Attachment 5

Visual Resource Evaluation Report

Proposed Wireless Telecommunications Facility

AT&T Site ID: SR1038

National Guard Armory

284 New Canaan Avenue

(Route 123)

Norwalk, Connecticut

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June 2011

Visual Resource Evaluation

New Cingular Wireless PCS, LLC ("AT&T") seeks approval from the Connecticut Siting Council for a Certificate of Environmental Compatibility and Public Need for the construction of a wireless telecommunications facility ("Facility") to be located on property at 284 New Canaan Avenue (Route 123) in the City of Norwalk, Connecticut (identified herein as the "host property"). This Visual Resource Evaluation was conducted to approximate the visibility of the proposed Facility within a two-mile radius of the Site ("Study Area"). The Study Area also includes land located within of the neighboring municipalities of New Canaan, Connecticut to the west; Wilton, Connecticut to the north; and Darien, Connecticut to the southwest. Attachment A contains a map that depicts the location of the proposed Facility and the limits of the Study Area.

Project Introduction

The proposed Facility includes the installation of a brown, 140-foot tall monopole where the telecommunications antenna panels and coaxial cable would be interior mounted such that no exterior antennas or related infrastructure would be visible. AT&T's antennas would be located at centerline heights of 137 feet above ground level (AGL) and 127 feet AGL. The monopole and associated ground equipment would be situated within a 50-foot by 80-foot fence-enclosed compound. The proposed Facility location's ground elevation lies at approximately 197 feet Above Mean Sea Level (AMSL). The proposed Facility would be accessed via an existing parking area currently located on the host property. AT&T's compound area has been designed to include adequate space for a future monopole of similar design to accommodate potential collocation opportunities (to be permitted and constructed by others when the need arises).

Site Description and Setting

The host property is located at the west end of Norwalk, adjacent to the Merritt Parkway and approximately 0.125 mile east of the New Canaan town line. Identified in the City of Norwalk Tax Assessor's records as Map 5/ Block 46/ Lot 76-0, the host property consists of approximately 11.50 acres of land and is currently occupied by the Connecticut National Guard Norwalk Armory building and associated parking area. The proposed Facility site would be located adjacent to the existing parking area, roughly 480 feet to the northeast of the Norwalk Armory building. A natural gas right-of-way traverses the northern portion of the host property. Land use within the general vicinity of the proposed Facility and host property consists primarily of medium-density residential development and transportation infrastructure associated with Route 15 (Merritt Parkway). In total, the Study Area features approximately 168 linear miles of roadways, including portions of State Routes 7, 15, 123 and 124.

The topography within the Study Area is characterized by rolling hills with ground elevations that range from approximately 30 feet AMSL to just over 430 feet AMSL. The Study Area contains approximately 88 acres of surface water that includes Deering Pond located approximately 1.33-mile to the southeast of the proposed Facility; Kellogg Pond located 1.30-mile to the southeast; portions of the Silvermine River located approximately 0.87 miles to the northeast; and portions of the Norwalk River located roughly 1.54-mile to the east. The tree cover within the Study Area consists of mixed deciduous hardwood species interspersed with stands of mature evergreens and occupies approximately 4,806 acres of the 8,042-acre study area (60%). During the in-field activities associated with this analysis, a laser range finder was used to determine the average tree canopy height throughout the Study Area. Numerous trees were selected for measurement and the average tree canopy was determined to be 65 feet.

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METHODOLOGY

To represent the visibility associated with the proposed Facility, VHB used a two-fold approach combining both a predictive computer model and in-field analysis. The predictive model was used to assess potential visibility throughout the entire Study Area, including private property and/or otherwise inaccessible areas for field verification. A "crane test" and Study Area drive-through reconnaissance were also conducted to obtain locational and height representations, back-check the initial computer model results and provide documentation from publicly accessible areas. Results of both activities were analyzed and incorporated into the final viewshed map. A description of the methodologies used in the analysis is provided below.

Visibility Analysis

VHB used ArcGIS® Spatial Analyst, a computer modeling tool developed by Environmental Systems Research Institute, Inc., to calculate the areas from which at least the top of the proposed Facility is expected to be visible. Project- and Study Area-specific data were incorporated into the computer model, including Facility height, locations and ground elevations, underlying and surrounding topography and existing vegetation. Information used in the model included Connecticut LiDAR[1]-based digital elevation data and a digital forest (or tree canopy) layer developed for the Study Area. The LiDAR-based Digital Elevation Model (DEM) represents ten-foot spatial resolution elevation information for the state of Connecticut that was derived through the spatial interpolation of airborne LiDAR-based data collected in the year 2000 and has a horizontal resolution of ten (10) feet. The LiDAR-based data was edited in 2007 and made available by the University of Connecticut through its Center for Land Use Education and Research (CLEAR). To create the forest layer, mature trees and woodland areas depicted on aerial photographs (ranging in dates from 2004 to 2010) were manually digitized (hand traced) in ArcGIS®, creating a geographic data layer for inclusion in the computer model. The black and white, digital aerial photographs, obtained from the Connecticut Department of Transportation, were flown in the spring of 2004 and selected for use in this analysis because of their image quality and depiction of pre-leaf emergence (i.e., "leaf-off") conditions; these photographs are half-foot pixel resolution. The 2008 and 2010 aerial photographs are one-meter pixel resolution. The more recent aerial

[1] LiDAR is an acronym for Light Detection and Ranging. It is a technology that utilized lasers to determine the distance to an object or surface. LiDAR is similar to radar, but incorporates laser pulses rather than sound waves. It measures the time delay between transmission and reflection of the laser pulse.

photographs (2008 and 2010) were overlaid and evaluated to identify any new development resulting in the removal of trees.

Once the specific data layers were entered, the ArcGIS® Spatial Analyst Viewshed tool was applied to achieve an estimate of locations where the proposed Facility could be visible. First, only topography was used as a possible visual constraint; the tree canopy was omitted to evaluate potential visibility with no intervening vegetative screening. The initial omission of this data layer resulted in an excessively conservative prediction, but it provided an opportunity to identify areas within potential direct lines of sight of the Facility.

The forest data layer was then overlaid and built into the DEM, using a conservative average tree canopy height of 50 feet, to establish a baseline assessment of intervening vegetation. The resultant preliminary viewshed map was used during the in-field activities to compare the outcome of the initial computer modeling with observations of the crane test and to identify any significant deviations that may have occurred due to land use changes. Information obtained from the field reconnaissance was ultimately incorporated into the model to refine the viewshed map.

The average tree canopy height was also refined based on information collected in the field using a combination of a hand-held laser range finder, clinometer and comparative observations. The revised average tree canopy height, in this case 65 feet, was then incorporated into the model and the results displayed on the viewshed map. The forested areas were overlaid on the DEM with a height of 65 feet added to the base elevation and the visibility from within the Study Area calculated.

As a final step, the forested areas were extracted from the areas of visibility, using a conservative assumption that a person standing within the forest will not be able to view the proposed Facility beyond a distance of approximately 500 feet. Depending on the density of the intervening tree canopy and understory of the surrounding woodlands, it is assumed that some locations within this distance could provide visibility of at least portions of the proposed Facility at any time of the year. In "leaf-on" conditions, this distance may be overly conservative for most locations. However, for purposes of this analysis, it was reasoned that forested land beyond 500 feet of the proposed Facility would consist of light-impenetrable trees of a uniform height.

Also included on the map is a data layer, obtained from the State of Connecticut Department of Environmental Protection ("CTDEP"), which depicts various land and water resources such as parks and forests, recreational facilities, dedicated open space, CTDEP boat launches and other categories. Lastly, based on a review of information published by the Connecticut Department of Transportation (ConnDOT) and discussions with municipal officials in Norwalk, New Canaan, Darien and Wilton, VHB has determined that the segment of Route 15 (Merritt Parkway) that traverses the Study Area is a designated national scenic byway.

Crane Test and Study Area Reconnaissance

On October 20, 2010 Vanasse Hangen Brustlin Inc., (VHB) observed a crane test at the project Site and conducted a Study Area reconnaissance to further evaluate the potential viewshed associated with the proposed Facility. The crane test consisted of locating a crane at the proposed Facility site and raising an equipment bucket attached to its boom arm to a height of 140 feet AGL. VHB staff conducted a drive-by reconnaissance along the roads located within the Study Area with an emphasis on nearby residential areas and other potential sensitive receptors in order to evaluate and refine the results of the preliminary viewshed map and to verify where the crane arm was, and was not, visible above and/or through the tree canopy. During the in-field activities, weather conditions were sunny with a temperature of approximately 50 to 60 degrees Fahrenheit.

Photographic Documentation

During the crane test, VHB personnel drove the public road system within the Study Area to inventory those locations where the crane arm was visible. The crane arm was photographed from a number of representative vantage points to document the actual view towards the proposed Facility. The locations of the photos are described in the table below:

View	Location	Orientation	Dist. To Site	Visibility
1	Route 15 (Merritt Parkway) south of Interchange 38	Northeast	± 0.25-Mile	Year-Round
2	Adjacent to #7 New Canaan Way	Northwest	± 0.36-Mile	Year-Round
3	Adjacent to #275 New Canaan Avenue (Route 123)	Northwest	± 0.19-Mile	Year-Round
4	New Canaan Avenue (Route 123) at Commuter Parking Lot across from host property	Northeast	± 0.17-Mile	Year-Round
5	New Canaan Avenue (Route 123) across from existing access drive to host property	Northeast	± 0.18-Mile	Year-Round
6	Adjacent to #46 Carter Street	Northeast	± 0.17-Mile	Seasonal
7	Carter Street at existing natural gas right-of-way	Northeast	± 0.15-Mile	Year-Round
8	Route 123 at Old Norwalk Road	Northeast	± 0.44-Mile	Not Visible
9	Adjacent to #178 Pocconock Trail	Southeast	± 0.11-Mile	Not Visible
10	Adjacent to #128 Pocconock Trail	Southeast	± 0.22-Mile	Not Visible
11	End of Klim Lane	Southwest	± 0.16-Mile	Not Visible
12	Adjacent to #19 Fullmar Lane	Southwest	± 0.22-Mile	Not Visible/Limited Seasonal
13	Route 15 (Merritt Parkway) Interchange 38 on-ramp	Northwest	± 0.18-Mile	Not Visible

Photographs of the crane arm from the view points listed above were taken with a Nikon D-3000 digital camera body equipped with a Nikon 18-135 mm zoom lens. For the purposes of this analysis, a lens setting of 50 mm was utilized to obtain views of the crane from all but one of the photographic locations listed above, "The lens that most closely approximates the view of the unaided human eye is known as the normal focal-length lens. For the 35 mm camera format, which gives a 24x36 mm image, the normal focal length is about 50 mm.[2]" The locations of the photographic points are recorded in the field using a GPS-enabled tablet computer and were subsequently plotted on the maps contained in the attachments to this document.

Photographic Simulation

Photographic simulations were generated for the representative locations where the crane arm was visible during the in-field activities. The photographic simulations portray a scaled rendering of the proposed Facility from these locations. The potential future monopole also depicted in the simulations to present a full-build scenario. Using field data, site plan information and 3-dimension (3D) modeling software, a scaled model of the facility and spatially referenced model of the Study Area were generated. Geographic coordinates (latitude and longitude) were collected in the field for all of the photograph locations via GPS and later used to generate virtual camera positions within the spatial 3D model. Photo simulations were then created using a combination of renderings generated in the 3D model and photo rendering software programs. The crane arm was included in the photographs to provide a visual marker and to cross-reference the height and proportions of the proposed Facility. A photolog map and the simulations are contained in Attachment A.

CONCLUSIONS

Based on this analysis, areas from where the proposed 140-foot tall flagpole would be visible above the tree canopy comprise approximately 7.6 acres, or approximately 0.094 percent of the 8,042-acres of land contained within Study Area. As depicted on the attached viewshed map, the majority of year-round visibility associated with proposed Facility would occur on the host property and along select portions of Route 123 and Carter Street within the immediate vicinity of the host property (Views 3 through 7). The map also depicts several small areas of anticipated year-round visibility along nearby segments of Route 15 (Merritt Parkway; View 1) and along select portions of New Canaan Way (View 2). VHB estimates that at least partial year-round views of the proposed Facility may be achieved from portions of approximately 4 residential properties located within the Study Area. The locations of these properties are summarized in the table below. Overall, potential year-round views of the proposed Facility would be limited to the areas described above by the intervening topography and vegetation contained within the Study Area. This is particularly true among the adjacent residential areas to north, northwest and northeast of the proposed Facility

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[2] Warren, Bruce. *Photography*, West Publishing Company, Eagan, MN, c. 1993, (page 70).
Note: Focal lengths ranging from 17 mm to 50 mm can approximate views similar to that achieved from the unaided human eye. Two key factors to consider when determining what specific focal length to use to best represent "real world" conditions is field of view and relation of sizes between objects in the frame. A 17 mm focal length has a wider field of view, which is more representative of the overall extent (including peripheral vision) that the human eye typically sees. At this focal length, relation of sizes between objects is skewed and not entirely accurate to what the human eye experiences. A 50 mm focal length has a narrower field of view than that of the human eye; however, the relation of sizes between objects is more representative to that of what the human eye perceives. When producing photographic simulations, VHB has chosen to use a 50 mm focal length whenever possible. For presentation purposes, such as in this report, the photographs are produced and viewed in an approximate 6.5" by 9.5" format. VHB has determined that when viewing a proposed facility at this format size, it is important to provide the largest representational image while maintaining an accurate relation of sizes between objects within the frame of the photograph.

where established stands of deciduous and evergreen trees would provide significant screening even during leaf-conditions.

The viewshed map also depicts several additional areas where seasonal (i.e. during "leaf off" conditions) views are anticipated. These areas comprise approximately 61 additional acres and are generally located within the immediate vicinity of the host property with several areas located along Fullmar Lane and New Canaan Way. Given the significant vegetative screening that currently exists in these areas, potential seasonal views are expected to be somewhat limited in their extent.

VHB estimates that seasonal views of the proposed Facility could be achieved from portions of approximately 23 additional residential properties, the locations of which are provided in the table below.

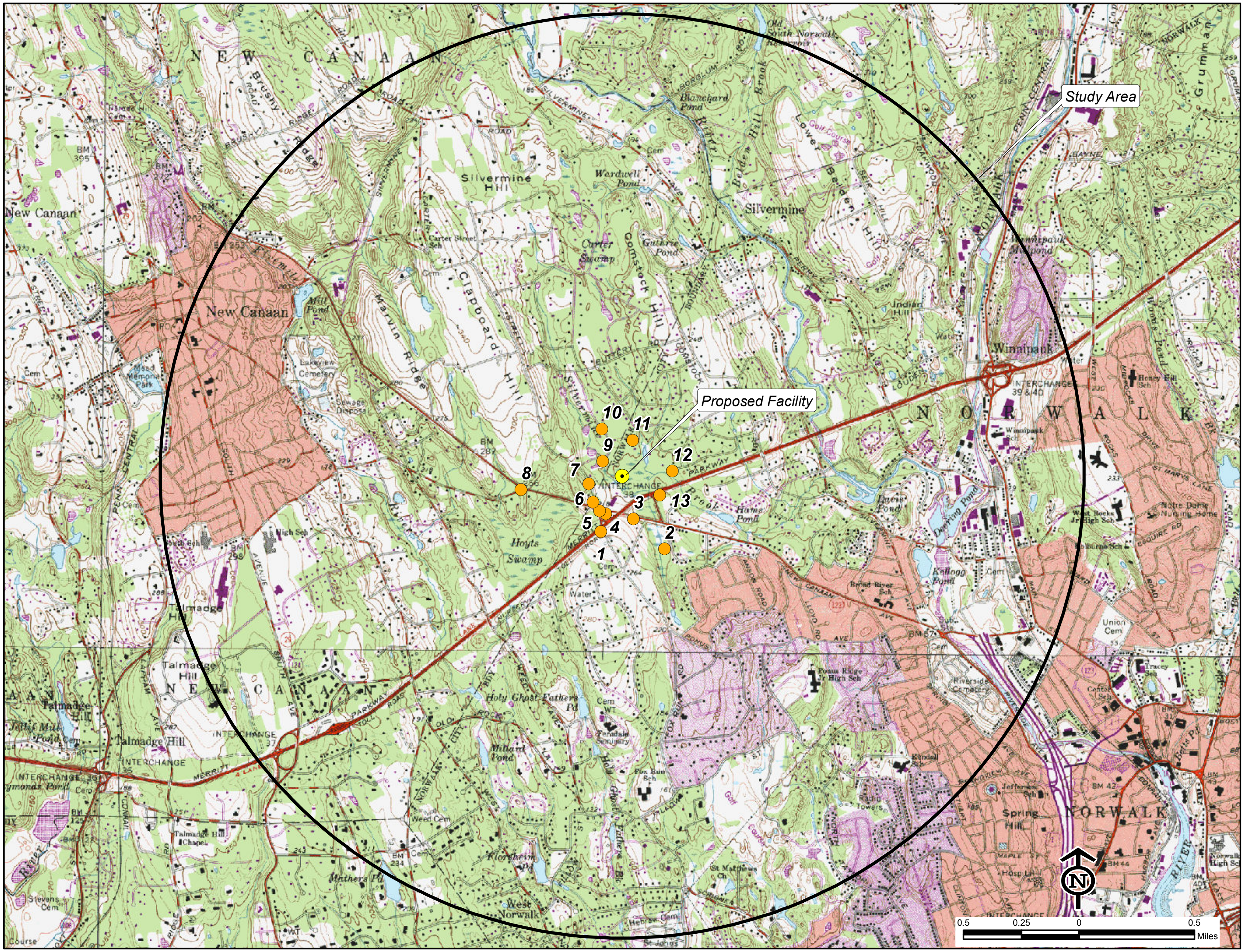
Location	*Number of Residential Properties With Potential Year-Round Visibility (Leaf-On)	*Number of Residential Properties With Potential Seasonal Visibility (Leaf-Off)
Carter Street	2	5
Fullmar Lane	0	4
Klim Lane	0	3
May Drive	0	1
New Canaan Way	2	7
Pocconock Trail	0	3
TOTAL:	**4**	**23**

*Indicates potential year-round or seasonal visibility from portions of "residential" properties. For purposes of this analysis, the term "residential" property may include undeveloped or agricultural land, forested tracts with some clearing, and/or parcels with non-residential structures. Potential visibility on a residential property does not necessarily mean that views would be achieved from within residential dwellings, exterior decks, porches or patios that might be located on such properties. Further, it may be possible to view the Facility from within portions of the shaded areas indicating potential visibility, but not necessarily from all locations within those shaded areas.

Attachment A

Photolog Documentation Map, Crane Test Photographs, and Photographic Simulations

PHOTOLOG MAP



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PHOTOGRAPHIC DOCUMENTATION

VIEW	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
1	ROUTE 15 (MERRITT PARKWAY) SOUTH OF INTERCHANGE 38	NORTHEAST	0.25 MILE +/-	YEAR-ROUND

VIEW	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
1	ROUTE 15 (MERRITT PARKWAY) SOUTH OF INTERCHANGE 38 (potential future facility would not be visible from this location during "leaf-on" conditions)	NORTHEAST	0.25 MILE +/-	YEAR-ROUND

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VIEW	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
2	ADJACENT TO #7 NEW CANAAN WAY	NORTHWEST	0.36 MILE +/-	YEAR-ROUND

PHOTOGRAPHIC SIMULATION

VIEW	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
2	ADJACENT TO #7 NEW CANAAN WAY	NORTHWEST	0.36 MILE +/-	YEAR-ROUND

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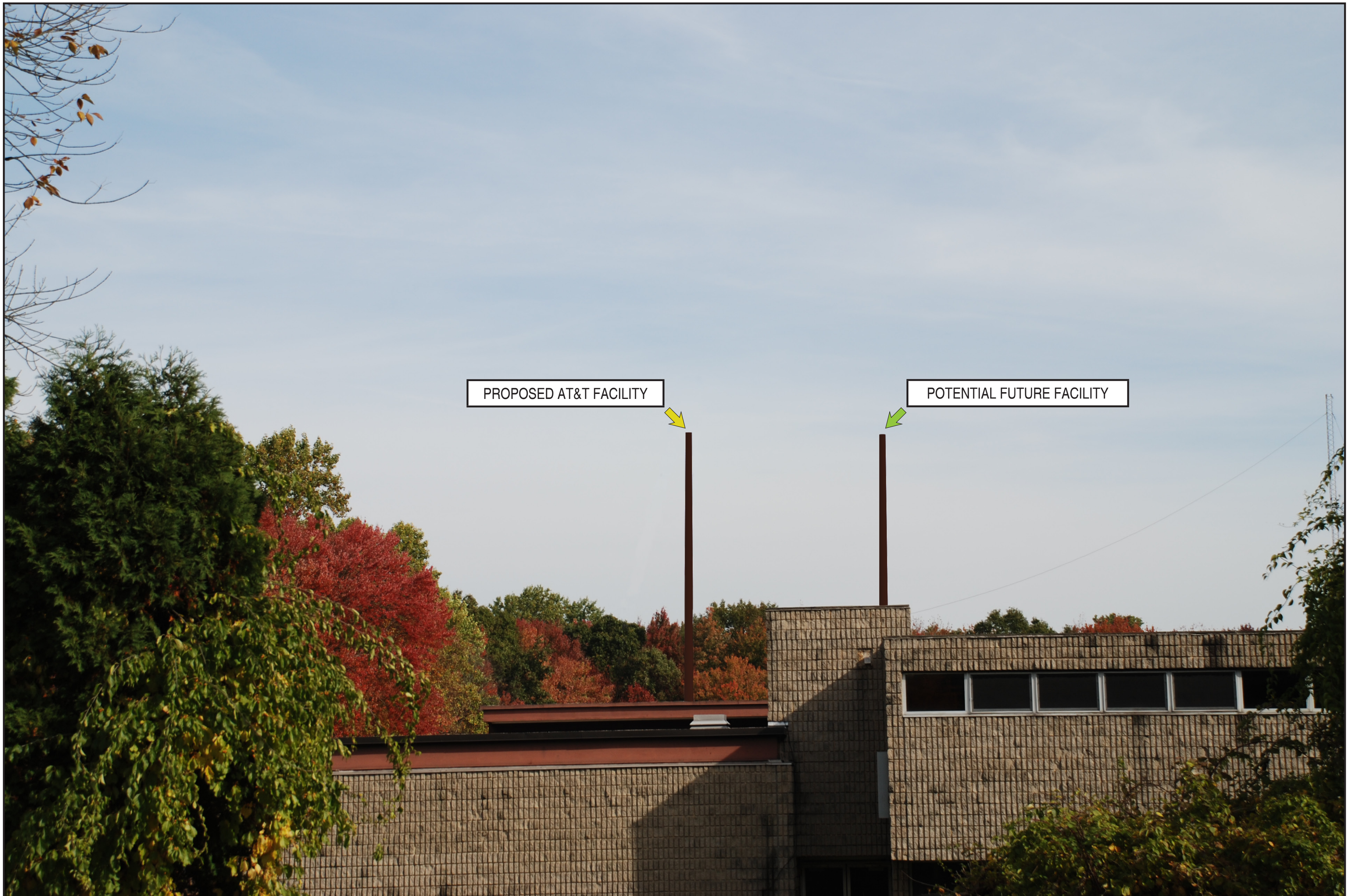
VIEW	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
3	ADJACENT TO #275 NEW CANAAN AVENUE (ROUTE 123)	NORTHWEST	0.19 MILE +/-	YEAR-ROUND

PHOTOGRAPHIC SIMULATION

VIEW	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
3	ADJACENT TO #275 NEW CANAAN AVENUE (ROUTE 123) (potential future facility would not be visible from this location during "leaf-on" conditions)	NORTHWEST	0.19 MILE +/-	YEAR-ROUND

VIEW	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
4	NEW CANAAN AVENUE (ROUTE 123) AT COMMUTER PARKING LOT ACROSS FROM HOST PROPERTY	NORTHEAST	0.17 MILE +/-	YEAR-ROUND

PHOTOGRAPHIC SIMULATION



VIEW	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
4	NEW CANAAN AVENUE (ROUTE 123) AT COMMUTER PARKING LOT ACROSS FROM HOST PROPERTY	NORTHEAST	0.17 MILE +/-	YEAR-ROUND

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