jun. 11 – Present)
Senior RF Engineer

- Prepared search ring documentation.
- Candidate identification and evaluation.
- RF design of new cell sites.
- Preparation of zoning exhibits and documentation.
- Expert Testimony.
- Modernization Project
- Synergy Project
- Preparation for litigation exhibits and documentation.
- PSEG Relocation project

PierCon Solutions Core Engineering (Jun. 09 – Jun 11)

- Development of RF reports and justification analysis in the NY/NJ area for T-Mobile and Verizon Wireless.
- Development of MPE reports and Intermodulation Studies in the NY/NJ area for T-Mobile and Verizon Wireless.
- Provide RF expert testimony in zoning hearings.

Consultant to Motorola (Mar. 07 to Jun. 09)
New York City Police Department - Microwave Expansion Project

- Lead Engineer for Digital Microwave DS3 Expansion Project.
- Preparation of DDR documents and reviewed with NYPD.
- Designed DC Distribution System.
- Created rack layout drawings for microwave equipment.

New York City Police Department - Dispatch Relocation Project

- Prepared DDR documentation and reviewed with NYPD.
- Prepared dispatch console layout diagrams for NYPD.
- Modified ATP documentation.
- Modified Method Of Procedure (MOP) documentation.

New York City Police Department - North Central Hub Relocation Project

- Modified Acceptance Testing Procedure (ATP) documentation.
- Updated and reviewed Bronx System audio routing drawings.
- Modified cross connect documentation.

Consultant to Sprint PCS (Dec. 04 – Mar. 07)

- Responsible for over eighty (80) sites throughout NY/NJ.
- Preparation and release of search rings.
- Site candidate selection, analysis and approval.
- Candidate identification and evaluation via Planet EV.

- Tuned models based on drive test data via Planet EV.
- RF design of cell sites.
- Review zoning drawings and preparation of zoning exhibits.
- Provide expert testimony in zoning hearings.
- Detailed review of construction drawings.
- Preparation of regulatory documentation.
- Review system sweeps.
- Review site installations for correct RF parameters.
- Review optimization drives for new sites.

PierCon Solutions Core Engineering (Dec. 03 – Dec. 04)
Associate RF Engineer

- Microwave point to point design and field surveys for the confirmation of line of site for microwave backhaul systems.
- Development of RF reports and justification analysis for over fifty (50) sites in the NY/NJ area for T-Mobile and Verizon Wireless.

Consultant to Sprint PCS (Jul. 03 – Dec. 03)
Associate RF Engineer

- Prepared search ring documentation.
- Candidate identification and evaluation via Decibel Planner.
- RF design of cell sites.
- Preparation of zoning exhibits and documentation.
- Familiar with Sprint's design processes.

INDUSTRY SKILLS

- Computer propagation tools: Planet EV, Decibel Planner, Odyssey, Asset.
- Analysis tools: Wind Catcher, Actix, Tems Agilent .
- GIS mapping tools: MapInfo, Terrain Navigator, Street Atlas, Street and Trips.
- Cobol, C++, HTML, ASP, Windows/NT, MS Office, Paint Brush, Mac layout and graphic design, Adobe Photoshop.

EDUCATION

B.S. - Information Systems – New Jersey Institute of Technology, Newark, NJ

APPENDIX 2

Attached Exhibits

- Exhibit 1: "Existing Reliable 3G/4G Coverage without the Facility" -This exhibit depicts T-Mobile's existing reliable 3G/4G coverage within the area of the wireless Facility without the Facility. The large blue dot depicts the wireless Facility labeled as "NODE-1, NODE-2, and NODE-3". The large black dots depict T-Mobile's existing on air sites. The pink dashed line depicts the Village of Pelham.
- Exhibit 2:"Existing Reliable 3G/4G Scan Test without the Facility" -This exhibit depicts T-Mobile's existing reliable 3G/4G coverage within the area of the wireless Facility without the Facility. The large blue dot depicts the wireless Facility labeled as "NODE-1, NODE-2, and NODE-3" The large black dots depict T-Mobile's existing on air sites. The pink dashed line depicts the Village of Pelham.
- Exhibit 3: "Existing Reliable 3G/4G Coverage with the Facility On Air" -This exhibit depicts T-Mobile's existing reliable 3G/4G coverage within the area of the wireless Facility with the Facility on air. The large blue dot depicts the wireless Facility labeled as "NODE-1, NODE-2, and NODE-3". The large black dots depict T-Mobile's existing on air sites. The pink dashed line depicts the Village of Pelham.
- Exhibit 4:"Existing Reliable 3G/4G Scan Test with the Facility" -This exhibit depicts T-Mobile's existing reliable 3G/4G coverage within the area of the wireless Facility without the Facility. The large blue dot depicts the wireless Facility labeled as "NODE-1, NODE-2, and NODE-3". The large black dots depict T-Mobile's existing on air sites. The pink dashed line depicts the Village of Pelham.
- Exhibit 5: "Existing Reliable 3G/4G Coverage without the Facility overlaid on Village of Pelham Zoning Map" -This exhibit depicts the locations of T-Mobile's existing sites and existing in-building coverage over laid on the Village of Pelham zoning map. The large blue dot depicts the wireless Facility labeled as "NODE-1, NODE-2, and NODE-3". The large black dots depict T-Mobile's existing surrounding on air sites. The pink dashed line depicts the Village of Pelham.

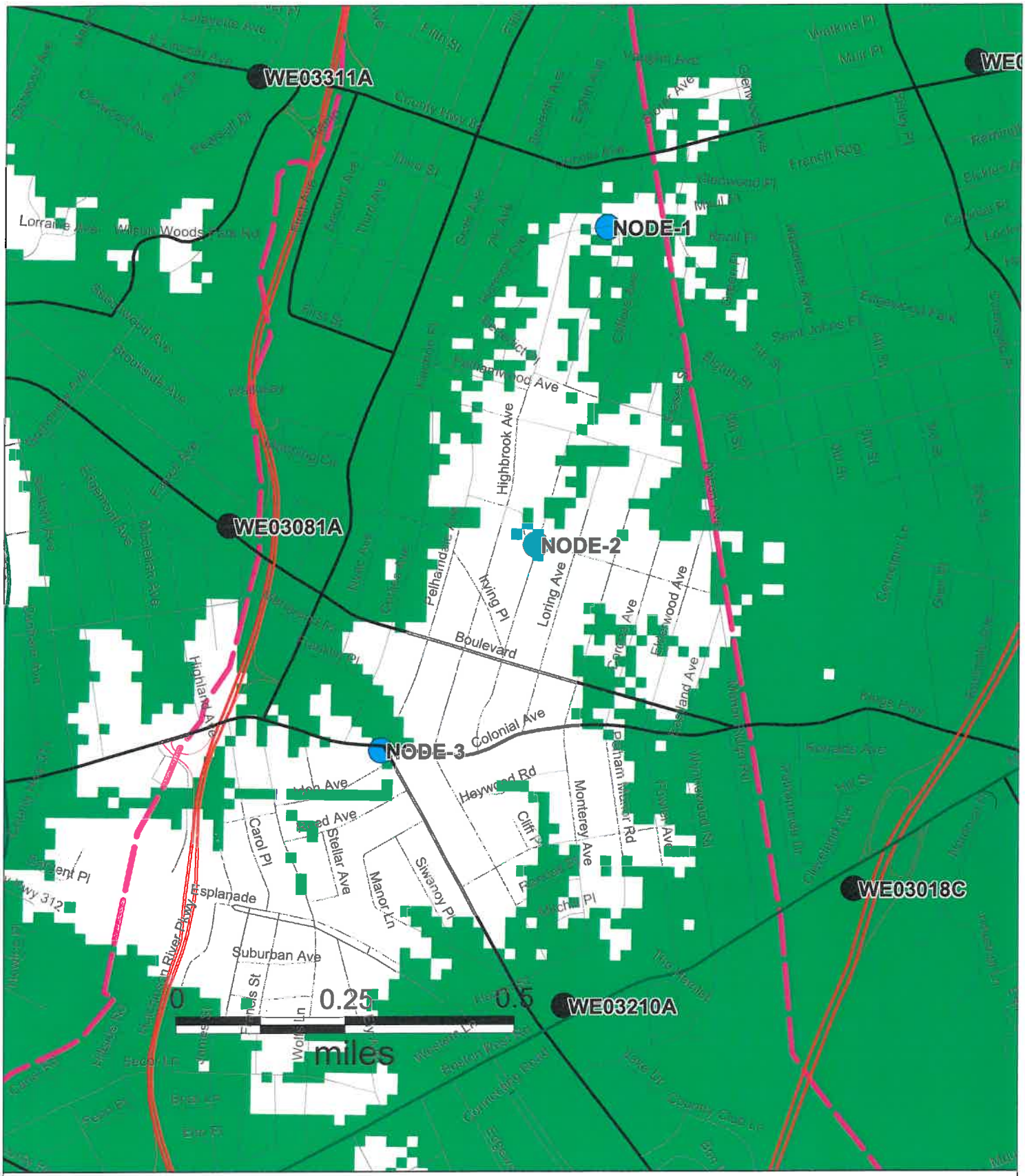

Exhibit 1: Existing Reliable 3G/4G Coverage without the Nodes

WE03782
Villiage of Pelham, Ny

10/16/2014

DAS Nodes

Existing Site

Villiage of Pelham

Reliable 3G/4G In Building

T··Mobile···

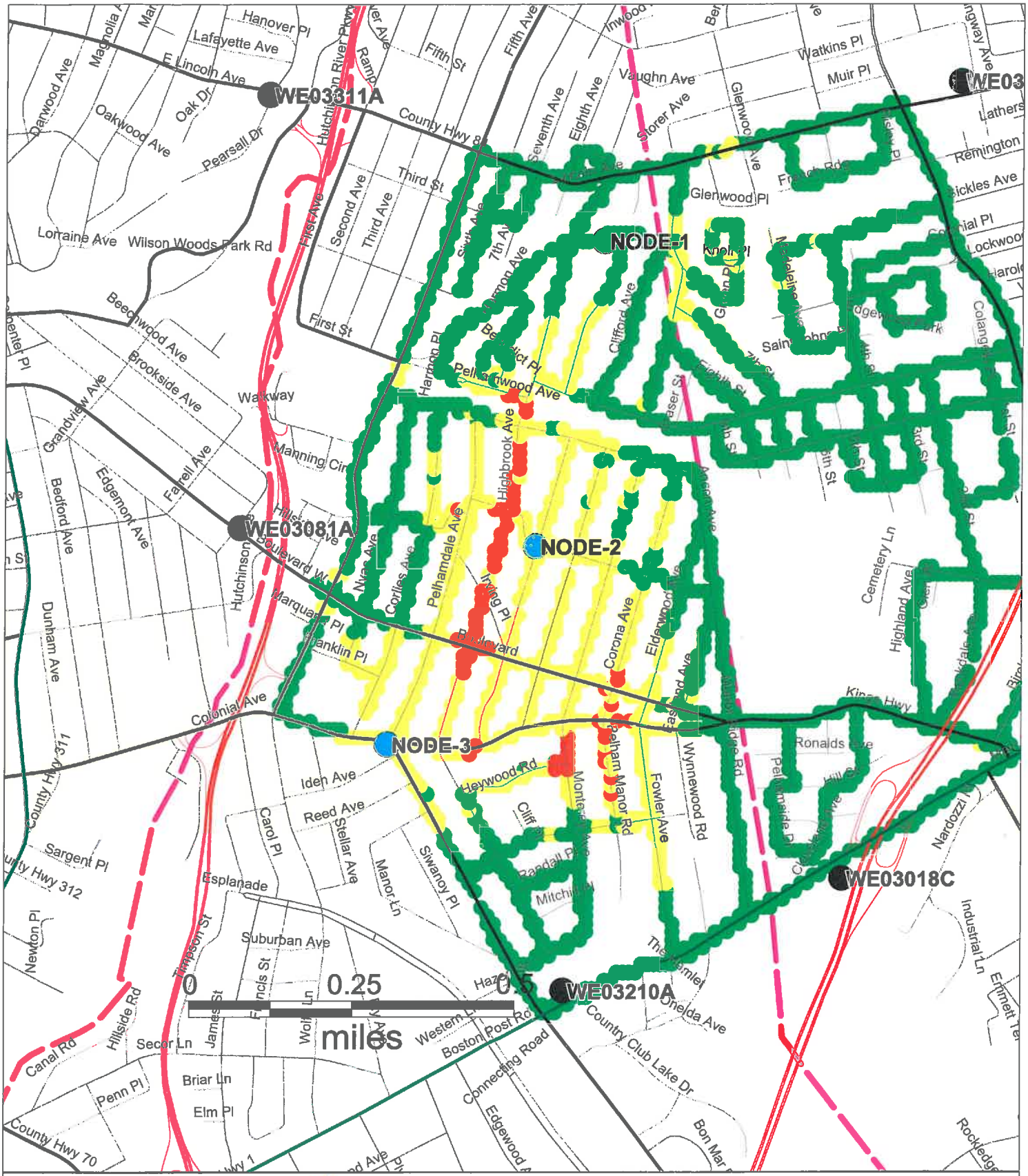

Exhibit 2: Existing Reliable 3G/4G Scan Test without the Facility

WE03782
Villiage of Pelham, Ny

10/21/2014

DAS Nodes

Existing Site

Villiage of Pelham

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Scan with Nodes Off Air

- -90 dBm <= x < 0 dBm
- -98 dBm <= x < -90 dBm
- -105 dBm <= x < -98 dBm

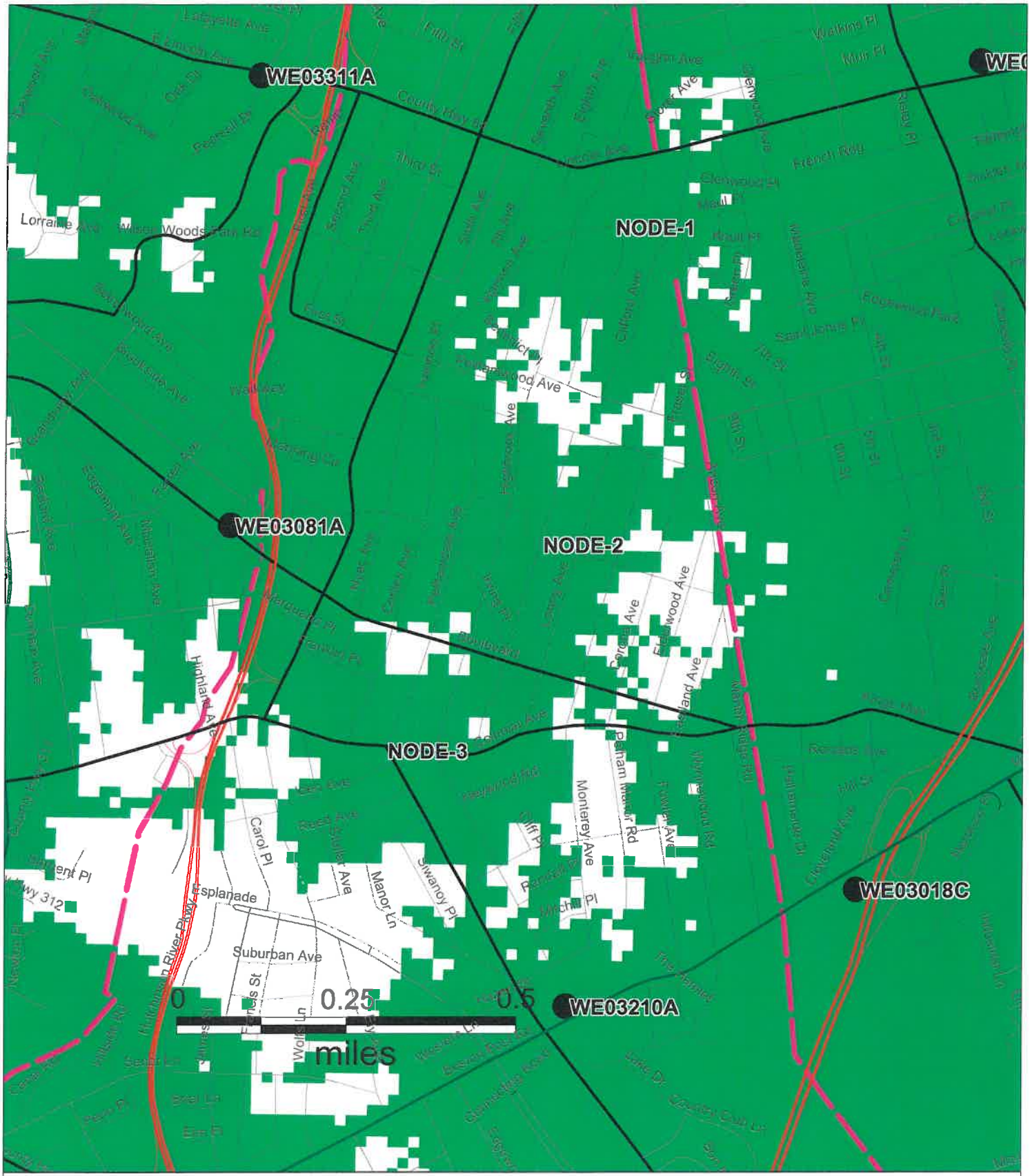

Exhibit 3: Existing Reliable 3G/4G Coverage with the Nodes

WE03782
Villiage of Pelham, Ny

10/21/2014

DAS Nodes

Existing Site

Reliable 3G/4G In Building

Villiage of Pelham

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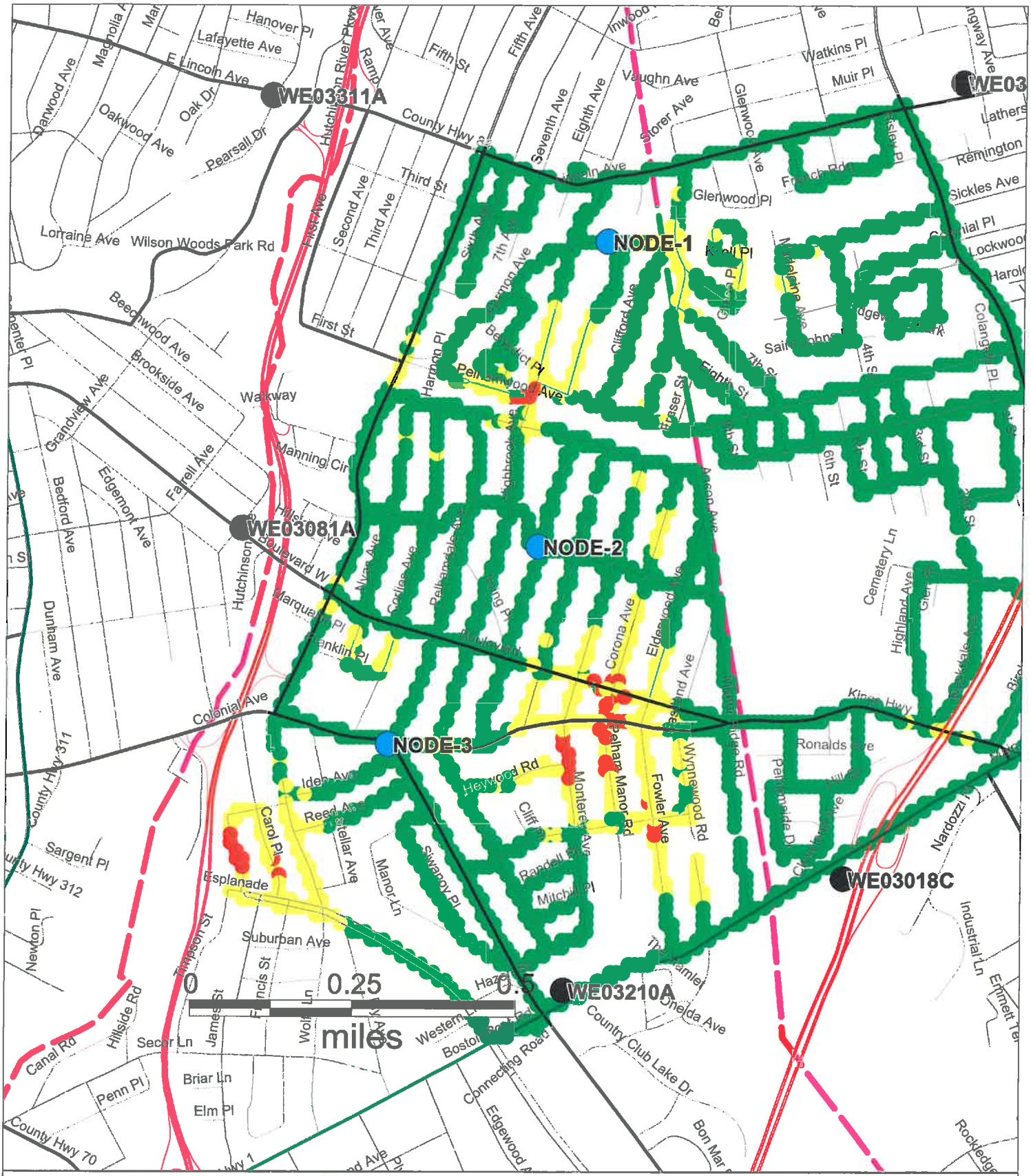

Exhibit 4: Existing Reliable 3G/4G Scan Test with the Facility

WE03782
Villiage of Pelham, Ny

10/21/2014

DAS Nodes

Existing Site

Villiage of Pelham

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Scan with Node On Air

-90 dBm <= x < 0 dBm

-98 dBm <= x <-90 dBm

-105 dBm <= x <-98 dBm

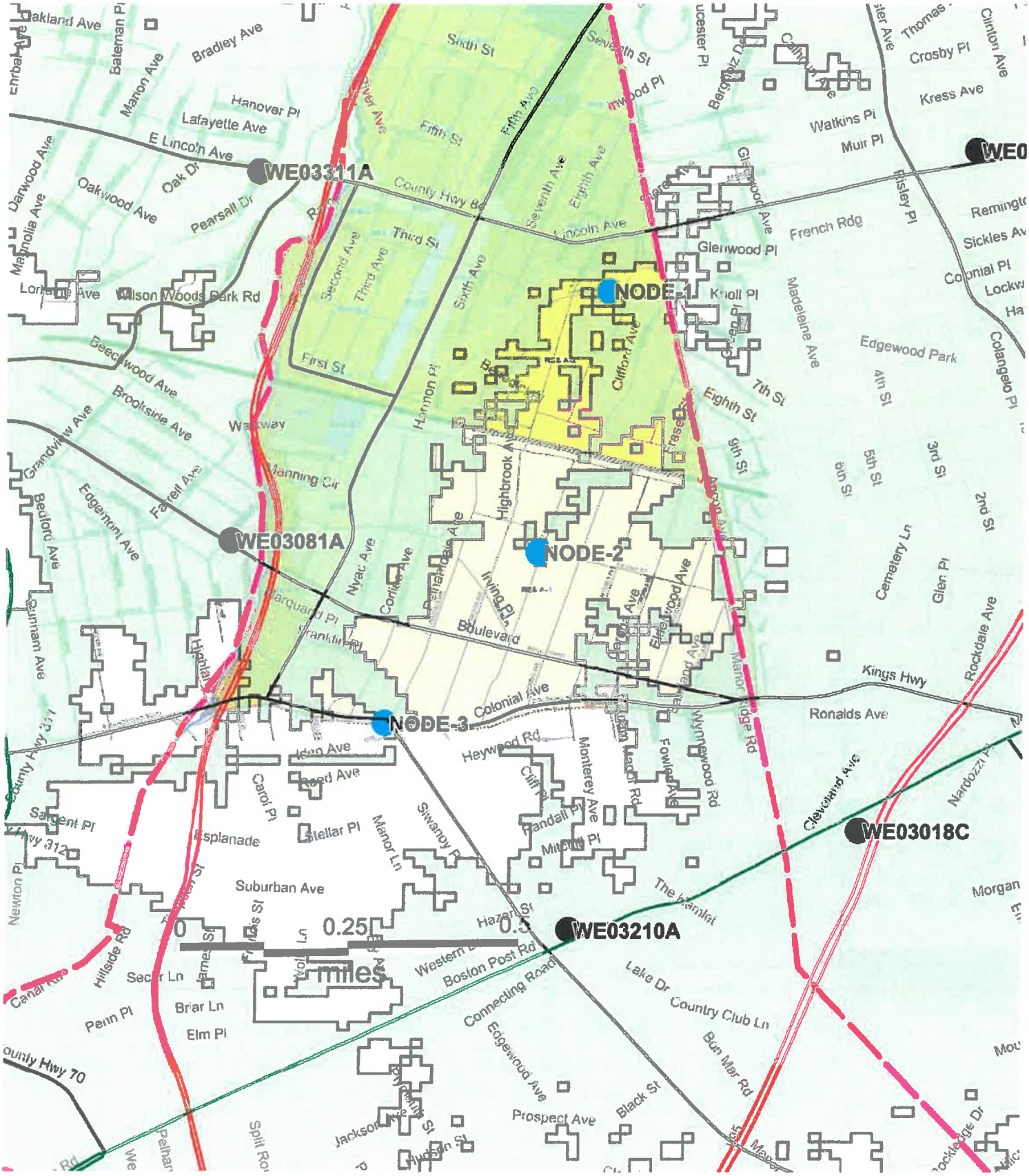

Exhibit 5: Existing Reliable 3G/4G Coverage without the Facility overlaid on Village of Pelham Zoning Map

WE03782
Villiage of Pelham, Ny

10/21/2014

T··Mobile···