March 3, 2021
10258372

City of Hudson Planning Board
520 Warren Street
Hudson, NY 12534

Re: Verizon Wireless Proposed Rooftop Installation
119 Columbia Street, Hudson, New York 12534
Technical Memorandum

Dear Chairperson Gramkow and Members of the Planning Board:

This technical memorandum (Tech Memo) was prepared to summarize HDR's review of the application materials prepared and submitted by Young/Sommer LLC, on behalf of the applicant, Bell Atlantic Mobile Systems LLC d/b/a Verizon Wireless (Verizon). The application is for the construction of a new wireless telecommunications facility proposed at the above-referenced location (the site) in a "GC – General Commercial" zoning district in the City of Hudson. The facility is proposed on the rooftop of an existing five-story apartment building (Providence Hall Apartments), fronted by Columbia Street, N. 1st Street, N 2nd Street, and Prison Alley, and located adjacent to the Warren Street Historic District. Verizon has reported a need to supplement its network's capacity and coverage to provide enhanced and reliable 4G wireless services to the site area. Site Plan and Special Use Permit approvals are being requested of the Planning Board. If approved, a Building Permit will also be required.

This technical review includes a general assessment of Verizon's application materials, focusing on issues related to facility operation and need, capacity/coverage, and conformance with electromagnetic radiation hazard criteria. In addition, potential aesthetic impacts, compliance with the City's wireless code (Chapter 284, *Telecommunications Facilities*), structural analysis, and other aspects of the proposed installation are discussed. This review consists of an analysis of application materials provided by the applicant as of the date of this memorandum, as well as public comments received in writing and during prior Planning Board meeting discussions.

This Tech Memo is written for the review and comment of the City of Hudson Planning Board in anticipation of its March 9, 2021 meeting and continued public hearing. A summary of Findings, Recommendations, and Outstanding Information is included at the end of this memorandum. HDR can prepare addendum memoranda if requested by the Planning Board.

The Tech Memo is divided into the following sections:

- Application Overview
- Summary of Application Filings and Completeness Reviews
- Site Visit
- Coverage / Capacity for the Proposed Verizon Facility
- Alternate Site Analysis

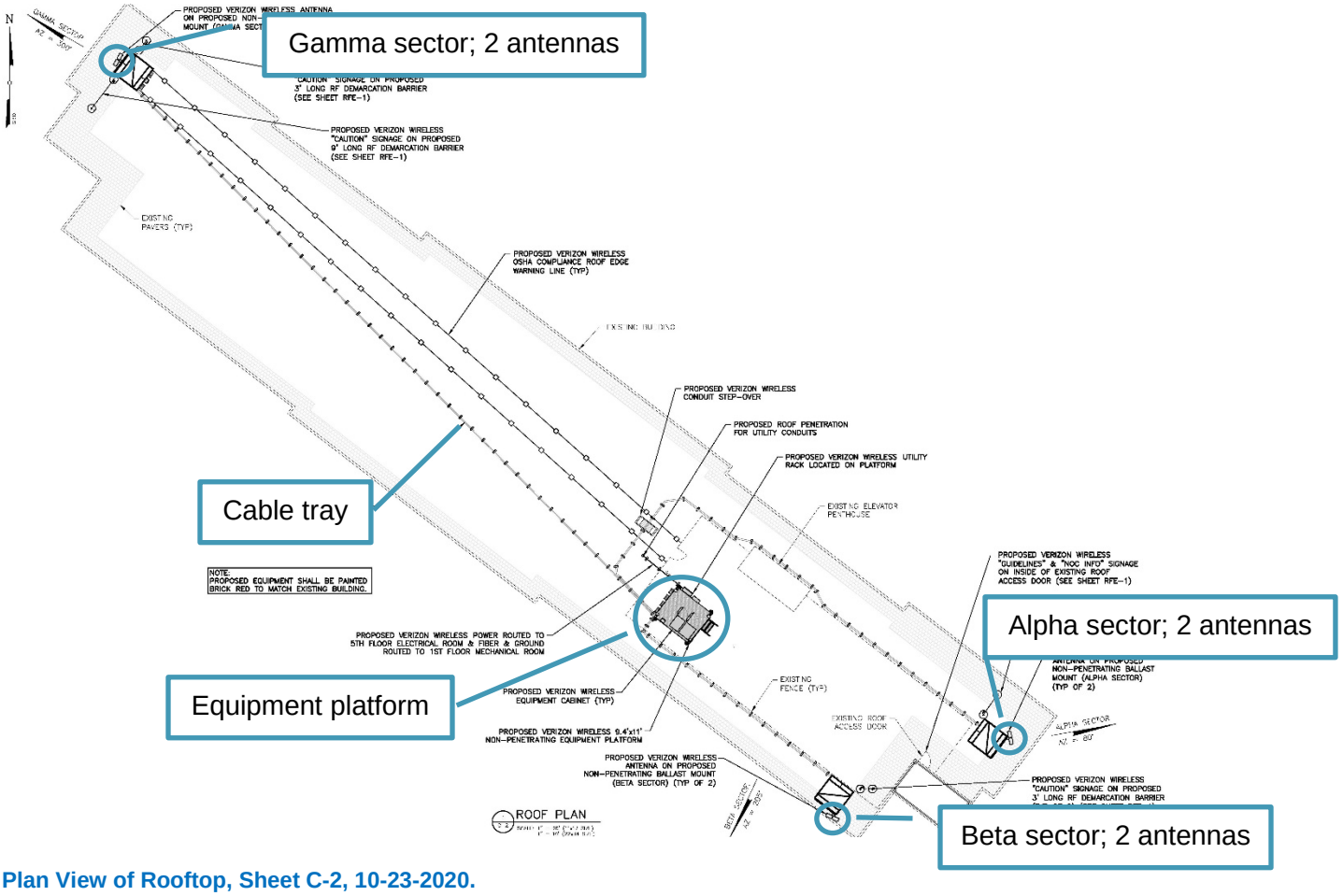
- Conformance with NIER and Other Radiation Hazard Criteria
- Visual Impact Analysis / Aesthetics and SHPO
- Structural and Safety Assessment
- Summary of Technical Review Findings, Recommendations, and Outstanding Information

1. Application Overview

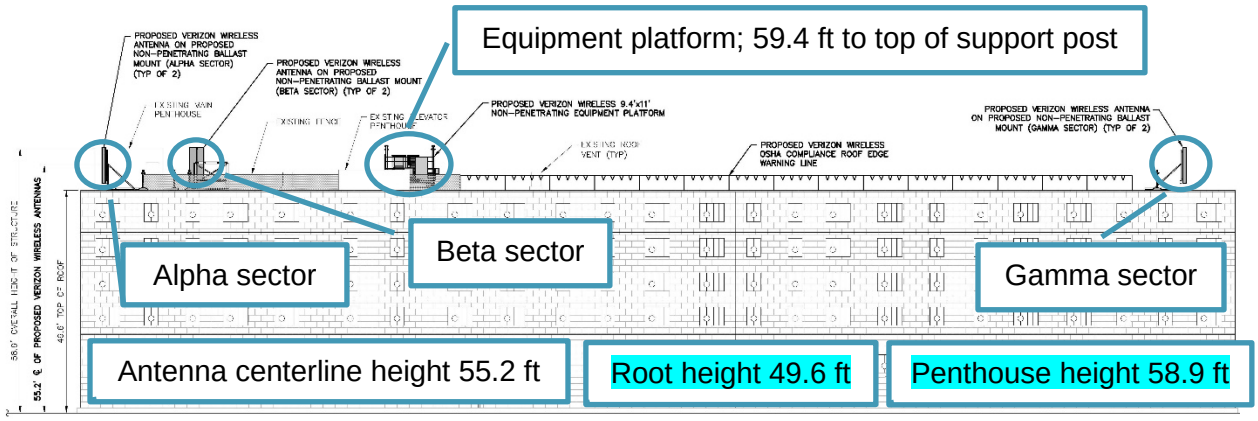
Verizon has proposed the installation of a new rooftop wireless telecommunication facility. Six (6) Verizon panel antennas are proposed in three sectors with a top height of 58.9 ft and centerline height of 55.2 ft above surrounding building grade. Installation of an equipment platform on the roof is also proposed.

For reference, images of the subject property and proposed facility from the latest Drawing set dated 10-23-2020 are included below.

Aerial View of 119 Columbia Street property, rooftop and surrounding area.



Plan View of Rooftop, Sheet C-2, 10-23-2020.



Cross-Section View of Building and Proposed Equipment, Sheet C-3, 10-23-2020. The existing roof penthouse is located between the Alpha and Beta sector antennas (heights of antennas will not exceed the penthouse height).

The six proposed Verizon panel antennas (2 per sector, 3 sectors) each measure 95.9" long, 15" wide and 7.4". Painting of the antennas to match the existing brick façade of the building and rooftop features is currently proposed; the applicant has also provided information for a stealth screening wall around the Gamma sector (western) antennas. The antennas will provide services on Verizon's FCC-licensed frequencies to support voice and data exchange services. The proposed installation will accommodate Verizon's enhanced "4G" long-term evolution (LTE) operations, including various voice and data services. Verizon is licensed to operate in the region at several frequency bands, including the 700, 850, 1900, and 2100 MHz ranges proposed at the site. 5G services are not proposed as part of this application.

A total of six remote radiohead (RRH) units, mounted on the equipment platform, are proposed. These small units are used by wireless carriers to boost antenna signals and process "call and data traffic". Two different RRH models are proposed to accommodate the various Verizon frequency bands:

- 700/850 dual band: 15 inches x 15 inches x 8.1 inches
- PCS/AWS dual band: 15 inches x 15 inches x 10 inches

A 9.4 ft by 11-ft equipment platform is proposed on the south central portion of the roof. The following equipment will be located on the platform to support the Verizon facility: one equipment cabinet, one battery cabinet, one telco box, an integrated load center, one GPS antenna, one over-voltage protector (OVP), the six RRH units, and two small light fixtures.

The light fixtures (four 25-watt LED bulbs) will be mounted on the equipment platform at a height of approximately 9 ft above the roof. The light fixtures operate on a shut-off dial timer (one hour maximum) to accommodate night-time maintenance visits by Verizon technicians that may be needed.

Additional equipment includes the following:

- Cables running from the antenna arrays to the equipment compound. Cables are routed within trays installed on the roof surface.
- Non-penetrating roof edge warning lines from the center of the roof to the western Gamma sector. OSHA requirement; 3 ft above roof surface.
- FCC RF signage (roof access door, and at each antenna sector) and Barrier systems (posts with yellow plastic chain) at each of the three sectors to deter access to the antennas.
- Signage with Verizon contact information (rooftop access door).

A back-up generator is not proposed for the site. No changes to rooftop access, parking or landscaping are proposed as part of Verizon's application.

2. Summary of Application Filings and Completeness Reviews

Application Submittals

The original application submittal and supplemental information and clarifications provided by the applicant during the review process have included the following:

1. August 20, 2020 Application for Site Plan Approval and Special Use Permit with 12 attachments:
    - August 20, 2020 Application cover page.
    - City of Hudson Planning Board application form, dated August 3, 2020.
    - Documentation of Public Utility Status letter.
    - Documentation of Personal Wireless Service Facility Status and Federal Telecommunications Act of 1996 letter.
    - Site Plan Drawings (Tectonic, NYS P.E.; 7 sheets; dated 7-22-2020).
    - Full SEQRA Environmental Assessment Form, Part 1, dated July 17, 2020.
    - Radio-Frequency Information memo (Verizon, dated January 30, 2020; 4 pp.), with narrative of proposed facility, technical information, and coverage maps.
    - Radio Frequency Compliance Certification (RF Emissions), prepared by Site Safe, dated February 7, 2020 (1 page certification letter with 3 pp. of supporting compliance exhibits).
    - Platform Analysis Report (structural assessment of proposed rooftop equipment platform), prepared by Tectonic, NYS P.E., dated March 4, 2020 (40 pp. including design assumptions [wind, seismic, ice, and snow], calculations, and structural drawings).
    - Radio-Frequency Information letter (operations and interference), prepared by Verizon, dated January 30, 2020 (1 page).
    - Area Map with photographs and leaf-on photo-simulations of the proposed facility, prepared by Tectonic (undated; 22 pp.).
    - Towair Determination Results (undated FAA determination on lighting; No Lighting is required for the rooftop facility); 1 page.
    - 1-mile Viewshed Map, prepared by Tectonic (1 page, undated)

2. October 28, 2020 Young/Sommer LLC letter regarding FCC Shot Clock and extension (with subsequent edits to this letter circulated between the applicant and City Planning Board).

3. November 20, 2020 Young/Sommer LLC response to comments letter to the Planning Board (7 pp.) with 9 attachments. ***This submittal was prepared in response to HDR's comments provided in Completeness Memo #1, dated October 8, 2020***.
    - Tab A – Documentation of initial application filings.
    - Tab B – Lease Agreement (redacted; non-executed) between applicant and Providence Hall Associates, L.P. c/o Arbor Management, LLC. 22 pp. plus 4 lease exhibits.
    - Tab C –
        - Tectonic response to comments letter, dated November 20, 2020 (5 pp.)
        - Visual Resource Evaluation, prepared by Tectonic, dated October 23, 2020 (32 pp.; including methodology, viewshed map, photo locations, and photosimulations of the proposed facility with alternate antenna color)

    - Revised Drawings, prepared by Tectonic, dated 10-23-2020 (10 sheets; T-1, AD-1, C-1 through C-7, RFE-1). ***This constitutes the latest Drawing Set as of the date of this Tech Memo. If the application is approved, a revised Drawing Set incorporating final comments and conditions of the Site Plan and Special Use Permit will need to be submitted.***
- Tab D – SiteSafe Radio Frequency (RF) Site Compliance Report, 18 pp. dated 2/6/2020.
- Tab E – Radio Frequency Compliance Signage Checklist, 3 pp. dated 2/6/2020
- Tab F – Copy of Verizon's FCC Licenses, 4 pp.
- Tab G – SHPO correspondence, dated August 20, 2020. Email correspondence (1 page) noting no historic properties in the Area of Potential Affect (APE).
- Tab H – Site Selection Analysis, 18 pp., prepared by Verizon, dated November 20, 2020 (Verizon search ring description; candidate site analysis [subject site, Bliss Tower narrative, and 3 other alternates] targeting the City's Wireless Code's siting priorities; alternate site coverage maps).
- Tab I – Engineering Necessity Case, 21 pp., prepared by Verizon, dated November 4, 2020 (inventory of existing "on air" Verizon cell sites in the area [5-mile radius], including east and west of the Hudson River; project need overview; capacity charts for the "on air" cell site at the Hospital; supplemental coverage maps).

4. Applicant Slide Deck (Received 12-10-2020; 25 slides)

5. January 6, 2021 Young/Sommer LLC response to comments letter (10 pp.) to the Planning Board with 7 attachments. ***This submittal was prepared in response to comments provided in HDR's Completeness Memo #2, dated December 2, 2020***.
    - Response to comments on site design, Drawing Set, and visual evaluation, prepared by Tectonic, dated December 31, 2020 (3 pp.).
    - Supplemental Visual Resource Evaluation (68 pp.), prepared by Tectonic, revised December 31, 2020 (including viewshed map, photo location index, photos, and off-leaf photosimulations generated from the November 24, 2020 visual assessment field work. Simulations of a stealth enclosure sample for the Gamma [western] antenna sector were also provided).
    - Supplemental Engineering Necessity Case (23 pp.), prepared by Verizon, dated November 4, 2020 (including additional information for existing Verizon cell sites; supplemental coverage maps; capacity plots).
    - Supplemental Radio Frequency (RF) Site Compliance Report (23 pp.), prepared by SiteSafe, dated December 18, 2020 (including graphical displays of RF Emissions modeling – based on conservative assumptions – from the antenna sectors; statements on general population MPE compliance; additional RF information and compliance measures proposed).
    - Section 106 Review Supporting Documents, including
        - Notification of SHPO Concurrence (File No. 0009172104), dated August 20, 2020 (1-page email; also provided in the applicant's November 2021 submittal) noting:

- **<u>Direct Effect</u>: No Historic Properties in Area of Potential Effects (APE)**
- **<u>Visual Effect</u>: No Adverse Effect on Historic Properties in the APE**

o FCC Wireless Telecommunication Bureau Collocation Submission Packet; 77 pp. with several attachments, including

- FCC NEPA Form 621 (18 pp.): site information, proposed Verizon facility information; SHPO determination information; Tribal/NHO Involvement form; Historic Properties inventory form; Local Government Involvement form (outreach was made to Hudson Historic Preservation Commission and Historic Hudson in February 2020); Designation of SHPO/THPO form (filing date to NYSHPO of 8/4/2020) and attachment list of filing
- Attachment of package filed with NYSHPO on August 4, 2020 (34 pp.), including CV for Cultural Resources Specialist; APE maps of property with historic district boundaries and cultural resource analysis photo locations; photos and captions; additional site information; lease exhibit drawings; Area of Potential Effects form; Historic Properties for Visual Effects form; and SHPO Historic Properties Map
- SHPO Receipt of filing (File No. 0009172104), email dated 8/5/2020
- Tribal Summary table and outreach correspondences

- Supplemental Site Selection Analysis, prepared by Verizon, dated December 8, 2020 (18 pp.), including search ring methods used by Verizon; City Wireless Code section references; Alternate Sites evaluated (A. Bliss Towers; B. Providence Hall; C. Columbia County Building, 325 Columbia Street; D. City of Hudson Dock Street property; and E. City of Hudson Water Street property); search area overlay maps; alternate site location map; Bliss Towers withdrawal letter; alternate site coverage maps.
- Response to RF questions in the HDR Completeness Memo #2, prepared by Verizon, dated December 28, 2020 (3 pp.).

6. January 27, 2021 Young/Sommer LLC letter responding to public questions (11 pp.)

7. February 3, 2021 Young/Sommer LLC letter (6 pp.) in support of the application

8. February 11, 2021 letter from Verizon's RF Engineer (7 pp.) partially responding to comments and discussion from the February 9, 2021 Planning Board meeting (i.e., dropped call data and RF drive testing). Additional applicant submittals with regard to those meeting discussions are anticipated.

Completeness Reviews

HDR prepared completeness reviews of the above-noted application materials (HDR memos dated October 8 and December 2, 2020). The application was deemed incomplete at these times and additional information and clarifications were requested. Supplemental application information has been submitted and reviewed (as outlined above) and is reviewed in this Tech Memo. HDR has also received and reviewed public comment submittals and the Opposition Filing received on February 9, 2021.

In general, the applicant filings, responses to comments, and supplemental information provided to date are responsive to HDR's comments, and the combined application materials / filings appear to be in accordance with the requirements of the City's Wireless Code (Chapter 284). Discussions during the February 9, 2021 Planning Board meeting and HDR's review of the applicant and public submittals identify additional information needs to complete the application. These include but are not limited to: Drawing updates; evaluation of possible alternates identified during the February 9, 2021 meeting (and as summarized in a February 20, 2021 correspondence from the Planning Board Chairperson); and supplemental photosimulations that will allow the Planning Board to further assess stealth screening options. Recommendations as well as an inventory of Outstanding Information is included at the end of this Tech Memo.

3. Site Visit (October 20, 2020)

A site visit at the Providence Hall Apartments was completed on October 20, 2020. HDR, Verizon representatives, and members of the Planning Board were present. Select photographs of the rooftop are provided below.

Rooftop view, looking northwest, towards proposed Gamma sector, 10/20/2020.

Penthouse at east side of roof and access door to roof, 10/20/2020.

4. Coverage / Capacity for the Verizon Facility Proposed at 119 Columbia Street

The frequencies involved in Verizon's operation require line-of-sight signal propagation paths for its performance with some enhancement due to reflections from solid structures or surfaces. When considering a regional wireless network plan (inclusive of mobile users), it is necessary that adjacent wireless telecommunications facilities exist in order to render homogeneous service and so that capacity (call traffic, data usage) can be managed in a given area of a service provider's network. In evaluating the need for a new wireless telecommunications facility, a number of factors are considered. A subscriber may not be able to complete a call or access data due to limitations in reliable *coverage* and/or *capacity* (limitation of the number of callers or data users that are communicating with the same cell site at a given time). The proliferation of cell phones, smartphones, tablet computers, and other devices has increased the need for network capacity, even within areas that were once "covered" during the early roll-out of wireless technology. Industry focus has shifted from large geographic coverage (several sq. miles) to "capacity coverage" in order to meet subscriber demand for bandwidth-intensive services. An inability to meet this demand results in overloaded networks and slow or interrupted service (e.g., "dropped calls" or data interruptions).

Existing cell sites can be and are routinely upgraded over time by adding newer antenna models and equipment to meet changing network demands and needs (for instance, the existing Verizon facility at the Hospital rooftop was upgraded in July 2020). However, capacity relief with a new

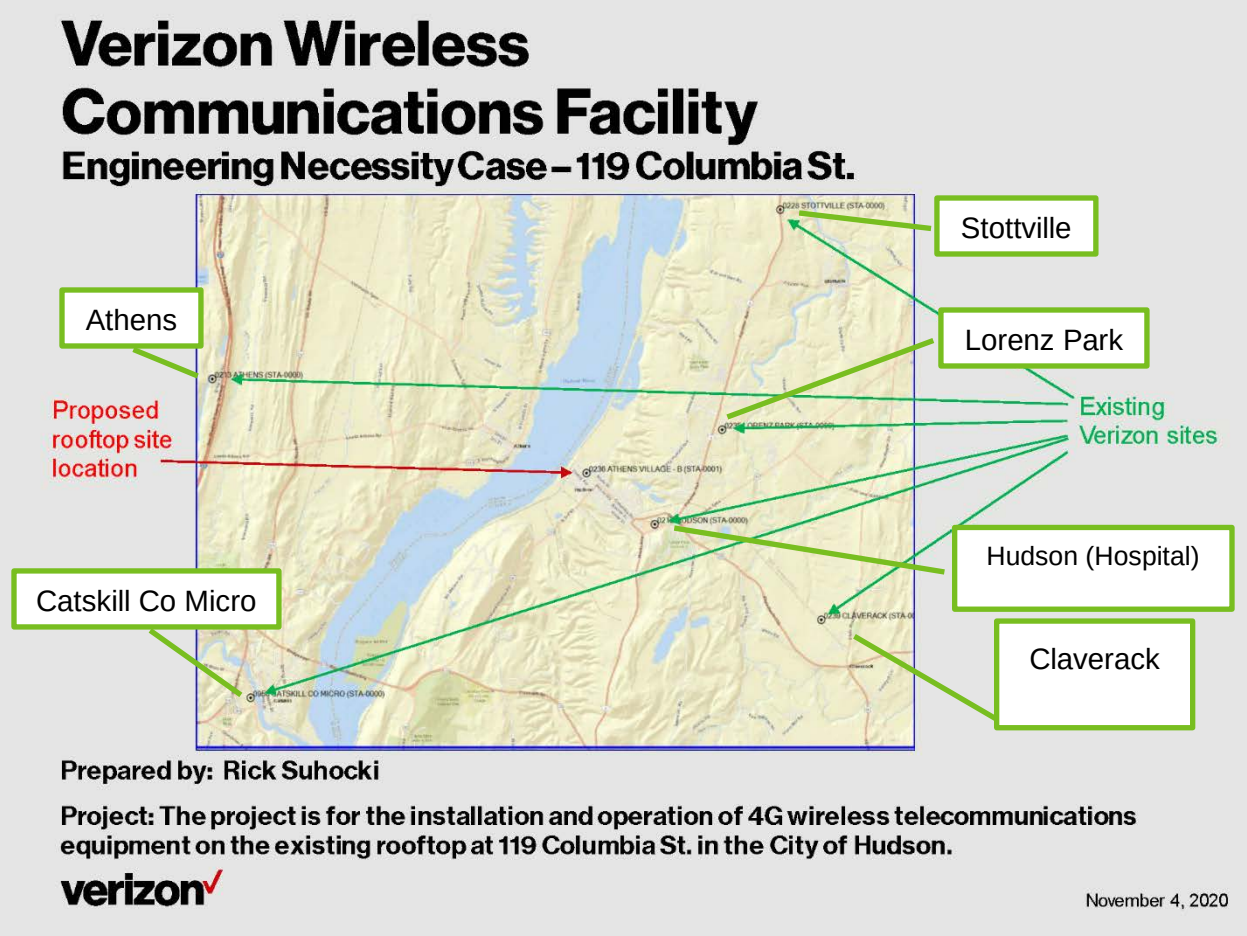
cell site ("cell splitting") is ultimately required in many instances to fully remedy local network problems. As such, the industry trend is to "split" geographic areas served by older towers and antenna sites by adding 'in fill' sites to relieve capacity issues. The 'in fill' sites must maintain sufficient separation from the surrounding sites, so not to impede or interfere with service. The 119 Columbia Street site is being proposed so that Verizon can provide more reliable and enhanced wireless voice and data services to the City of Hudson and the site area by adding capacity and supplementing coverage to its existing local cell site network.

As stated by Verizon's RF Engineer (November 2020 Engineering Necessity Case), the primary objectives for the proposed rooftop site at 119 Columbia Street are to provide an adequate and safe level of emergency and non-emergency Verizon Wireless 4G communications services across the City of Hudson and surrounding areas. Verizon notes that the proposed facility will offer significant improvements in both coverage and capacity to residential, commercial, and other land uses, and to roadways and transportation corridors across the lower areas of the City and the surrounding area including, along Route 9G (3rd St), along Columbia Street, and other local roads. The proposed facility will also improve service and serve to in-fill 4G network service gaps along several local roads in Hudson and across the larger target coverage area. The proposed facility will also interact with existing Verizon facilities to alleviate documented capacity shortfalls.

Existing Verizon Cell Sites

There are six existing ('on air') Verizon cell sites within a five-mile radius of the proposed site, as listed in the below table. The figure below also depicts the locations of these existing Verizon cell sites and the facility proposed at 119 Columbia Street.

Verizon Facility Name	**Address**		**Type**	**Distance from 119 Columbia Street**
Athens	140 Black Lake Rd	Athens	Tower	4.5 miles West
Catskill Co Micro	295 W. Main St	Catskill	Rooftop	4.6 miles Southwest
Claverack	79 Old Lane	Claverack	Water Tank	3.2 miles Southeast
Hudson	71 Prospect Ave	Hudson	Rooftop	1.0 mile East (Columbia Memorial Hospital)
Lorenz Park	38 Apple Meadow Rd	Hudson	Tower	1.6 miles Northeast
Stottville	6909 Rt 9	Stockport	Water Tank	3.8 miles North



Attachment A of this Tech Memo provides location maps and images (where available) of the above-listed existing Verizon facilities.

Capacity

Verizon's RF engineer has provided documentation that attests to the need for capacity relief in the area around 119 Columbia Avenue, noting that existing Verizon cell sites in the vicinity have or will soon become overburdened (capacity shortfall), and thus increasing the potential for denied access to the Verizon network, a reduction in data transmission speed, dropped calls, and/or an inability to successfully transmit data. Capacity information for the existing 'on air' "Hudson" Verizon cell site (Hospital rooftop, located east of the proposed site) was provided in the applicant's November 2020 and January 2021 filings and was reviewed by HDR. **The data appear to justify that the 'on air' facilities surrounding the proposed site are and will increasingly be in need of capacity relief, justifying a need for a new site in the area**. **Verizon's RF engineer furnished trend data (plots) with network key performance indicators (KPI's) showing that the Hudson 'on air' Verizon cell site (Hospital rooftop facility) experiences capacity shortfalls and will become increasingly overburdened. The**

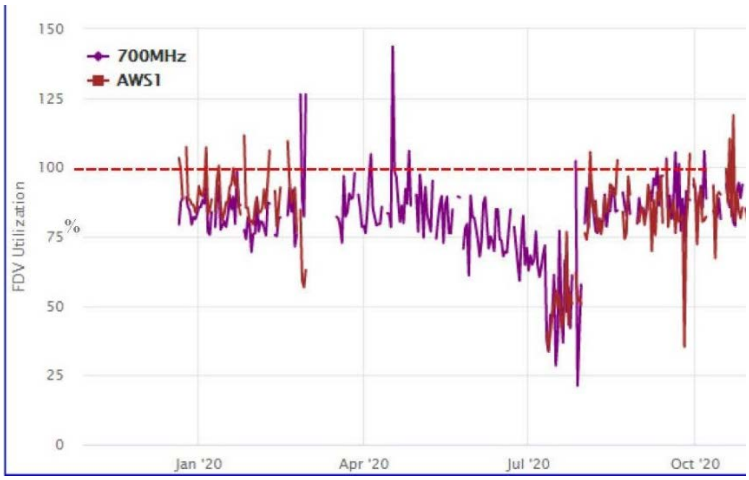
site at 119 Columbia Street was identified and designed, in part, to supplement capacity for the area and alleviate the existing sites from experienced capacity shortfalls.

The capacity plots show the KPIs of Forward Data Volume (FDV), Average Schedule Eligible User (ASEU), and Average Active Connections (AvgAC) for the west-facing sector at the existing Verizon site on the Hospital rooftop. FDV is a measurement of usage on a particular cell site over time and is indicative of the amount of data a cell site can provide before users start to experience poor data throughputs. ASEU is a measurement of the loading of control channels and systems at a given cell site and determines users (within smaller geographies within a "cell") that can send data and when it can be sent. If the ASEU is too high (too many users), and the FDV (data capacity) is also exceeded, users experience dropped calls and an inability to access data. AvgAC is a measurement of how many devices/users can connect to a cell site at a given time. If the AvgAC is exceeded, users experience dropped calls and connection failures.

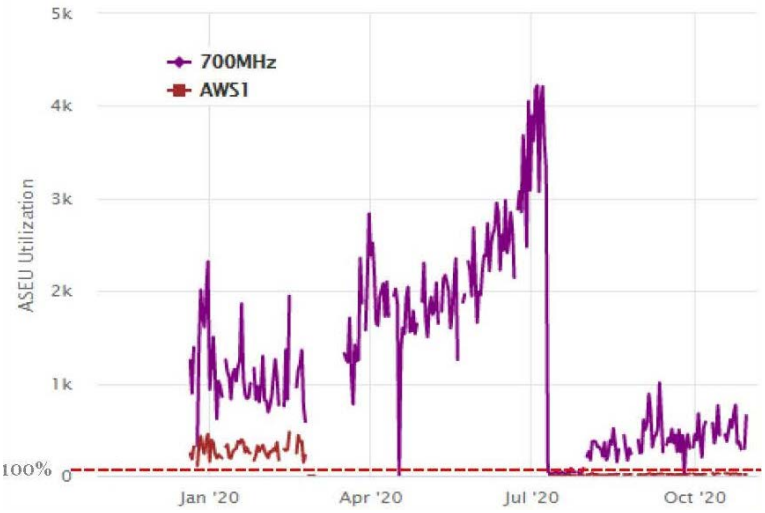
FDV, ASEU and AvgAC capacity charts for the "on air" Verizon site at the Hospital rooftop are provided below. Purple lines represent the daily maximum busy hour utilization for the low band frequency (700 MHz). The dark red lines are the daily maximum busy hour utilization for high band frequency (AWS, 2100 MHz). The red dashed line (shown at 100% on the charts) is Verizon's limit for where the sector reaches exhaustion and service may start to significantly degrade.

As shown in the images below, for a majority of 2020, the Hudson Alpha sector has been within 75-100% of the FDV utilization threshold, with multiple instances of exceedances. Based on the FDV chart, usage of this existing cell site appears to have decreased during July 2020; the Verizon RF Engineer confirmed that an upgrade was made to the cell site at that time which resulted in a short-term drop in this criterion. The ASEU utilization continuously exceeded the 100% threshold. The AvgAC utilization shows exceedances primarily between late March through June 2020, when the upgrade was made. However, all three capacity indicators are noted to be trending upwards, with one or more frequency bands currently at or exceeding its threshold.

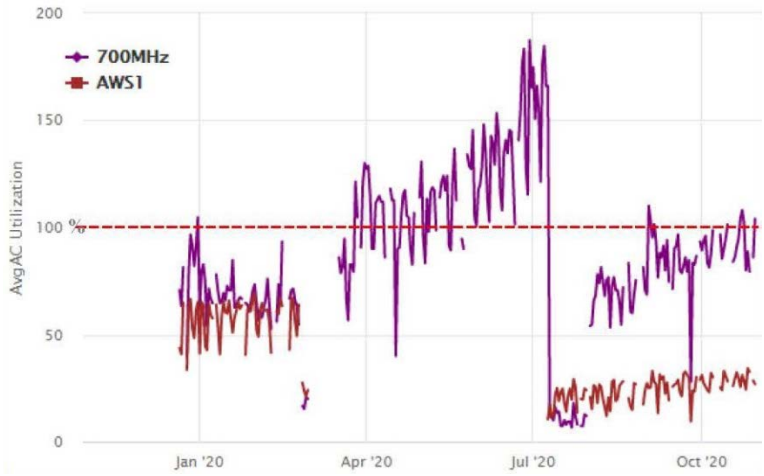
Based on a review of the capacity data, the need for supplemental capacity in Verizon's local area network has been documented.



FDV for "Hudson" site's Alpha sector



ASEU for "Hudson" site's Alpha sector



AvgAC for "Hudson" site's Alpha sector

Coverage

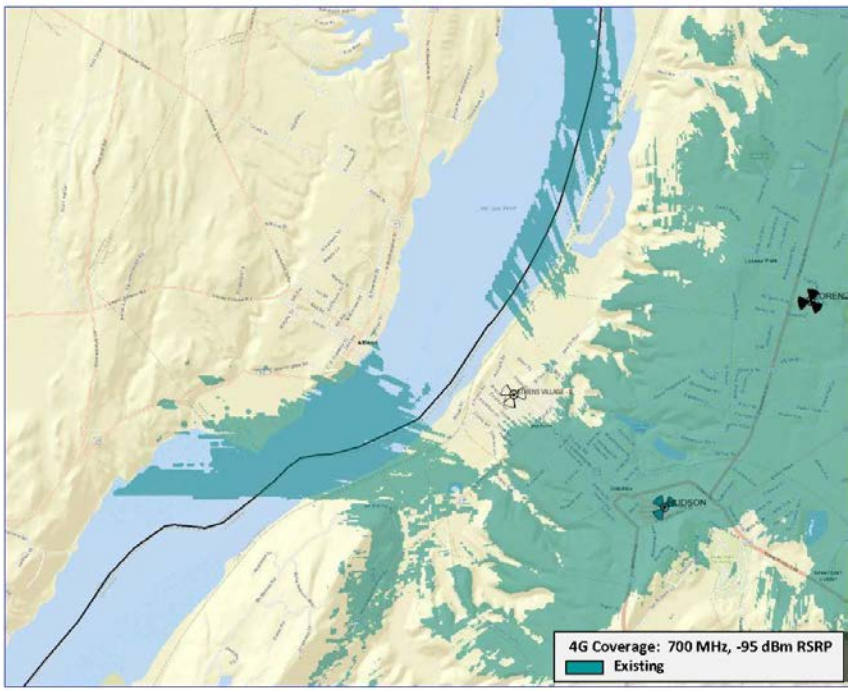
In addition to alleviating capacity shortfalls in Verizon's local area network, the site at 119 Columbia Street is also proposed to provide supplemental coverage to the area. Coverage maps are specific to the licensed frequency band (e.g., low-band or high-band) and assumptions made on necessary signal strength to serve mobile user locations. For instance, the modeled coverage footprint to achieve reliable "in building" service [-75 to -95 dBm signal loss] – where signal needs to be strong enough to penetrate building materials - would be smaller or closer to the cell site than the coverage modeled for "in-vehicle" users [-95 to -105dBm signal loss], which in turn is smaller than the coverage modeled for "best server", -105dBm, for user locations with no or limited impediments between themselves and the cell site (for instance those walking outdoors or recreating). The applicant has submitted coverage maps with its initial filing and supplemental filings to address HDR comments.

The Verizon RF Engineers utilize Forsk's Atoll software for development of signal propagation (coverage) maps (https://www.forsk.com/atoll-live). The software tools take into account terrain, vegetation, building types, and other site-specific information such as population and demographics. The software is commonly used throughout the wireless industry and is periodically updated over the years as field information in integrated. It is also noted that software optimizations may have been completed between the coverage map submittals for this application which can alter the propagation maps somewhat. However, the coverage maps submitted across the applicant filings have not been noted to have changed in any significant way.

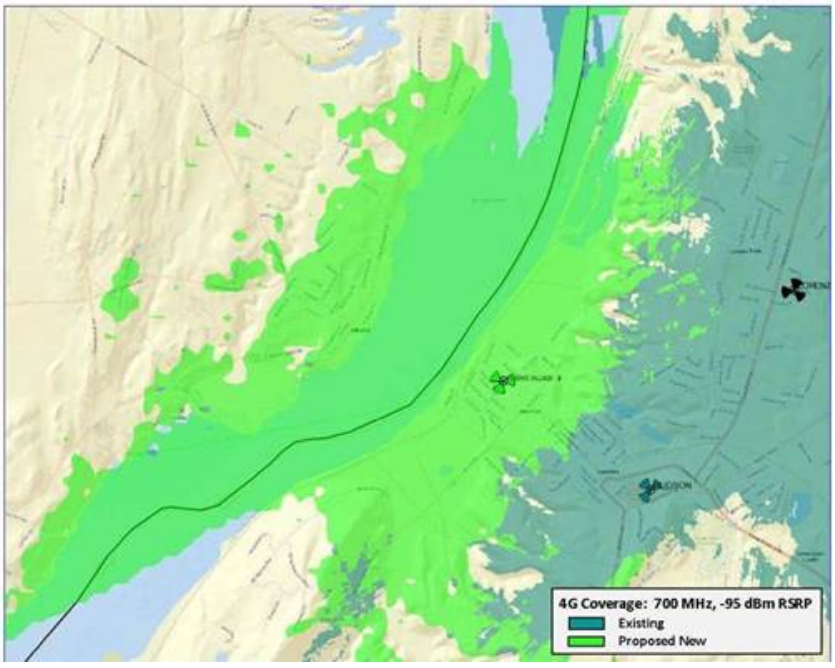
The below images and captions include a subset of the Verizon coverage maps that have been provided.

August 20, 2020 application submittal:

Exhibit 1. Existing Verizon Wireless 4G Coverage in Hudson Area

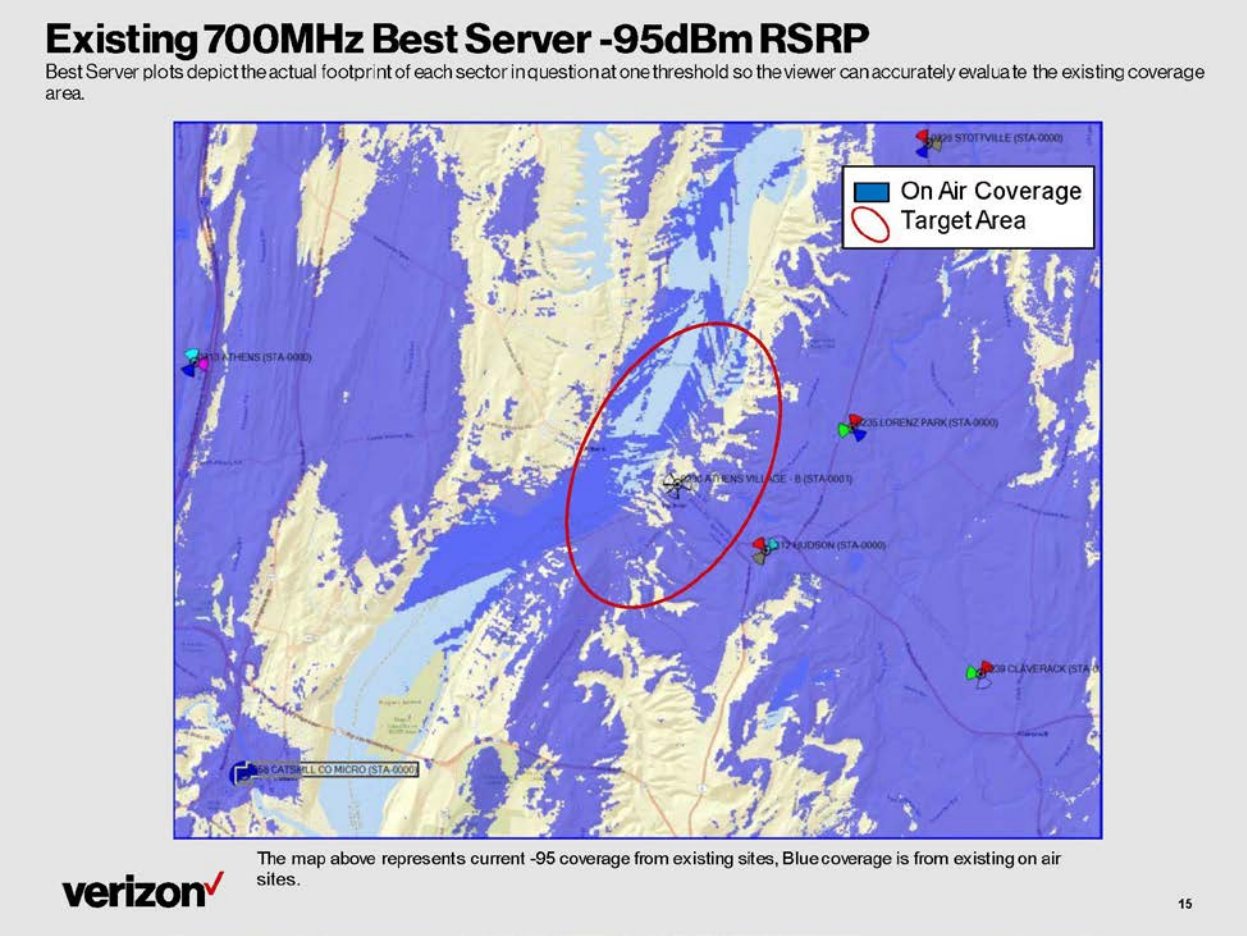


Existing coverage in teal for low-band (700 MHz) frequency, -95 dBm (in-building), 01/30/2020 RF Report. Two existing Verizon cell sites (dark symbols) and 119 Columbia Street (lighter symbol) are included. Note that existing coverage from other area Verizon cell sites was not included in the initial application materials.

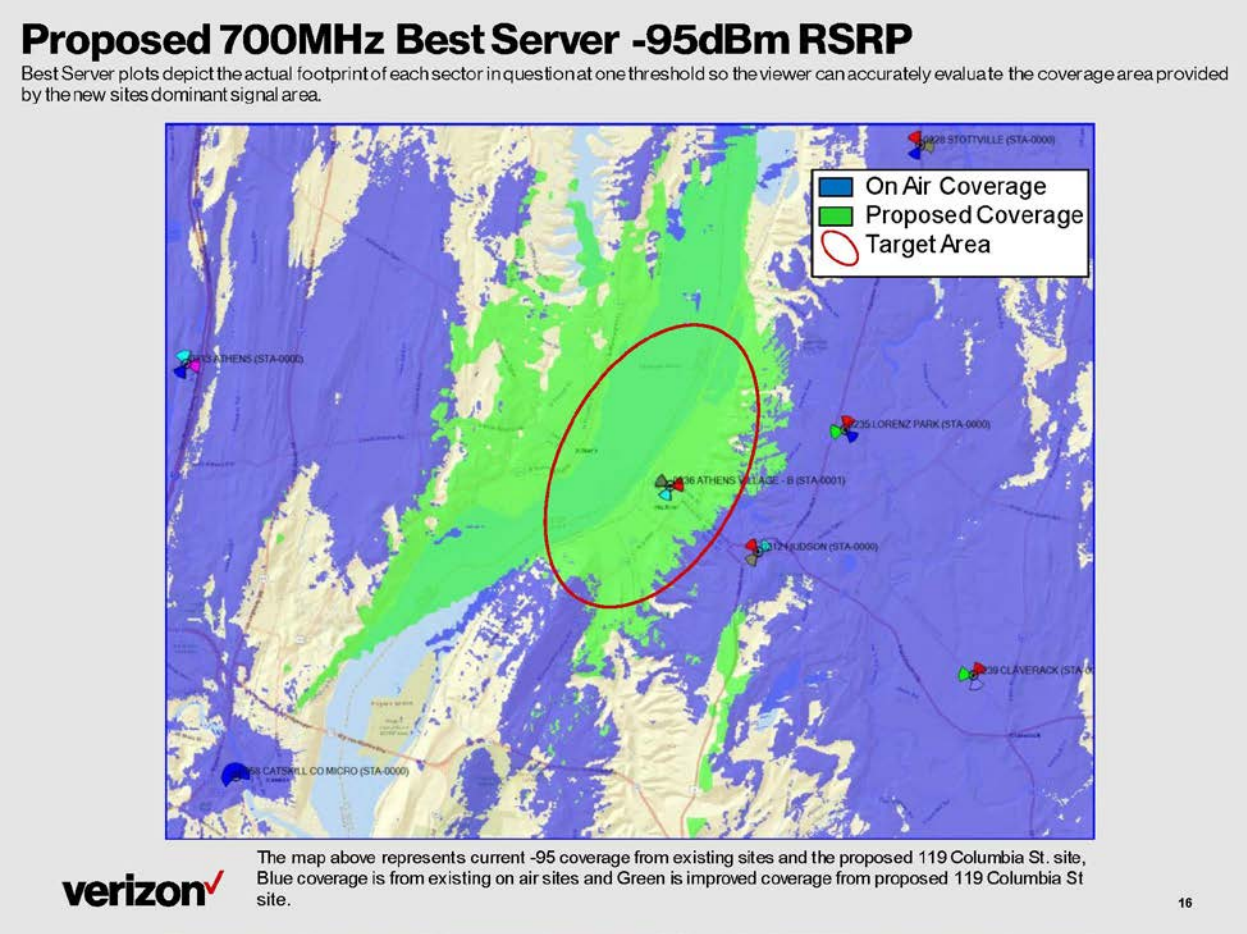


"Proposed" coverage, low-band (700 MHz) frequency, -95 dBm (in-building), 01/30/20.
The light green color denotes 700 MHz service that will be provided by the proposed facility.

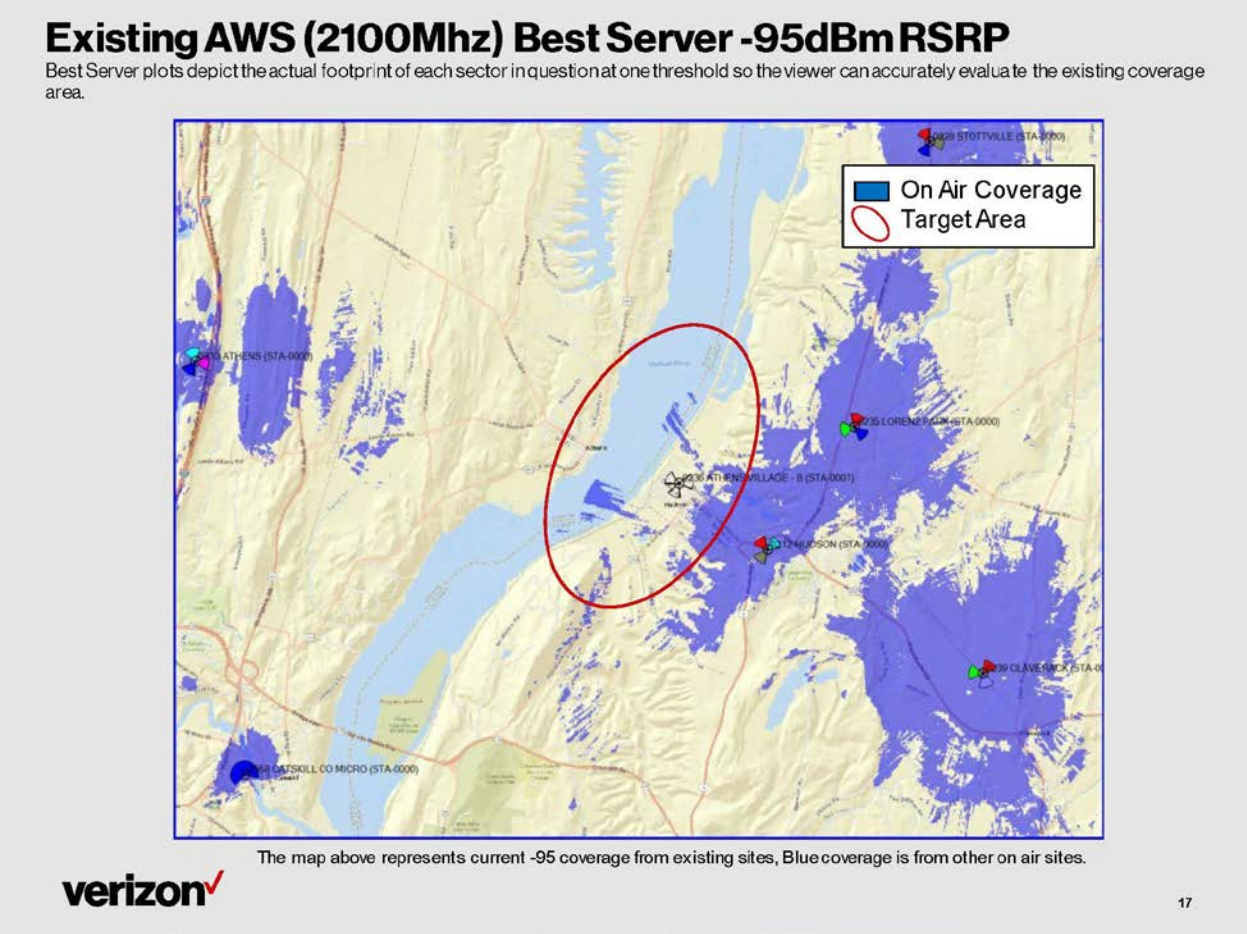
November 20, 2020 and January 6, 2021 application submittals:



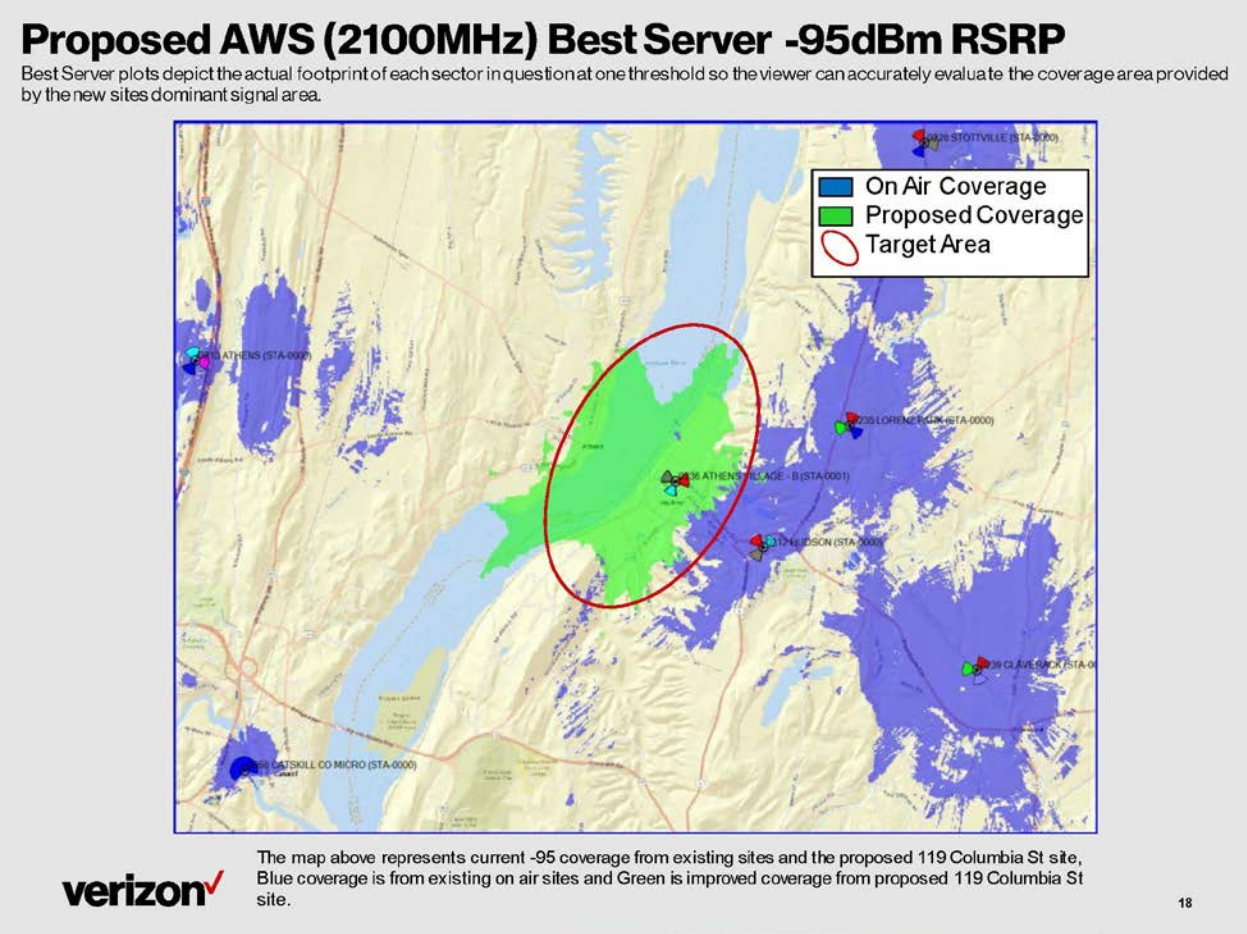
Existing coverage in blue for low-band (700 MHz) frequency, -95 dBm (in-building), 11/4/20. Six existing Verizon cell sites (colored symbols) and 119 Columbia Street (circled in red) are included. This plot is analogous to the existing coverage low band map included above; however, since additional cell sites and their existing coverage plots are depicted, this map is at a smaller scale than the earlier submittal.



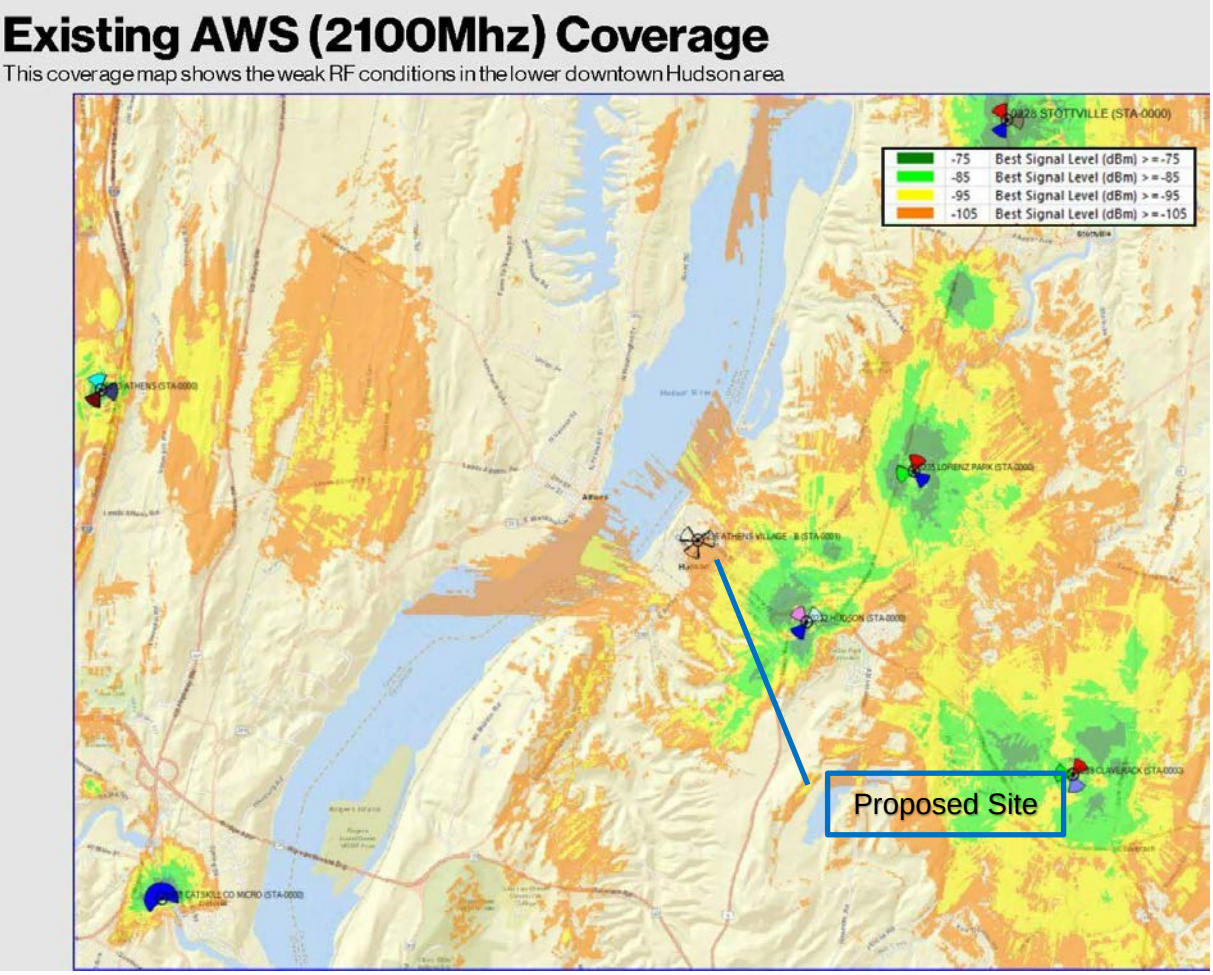
"Proposed" coverage (light green) for low-band (700 MHz) frequency, -95 dBm (in-building), 11/4/20. Six existing Verizon cell sites (colored symbols) and 119 Columbia Street (circled in red) are included. This plot is analogous to the above "proposed" low band coverage map, however, since additional cell sites and their existing coverage plots are depicted, this map is at a smaller scale than the earlier submittal.



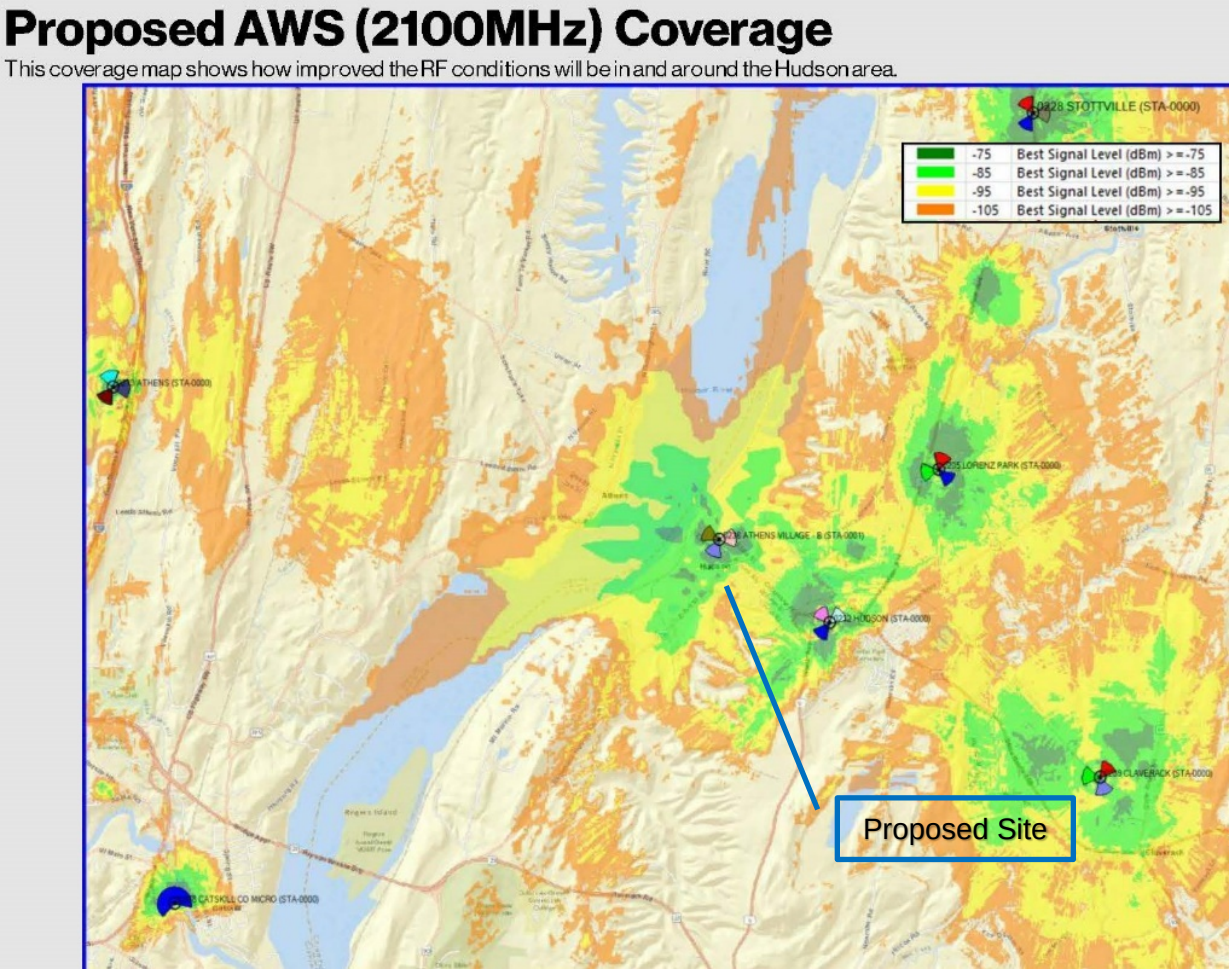
Existing coverage high-band (2100 MHz) frequency, -95 dBm (in-building), 11/4/20. Six existing Verizon cell sites (colored symbols) and 119 Columbia Street (circled in red) are included. 2100 MHz plots were not included in the initial submittal.



"Proposed" coverage high-band (2100 MHz) frequency, -95 dBm (in-building), 11/4/20. Six existing Verizon cell sites (colored symbols) and 119 Columbia Street (circled in red) are included. 2100 MHz plots were not included in the initial submittal. It is noted that coverage footprints for the high band frequency are significantly smaller than those at 700 MHz.



Existing coverage high-band (2100 MHz) frequency, January 2021 submittal. Six existing Verizon cell sites (colored symbols) and 119 Columbia Street are included. This map depicts various signal strengths, including In-Vehicle / Open Space (orange, -105dBm) down to In-Building (-95dBm at green/yellow interface).



"Proposed" coverage high-band (2100 MHz) frequency, January 2021 submittal. Six existing Verizon cell sites (colored symbols) and 119 Columbia Street are included. This map depicts various signal strengths, including In-Vehicle / Open Space (orange, -105dBm) down to In-Building (-95dBm at green/yellow interface). It is noted that coverage footprints for the high band frequency are significantly smaller than those at 700 MHz.

Gaps in coverage have been documented for the City and site area, based on a review of the modeling data and maps provided, particularly for the high band (2100 MHz) frequency. **The site at 119 Columbia Street was identified and designed, in part, to provide enhanced low band and high band 4G coverage to the City and surrounding area**. If approved and constructed, the proposed Verizon rooftop facility will remedy capacity shortfalls and provide supplemental coverage to the City and site area.

As a follow-on analysis, HDR evaluated areas of service (City of Hudson vs. Greene County) that would be provided by the Verizon rooftop facility proposed at 119 Columbia Street, if approved and constructed. It is our opinion that the proposed facility will predominately service the City of Hudson and areas east of the Hudson River, with some coverage afforded to Greene County, NY

and areas west of the Hudson River. HDR's addendum memo describing this analysis is included as Attachment B of this Tech Memo.

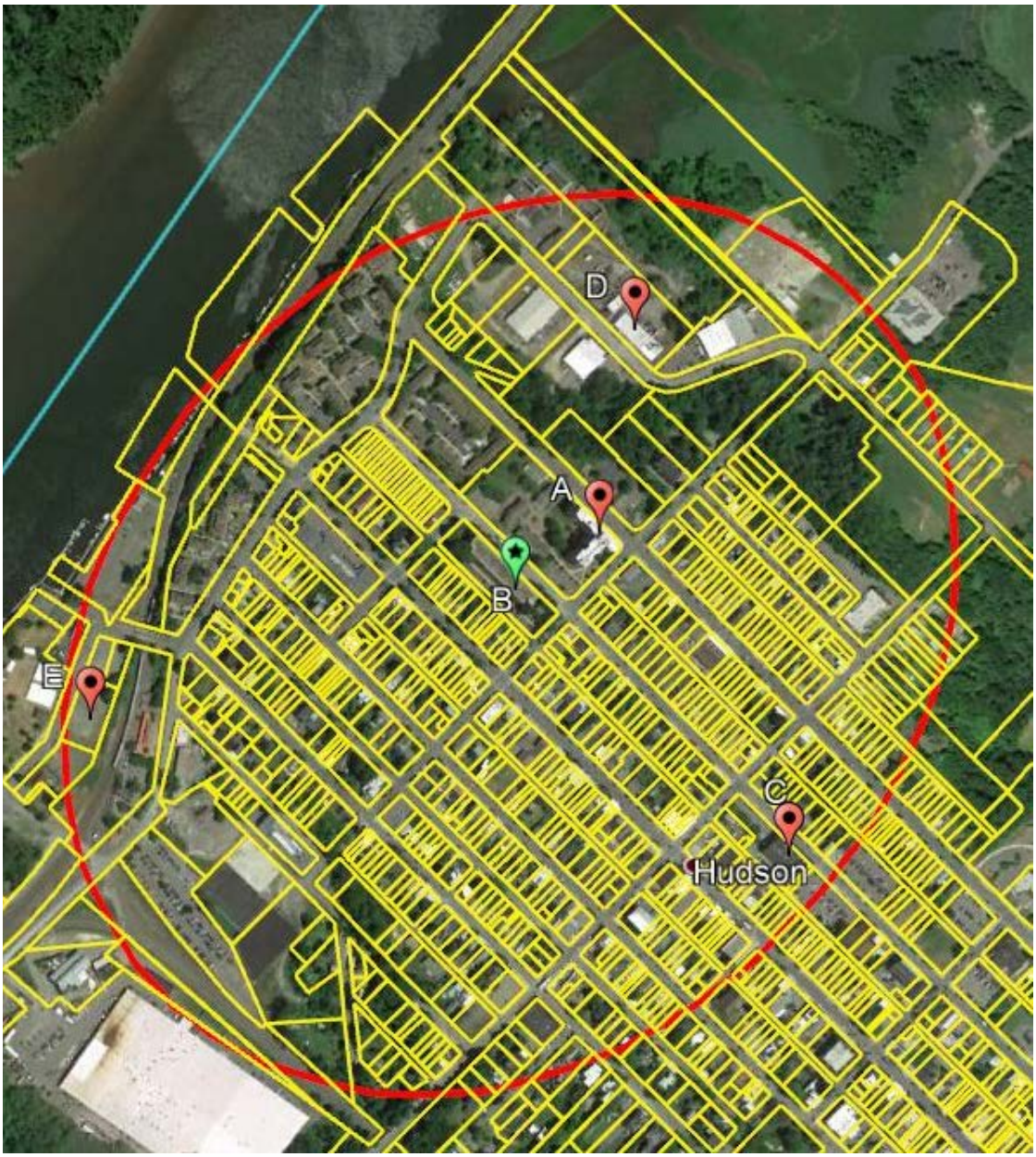
Drive Testing

HDR notes that drive test data can be useful to evaluate existing cell service (and gaps) in an area under some circumstances. Some municipal wireless codes we have worked with prescribe the need for drive testing, while others (such as the City of Hudson) do not explicitly require it. Drive testing collects signal data in the field by driving a vehicle with receivers and data loggers over area roadways (and linking the signal readings with GPS location data). This information can be configured to create a map depiction of 'existing signal' and can at times be useful to corroborate modeled coverage mapping information to demonstrate a gap or need. In our experience, drive testing is useful in more rural/semi-rural search areas than exists with this application. HDR does not recommend the need for drive test data in this instance, based on the documented service needs (capacity and coverage data that has been furnished) and because the Verizon design criteria for the proposed site incorporates In-Building service. Drive testing cannot measure existing signal "in building" (i.e., within homes, businesses, and other structures), and based on population density and land uses (residential, commercial/business) in the western portions of the City, drive test data likely will not provide useful supplemental information to evaluate this application.

5. Alternate Site Analysis

The applicant's site selection analyses, dated November 20 and December 8, 2020, conclude that there are no existing towers or other tall structures (Code priorities #1 and #2; Section 284-9.A) in Verizon's target search area upon which to co-locate. As described in the analyses, an alternate rooftop location was initially identified and considered by Verizon: Bliss Towers at 41 N. 2nd Street. The location was withdrawn from consideration as the Bliss Towers owner reportedly withdrew its offer to lease or license the property in 2019.

Three additional locations (City-or County-owned) were identified to consider as possible alternates, as depicted in the below map.



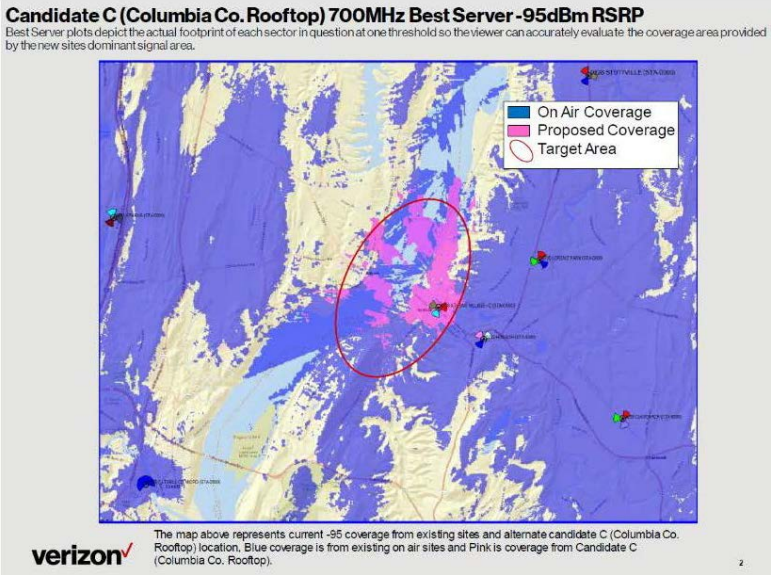
Candidate A (Bliss Tower – original proposal; lease withdrawn); Candidate B (proposed rooftop facility at 119 Columbia Street); Candidate C (325 Columbia Street; 30 ft rooftop); Candidate D (Dock Street property; 15 ft rooftop); Candidate E (Water Street properties)

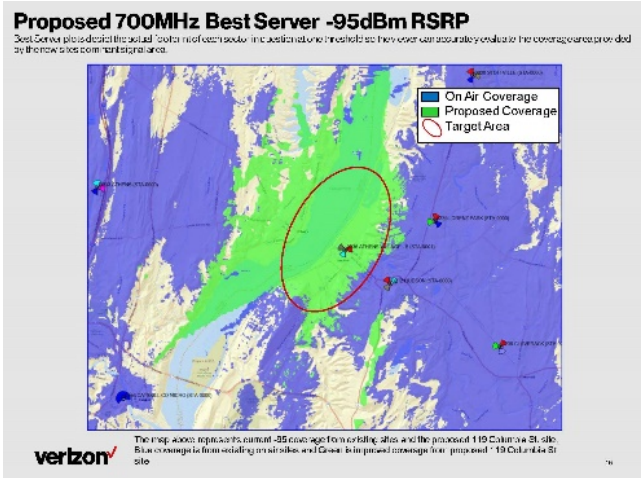
A three-story County building at 325 Columbia Street (Candidate C) was deemed to be too low in elevation, as compared to the proposed site. City-owned buildings on Dock Street (Candidate D) were considered, but the elevation – and resulting coverage with a rooftop installation there - is also deemed to be too low as compared to the 119 Columbia Street site. Water Street was also considered, but the elevations of buildings on municipal properties in this area (C-R Core Waterfront Zoning District) were also deemed to be too low and a new tower structure would be required in this area to meet Verizon's coverage and capacity needs.

RF (Coverage) Analysis – Alternate Sites

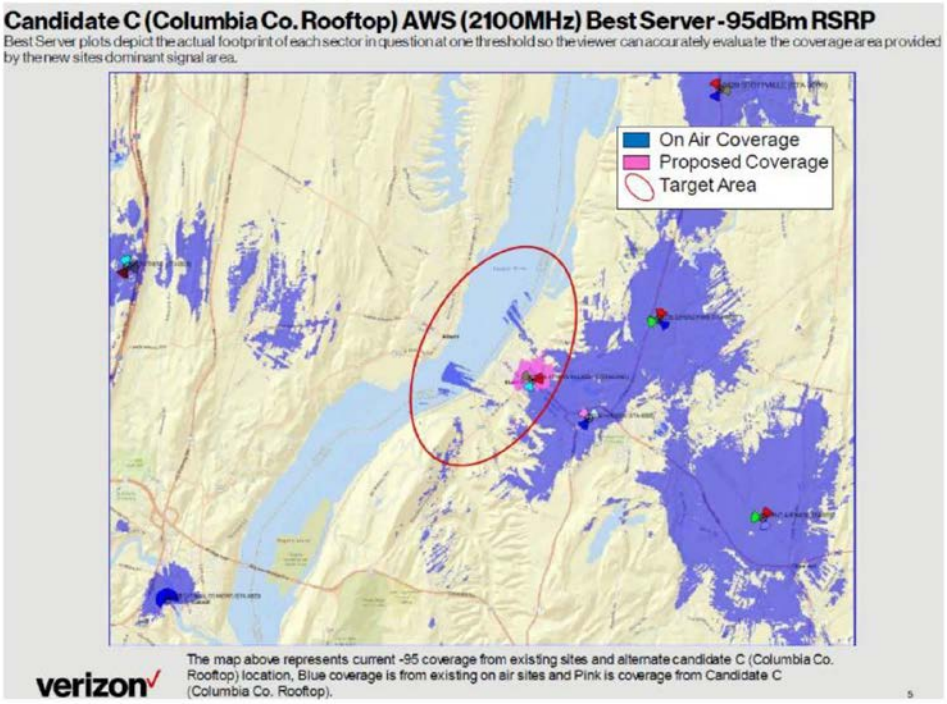
To further assess the alternates, RF modeling was requested so that these Code priority alternate locations could be further assessed against the services provided from the 119 Columbia Street site. The Verizon RF engineer provided -95 dBm coverage maps for two of the alternates (Candidates C and D) to assess the feasibility to meet Verizon's coverage and capacity needs. The alternate site coverage maps (700 MHz and 2100 MHz) are provided below. Existing coverage is depicted in blue, and modeled coverage from the alternate is depicted in the lighter purple color. Smaller inserts of corresponding coverage maps from the proposed rooftop facility at 119 Columbia Street are provided for reference.

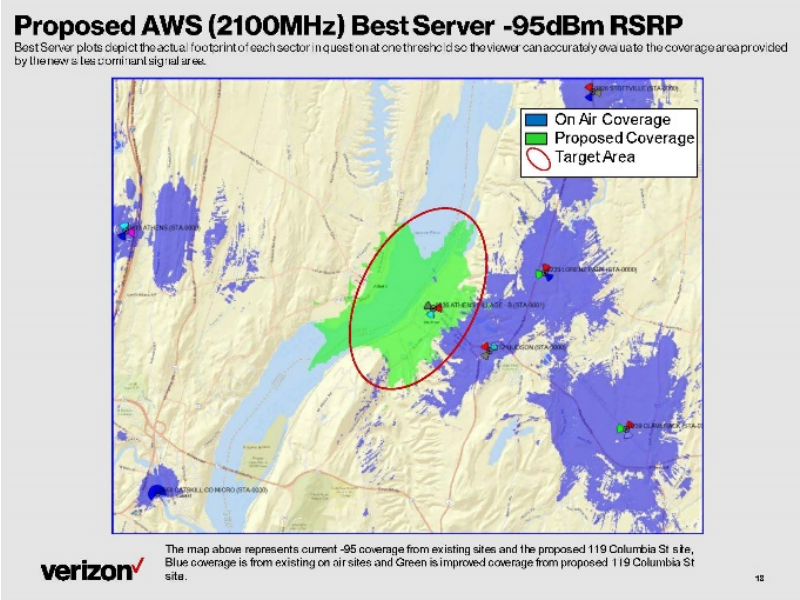
Candidate C (700 MHz) – 325 Columbia Street (Modeling at 40 ft above grade)



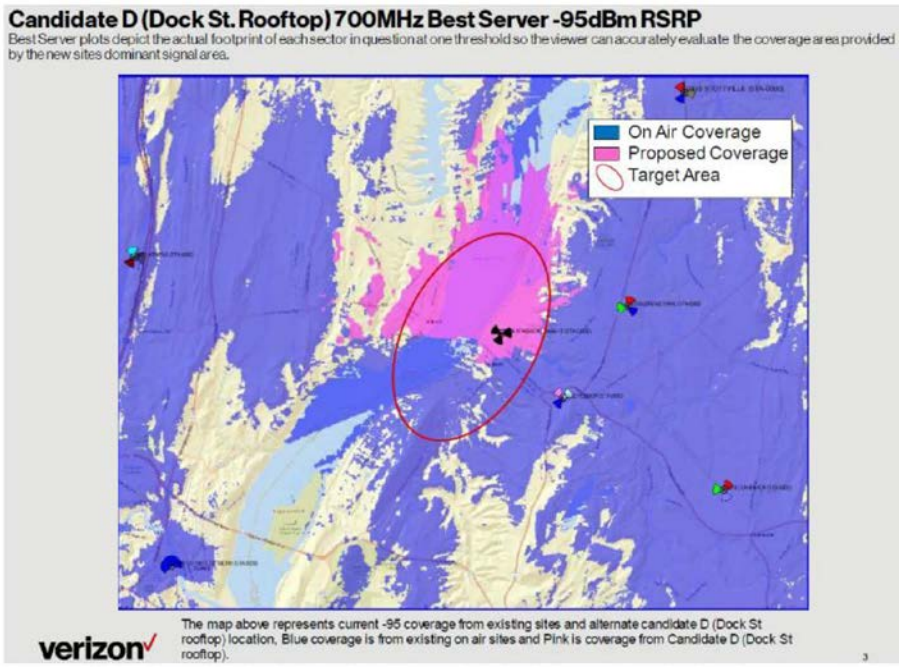


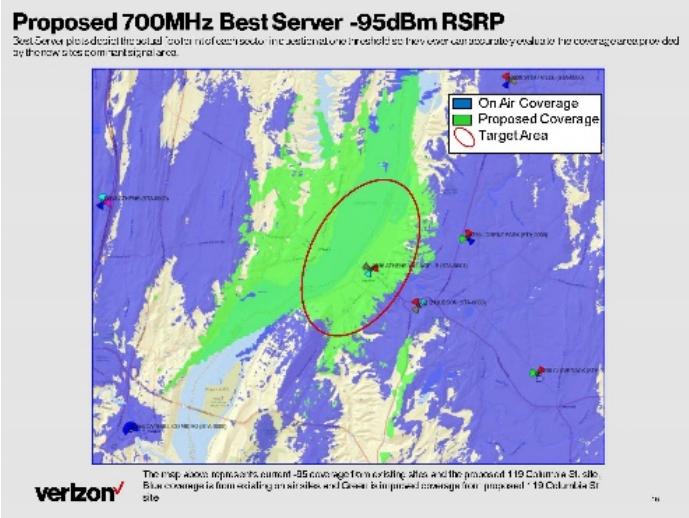
Candidate C (2100 MHz)



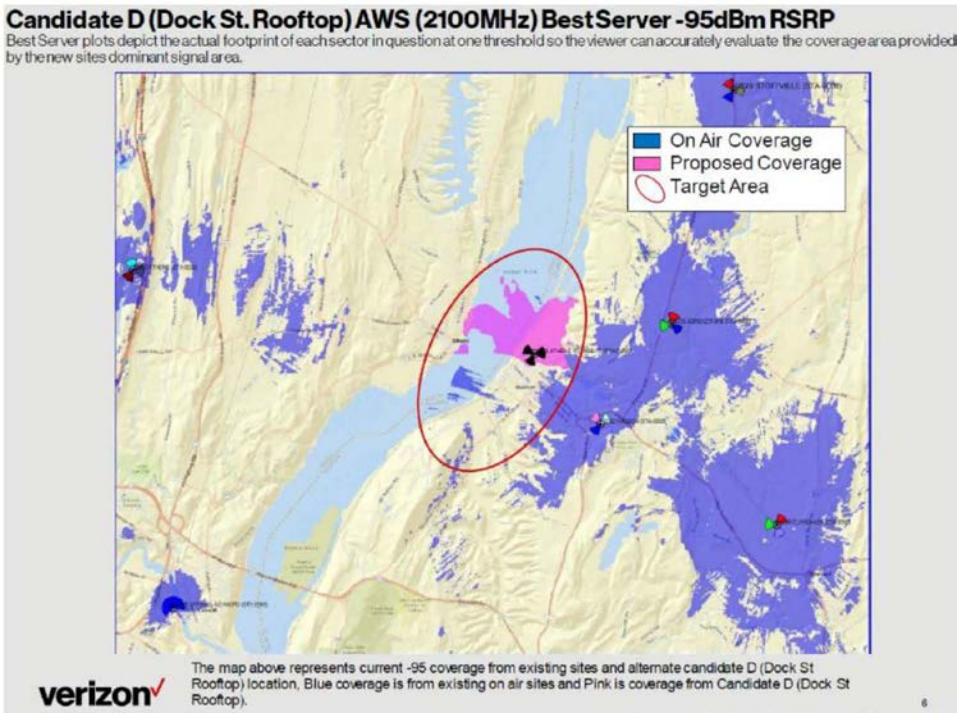


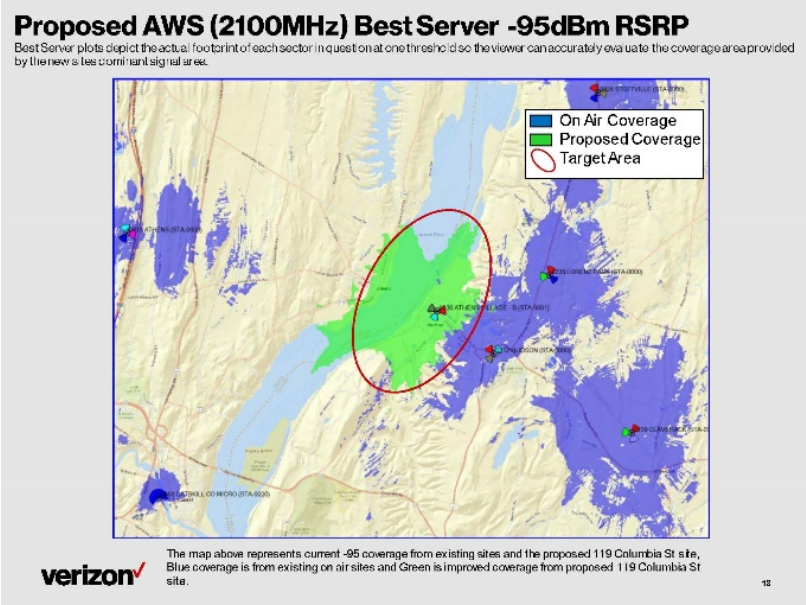
Candidate D (700 MHz) – Dock Street Building (Modeling at 25 ft above grade)





Candidate D (2100 MHz)





The 700 MHz and 2100 MHz coverages modeled for the proposed site at 119 Columbia Street are larger than (superior to) those from either of the two alternate sites. As anticipated, the differential is more dramatic for the high band (2100 MHz) frequency, with inferior coverage

provided from the alternates to the western and southern areas of the City (as compared with the proposed site).

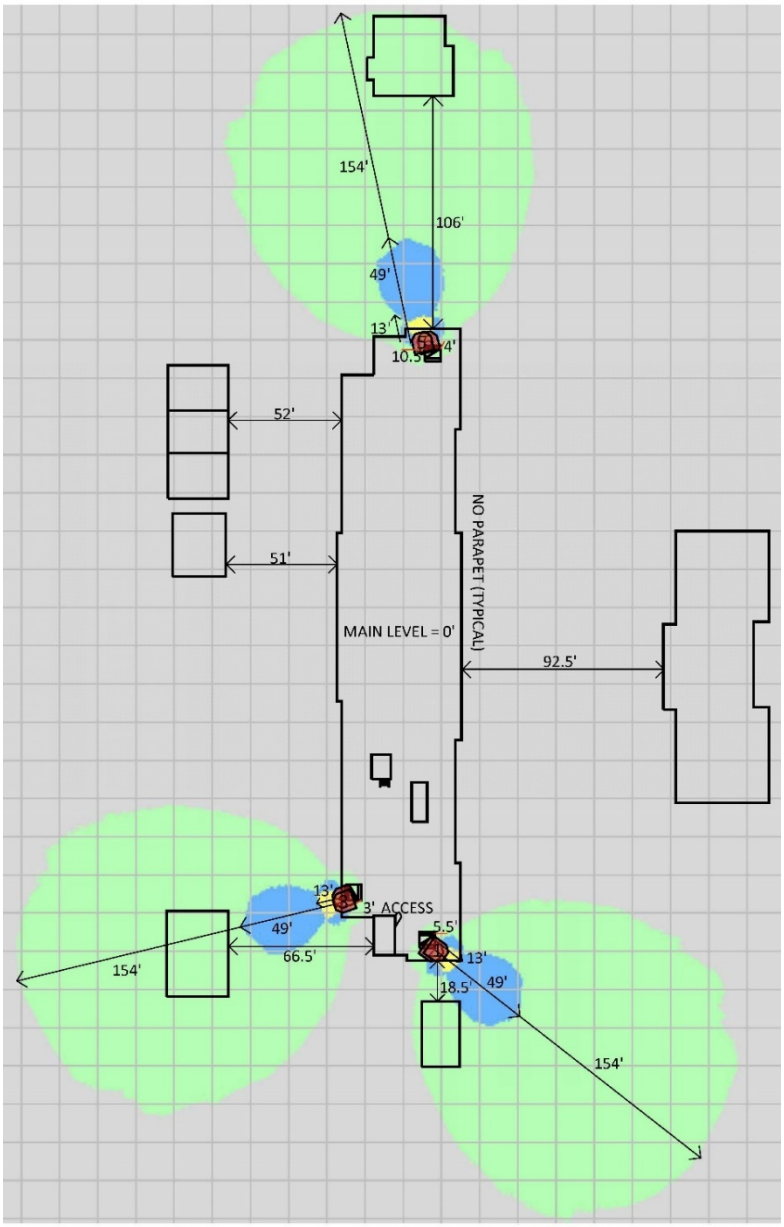
In summary, HDR has reviewed the alternative site data, including the RF affidavits and coverage maps, alternate site analyses, and supplemental data furnished, and believes that the information presented is reasonable in justifying the facility at 119 Columbia Street over these two alternatives. HDR agrees with the applicant in that the alternates would provide inferior service and leave gaps in Verizon's search area when compared to the proposed site at 119 Columbia Street.

In terms of alternate sites, HDR understands that other alternatives need to be evaluated based on discussions of the February 9, 2021 Planning Board meeting, and as relayed by the Planning Board Chairperson in an email dated February 20, 2021 (see Outstanding Information at the end of this Tech Memo).

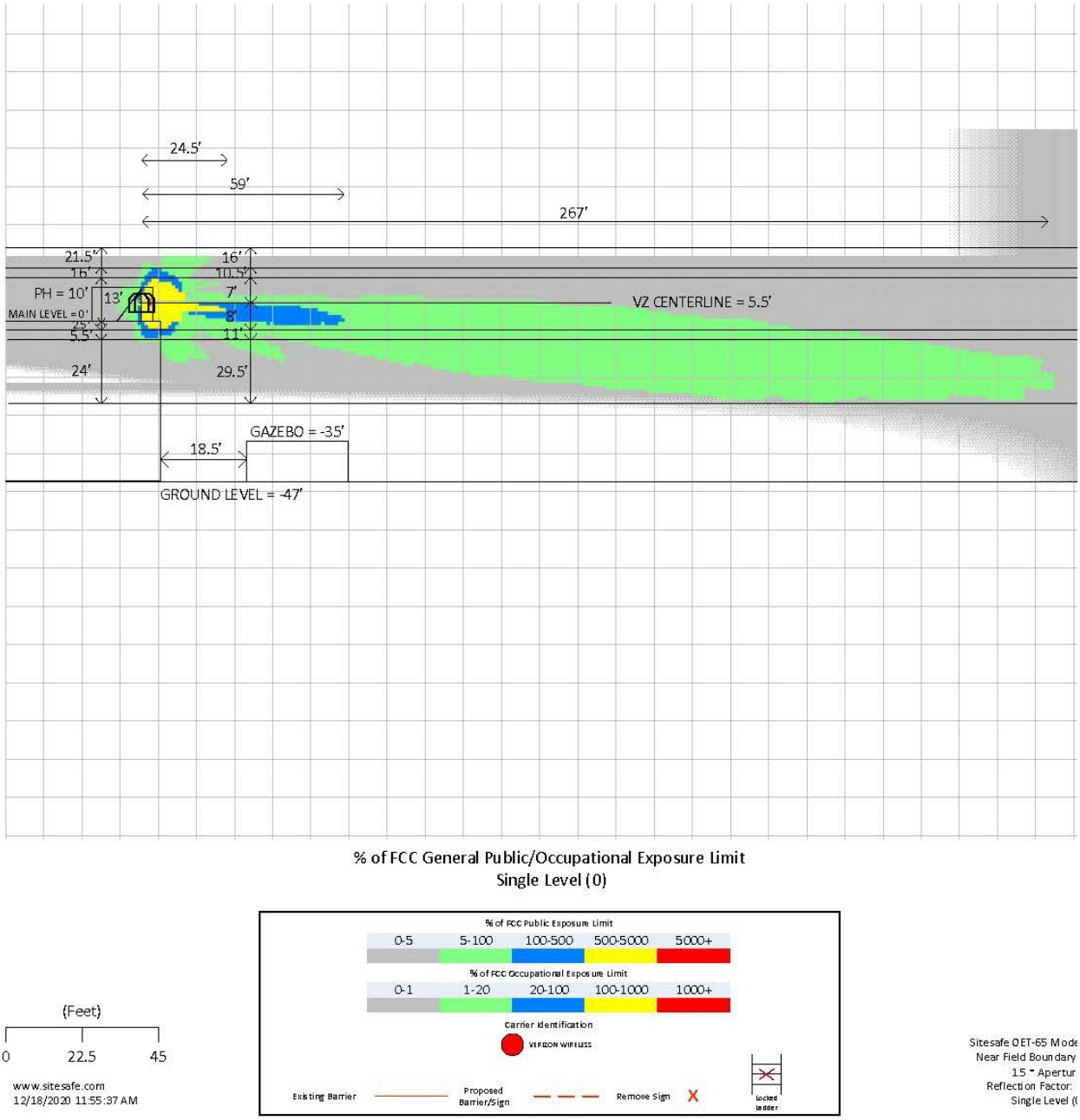
6. Conformance with NIER and Other Radiation Hazard Criteria

In order to comply with the Non-Ionizing Electromagnetic Radiation (NIER) hazard criteria, SiteSafe LLC, on behalf of the applicant, calculated power density levels, also referred to herein as radio frequency (RF) levels, for the proposed installation. Verizon's FCC-licensed frequencies (751 MHz, 850 MHz, 1900 MHz, and 2100 MHz) were included, along with operational assumptions at the proposed Verizon facility. SiteSafe analyses were presented with the initial applicant submittal and with the November 2020 and January 2021 supplements to address HDR comments. The analyses demonstrate compliance with the FCC's general population maximum permissible exposure (MPE) limits at all off-site areas, and full compliance with the MPE at the rooftop with the proposed mitigation measures (FCC signage and barrier systems) implemented. It is the applicant's understanding that the residents of the building are not permitted to access the roof, and that the roof access is locked 24/7 and only accessible by building maintenance staff.

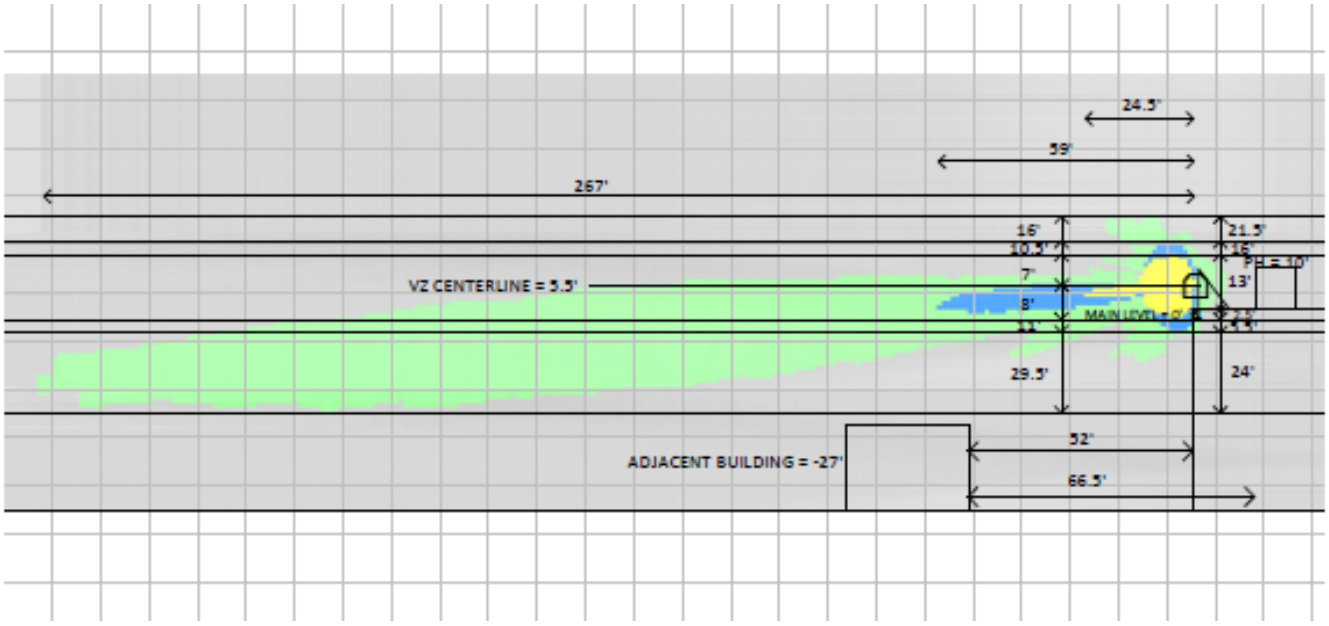
Adjacent buildings, down to ground level, were also included in the January 2021 supplemental RF emissions analysis (see below images). HDR reviewed the antenna and operation assumptions, and spot-checked off-site structure distances and heights, to confirm that the assumptions and calculations presented were reasonable and appropriate to document compliance. Conservative assumptions (e.g., calculations run at maximum duty cycle and power output levels; all proposed frequencies considered) were used in the analyses. HDR agrees with the findings and that the Verizon facility – as proposed – will comply with applicable FCC criteria. SiteSafe also notes that occupants of the 119 Columbia Street building will not be exposed to RF emissions levels that exceed the FCC's general population criteria, based on the antenna orientations and signal patterns, and because the roof and building materials will significantly attenuate any indirect signal. HDR agrees with this conclusion.



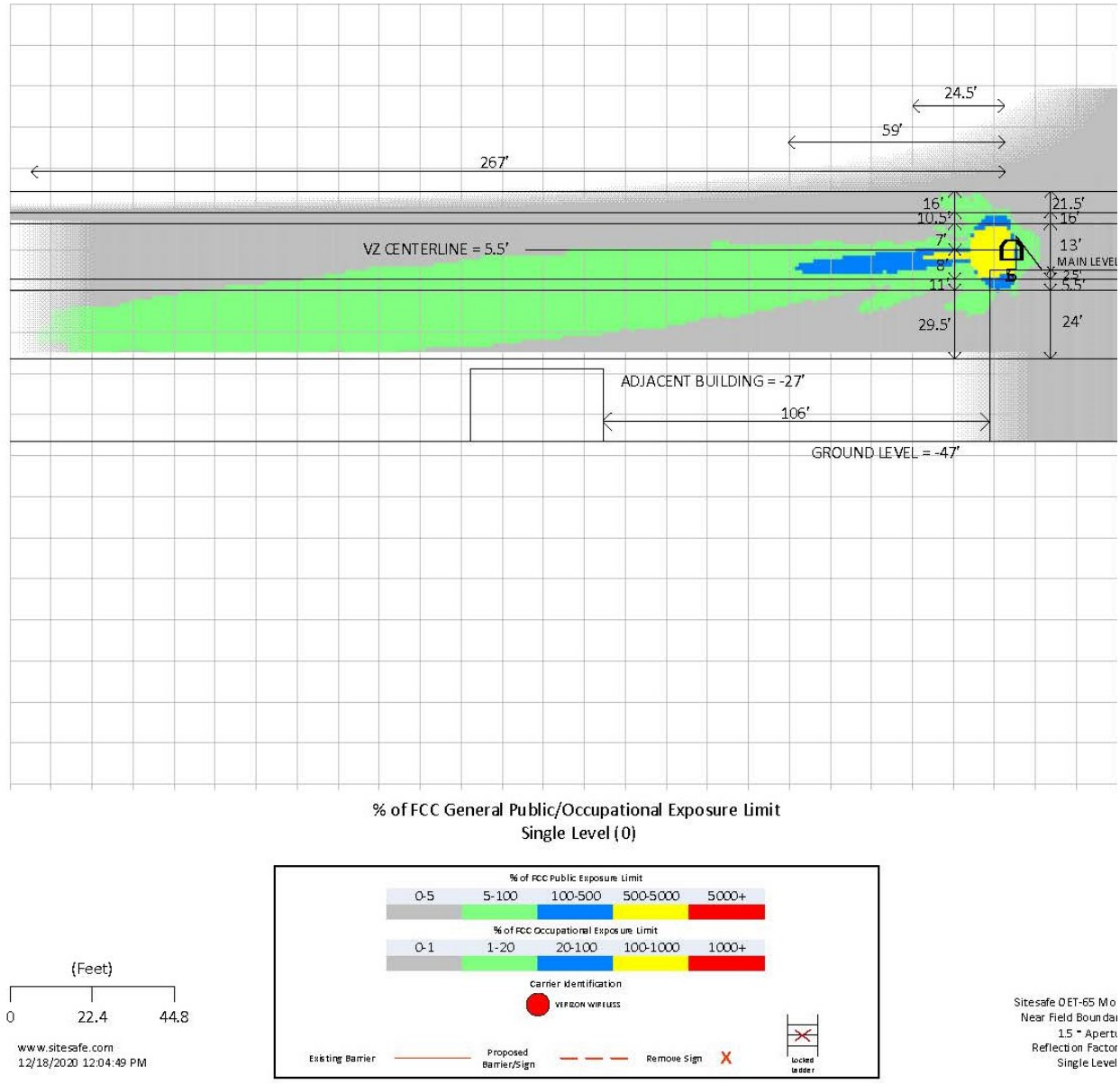
RF Exposure Simulation from Rooftop Antenna Sectors, Plan View of rooftop. Gamma sector (western) at top; Alpha sector (northern) at right; Beta Sector (southern) at left. Grey (unshaded) areas indicate RF levels <5% of the general population MPE limit (on the roof and at off-site areas off of the roofline). Green shading also indicates compliance with the FCC general population MPE limit.



RF Exposure Simulation from Rooftop Alpha Antenna Sector (northern), Cross-Section / Elevation View. Grey (unshaded) areas indicate RF levels <5% of the general population MPE. Green shading also indicates compliance with the FCC general population MPE limit.



RF Exposure Simulation from Rooftop Beta Antenna Sector (southern), Cross-Section / Elevation View Grey (unshaded) areas indicate RF levels <5% of the general population MPE. Green shading also indicates compliance with the FCC general population MPE limit.



RF Exposure Simulation from Rooftop Gamma Antenna Sector (western), Cross-Section / Elevation View. Grey (unshaded) areas indicate RF levels <5% of the general population MPE. Green shading also indicates compliance with the FCC general population MPE limit.

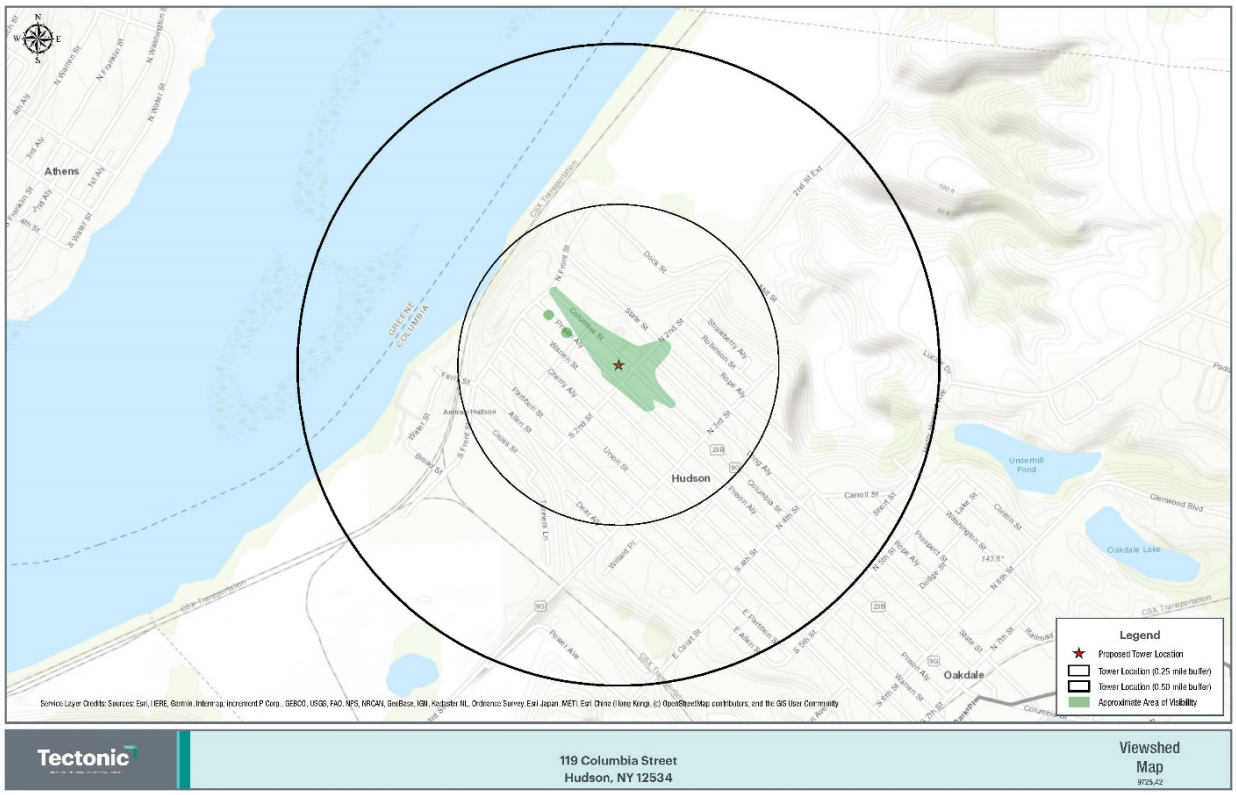
7. Visual Impact Analysis/Aesthetics and SHPO

Several submittals regarding the 119 Columbia Street visual assessment were submitted by Tectonic on behalf of the applicant including descriptions of methodology used, site reconnaissance findings, viewshed maps, photographs, and photosimulations. The Tectonic assessments were developed to evaluate public areas within the viewshed of the proposed rooftop facility, which is consistent with NYSDEC's visual assessment policy[1]. Proposed

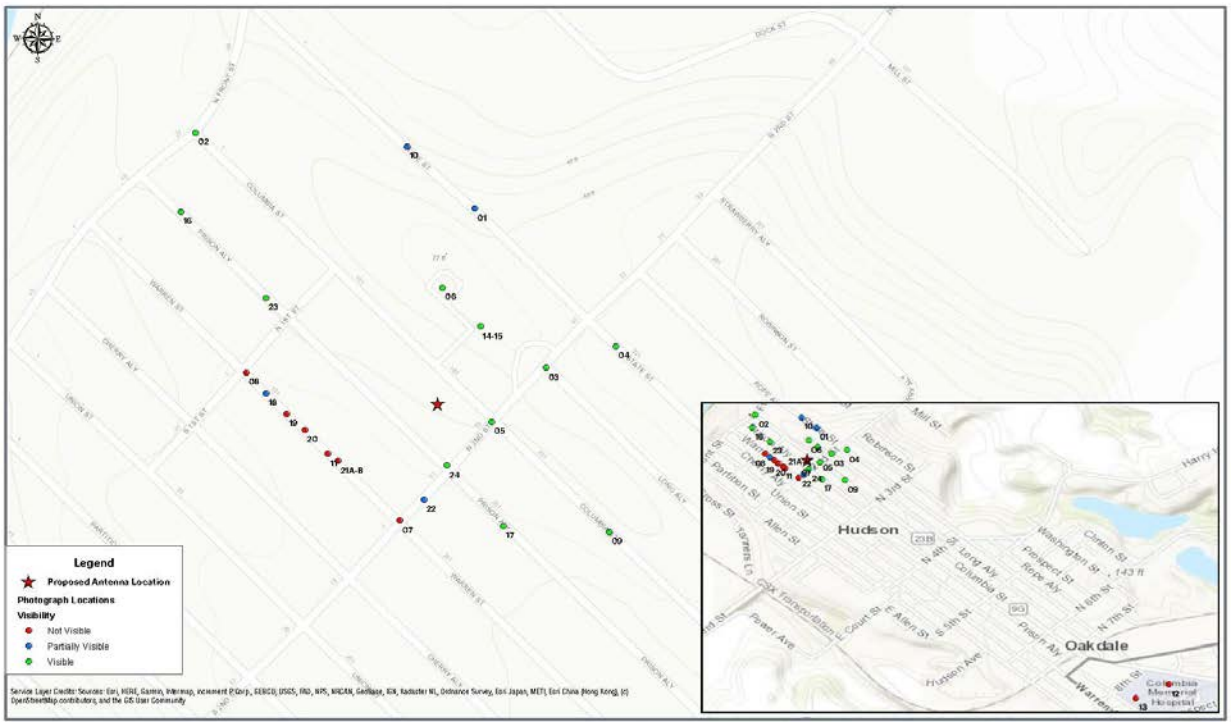
[1] https://www.dec.ny.gov/docs/permits_ej_operations_pdf/visualpolicydep002.pdf

photograph locations were reviewed and approved by the Planning Board and HDR. The most recent Visual Resource Evaluation (VRE, dated December 31, 2020) includes off-leaf simulations of the antenna sectors, alternate antenna colors, and a stealth screening option for the Gamma (western) sector. The VRE is suitable for use in the Planning Board's determination of potential visual impacts – and mitigation if needed - under SEQRA. It is noted that photographs of the subject building have also been submitted by citizens during the course of the application process.

Excerpts from the VRE, including Viewshed map, photo locations, and photosimulations are provided below for reference.

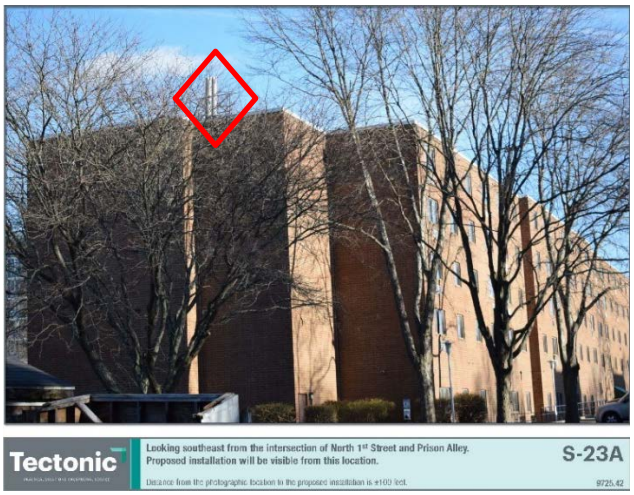


1/2-mile viewshed map. The red star depicts the proposed rooftop location at 119 Columbia Street. The green shading indicates viewshed potential, accounting for existing vegetation and structures.

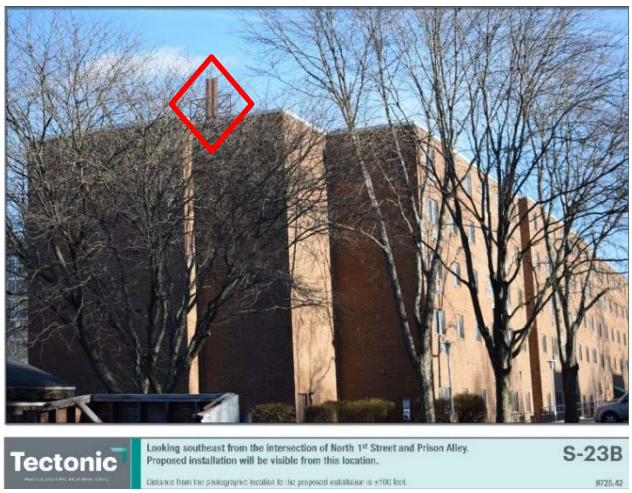


Photograph Log. The red star depicts the proposed rooftop location at 119 Columbia Street. The green dots indicate locations where the antennas would be visible. The red dots indicate where the antennas would not be visible, based on Tectonic's site reconnaissance and evaluation.

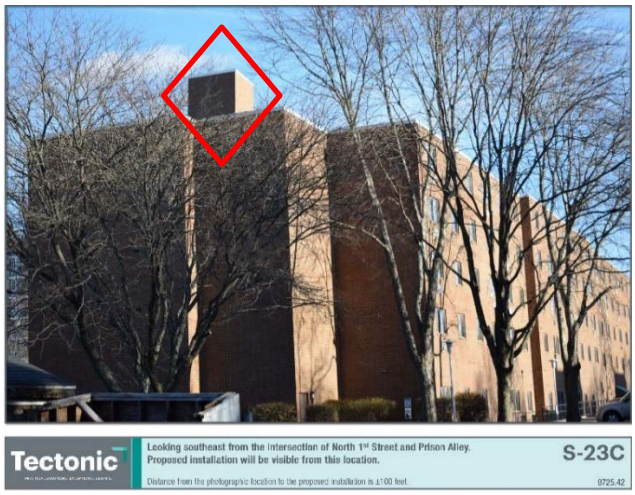
Three photosimulations, all looking eastward from the intersection of North 1st Street and Prison Alley, are provided below. The images serve to compare the appearance of white antennas, red brick-colored antennas, and a screening wall around the Gamma sector (western) antennas. Additional photosimulations are also included below.



Gamma sector at the northwest corner of the roof; photo looking eastward. White colored antennas.



Gamma sector at the northwest corner of the roof; photo looking eastward. Red brick colored antennas.



Gamma sector at the northwest corner of the roof; photo looking eastward. Screening wall option.

Alpha sector at the northeast corner of the roof; photo looking southwest. White colored antennas.

Alpha sector at the northeast corner of the roof; photo looking southwest. Red brick-colored antennas.

Existing building profile (looking westward) towards proposed Beta and Alpha sectors.

Beta and Alpha sector simulations (white antennas); photo looking westward.

Beta and Alpha sector simulations (red brick-colored antennas); photo looking westward.

While stealth screening enclosures have greater bulk than the antennas themselves, the overall appearance can blend with existing rooftop features, providing better 'camouflage' (a mitigation measure noted in the City Wireless Code). As further described in the Recommendations section at the end of this Tech Memo, stealth concealment is recommended for Planning Board consideration. The screening walls should have a red-brick appearance to match the façade of the building and the existing penthouse, as depicted in the Gamma sector photosimulations of the VRE dated December 31, 2020. Final design/configuration, colors, textures, and other aesthetic aspects of all proposed equipment are subject to Planning Board review and approval. Visible portions of the proposed Verizon equipment will be color matched to the existing rooftop / building features. **Additional photosimulations to further evaluate stealth screening at the Alpha and Beta sectors are requested, as outlined in the Outstanding Information at the end of this Tech Memo**.

SHPO

The applicant provided documentation of filing with SHPO (included in the January 2021 submittal), and SHPO's concurrence of no adverse effects in the area of potential effects (APE) or on historic properties in the APE. Descriptions of the proposed facility and a cultural resources survey (including maps of the City's Warren Street Historic District and photos of the site area)

were provided to the agency. Notification of SHPO Concurrence (File No. 0009172104), was received via email on August 20, 2020 noting:

- Direct Effect: No Historic Properties in Area of Potential Effects (APE)
- Visual Effect: No Adverse Effect on Historic Properties in the APE

8. Structural and Safety Assessment

A Platform Analysis Report from a NYS P.E. (Tectonic), dated March 4, 2020, was provided in the original application materials. The report states that the proposed equipment platform and building structure have sufficient capacity to accommodate the Verizon equipment. The analysis including design assumptions [wind, seismic, ice, and snow], calculations, and structural drawings. **It is understood that the Applicant maintains full responsibility for the accuracy and adequacy of all aspects of the proposed installation design, construction, and operations should the necessary City approvals be granted**. It is also understood that the City's Building Department may conduct a detailed review of the structural analyses, including all design assumptions and calculations, and construction logistics during the Building Permit phase of the project.

The applicant has confirmed that the proposed wireless telecommunications facility will (if approved and constructed) be maintained in a safe manner and in compliance with all conditions of the Special Use Permit, without exception, unless specifically granted relief by the City in writing, as well as all applicable and permissible local codes, ordinances, and regulations, including any and all applicable City, State and Federal laws, rules, and regulations.

Recommendations relating to structural analysis and safety are included at the end of this Tech Memo.

9. Summary of Technical Review Findings, Recommendations and Outstanding Information

Findings

- The applicant filings, responses to comments, and supplemental information provided to date appear to be responsive to HDR's comments, and the combined application materials / filings appear to be in accordance with the requirements of the City's Wireless Code (Chapter 284). See *Outstanding Information* below.

- As depicted in the application materials and described in this Tech Memo, a need for Verizon to provide capacity and coverage to its local wireless network has been documented. A telecommunications facility on the rooftop of 119 Columbia Street, with configuration and height as proposed in the application materials, will provide enhanced services to the site area and capacity relief to the existing Verizon network. As described above and in Attachment B of this Tech Memo, the proposed Verizon facility will predominately serve the City of Hudson and areas east of the Hudson River (vs. areas in

Greene County, NY). This conclusion is based on an analysis of the applicant's technical information and an assessment of land uses and demographics within the coverage map areas depicted for Verizon's low band and high band frequencies. It is also noted that Verizon is currently filing an application for a proposed cell site in the Town of Athens.

- The use of the subject rooftop (an existing other structure), as proposed, is noted to be the second highest of the five siting criteria of the Wireless Code (Chapter 284-9 A).

  (1) On existing towers or other structures on City-owned properties;
  (2) ***On existing towers or other structures on other property in the City****;*
  (3) A new tower on City-owned properties;
  (4) On properties in areas zoned for heavy industrial use;
  (5) On properties in areas zoned for commercial use.

  Information on City-owned properties (highest Code priority) as potential alternates has been submitted and evaluated, including RF analyses and coverage maps developed for two alternates (325 Columbia Street and Dock Street property). HDR agrees with the applicant in that the properties would provide inferior service and leave gaps in Verizon's search area, when compared to the proposed site at 119 Columbia Street. There are no existing telecommunication towers located within Verizon's search area which can be utilized.

  Wireless Code Section 284-8.K.1 (application for a new tower), includes the language, *In the case of a new tower, the applicant shall be required to submit a written report demonstrating its meaningful efforts to secure shared use of existing tower(s) or the use of alternative buildings or other structures within the City*, which implies that use of existing towers or buildings are favored over the construction of new tower structures. Section 284-10.A notes*, the City, as opposed to the construction of a new tower, shall prefer locating on existing towers or other structures without increasing the height*.

  - HDR understands that other alternatives need to be evaluated based on discussions of the February 9, 2021 Planning Board meeting, and as relayed by the Planning Board Chairperson in an email dated February 20, 2021 (see Outstanding Information below).

- In order to evaluate RF emissions from the proposed facility and confirm compliance with the applicable FCC general population MPE criteria, RF levels were modeled for the proposed Verizon antenna installation (Site Safe submittals as described earlier in this Tech Memo). The calculated RF emissions demonstrate that the proposed rooftop facility will operate within acceptable FCC limits across the majority of the rooftop and at adjacent areas in the site vicinity. Compliance with the FCC general population MPE would also be achieved within the 119 Columbia Street building, based on antenna configurations, antenna patterns, and attenuation of signal by building materials Although the modeling

shows that the majority of the roof areas will be compliant with the general public MPE limit, RF levels in the vicinity of the Verizon antenna sectors ("nearfield" areas) may exceed the FCC general public MPE limit, as is common with many rooftop cell sites. The applicant has proposed RF warning signage and chain barrier systems, in accordance with FCC guidance. With these measures in place, the rooftop facility would meet applicable FCC compliance requirements (see Recommendations related to RF emissions and safety below).

- No FAA lighting will be required for the proposed rooftop facility. Two small light fixtures (four 25-watt LED bulbs) will be mounted on the equipment platform at a height of approximately 9 ft above the roof. The light fixtures operate on a shut-off dial timer (one hour maximum) to accommodate night-time maintenance visits by Verizon technicians that may be needed.

Recommendations

The following recommendations were identified based on HDR's technical review of the application materials. Some of the below recommendations may be considered as conditions of the Site Plan and Special Use Permit, if the application for the rooftop site at 119 Columbia Street is approved by the Planning Board and the facility is constructed. HDR notes that many of the below recommendations would be applicable for other rooftop or 'other structure' cell sites.

1. RF-Transparent Screening Walls are recommended at all three antenna sectors, in addition to the screening currently proposed around the Gamma (western) antenna sector. The stealth screening is recommended in accordance with Wireless Code Section 284-5.E: *Promoting and encouraging, wherever possible, the placement, height and quantity of wireless telecommunications facilities in such a manner, including, but not limited to,* ***the use of stealth technology, as to minimize adverse aesthetic and visual impacts*** *on the land, property, buildings, and other facilities adjacent to, surrounding, and in generally the same area as the requested location of such wireless telecommunications facilities, which shall mean using the least visually and physically intrusive facility that is not technologically or commercially impracticable under the facts and circumstances*; and Section 284-8.Q: *The wireless telecommunications facility and any and all accessory or associated facilities* ***shall maximize the use of building materials, colors and textures designed to blend with the structure to which it may be affixed and/or to harmonize with the natural surroundings; this shall include the utilization of stealth or concealment technology*** *as may be required by the City*.

   Recommendations for screening walls are included below for the Planning Board's consideration. The heights of screening employed should match the heights of the top of the antennas, and the width / surface area should be the minimum needed to conceal the equipment.

- Alpha sector (northeast corner of building): screening on all 4 sides of the array should be installed, oriented with the existing building lines and to match the nearby existing penthouse;
- Beta sector (southeast corner of building): screening on south, east, and west sides, oriented with the existing building lines and to match the nearby existing penthouse; and
- Gamma sector (western array): screening on all 4 side of the array should be installed, oriented with the existing building lines.

The screening walls should have a red-brick appearance to match the façade of the building and the existing penthouse and rooftop elements, as depicted in the Gamma sector photosimulations of the Visual Resource Evaluation dated December 31, 2020. (See Outstanding Information below as related to Planning Board assessment of stealth screening.)

HDR recommends that the maximum heights proposed for all rooftop equipment (i.e., not to exceed 10 ft above rooftop surface or the height of the existing penthouse, as depicted on the applicant's Drawings) and the screening walls be documented and memorialized in the final Planning Board Drawing set.

It is understood that final design/configuration, colors, textures, and other aesthetic aspects of all proposed equipment are subject to Planning Board review and approval. Visible portions of the proposed Verizon equipment (including RRH units, cabinet shelter, stealth screening walls) shall be color matched to the existing rooftop / building features.

2. FCC Eligible Facilities Request (EFR) – As part of final Site Plan / Special Use Permit approval conditions, the property owner and Verizon should acknowledge that all approved aesthetic conditions (equipment configuration, equipment height, stealth screening, etc.) will be maintained at the site, and that the heights of the proposed equipment and the stealth elements will not be altered from the final approval. The name and qualifications of the vender selected to design and provide the recommended stealth screening should be submitted to the Planning Board.

   Section 284-5.A of the City's Wireless Code notes that any modifications to an existing cell site must first obtain Special Use Permit approval. Thus, if Verizon is approved and the proposed facility is constructed, any proposed changes to operations (e.g., future addition of 5G services) and/or equipment will need to be reviewed and approved by the Planning Board under a new Special Use Permit application and by the Building Department for a building permit.

3. Rooftop Management and Future Co-Location - It is recommended that City discussions with the property owner should be made to confirm the property owner's involvement with and understanding of this application. Verizon has drafted a lease for the 119 Columbia Street rooftop; however, if approved, other wireless carriers cannot be installed 'as of right'

and significant modifications cannot be made without the property owner first consenting (City review of Site Plan and Special Use Permit applications would of course be required for any future co-location or modification proposed).

HDR has contacted a representative of Arbor Management (property owner) to confirm awareness of the Verizon application and to relay Planning Board discussions that have occurred. Further discussions with the property owner before, during, or after the March 9, 2021 Planning Board meeting are recommended to understand the owner's experience with similar projects, to discuss the recommendations of this Tech Memo and all Planning Board conditions (including the management of a rooftop wireless facility), and to evaluate future co-location / modifications at the site. It is noted that the applicant and property owner may need to revise the lease and lease exhibits to account for Planning Board approval conditions.

4. A final structural analysis will need to incorporate all Planning Board conditions including, but not limited to, stealth screening and mounting of equipment on the roof. It is submitted that the final structural analysis can be reviewed by the City as part of the Building Permit phase of the project should the Site Plan and Special Use Permit be approved.

5. If Planning Board approval is obtained and the facility is built, a Structural/Safety Compliance Report shall be submitted. The periodic report should include a statement by a NYS P.E. that the structural integrity of the building rooftop, antenna mounts, rooftop equipment platform, and stealth enclosures are in accordance with the approved Site Plan and meet the applicable City and State codes, and that the stealth enclosures / other conditions are maintained in accordance with the Planning Board approvals. Wireless Code sections, including but not limited to Section 248-8.T, should be followed. The scope, design criteria (e.g., wind, ice assumptions), and schedule (e.g., 3-year reporting interval) of the Structural/Safety Compliance Report can be established during the Building Permit phase of the project.
    a. Prior to construction, the Building Department shall be notified to verify schedule, logistics, equipment needed (e.g., crane), number of workdays, and City requirements (work hours; other local approvals for construction; third-party inspections, if required). Construction may only occur after all necessary approvals from the Planning Board are obtained and after a building permit is issued.
    b. A set of "As-Built" Drawings shall be submitted for Building Department review after the facility is constructed and before a certificate of compliance is issued. Any deviations from the final Planning Board Drawings or approval conditions shall be noted with the As-Built Drawing submittal. As Built drawings should include the following information along with any additional items required by the Planning Board or Building Department:
        - Documentation/survey of actual equipment location and height.
        - Actual centerline height of the Verizon antennas.
        - Location of utility connections associated with the new facility.

- Documentation that antennas and all other equipment is properly grounded and in compliance with all applicable electrical and fire codes.
- Documentation that all necessary permits for work and third-party inspections (as required by the City) have been obtained and complied with.

c. Inspection of the stealth screening should be performed by the City after construction to confirm that it matches the Planning Board conditions and the applicant's photosimulations. An Inspection and Maintenance Plan, which includes an annual inspection and response plan should the stealth screening materials become damaged or faded by wind / weather, should be provided at the building permit phase of the project for Building Department review.

6. The 10-23-2020 Drawing set will require revisions per the applicant's January 2021 supplemental submittal and will need to include all Planning Board conditions associated with the Site Plan and Special Use Permit (if the application is approved), including but not limited to the depiction of stealth screening at the three antenna arrays. The 10-23-2020 Drawing RFE-1 will need to be revised to include the measures provided in SiteSafe's December 18, 2020 RF Site Compliance Report. The property lot line dimensions should be confirmed on Drawing C-1.

7. RF Emissions and Site Safety -

   a. The rooftop access signage (Verizon contact information and FCC warning/notification), signage at the antenna arrays and equipment platform, and barrier systems near the antenna arrays should be routinely inspected and maintained in accordance with all FCC rules, regulations, and guidance by Verizon and the property owner. The mitigation measures proposed in the SiteSafe RF Site Compliance Report, dated December 18, 2020, should be adhered to by Verizon to ensure that the rooftop operates as an FCC Controlled Exposure environment.
   b. To eliminate the potential for RF exposures at levels above the general population MPE, protocols should be established and maintained for rooftop access for persons not trained in RF emissions, such as maintenance workers that may need to work on the roof in proximity to the antennas. Such work should be coordinated between Verizon and the property owner / building operator.
   c. If Planning Board approval is obtained and the facility is built, an Annual RF Emissions Compliance Report shall be submitted. The annual report should include a statement by a qualified RF Engineer that the operations (power levels, frequencies) are in compliance with FCC regulations; that signage and barriers are maintained; and that the rooftop complies as an FCC Controlled Exposure environment. The Annual RF Emissions Compliance Report should also confirm - with citations - the current and applicable FCC MPE levels (both general population and occupational) and FCC guidelines, and confirm that rooftop access protocols are in place. The full scope of content (e.g., checklist and photos) and schedule of

the Annual RF Emissions Compliance Report can be established during the Building Permit phase of the project.

8. If approved, operations should be maintained in accordance with the City's Wireless Code (Chapter 284), all other applicable City codes, and State / Federal requirements. Any proposed modifications, or increases in Verizon's number of antennas, antenna sizes, or number/sizes of other equipment from the "final" configurations as noted on the final Planning Board Drawing Set shall be approved by the City prior to any modifications.

9. It is understood that the Applicant and the Applicant's engineer maintain full responsibility for the accuracy and adequacy of all aspects of the design and structural analyses, and for the construction and maintenance/operation of the Verizon facility.

10. If approved, the Planning Board and the Building Department should review the applicant's insurance and workers' compensation submittals; Contractor licenses as applicable for the construction work; required performance / removal bond ($25,000; Section 284-21); fees; and escrows to verify they are adequate.

    a. The applicant shall confirm that the requirements of Sections 284-23 (Liability Insurance) and 284-24 (Indemnification) will be submitted to the City upon approval of the Site Plan and Special Use Permit.

    b. It is requested that the applicant (a) furnish General Liability certificate without a pollution exclusion, and (b) include the City and its officers, councils, employees, committee members, attorneys, agents, and consultants as additional insureds.

Outstanding Information

As of the date of this Tech Memo, the following information has been identified by HDR to be outstanding:

- Response to / evaluation of possible alternates, as discussed at the February 9, 2021 Planning Board meeting and as were to be submitted to the Planning Board by February 19, 2021. See email correspondence from Planning Board Chairperson dated February 20, 2021 in which two potential alternate rooftop sites in the City were noted, as well as vacant land at the City landfill off of 2nd Street.
    - Two potential rooftop sites (Harney Tea and the Verizon building off of Union Street) would also appear to qualify as Priority #2 sites of Wireless Code Section 284-9.A, as the 119 Columbia Street site does; however, the feasibility of these locations to work within Verizon's existing network of sites and the property owner's willingness to accommodate a wireless facility have not been assessed by the applicant. As noted in the above Findings, a new tower structure ranks lower on the Wireless Code's priorities than use of an existing building rooftop.
    - Other questions were posed in the Chairperson's February 20, 2021 email correspondence that the applicant should clarify and respond to.
- Stealth Screening – To supplement the recommendation for stealth screening in this Tech Memo, the applicant should provide to the Planning Board the following supplemental "off-

leaf" simulations from the December 31, 2020 Visual Resources Evaluation. The intent is to depict the stealthing around the Alpha and Beta antenna sectors:

- S-3A
- S-5B
- S-6B
- S-9B
- S-14 (stealthing at Gamma sector should be shown)
- S-17
- S-24

The applicant should also furnish vender information and qualifications of the firm selected to design the stealth screening, along with spec sheets for the stealth screening materials to be utilized.

- Assessment of service from proposed facility at 119 Columbia Street. Attachment B of this Tech Memo provides an analysis that concludes that the proposed facility will predominately serve the City of Hudson and areas east of the river (vs. areas in Greene County, NY). The applicant should review HDR's assessment and provide comments / enhancements based on Verizon's area network information (see also Planning Board member comments in the Chairperson's February 20, 2021 email correspondence). The applicant should also confirm Verizon's plans for the Town of Athens, in terms of a recent wireless facility application.
- Documentation (i.e., Case Law, litigation decisions) of the applicability of Verizon's use of coverage maps and capacity data – as submitted with this application – to provide substantive evidence for cell site need. Applicant to provide
- EFR - Acknowledgement by applicant and property owner that approved configuration and heights of equipment will not be altered in the future, given that the facility abuts the Warren Street Historic District.

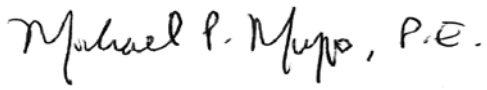
Please feel free to contact us should you have any questions on this Tech Memo. I look forward to participating at the March 9, 2021 Planning Board meeting.

Sincerely,

Henningson, Durham & Richardson

Architecture and Engineering, P.C.

in association with HDR Engineering Inc.



Michael P. Musso, P.E.

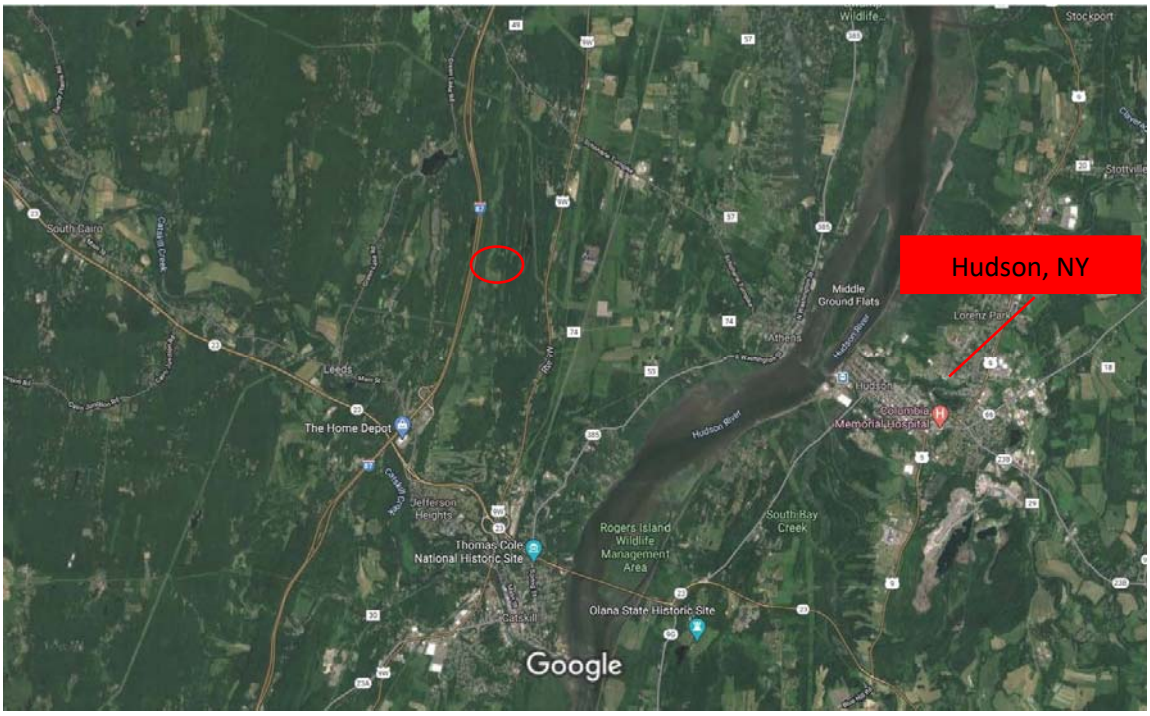
Senior Project Engineer

Attachments

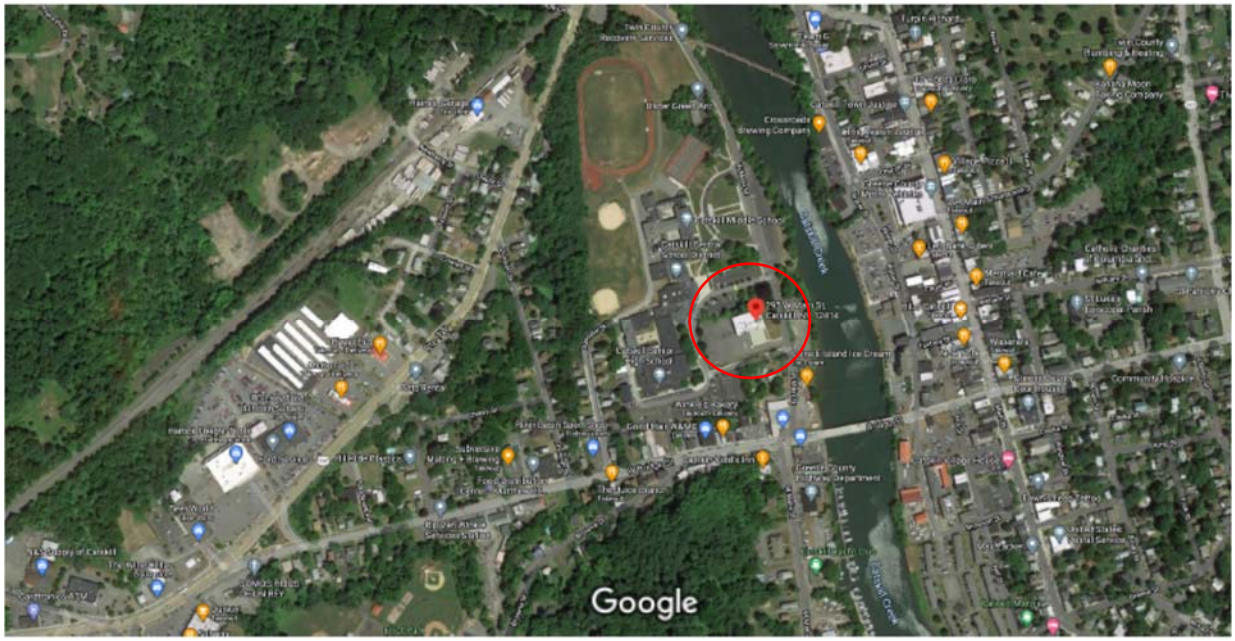
cc: S. Olson, Esq.

Attachment A

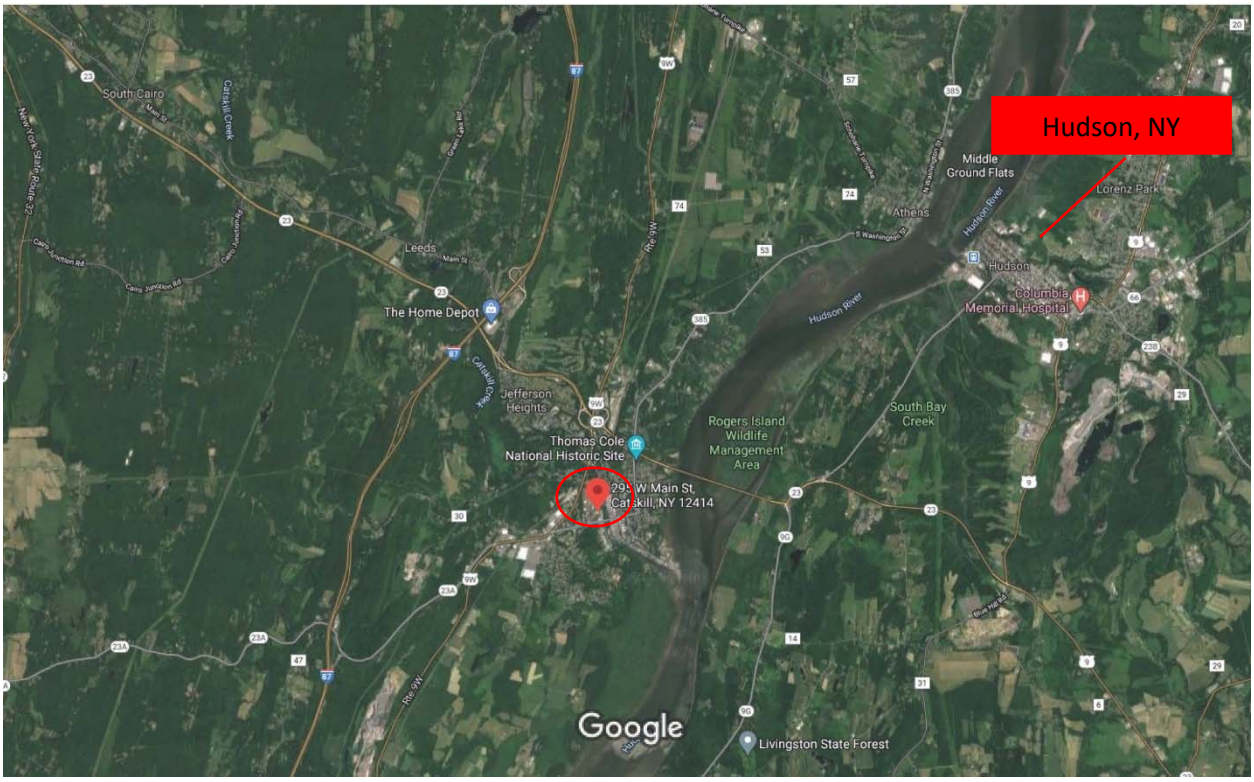
Athens Verizon Facility (tower). 140 Black Lake Road, Athens, NY. Street view is not available.



Athens Verizon Facility (tower). 140 Black Lake Road, Athens, NY. 4.5 miles west of 119 Columbia St. Street view is not available.



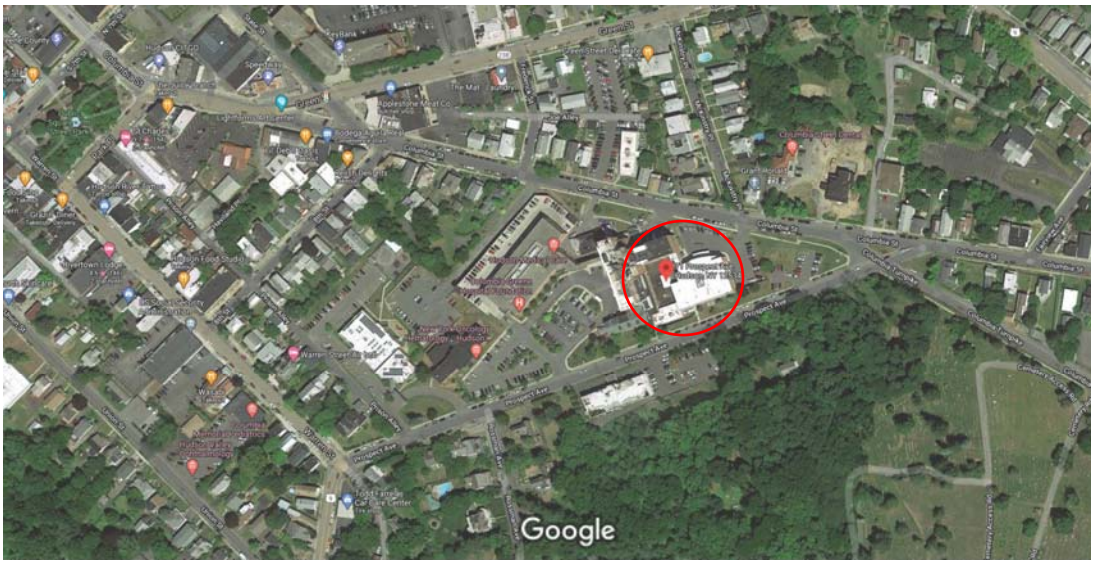
Catskill Co Micro Verizon Facility (rooftop). 295 W. Main, Catskill, NY. Aerial View.



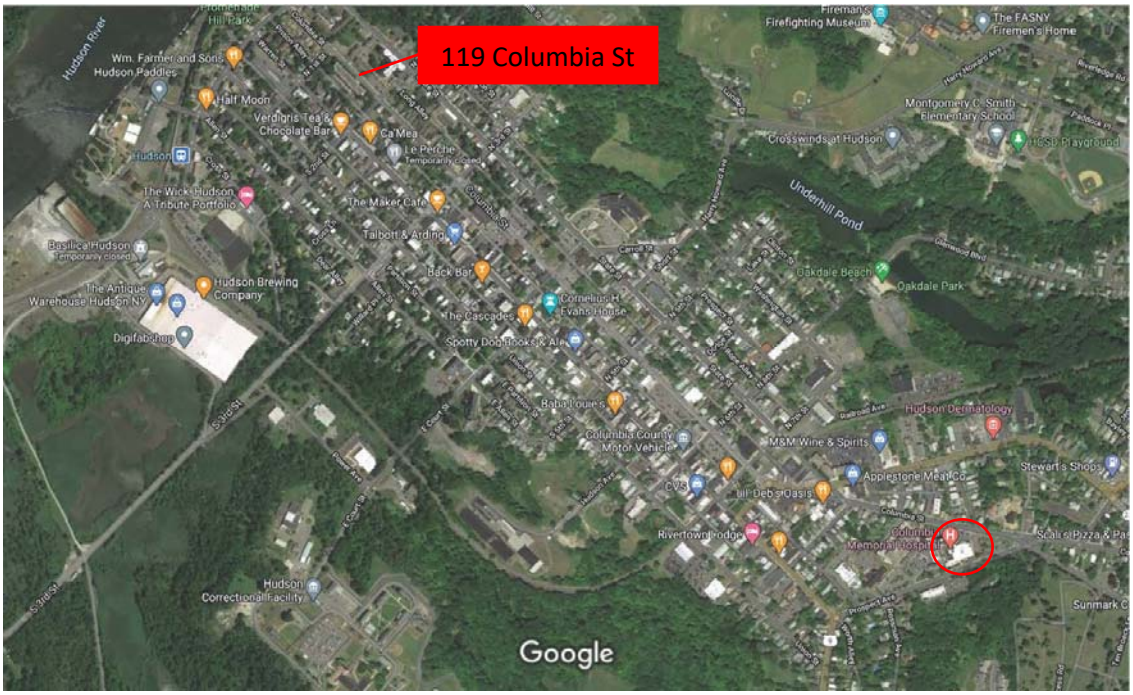
Catskill Co Micro Verizon Facility (rooftop). 295 W. Main, Catskill, NY. Aerial View. 4.6 miles southwest of 119 Columbia St. Street view is not available.

Catskill Co Micro Verizon Facility (rooftop). 295 W. Main, Catskill, NY. Street View.

Claverack Verizon Facility (water tank). 79 Old Lane, Claverack, NY. Plan View. Street view is not available.



Hudson Verizon Facility (rooftop). Columbia Memorial Health (hospital), 71 Prospect Avenue, Hudson, NY. Aerial View.

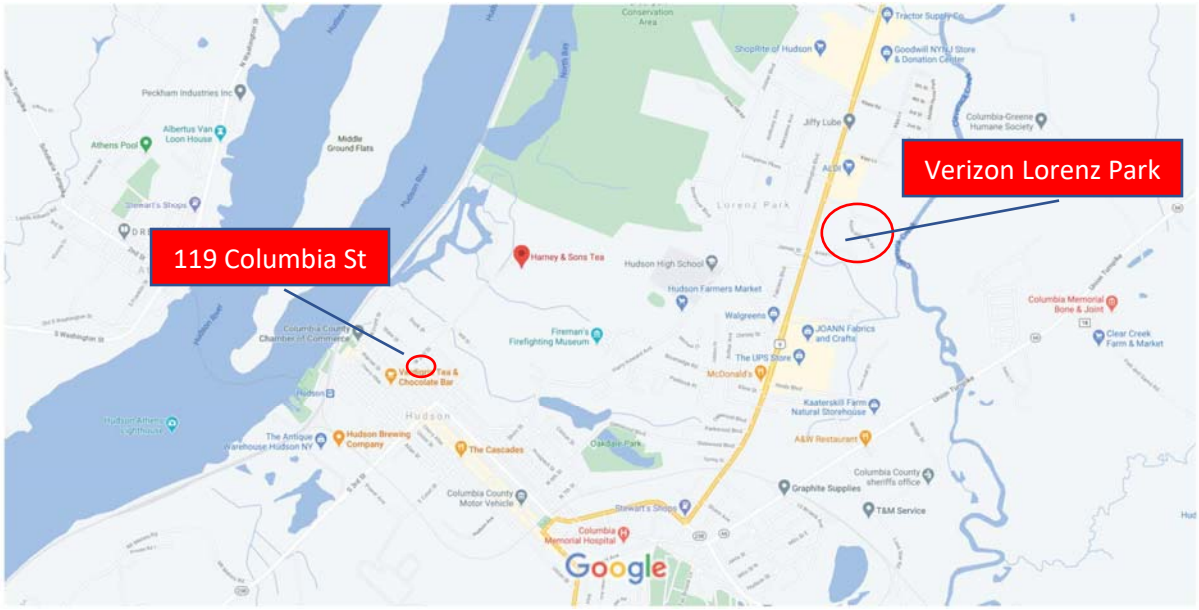


Hudson Verizon Facility (rooftop). Columbia Memorial Health (hospital), 71 Prospect Avenue, Hudson, NY. Aerial View.

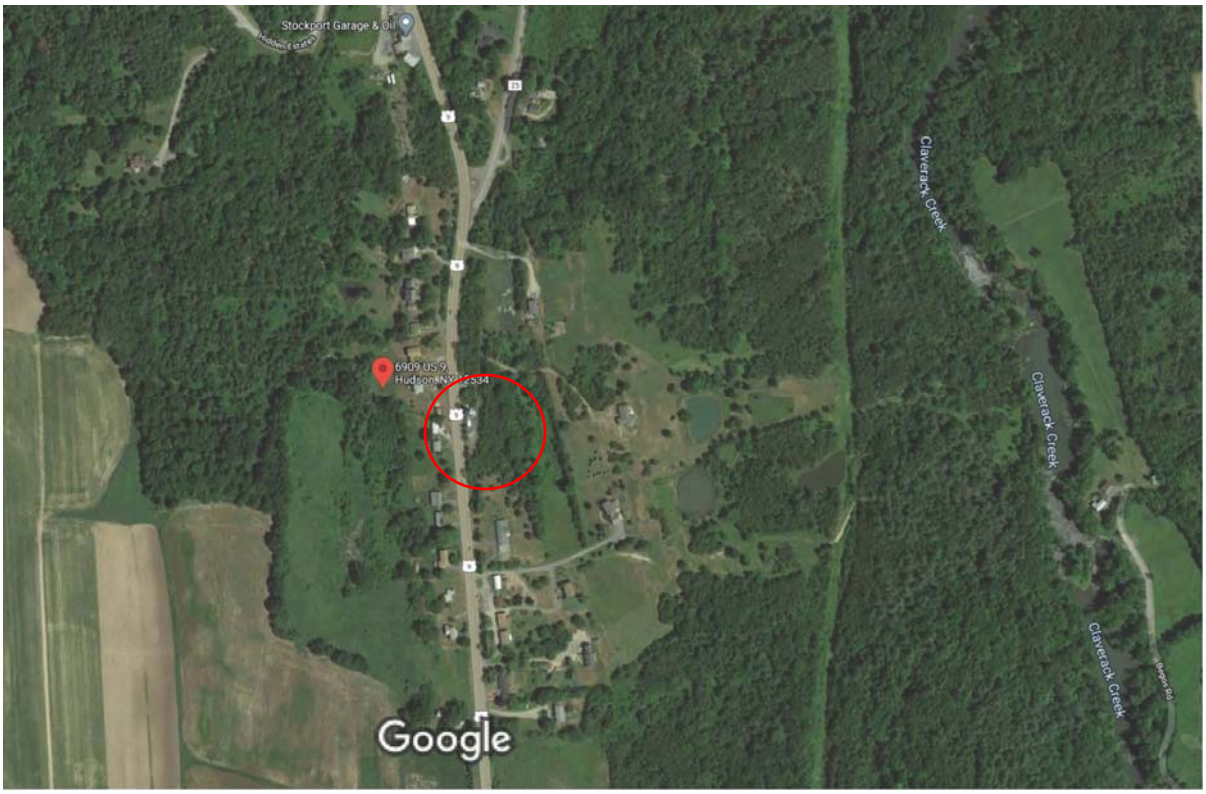
Hudson Verizon Facility (rooftop). Columbia Memorial Health (hospital), 71 Prospect Avenue, Hudson, NY. Street View.

Lorenz Park Verizon Facility (tower). 38 Apple Meadow Road, Hudson, NY. Aerial View.

Lorenz Park Verizon Facility (tower). 38 Apple Meadow Road, Hudson, NY. Street View.



Lorenz Park Location (tower). 38 Apple Meadow Road, Hudson, NY.



Stottville Verizon Facility (water tank). 6909 Rt 9, Stockport, NY. Aerial View. 3.8 miles north of 119 Columbia Street.

Stottville Verizon Facility (water tank). 6909 Rt 9, Stockport, NY. Aerial View. 3.8 miles north of 119 Columbia Street.

Stottville Verizon Facility (water tank). 6909 Rt 9, Stockport, NY. Street View.

Attachment B

March 3, 2021
10258372

City of Hudson Planning Board
520 Warren Street
Hudson, NY 12534

Re: Verizon Wireless Proposed Rooftop Installation
119 Columbia Street, Hudson, New York 12534
Technical Memorandum

Dear Chairperson Gramkow and Members of the Planning Board:

This memorandum was prepared as an addendum to HDR's Tech Memo review of the application materials prepared and submitted by Young/Sommer LLC, on behalf of the applicant, Bell Atlantic Mobile Systems LLC d/b/a Verizon Wireless (Verizon). The application is for the construction of a new wireless telecommunications facility proposed at the above-referenced location (the site) in a "GC – General Commercial" zoning district in the City of Hudson. The facility is proposed on the rooftop of an existing five-story apartment building (Providence Hall Apartments), fronted by Columbia Street, N. 1st Street, N 2nd Street, and Prison Alley. Verizon has reported a need to supplement its network's capacity and coverage to provide enhanced and reliable 4G wireless services to the site area. Site Plan and Special Use Permit approvals are being requested of the Planning Board by the applicant. If approved, a Building Permit will also be required.

This review includes a general assessment of population and land use in the area of the proposed wireless facility, as well as areas west of the proposed facility in Greene County, NY where some new Verizon wireless service will be provided if the proposed rooftop facility is approved.. An evaluation of use of the proposed cell site – in terms of City of Hudson users vs. users in Greene County – was requested by the Planning Board.

This memorandum is written to supplement the Tech Memo submitted on March 3, 2021. As noted in the Outstanding Information at the end of the Tech Memo, the applicant should review this analysis and provide comments / enhancements based on Verizon's own network data. This analysis is qualitative in nature.

Population

To evaluate users of wireless networks (Verizon or other commercial carriers that service a given geographical area), an understanding of population, population density, and land use affecting the number of people in or traveling through a locale is required. To illustrate the potential range in wireless users who may be serviced by the proposed site, HDR reviewed the population, visitors/travelers, and density of the City of Hudson and surrounding areas, specifically, the Village

of Athens in Greene County within an area of 2 miles from the proposed Verizon facility location (see Figure 1 and Figure 2).

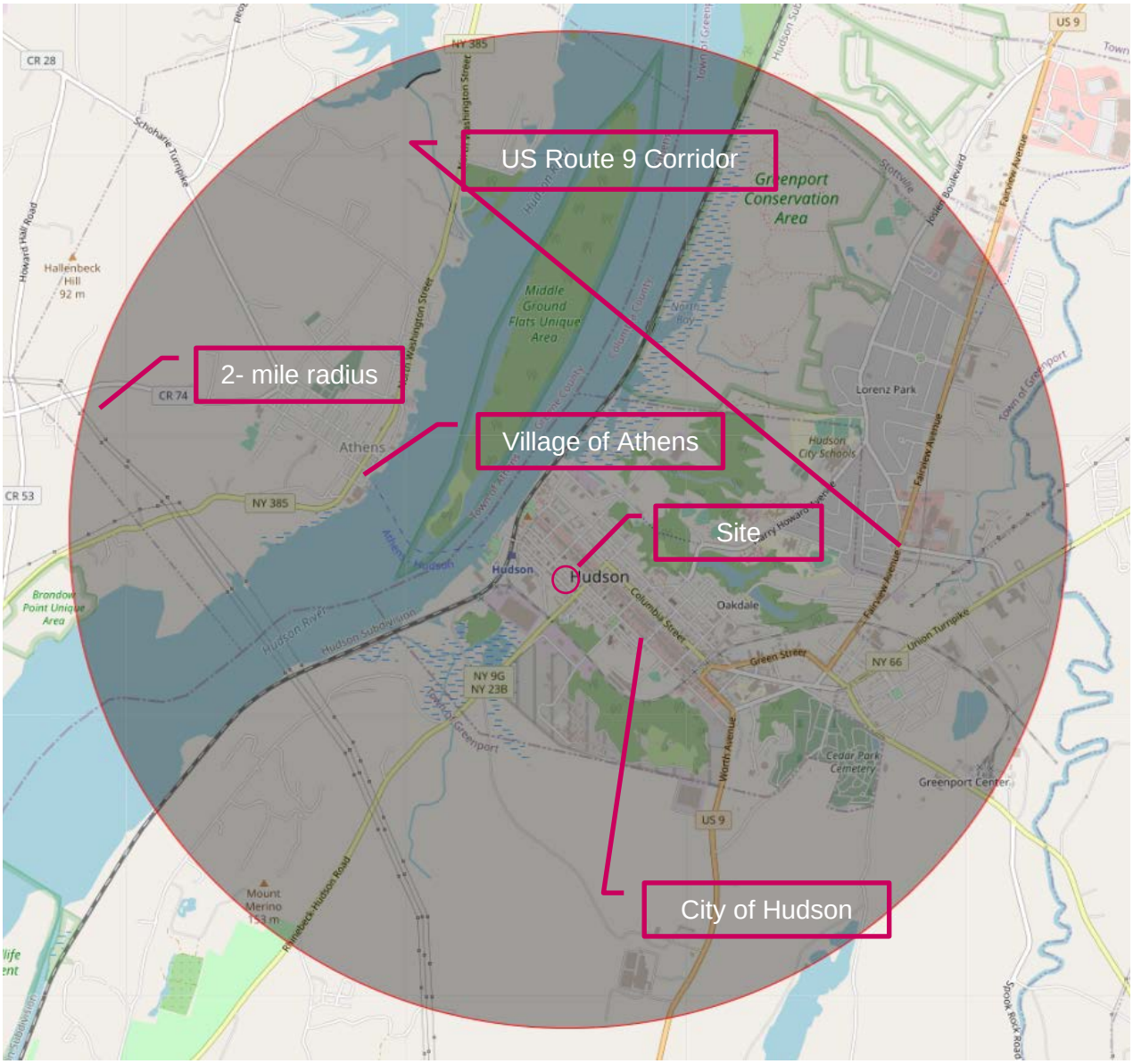


Figure 1 - 2-Mile Radius Map

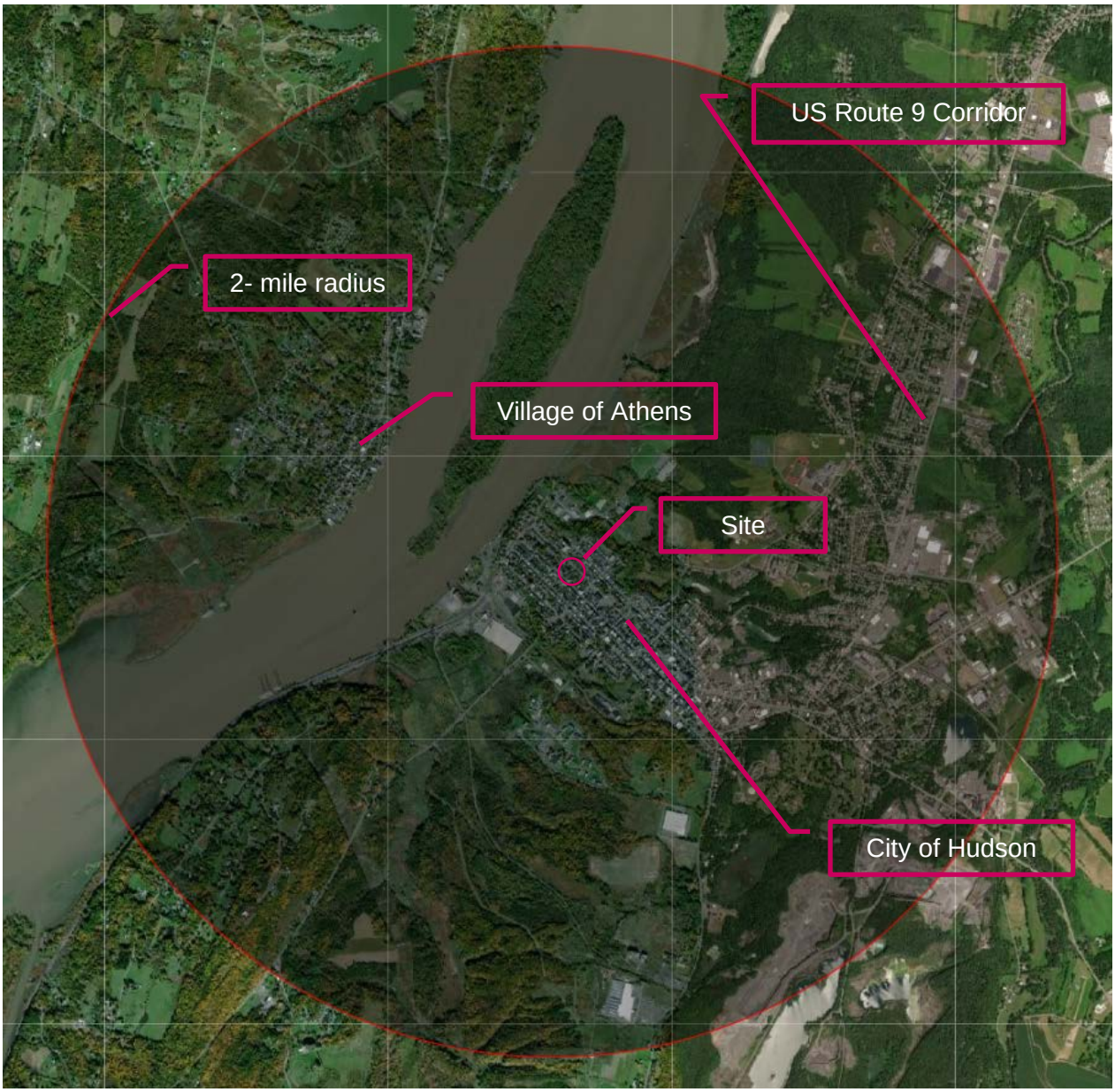


Figure 2 - 2-Mile Radius Aerial Map

This radius of evaluation was selected based on the Verizon coverage maps, particularly the 700 MHz (low band) maps which depict larger coverage footprints than the high band maps.

The entire area of City of Hudson encompasses 2.32 square miles, while the entire Village of Athens, Greene County, encompasses 3.42 square miles, although 1.19 square miles are in-water (Hudson River). The Village of Athens is located within the larger Town of Athens. The Town of Athens is not included in this memorandum. It is noted that the island in the middle of the Hudson River is within the Village of Athens. As illustrated in the figures above, there are three main areas of development; the City of Hudson, the US Route 9 corridor, and the Village of Athens. The City of Hudson is the area of densest development within the 2- mile radius. The total population within the 2-mile radius is 5,245.

The populations of Hudson and Athens within the 2-mile radius are noted below.

	Population[1]		
	2018	2019	2010
City of Hudson	6144	6072	6710
Village of Athens	1603	1598	1668

Visitors/Travelers

The New York State Department of Transportation tracks the number of average annual daily travelers (AADT) on major NYS roads. The table below lists the number of AADTs on various roadways within Hudson and Athens. As illustrated, there are more travelers along the roadways in the City of Hudson than in the Village of Athens. The U.S. Route 9 corridor has a considerable number of travelers on an average daily basis.

	from	to	AADT (2019)[2]
Hudson			
Warren Street	Front Street	7th Street	2,460
Columbia Street	Front Street	Third Street	1,603
Third Street	Columbia Street	Robinson Street	3,086
NY Route 9G	End Route 23 Overlap	Columbia Street	8,386
NY Route 9G	Columbia Street	Robinson Street	3,086
Columbia Street/ Rt 9G	Columbia Street	Park Place End	3,040
S Front Street	End	Warren Street	1,660
US Route 9	End/ Route 23B	Livingston Parkway	16,100
Athens			
North Washington Street	2nd Street	Lawrence Ave	2,184
NY Route 385	Route 23	2nd Street	2,184
2nd Street	Washington Street	County Route 28	840

In addition to the area roadways, within the City of Hudson is an Amtrak train stop. The train station is approximately 1,300 feet southwest of the proposed rooftop facility (see Figure 3). Amtrak reported 237,268 boardings and alightings[3] at this station in 2019. Annual Station Ridership (FY 2020) noted at the Hudson station was 131,357.

[1] Find Population on Map (freemaptools.com)
[2] https://gisportalny.dot.ny.gov/portalny/apps/webappviewer/index.html?id=28537cbc8b5941e19cf8e959b16797b4
[3] https://www.amtrak.com/content/dam/projects/dotcom/english/public/documents/corporate/statefactsheets/NEWYORK19.pdf

Figure 3 - Amtrak Train Station Location

HDR concludes that based on the population, population density (including influx of visitors and tourists during certain times of year), and highly utilized transportation corridors, there is a higher number of wireless device users in the City as compared with the Village of Athens study area of the 2-mile radius map. We submit that the proposed rooftop facility at 119 Columbia Street will thus predominately service the City, as opposed to areas west of the Hudson River.

This conclusion is also supported by the following:

- Two of the three proposed antenna sectors do not directly face Greene County.
- Capacity issues have been documented by Verizon at the rooftop facility at Columbia Memorial Hospital, confirming high mobile use traffic in the City.

Coverage

In addition to alleviating capacity shortfalls in Verizon's local area network, the site at 119 Columbia Street is also proposed to provide supplemental coverage to the area. The below maps illustrate the prime antenna direction (Figure 4) and amount of coverage (Figures 5 and 6) anticipated for the City of Hudson and the Village of Athens.

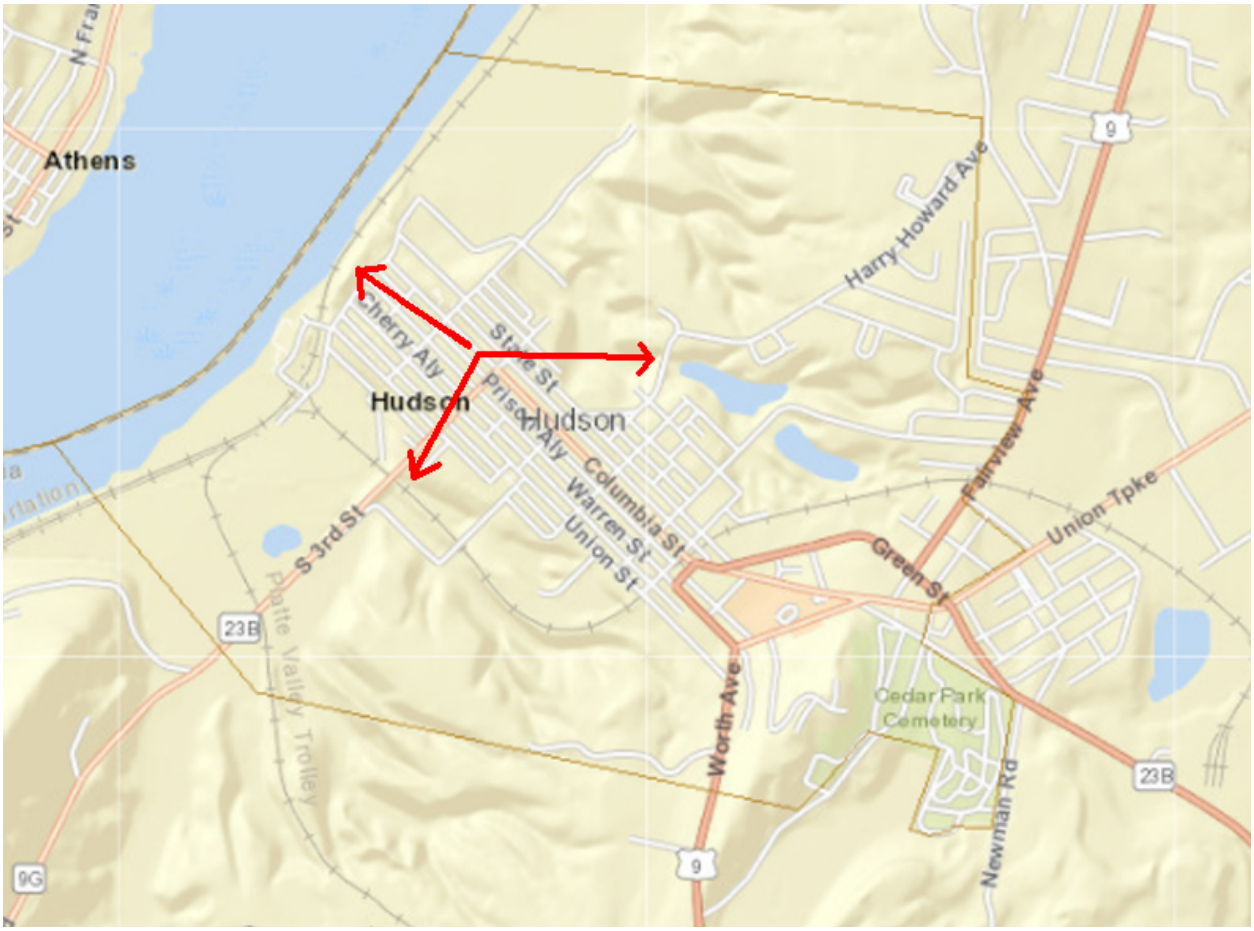


Figure 4 – Prime Directions of Proposed Antenna Sectors

As can be seen in the image below, on a geographic basis much of the downtown commercial, residential, and waterfront areas in the City of Hudson would receive 700Mhz coverage with the proposed site, while approximately three-quarters of the Village of Athens would receive coverage.

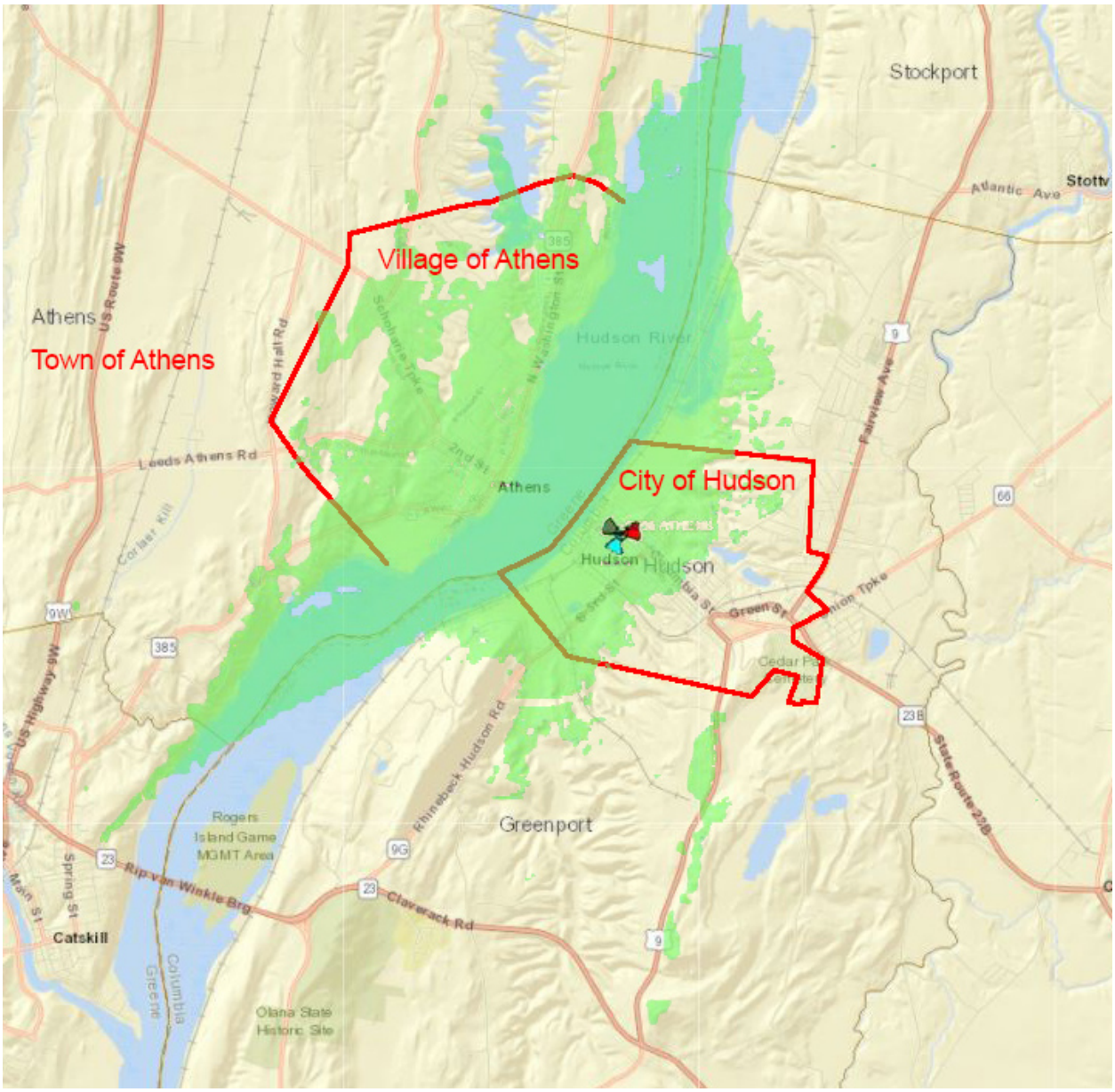


Figure 5 – Proposed Coverage (700 Mhz)

As can be seen in the image below, much of the downtown commercial, residential, and waterfront areas in the City of Hudson would receive 2100Mhz coverage with the proposed site, while none of the Village of Athens would receive high band coverage.

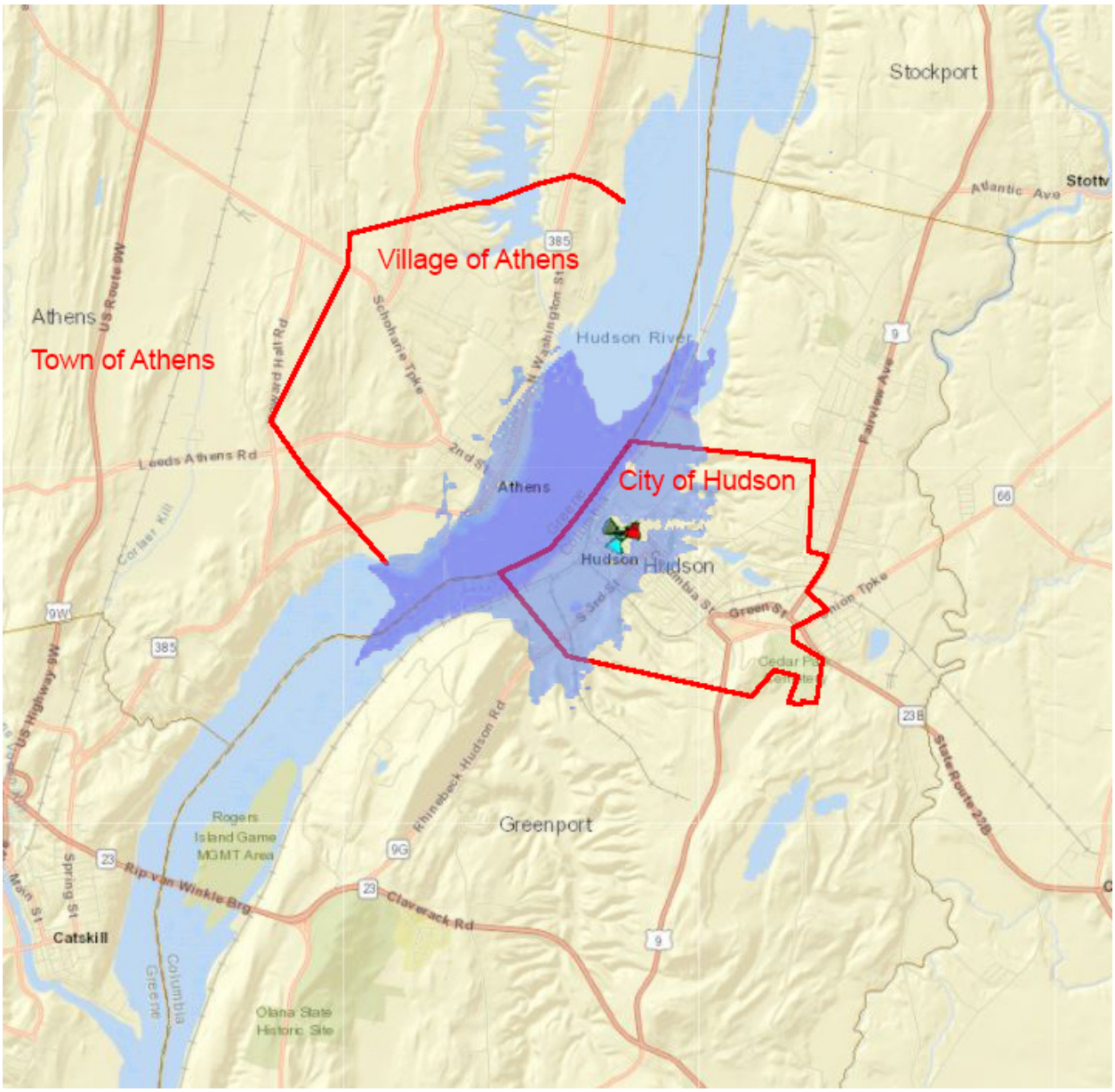


Figure 6 – Proposed Coverage (2100Mhz)

It must be noted that Figures 5 and 6 are simple geographic analyses of coverage maps (low band and high band frequencies) overlaid on municipal boundaries. They do not necessarily depict the known capacity issues. As Verizon is licensed by the FCC to operate at both low and high band frequencies, the coverage and capacity data submitted for the 119 Columbia Street application appears to support the statement that service from the site – if approved and constructed – will predominately service the City of Hudson.

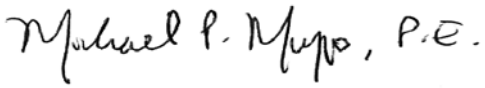
Please feel free to contact us should you have any questions on this memorandum.

Sincerely,

Henningson, Durham & Richardson

Architecture and Engineering, P.C.

in association with HDR Engineering Inc.



Michael P. Musso, P.E.

Senior Project Engineer

Stacey L. Calta, RLA.

Landscape Architect

Attachments

cc: S. Olson, Esq.