June 1, 2017
File: 10057100-02

Mr. Chris Brand, Chairman
Town of Marlborough Planning Board
Town Hall
21 Milton Turnpike
Milton, New York 12547

Re: Verizon Permit Application for Micro Cell Site Installation
3 Young Avenue; Section 109.1, Block 3, Lot 26.2
Town of Marlborough, New York, 12542
Verizon Site Name: Marlboro 9W ODAS (Node 9)
Technical Review Memo

Chairman Brand and Members of the Planning Board:

This letter report was prepared to summarize HDR's technical review of an application prepared by Young / Sommer LLC, an agent of Cello Partnership d/b/a Verizon Wireless (Verizon), to install a new "small cell" wireless telecommunication facility on a new utility pole within a 48 sq ft leased area on a residential property at the above-referenced location (the site) in the Town of Marlborough, New York. The site is located on private property in a "R1 – Residential District"" zoning district, adjacent to the Route 9W northbound right-of-way.

Verizon is proposing the installation of a new 38.5 ft tall utility pole structure with one cylindrical antenna and related equipment, reaching a total height of 41.3 ft. The purpose of the facility is to improve network capacity and service in the immediate area. Co-location by other commercial wireless carriers that service the Town is not part of the proposed application or design.

This review includes a general assessment of Verizon's small cell application and consists of an analysis of the application materials HDR received in March 2017 and supplemental materials dated April 27, 2017. The supplemental information was provided in response to a request from the Planning Board during its April 3, 2017 meeting. The applicant is seeking a Special Use permit (SUP) and site plan approval for the proposed installation. A building permit will also be required. This Tech Memo is written for the review and comment of the Town of Marlborough Planning Board. Aside from the SUP, the applicant has requested several waivers including:

- Recertification of Special Use Permit
- Geotechnical and foundation design
- Annual NIER Certification
- Liability insurance
- Indemnification

- Tower setback
- Co-location requirement
- Balloon test
- Security fencing

It is noted that the subject property is located in a R-1 (residential) zoning district (parcel is approximately 0.21 acres in area). The Town's wireless ordinance (152-14) requires a minimum lot size of 4 acres for wireless telecommunications facilities in this zone.

1. Application Review and Nature of Proposed Verizon Installation

The following information was reviewed for this Tech Memo, including original and supplemental materials furnished by Verizon:

- March 10, 2017 Application for Site Plan Approval, Special Use Permit and Statement of Intent:
    - Checklist for Major/Minor Subdivision, site Plan and/or Lot Line Revision
    - Town of Marlborough Planning Board Application (Site Plan)
    - Statement of Intent
    - Full EAF
    - Lease between property owner and Verizon
    - Drawings
    - Site Selection Analysis and RF justification
    - Small cell fact sheet
    - Overview of the Telecommunications Act of 1996
    - Verizon's FCC licenses for the Ulster County area
    - Visual EAF Addendum
    - Viewshed Map
    - FCC TOWAIR determination
    - RF Safety Report
    - Non-Interference statement
    - Tower design, maintenance, and bond commitment letter

- Supplemental information dated April 27, 2017(addressing comments made at the April 3, 2017 Planning Board meeting and offered by the Planning Board Engineer):
    - Redacted copy of lease agreement with property owner, with signatures
    - Revised site plans (dated 4-25-17) with survey information
    - Revised SEQRA Long EAF
    - Photosimulation of the proposed small cell facility

Background on Proposed Verizon Small Cells

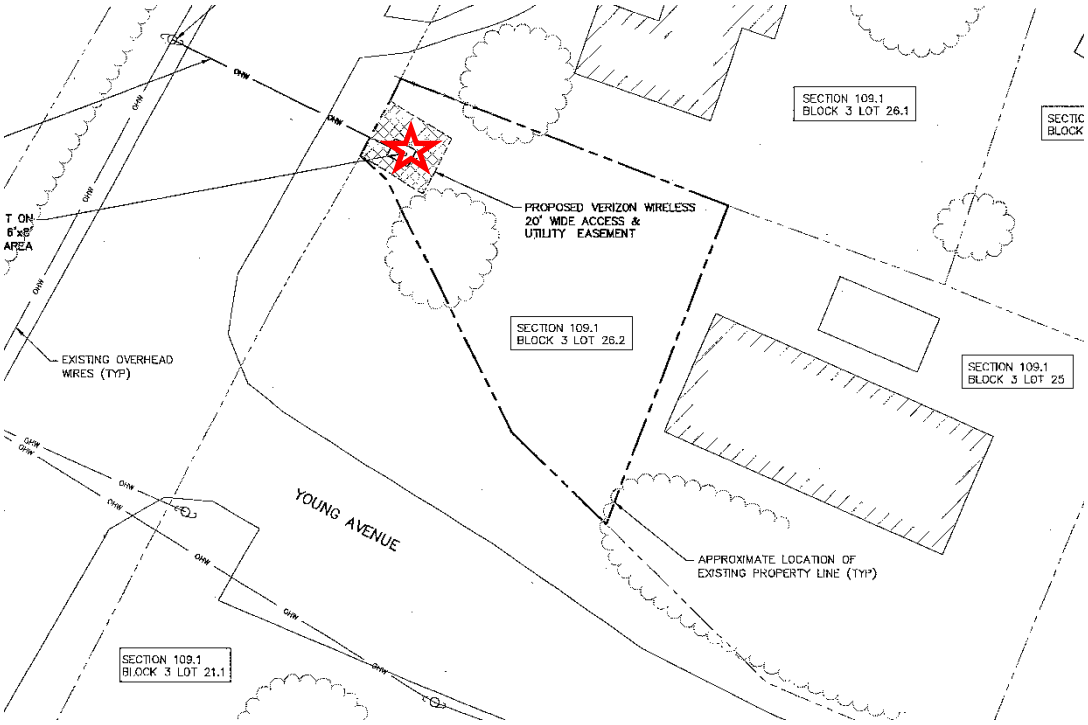
The proposed small cell installation ("Node No. 9") is part of Verizon's 700 and 2100 MHz (4G/LTE) licensed network roll out to provide enhanced voice and data services in the immediate site area to its customers. The coverage range for this type of proposed antenna system is typically on the order of 500 - 1000 ft. At the current time, Verizon has proposed to install (or may propose to install) other nodes in Marlborough with the combined objective of providing enhanced service (coverage, capacity) along the Route 9W corridor. These are the first small cell facilities proposed in the Town. Additional Verizon small cell nodes are also proposed for the Route 9W corridor to the south in the Town of Newburgh. The applicant reports that a total eleven (11) small cell nodes are currently planned for the Route 9W corridor.

Co-location on nearby (existing) Central Hudson poles in the utility right-of-way of Route 9W was evaluated by the applicant. Eight other potential utility poles were considered, but were deemed to not be viable options for Verizon (based on lack of interest by Central Hudson to lease space; presence of a transformer; presence of a nearby gas pipeline; lack of space on the pole; and safety issues). Verizon has thus moved forward with a Special Use Permit application for a new utility pole / small cell site at 3 Young Avenue.

Small cells are low-powered wireless base stations that function like cells in a mobile wireless network, typically covering targeted indoor or localized outdoor areas ranging in size from homes and offices to stadiums, shopping malls, hospitals, and metropolitan outdoor spaces. Wireless service providers often use small cells to provide connectivity to their subscribers in areas that present capacity and coverage challenges to traditional wide-area macrocell networks, such as coverage gaps created by buildings, tower siting difficulties, and challenging terrain. Small cells typically are built to service one wireless carrier. It is noted that a small cell network, such as the nodes proposed along the Route 9W corridor, can alleviate the need for one or more new "macro" cell sites (conventional cell towers), and is increasingly being utilized by wireless carriers to fulfill increased service needs in suburban settings.

Small Cell Proposed at 3 Young Avenue (along Route 9W)

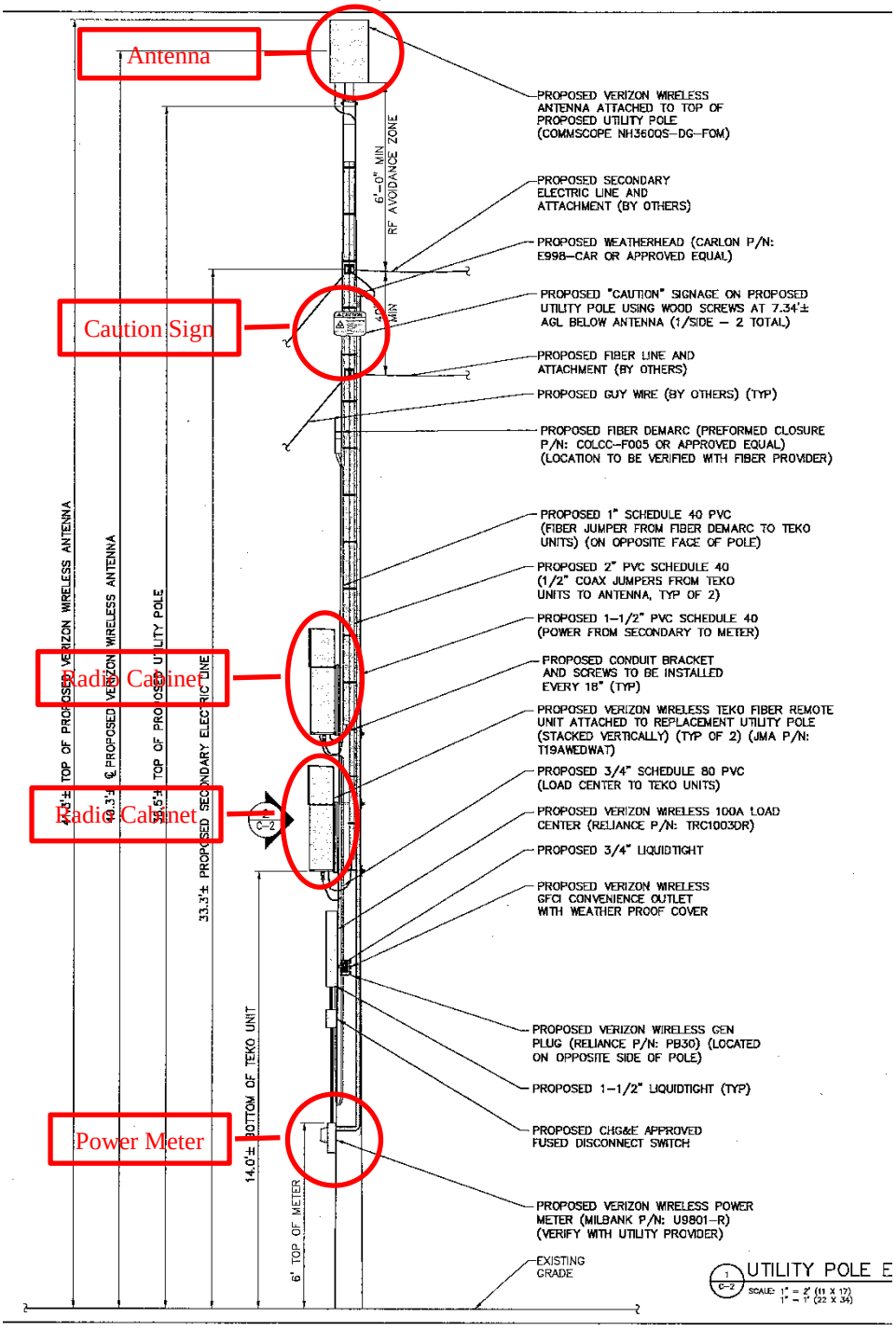
Verizon is proposing the installation of one (1) small canister antenna measuring 24" tall with a diameter of 12", two (2) small base radio cabinets; a power supply box; a power meter; and other support equipment on a new utility pole. The proposed location is on the east side of Route 9W, approximately 89 feet north of Young Avenue. The proposed installation will be within a 48 sq ft (6' x 8') leased area on the western side of the property. A 20 ft wide access easement on the existing lot is also proposed.



Plan View layout of property and proposed small cell installation.

The antenna centerline height is proposed to be approximately 40.3 ft above surrounding grade level (agl) and the antenna top reaches 41.3 ft agl. The top of the new, tapered utility pole reaches 38.5 ft agl. The equipment proposed for installation on the utility pole includes a power meter (at approximately 6 ft agl), disconnect switch, GFCI outlet, load center, two fiber remote units ("shrouds", analogous to equipment cabinets at conventional cell sites); associated cables; and two 4.5 inch by 7 inch FCC "caution" signs. Overhead electric and fiber lines are proposed to feed-in to the small cell facility near the top of the utility pole, and a guy cable is proposed to anchor the utility pole to the ground in the access easement area. [It is noted that fiber optics will connect the small cell nodes to one another and to one or more Verizon "macro" sites.]

The image below provides a cross-section of the proposed utility pole and equipment.



Cross-sectional view of proposed small cell facility and utility pole.

In addition to reviewing the above-noted application materials, HDR visited the site on April 22, 2017. The subject property is located on the east side of Route 9W, north of Young Avenue, on a residential property. The location is along Route 9W,

near a residential area and an elementary school. The below image provides an aerial view of the proposed Node 9 location and surrounding land uses.

Node 9, 3 Young Avenue; Section 109.1, Block 3, Lot 26.2.

Photos of the subject site area and proposed Verizon Node 9 location are included below.

Proposed Verizon Node 9 Installation, Looking North along Route 9W.

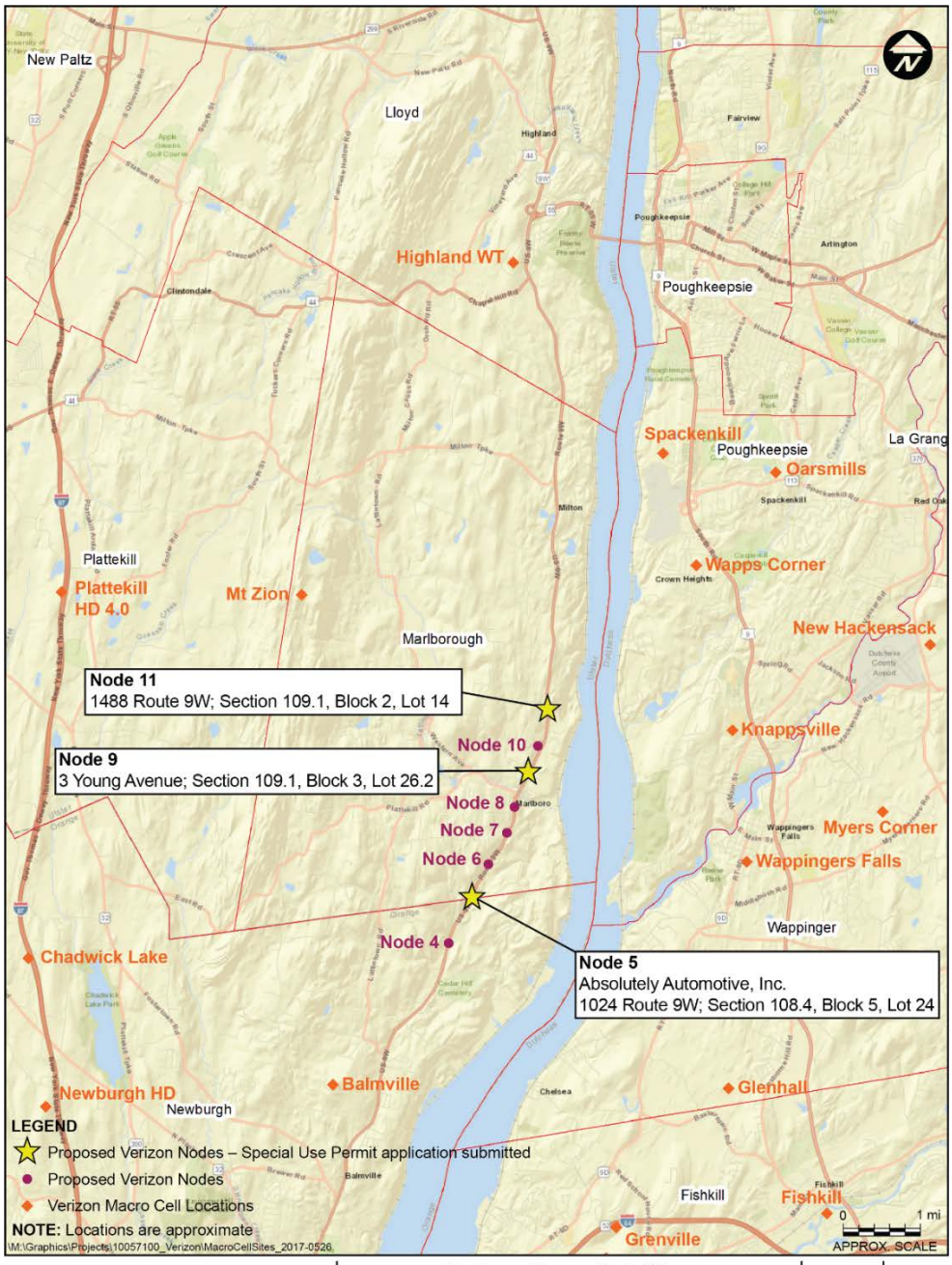
Proposed Node 9 Installation, Looking North along Route 9W.

2. Coverage / Capacity for the Verizon Facility Proposed at 3 Young Avenue (Node 9)

A number of factors can prevent the commencement or completion of a call from a wireless phone. A subscriber may not be able to complete a call due to limitations in *capacity* (how many callers are communicating with the same cell site at a given time). The proliferation of cell phones, smartphones and tablet computers has increased the need for network capacity, even within areas that were “covered” during the early roll-out of wireless telecommunications facilities. Industry focus has shifted from simply geographic coverage to "capacity coverage" in order to meet subscriber demand for bandwidth-intensive services. An inability to meet this demand results in overloaded networks and sluggish or interrupted service (e.g., “dropped calls”). The site is proposed predominantly to prevent short falls in capacity in the Verizon network in the area and to improve coverage in the immediate vicinity of the proposed location.

The frequencies involved in Verizon’s operation require line-of-sight propagation paths for its performance (with some enhancement due to reflections from solid structures). It is necessary that adjacent wireless telecommunications facilities exist in order to render homogeneous coverage and so that capacity (call traffic, data usage) can be managed in a given region of a service provider’s network. The Verizon site is being proposed as a “small cell” within the existing network of Verizon sites.

The below image provides an overview of existing Verizon cell tower (conventional) wireless facility sites in the area, based on information obtained from prior HDR review work on other Verizon applications. Currently, there is one Verizon cell site in the Town of Marlborough ("macro" site; co-location at the Mt. Zion Road tower).



HDR Engineering, Inc.
1 International Blvd., 10th Floor
Mahwah, NJ 07495

Verizon Macro Cell Sites

05/26/17 | Figure 1
10057100

HDR reviewed the RF Design Engineer's narrative that describes the needs for additional coverage and capacity in the local Verizon wireless network. The proposed small cell installation at 3 Young Avenue will remedy coverage deficits that currently exist in the Route 9W area (due to topography and vegetation), and will provide additional capacity for purposes of "off loading" call and data traffic from the existing network of Verizon "macro" sites.

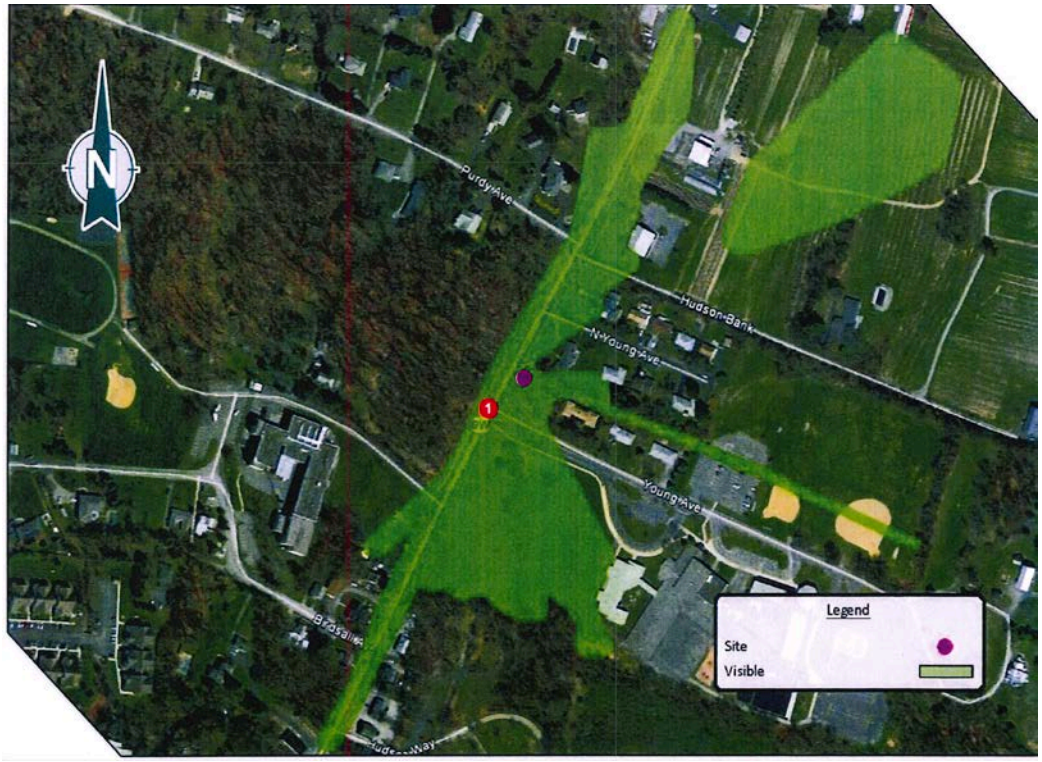
A coverage map was furnished for the Node 9 small cell facility that is proposed. The map (included below) provides an overlay of existing wireless coverage in the area (blue shading; service provided from conventional "macro" cell sites), along with the focused signal range (green) of the Node 9 small cell facility at 3 Young Avenue. Other Verizon small cell nodes (currently proposed or to be contemplated in Marlborough in the future) are also depicted, as is a proposed small cell location in the Town of Newburgh.

The above map and application information reviewed by HDR demonstrate that there is currently a focused gap in Verizon wireless service along the Route 9W corridor and losses in network capacity in the area. The proposed Verizon "small cell" facility (Node 9) is situated and designed to provide capacity relief and supplemental coverage to Verizon's local cell site network, and to interact with other small cell nodes proposed for the Route 9W corridor.

3. Additional Application Issues and Considerations

Aesthetics

Tectonic prepared a Viewshed Map, which demonstrates that the proposed installation will be predominantly visible from the subject property, along Route 9W, and from other nearby locations. The area of visual influence is based on the limited height of the pole, existing vegetation, and topography. Although no balloon test was conducted for this small cell node, the provided viewshed analysis appears to be reasonable based on HDR's site visit and map reviews. Visibility may differ slightly depending on season, and depending on "off-leaf" conditions.



Node 9 Viewshed map.

One photo-simulation was provided by the applicant that depicts the proposed utility pole and equipment (see below image). The installation appears similar in height to a nearby existing utility pole across Route 9W and to a new traffic light utility pole on the northeast corner of the intersection of Young Avenue and Route 9W (the poles are not depicted in the photosimulation). Visual impacts from the proposed facility do not appear to be significant, considering the proposed height and proximity to existing utility poles and overhead wires in the Route 9W right-of-way.

Photosimulation of Node 9 (new traffic pole not depicted).

No modification to the existing landscaping or site driveway are proposed. Fencing and lighting are not proposed. A 20 ft wide access easement area and guywire anchor area will be dedicated at the base of the proposed utility pole.

For reference, Attachment A provides photo examples of existing small cell and DAS sites in other municipalities.

Conformance with NIER and Other Radiation Hazard Criteria

In order to comply with the Non-Ionizing Electromagnetic Radiation (NIER) hazard criteria, Millennium Engineering, P.C. (on behalf of the applicant) calculated radio frequency [RF] levels for the proposed installation. The February 11, 2017 RF analysis included the proposed Verizon small cell 700 MHz (LTE) operations. For general public exposure at “ground level” areas in proximity to the installation, the maximum RF levels were calculated to be less than 1% of the general public maximum permissible exposure (MPE) limit, and thus in compliance with FCC

regulations. RF levels were calculated for occupational workers at 3 feet in front of the antenna, and were found to be below the FCC occupational limits.

Structural Assessment

A Structural Analysis Statement prepared by the applicant confirms that the Node 9 installation will be designed and constructed to meet all structural requirements for loads, including wind and ice. Additional certifications ('as-built", grounding/bonding) will be submitted after construction, and HDR assumes the Building Department will complete structural review when the information is received. It is noted that the Drawings (dated 4-25-2017 and signed by a NYS P.E.) provide structural design criteria including ANSI/TIA 222-G which appears to be appropriate. **It is noted that the Applicant and the Applicant's engineer maintain full responsibility for the accuracy and adequacy of all aspects of the Verizon small cell design and structural and foundation analyses, and for the construction and maintenance of the Verizon facility**.

4. Recommendations

The following recommendations were identified based on HDR's technical review of the Verizon Node 9 small cell application. These recommendations can be considered as conditions of the special use and/or building permits, if the small cell application at 3 Young Avenue is approved.

- **PROPOSED WAIVERS**. HDR has reviewed the proposed waivers and provides comments and recommendations to consider for each:

  Recertification of Special Use Permit - The small cell application includes a request to waive the requirement for any future periodic renewal / recertification of the Special Use Permit. Based on the rapidly changing technologies associated with wireless telecommunications facilities, and considering this is among the first small cell applications received by the Town of Marlborough, HDR is of the opinion that the 5-year renewal (and review) process per Section 152-19 is an important part of the Town's Wireless Ordinance and should remain in-place for this application (and all other wireless telecommunications facilities in the Town).

  Geotechnical and foundation design – Provided the nature of the proposed facility (utility pole), it is suggested that final structural / foundation analysis can be reviewed at the Building Permit phase of the project.

Annual NIER Certification - Considering that this is among the first small cell applications received by the Town of Marlborough, HDR is of the opinion that the annual NIER certification requirement (per Section 152-24 of the wireless code) should remain in-place for this application.

Liability insurance / Indemnification – It is recommended that the Town review all insurance and indemnification requirements.

Tower setback – The existing set-backs based on the revised DWG set are as follows:

- Side yard (north) = 22.5 ft (proposed pole height is 41.3 ft)
- Side yard (south) = 10 ft
- Front yard = 11 ft
- Rear yard = 105.5 ft

HDR notes that guy cables are proposed to provide a controlled fall area in the unlikely event of a structural failure. The setback requirements noted in Section 152-14 for new tower structures is twice the height of the structure. **It is understood that the Planning Board and/or Building Inspector may refer the application to the Zoning Board of Appeals for a variance, if this proposed waiver cannot be waived by the Planning Board**.

It is further noted that the subject property is located in a R-1 (residential) zoning district on an approximately 0.21 acre parcel. The Town's wireless ordinance (152-14) requires a minimum lot size of 4 acres for wireless telecommunications facilities in this zone.

Co-location requirement – HDR notes that co-location by other wireless carriers is not part of Verizon's small cell design for Node 9 (and the other nodes proposed in the Town). Small cell technology (ROW utility poles; new utility poles; rooftops) is commonly utilized by a single carrier to supplement that carrier's coverage and capacity within a given area or corridor. HDR is of the opinion that a statement or commitment to co-location is not relevant or required for this application.

Balloon test – a desktop viewshed analysis was performed by the applicant, and a photosimulation for Node 9 was provided. Given the relatively low height and limited viewshed of the proposed small cell, as compared with conventional "macro" cell tower structures, HDR feels that the balloon test requirement can be waived for this application.

Security fencing – As depicted on the site plan drawings and the images provided above (and in Attachment A), there is no ground-based equipment

area. A single antenna and support equipment are proposed to be attached to the new utility pole. HDR believes that the security fencing requirement can be waived.

It is understood that the Planning Board will consider and review the proposed waivers further, as part of SUP and Site Plan review.

- It is understood that final colors of all proposed equipment are subject to Planning Board review and approval. A galvanized / grey utility pole (to match existing utility poles in the immediate site area) or a brown wooden pole (as proposed; to match other wooden utility poles along the Route 9W corridor) is recommended. Visible portions of the proposed Verizon equipment (antenna, mounting system, cables, and affixed equipment boxes) should be color matched to the utility pole color. Non-reflective paint / coating (matted finish) is recommended for the utility pole and all ancillary equipment. It is noted that no landscaping, lighting, or ground-based equipment is proposed as part of the application. For reference, photo examples of existing small cells / outdoor Distributed Antenna Systems are include in Attachment A.

- Revised SEQRA Long EAF (4/24/2017): It is understood that the Planning Board will review the information provided in the revised EAF, particularly with regard to Items E.2 (Natural Resources) and E.3 (Designated Public Resources.

  It is suggested that the applicant provide comment and supplemental information regarding these items (copies of agency correspondences; results of database reviews used to complete the EAF). Prior determinations (or exemptions) that have been established by NYSDEC and Federal agencies with regards to proposed antenna installations should also be furnished by the applicant, as available. This information will be useful to the project file.

- As this is among the first small cell installations in the Town, if SUP / Site Plan approval is granted, it is recommended that a construction plan be submitted for Town review which provides a scope and schedule for the node installation. Plans for site access and construction equipment to be used (including crane and other heavy machinery) should be described. All work associated with the construction of the Verizon small cell facility – including grading / clearing and utility installations / connections - will be coordinated with the Town Building Department as part of the Building Permit. Contractor submittals (insurance; workers' compensation filings) should also be provided to the satisfaction of the Town. The applicant maintains full responsibility for inspection work required for utility connections and construction, and compliance with all local and other

relevant codes and regulations. The applicant proposes to submit a structural assessment or certification during the building permit stage of the project.

- Operations should be maintained in accordance with the Town's wireless ordinance and all other relevant Town codes. It is recommended that any future changes to the approved small cell facility as depicted in the application submittals (e.g., number, sizes, locations, and transmit powers of any antennas; pole height; addition of ground-based equipment) be reviewed by the appropriate Town agency prior to modification. All necessary Town approvals must be obtained before any modifications are conducted.

- Small FCC signage should be installed and routinely inspected and maintained in accordance with all FCC rules, regulations, and guidance. Signage is proposed to be installed at a height of approximately 30 ft agl. **It is recommended that an FCC sign / sticker also be placed on or immediately below the power meter (approximately 6 ft agl)**. It is the applicant's responsibility to comply with all FCC rules and regulations that are applicable to the site and operations, including but not limited to compliance with RF emission levels.

- If constructed, As-built Drawings shall be prepared for the Building Department files which depict the actual locations and heights of all Verizon small cell equipment including - but not limited to - the utility pole and subgrade / overhead utility runs and tie-ins. Access Easements shall also be documented.

  Additional certifications ('as-built', grounding/bonding) are proposed to be submitted after construction, and HDR assumes the Building Department will complete review when the information is received. It is noted that the Drawings (dated 4-25-2017 and signed by a NYS P.E.) provide structural design criteria including ANSI/TIA 222-G which appears to be appropriate. It is noted that the Applicant and the Applicant's engineer maintain full responsibility for the accuracy and adequacy of all aspects of the Verizon co-location design and structural and foundation analyses, and for the construction and maintenance of the Verizon facility.

- Comments received from the County Planning Department – if any – should be reviewed and addressed if warranted. As the proposed small cell site is located in a commercial/residential area along Route 9W, the New York State Department of Transportation (NYSDOT) should be notified. Copies of correspondences with referral agencies, utility companies (including Central Hudson), and neighboring municipalities (if applicable) should be provided for the Town's files.

- Prior to any construction at the site, the Town Building Department should review the applicant's insurance, workers' compensation, and security bond submittals to verify they are adequate. Application materials note that a removal bond / removal agreement will be prepared by Verizon and executed with the Town during the building permit phase of the project.

Please feel free to contact us should you have any questions on this report.

Sincerely,
Henningson, Durham & Richardson
Architecture and Engineering, P.C.
in association with HDR Engineering Inc.

Michael P. Musso, P.E.

Michael P. Musso, P.E.
Senior Project Engineer

cc: Scott Olson, Young/Sommer, LLC

Attachment A

Photo Examples - Small Cells and DAS

Mobilite Built Small Cell Sites

Mobilite Built Small Cell Sites

Crown Castle DAS