15 Chestnut Street
4th Floor
Worcester, MA 01609

Paula Foley
Network Real Estate / Regulatory

July 28, 2022

Andover Select Board
c/o Office of the Town Manager
Town of Andover
36 Bartlet Street
Andover, MA 01810

Re: Verizon Small Cell Wireless Facilities Application

Dear Select Board and Town Manager:

Enclosed please find an Application for approval of five (5) small cell wireless facilities on existing utility poles located within the public right of way. We are submitting this Application, $500.00 application fee, and supporting materials pursuant to the Town of Andover Policy concerning Applications for Small Cell Wireless Installations and Design Rules and Regulations effective April 11, 2019.

Thank you for your assistance in this matter. Should you have any questions, please feel free to contact me.

Yours sincerely,

Paula Foley

Paula Foley
Network Real Estate / Regulatory
M: 508.296.0172
Paula.foley@verizonwireless.com

Attachments: Application and Exhibits

verizon

Town of Andover
Applications for Small Cell Wireless Installations
Cover Sheet

Applicant's use of this cover sheet is mandatory. It is meant to provide a framework to ensure compliance with the Town of Andover's Policy for Applications for Small Cell Wireless Installations.

Total number of Small Wireless Facilities being requested on this application
5 (Per town policy, no application may exceed 5 proposed facilities)

Total number of applications filed by the applicant or closely held applicant in the last 60 days (Per town policy, no application will be accepted if more than 2 applications have been filed in that time period)

☑ Date and Time stamped on each application

$500 made out to the Town of Andover for up to five locations for initial application review
$100 for each additional location

All applications shall number each page with easily identifiable identifier numbers unique to each application

Specify whether the application is under the FCC Declaratory Ruling and Third Report and Order, §6409/Wireless Siting Order, or neither: ***FCC Declaratory Ruling and Third Report and Order 18-133 ("FCC Small Cell Order")***

a. If §6409 application, submit documentation to establish the basis for that conclusion

Specify which shot clock (60-90-150 day) applies and the basis for that conclusion:

60 day shotclock applies per 47 CFR § 1.6003(c)(1)(i) (review of application to collocate a Small Wireless Facility on an existing structure)

10 day receipt date 8/8/22

Applications complete, including receipt of all permits or notification that a permit was not needed except for a building permit from other town boards and commissions applicable to the proposed locations and facilities? Yes No

Checklist of prior reviewing departments (insert Y, N, or N/A)

_____ Police
_____ Fire
_____ Board of Health
_____ Conservation Commission
_____ Planning

_____ Engineering
_____ Building
_____ Other (specify)

a. Submit a copy of all such received permits or verification that no permit is needed

If no, which applications are incomplete (any incomplete applications will be rejected)

a. Identify how each application is incomplete

Date and time of re-submission _____

Public Hearing Notice published in a newspaper of general circulation and mailed to abutters within 300 feet of the proposed locations by applicant using notice provided by Town.
The applicant must obtain the certified abutter's list from the Assessor's Office.

Public Hearing fee is paid for by applicant.

Ten (10) hard copies of the application are required
One (1) electronic copy to manager@andoverma.gov sent on 7/28/22

Applicant's name **Cellco Partnership d/b/a Verizon Wireless**
Address **15 Chestnut Street, 4th Floor, Worcester, MA 01609**
Telephone number **508-269-0172**
Email address. **paula.foley@verizonwireless.com**

Names, addresses, telephone numbers, and email addresses of anyone acting on behalf of the Applicant with respect to the application.

Paula Foley, Verizon Wireless Network Real Estate
15 Chestnut Street, 4th Floor
Worcester, MA 01609
508-269-0172
paula.foley@verizonwireless.com

Michael Fox, SAI Group LLC
12 Industrial Way
Salem, NH 03079
617-571-8835
mfox@saigrp.com

Ensure that wet stamps/wet signatures of professional designers are on all drawings

Include detailed drawings and descriptions of the equipment to be installed, whether mounted on poles or on the ground, or otherwise, including:

Description of type of equipment ***Please refer to Exhibit 1, Site Drawings and see attached Narrative.***

Specifications of equipment ***Please see attached Narrative.***

Dimension of each piece of equipment and total dimensions of all equipment ***Please see attached Narrative.***

Costs of all equipment and installation ***Please see attached Narrative.***

Total weight at each location ***Please see attached Narrative.***

How will equipment be mounted and what type of material will be used to mount equipment

Please see attached Narrative.

All power sources for equipment (comment on necessary wires, cables, and conduit)

Please see attached Narrative.

Expected life of equipment

Please see attached Narrative.

Coverage area of equipment on the location

Please see attached Narrative.

Amount of antennas

Antenna model

Antenna length remote radio units (RRU) count and power

Antenna height

Typical coverage area radius

Please see attached Narrative.

Call capacity of equipment, including:

Total RRUs

Max bandwidth per RRU

Multiple input, multiple output (MIMO) per RRU

Backhaul rate per RRU

Please see attached Narrative.

Hardening, including:

Is there battery backup

Is there generator backup

Will there be multiple fiber paths to switch
Please see attached Narrative.

Frequency of equipment proposed to be installed. ***Please see attached Narrative.***

Photos, rendering and elevation of equipment proposed to be installed:

☑Include detailed map with locations of the poles or other facility on which equipment is to be located, including specific pole identification number, if applicable, and the areas it will service. Location details must be provided to be compatible as an additional data layer to the Town's GIS map ***Please refer to Exhibit 1, Site Drawings.***

☑Include detailed map showing existing and proposed small cell installations within 500 feet of the Application site. ***There are no existing small cell installations within 500' of Verizon's proposed sites, however Verizon does not know if other applicants have proposed installations. Please refer to Exhibit 2, Distance Maps.***

☑Include certification by a registered professional engineer that the pole/or location will safely support the proposed equipment. ***Please refer to Exhibit 3, Pole Structural Certifications***

☑Include written consent from the pole, structure, or facility owner to the installation.

Please refer to Exhibit 4, Letter of Authorization

☑Include an affidavit from a Radio Frequency Engineer outlining the network/network service requirements in Andover and how the installations address that need in Andover. Such affidavit should characterize the current level of coverage and how the desired installations will change the current level of coverage, through or with coverage maps, including current and proposed coverage, including a breakdown of "excellent" "good and "poor" reception areas.

Please refer to Exhibit 5, RF Engineer Affidavit

☑Include insurance certificate evidencing workers' compensation and comprehensive general liability coverage for the installation.

Please refer to Exhibit 6, Certificate of Insurance

☑Include a description as to why the desired location is superior to other similar locations, from a community perspective, including:

☑Visual aspects ***Please refer to attached Narrative***

☑Proximity to residential structures ***Please refer to attached Narrative***

☐Include a description of efforts to co-locate the equipment on existing structures, poles, or towers which currently exist or are under construction. A good faith effort to co-locate is required and evidence of such efforts must be included within the application.

Please refer to attached Narrative

☐Include a narrative of how design requirements have been met.

Please refer to attached Narrative

☐Include an affidavit from the applicant which certifies that it will maintain the installations in good repair and according to FCC standards, and will remove any installation not in such good repair, or not in use, within 60 days of being no longer in good repair or no longer in use.

Please refer to Exhibit 7, Project Engineer Affidavit

☐Include surety bond on which the Town is obligee, in an amount equal to the cost of installation, to ensure removal of equipment. ***Please refer to attached Narrative***

Annual Re-Certification and Affidavit.

- Each year on July 1 the party responsible for the equipment maintenance shall submit an affidavit which shall list, by location, all small cell wireless installations it maintains within the Town of Andover by location, and shall certify: (1) each such installation that remains in use; (2) that such in use installations remain covered by insurance as required by MassDOT; and (3) each such installation which is no longer in use.
- The party responsible for the equipment maintenance shall pay an annual re-certification fee of $100 per installation which remains in use.
- Any small cell wireless installation which is no longer in use shall be removed by the owner within 60 days of receipt of the annual re-certification affidavit, at that party's expense.
- Any small cell wireless installation which is not removed within 60 days after being listed as no longer in use in the annual re-certification affidavit shall be subject to a fine of $100/day against the party responsible for the equipment's maintenance until such installation is removed.
- Where such annual re-certification has not been timely submitted, or equipment no longer in use has not been removed within the required 60-day period, no further applications for small cell wireless installations will be accepted by the Town until such time as the annual re-certification has been submitted and all fees and fines paid.

☐ Agree to annual re-certification and affidavit and payment as shown above.

Conditions/Prohibitions.

- No small cell wireless installations shall be installed on double poles.
- No small cell wireless installation shall be installed on poles which are not ADA compliant.
- No small cell wireless installations shall remain within the Town right of way or on Town property which has not been certified as in use in the annual re-certification affidavit.

- No small cell wireless installation equipment shall be replaced or altered without a re-application, hearing, and approval from the Board of Selectmen unless the equipment is no longer properly functioning, and it is being replaced with the same or substantially similar equipment.

☑Agree to Conditions/Prohibitions as set forth in town bylaws and policies.

As submitted by,

Paula Foley, Network Real Estate / Regulatory

Verizon Wireless

15 Chestnut Street, 4th Floor

Worcester, MA 01609

VERIZON WIRELESS

NARRATIVE IN SUPPPORT OF

SMALL CELL WIRELESS FACILITIES APPLICATION

DATE SUBMITTED: 7/28/22

PROPOSED LOCATIONS:

SITE NAME	ADDRESS	UTILITY POLE #
ANDOVER_MA_SC17	39 Stinson Road	6821
ANDOVER_MA_SC18	36 Vine Street (Pole on Andover Bypass Road)	4540
ANDOVER_MA_SC30	164 Andover Street	4266/39
ANDOVER_MA_SC33	2 Hanscom Road (Pole on LoveJoy Road)	7167/32
ANDOVER_MA_SC35	59 Dascomb Road	2857, 19/20

Description of type of equipment:

The proposed small cell installations will include one (1) canister style antenna, two (2) remote radio heads, and associated wires, cable, fiber demarcs, A/C converters, diplexers and electric meters attached to existing utility poles in the public rights of way in Andover, MA. Similar in appearance to equipment commonly seen on utility poles, the proposed small cell attachments consist of a single antenna and small radios that will be mounted on the top or the side of the existing utility poles which carry electric and communications services. The Verizon equipment will draw power by connecting to the existing electrical service on the pole. It will also tie into the fiber already on the pole to make a backhaul connection to an existing equipment room. The installations will not include any ground equipment or ground disturbance.

The small cell facilities will operate as an integral part of the Verizon network and will improve the reliability of wireless service for Andover residents and businesses. The small cell facilities will provide improved service to areas where wireless service is currently unavailable or unreliable because the wireless signal is dissipated by the distance from the nearest macro (i.e., tower) facility, obstructed by intervening terrain, or diverted by high demand. In order to upgrade service, Verizon will need to attach the proposed small cells to utility poles located in the Town rights of way that will address both gaps in reliable coverage and enhance system performance.

Small cell technology provides for the continued deployment of Verizon's network in Andover and the greater Commonwealth. The small size and unique design of small cell units allows Verizon to strategically install antennas in high demand locations while mitigating visual impact and increasing wireless performance in targeted areas.

In contrast to conventional, single-location, multi-function macro wireless facilities, small cell technology provides site-specific network solutions in small, visually unobtrusive units. Verizon uses small cell antennas to combine transmission and processing in a single canister style unit allowing antenna placement and signal creation without the need for ground equipment. This type of signal

processing is highly advantageous in high demand locations where network capacity is an issue during periods of peak use. Subsequently, municipalities can experience substantially improved wireless coverage by the use of this state of the art and discreet antenna technology.

Verizon proposes the attachment of one (1) small cell antenna on each of the five (5) existing utility poles. Each installation consists of a 14" D x 35.4" H canister antenna top or side mounted on the utility pole and resembles a common electric transformer. The antennas comply with all applicable FCC radio frequency emissions standards and regulations, and require minimal maintenance. Subsequently, the antennas will not impact utilities, schools, traffic or other municipal resources in the Town of Andover but will greatly improve wireless connectivity in the vicinity of the antennas in the least disruptive manner possible and thus facilitate benefits to nearby residents and businesses as well as enhancing access to 911 and emergency services.

Dimensions, Specifications and Weight at each location:

Equipment	Height (in)	Width (in)	Depth (in)	Weight (lbs)	Volume (cubic feet)
Cantenna	35.4	14 (diameter)	N/A	35.0	2.98
RRH #1	17.3	17.3	11.5	102.5	1.9
RRH #2	13.9	9.8	4.8	21.4	0.37
Diplexer	4.8	7.9	3.3	7.6	0.07

Cost of all equipment and installations:

Verizon shall be responsible for all direct and indirect costs (labor, materials and overhead) for purchasing and installing its equipment in accordance with the Town-approved plans and all applicable laws. Verizon does not publicly disclose its equipment or installation costs.

Equipment mount type and materials:

Please reference **Exhibit 1, Site Drawings**. Each Site Drawing includes, at page LE-3, a "Cantenna Mount Detail" and "Ancillary Equipment Mounting Bracket Mount Detail."

Power source or sources for equipment (comment on necessary wires, cables, and conduits):

The power source for the proposed equipment is the existing utility company power line fed to a utility meter then to an electrical load center/diplexer located on the pole. Please reference **Exhibit 1, Site Drawings**, each Site Drawing, at page LE-4, includes a "Fiber / Electrical One-Line Diagram."

Expected life of equipment:

Approximately 2+ years.

Coverage area of equipment, including amount of antennas, model, length and height, remote radio units (RRU) count and power, and typical coverage area radius:

Small cells typically have a range from ten meters to several hundred meters. Please refer to the table above for antenna length and height. The proposed antenna model is JMA CX16OMI236-1C. There are two (2) RRUs on each proposed installation, each with a power output of 320W.

Call capacity of equipment, including Total RRUs, max bandwidth per RRU, multiple input, multiple output (MIMO) per RRU, and backhaul rate per RRU:

The radios are capable of processing simultaneous traffic on a maximum of 1,200 unique devices. The backhaul rate per RRU is CPRI rate 7 (about 9.8304 Gbps). This is a radio interface and does not reflect the max throughput per RRU. The max bandwidth per RRU is 10 MHz of 700 MHz / 10 MHz of 850 MHz (20 MHz total). MIMO capability per RRU is 4 transmit, 4 receive.

Hardening, including if there is a battery or generator backup and whether there are multiple fiber paths to switch:

There are no battery backups, generators or multiple fiber paths to switch for the proposed small cells.

Frequency of equipment to be installed:

700 MHz LTE and 850 MHz LTE

Description as to why the desired locations are superior to similar locations, from a community perspective, including visual aspects and proximity to residential structures:

Choosing a location for small cell infrastructure involves many factors, including local zoning requirements, state and federal regulations as well as aesthetic requirements established by the municipality. In addition, Verizon has many guidelines on where small cells may be located in terms of having an effective wireless network infrastructure site including but not limited to height of the antenna above ground level, proximity to other wireless infrastructure sites, the existence and degree of tree cover, and access to power and fiber backhaul connections.

The five (5) locations proposed by Verizon in this Application are superior to other locations in the Town given that they are set in areas of coverage need in the Town and will be used to increase the bandwidth and cellular quality of Verizon network devices in the vicinity. The five (5) locations are all within the public rights-of-way and the proposed locations comply with all of the requirements of National Grid to attach to its poles such as the absence of transformers. In addition, all five (5) installations comply with the Town's desire as stated in its the Small Cell Policy and Design Rules and Regulations for equipment to be collocated on existing structures.

In addition, each proposed location is located at a reasonable distance from the nearest residential structure. Of the five (5) locations proposed, the closest proximity to a residential structure is 39 feet and the furthest is 157 feet.

Description of efforts to collocate the equipment on structures, poles or towers which currently exist or are under construction. A good faith effort to collocate is required and evidence of said efforts must be included within the application:

All of the equipment is proposed to be collocated on existing utility poles in the public rights of way. Please reference **Exhibit 1, Site Drawings.**

How design requirements have been met:

The Town of Andover Small Cell Wireless Facility Design Rules and Regulations ("Design Rules") contains detailed standards and aesthetics for the design and installation of small wireless facilities. Each section of the Design Rules is discussed below.

Siting Prohibitions: Verizon's proposed facilities comply with the section of the Design Rules as they are to be installed on existing utility poles and not double poles or poles which are not ADA compliant. Verizon is not proposing ground mounted equipment or cabinets.

Aesthetic Requirements: Verizon's proposed facilities comply with this section of the Design Rules as they are to be installed on existing wood utility poles without exposed wires or signage other than FCC required information. Verizon is not proposing to install standalone poles.

Antennas: Verizon's proposed facilities comply with this section of the Design Rules as the proposed antennas will be canister-style and located on the top or side of the utility pole at a height of more than 10' above ground level. There will be no improper tree pruning or topping. There will be no external wires hanging off the utility poles. The color of the proposed equipment is neutral grey and will blend with the wood utility poles. Verizon is not proposing equipment cabinets or enclosures.

Signage/Logos/Lights/Decals/Cooling Fans: Verizon's proposed facilities comply with this section of the Design Rules as no signage other than that required by the FCC will be attached to the utility poles, as well as no lights, logos or decals. Verizon is not proposing the use of cooling fans.

Location Requirements: Verizon's proposed facilities comply with this section of the Design Rules in that they are located in the public rights of way in areas of the Town where wireless service needs improvement. All of Verizon's proposed equipment will be collocated on existing structures (i.e., utility poles); Verizon is not proposing to install standalone poles. The proposed equipment is similar in size, shape and color to equipment (such as transformers, junction boxes and cable television equipment) that are already located on utility poles in the vicinity, therefore Verizon's proposed facilities will not look out of character with the existing streetscapes. Verizon also complies with the additional guidelines on placement contained in section 7.6(a) through (m) of the Design Rules.

Pedestrian Path and Amenity Zone: Verizon's proposed facilities comply with this section of the Design Rules because Verizon is not proposing to install standalone poles. All of Verizon's proposed equipment will be located on existing utility poles in the public rights of way.

Access, Circulation and Sight Distances: Verizon's proposed facilities comply with this section of the Design Rules because Verizon is not proposing to install standalone poles. All of Verizon's proposed equipment will be located on existing utility poles in the public rights of way.

Other Required Submission Information: Please refer to **Exhibit 8, Composite Map**, for a composite map of the five (5) proposed locations. With regard to sharing of infrastructure, Verizon's proposed equipment is designed for use by Verizon only because each service provider has its own equipment requirements consistent with its own network needs. In addition, while cell towers can accommodate the equipment of multiple providers due to size of the tower infrastructure, utility poles cannot ordinarily accommodate more than one set of small cell equipment, therefore sharing of these types of support structures is not feasible.

Provide surety bond with Town named as oblige, in an amount equal to the costs of installation, to ensure removal of equipment:

Verizon agrees to provide a surety bond in a mutually agreeable amount for the installations that are approved by the Town.

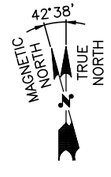
EXHIBIT 1:

SITE DRAWINGS

ANDOVER MA SC17

 # 6821
39 STINSON ROAD
ANDOVER, MA 01810

PRESIDING POWER COMPANY
nationalgrid



LOCATION PLAN-AERIAL IMAGE (1 / L-1)
SCALE: N.T.S

FIELD INSPECTION DATE: 04-25-2022

SITE COORDINATES:	LAT:	N42° 38' 11.57"±
	LONG:	W71° 06' 55.82"±
	LAT:	N42.636550°±
	LONG:	W71.115508°±
APPROXIMATE GROUND ELEVATION: 270.0'± AMSL		

SHEET INDEX

SHEET NO.	DESCRIPTION
L-1	LOCATION PLAN/AERIAL IMAGE
L-2	UTILITY POLE PHOTOGRAPH AND ELEVATION
L-3	ANTENNA & ANCILLARY EQUIPMENT ORIENTATION PLANS AND MOUNTING DETAILS
L-4	ANTENNA & ANCILLARY EQUIPMENT SPECIFICATIONS AND ONE-LINE DIAGRAM

HUDSON Design Group LLC
45 BEECHWOOD DRIVE
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

COMMONWEALTH OF MASSACHUSETTS
DANIEL P. HAMM
CIVIL
No. 40720
REGISTERED PROFESSIONAL ENGINEER

CHECKED BY: JX

APPROVED BY: DPH

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
0	07/22/22	LEASE EXHIBIT	SF

SITE NAME:
ANDOVER MA SC17

SITE ADDRESS:
6821
39 STINSON ROAD
ANDOVER, MA 01810

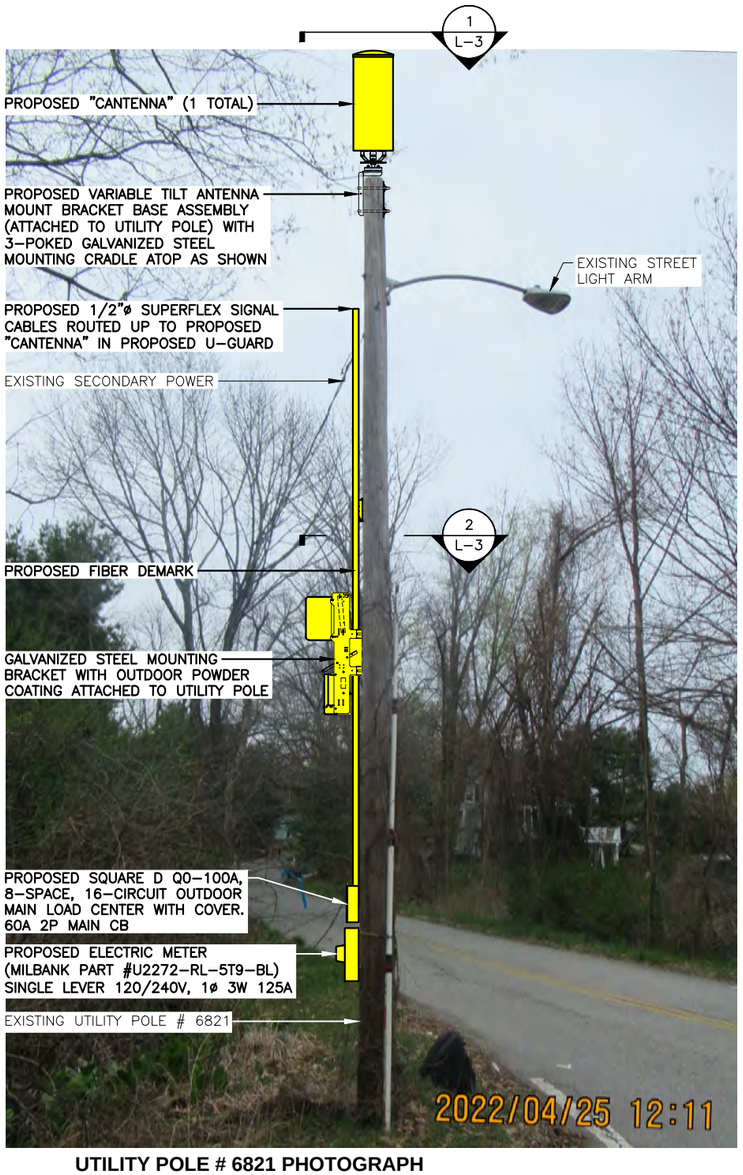
SHEET TITLE
LOCATION PLAN/AERIAL IMAGE

SHEET NUMBER
L-1

LEASE EXHIBIT
(NOT FOR CONSTRUCTION)

GENERAL NOTE:

1. THESE DRAWINGS ARE DIAGRAMMATIC IN NATURE AND ARE INTENDED TO PROVIDE GENERAL INFORMATION REGARDING THE LOCATION, SIZE AND ORIENTATION OF THE PROPOSED WIRELESS TELECOMMUNICATIONS EQUIPMENT INSTALLATION ON THE UTILITY POLE AND ARE NOT SPECIFICALLY INTENDED FOR CONSTRUCTION.
2. VERIZON WIRELESS SHALL PLACE WEATHER RESISTANT PHENOLIC PLACARDS ON UTILITY POLE AND ANCILLARY EQUIPMENT TO IDENTIFY EQUIPMENT OWNERSHIP & CONTACT INFORMATION TO BE UTILIZED IN THE CASE OF EMERGENCY.
3. AN ANALYSIS OF THE CAPACITY OF THE EXISTING UTILITY POLE TO SUPPORT THE PROPOSED LOADING HAS BEEN COMPLETED BY HUDSON DESIGN GROUP, LLC. REFER TO LATEST STRUCTURAL ANALYSIS.
4. VERIZON WIRELESS' GENERAL CONTRACTOR SHALL EXTEND EFFORTS TO ENSURE THAT ALL PROPOSED EQUIPMENT MEETS THE REQUIREMENTS OF THE EXISTING UTILITY COMPANY OR COMPANIES CURRENTLY OCCUPYING THE UTILITY POLE AND THE 2017 NATIONAL ELECTRICAL SAFETY CODE.

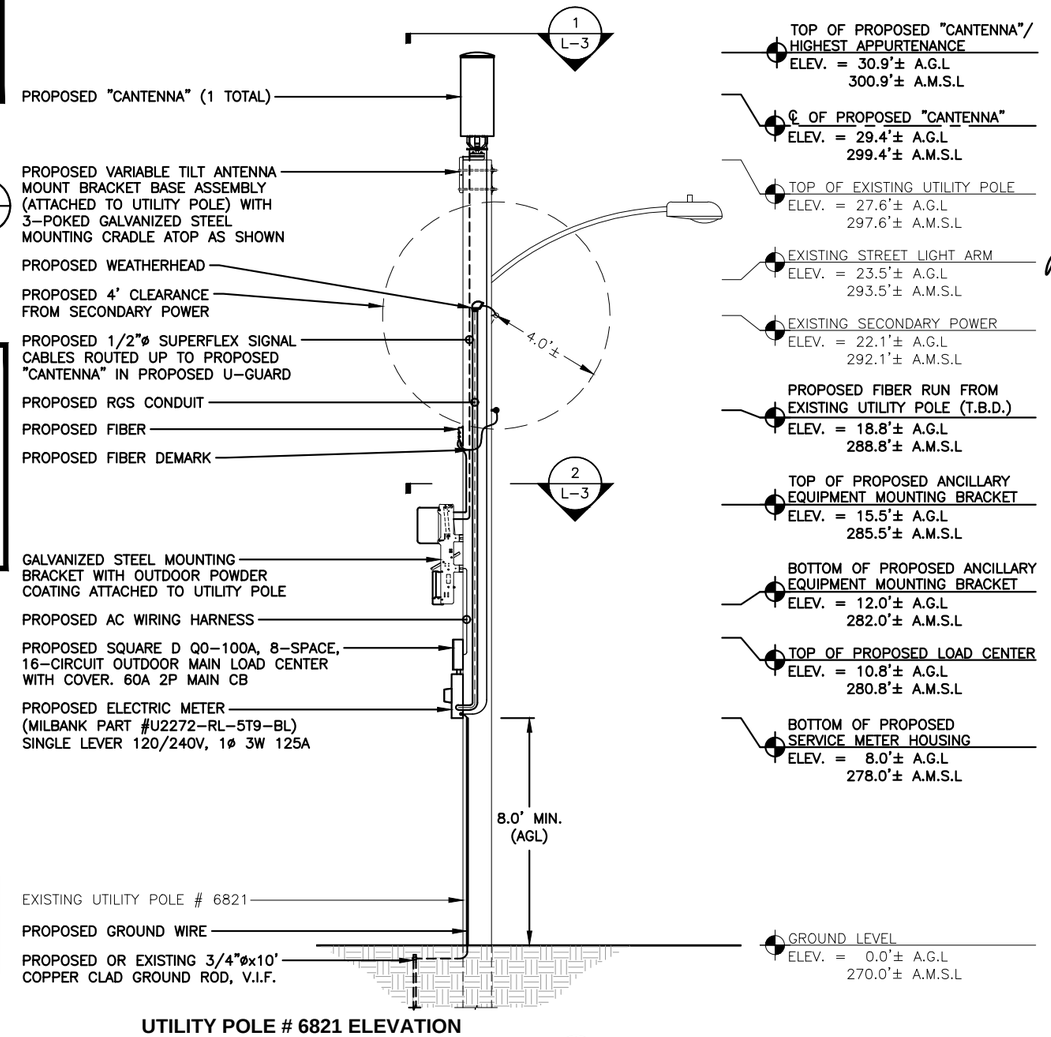


UTILITY POLE # 6821 PHOTOGRAPH
(EXISTING CONDITIONS/SCHEMATIC RENDERING) 1/L-2
SCALE: N.T.S

ANTENNA AND MOUNT NOTE:
CONTRACTOR SHALL POSITION/ROTATE PROPOSED ANTENNA MOUNT/BRACKET IN SUCH A WAY SO AS TO NOT INTERFERE WITH EXISTING STREET LIGHT, PRIMARY POWER CROSSARM(S) (IF PRESENT), BRACKETS, BRACES, SECONDARY POWER SUPPORTS OR ANY OTHER MISCELLANEOUS APPURTENANCES AND RELATED SUPPORT BRACKETS ENCOUNTERED LOCATED ON THE EXISTING UTILITY POLE.

EQUIPMENT AND MOUNT NOTE:
CONTRACTOR SHALL POSITION/ROTATE PROPOSED EQUIPMENT AND ASSOCIATED MOUNTS/BRACKETS IN SUCH A WAY SO AS TO NOT INTERFERE WITH EXISTING WIRES/PANELS ETC. OR ANY OTHER MISCELLANEOUS APPURTENANCES AND RELATED SUPPORT BRACKETS ENCOUNTERED LOCATED ON THE FACE OF THE EXISTING UTILITY POLE.

NOTE:
UTILITY POLE, EXISTING APPURTENANCES AND DETAILS OF PROPOSED INSTALLATION SHOWN SCHEMATICALLY.



UTILITY POLE # 6821 ELEVATION
(PROPOSED CONDITIONS) 2/L-2
22x34 SCALE: 3/8"=1'-0"
11x17 SCALE: 3/16"=1'-0"

GRAPHIC SCALE
0 1'-4" 2'-8" 5'-4" 8'-0"

HUDSON Design Group LLC
45 BEECHWOOD DRIVE
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

COMMONWEALTH OF MASSACHUSETTS
DANIEL P. HAMM
No. 40720
REGISTERED PROFESSIONAL ENGINEER

CHECKED BY: JX

APPROVED BY: DPH

SUBMITTALS

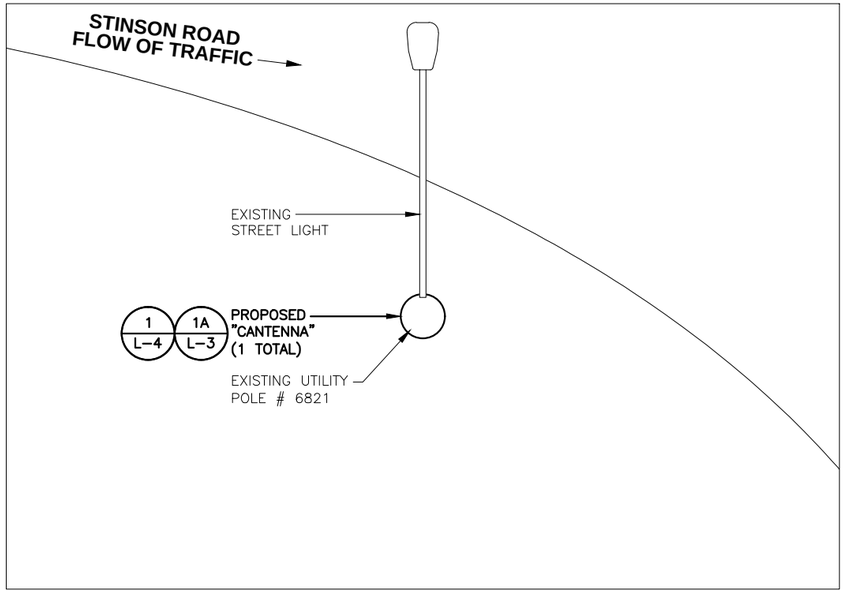
REV.	DATE	DESCRIPTION	BY
0	07/22/22	LEASE EXHIBIT	SF

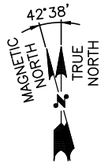
SITE NAME:
ANDOVER MA SC17

SITE ADDRESS:
6821
39 STINSON ROAD
ANDOVER, MA 01810

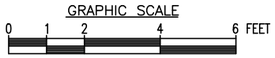
SHEET TITLE
UTILITY POLE PHOTOGRAPH AND ELEVATION

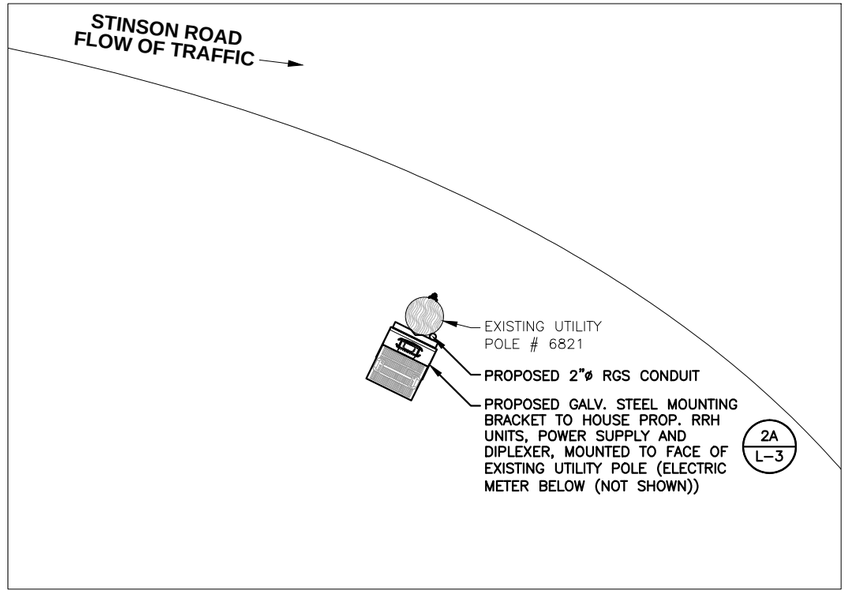
SHEET NUMBER
L-2

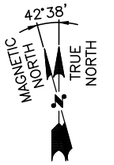




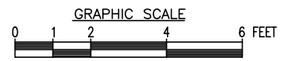
ANTENNA ORIENTATION PLAN (1 / L-3)
22x34 SCALE: 1/2"=1'-0"
11x17 SCALE: 1/4"=1'-0"

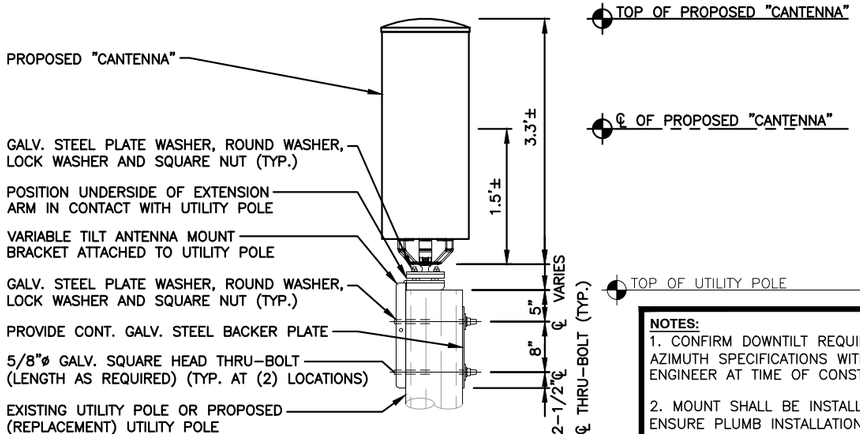






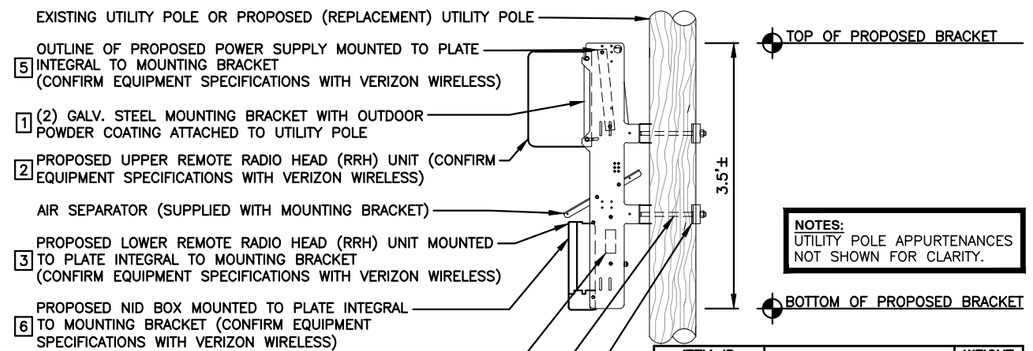
ANCILLARY EQUIPMENT ORIENTATION PLAN (2 / L-3)
22x34 SCALE: 1/2"=1'-0"
11x17 SCALE: 1/4"=1'-0"





NOTES:
1. CONFIRM DOWNTILT REQUIREMENTS (IF ANY) AND AZIMUTH SPECIFICATIONS WITH VERIZON WIRELESS 'RF' ENGINEER AT TIME OF CONSTRUCTION.
2. MOUNT SHALL BE INSTALLED IN SUCH A WAY TO ENSURE PLUMB INSTALLATION OF "CANTENNA".
3. UTILITY POLE APPURTENANCES NOT SHOWN FOR CLARITY.

"CANTENNA" MOUNT DETAIL (1A / L-3)
SCALE: N.T.S



NOTES:
UTILITY POLE APPURTENANCES NOT SHOWN FOR CLARITY.

ITEM ID (SEE DETAIL)	DESCRIPTION	WEIGHT (LBS)
1	MOUNTING BRACKET (2)	32.2±
2	UPPER RRH UNIT	102.5±
3	LOWER RRH UNIT	21.4±
4	DIPLEXER	7.6±
5	POWER SUPPLY	25.6±
6	NID BOX	–
TOTAL – 189.3± LBS (SAY 190 LBS)		

ANCILLARY EQUIPMENT MOUNTING BRACKET MOUNT DETAIL (2A / L-3)
SCALE: N.T.S

HUDSON Design Group LLC
45 BEECHWOOD DRIVE
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

COMMONWEALTH OF MASSACHUSETTS
DANIEL P. HAMM
CIVIL
No. 40720
REGISTERED PROFESSIONAL ENGINEER

CHECKED BY: JX

APPROVED BY: DPH

SUBMITTALS

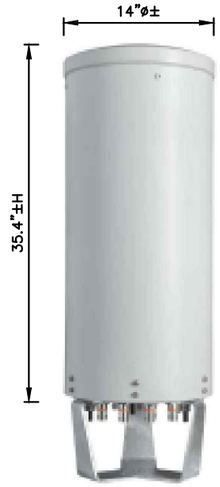
REV.	DATE	DESCRIPTION	BY
0	07/22/22	LEASE EXHIBIT	SF

SITE NAME:
ANDOVER MA SC17

SITE ADDRESS:
6821
39 STINSON ROAD
ANDOVER, MA 01810

SHEET TITLE
ANTENNA & ANCILLARY EQUIPMENT ORIENTATION PLANS AND MOUNTING DETAILS

SHEET NUMBER
L-3



SMALL CELL "CANTENNA"
DIMENSIONS: 14"±ø x 35.4"±H WEIGHT: 35.0± LBS QUANTITY: TOTAL OF 1

TYPICAL "CANTENNA" SPECIFICATIONS — 1 / L-4

SCALE: N.T.S

REMOTE RADIO HEAD UNIT
DIMENSIONS: 17.3"±H x 17.3"±W x 11.5"±D WEIGHT: 102.5± LBS QUANTITY: TOTAL OF 1

REMOTE RADIO HEAD UNIT
DIMENSIONS: 13.9"±H x 9.8"±W x 4.8"±D WEIGHT: 21.4± LBS QUANTITY: TOTAL OF 1

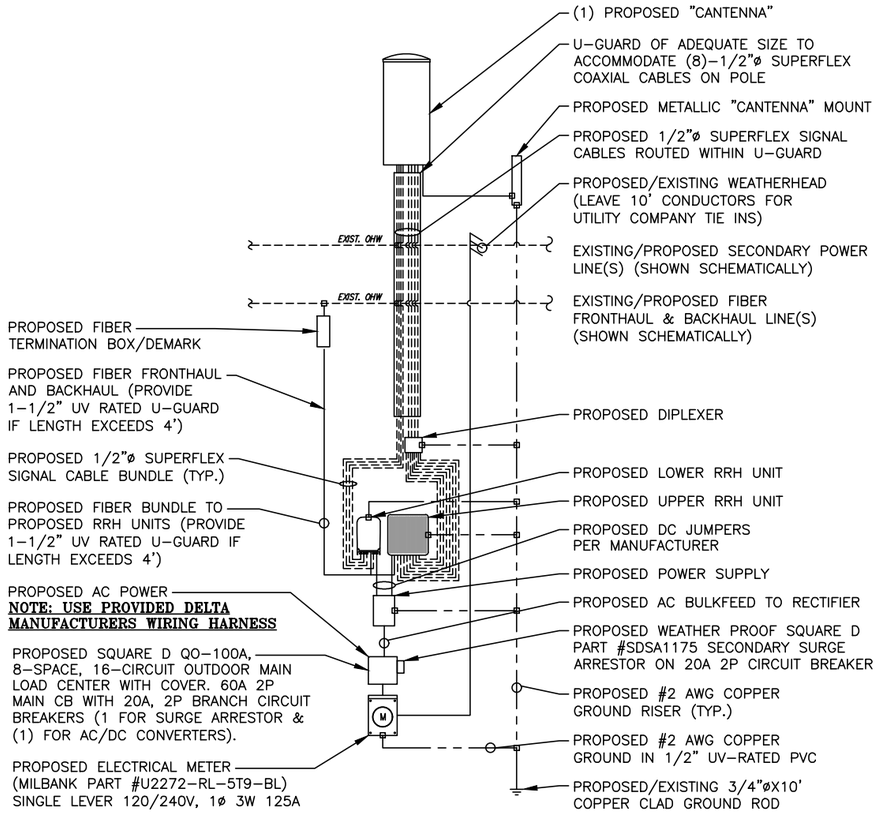
TYPICAL REMOTE RADIO HEAD (RRH) UNIT DIMENSIONS — 2 / L-4

SCALE: N.T.S

DIPLEXER
DIMENSIONS: 4.8"±H x 7.9"±W x 3.3"±D WEIGHT: 7.6± LBS QUANTITY: TOTAL OF 1

TYPICAL DIPLEXER DIMENSIONS — 3 / L-4

SCALE: N.T.S



ONE-LINE DIAGRAM NOTES:

1. PROVIDE WEATHER TIGHT SEAL CONNECTORS ON ALL CONNECTIONS EACH SIDE OF ENCLOSURE HOUSING.
2. COORDINATE ANY FURTHER MISCELLANEOUS WIRING AND CONDUIT REQUIREMENTS WITH VERIZON WIRELESS AND ELECTRIC COMPANY.

FIBER/ ELECTRICAL ONE-LINE DIAGRAM — 4 / L-4

SCALE: N.T.S

HUDSON Design Group LLC
45 BEECHWOOD DRIVE
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

COMMONWEALTH OF MASSACHUSETTS
DANIEL P. HAMM
CIVIL
No. 40720
REGISTERED PROFESSIONAL ENGINEER

CHECKED BY: JX

APPROVED BY: DPH

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
0	07/22/22	LEASE EXHIBIT	SF

SITE NAME:
ANDOVER MA SC17

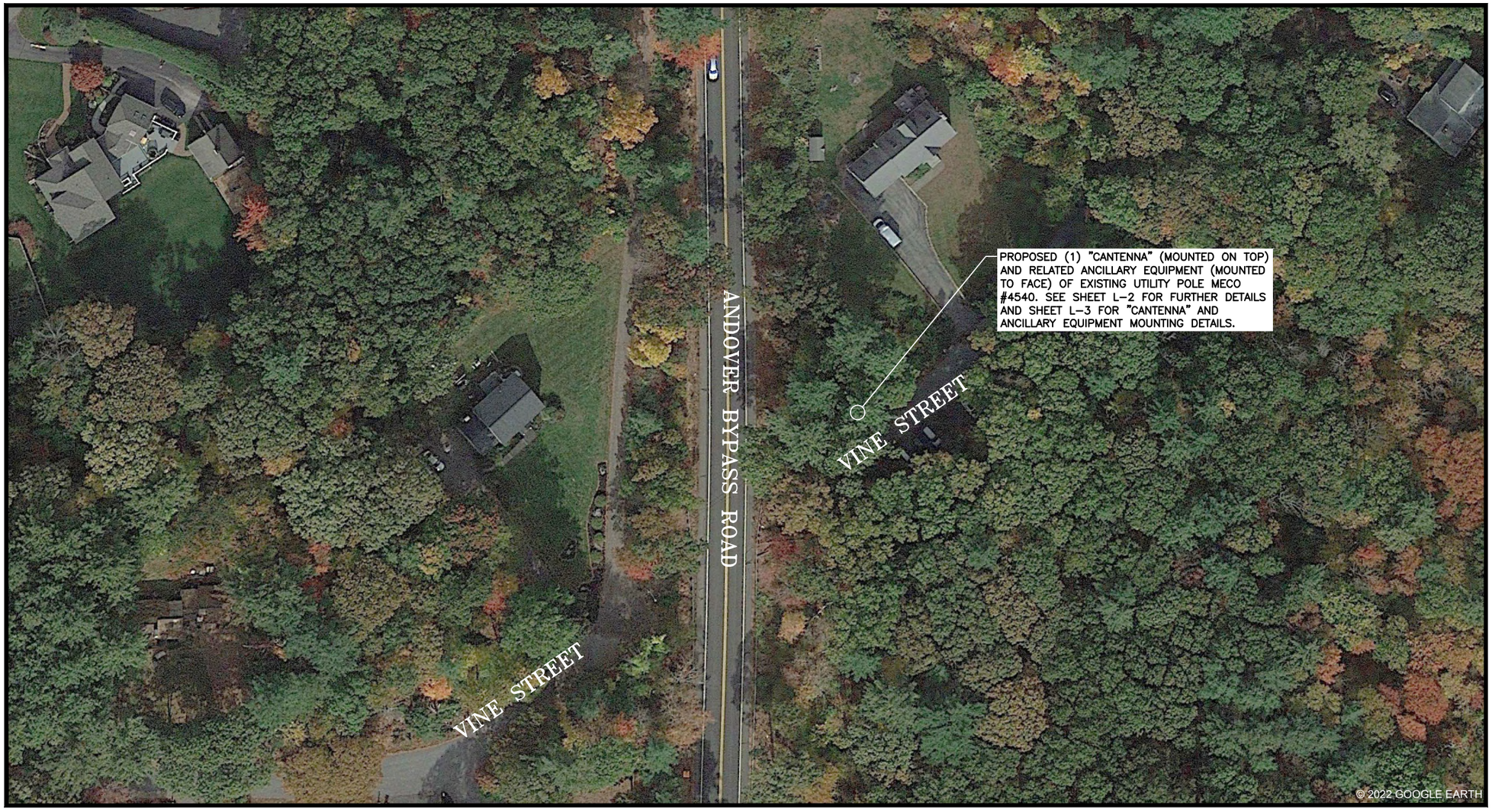
SITE ADDRESS:
6821
39 STINSON ROAD
ANDOVER, MA 01810

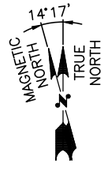
SHEET TITLE
ANTENNA & ANCILLARY EQUIPMENT SPECIFICATIONS AND ONE LINE DIAGRAM

SHEET NUMBER
L-4

ANDOVER MA SC18

MECO #4540
36 VINE STREET
ANDOVER, MA





LOCATION PLAN-AERIAL IMAGE (1 / L-1)
SCALE: N.T.S

FIELD INSPECTION DATE: 11-30-2021

SITE COORDINATES:	LAT:	N42° 37' 56.01"±
	LONG:	W71° 06' 53.10"±
	LAT:	N42.632226°±
	LONG:	W71.114750°±
APPROXIMATE GROUND ELEVATION: 242'± AMSL		

SHEET INDEX

PRESIDING POWER COMPANY
EVERSOURCE

HUDSON Design Group LLC
45 BEECHWOOD DRIVE
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

COMMONWEALTH OF MASSACHUSETTS
DANIEL P. HAMM
CIVIL
No. 40720
REGISTERED PROFESSIONAL ENGINEER

CHECKED BY: JX

APPROVED BY: DPH

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
1	07/22/22	REVISED MOUNT	SD
0	12/10/21	LEASE EXHIBIT	CS

SITE NAME:
ANDOVER MA SC18

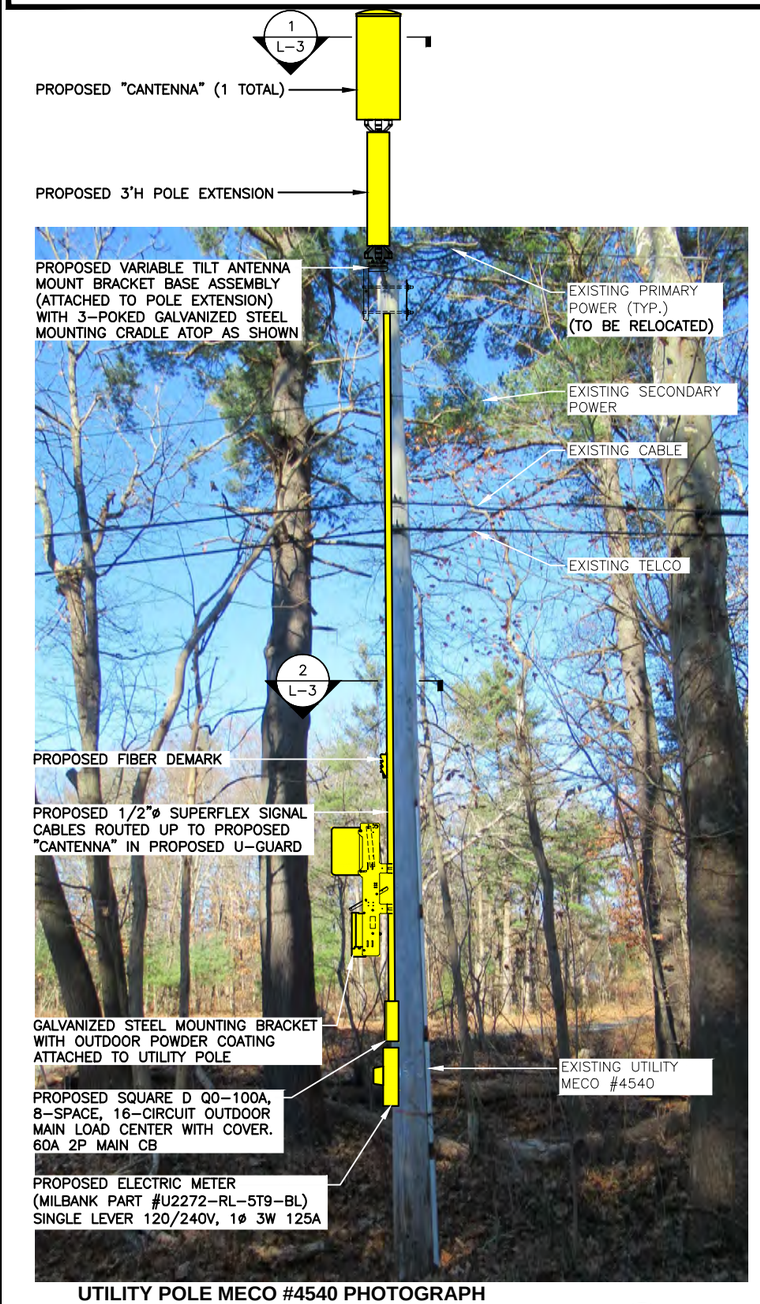
SITE ADDRESS:
MECO #4540
36 VINE STREET
ANDOVER, MA

SHEET TITLE
LOCATION PLAN/AERIAL IMAGE

SHEET NUMBER
L-1

GENERAL NOTE:
1. THESE DRAWINGS ARE DIAGRAMMATIC IN NATURE AND ARE INTENDED TO PROVIDE GENERAL INFORMATION REGARDING THE LOCATION, SIZE AND ORIENTATION OF THE PROPOSED WIRELESS TELECOMMUNICATIONS EQUIPMENT INSTALLATION ON THE UTILITY POLE AND ARE NOT SPECIFICALLY INTENDED FOR CONSTRUCTION.
2. VERIZON WIRELESS SHALL PLACE WEATHER RESISTANT PHENOLIC PLACARDS ON UTILITY POLE AND ANCILLARY EQUIPMENT TO IDENTIFY EQUIPMENT OWNERSHIP & CONTACT INFORMATION TO BE UTILIZED IN THE CASE OF EMERGENCY.
3. AN ANALYSIS OF THE CAPACITY OF THE EXISTING UTILITY POLE TO SUPPORT THE PROPOSED LOADING HAS BEEN COMPLETED BY HUDSON DESIGN GROUP, LLC. REFER TO LATEST STRUCTURAL ANALYSIS.
4. VERIZON WIRELESS' GENERAL CONTRACTOR SHALL EXTEND EFFORTS TO ENSURE THAT ALL PROPOSED EQUIPMENT MEETS THE REQUIREMENTS OF THE EXISTING UTILITY COMPANY OR COMPANIES CURRENTLY OCCUPYING THE UTILITY POLE AND THE 2017 NATIONAL ELECTRICAL SAFETY CODE.

LEASE EXHIBIT
(NOT FOR CONSTRUCTION)

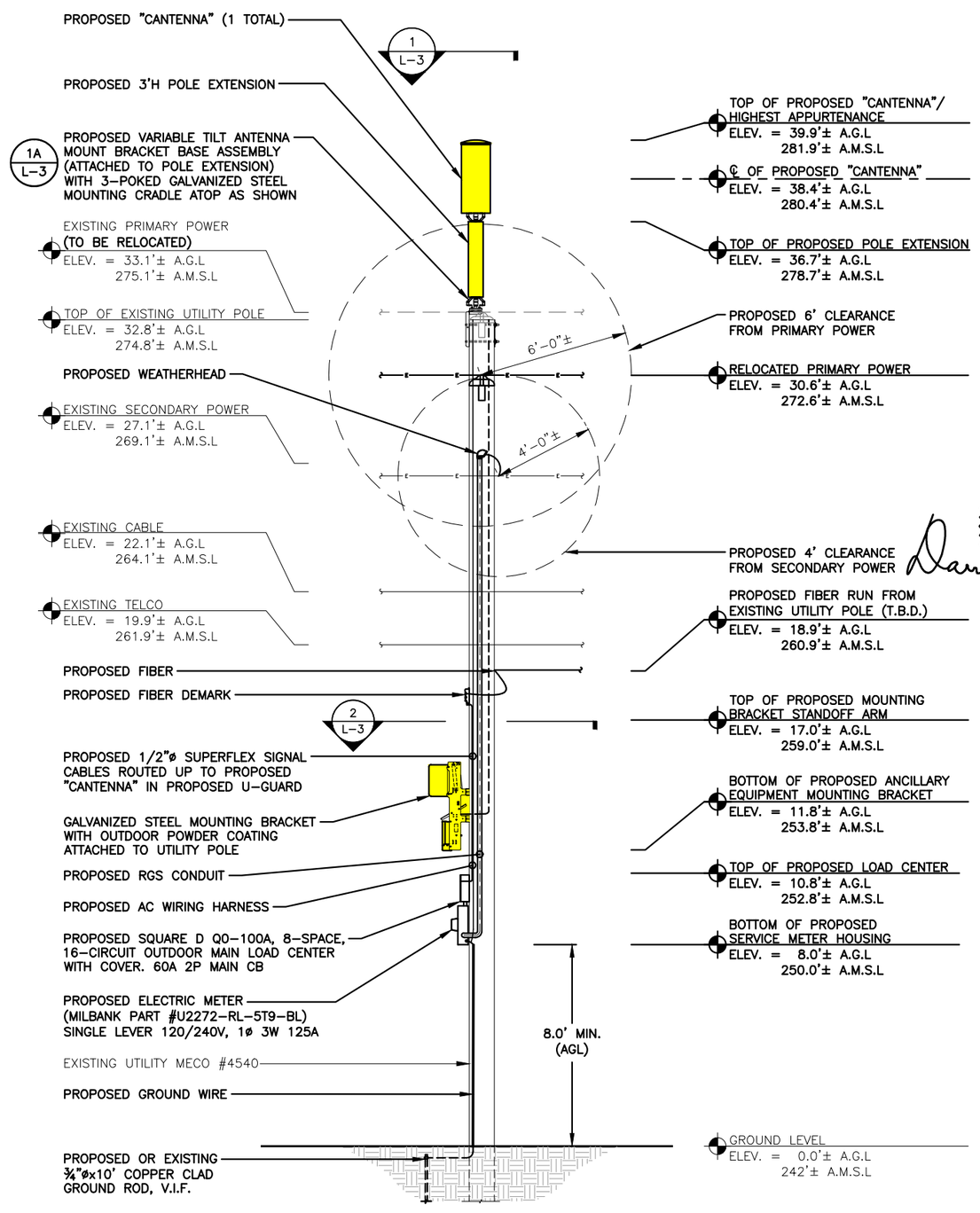


UTILITY POLE MECO #4540 PHOTOGRAPH
(EXISTING CONDITIONS/SCHEMATIC RENDERING)
SCALE: N.T.S
1 L-2

ANTENNA AND MOUNT NOTE:
CONTRACTOR SHALL POSITION/ROTATE PROPOSED ANTENNA MOUNT/BRACKET IN SUCH A WAY SO AS TO NOT INTERFERE WITH EXISTING STREET LIGHT, PRIMARY POWER CROSSARM(S) (IF PRESENT), BRACKETS, BRACES, SECONDARY POWER SUPPORTS OR ANY OTHER MISCELLANEOUS APPURTENANCES AND RELATED SUPPORT BRACKETS ENCOUNTERED LOCATED ON THE EXISTING UTILITY POLE.

EQUIPMENT AND MOUNT NOTE:
CONTRACTOR SHALL POSITION/ROTATE PROPOSED EQUIPMENT AND ASSOCIATED MOUNTS/BRACKETS IN SUCH A WAY SO AS TO NOT INTERFERE WITH EXISTING WIRES/PANELS ETC. OR ANY OTHER MISCELLANEOUS APPURTENANCES AND RELATED SUPPORT BRACKETS ENCOUNTERED LOCATED ON THE FACE OF THE EXISTING UTILITY POLE.

NOTE:
UTILITY POLE, EXISTING APPURTENANCES AND DETAILS OF PROPOSED INSTALLATION SHOWN SCHEMATICALLY.



UTILITY POLE MECO #4540 ELEVATION
(PROPOSED CONDITIONS)
22x34 SCALE: 3/8"=1'-0"
11x17 SCALE: 3/16"=1'-0"
2 L-2

GRAPHIC SCALE
0 1'-4" 2'-8" 5'-4" 8'-0"

HUDSON Design Group LLC
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FAX: (978) 336-5586

COMMONWEALTH OF MASSACHUSETTS
DANIEL P. HAMM
No. 40720
REGISTERED PROFESSIONAL ENGINEER

CHECKED BY: JX

APPROVED BY: DPH

SUBMITTALS

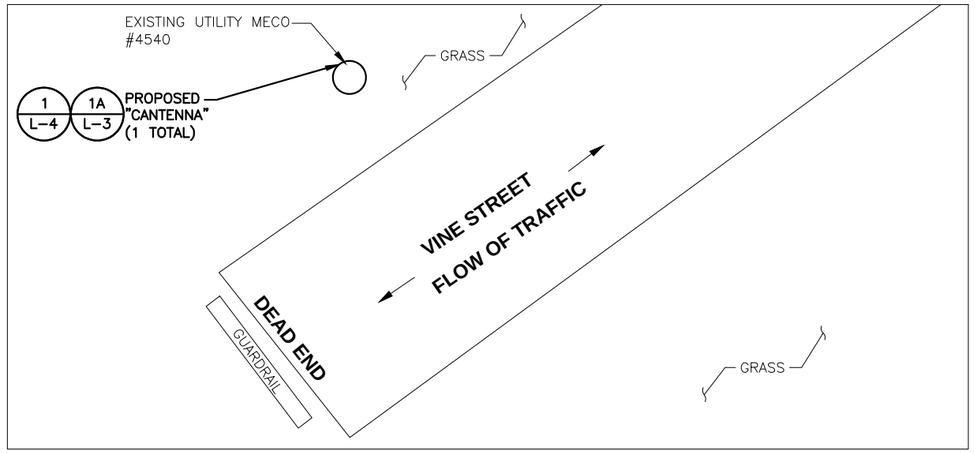
REV.	DATE	DESCRIPTION	BY
1	07/22/22	REVISED MOUNT	SD
0	12/10/21	LEASE EXHIBIT	CS

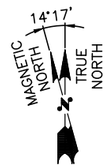
SITE NAME:
ANDOVER MA SC18

SITE ADDRESS:
MECO #4540
36 VINE STREET
ANDOVER, MA

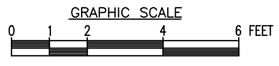
SHEET TITLE
UTILITY POLE PHOTOGRAPH AND ELEVATION

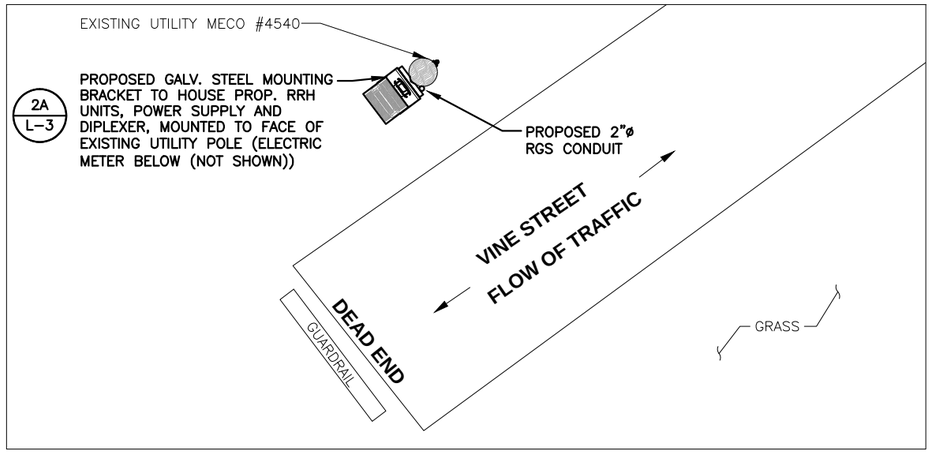
SHEET NUMBER
L-2

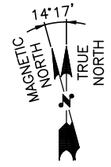




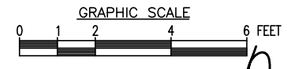
ANTENNA ORIENTATION PLAN (1 / L-3)
22x34 SCALE: 1/2"=1'-0"
11x17 SCALE: 1/4"=1'-0"

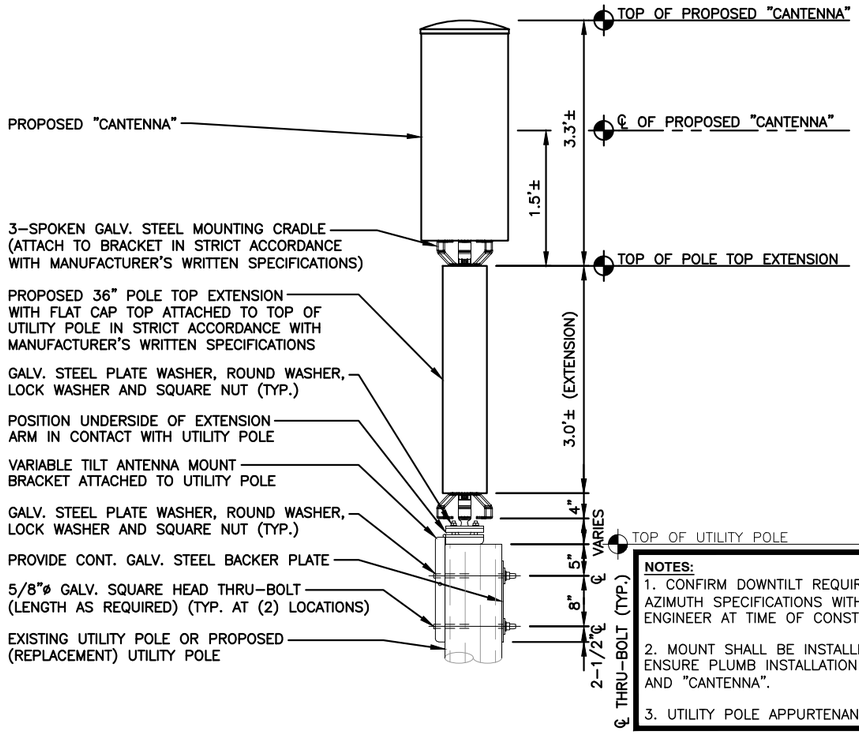






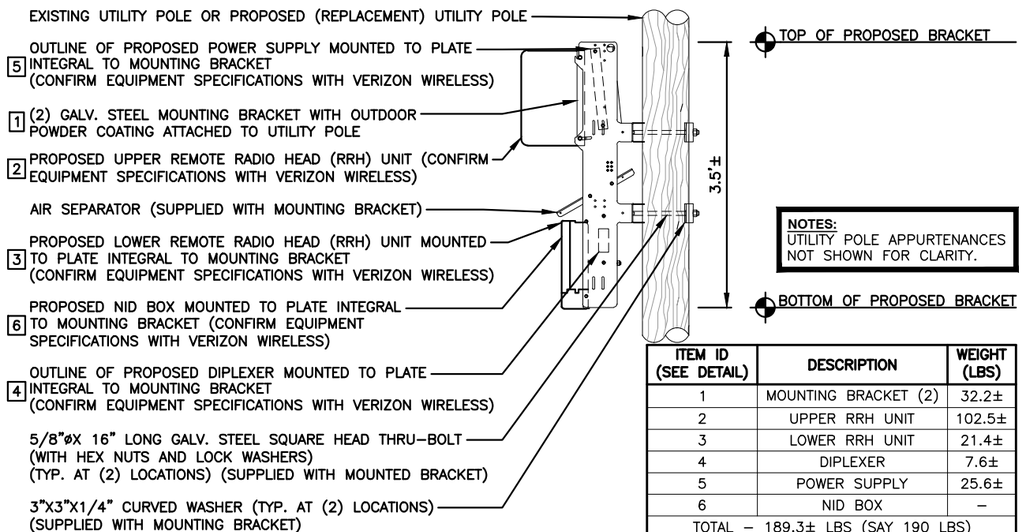
ANCILLARY EQUIPMENT ORIENTATION PLAN (2 / L-3)
22x34 SCALE: 1/2"=1'-0"
11x17 SCALE: 1/4"=1'-0"





NOTES:
1. CONFIRM DOWNTILT REQUIREMENTS (IF ANY) AND AZIMUTH SPECIFICATIONS WITH VERIZON WIRELESS 'RF' ENGINEER AT TIME OF CONSTRUCTION.
2. MOUNT SHALL BE INSTALLED IN SUCH A WAY TO ENSURE PLUMB INSTALLATION OF POLE TOP EXTENSION AND "CANTENNA".
3. UTILITY POLE APPURTENANCES NOT SHOWN FOR CLARITY.

"CANTENNA" MOUNT WITH 36" EXTENSION DETAIL (1A / L-3)
SCALE: N.T.S



NOTES:
UTILITY POLE APPURTENANCES NOT SHOWN FOR CLARITY.

ITEM ID (SEE DETAIL)	DESCRIPTION	WEIGHT (LBS)
1	MOUNTING BRACKET (2)	32.2±
2	UPPER RRH UNIT	102.5±
3	LOWER RRH UNIT	21.4±
4	DIPLEXER	7.6±
5	POWER SUPPLY	25.6±
6	NID BOX	–
TOTAL – 189.3± LBS (SAY 190 LBS)		

ANCILLARY EQUIPMENT MOUNTING BRACKET MOUNT DETAIL (2A / L-3)
SCALE: N.T.S

HUDSON Design Group LLC
45 BEECHWOOD DRIVE
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

COMMONWEALTH OF MASSACHUSETTS
DANIEL P. HAMM
CIVIL
No. 40720
REGISTERED PROFESSIONAL ENGINEER

CHECKED BY: JX

APPROVED BY: DPH

SUBMITTALS

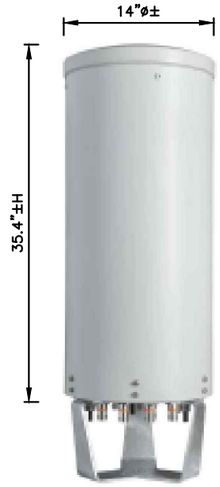
REV.	DATE	DESCRIPTION	BY
1	07/22/22	REVISED MOUNT	SD
0	12/10/21	LEASE EXHIBIT	CS

SITE NAME:
ANDOVER MA SC18

SITE ADDRESS:
MECO #4540
36 VINE STREET
ANDOVER, MA

SHEET TITLE
ANTENNA & ANCILLARY EQUIPMENT ORIENTATION PLANS AND MOUNTING DETAILS

SHEET NUMBER
L-3



SMALL CELL "CANTENNA"
DIMENSIONS: 14"±ø x 35.4"±H WEIGHT: 35.0± LBS QUANTITY: TOTAL OF 1

TYPICAL "CANTENNA" SPECIFICATIONS (1 / L-4)

SCALE: N.T.S

REMOTE RADIO HEAD UNIT
DIMENSIONS: 17.3"±H x 17.3"±W x 11.5"±D WEIGHT: 102.5± LBS QUANTITY: TOTAL OF 1

REMOTE RADIO HEAD UNIT
DIMENSIONS: 13.9"±H x 9.8"±W x 4.8"±D WEIGHT: 21.4± LBS QUANTITY: TOTAL OF 1

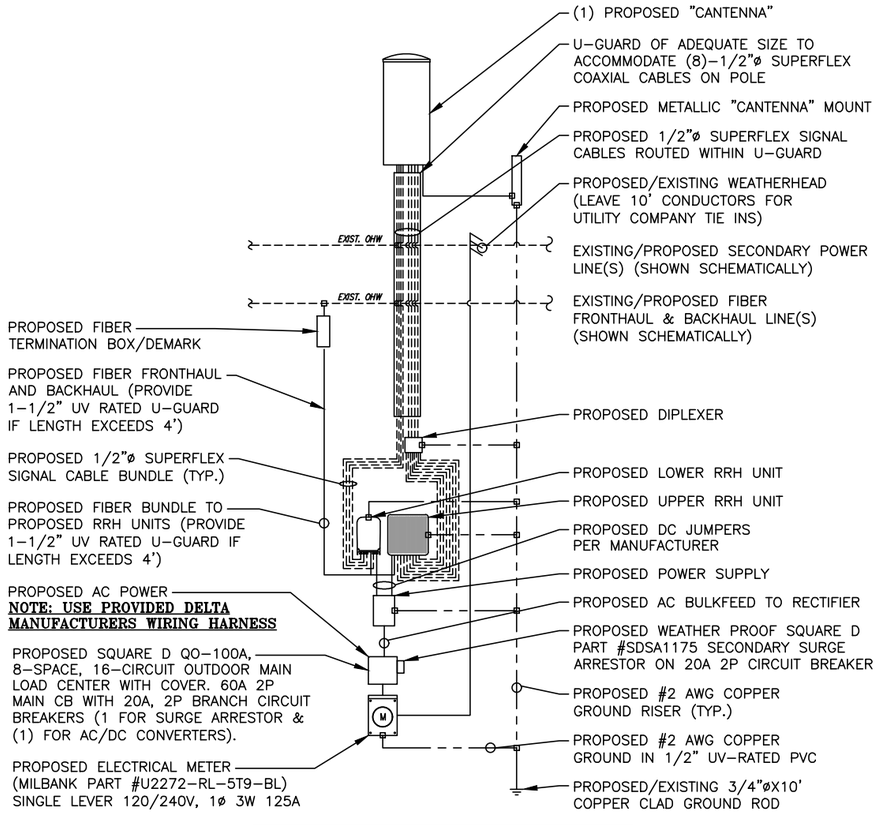
TYPICAL REMOTE RADIO HEAD (RRH) UNIT DIMENSIONS (2 / L-4)

SCALE: N.T.S

DIPLEXER
DIMENSIONS: 4.8"±H x 7.9"±W x 3.3"±D WEIGHT: 7.6± LBS QUANTITY: TOTAL OF 1

TYPICAL DIPLEXER DIMENSIONS (3 / L-4)

SCALE: N.T.S



ONE-LINE DIAGRAM NOTES:

1. PROVIDE WEATHER TIGHT SEAL CONNECTORS ON ALL CONNECTIONS EACH SIDE OF ENCLOSURE HOUSING.
2. COORDINATE ANY FURTHER MISCELLANEOUS WIRING AND CONDUIT REQUIREMENTS WITH VERIZON WIRELESS AND ELECTRIC COMPANY.

FIBER/ ELECTRICAL ONE-LINE DIAGRAM (4 / L-4)

SCALE: N.T.S

HUDSON Design Group LLC
45 BEECHWOOD DRIVE
N. ANDOVER, MA 01845
TEL: (978) 557-5553
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COMMONWEALTH OF MASSACHUSETTS
DANIEL P. HAMM
CIVIL
No. 40720
REGISTERED PROFESSIONAL ENGINEER

CHECKED BY: JX

APPROVED BY: DPH

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
1	07/22/22	REVISED MOUNT	SD
0	12/10/21	LEASE EXHIBIT	CS

SITE NAME:
ANDOVER MA SC18

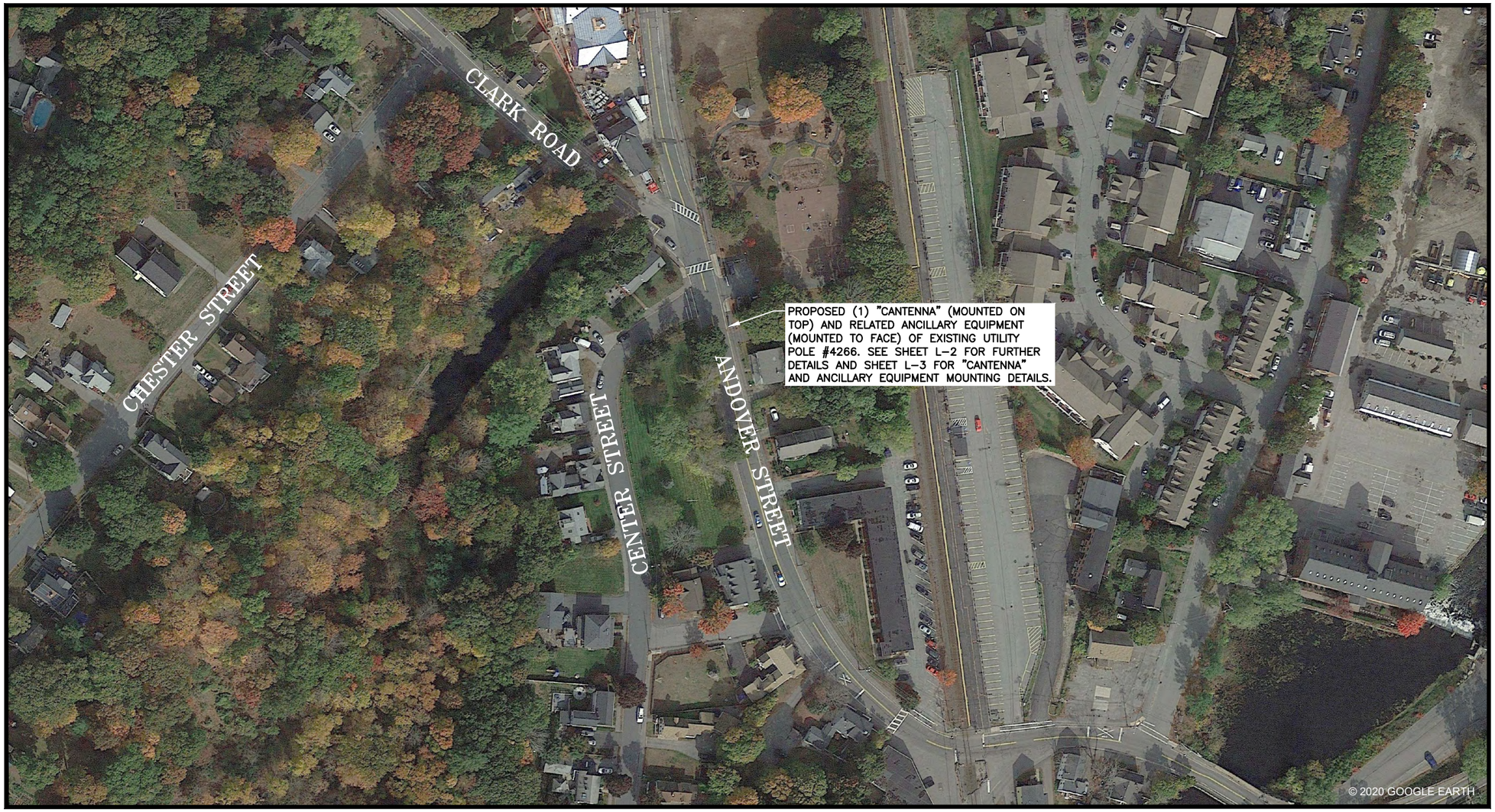
SITE ADDRESS:
MECO #4540
36 VINE STREET
ANDOVER, MA

SHEET TITLE
ANTENNA & ANCILLARY EQUIPMENT SPECIFICATIONS AND ONE LINE DIAGRAM

SHEET NUMBER
L-4

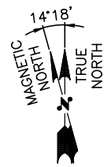
ANDOVER MA SC30

#4266
164 ANDOVER STREET
ANDOVER, MA 01810



FIELD INSPECTION DATE: 11-30-2021

SITE COORDINATES:
LAT: N46° 37' 41.15"±
LONG: W71° 09' 19.13"±
LAT: N46.628098°±
LONG: W71.160870°±
APPROXIMATE GROUND ELEVATION: 75.0'± AMSL



LOCATION PLAN/ AERIAL IMAGE (1 / L-1)
SCALE: N.T.S

SHEET INDEX

PRESIDING POWER COMPANY
nationalgrid

HUDSON Design Group LLC
45 BEECHWOOD DRIVE
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

COMMONWEALTH OF MASSACHUSETTS
DANIEL P. HAMM
CIVIL
No. 40720
REGISTERED PROFESSIONAL ENGINEER

CHECKED BY: JX

APPROVED BY: DPH

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
1	07/22/22	REVISED TO TOP MOUNT	SF
0	12/10/21	LEASE EXHIBIT	CS

SITE NAME:
ANDOVER MA SC30

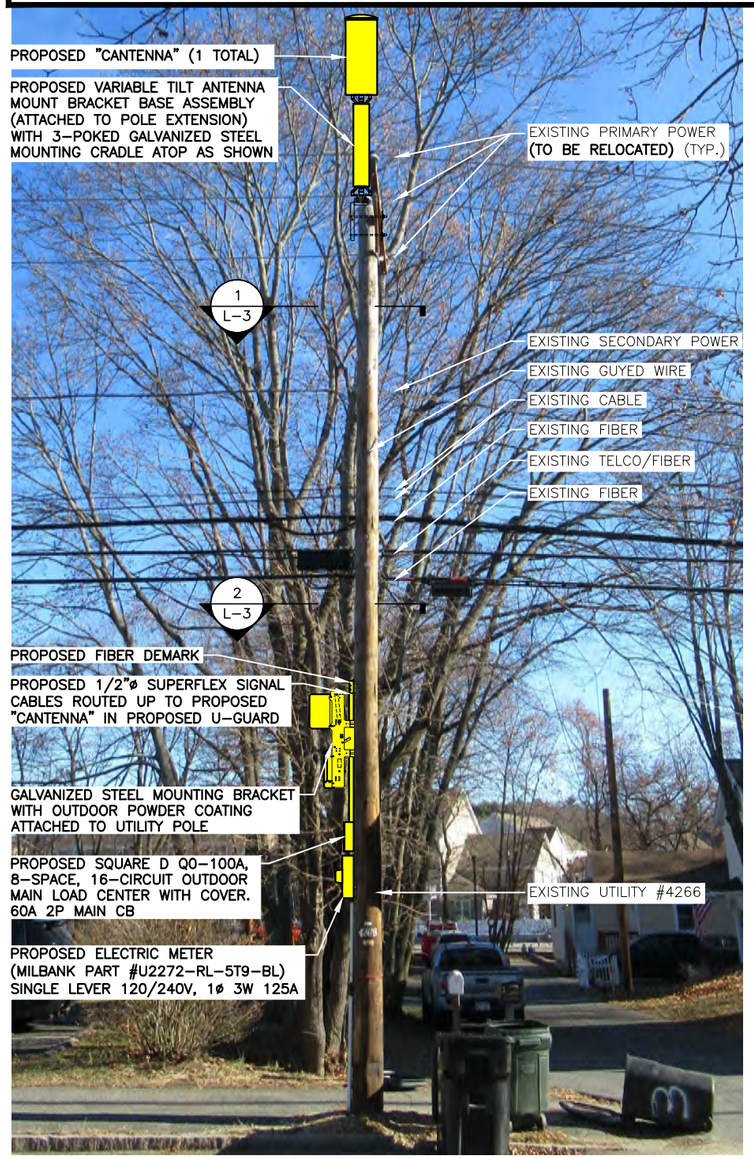
SITE ADDRESS:
#4266
164 ANDOVER STREET
ANDOVER, MA 01810

SHEET TITLE
LOCATION PLAN/AERIAL IMAGE

SHEET NUMBER
L-1

LEASE EXHIBIT
(NOT FOR CONSTRUCTION)

GENERAL NOTE:
1. THESE DRAWINGS ARE DIAGRAMMATIC IN NATURE AND ARE INTENDED TO PROVIDE GENERAL INFORMATION REGARDING THE LOCATION, SIZE AND ORIENTATION OF THE PROPOSED WIRELESS TELECOMMUNICATIONS EQUIPMENT INSTALLATION ON THE UTILITY POLE AND ARE NOT SPECIFICALLY INTENDED FOR CONSTRUCTION.
2. VERIZON WIRELESS SHALL PLACE WEATHER RESISTANT PHENOLIC PLACARDS ON UTILITY POLE AND ANCILLARY EQUIPMENT TO IDENTIFY EQUIPMENT OWNERSHIP & CONTACT INFORMATION TO BE UTILIZED IN THE CASE OF EMERGENCY.
3. AN ANALYSIS OF THE CAPACITY OF THE EXISTING UTILITY POLE TO SUPPORT THE PROPOSED LOADING HAS BEEN COMPLETED BY HUDSON DESIGN GROUP, LLC. REFER TO LATEST STRUCTURAL ANALYSIS.
4. VERIZON WIRELESS' GENERAL CONTRACTOR SHALL EXTEND EFFORTS TO ENSURE THAT ALL PROPOSED EQUIPMENT MEETS THE REQUIREMENTS OF THE EXISTING UTILITY COMPANY OR COMPANIES CURRENTLY OCCUPYING THE UTILITY POLE AND THE 2017 NATIONAL ELECTRICAL SAFETY CODE.

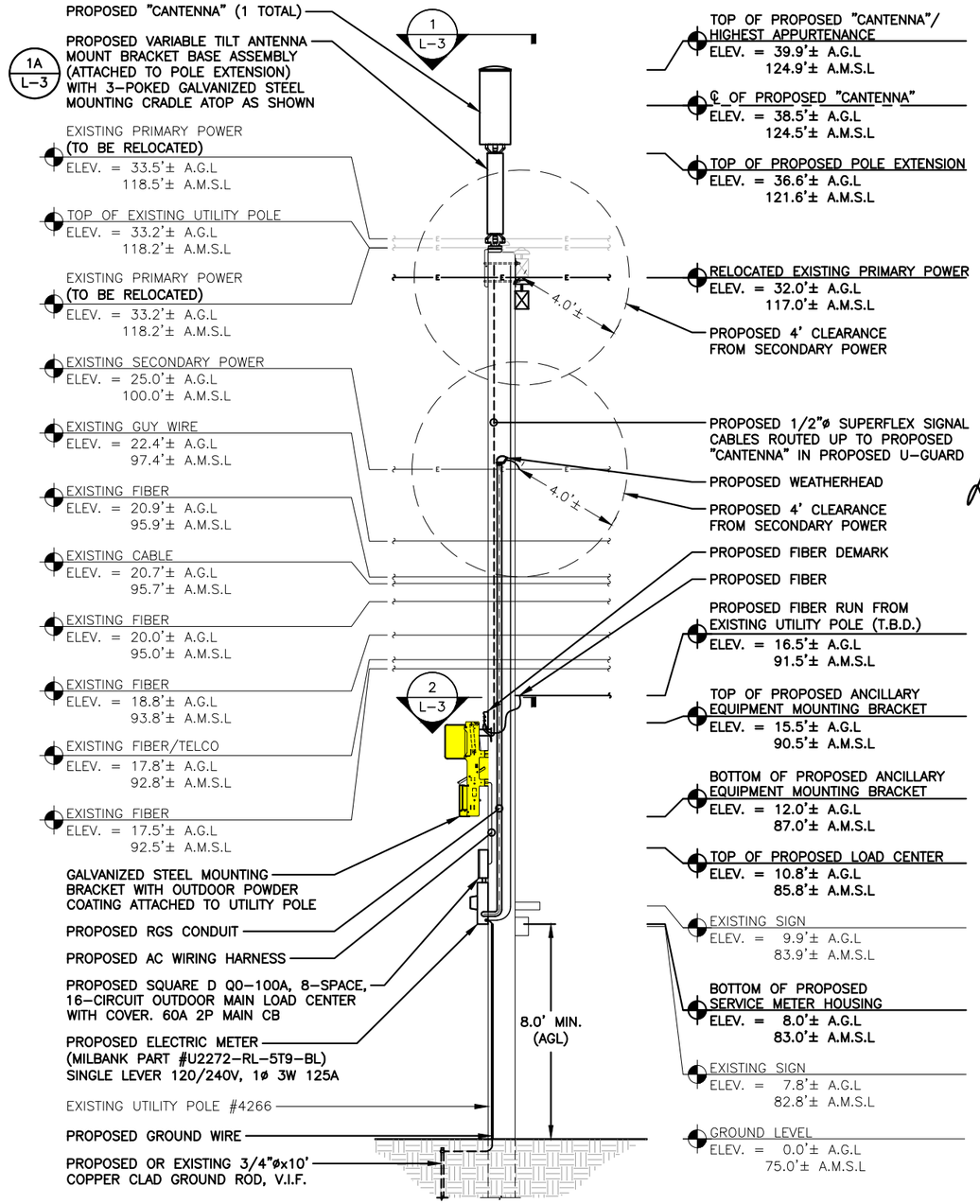


UTILITY #4266 PHOTOGRAPH
(EXISTING CONDITIONS/SCHEMATIC RENDERING) (1 / L–2)
SCALE: N.T.S

ANTENNA AND MOUNT NOTE:
CONTRACTOR SHALL POSITION/ROTATE PROPOSED ANTENNA MOUNT/BRACKET IN SUCH A WAY SO AS TO NOT INTERFERE WITH EXISTING STREET LIGHT, PRIMARY POWER CROSSARM(S) (IF PRESENT), BRACKETS, BRACES, SECONDARY POWER SUPPORTS OR ANY OTHER MISCELLANEOUS APPURTENANCES AND RELATED SUPPORT BRACKETS ENCOUNTERED LOCATED ON THE EXISTING UTILITY POLE.

EQUIPMENT AND MOUNT NOTE:
CONTRACTOR SHALL POSITION/ROTATE PROPOSED EQUIPMENT AND ASSOCIATED MOUNTS/BRACKETS IN SUCH A WAY SO AS TO NOT INTERFERE WITH EXISTING WIRES/PANELS ETC. OR ANY OTHER MISCELLANEOUS APPURTENANCES AND RELATED SUPPORT BRACKETS ENCOUNTERED LOCATED ON THE FACE OF THE EXISTING UTILITY POLE.

NOTE:
UTILITY POLE, EXISTING APPURTENANCES AND DETAILS OF PROPOSED INSTALLATION SHOWN SCHEMATICALLY.



UTILITY POLE #4266 ELEVATION
(PROPOSED CONDITIONS) (2 / L–2)
22x34 SCALE: 3/8"=1'–0"
11x17 SCALE: 3/16"=1'–0"

GRAPHIC SCALE
0 1'–4" 2'–8" 5'–4" 8'–0"

HUDSON Design Group LLC
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FAX: (978) 336-5586

COMMONWEALTH OF MASSACHUSETTS
DANIEL P. HAMM
No. 40720
REGISTERED PROFESSIONAL ENGINEER

CHECKED BY: JX

APPROVED BY: DPH

SUBMITTALS

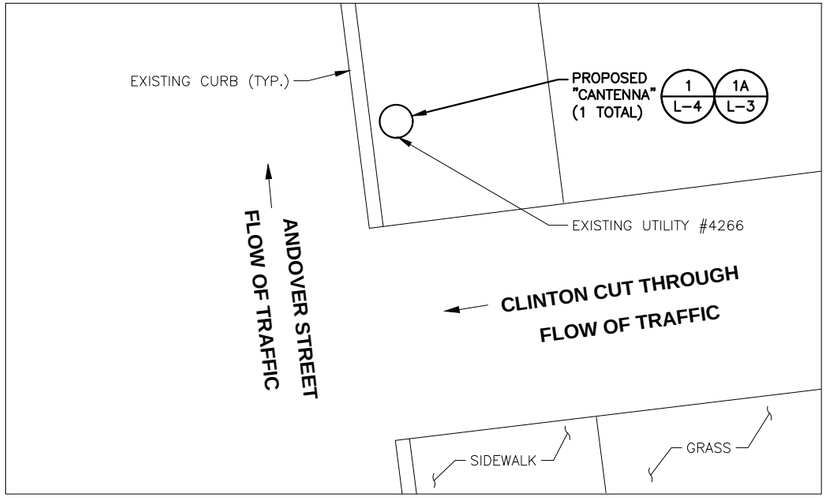
REV.	DATE	DESCRIPTION	BY
1	07/22/22	REVISED TO TOP MOUNT	SF
0	12/10/21	LEASE EXHIBIT	CS

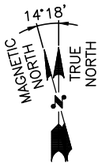
SITE NAME:
ANDOVER MA SC30

SITE ADDRESS:
#4266
164 ANDOVER STREET
ANDOVER, MA 01810

SHEET TITLE
UTILITY POLE PHOTOGRAPH AND ELEVATION

SHEET NUMBER
L-2

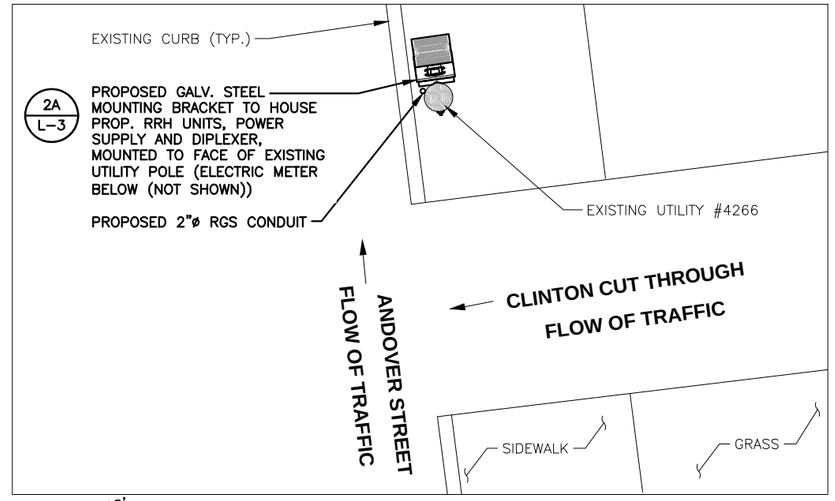


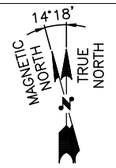


ANTENNA ORIENTATION PLAN (1 / L-3)

22x34 SCALE: 3/8"=1'-0"
11x17 SCALE: 3/16"=1'-0"

GRAPHIC SCALE
0 1'-4" 2'-8" 5'-4" 8'-0"

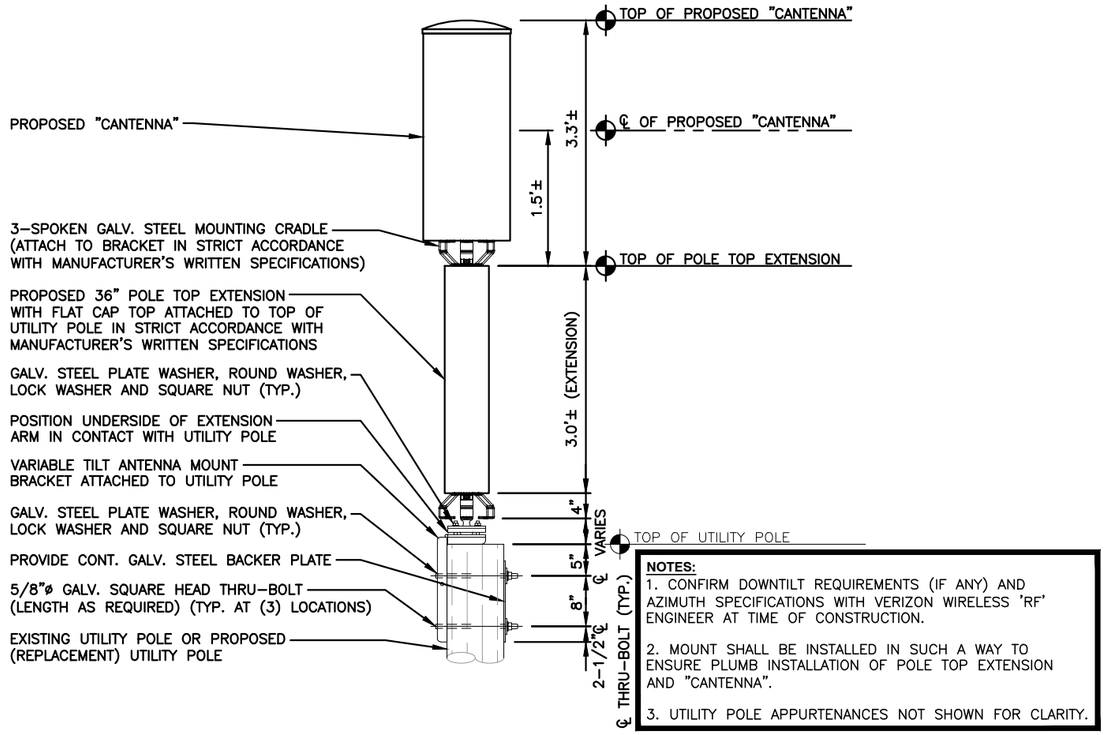




ANCILLARY EQUIPMENT ORIENTATION PLAN (2 / L-3)

22x34 SCALE: 3/8"=1'-0"
11x17 SCALE: 3/16"=1'-0"

GRAPHIC SCALE
0 1'-4" 2'-8" 5'-4" 8'-0"



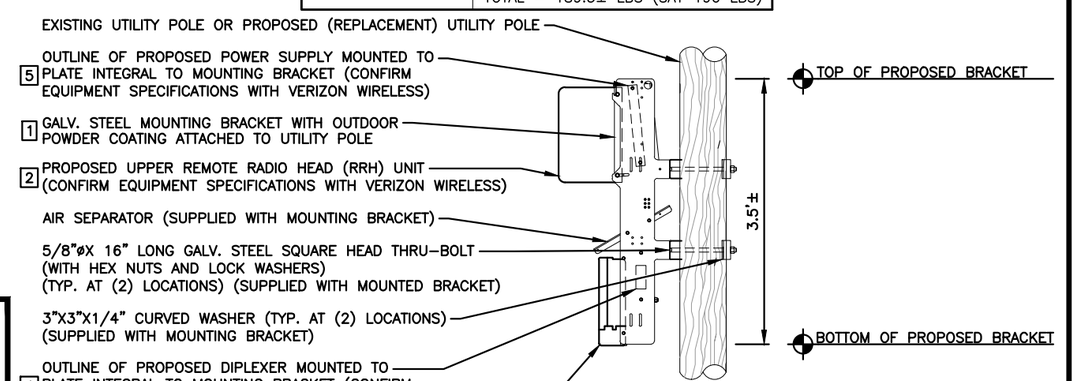
NOTES:

1. CONFIRM DOWNTILT REQUIREMENTS (IF ANY) AND AZIMUTH SPECIFICATIONS WITH VERIZON WIRELESS 'RF' ENGINEER AT TIME OF CONSTRUCTION.
2. MOUNT SHALL BE INSTALLED IN SUCH A WAY TO ENSURE PLUMB INSTALLATION OF POLE TOP EXTENSION AND "CANTENNA".
3. UTILITY POLE APPURTENANCES NOT SHOWN FOR CLARITY.

"CANTENNA" MOUNT WITH 36" EXTENSION DETAIL (1A / L-3)

SCALE: N.T.S

ITEM ID (SEE DETAIL)	DESCRIPTION	WEIGHT (LBS)
1	MOUNTING BRACKET	32.2±
2	UPPER RH UNIT	102.5±
3	LOWER RRH UNIT	21.4±
4	DIPLEXER	7.6±
5	POWER SUPPLY	25.6±
	TOTAL – 189.3± LBS (SAY 190 LBS)	



NOTES:
UTILITY POLE APPURTENANCES NOT SHOWN FOR CLARITY.

ANCILLARY EQUIPMENT MOUNTING BRACKET MOUNT DETAIL (2A / L-3)

SCALE: N.T.S

HUDSON Design Group LLC
45 BEECHWOOD DRIVE
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

COMMONWEALTH OF MASSACHUSETTS
DANIEL P. HAMM
CIVIL
No. 40720
REGISTERED PROFESSIONAL ENGINEER

CHECKED BY: JX

APPROVED BY: DPH

SUBMITTALS

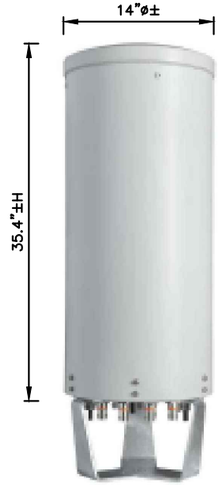
REV.	DATE	DESCRIPTION	BY
1	07/22/22	REVISED TO TOP MOUNT	SF
0	12/10/21	LEASE EXHIBIT	CS

SITE NAME:
ANDOVER MA SC30

SITE ADDRESS:
#4266
164 ANDOVER STREET
ANDOVER, MA 01810

SHEET TITLE
ANTENNA & ANCILLARY EQUIPMENT ORIENTATION PLANS AND MOUNTING DETAILS

SHEET NUMBER
L-3



SMALL CELL "CANTENNA"
DIMENSIONS: 14"±ø x 35.4"±H WEIGHT: 35.0± LBS QUANTITY: TOTAL OF 1

TYPICAL "CANTENNA" SPECIFICATIONS — 1 / L-4

SCALE: N.T.S

REMOTE RADIO HEAD UNIT
DIMENSIONS: 17.3"±H x 17.3"±W x 11.5"±D WEIGHT: 102.5± LBS QUANTITY: TOTAL OF 1

REMOTE RADIO HEAD UNIT
DIMENSIONS: 13.9"±H x 9.8"±W x 4.8"±D WEIGHT: 21.4± LBS QUANTITY: TOTAL OF 1

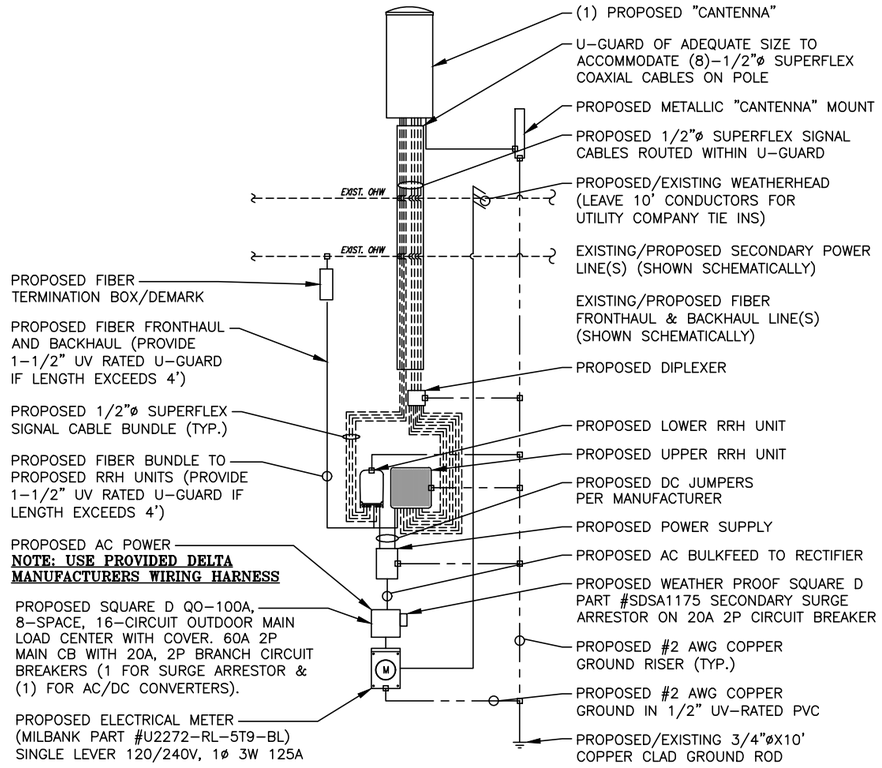
TYPICAL REMOTE RADIO HEAD (RRH) UNIT DIMENSIONS — 2 / L-4

SCALE: N.T.S

DIPLEXER
DIMENSIONS: 4.8"±H x 7.9"±W x 3.3"±D WEIGHT: 7.6± LBS QUANTITY: TOTAL OF 1

TYPICAL DIPLEXER DIMENSIONS — 3 / L-4

SCALE: N.T.S



ONE-LINE DIAGRAM NOTES:

1. PROVIDE WEATHER TIGHT SEAL CONNECTORS ON ALL CONNECTIONS EACH SIDE OF ENCLOSURE HOUSING.
2. COORDINATE ANY FURTHER MISCELLANEOUS WIRING AND CONDUIT REQUIREMENTS WITH VERIZON WIRELESS AND ELECTRIC COMPANY.

FIBER/ ELECTRICAL ONE-LINE DIAGRAM — 4 / L-4

SCALE: N.T.S

HUDSON Design Group LLC
45 BEECHWOOD DRIVE
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

COMMONWEALTH OF MASSACHUSETTS
DANIEL P. HAMM
CIVIL
No. 40720
REGISTERED PROFESSIONAL ENGINEER

CHECKED BY: JX

APPROVED BY: DPH

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
1	07/22/22	REVISED TO TOP MOUNT	SF
0	12/10/21	LEASE EXHIBIT	CS

SITE NAME:
ANDOVER MA SC30

SITE ADDRESS:
#4266
164 ANDOVER STREET
ANDOVER, MA 01810

SHEET TITLE
ANTENNA & ANCILLARY EQUIPMENT SPECIFICATIONS AND ONE LINE DIAGRAM

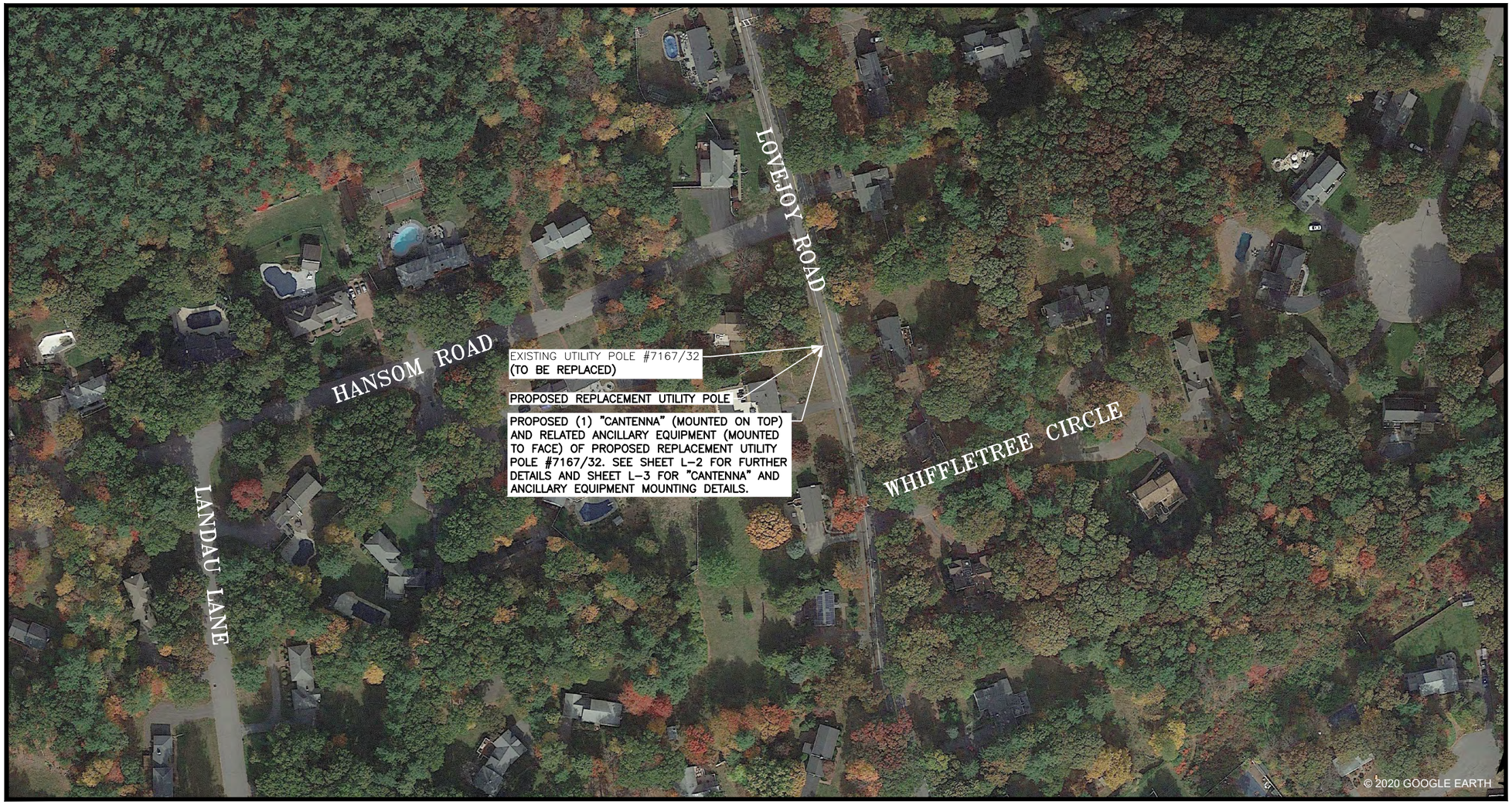
SHEET NUMBER
L-4

NOTE:
POLE REPLACEMENT REQUIRED

ANDOVER MA SC33

#7167/32
2 HANSOM ROAD
ANDOVER, MA 01810

PRESIDING POWER COMPANY
nationalgrid



FIELD INSPECTION DATE: 11-30-2021

SITE COORDINATES:
LAT: N42° 38' 15.27"±
LONG: W71° 10' 32.46"±
LAT: N42.6375759°±
LONG: W71.1756828°±
APPROXIMATE GROUND ELEVATION: 203.0'± AMSL

LOCATION PLAN/ AERIAL IMAGE (1 / L-1)
SCALE: N.T.S

SHEET INDEX

HUDSON Design Group LLC
45 BEECHWOOD DRIVE
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

COMMONWEALTH OF MASSACHUSETTS
DANIEL P. HAMM
CIVIL
No. 40720
REGISTERED PROFESSIONAL ENGINEER

CHECKED BY: JX

APPROVED BY: DPH

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
2	07/25/22	POLE REPLACEMENT	SF
1	05/10/22	REVISED TO TOP MOUNT	SF
0	12/10/21	LEASE EXHIBIT	CS

SITE NAME:
ANDOVER MA SC33

SITE ADDRESS:
#7167/32
2 HANSOM ROAD
ANDOVER, MA 01810

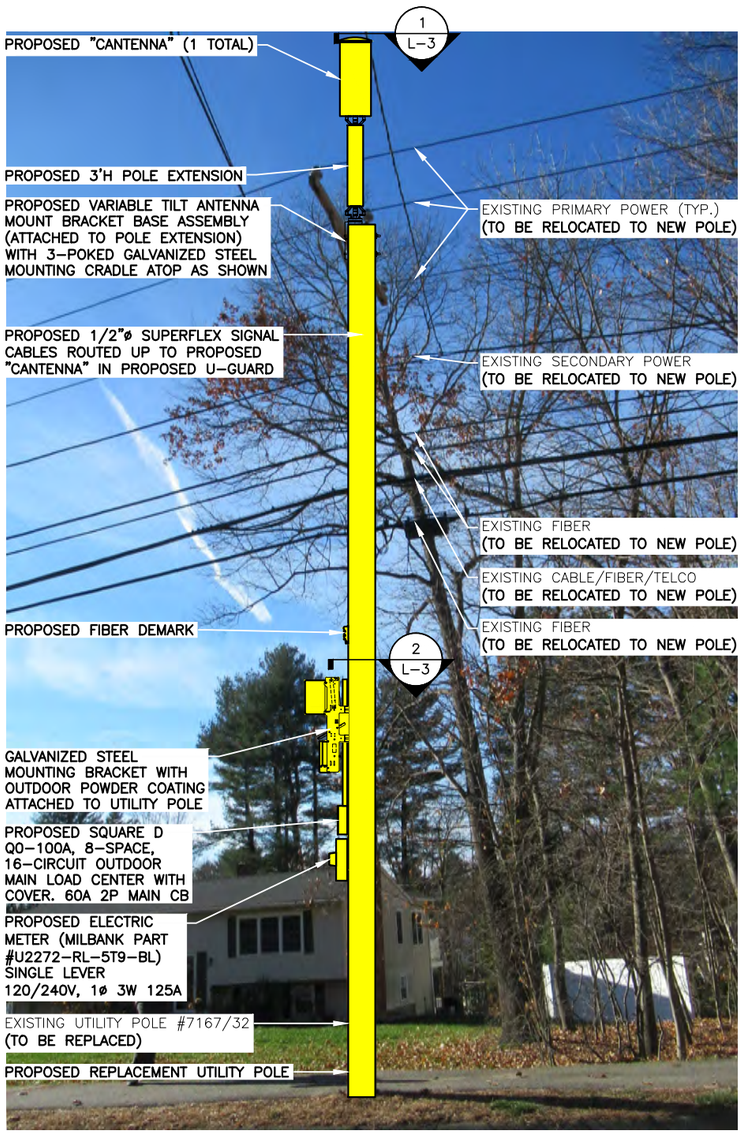
SHEET TITLE
LOCATION PLAN/AERIAL IMAGE

SHEET NUMBER
L-1

LEASE EXHIBIT
(NOT FOR CONSTRUCTION)

GENERAL NOTE:

1. THESE DRAWINGS ARE DIAGRAMMATIC IN NATURE AND ARE INTENDED TO PROVIDE GENERAL INFORMATION REGARDING THE LOCATION, SIZE AND ORIENTATION OF THE PROPOSED WIRELESS TELECOMMUNICATIONS EQUIPMENT INSTALLATION ON THE UTILITY POLE AND ARE NOT SPECIFICALLY INTENDED FOR CONSTRUCTION.
2. VERIZON WIRELESS SHALL PLACE WEATHER RESISTANT PHENOLIC PLACARDS ON UTILITY POLE AND ANCILLARY EQUIPMENT TO IDENTIFY EQUIPMENT OWNERSHIP & CONTACT INFORMATION TO BE UTILIZED IN THE CASE OF EMERGENCY.
3. AN ANALYSIS OF THE CAPACITY OF THE EXISTING UTILITY POLE TO SUPPORT THE PROPOSED LOADING HAS BEEN COMPLETED BY HUDSON DESIGN GROUP, LLC. REFER TO LATEST STRUCTURAL ANALYSIS.
4. VERIZON WIRELESS' GENERAL CONTRACTOR SHALL EXTEND EFFORTS TO ENSURE THAT ALL PROPOSED EQUIPMENT MEETS THE REQUIREMENTS OF THE EXISTING UTILITY COMPANY OR COMPANIES CURRENTLY OCCUPYING THE UTILITY POLE AND THE 2017 NATIONAL ELECTRICAL SAFETY CODE.

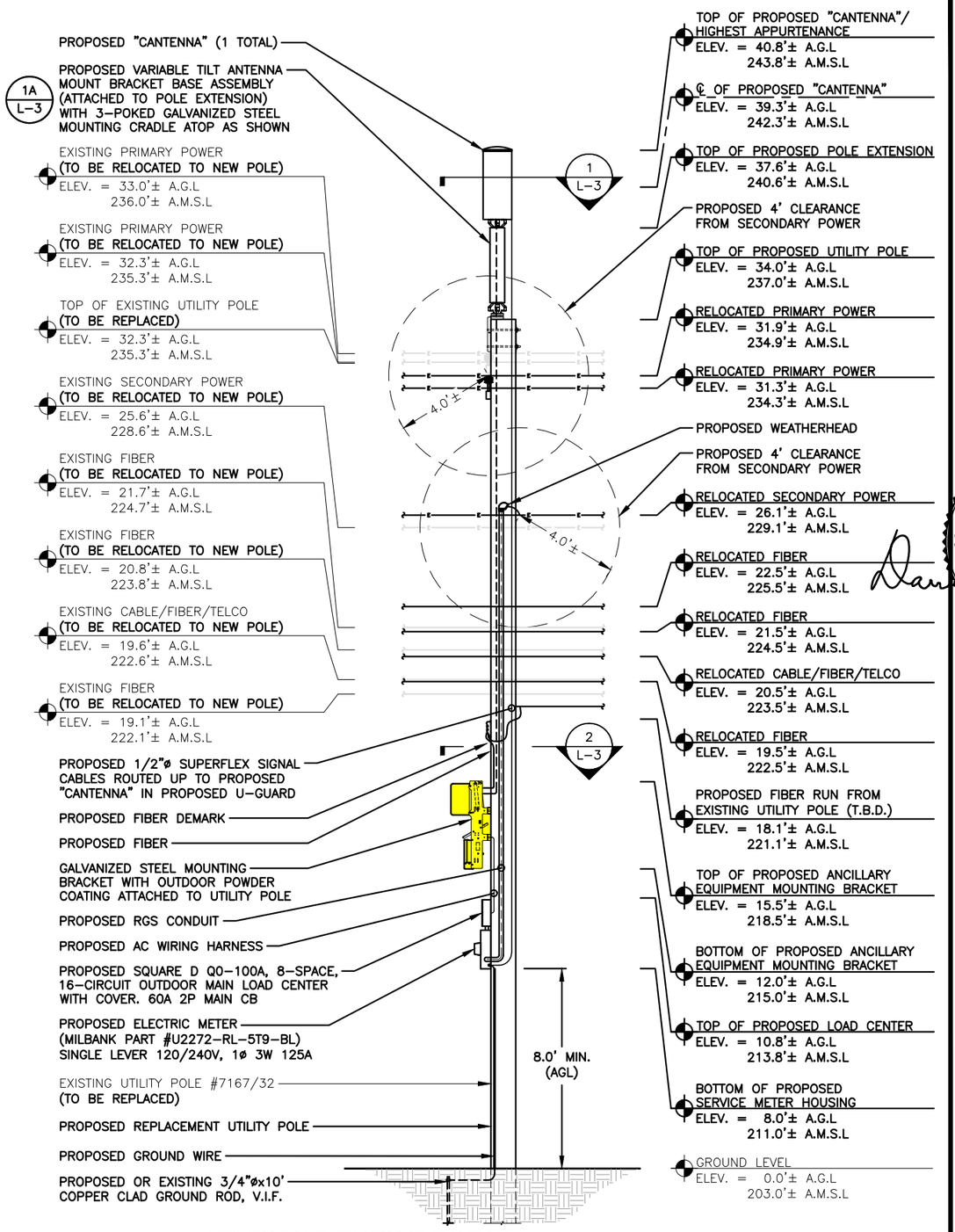


UTILITY POLE #7167/32 PHOTOGRAPH
(EXISTING CONDITIONS/SCHEMATIC RENDERING) 1/L-2
SCALE: N.T.S

ANTENNA AND MOUNT NOTE:
CONTRACTOR SHALL POSITION/ROTATE PROPOSED ANTENNA MOUNT/BRACKET IN SUCH A WAY SO AS TO NOT INTERFERE WITH EXISTING STREET LIGHT, PRIMARY POWER CROSSARM(S) (IF PRESENT), BRACKETS, BRACES, SECONDARY POWER SUPPORTS OR ANY OTHER MISCELLANEOUS APPURTENANCES AND RELATED SUPPORT BRACKETS ENCOUNTERED LOCATED ON THE EXISTING UTILITY POLE.

EQUIPMENT AND MOUNT NOTE:
CONTRACTOR SHALL POSITION/ROTATE PROPOSED EQUIPMENT AND ASSOCIATED MOUNTS/BRACKETS IN SUCH A WAY SO AS TO NOT INTERFERE WITH EXISTING WIRES/PANELS ETC. OR ANY OTHER MISCELLANEOUS APPURTENANCES AND RELATED SUPPORT BRACKETS ENCOUNTERED LOCATED ON THE FACE OF THE EXISTING UTILITY POLE.

NOTE:
UTILITY POLE, EXISTING APPURTENANCES AND DETAILS OF PROPOSED INSTALLATION SHOWN SCHEMATICALLY.



UTILITY POLE #7167/32 ELEVATION
(PROPOSED CONDITIONS) 2/L-2
22x34 SCALE: 3/8"=1'-0"
11x17 SCALE: 3/16"=1'-0"

GRAPHIC SCALE
0 1'-4" 2'-8" 5'-4" 8'-0"

HUDSON Design Group LLC
45 BEECHWOOD DRIVE
N. ANDOVER, MA 01845
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FAX: (978) 336-5586

COMMONWEALTH OF MASSACHUSETTS
DANIEL P. HAMM
CIVIL
No. 40720
REGISTERED PROFESSIONAL ENGINEER

CHECKED BY: JX

APPROVED BY: DPH

SUBMITTALS

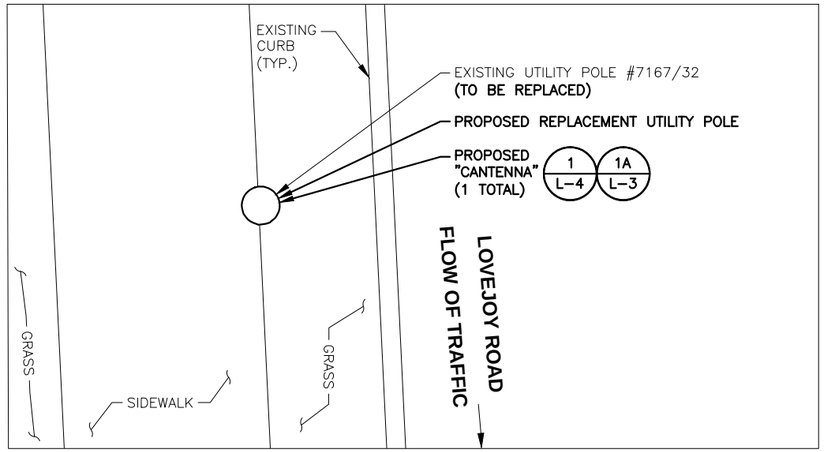
REV.	DATE	DESCRIPTION	BY
2	07/25/22	POLE REPLACEMENT	SF
1	05/10/22	REVISED TO TOP MOUNT	SF
0	12/10/21	LEASE EXHIBIT	CS

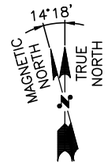
SITE NAME:
ANDOVER MA SC33

SITE ADDRESS:
#7167/32
2 HANSOM ROAD
ANDOVER, MA 01810

SHEET TITLE
UTILITY POLE PHOTOGRAPH AND ELEVATION

SHEET NUMBER
L-2

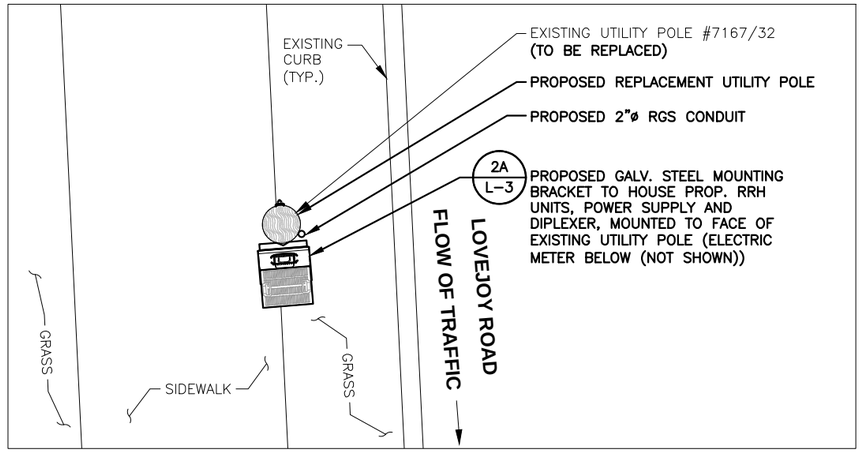


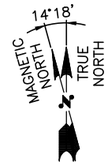


ANTENNA ORIENTATION PLAN (1 / L-3)

22x34 SCALE: 1/2"=1'-0"
11x17 SCALE: 1/4"=1'-0"

GRAPHIC SCALE
0 1 2 4 6 FEET

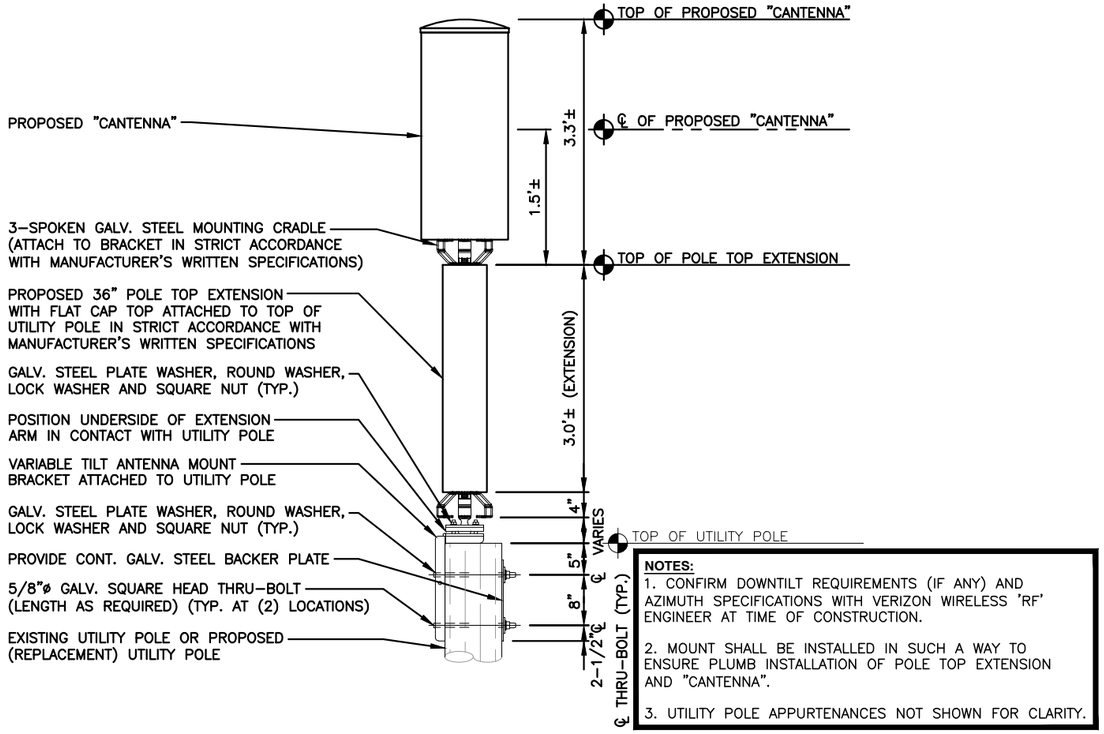




ANCILLARY EQUIPMENT ORIENTATION PLAN (2 / L-3)

22x34 SCALE: 1/2"=1'-0"
11x17 SCALE: 1/4"=1'-0"

GRAPHIC SCALE
0 1 2 4 6 FEET

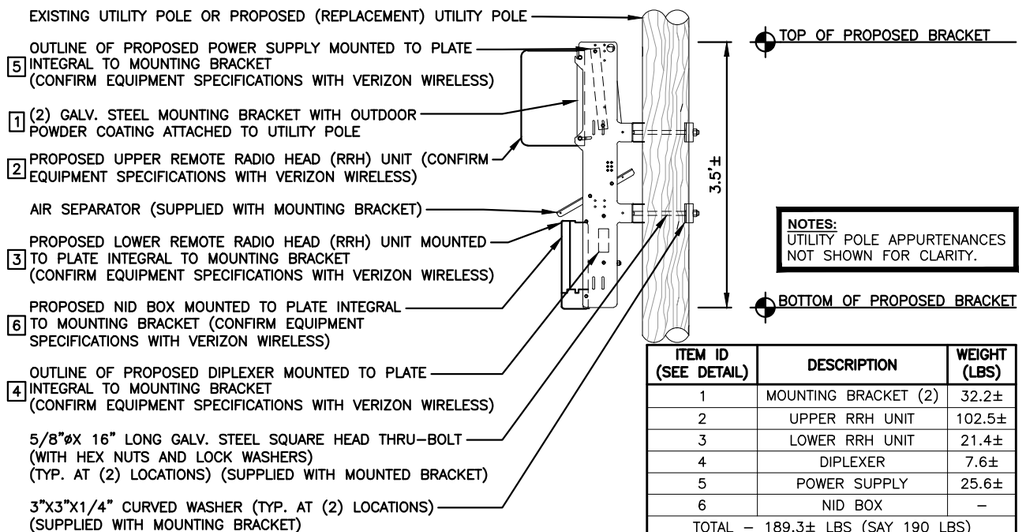


NOTES:

1. CONFIRM DOWNTILT REQUIREMENTS (IF ANY) AND AZIMUTH SPECIFICATIONS WITH VERIZON WIRELESS 'RF' ENGINEER AT TIME OF CONSTRUCTION.
2. MOUNT SHALL BE INSTALLED IN SUCH A WAY TO ENSURE PLUMB INSTALLATION OF POLE TOP EXTENSION AND "CANTENNA".
3. UTILITY POLE APPURTENANCES NOT SHOWN FOR CLARITY.

"CANTENNA" MOUNT WITH 36" EXTENSION DETAIL (1A / L-3)

SCALE: N.T.S



NOTES:
UTILITY POLE APPURTENANCES NOT SHOWN FOR CLARITY.

ITEM ID (SEE DETAIL)	DESCRIPTION	WEIGHT (LBS)
1	MOUNTING BRACKET (2)	32.2±
2	UPPER RRH UNIT	102.5±
3	LOWER RRH UNIT	21.4±
4	DIPLEXER	7.6±
5	POWER SUPPLY	25.6±
6	NID BOX	–
TOTAL – 189.3± LBS (SAY 190 LBS)		

ANCILLARY EQUIPMENT MOUNTING BRACKET MOUNT DETAIL (2A / L-3)

SCALE: N.T.S

HUDSON Design Group LLC
45 BEECHWOOD DRIVE
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

COMMONWEALTH OF MASSACHUSETTS
DANIEL P. HAMM
No. 40720
REGISTERED PROFESSIONAL ENGINEER

CHECKED BY: JX

APPROVED BY: DPH

SUBMITTALS

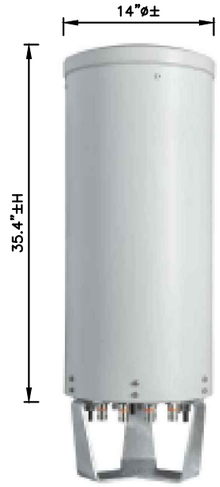
REV.	DATE	DESCRIPTION	BY
2	07/25/22	POLE REPLACEMENT	SF
1	05/10/22	REVISED TO TOP MOUNT	SF
0	12/10/21	LEASE EXHIBIT	CS

SITE NAME:
ANDOVER MA SC33

SITE ADDRESS:
#7167/32
2 HANSOM ROAD
ANDOVER, MA 01810

SHEET TITLE
ANTENNA & ANCILLARY EQUIPMENT ORIENTATION PLANS AND MOUNTING DETAILS

SHEET NUMBER
L-3



SMALL CELL "CANTENNA"
DIMENSIONS: 14"±ø x 35.4"±H WEIGHT: 35.0± LBS QUANTITY: TOTAL OF 1

TYPICAL "CANTENNA" SPECIFICATIONS (1 / L-4)

SCALE: N.T.S

REMOTE RADIO HEAD UNIT
DIMENSIONS: 17.3"±H x 17.3"±W x 11.5"±D WEIGHT: 102.5± LBS QUANTITY: TOTAL OF 1

REMOTE RADIO HEAD UNIT
DIMENSIONS: 13.9"±H x 9.8"±W x 4.8"±D WEIGHT: 21.4± LBS QUANTITY: TOTAL OF 1

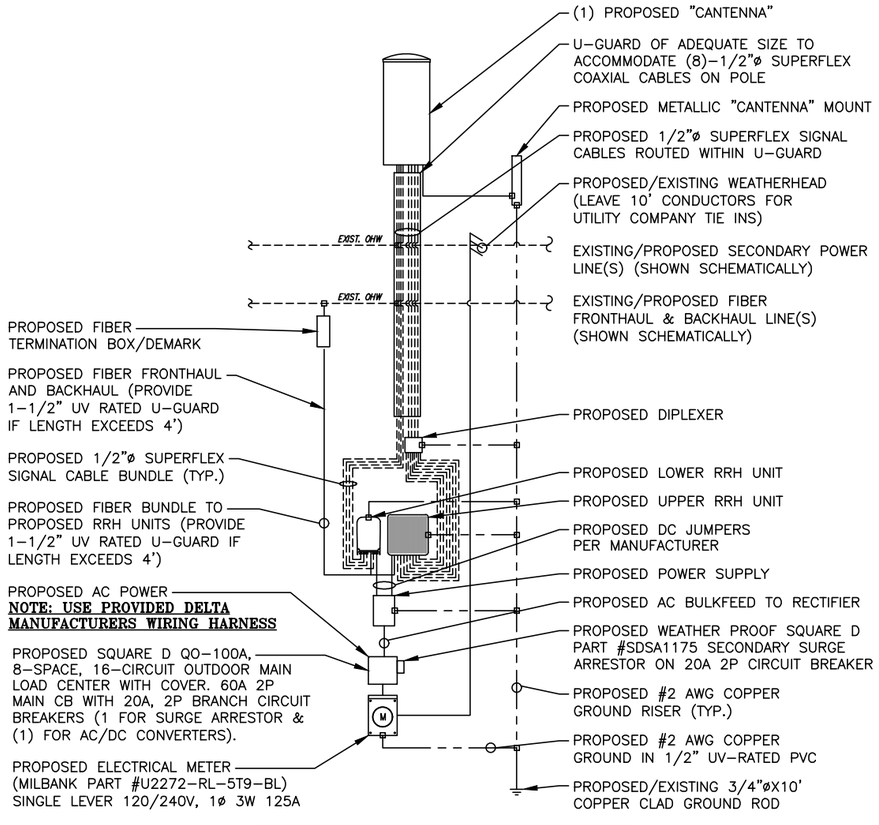
TYPICAL REMOTE RADIO HEAD (RRH) UNIT DIMENSIONS (2 / L-4)

SCALE: N.T.S

DIPLEXER
DIMENSIONS: 4.8"±H x 7.9"±W x 3.3"±D WEIGHT: 7.6± LBS QUANTITY: TOTAL OF 1

TYPICAL DIPLEXER DIMENSIONS (3 / L-4)

SCALE: N.T.S



ONE-LINE DIAGRAM NOTES:

1. PROVIDE WEATHER TIGHT SEAL CONNECTORS ON ALL CONNECTIONS EACH SIDE OF ENCLOSURE HOUSING.
2. COORDINATE ANY FURTHER MISCELLANEOUS WIRING AND CONDUIT REQUIREMENTS WITH VERIZON WIRELESS AND ELECTRIC COMPANY.

FIBER/ ELECTRICAL ONE-LINE DIAGRAM (4 / L-4)

SCALE: N.T.S

HUDSON Design Group LLC
45 BEECHWOOD DRIVE
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

COMMONWEALTH OF MASSACHUSETTS
DANIEL P. HAMM
CIVIL
No. 40720
REGISTERED PROFESSIONAL ENGINEER

CHECKED BY: JX

APPROVED BY: DPH

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
2	07/25/22	POLE REPLACEMENT	SF
1	05/10/22	REVISED TO TOP MOUNT	SF
0	12/10/21	LEASE EXHIBIT	CS

SITE NAME:
ANDOVER MA SC33

SITE ADDRESS:
#7167/32
2 HANSOM ROAD
ANDOVER, MA 01810

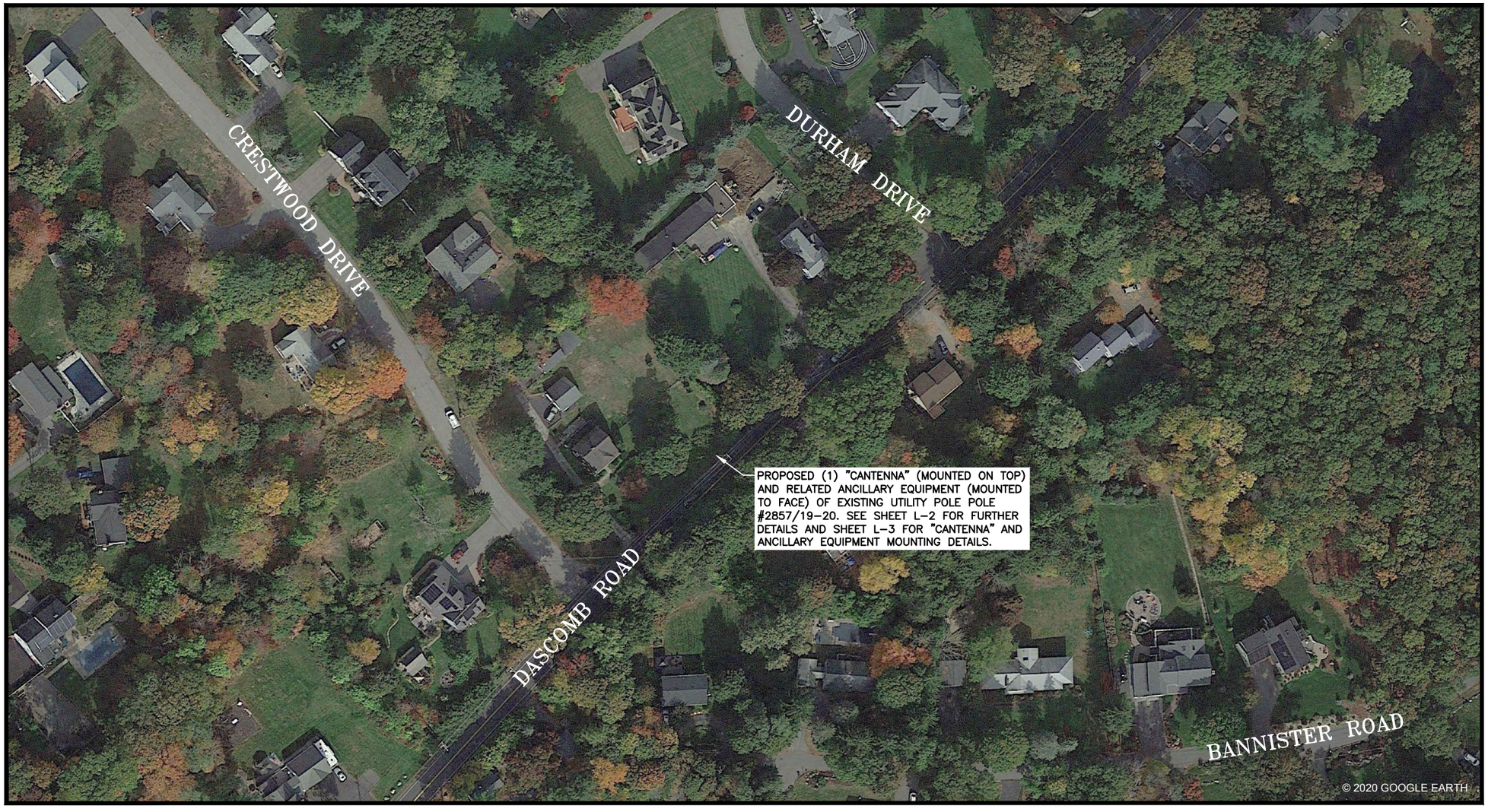
SHEET TITLE
ANTENNA & ANCILLARY EQUIPMENT SPECIFICATIONS AND ONE LINE DIAGRAM

SHEET NUMBER
L-4

PRESIDING POWER COMPANY
nationalgrid

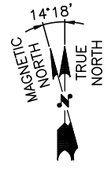
ANDOVER MA SC35

POLE #2857/19-20
59 DASCOMB ROAD
ANDOVER, MA 01810



FIELD INSPECTION DATE: 11-30-2021

SITE COORDINATES: LAT: N42° 38' 02.68"±
LONG: W71° 10' 0.213"±
LAT: N42.634078°±
LONG: W71.166726°±
APPROXIMATE GROUND ELEVATION: 147.0'± AMSL



LOCATION PLAN/ AERIAL IMAGE (1 / L-1)
SCALE: N.T.S

SHEET INDEX

HUDSON Design Group LLC
45 BEECHWOOD DRIVE
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

COMMONWEALTH OF MASSACHUSETTS
DANIEL P. HAMM
CIVIL
No. 40720
REGISTERED PROFESSIONAL ENGINEER

CHECKED BY: JX

APPROVED BY: DPH

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
1	07/25/22	REVISED TO TOP MOUNT	SF
0	12/10/21	LEASE EXHIBIT	CS

SITE NAME:
ANDOVER MA SC35

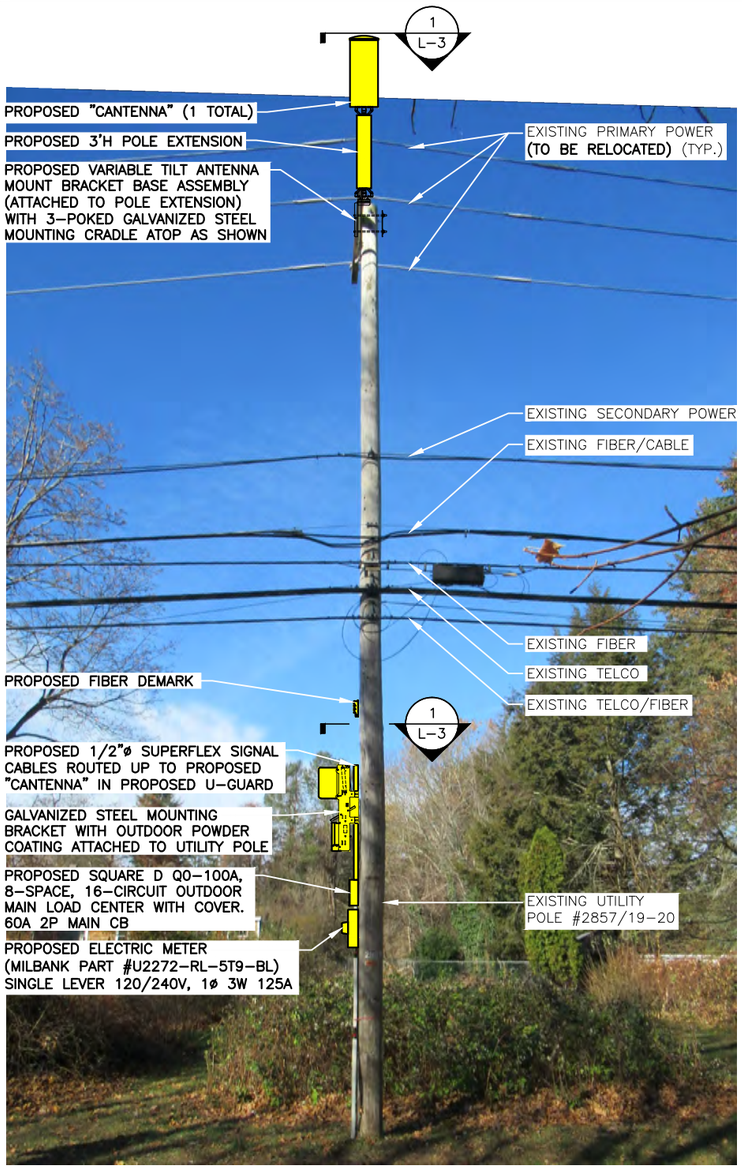
SITE ADDRESS:
POLE #2857/19-20
59 DASCOMB ROAD
ANDOVER, MA 01810

SHEET TITLE
LOCATION PLAN/AERIAL IMAGE

SHEET NUMBER
L-1

LEASE EXHIBIT
(NOT FOR CONSTRUCTION)

GENERAL NOTE:
1. THESE DRAWINGS ARE DIAGRAMMATIC IN NATURE AND ARE INTENDED TO PROVIDE GENERAL INFORMATION REGARDING THE LOCATION, SIZE AND ORIENTATION OF THE PROPOSED WIRELESS TELECOMMUNICATIONS EQUIPMENT INSTALLATION ON THE UTILITY POLE AND ARE NOT SPECIFICALLY INTENDED FOR CONSTRUCTION.
2. VERIZON WIRELESS SHALL PLACE WEATHER RESISTANT PHENOLIC PLACARDS ON UTILITY POLE AND ANCILLARY EQUIPMENT TO IDENTIFY EQUIPMENT OWNERSHIP & CONTACT INFORMATION TO BE UTILIZED IN THE CASE OF EMERGENCY.
3. AN ANALYSIS OF THE CAPACITY OF THE EXISTING UTILITY POLE TO SUPPORT THE PROPOSED LOADING HAS BEEN COMPLETED BY HUDSON DESIGN GROUP, LLC. REFER TO LATEST STRUCTURAL ANALYSIS.
4. VERIZON WIRELESS' GENERAL CONTRACTOR SHALL EXTEND EFFORTS TO ENSURE THAT ALL PROPOSED EQUIPMENT MEETS THE REQUIREMENTS OF THE EXISTING UTILITY COMPANY OR COMPANIES CURRENTLY OCCUPYING THE UTILITY POLE AND THE 2017 NATIONAL ELECTRICAL SAFETY CODE.

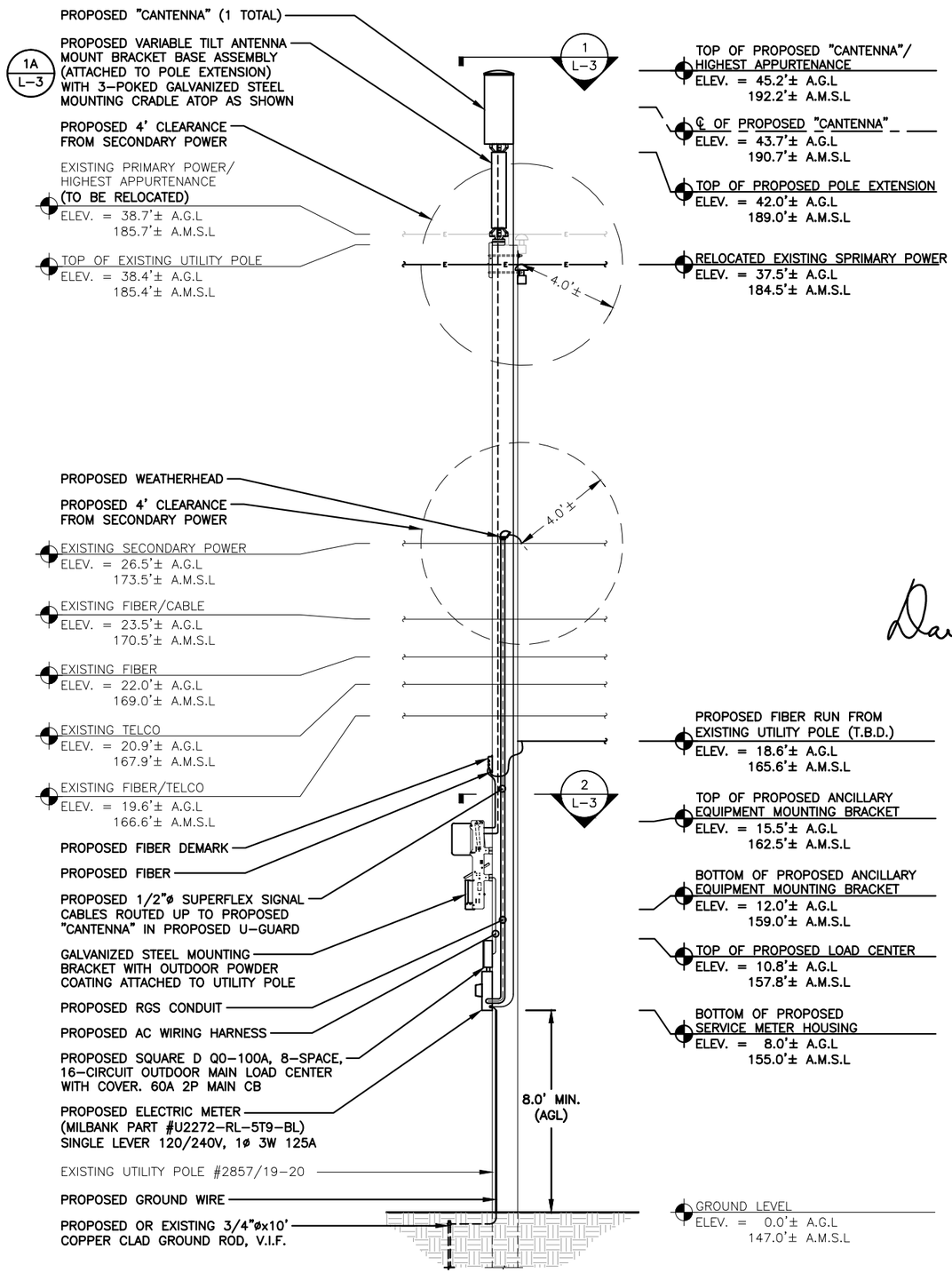


UTILITY POLE #2857/19-20 PHOTOGRAPH (EXISTING CONDITIONS/SCHEMATIC RENDERING)
SCALE: N.T.S
1 / L-2

ANTENNA AND MOUNT NOTE:
CONTRACTOR SHALL POSITION/ROTATE PROPOSED ANTENNA MOUNT/BRACKET IN SUCH A WAY SO AS TO NOT INTERFERE WITH EXISTING STREET LIGHT, PRIMARY POWER CROSSARM(S) (IF PRESENT), BRACKETS, BRACES, SECONDARY POWER SUPPORTS OR ANY OTHER MISCELLANEOUS APPURTENANCES AND RELATED SUPPORT BRACKETS ENCOUNTERED LOCATED ON THE EXISTING UTILITY POLE.

EQUIPMENT AND MOUNT NOTE:
CONTRACTOR SHALL POSITION/ROTATE PROPOSED EQUIPMENT AND ASSOCIATED MOUNTS/BRACKETS IN SUCH A WAY SO AS TO NOT INTERFERE WITH EXISTING WIRES/PANELS ETC. OR ANY OTHER MISCELLANEOUS APPURTENANCES AND RELATED SUPPORT BRACKETS ENCOUNTERED LOCATED ON THE FACE OF THE EXISTING UTILITY POLE.

NOTE:
UTILITY POLE, EXISTING APPURTENANCES AND DETAILS OF PROPOSED INSTALLATION SHOWN SCHEMATICALLY.



UTILITY POLE #2857/19-20 ELEVATION (PROPOSED CONDITIONS)
22x34 SCALE: 3/8"=1'-0"
11x17 SCALE: 3/16"=1'-0"
2 / L-2

GRAPHIC SCALE
0 1'-4" 2'-8" 5'-4" 8'-0"

HUDSON Design Group LLC
45 BEECHWOOD DRIVE
N. ANDOVER, MA 01845
TEL: (978) 557-5553
FAX: (978) 336-5586

COMMONWEALTH OF MASSACHUSETTS
DANIEL P. HAMM
CIVIL
No. 40720
REGISTERED PROFESSIONAL ENGINEER

CHECKED BY: JX

APPROVED BY: DPH

SUBMITTALS

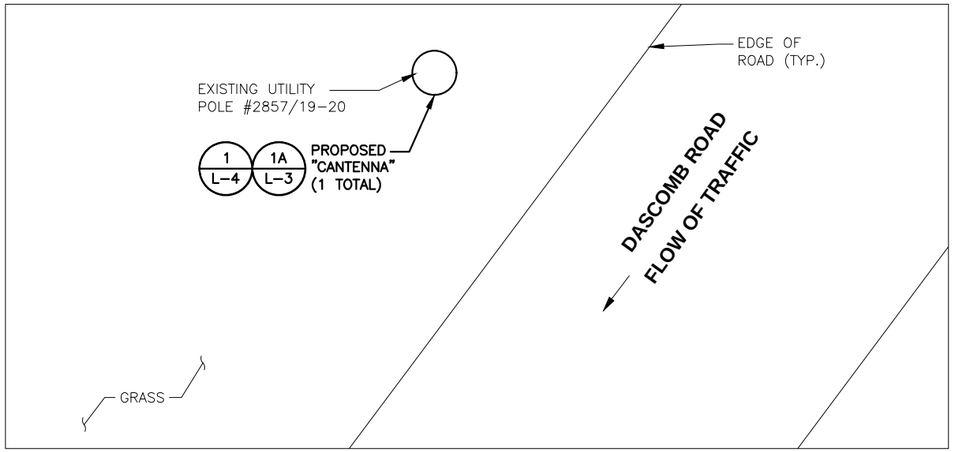
REV.	DATE	DESCRIPTION	BY
1	07/25/22	REVISED TO TOP MOUNT	SF
0	12/10/21	LEASE EXHIBIT	CS

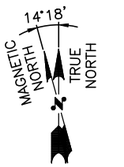
SITE NAME:
ANDOVER MA SC35

SITE ADDRESS:
POLE #2857/19-20
59 DASCOMB ROAD
ANDOVER, MA 01810

SHEET TITLE
UTILITY POLE PHOTOGRAPH AND ELEVATION

SHEET NUMBER
L-2

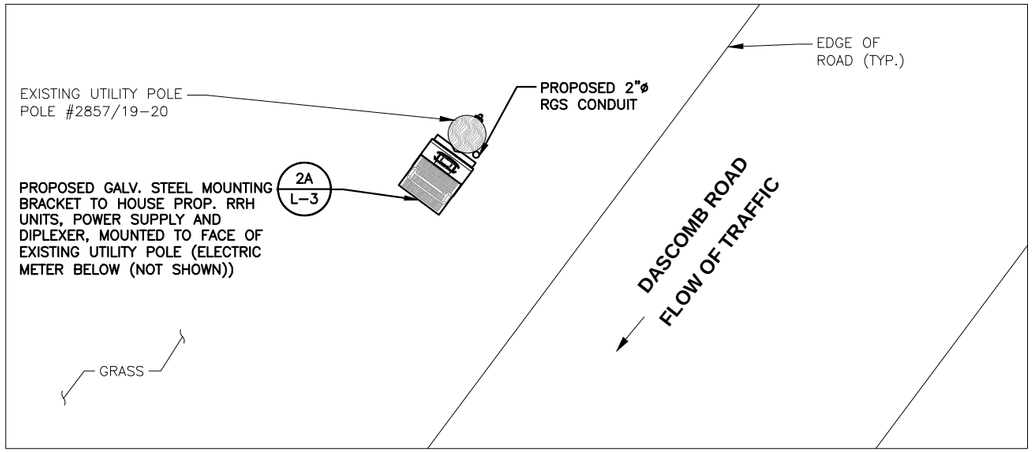


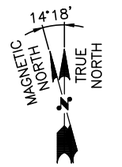


ANTENNA ORIENTATION PLAN (1 / L-3)

22x34 SCALE: 1/2"=1'-0"
11x17 SCALE: 1/4"=1'-0"

GRAPHIC SCALE
0 1 2 4 6 FEET





ANCILLARY EQUIPMENT ORIENTATION PLAN (2 / L-3)

22x34 SCALE: 1/2"=1'-0"
11x17 SCALE: 1/4"=1'-0"

GRAPHIC SCALE
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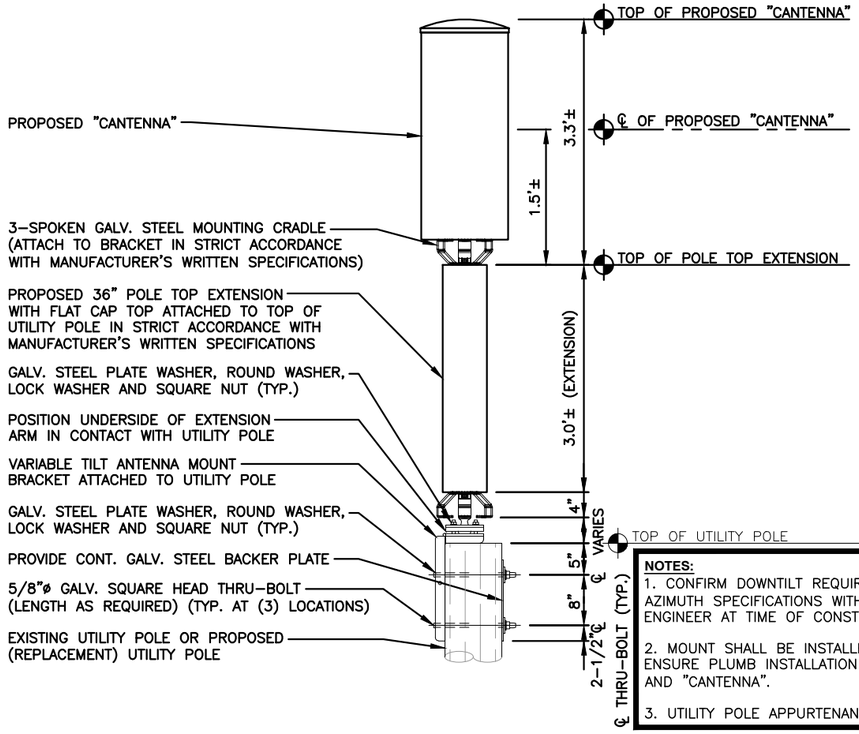


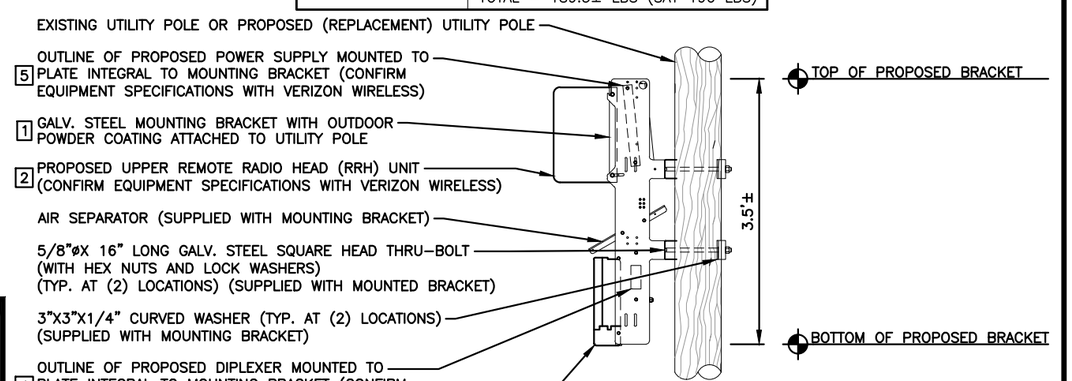
NOTES:

1. CONFIRM DOWNTILT REQUIREMENTS (IF ANY) AND AZIMUTH SPECIFICATIONS WITH VERIZON WIRELESS 'RF' ENGINEER AT TIME OF CONSTRUCTION.
2. MOUNT SHALL BE INSTALLED IN SUCH A WAY TO ENSURE PLUMB INSTALLATION OF POLE TOP EXTENSION AND "CANTENNA".
3. UTILITY POLE APPURTENANCES NOT SHOWN FOR CLARITY.

"CANTENNA" MOUNT WITH 36" EXTENSION DETAIL (1A / L-3)

SCALE: N.T.S

ITEM ID (SEE DETAIL)	DESCRIPTION	WEIGHT (LBS)
1	MOUNTING BRACKET	32.2±
2	UPPER RH UNIT	102.5±
3	LOWER RRH UNIT	21.4±
4	DIPLEXER	7.6±
5	POWER SUPPLY	25.6±
	TOTAL – 189.3± LBS (SAY 190 LBS)	



NOTES:
UTILITY POLE APPURTENANCES NOT SHOWN FOR CLARITY.

ANCILLARY EQUIPMENT MOUNTING BRACKET MOUNT DETAIL (2A / L-3)

SCALE: N.T.S

HUDSON Design Group LLC
45 BEECHWOOD DRIVE
N. ANDOVER, MA 01845
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COMMONWEALTH OF MASSACHUSETTS
DANIEL P. HAMM
CIVIL
No. 40720
REGISTERED PROFESSIONAL ENGINEER

CHECKED BY: JX

APPROVED BY: DPH

SUBMITTALS

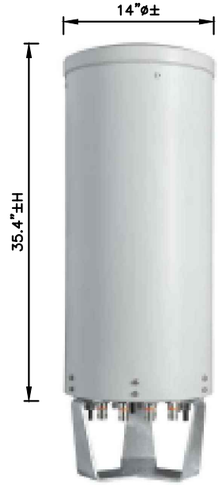
REV.	DATE	DESCRIPTION	BY
1	07/25/22	REVISED TO TOP MOUNT	SF
0	12/10/21	LEASE EXHIBIT	CS

SITE NAME:
ANDOVER MA SC35

SITE ADDRESS:
POLE #2857/19-20
59 DASCOMB ROAD
ANDOVER, MA 01810

SHEET TITLE
ANTENNA & ANCILLARY EQUIPMENT ORIENTATION PLANS AND MOUNTING DETAILS

SHEET NUMBER
L-3



SMALL CELL "CANTENNA"
DIMENSIONS: 14"±ø x 35.4"±H WEIGHT: 35.0± LBS QUANTITY: TOTAL OF 1

TYPICAL "CANTENNA" SPECIFICATIONS — 1 / L-4

SCALE: N.T.S

REMOTE RADIO HEAD UNIT
DIMENSIONS: 17.3"±H x 17.3"±W x 11.5"±D WEIGHT: 102.5± LBS QUANTITY: TOTAL OF 1

REMOTE RADIO HEAD UNIT
DIMENSIONS: 13.9"±H x 9.8"±W x 4.8"±D WEIGHT: 21.4± LBS QUANTITY: TOTAL OF 1

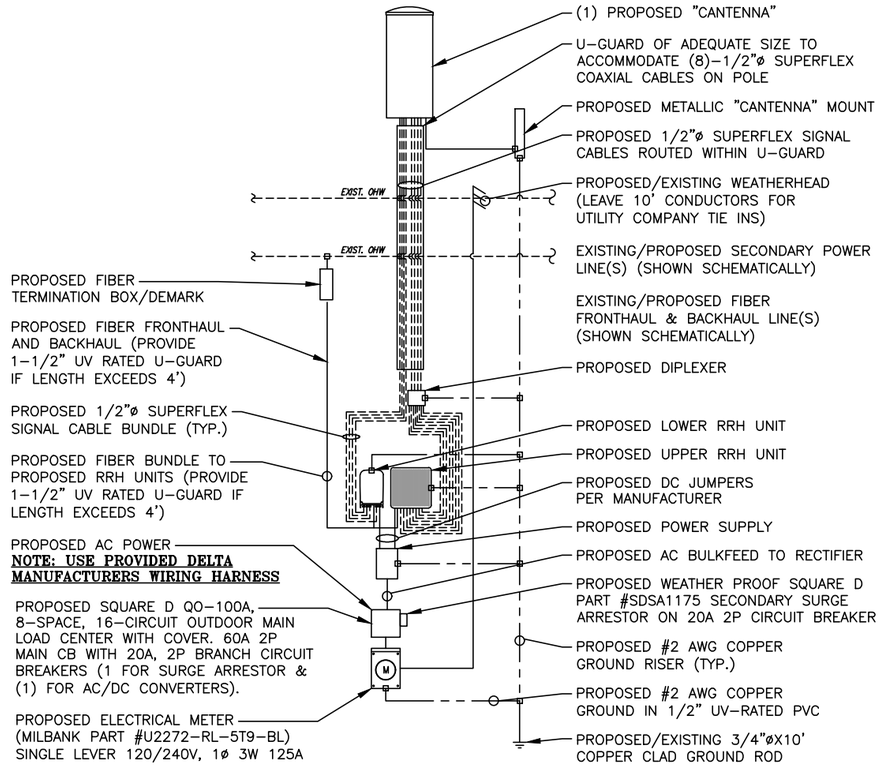
TYPICAL REMOTE RADIO HEAD (RRH) UNIT DIMENSIONS — 2 / L-4

SCALE: N.T.S

DIPLEXER
DIMENSIONS: 4.8"±H x 7.9"±W x 3.3"±D WEIGHT: 7.6± LBS QUANTITY: TOTAL OF 1

TYPICAL DIPLEXER DIMENSIONS — 3 / L-4

SCALE: N.T.S



ONE-LINE DIAGRAM NOTES:

1. PROVIDE WEATHER TIGHT SEAL CONNECTORS ON ALL CONNECTIONS EACH SIDE OF ENCLOSURE HOUSING.
2. COORDINATE ANY FURTHER MISCELLANEOUS WIRING AND CONDUIT REQUIREMENTS WITH VERIZON WIRELESS AND ELECTRIC COMPANY.

FIBER/ ELECTRICAL ONE-LINE DIAGRAM — 4 / L-4

SCALE: N.T.S

HUDSON Design Group LLC
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No. 40720
REGISTERED PROFESSIONAL ENGINEER

CHECKED BY: JX

APPROVED BY: DPH

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
1	07/25/22	REVISED TO TOP MOUNT	SF
0	12/10/21	LEASE EXHIBIT	CS

SITE NAME:
ANDOVER MA SC35

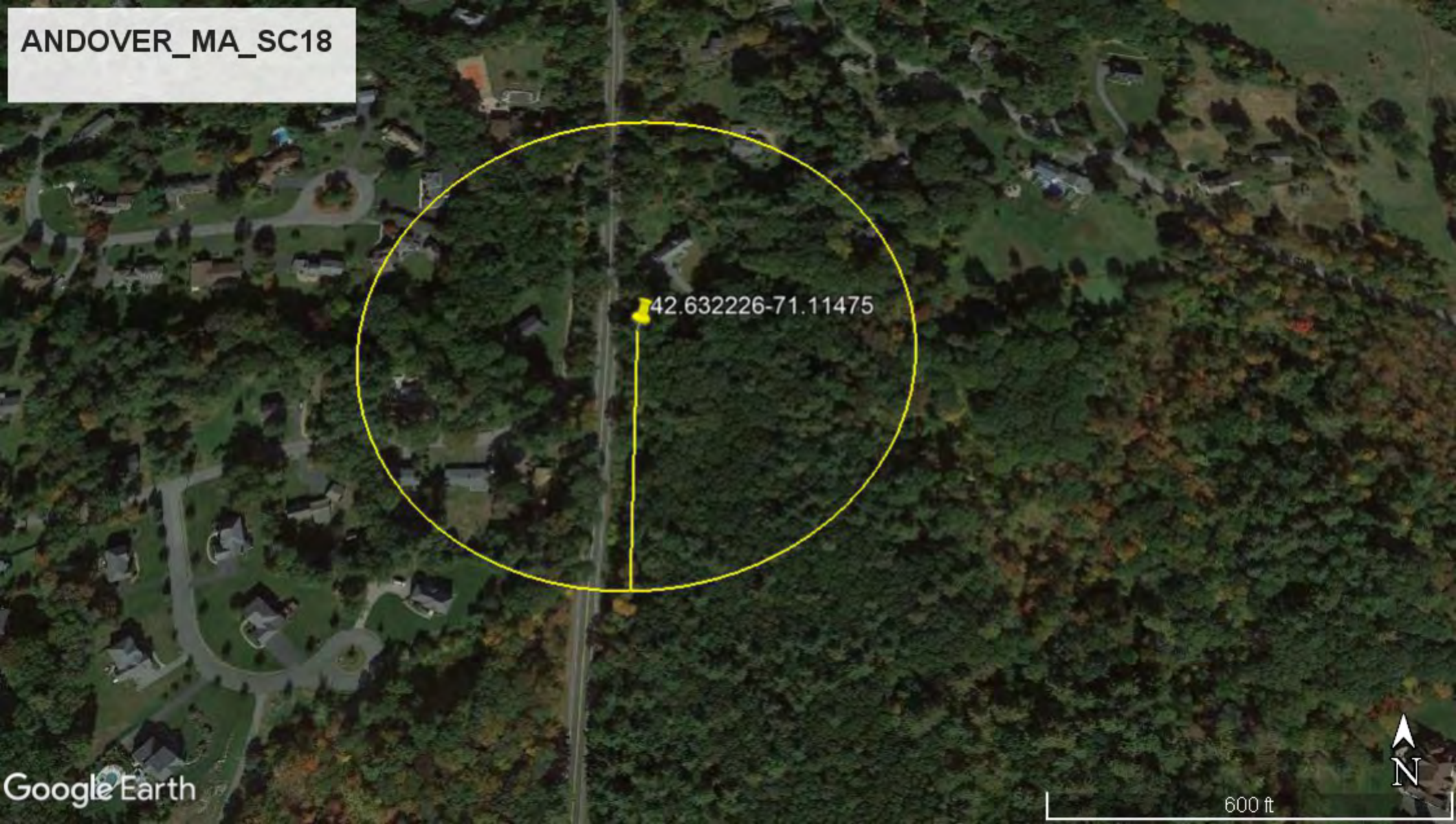
SITE ADDRESS:
POLE #2857/19-20
59 DASCOMB ROAD
ANDOVER, MA 01810

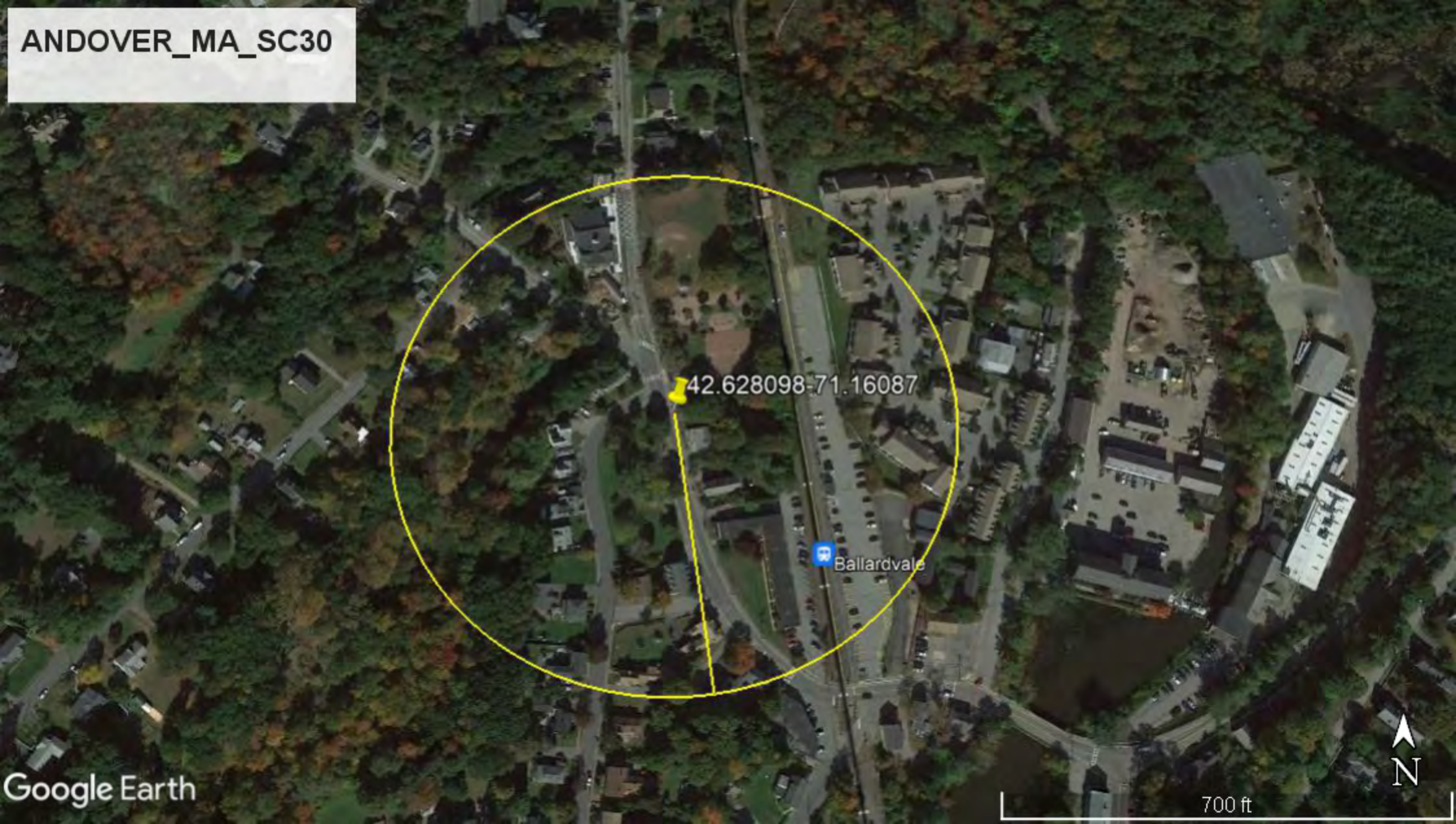
SHEET TITLE
ANTENNA & ANCILLARY EQUIPMENT SPECIFICATIONS AND ONE LINE DIAGRAM

SHEET NUMBER
L-4

EXHIBIT 2:
DISTANCE MAPS


ANDOVER_MA_SC17
42.63656-71.11553
Google Earth
700 ft
N


ANDOVER_MA_SC18
42.632226-71.11475
Google Earth
600 ft
N


ANDOVER_MA_SC30
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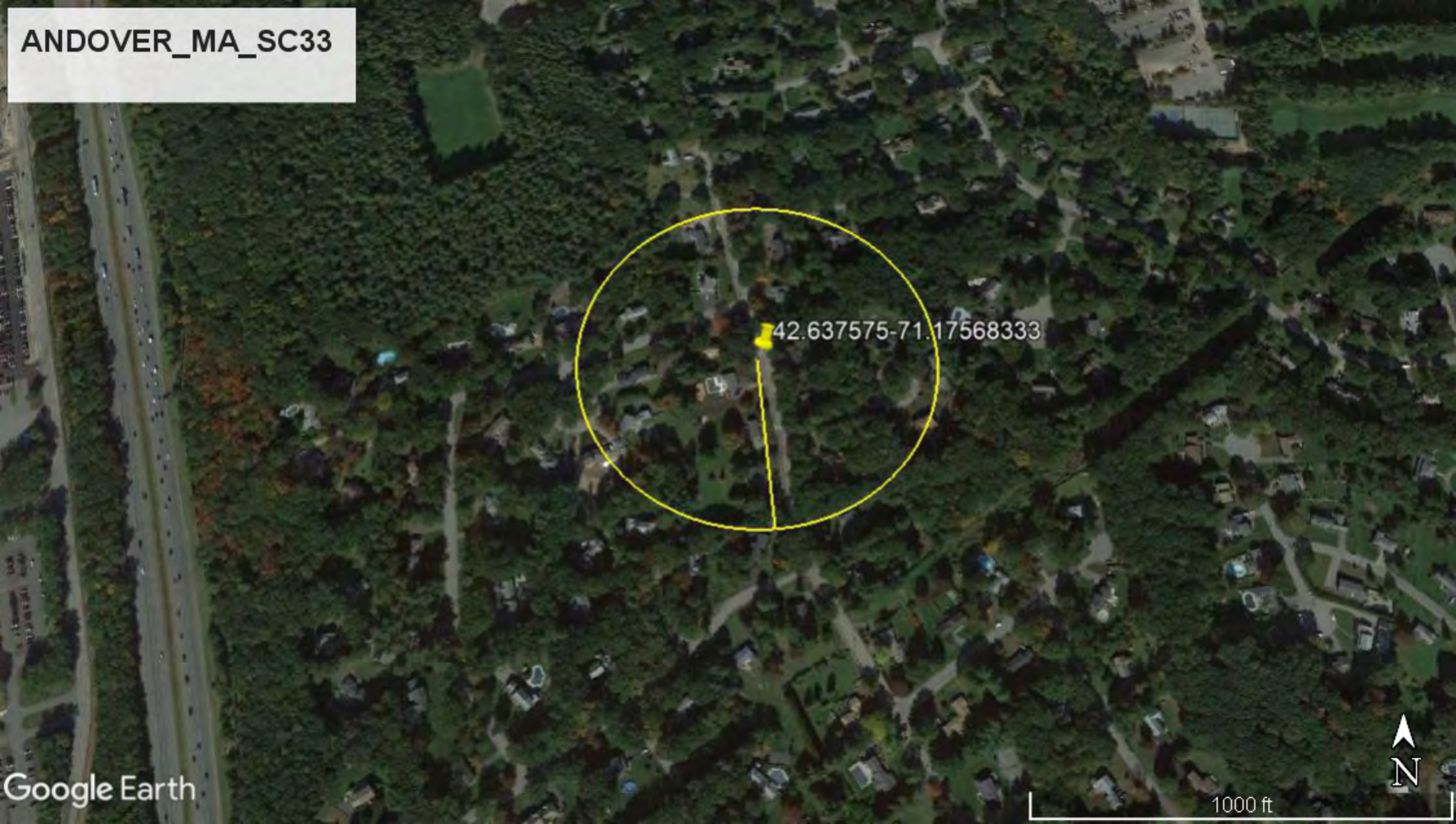
Ballardvale
Google Earth
700 ft
N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Google Earth
N
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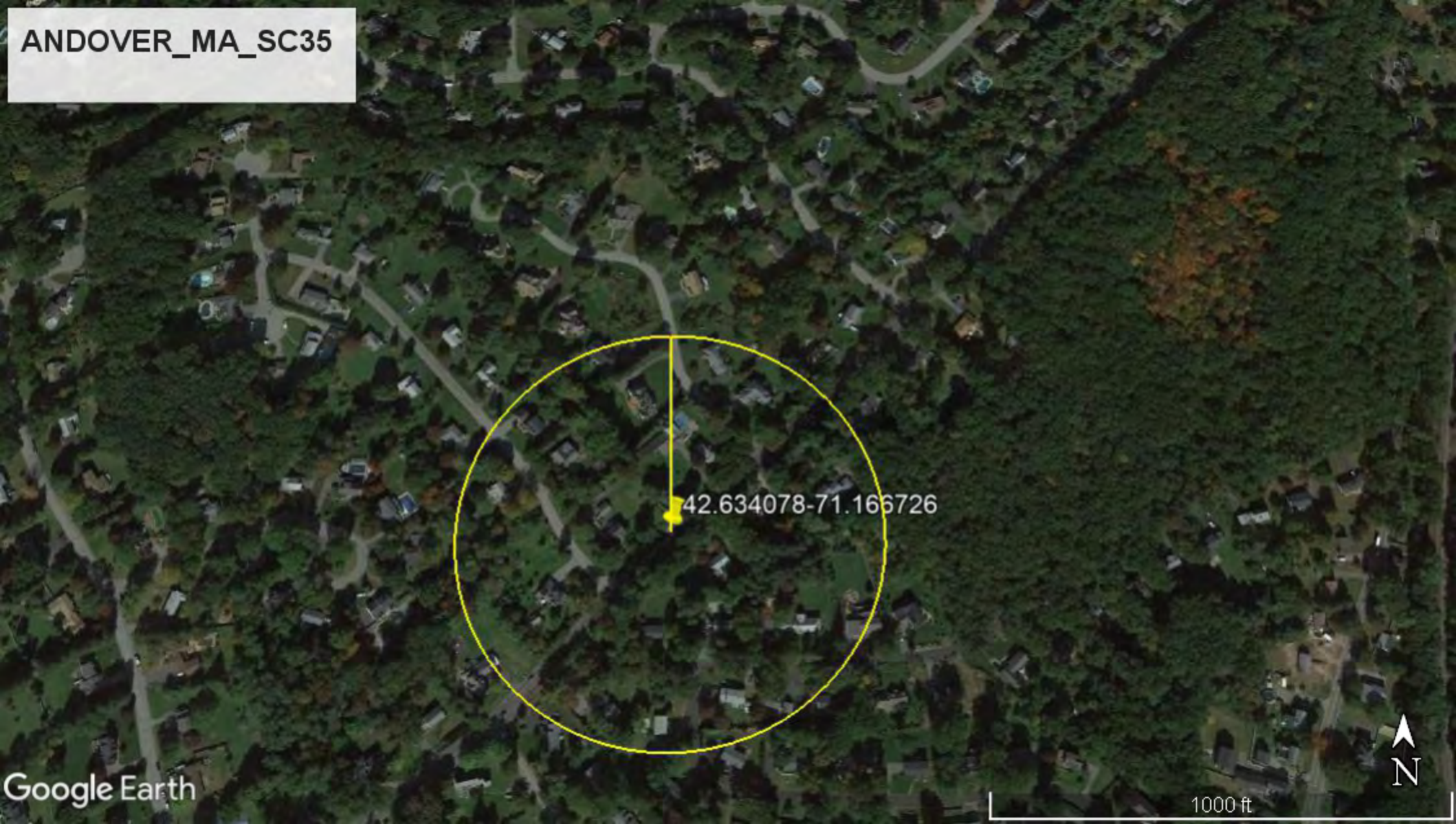

ANDOVER_MA_SC35
42.634078-71.166726
Google Earth
N
1000 ft

EXHIBIT 3:

POLE STRUCTURAL ANALYSES

STRUCTURAL ANALYSIS REPORT

For

ANDOVER_MA_SC17

39 Stinson Road
Andover, MA 01810

Equipment Mounted on Utility Pole

Prepared for:

verizon

900 Chelmsford Street, Tower 2 Floor 5
Lowell, MA 01851

Dated: July 15, 2022

HUDSON Design Group LLC

45 Beechwood Drive
North Andover, MA 01845
Phone: (978) 557-5553
www.hudsondesigngroupllc.com

HUDSON Design Group LLC

SCOPE OF WORK:

Hudson Design Group LLC (HDG) has been authorized by Verizon to conduct a structural evaluation of the existing utility pole supporting the proposed Verizon equipment.

This report represents this office's findings, conclusions and recommendations pertaining to the support of the proposed Verizon equipment listed below.

This office conducted an on-site visual survey of the above areas on April 25, 2022. Attendees included Patrick Barrett (HDG – Field Technician).

CONCLUSION SUMMARY:

Based on our evaluation, we have determined that the existing pole is not in conformance with the National Electric Safety Code 2017 (NESC). The utility pole structure is rated at 121.1%.

APPURTENANCES CONFIGURATION:

Appurtenances	Elev.	Mount
(1) Typical Antenna	29'-5"	Side of Wood Pole
(1) Demark Box	17'-6"	Side of Wood Pole
(1) Upper RRH Unit	14'-9"	Side of Wood Pole
(1) Lower RRH Unit	12'-9"	Side of Wood Pole
(1) Diplexer	12'-9"	Side of Wood Pole
(1) Load Center	10'-2"	Side of Wood Pole
(1) Elec. Meter	8'-9"	Side of Wood Pole

*Proposed Equipment shown in bold.

ANALYSIS RESULTS SUMMARY:

Component	Max. Stress Ratio	Elev. of Component (ft.)	Pass/Fail
SP 5 (Existing)	121.1%	0 **– 27'-7"**	FAIL

DESIGN CRITERIA:

National Electric Safety Code 2017 (NESC) and 780 CMR MA Building Code, 9th Edition.		
Wind		
City/Town:	Andover	
County:	Middlesex	
NESC Rule	Rule 250B	NESC Section 25
Construction Grade	C	NESC Section 25
Wind Load:	39.53 mph	NESC Table 230-2
Ice		
Loading District	Heavy	NESC Figure 250-1
Radial Ice Thickness:	0.50 in	NESC Table 230-1

1. Approximate height above grade to center of the proposed antenna: 29'-5" +/-

*Calculations and referenced documents are attached.

EXISTING STRUCTURE:

The existing 27'-7" +/- wood pole is assumed to be Southern Pine Class 5 (Fb = 8000 psi) with a 10.0" diameter base. If field conditions differ from what is assumed in this report, then the engineer of record is to be notified as soon as possible.

ANTENNA SUPPORT RECOMMENDATIONS:

The proposed antenna is to be installed on a proposed top mount kit secured to the existing pole using thru bolts.

RRH SUPPORT RECOMMENDATIONS:

The proposed RRH's are to be installed on a proposed RRH mounting bracket secured to the existing pole using thru bolts.

EQUIPMENT SUPPORT RECOMMENDATIONS:

The proposed equipment is to be installed on the existing wood pole using the approved manufacturer's mount.

Limitations and assumptions:

1. Reference the latest HDG construction drawings for all the equipment locations details.
2. Mount all equipment per manufacturer's specifications.
3. All structural members and their connections are assumed to be in good condition and are free from defects with no deterioration to its member capacities. Contractor to perform pre-inspection prior to construction.
4. All antennas and waveguide cables are assumed to be properly installed and supported as per the manufacturer requirements.
5. HDG is not responsible for any modifications completed prior to and hereafter which HDG was not directly involved.
6. If field conditions differ from what is assumed in this report, then the engineer of record is to be notified as soon as possible.
7. HDG did not perform any geotechnical analysis / or / investigation. Soil Information is unknown.

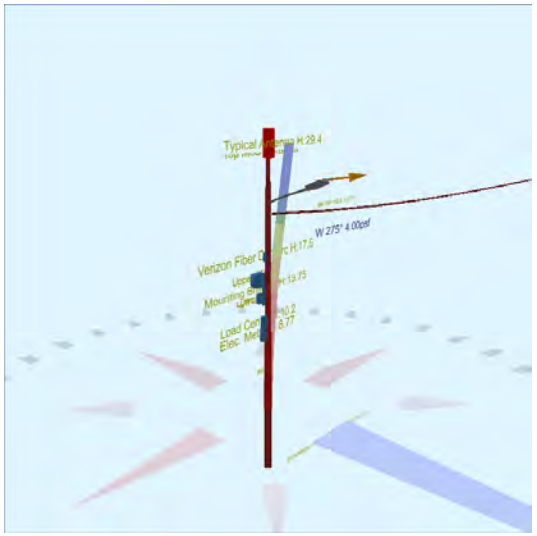
FIELD PHOTOS:

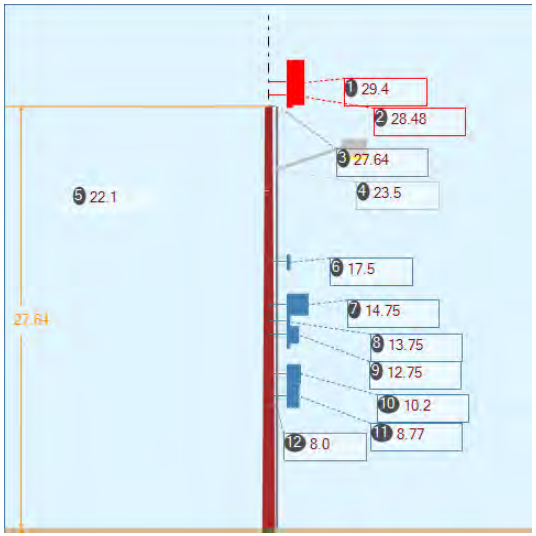
Photo 1: Sample photo illustrating the existing wood pole.

HUDSON
Design Group LLC

Calculations

Pole Num:	**#6821**	Pole Length / Class:	**35 / 5**	Code:	**NESC**	Structure Type:	**Deadend**
Pole Number:	**#6821**	Species:	**SOUTHERN PINE**	NESC Rule:	**Rule 250B**	Status	**Unguyed**
Site Name:	**Andover MA SC17**	Setting Depth (ft):	**7.36**	Construction Grade:	**C**	Pole Strength Factor:	**0.85**
Address:	**39 Stinson Road**	G/L Circumference (in):	**31.42**	Loading District:	**Heavy**	Transverse Wind LF:	**1.75**
Town, State:	**Andover, MA**	G/L Fiber Stress (psi):	**8,000**	Ice Thickness (in):	**0.50**	Wire Tension LF:	**1.30**
Zip Code:	**01810**	Allowable Stress (psi):	**6,800**	Wind Speed (mph):	**39.53**	Vertical LF:	**1.90**
Designed By:	**JC**	Fiber Stress Ht. Reduc:	**No**	Wind Pressure (psf):	**4.00**		
Latitude:	**42.636563**	Longitude:			**-71.115541**	Elevation:	**89.6M**





Pole Capacity Utilization (%)		Height (ft)	Wind Angle (deg)
Maximum	**121.1**	0.0	274.8
Groundline	**121.1**	0.0	274.8
Vertical	**5.4**	16.1	274.8

Pole Moments (ft-lb)		Load Angle (deg)	Wind Angle (deg)
Max Cap Util	**67,185**	270.6	274.8
Groundline	**67,185**	270.6	274.8
GL Allowable	**55,654**		

Groundline Load Summary - Reporting Angle Mode: Load - Reporting Angle: 270.6°

	Shear Load* (lbs)	Applied Load (%)	Bending Moment (ft-lb)	Applied Moment (%)	Pole Capacity (%)	Bending Stress (+/- psi)	Vertical Load (lbs)	Vertical Stress (psi)	Total Stress (psi)	Pole Capacity (%)
Powers	2,803	91.2	**62,449**	93.0	**112.2**	**7,592**	417	5	**7,598**	**111.7**
GenericEquipments	72	2.3	**1,406**	2.1	**2.5**	**171**	563	7	**178**	**2.6**
Pole	129	4.2	**1,846**	2.8	**3.3**	**224**	1,129	14	**239**	**3.5**
Streetlights	40	1.3	**950**	1.4	**1.7**	**116**	114	1	**117**	**1.7**
Risers	30	1.0	**534**	0.8	**1.0**	**65**	68	1	**66**	**1.0**
Insulators	0	0.0	**0**	0.0	**0.0**	**0**	10	0	**0**	**0.0**
Pole Load	3,074	100.0	**67,185**	100.0	**120.7**	**8,168**	2,300	29	**8,197**	**120.6**
Pole Reserve Capacity			**-11,531**		**-20.7**	**-1,368**			**-1,397**	**-20.6**

Load Summary by Owner - Reporting Angle Mode: Load - Reporting Angle: 270.6°

	Shear Load* (lbs)	Applied Load (%)	Bending Moment (ft-lb)	Applied Moment (%)	Pole Capacity (%)	Bending Stress (+/- psi)	Vertical Load (lbs)	Vertical Stress (psi)	Total Stress (psi)	Pole Capacity (%)
Existing	2,843	92.5	**63,400**	94.4	**113.9**	**7,708**	541	7	**7,715**	**113.5**
Proposed	102	3.3	**1,939**	2.9	**3.5**	**236**	630	8	**244**	**3.6**
Pole	129	4.2	**1,846**	2.8	**3.3**	**224**	1,129	14	**239**	**3.5**
Totals:	3,074	100.0	**67,185**	100.0	**120.7**	**8,168**	2,300	29	**8,197**	**120.6**

Detailed Load Components:

Power		Owner	Height (ft)	Horiz. Offset (in)	Cable Diameter (in)	Sag at Max Temp (ft)	Cable Weight (lbs/ft)	Lead/Span Length (ft)	Span Angle (deg)	Wire Length (ft)	Tension (lbs)	Tension Moment* (ft-lb)	Offset Moment* (ft-lb)	Wind Moment* (ft-lb)	Moment at GL* (ft-lb)
Secondary	DUPLEX 1/0	Existing	22.05	5.83	0.9540		0.260	193.0	270.0	193.2			72	1	73
Secondary	DUPLEX 1/0	Existing	22.15	5.83	0.9540		0.260	193.0	270.0	193.2			72	1	73
Overlashed Bundle	8M	Existing	22.10	5.83	0.2720	3.51	0.131	193.0	270.0	193.2	2,156	62,242	60	2	62,304
											Totals:	**62,242**	**204**	**3**	**62,449**

GenericEquipment		Owner	Height (ft)	Horiz. Offset (in)	Offset Angle (deg)	Rotate Angle (deg)	Unit Weight (lbs)	Unit Height (in)	Unit Depth (in)	Unit Diameter (in)	Unit Length (in)	Offset Moment* (ft-lb)	Wind Moment* (ft-lb)	Moment at GL* (ft-lb)
Cylinder	Typical Antenna	Proposed	29.40	0.90	0.0	0.0	35.00	35.40	--	14.00	--	0	710	710
Cylinder	Top Mount Bracket	Proposed	28.48	0.10	180.0	0.0	5.00	20.00	--	5.00	--	0	143	143
Box	Elec. Meter	Proposed	8.77	6.87	180.0	0.0	15.00	18.50	5.00	--	10.00	0	63	63
Box	Load Center	Proposed	10.20	6.12	180.0	0.0	19.80	15.50	3.70	--	11.30	0	46	45
Box	Mounting Bracket	Proposed	13.75	8.02	180.0	0.0	32.20	42.00	2.00	--	3.00	0	90	90

Box	Upper RRH	Proposed	14.75	16.77	180.0	0.0	128.10	17.30	11.50	--	17.30	-4	213	210
Box	Lower RRH	Proposed	12.75	13.42	180.0	0.0	29.00	13.90	4.80	--	9.80	-1	72	71
Box	DIPLEXER	Proposed	12.75	10.67	180.0	0.0	29.00	4.80	3.30	--	7.90	-1	17	16
Box	Verizon Fiber Demarc	Proposed	17.50	5.45	180.0	0.0	3.00	12.30	3.40	--	3.00	0	57	57
											Totals:	**-5**	**1,411**	**1,406**

Streetlight		**Owner**	**Height (ft)**	**Horiz. Offset (in)**	**Offset Angle (deg)**	**Rotate Angle (deg)**	**Unit Weight (lbs)**	**Unit Height (in)**	**Unit Depth (in)**	**Unit Diameter (in)**	**Unit Length (in)**	**Offset Moment* (ft-lb)**	**Wind Moment* (ft-lb)**	**Moment at GL* (ft-lb)**
Flood Light	Streetlight - 6 ft. Arm	Existing	23.50	3.25	0.0	0.0	60.00	24.00	20.00	3.00	72.00	5	945	950
											Totals:	**5**	**945**	**950**

Riser		**Owner**	**Height (ft)**	**Horiz. Offset (in)**	**Offset Angle (deg)**	**Rotate Angle (deg)**	**Unit Weight (lbs)**	**Unit Height (in)**	**Unit Depth (in)**	**Unit Diameter (in)**	**Unit Length (in)**	**Offset Moment* (ft-lb)**	**Wind Moment* (ft-lb)**	**Moment at GL* (ft-lb)**
Ground Wire 180.0° H:8.0	Ground Wire	Proposed	8.00	5.24	180.0	180.0	8.00	96.00	0.50	0.50	96.00	0	12	12
2" U-Guard 215.0° H:27.64	2" U-Guard	Proposed	27.64	5.24	215.0	215.0	27.64	331.68	2.00	2.00	331.68	7	515	521
											Totals:	**7**	**527**	**534**

Insulator		**Owner**	**Height (ft)**	**Horiz. Offset (in)**	**Offset Angle (deg)**	**Rotate Angle (deg)**	**Unit Weight (lbs)**	**Unit Diameter (in)**	**Unit Length (in)**	**Offset Moment* (ft-lb)**	**Wind Moment* (ft-lb)**	**Moment at GL* (ft-lb)**
Bolt	Single Bolt	Existing	22.10	0.00	270.0	180.0	5.00	3.00	0.10	0	0	0
									Totals:	**0**	**0**	**0**

Pole Buckling

Buckling Constant	**Buckling Column Height* (ft)**	**Buckling Section Height (% Buckling Col. Hgt.)**	**Buckling Section Diameter (in)**	**Minimum Buckling Diameter at GL (in)**	**Diameter at Tip (in)**	**Diameter at GL (in)**	**Modulus of Elasticity (psi)**	**Pole Density (pcf)**	**Ice Density (pcf)**	**Pole Tip Height (ft)**	**Buckling Load Capacity at Height (lbs)**	**Buckling Load Applied at Height (lbs)**	**Buckling Load Factor of Safety**
2.00	16.06	33.45	9.23	4.81	6.05	10.01	2.13e+6	60.00	57.00	27.64	42,891	**425.97**	**18.52**

STRUCTURAL ANALYSIS REPORT

For

ANDOVER MA SC18

36 Vine Street
Andover, MA 01810

Equipment Mounted on Utility Pole

Prepared for:

verizon

900 Chelmsford Street, Tower 2 Floor 5
Lowell, MA 01851

Dated: July 15, 2022

HUDSON
Design Group LLC

45 Beechwood Drive
North Andover, MA 01845
Phone: (978) 557-5553
www.hudsondesigngroupllc.com

HUDSON Design Group LLC

SCOPE OF WORK:

Hudson Design Group LLC (HDG) has been authorized by Verizon to conduct a structural evaluation of the existing utility pole supporting the proposed Verizon equipment.

This report represents this office's findings, conclusions and recommendations pertaining to the support of the proposed Verizon equipment listed below.

This office conducted an on-site visual survey of the above areas on November 30, 2021. Attendees included Sam Foley (HDG – CAD Designer).

CONCLUSION SUMMARY:

Based on our evaluation, we have determined that the existing pole is in conformance with the National Electric Safety Code 2017 (NESC). The utility pole structure is rated at 87.7%.

APPURTENANCES CONFIGURATION:

Appurtenances	Elev.	Mount
(1) Typical Antenna	38'-5"	Top of Pole Extension
(1) Demark Box	17'-6"	Side of Wood Pole
(1) Upper RRH Unit	14'-7"	Side of Wood Pole
(1) Lower RRH Unit	12'-7"	Side of Wood Pole
(1) Diplexer	12'-7"	Side of Wood Pole
(1) Load Center	10'-2"	Side of Wood Pole
(1) Elec. Meter	8'-6"	Side of Wood Pole

*Proposed Equipment in bold.

ANALYSIS RESULTS SUMMARY:

Component	Max. Stress Ratio	Elev. of Component (ft.)	Pass/Fail
SP 3 (Existing)	87.7%	0-32'-**10"**	PASS

DESIGN CRITERIA:

National Electric Safety Code 2017 (NESC) and 780 CMR MA Building Code, 9th Edition.		
Wind		
City/Town:	Andover	
County:	Middlesex	
NESC Rule	Rule 250B	NESC Section 25
Construction Grade	C	NESC Section 25
Wind Load:	39.53 mph	NESC Table 230-2
Ice		
Loading District	Heavy	NESC Figure 250-1
Radial Ice Thickness:	0.50 in	NESC Table 230-1

1. Approximate height above grade to center of the proposed antenna: 38'-5" +/-

*Calculations and referenced documents are attached.

EXISTING STRUCTURE:

The existing 32'-10" +/- wood pole is assumed to be Southern Pine Class 3 (Fb = 8000 psi) with a 12.0" diameter base. If field conditions differ from what is assumed in this report, then the engineer of record is to be notified as soon as possible.

ANTENNA SUPPORT RECOMMENDATIONS:

The proposed antenna is to be installed on a proposed top mount kit secured to the proposed pole extension using thru bolts.

RRH SUPPORT RECOMMENDATIONS:

The proposed RRH's are to be installed on a proposed RRH mounting bracket secured to the existing pole using thru bolts.

EQUIPMENT SUPPORT RECOMMENDATIONS:

The proposed equipment is to be installed on the existing wood pole using the approved manufacturer's mount.

Limitations and assumptions:

1. Reference the latest HDG construction drawings for all the equipment locations details.
2. Mount all equipment per manufacturer's specifications.
3. All structural members and their connections are assumed to be in good condition and are free from defects with no deterioration to its member capacities. Contractor to perform pre-inspection prior to construction.
4. All antennas and waveguide cables are assumed to be properly installed and supported as per the manufacturer requirements.
5. HDG is not responsible for any modifications completed prior to and hereafter which HDG was not directly involved.
6. If field conditions differ from what is assumed in this report, then the engineer of record is to be notified as soon as possible.
7. HDG did not perform any geotechnical analysis / or / investigation. Soil Information is unknown.

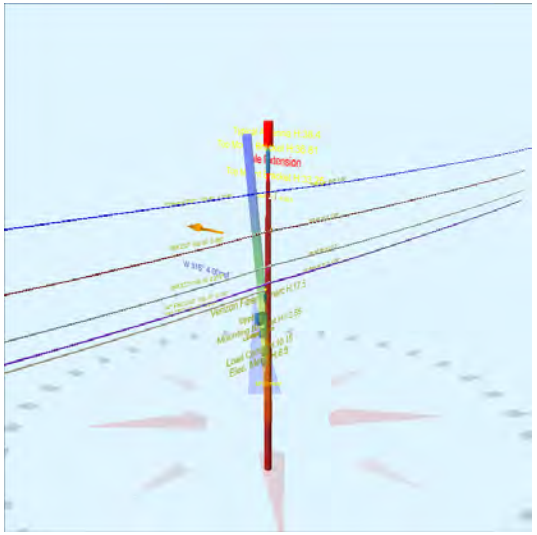
FIELD PHOTOS:

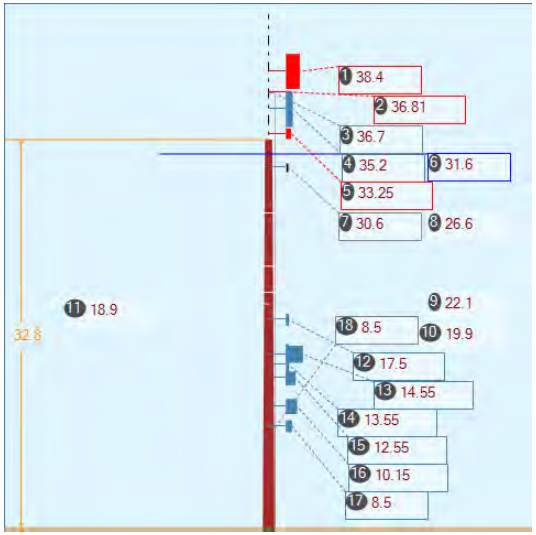
Photo 1: Sample photo illustrating the existing wood pole.

HUDSON
Design Group LLC

Calculations

Pole Num:	**MECO #4540**	Pole Length / Class:	**40 / 3**	Code:	**NESC**	Structure Type:	**Angle**
Pole Number:	**MECO #4540**	Species:	**SOUTHERN PINE**	NESC Rule:	**Rule 250B**	Status	**Unguyed**
Site Name:	**ANDOVER_MA_SC18**	Setting Depth (ft):	**7.2**	Construction Grade:	**C**	Pole Strength Factor:	**0.85**
Address:	**36 Vine Street**	G/L Circumference (in):	**37.70**	Loading District:	**Heavy**	Transverse Wind LF:	**1.75**
Town, State:	**Andover, MA**	G/L Fiber Stress (psi):	**8,000**	Ice Thickness (in):	**0.50**	Wire Tension LF:	**1.30**
Zip Code:	**01810**	Allowable Stress (psi):	**6,800**	Wind Speed (mph):	**39.53**	Vertical LF:	**1.90**
Designed By:	**JC**	Fiber Stress Ht. Reduc:	**No**	Wind Pressure (psf):	**4.00**		
Latitude:	**42.632226**	Longitude:			**-71.11475**	Elevation:	**0M**





Pole Capacity Utilization (%)		Height (ft)	Wind Angle (deg)
Maximum	**87.7**	0.0	316.3
Groundline	**87.7**	0.0	316.3
Vertical	**8.6**	19.8	316.3

Pole Moments (ft-lb)		Load Angle (deg)	Wind Angle (deg)
Max Cap Util	**83,725**	279.3	316.3
Groundline	**83,725**	279.3	316.3
GL Allowable	**96,140**		

Groundline Load Summary - Reporting Angle Mode: Load - Reporting Angle: 279.3°

	Shear Load* (lbs)	Applied Load (%)	Bending Moment (ft-lb)	Applied Moment (%)	Pole Capacity (%)	Bending Stress (+/- psi)	Vertical Load (lbs)	Vertical Stress (psi)	Total Stress (psi)	Pole Capacity (%)
Powers	874	22.4	**24,174**	28.9	**25.1**	**1,711**	688	6	**1,717**	**25.2**
Comms	2,788	71.5	**54,731**	65.4	**56.9**	**3,873**	1,533	14	**3,887**	**57.2**
GenericEquipments	86	2.2	**2,221**	2.7	**2.3**	**157**	639	6	**163**	**2.4**
Pole	148	3.8	**2,468**	3.0	**2.6**	**175**	1,941	17	**192**	**2.8**
Crossarms	0	0.0	**-2**	0.0	**0.0**	**0**	21	0	**0**	**0.0**
Risers	3	0.1	**86**	0.1	**0.1**	**6**	86	1	**7**	**0.1**
Insulators	2	0.0	**47**	0.1	**0.1**	**3**	51	0	**4**	**0.1**
Pole Load	3,901	100.0	**83,725**	100.0	**87.1**	**5,925**	4,959	44	**5,969**	**87.8**
Pole Reserve Capacity			**12,415**		**12.9**	**875**			**831**	**12.2**

Load Summary by Owner - Reporting Angle Mode: Load - Reporting Angle: 279.3°

	Shear Load* (lbs)	Applied Load (%)	Bending Moment (ft-lb)	Applied Moment (%)	Pole Capacity (%)	Bending Stress (+/- psi)	Vertical Load (lbs)	Vertical Stress (psi)	Total Stress (psi)	Pole Capacity (%)
Existing	2,010	51.5	**47,605**	56.9	**49.5**	**3,369**	1,996	18	**3,386**	**49.8**
Proposed	1,743	44.7	**33,652**	40.2	**35.0**	**2,381**	1,023	9	**2,390**	**35.2**
Pole	148	3.8	**2,468**	3.0	**2.6**	**175**	1,941	17	**192**	**2.8**
Totals:	3,901	100.0	**83,725**	100.0	**87.1**	**5,925**	4,959	44	**5,969**	**87.8**

Detailed Load Components:

Power		Owner	Height (ft)	Horiz. Offset (in)	Cable Diameter (in)	Sag at Max Temp (ft)	Cable Weight (lbs/ft)	Lead/Span Length (ft)	Span Angle (deg)	Wire Length (ft)	Tension (lbs)	Tension Moment* (ft-lb)	Offset Moment* (ft-lb)	Wind Moment* (ft-lb)	Moment at GL* (ft-lb)
Primary	AAAC 123.3 KCM AZUSA	Existing	31.60	14.82	0.3980	1.44	0.115	88.3	44.0	88.3	1,313	-30,690	-55	934	-29,811
Primary	AAAC 123.3 KCM AZUSA	Existing	31.60	14.82	0.3980	1.59	0.115	165.6	232.0	165.6	1,313	36,564	-104	1,561	38,021
Secondary	DUPLEX 1/0	Existing	26.56	6.67	0.9540		0.260	88.3	44.0	88.3			-26	357	330
Secondary	DUPLEX 1/0	Existing	26.56	6.57	0.9540		0.260	88.3	44.0	88.3			-29	357	328
Secondary	DUPLEX 1/0	Existing	26.56	6.60	0.9540		0.260	165.6	232.0	165.7			-49	596	547
Secondary	DUPLEX 1/0	Existing	26.56	6.64	0.9540		0.260	165.6	232.0	165.7			-55	596	541
Overlashed Bundle	10M	Existing	26.60	6.60	0.3060	0.85	0.165	88.3	44.0	88.3	1,993	-39,205	-24	920	-38,310
Overlashed Bundle	10M	Existing	26.60	6.60	0.3060	2.82	0.165	165.6	232.0	165.7	2,179	51,038	-46	1,536	52,528
											Totals:	**17,706**	**-389**	**6,857**	**24,174**

Comm		Owner	Height (ft)	Horiz. Offset (in)	Cable Diameter (in)	Sag at Max Temp (ft)	Cable Weight (lbs/ft)	Lead/Span Length (ft)	Span Angle (deg)	Wire Length (ft)	Tension (lbs)	Tension Moment* (ft-lb)	Offset Moment* (ft-lb)	Wind Moment* (ft-lb)	Moment at GL* (ft-lb)
Overlashed Bundle	1/4" EHS	Existing	19.90	7.08	0.2500	0.60	0.121	88.3	44.0	88.3	2,986	-43,942	-19	769	-43,192
CATV	CATV 1.0	Existing	19.83	7.08	1.3300		1.200	88.3	44.0	88.3			-46	347	301
Overlashed Bundle	1/4" EHS	Existing	19.90	7.08	0.2500	2.34	0.121	165.6	232.0	165.7	2,955	51,802	-36	1,284	53,050
CATV	CATV 1.0	Existing	19.83	7.08	1.3300		1.200	165.6	232.0	165.7			-85	579	494
Overlashed Bundle	8M	Existing	22.10	6.92	0.2720	0.72	0.131	88.3	44.0	88.3	2,325	-37,998	-25	782	-37,241
Fiber	TELE 1.0	Existing	22.06	6.99	1.0000		0.400	88.3	44.0	88.3			-34	314	281
Telco	TELE 1.0	Existing	22.06	6.89	1.0000		0.400	88.3	44.0	88.3			-37	314	277
Overlashed Bundle	8M	Existing	22.10	6.92	0.2720	2.64	0.131	165.6	232.0	165.7	2,427	47,240	-47	1,306	48,500
Fiber	TELE 1.0	Existing	22.06	6.93	1.0000		0.400	165.6	232.0	165.7			-63	525	462
Telco	TELE 1.0	Existing	22.06	6.96	1.0000		0.400	165.6	232.0	165.7			-70	525	455
Overlashed Bundle	6M	Proposed	18.90	7.15	0.2420	2.92	0.104	165.6	231.7	165.7	1,780	29,471	44	1,221	30,736
Fiber	TELE 1.0	Proposed	18.82	7.15	1.0000		0.400	165.6	231.7	165.7			61	548	609
											Totals:	**46,574**	**-358**	**8,516**	**54,731**

GenericEquipment		Owner	Height (ft)	Horiz. Offset (in)	Offset Angle (deg)	Rotate Angle (deg)	Unit Weight (lbs)	Unit Height (in)	Unit Depth (in)	Unit Diameter (in)	Unit Length (in)	Offset Moment* (ft-lb)	Wind Moment* (ft-lb)	Moment at GL* (ft-lb)
Cylinder	Pole Extension	Proposed	35.20	0.06	46.7	0.0	40.00	36.00	--	6.86	--	0	337	337
Cylinder	Top Mount Bracket	Proposed	33.25	0.13	46.7	0.0	5.00	10.80	--	5.00	--	0	70	70
Cylinder	Typical Antenna	Proposed	38.40	0.26	46.7	0.0	35.00	35.40	--	14.00	--	-1	738	737
Cylinder	Top Mount Bracket	Proposed	36.81	0.13	46.7	0.0	5.00	2.70	--	5.00	--	0	19	19
Box	Verizon Fiber Demarc	Proposed	17.50	6.45	316.7	0.0	3.00	12.30	3.40	--	3.00	2	40	43
Box	Mounting Bracket	Proposed	13.55	6.03	316.7	0.0	32.20	42.00	2.00	--	3.00	24	106	130
Box	Upper RRH	Proposed	14.55	14.78	316.7	0.0	128.10	17.30	11.50	--	17.30	238	251	489
Box	Lower RRH	Proposed	12.55	11.43	316.7	0.0	29.00	13.90	4.80	--	9.80	42	114	156
Box	Diplexer	Proposed	12.55	8.68	316.7	0.0	29.00	4.80	3.30	--	7.90	32	32	63
Box	Load Center	Proposed	10.15	7.13	316.7	0.0	19.80	15.50	3.70	--	11.30	18	110	128
Box	Elec. Meter	Proposed	8.50	8.39	316.7	0.0	10.00	12.00	6.00	--	6.00	11	38	49
											Totals:	**365**	**1,856**	**2,221**

Crossarm		Owner	Height (ft)	Horiz. Offset (in)	Offset Angle (deg)	Rotate Angle (deg)	Unit Weight (lbs)	Unit Height (in)	Unit Depth (in)	Unit Length (in)	Offset Moment* (ft-lb)	Wind Moment* (ft-lb)	Moment at GL* (ft-lb)
Standoff	12" Standoff	Existing	30.60	4.57	46.7	46.7	11.30	4.75	1.50	12.00	-5	3	-2
										Totals:	**-5**	**3**	**-2**

Riser		Owner	Height (ft)	Horiz. Offset (in)	Offset Angle (deg)	Rotate Angle (deg)	Unit Weight (lbs)	Unit Height (in)	Unit Depth (in)	Unit Diameter (in)	Unit Length (in)	Offset Moment* (ft-lb)	Wind Moment* (ft-lb)	Moment at GL* (ft-lb)
1/2" Ground Wire 316.7° H:8.5	1/2" Ground Wire	Proposed	8.50	6.23	316.7	316.7	8.50	102.00	0.50	0.50	102.00	3	0	3

1/2" U-Guard 336.7° H:36.7	1/2" U-Guard	Proposed	36.70	6.23	336.7	336.7	36.70	440.40	0.50	0.50	440.40	10	73	83
											Totals:	**13**	**73**	**86**

Insulator		**Owner**	**Height (ft)**	**Horiz. Offset (in)**	**Offset Angle (deg)**	**Rotate Angle (deg)**	**Unit Weight (lbs)**	**Unit Diameter (in)**	**Unit Length (in)**	**Offset Moment* (ft-lb)**	**Wind Moment* (ft-lb)**	**Moment at GL* (ft-lb)**
Pin	Pin Insulator - 15 kV	Existing	30.60	6.00	136.7	0.0	10.00	2.50	12.00	0	36	36
Spool	Spool 3"	Existing	26.60	0.00	136.7	0.0	2.00	3.00	3.19	0	10	10
Bolt	Three Bolt	Existing	19.90	0.00	159.8	23.1	5.00	3.00	0.10	0	0	0
Bolt	Three Bolt	Existing	22.10	0.00	136.7	0.0	5.00	3.00	0.10	0	0	0
Bolt	Three Bolt	Proposed	18.90	0.00	226.7	90.0	5.00	3.00	0.10	0	0	0
									Totals:	**0**	**47**	**47**

Pole Buckling

Buckling Constant	**Buckling Column Height* (ft)**	**Buckling Section Height (% Buckling Col. Hgt.)**	**Buckling Section Diameter (in)**	**Minimum Buckling Diameter at GL (in)**	**Diameter at Tip (in)**	**Diameter at GL (in)**	**Modulus of Elasticity (psi)**	**Pole Density (pcf)**	**Ice Density (pcf)**	**Pole Tip Height (ft)**	**Buckling Load Capacity at Height (lbs)**	**Buckling Load Applied at Height (lbs)**	**Buckling Load Factor of Safety**
2.00	19.81	33.53	11.05	6.49	7.32	12.01	2.13e+6	60.00	57.00	32.80	57,900	**576.67**	**11.63**

STRUCTURAL ANALYSIS REPORT

For

ANDOVER MA SC30

164 Andover Street
Andover, MA 01810

Equipment Mounted on Utility Pole

Prepared for:

verizon

900 Chelmsford Street, Tower 2 Floor 2
Lowell, MA 01851

Dated: July 15, 2022

COMMONWEALTH OF MASSACHUSETTS
DANIEL P. HAMM
CIVIL
No. 40720
REGISTERED PROFESSIONAL ENGINEER

HUDSON Design Group LLC

45 Beechwood Drive
North Andover, MA 01845
Phone: (978) 557-5553
www.hudsondesigngroupllc.com

HUDSON Design Group LLC

SCOPE OF WORK:

Hudson Design Group LLC (HDG) has been authorized by Verizon to conduct a structural evaluation of the existing utility pole supporting the proposed Verizon equipment.

This report represents this office's findings, conclusions and recommendations pertaining to the support of the proposed Verizon equipment listed below.

This office conducted an on-site visual survey of the above areas on November 30, 2021. Attendees included Sam Foley (HDG – CAD Designer).

CONCLUSION SUMMARY:

Based on our evaluation, we have determined that the existing pole is in conformance with the National Electric Safety Code 2017 (NESC). The utility pole structure is rated at 77.4%.

APPURTENANCES CONFIGURATION:

Appurtenances	Elev.	Mount
(1) Typical Antenna	38'-6"	Top of Pole Extension
(1) Demark Box	16'-6"	Side of Wood Pole
(1) Upper RRH Unit	14'-9"	Side of Wood Pole
(1) Lower RRH Unit	12'-9"	Side of Wood Pole
(1) Diplexer	12'-9"	Side of Wood Pole
(1) Load Center	10'-4"	Side of Wood Pole
(1) Elec. Meter	8'-10"	Side of Wood Pole

*Proposed Equipment in bold.

ANALYSIS RESULTS SUMMARY:

Component	Max. Stress Ratio	Elev. of Component (ft.)	Pass/Fail
SP 4 (Existing)	77.4%	0 **– 33'-2"**	PASS

DESIGN CRITERIA:

National Electric Safety Code 2017 (NESC) and 780 CMR MA Building Code, 9th Edition.		
Wind		
City/Town:	Andover	
County:	Middlesex	
NESC Rule	Rule 250B	NESC Section 25
Construction Grade	C	NESC Section 25
Wind Load:	39.53 mph	NESC Table 230-2
Ice		
Loading District	Heavy	NESC Figure 250-1
Radial Ice Thickness:	0.50 in	NESC Table 230-1

1. Approximate height above grade to center of the proposed antenna: 38'-6" +/-

*Calculations and referenced documents are attached.

EXISTING STRUCTURE:

The existing 33'-2" +/- wood pole is assumed to be Southern Pine Class 4 (Fb = 8000 psi) with a 11.0" diameter base. If field conditions differ from what is assumed in this report, then the engineer of record is to be notified as soon as possible.

ANTENNA SUPPORT RECOMMENDATIONS:

The proposed antenna is to be installed on a proposed mount kit secured to the proposed pole extension using thru bolts.

RRH SUPPORT RECOMMENDATIONS:

The proposed RRH's are to be installed on a proposed RRH mounting bracket secured to the existing pole using thru bolts.

EQUIPMENT SUPPORT RECOMMENDATIONS:

The proposed equipment is to be installed on the existing wood pole using the approved manufacturer's mount.

Limitations and assumptions:

1. Reference the latest HDG construction drawings for all the equipment locations details.
2. Mount all equipment per manufacturer's specifications.
3. All structural members and their connections are assumed to be in good condition and are free from defects with no deterioration to its member capacities. Contractor to perform pre-inspection prior to construction.
4. All antennas and waveguide cables are assumed to be properly installed and supported as per the manufacturer requirements.
5. HDG is not responsible for any modifications completed prior to and hereafter which HDG was not directly involved.
6. If field conditions differ from what is assumed in this report, then the engineer of record is to be notified as soon as possible.
7. HDG did not perform any geotechnical analysis / or / investigation. Soil Information is unknown.

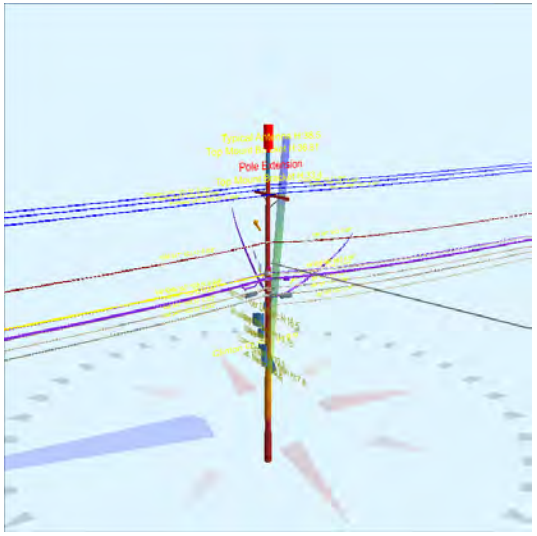
FIELD PHOTOS:

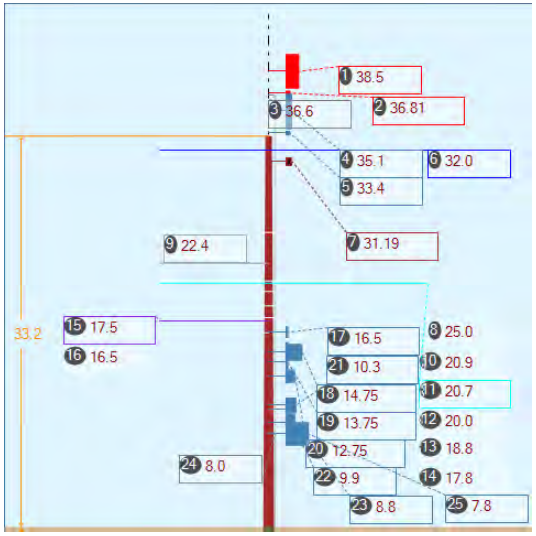
Photo 1: Sample photo illustrating the existing wood pole.

HUDSON
Design Group LLC

Calculations

Pole Num:	**NG #4266 / VZ #39**	Pole Length / Class:	**40 / 4**	Code:	**NESC**	Structure Type:	**Guyed Tangent**
Pole Number:	**NG #4266 / VZ #39**	Species:	**SOUTHERN PINE**	NESC Rule:	**Rule 250B**	Status	**Guy Wires Adequate**
Site Name:	**ANDOVER_MA_SC30**	Setting Depth (ft):	**6.8**	Construction Grade:	**C**	Pole Strength Factor:	**0.85**
Address:	**170 Andover Street**	G/L Circumference (in):	**34.56**	Loading District:	**Heavy**	Transverse Wind LF:	**1.75**
Town, State:	**Andover, MA**	G/L Fiber Stress (psi):	**8,000**	Ice Thickness (in):	**0.50**	Wire Tension LF:	**1.30**
Zip Code:	**01810**	Allowable Stress (psi):	**6,800**	Wind Speed (mph):	**39.53**	Vertical LF:	**1.90**
Designed By:	**JC**	Fiber Stress Ht. Reduc:	**No**	Wind Pressure (psf):	**4.00**		
Latitude:	**42.628094**	Longitude:		**-71.160869**		Elevation:	**0M**





Pole Capacity Utilization (%)		Height (ft)	Wind Angle (deg)
Maximum	**77.4**	0.0	102.8
Groundline	**77.4**	0.0	102.8
Vertical	**2.6**	20.4	65.5

Pole Moments (ft-lb)		Load Angle (deg)	Wind Angle (deg)
Max Cap Util	**56,368**	146.4	102.8
Groundline	**56,368**	146.4	102.8
GL Allowable	**74,063**		

Guy System Component Summary				Load From Worst Wind Angle on Pole		Individual Maximum Load With Overload Applied	
Description	**Lead Length (ft)**	**Lead Angle (deg)**	**Height (ft)**	**Nominal Capacity (%)**	**Wind Angle (deg)**	**Max* Load Capacity (%)**	**Wind Angle (deg)**
? Anchor	126.0	245.5		**12.6**	102.8	**15.1**	70.0
? EHS 3/8 (Span/Head)			22.4	**18.2**	102.8	**21.8**	70.0
			System Capacity Summary:	**Adequate**		**Adequate**	

Groundline Load Summary - Reporting Angle Mode: Load - Reporting Angle: 146.4°

	Shear Load* (lbs)	Applied Load (%)	Bending Moment (ft-lb)	Applied Moment (%)	Pole Capacity (%)	Bending Stress (+/- psi)	Vertical Load (lbs)	Vertical Stress (psi)	Total Stress (psi)	Pole Capacity (%)
Powers	336	10.8	**11,091**	19.7	**15.0**	**987**	911	10	**997**	**14.7**
Comms	2,887	93.0	**49,548**	87.9	**66.9**	**4,411**	4,309	45	**4,456**	**65.5**
GuyBraces	-370	-11.9	**-8,554**	-15.2	**-11.6**	**-762**	51	1	**-761**	**-11.2**
GenericEquipments	101	3.2	**1,383**	2.5	**1.9**	**123**	711	7	**131**	**1.9**
Pole	124	4.0	**2,145**	3.8	**2.9**	**191**	1,646	17	**208**	**3.1**
Crossarms	13	0.4	**467**	0.8	**0.6**	**42**	101	1	**43**	**0.6**
Risers	9	0.3	**186**	0.3	**0.3**	**17**	85	1	**17**	**0.3**
Insulators	3	0.1	**103**	0.2	**0.1**	**9**	213	2	**11**	**0.2**
Pole Load	3,103	100.0	**56,368**	100.0	**76.1**	**5,018**	8,027	84	**5,102**	**75.0**
Pole Reserve Capacity			**17,695**		**23.9**	**1,782**			**1,698**	**25.0**

Load Summary by Owner - Reporting Angle Mode: Load - Reporting Angle: 146.4°

	Shear Load* (lbs)	Applied Load (%)	Bending Moment (ft-lb)	Applied Moment (%)	Pole Capacity (%)	Bending Stress (+/- psi)	Vertical Load (lbs)	Vertical Stress (psi)	Total Stress (psi)	Pole Capacity (%)
Existing	1,301	41.9	**25,679**	45.6	**34.7**	**2,286**	5,396	57	**2,343**	**34.5**
<Undefined>	1,583	51.0	**26,981**	47.9	**36.4**	**2,402**	101	1	**2,403**	**35.3**
Proposed	95	3.1	**1,563**	2.8	**2.1**	**139**	884	9	**148**	**2.2**
Pole	124	4.0	**2,145**	3.8	**2.9**	**191**	1,646	17	**208**	**3.1**
Totals:	3,103	100.0	**56,368**	100.0	**76.1**	**5,018**	8,027	84	**5,102**	**75.0**

Detailed Load Components:

Power		Owner	Height (ft)	Horiz. Offset (in)	Cable Diameter (in)	Sag at Max Temp (ft)	Cable Weight (lbs/ft)	Lead/Span Length (ft)	Span Angle (deg)	Wire Length (ft)	Tension (lbs)	Tension Moment* (ft-lb)	Offset Moment* (ft-lb)	Wind Moment* (ft-lb)	Moment at GL* (ft-lb)
Primary	AAAC 123.3 KCM AZUSA	Existing	32.00	3.52	0.3980	1.65	0.115	125.2	166.2	125.2	1,156	40,552	8	443	41,003
Primary	AAAC 123.3 KCM AZUSA	Existing	32.00	3.52	0.3980	1.55	0.115	103.1	346.6	103.1	986	-34,495	7	373	-34,115
Primary	AAAC 123.3 KCM AZUSA	Existing	32.00	44.31	0.3980	1.55	0.115	103.1	346.6	103.1	1,079	-37,782	-58	374	-37,466
Primary	AAAC 123.3 KCM AZUSA	Existing	32.00	44.31	0.3980	1.65	0.115	125.2	166.2	125.2	1,079	37,878	-70	443	38,251
Primary	AAAC 123.3 KCM AZUSA	Existing	32.00	44.31	0.3980	1.55	0.115	103.1	346.6	103.1	1,079	-37,782	105	374	-37,303

Primary	AAAC 123.3 KCM AZUSA	Existing	32.00	44.31	0.3980	1.65	0.115	125.2	166.2	125.2	1,079	37,878	128	443	38,449
Secondary	DUPLEX 1/0	Existing	24.96	5.94	0.9540		0.260	125.2	166.2	125.4			14	157	171
Secondary	DUPLEX 1/0	Existing	24.96	6.83	0.9540		0.260	125.2	166.2	125.4			18	157	175
Secondary	DUPLEX 1/0	Existing	24.96	5.94	0.9540		0.260	103.1	346.6	103.2			12	132	144
Secondary	DUPLEX 1/0	Existing	24.96	6.83	0.9540		0.260	103.1	346.6	103.2			15	132	148
Overlashed Bundle	10M	Existing	25.00	6.38	0.3060	2.54	0.165	125.2	166.2	125.3	1,500	41,127	14	405	41,546
Overlashed Bundle	10M	Existing	25.00	6.38	0.3060	1.68	0.165	103.1	346.6	103.2	1,527	-41,727	12	341	-41,375
											Totals:	**5,649**	**205**	**3,775**	**9,629**

Comm		**Owner**	**Height (ft)**	**Horiz. Offset (in)**	**Cable Diameter (in)**	**Sag at Max Temp (ft)**	**Cable Weight (lbs/ft)**	**Lead/Span Length (ft)**	**Span Angle (deg)**	**Wire Length (ft)**	**Tension (lbs)**	**Tension Moment* (ft-lb)**	**Offset Moment* (ft-lb)**	**Wind Moment* (ft-lb)**	**Moment at GL* (ft-lb)**
Overlashed Bundle	1/4" EHS	Existing	20.90	6.64	0.2500	2.37	0.121	125.2	166.2	125.3	1,650	37,781	16	353	38,149
CATV	CATV .75	Existing	20.84	6.64	1.0700		0.900	125.2	166.2	125.3			33	145	178
Overlashed Bundle	1/4" EHS	Existing	20.90	6.64	0.2500	1.48	0.121	103.1	346.6	103.2	1,696	-38,736	13	297	-38,426
CATV	CATV .75	Existing	20.84	6.64	1.0700		0.900	103.1	346.6	103.2			27	122	150
Overlashed Bundle	1/4" EHS	Existing	20.70	6.65	0.2500	2.37	0.121	125.2	166.2	125.3	1,650	37,419	16	349	37,784
Fiber	CATV .75	Existing	20.64	6.65	1.0700		0.900	125.2	166.2	125.3			33	144	177
Overlashed Bundle	1/4" EHS	Existing	20.70	6.65	0.2500	1.20	0.121	125.2	346.5	125.2	2,520	-57,027	16	356	-56,656
Fiber	CATV .75	Existing	20.64	6.65	1.0700		0.900	125.2	346.5	125.2			33	146	180
Overlashed Bundle	10M	Existing	20.00	6.70	0.3060	2.16	0.165	125.2	166.2	125.3	5,581	122,273	14	326	122,614
Fiber	CATV 1.0	Existing	19.92	6.70	1.3300		1.200	125.2	166.2	125.3			37	128	165
Fiber	CATV 1.0	Existing	20.00	7.59	1.3300		1.200	125.2	166.2	125.3			47	128	175
CATV	CATV 1.0	Existing	20.08	6.70	1.3300		1.200	125.2	166.2	125.3			37	145	182
CATV	CATV 1.0	Existing	20.00	5.82	1.3300		1.200	125.2	166.2	125.3			28	128	156
Overlashed Bundle	10M	Existing	20.00	6.70	0.3060	1.52	0.165	103.1	346.6	103.2	5,363	-117,200	12	275	-116,914
Fiber	CATV 1.0	Existing	19.92	6.70	1.3300		1.200	103.1	346.6	103.2			31	108	138
Fiber	CATV 1.0	Existing	20.00	7.59	1.3300		1.200	103.1	346.6	103.2			39	112	150
CATV	CATV 1.0	Existing	20.08	6.70	1.3300		1.200	103.1	346.6	103.2			31	112	143
CATV	CATV 1.0	Existing	20.00	5.82	1.3300		1.200	103.1	346.6	103.2			23	108	131
Overlashed Bundle	8M	Existing	18.80	6.78	0.2720	2.47	0.131	125.2	166.2	125.3	1,647	33,935	15	312	34,262
Fiber	TELE 1.0	Existing	18.76	6.32	1.0000		0.400	125.2	166.2	125.3			18	127	145
Telco	TELE 1.0	Existing	18.76	7.26	1.0000		0.400	125.2	166.2	125.3			24	127	151
Overlashed Bundle	8M	Existing	18.80	6.78	0.2720	1.79	0.131	103.1	346.6	103.2	1,548	-31,820	12	263	-31,545
Fiber	TELE 1.0	Existing	18.76	6.32	1.0000		0.400	103.1	346.6	103.2			15	110	125
Telco	TELE 1.0	Existing	18.76	7.26	1.0000		0.400	103.1	346.6	103.2			20	151	170
Overlashed Bundle	6M	Existing	17.80	6.84	0.2420	2.49	0.104	125.2	166.2	125.3	1,580	30,837	15	306	31,157
Telco	TELE 1.0	Existing	17.75	6.84	1.0000		0.400	125.2	166.2	125.3			22	166	188
Fiber	TELE 1.0	Existing	17.67	6.84	1.0000		0.400	125.2	166.2	125.3			22	128	150
Overlashed Bundle	6M	Existing	17.80	6.84	0.2420	1.80	0.104	103.1	346.6	103.2	1,478	-28,759	13	258	-28,489
Telco	TELE 1.0	Existing	17.75	6.84	1.0000		0.400	103.1	346.6	103.2			18	109	127

Fiber	TELE 1.0	Existing	17.67	6.84	1.0000		0.400	103.1	346.6	103.2			18	108	126
CATV	CATV .50	Existing	17.50	6.86	0.5700	1.60	0.600	44.0	131.9	44.2	192	3,789	25	-39	3,776
CATV	CATV .50	Existing	17.50	6.86	0.5700	1.84	0.600	44.0	131.9	44.3	162	3,188	25	-39	3,175
CATV	CATV .50	Existing	17.50	6.86	0.5700	2.19	0.600	71.2	103.2	71.4	385	5,714	41	-2	5,752
CATV	CATV .50	Existing	17.50	6.86	0.5700	2.43	0.600	71.2	103.2	71.5	336	4,978	41	-2	5,016
CATV	CATV .75	Existing	17.50	6.86	1.0700	2.66	0.900	71.2	103.2	71.5	444	6,583	60	-3	6,641
Overlashed Bundle	6M		16.50	6.93	0.2420	2.58	0.104	125.2	165.5	125.3	1,271	23,096	44	286	23,426
Fiber	TELE 1.0	Proposed	16.42	6.93	1.0000		0.400	125.2	165.5	125.3			61	128	189
											Totals:	**36,051**	**992**	**5,977**	**43,020**

GenericEquipment		Owner	Height (ft)	Horiz. Offset (in)	Offset Angle (deg)	Rotate Angle (deg)	Unit Weight (lbs)	Unit Height (in)	Unit Depth (in)	Unit Diameter (in)	Unit Length (in)	Offset Moment* (ft-lb)	Wind Moment* (ft-lb)	Moment at GL* (ft-lb)
Box	Clinton Ct Sign	Existing	9.90	16.86	78.5	0.0	10.00	8.00	24.00	--	1.00	9	52	61
Box	Kids At Play Sign	Existing	7.80	5.49	168.5	45.0	10.00	24.00	1.00	--	24.00	7	125	133
Cylinder	Pole Extension	Proposed	35.10	0.65	258.5	0.0	40.00	36.00	--	6.86	--	-1	273	272
Cylinder	Top Mount Bracket	Proposed	33.40	0.83	258.5	0.0	15.16	4.80	--	5.00	--	-1	25	25
Cylinder	Typical Antenna	Proposed	38.50	1.00	258.5	0.0	37.90	35.40	--	14.00	--	-2	601	599
Cylinder	Top Mount Bracket	Proposed	36.81	0.79	258.5	0.0	5.00	5.10	--	5.00	--	0	30	30
Box	Mounting Bracket	Proposed	13.75	8.61	348.5	0.0	32.20	42.00	2.00	--	3.00	-36	74	37
Box	Upper RRH	Proposed	14.75	17.36	348.5	0.0	128.10	17.30	11.50	--	17.30	-292	175	-117
Box	Lower RRH	Proposed	12.75	14.01	348.5	0.0	29.00	13.90	4.80	--	9.80	-53	72	18
Box	Diplexer	Proposed	12.75	14.01	348.5	0.0	29.00	13.90	4.80	--	9.80	-53	72	18
Box	Load Center	Proposed	10.30	6.68	348.5	0.0	19.80	15.50	3.70	--	11.30	-17	62	45
Box	Elec. Meter	Proposed	8.80	7.43	348.5	0.0	15.00	19.00	5.00	--	10.00	-15	64	50
Box	Verizon Fiber Demarc	Proposed	16.50	6.13	348.5	0.0	3.00	12.30	3.40	--	3.00	-2	33	30
											Totals:	**-457**	**1,658**	**1,200**

Crossarm		Owner	Height (ft)	Horiz. Offset (in)	Offset Angle (deg)	Rotate Angle (deg)	Unit Weight (lbs)	Unit Height (in)	Unit Depth (in)	Unit Length (in)	Offset Moment* (ft-lb)	Wind Moment* (ft-lb)	Moment at GL* (ft-lb)
Normal	CROSSARM 3-1/2 X 4-1/2 X 8	Existing	31.19	5.22	168.5	168.5	53.00	4.50	3.50	96.00	36	369	405
										Totals:	**36**	**369**	**405**

Riser		Owner	Height (ft)	Horiz. Offset (in)	Offset Angle (deg)	Rotate Angle (deg)	Unit Weight (lbs)	Unit Height (in)	Unit Depth (in)	Unit Diameter (in)	Unit Length (in)	Offset Moment* (ft-lb)	Wind Moment* (ft-lb)	Moment at GL* (ft-lb)
1/2" Ground Wire 348.5° H:8.0	1/2" Ground Wire	Proposed	8.00	5.68	348.5	348.5	8.00	96.00	0.50	0.50	96.00	-3	7	4
1/2" U-Guard 8.5° H:36.6	1/2" U-Guard	Proposed	36.60	5.68	8.5	8.5	36.60	439.20	0.50	0.50	439.20	-11	168	157
											Totals:	**-14**	**176**	**162**

Insulator		Owner	Height (ft)	Horiz. Offset (in)	Offset Angle (deg)	Rotate Angle (deg)	Unit Weight (lbs)	Unit Diameter (in)	Unit Length (in)	Offset Moment* (ft-lb)	Wind Moment* (ft-lb)	Moment at GL* (ft-lb)
Davit	Insulator, 15 kV	Existing	30.50	0.00	78.5	180.0	60.00	2.50	18.00	0	43	43

Pin	Pin Insulator - 5 kV	Existing	31.38	44.00	251.8	0.0	6.00	3.00	7.50	0	22	22
Pin	Pin Insulator - 5 kV	Existing	31.38	-44.00	85.3	0.0	6.00	3.00	7.50	0	22	22
Bolt	Single Bolt	Existing	25.00	0.00	78.5	180.0	5.00	3.00	0.10	0	0	0
J-Hook	J-Hook	Existing	20.90	0.00	78.5	180.0	5.00	3.00	0.10	0	0	0
J-Hook	J-Hook	Existing	20.70	0.00	78.5	180.0	5.00	3.00	0.10	0	0	0
Bolt	Three Bolt	Existing	20.00	0.00	78.5	180.0	5.00	3.00	0.10	0	0	0
Bolt	Three Bolt	Existing	18.80	0.00	78.5	180.0	5.00	3.00	0.10	0	0	0
Bolt	Three Bolt	Existing	17.80	0.00	78.5	180.0	5.00	3.00	0.10	0	0	0
J-Hook	J-Hook	Existing	17.50	0.00	168.5	270.0	5.00	3.00	0.10	0	0	0
Bolt	Three Bolt		16.50	0.00	168.5	180.0	5.00	3.00	0.10	0	0	0
									Totals:	**0**	**89**	**89**

Guy Wire and Brace		**Owner**	**Attach Height (ft)**	**End Height (ft)**	**Lead/Span Length (ft)**	**Wire Diameter (in)**	**Percent Solid (%)**	**Lead Angle (deg)**	**Incline Angle (deg)**	**Wire Weight (lbs/ft)**	**Rest Length (ft)**	**Stretch Length (in)**
EHS 3/8	Span/Head	Existing	22.40	22.40	126.00	0.375	75.00	245.5	0.0	0.273	123.35	1.96

Guy Wire and Brace (Loads and Reactions)		**Elastic Modulus (psi)**	**Rated Tensile Strength (lbs)**	**Guy Strength Factor**	**Allowable Tension (lbs)**	**Initial Tension (lbs)**	**Loaded Tension*[2] (lbs)**	**Maximum Tension[2] (lbs)**	**Applied Tension[3] (lbs)**	**Vertical Load (lbs)**	**Shear Load In Guy Dir (lbs)**	**Shear Load At Report Angle (lbs)**	**Moment at GL[3] (ft-lb)**
EHS 3/8	Span/Head	2.30e+7	15,400	0.90	13,860	700	3,023	2,748	2,525	0	2,525	-400	-8,294
									Totals:	**0**	**2,525**	**-400**	**-8,294**

Anchor/Rod Load Summary	**Owner**	**Rod Length AGL (in)**	**Lead Length (ft)**	**Lead Angle (deg)**	**Strength of Assembly (lbs)**	**Anchor/Rod Strength Factor**	**Allowable Load (lbs)**	**Max Load[2] (lbs)**	**Load at Pole MCU[3] (lbs)**	**Max Required Capacity[2] (%)**
Anchor	Existing	30.00	126.00	245.5	20,000	1.00	20,000	3,023	2,525	15.1

Pole Buckling

Buckling Constant	**Buckling Column Height* (ft)**	**Buckling Section Height (% Buckling Col. Hgt.)**	**Buckling Section Diameter (in)**	**Minimum Buckling Diameter at GL (in)**	**Diameter at Tip (in)**	**Diameter at GL (in)**	**Modulus of Elasticity (psi)**	**Pole Density (pcf)**	**Ice Density (pcf)**	**Pole Tip Height (ft)**	**Buckling Load Capacity at Height (lbs)**	**Buckling Load Applied at Height (lbs)**	**Buckling Load Factor of Safety**
0.71	20.39	33.61	10.11	4.43	6.69	11.01	2.13e+6	60.00	57.00	33.20	306,046	**3087.44**	**38.46**

STRUCTURAL ANALYSIS REPORT

For

ANDOVER_MA_SC33

2 Hansom Road
Andover, MA 01810

Equipment Mounted on Proposed Utility Pole

Prepared for:

verizon

900 Chelmsford Street, Tower 2 Floor 5
Lowell, MA 01851

Dated: July 20, 2022

COMMONWEALTH OF MASSACHUSETTS
DANIEL P. HAMM
CIVIL
No. 40720
REGISTERED PROFESSIONAL ENGINEER

HUDSON Design Group LLC

45 Beechwood Drive
North Andover, MA 01845
Phone: (978) 557-5553
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HUDSON Design Group LLC

SCOPE OF WORK:

Hudson Design Group LLC (HDG) has been authorized by Verizon to conduct a structural evaluation of the proposed utility pole supporting the proposed Verizon equipment.

This report represents this office's findings, conclusions and recommendations pertaining to the support of the proposed Verizon equipment listed below.

This office conducted an on-site visual survey of the above areas on November 30, 2021. Attendees included Sam Foley (HDG – CAD Designer).

CONCLUSION SUMMARY:

Based on our evaluation, we have determined that the proposed pole is in conformance with the National Electric Safety Code 2017 (NESC). The utility pole structure is rated at 72.2%.

APPURTENANCES CONFIGURATION:

Appurtenances	Elev.	Mount
(1) Typical Antenna	39'-3"	Top of Pole Extension
(1) Demark Box	16'-0"	Side of Wood Pole
(1) Upper RRH Unit	14'-3"	Side of Wood Pole
(1) Lower RRH Unit	12'-3"	Side of Wood Pole
(1) Diplexer	12'-3"	Side of Wood Pole
(1) Load Center	10'-3"	Side of Wood Pole
(1) Elec. Meter	8'-9"	Side of Wood Pole

*Proposed Equipment in bold.

ANALYSIS RESULTS SUMMARY:

Component	Max. Stress Ratio	Elev. of Component (ft.)	Pass/Fail
SP 2 (Proposed)	72.2%	0 **– 34'-0"**	PASS

DESIGN CRITERIA:

National Electric Safety Code 2017 (NESC) and 780 CMR MA Building Code, 9th Edition		
Wind		
City/Town:	Andover	
County:	Middlesex	
NESC Rule	Rule 250B	NESC Section 25
Construction Grade	C	NESC Section 25
Wind Load:	39.53 mph	NESC Table 230-2
Ice		
Loading District	Heavy	NESC Figure 250-1
Radial Ice Thickness:	0.50 in	NESC Table 230-1

1. Approximate height above grade to center of the proposed antenna: 39'-3" +/-

*Calculations and referenced documents are attached.

PROPOSED STRUCTURE:

The proposed 34'-0" +/- wood pole is assumed to be Southern Pine Class 2 (Fb = 8000 psi) with a 11.62" diameter base. If field conditions differ from what is assumed in this report, then the engineer of record is to be notified as soon as possible.

ANTENNA SUPPORT RECOMMENDATIONS:

The proposed antenna is to be installed on a proposed top mount kit secured to the proposed pole extension using thru bolts.

RRH SUPPORT RECOMMENDATIONS:

The proposed RRH's are to be installed on a proposed RRH mounting bracket secured to the side of the proposed pole using thru bolts.

EQUIPMENT SUPPORT RECOMMENDATIONS:

The proposed equipment is to be installed on the proposed wood pole using the approved manufacturer's mount.

Limitations and assumptions:

1. Reference the latest HDG construction drawings for all the equipment locations details.
2. Mount all equipment per manufacturer's specifications.
3. All structural members and their connections are assumed to be in good condition and are free from defects with no deterioration to its member capacities. Contractor to perform pre-inspection prior to construction.
4. All antennas and waveguide cables are assumed to be properly installed and supported as per the manufacturer requirements.
5. HDG is not responsible for any modifications completed prior to and hereafter which HDG was not directly involved.
6. If field conditions differ from what is assumed in this report, then the engineer of record is to be notified as soon as possible.
7. HDG did not perform any geotechnical analysis / or / investigation. Soil Information is unknown.

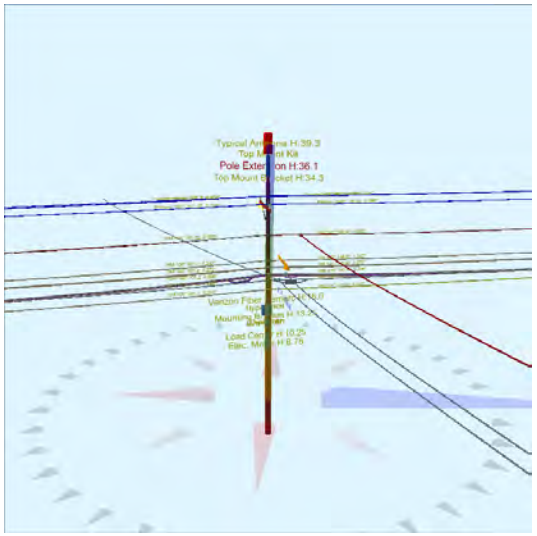
FIELD PHOTOS:

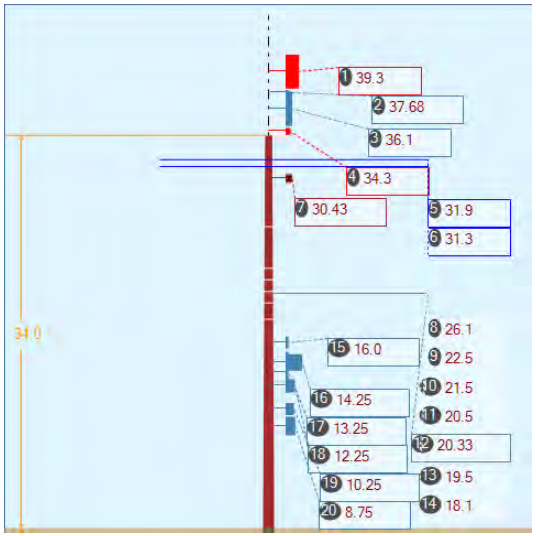
Photo 1: Sample photo illustrating the existing wood pole (to be removed and replaced).

HUDSON
Design Group LLC

Calculations

Pole Num:	**Proposed**	Pole Length / Class:	**40 / 2**	Code:	**NESC**	Structure Type:	**Unguyed Tangent**
Pole Number:	**Proposed**	Species:	**SOUTHERN PINE**	NESC Rule:	**Rule 250B**	Status	**Unguyed**
Site Name:	**ANDOVER_MA_SC33**	Setting Depth (ft):	**6.0**	Construction Grade:	**C**	Pole Strength Factor:	**0.85**
Address:	**2 Hansom Road**	G/L Circumference (in):	**36.50**	Loading District:	**Heavy**	Transverse Wind LF:	**1.75**
Town, State:	**Andover, MA**	G/L Fiber Stress (psi):	**8,000**	Ice Thickness (in):	**0.50**	Wire Tension LF:	**1.00**
Zip Code:	**01810**	Allowable Stress (psi):	**6,800**	Wind Speed (mph):	**39.53**	Vertical LF:	**1.90**
Designed By:	**JC**	Fiber Stress Ht. Reduc:	**No**	Wind Pressure (psf):	**4.00**		
Latitude:	**42.637576**	Longitude:			**-71.175683**	Elevation:	**0M**





Pole Capacity Utilization (%)		Height (ft)	Wind Angle (deg)
Maximum	**72.2**	0.0	77.0
Groundline	**72.2**	0.0	77.0
Vertical	**19.6**	21.3	77.0

Pole Moments (ft-lb)		Load Angle (deg)	Wind Angle (deg)
Max Cap Util	**61,919**	78.3	77.0
Groundline	**61,919**	78.3	77.0
GL Allowable	**87,248**		

Groundline Load Summary - Reporting Angle Mode: Load - Reporting Angle: 78.3°

	Shear Load* (lbs)	Applied Load (%)	Bending Moment (ft-lb)	Applied Moment (%)	Pole Capacity (%)	Bending Stress (+/- psi)	Vertical Load (lbs)	Vertical Stress (psi)	Total Stress (psi)	Pole Capacity (%)
Powers	1,316	57.9	**38,088**	61.5	**43.7**	**2,830**	1,273	12	**2,842**	**41.8**
Comms	652	28.7	**18,220**	29.4	**20.9**	**1,354**	4,475	42	**1,396**	**20.5**
GenericEquipments	112	4.9	**1,974**	3.2	**2.3**	**147**	673	6	**153**	**2.3**
Pole	188	8.3	**3,403**	5.5	**3.9**	**253**	1,929	18	**271**	**4.0**
Crossarms	1	0.1	**42**	0.1	**0.1**	**3**	101	1	**4**	**0.1**
Insulators	6	0.3	**192**	0.3	**0.2**	**14**	198	2	**16**	**0.2**
Pole Load	2,274	100.0	**61,919**	100.0	**71.0**	**4,600**	8,649	82	**4,682**	**68.9**
Pole Reserve Capacity			**25,329**		**29.0**	**2,200**			**2,118**	**31.1**

Load Summary by Owner - Reporting Angle Mode: Load - Reporting Angle: 78.3°

	Shear Load* (lbs)	Applied Load (%)	Bending Moment (ft-lb)	Applied Moment (%)	Pole Capacity (%)	Bending Stress (+/- psi)	Vertical Load (lbs)	Vertical Stress (psi)	Total Stress (psi)	Pole Capacity (%)
Existing	1,772	77.9	**52,273**	84.4	**59.9**	**3,884**	5,229	49	**3,933**	**57.8**
Proposed	314	13.8	**6,242**	10.1	**7.2**	**464**	1,490	14	**478**	**7.0**
Pole	188	8.3	**3,403**	5.5	**3.9**	**253**	1,929	18	**271**	**4.0**
Totals:	2,274	100.0	**61,919**	100.0	**71.0**	**4,600**	8,649	82	**4,682**	**68.9**

Detailed Load Components:

Power		Owner	Height (ft)	Horiz. Offset (in)	Cable Diameter (in)	Sag at Max Temp (ft)	Cable Weight (lbs/ft)	Lead/Span Length (ft)	Span Angle (deg)	Wire Length (ft)	Tension (lbs)	Tension Moment* (ft-lb)	Offset Moment* (ft-lb)	Wind Moment* (ft-lb)	Moment at GL* (ft-lb)
Primary	AAAC 123.3 KCM AZUSA	Existing	31.30	45.35	0.3980	2.19	0.115	201.0	166.0	201.0	1,545	2,008	508	2,690	5,206
Primary	AAAC 123.3 KCM AZUSA	Existing	31.30	45.35	0.3980	1.68	0.115	146.9	346.0	146.9	1,545	-2,008	371	1,966	329
Primary	AAAC 123.3 KCM AZUSA	Existing	31.30	45.35	0.3980	2.19	0.115	201.0	166.0	201.0	1,545	2,008	-503	2,690	4,195
Primary	AAAC 123.3 KCM AZUSA	Existing	31.30	45.35	0.3980	1.68	0.115	146.9	346.0	146.9	1,545	-2,008	-368	1,966	-409
Secondary	DUPLEX 1/0	Existing	26.05	6.66	0.9540		0.260	201.0	166.0	201.1			-89	987	899
Secondary	DUPLEX 1/0	Existing	26.05	6.66	0.9540		0.260	146.9	346.0	146.9			-65	722	657
Secondary	TRIPLEX 1/0	Existing	25.90	60.37	1.0300	2.24	0.399	85.0	65.4	85.1	698	17,854	-6	60	17,908
Primary	AAAC 123.3 KCM AZUSA	Existing	31.90	3.89	0.3980	1.35	0.115	146.9	346.0	146.9	1,536	-2,033	32	2,003	2

Primary	AAAC 123.3 KCM AZUSA	Existing	31.90	3.89	0.3980	2.62	0.115	201.2	166.0	201.2	1,526	2,021	44	2,743	4,807
Overlashed Bundle	10M	Existing	26.10	6.66	0.3060	2.40	0.165	201.0	166.0	201.1	2,453	2,656	-78	2,593	5,171
Overlashed Bundle	10M	Existing	26.10	6.66	0.3060	1.28	0.165	146.9	346.0	146.9	2,324	-2,516	-57	1,895	-678
											Totals:	**17,983**	**-211**	**20,315**	**38,088**

Comm		**Owner**	**Height (ft)**	**Horiz. Offset (in)**	**Cable Diameter (in)**	**Sag at Max Temp (ft)**	**Cable Weight (lbs/ft)**	**Lead/Span Length (ft)**	**Span Angle (deg)**	**Wire Length (ft)**	**Tension (lbs)**	**Tension Moment* (ft-lb)**	**Offset Moment* (ft-lb)**	**Wind Moment* (ft-lb)**	**Moment at GL* (ft-lb)**
Overlashed Bundle	6M	Existing	22.50	6.89	0.2420	2.13	0.104	201.2	166.0	201.2	2,401	2,241	73	2,224	4,538
Fiber	TELE 1.0	Existing	22.45	6.89	1.0000		0.400	201.2	166.0	201.2			107	839	946
Overlashed Bundle	6M	Existing	22.50	6.89	0.2420	1.09	0.104	146.9	346.0	146.9	2,332	-2,177	54	1,624	-499
Fiber	TELE 1.0	Existing	22.45	6.89	1.0000		0.400	146.9	346.0	146.9			78	612	691
Overlashed Bundle	8M	Existing	21.50	6.95	0.2720	2.06	0.131	201.2	166.0	201.2	4,005	3,572	81	2,299	5,951
Fiber	TELE 1.0	Existing	21.45	6.95	1.0000		0.400	201.2	166.0	201.2			112	975	1,086
Fiber	TELE 1.0	Existing	21.37	6.95	1.0000		0.400	201.2	166.0	201.2			112	971	1,083
Overlashed Bundle	8M	Existing	21.50	6.95	0.2720	1.04	0.131	146.9	346.0	146.9	3,982	-3,551	59	1,679	-1,813
Fiber	TELE 1.0	Existing	21.45	6.95	1.0000		0.400	146.9	346.0	146.9			82	712	793
Fiber	TELE 1.0	Existing	21.37	6.95	1.0000		0.400	146.9	346.0	146.9			82	709	790
Overlashed Bundle	10M	Existing	20.50	7.02	0.3060	3.07	0.165	201.2	166.0	201.3	5,985	5,090	88	2,328	7,506
Telco	TELE 1.0	Existing	20.45	7.02	1.0000		0.400	201.2	166.0	201.3			116	1,090	1,205
Fiber	TELE 1.0	Existing	20.37	7.02	1.0000		0.400	201.2	166.0	201.3			116	1,061	1,176
CATV	CATV .75	Existing	20.29	7.02	1.0700		0.900	201.2	166.0	201.3			174	1,081	1,255
Fiber	TELE 1.0	Existing	20.20	7.02	1.0000		0.400	201.2	166.0	201.3			116	1,052	1,168
Overlashed Bundle	10M	Existing	20.50	7.02	0.3060	1.88	0.165	146.9	346.0	147.0	5,199	-4,421	64	1,700	-2,657
Telco	TELE 1.0	Existing	20.45	7.02	1.0000		0.400	146.9	346.0	147.0			85	778	862
Fiber	TELE 1.0	Existing	20.37	7.02	1.0000		0.400	146.9	346.0	147.0			85	774	859
CATV	CATV .75	Existing	20.29	7.02	1.0700		0.900	146.9	346.0	147.0			127	786	913
Fiber	TELE 1.0	Existing	20.20	7.02	1.0000		0.400	146.9	346.0	147.0			85	768	853
Telco	TELE 1.0	Existing	20.33	30.81	1.0000	2.39	0.400	85.0	65.4	85.1	752	15,368	8	47	15,423
Overlashed Bundle	6M	Existing	19.50	7.08	0.2420	2.13	0.104	201.2	166.0	201.2	2,401	1,942	75	1,928	3,945
Telco	TELE 1.0	Existing	19.45	7.08	1.0000		0.400	201.2	166.0	201.2			110	726	837
Overlashed Bundle	6M	Existing	19.50	7.08	0.2420	0.70	0.104	146.9	346.0	146.9	3,137	-2,537	55	1,408	-1,075
Telco	TELE 1.0	Existing	19.45	7.08	1.0000		0.400	146.9	346.0	146.9			81	711	791
Telco	TELE 1.0	Existing	19.47	19.34	1.0000	2.39	0.400	85.0	65.4	85.1	752	14,814	14	45	14,873
Telco	TELE 1.0	Existing	19.47	19.34	1.0000	1.68	0.400	89.6	236.4	89.7	2,530	-47,469	15	139	-47,316
Overlashed Bundle	6M	Proposed	18.10	7.17	0.2420	2.13	0.104	201.2	166.0	201.2	2,401	1,803	76	1,789	3,668
Fiber	TELE 1.0	Proposed	18.05	7.17	1.0000		0.400	201.2	166.0	201.2			112	674	786
Overlashed Bundle	6M	Proposed	18.10	7.17	0.2420	0.70	0.104	146.9	346.0	146.9	3,137	-2,355	56	1,307	-993
Fiber	TELE 1.0	Proposed	18.05	7.17	1.0000		0.400	146.9	346.0	146.9			82	492	574
											Totals:	**-17,682**	**2,577**	**33,326**	**18,220**

GenericEquipment		Owner	Height (ft)	Horiz. Offset (in)	Offset Angle (deg)	Rotate Angle (deg)	Unit Weight (lbs)	Unit Height (in)	Unit Depth (in)	Unit Diameter (in)	Unit Length (in)	Offset Moment* (ft-lb)	Wind Moment* (ft-lb)	Moment at GL* (ft-lb)
Cylinder	Typical Antenna	Proposed	39.30	0.67	270.0	0.0	37.90	35.40	--	14.00	--	4	993	997
Cylinder	Pole Extension	Proposed	36.10	0.96	270.0	0.0	40.00	36.00	--	6.86	--	-6	455	448
Cylinder	Top Mount Kit	Proposed	37.68	1.14	270.0	0.0	15.16	5.10	--	3.50	--	-3	33	30
Cylinder	Top Mount Bracket	Proposed	34.30	1.14	270.0	0.0	5.00	7.20	--	5.00	--	-1	63	62
Box	Mounting Bracket	Proposed	13.25	5.97	256.0	0.0	32.20	42.00	2.00	--	3.00	-32	136	104
Box	Upper RRH	Proposed	14.25	14.72	256.0	0.0	128.10	17.30	11.50	--	17.30	-313	323	10
Box	Lower RRH	Proposed	12.25	11.37	256.0	0.0	29.00	13.90	4.80	--	9.80	-55	147	92
Box	Diplexer	Proposed	12.25	8.62	256.0	0.0	29.00	4.80	3.30	--	7.90	-42	41	-1
Box	Verizon Fiber Demarc	Proposed	16.00	6.50	256.0	0.0	3.00	12.30	3.40	--	3.00	-3	48	45
Box	Load Center	Proposed	10.25	7.26	256.0	0.0	19.80	12.60	4.20	--	8.80	-24	93	69
Box	Elec. Meter	Proposed	8.75	7.76	256.0	0.0	15.00	19.00	5.00	--	10.00	-19	136	116
											Totals:	**-493**	**2,467**	**1,974**

Crossarm		Owner	Height (ft)	Horiz. Offset (in)	Offset Angle (deg)	Rotate Angle (deg)	Unit Weight (lbs)	Unit Height (in)	Unit Depth (in)	Unit Length (in)	Offset Moment* (ft-lb)	Wind Moment* (ft-lb)	Moment at GL* (ft-lb)
Normal	CROSSARM 3-1/2 X 4-1/2 X 8	Proposed	30.43	5.64	166.0	166.0	53.00	4.50	3.50	96.00	2	40	42
										Totals:	**2**	**40**	**42**

Insulator		Owner	Height (ft)	Horiz. Offset (in)	Offset Angle (deg)	Rotate Angle (deg)	Unit Weight (lbs)	Unit Diameter (in)	Unit Length (in)	Offset Moment* (ft-lb)	Wind Moment* (ft-lb)	Moment at GL* (ft-lb)
Pin	Pin Insulator - 10 kV	Proposed	30.62	-45.00	83.1	0.0	7.00	4.50	8.50	0	60	60
Pin	Pin Insulator - 10 kV	Proposed	30.62	45.00	248.9	0.0	7.00	4.50	8.50	0	60	60
Bolt	Single Bolt	Proposed	26.10	0.00	256.0	256.0	5.00	3.00	0.10	0	0	0
Bolt	Three Bolt	Proposed	22.50	0.00	76.0	346.0	5.00	3.00	0.10	0	0	0
Bolt	Three Bolt	Proposed	21.50	0.00	76.0	346.0	5.00	3.00	0.10	0	0	0
Bolt	Three Bolt	Proposed	20.50	0.00	76.0	346.0	5.00	3.00	0.10	0	0	0
Bolt	Three Bolt	Proposed	19.50	0.00	76.0	346.0	5.00	3.00	0.10	0	0	0
Bolt	Three Bolt	Proposed	18.10	0.00	76.0	346.0	5.00	3.00	0.10	0	0	0
Davit	Insulator, 15 kV	Proposed	30.43	0.00	76.0	76.0	60.00	2.50	18.00	0	70	70
									Totals:	**0**	**192**	**192**

Pole Buckling

Buckling Constant	Buckling Column Height* (ft)	Buckling Section Height (% Buckling Col. Hgt.)	Buckling Section Diameter (in)	Minimum Buckling Diameter at GL (in)	Diameter at Tip (in)	Diameter at GL (in)	Modulus of Elasticity (psi)	Pole Density (pcf)	Ice Density (pcf)	Pole Tip Height (ft)	Buckling Load Capacity at Height (lbs)	Buckling Load Applied at Height (lbs)	Buckling Load Factor of Safety
2.00	21.33	33.48	10.72	7.73	7.33	11.62	2.13e+6	60.00	57.00	34.00	44,140	**441.28**	**5.10**

STRUCTURAL ANALYSIS REPORT

For

ANDOVER_MA_SC35

59 Dascomb Road
Andover, MA 01810

Equipment Mounted on Existing Utility Pole

Prepared for:

verizon

900 Chelmsford Street
Tower 2 Floor 5
Lowell, MA 01851

COMMONWEALTH OF MASSACHUSETTS
DANIEL P. HAMM
CIVIL
No. 40720
REGISTERED PROFESSIONAL ENGINEER

Dated: July 22, 2022

HUDSON Design Group LLC

45 Beechwood Drive
North Andover, MA 01845
Phone: (978) 557-5553
www.hudsondesigngroupllc.com

SCOPE OF WORK:

Hudson Design Group LLC (HDG) has been authorized by Verizon to conduct a structural evaluation of the existing utility pole supporting the proposed Verizon equipment.

This report represents this office's findings, conclusions and recommendations pertaining to the support of the proposed Verizon equipment listed below.

This office conducted an on-site visual survey of the above areas on November 30, 2021. Attendees included Sam Foley (HDG – CAD Designer).

CONCLUSION SUMMARY:

Based on our evaluation, we have determined that the existing pole **is in conformance** with the National Electric Safety Code 2017 (NESC). The utility pole structure is rated at 67.1%.

APPURTENANCES CONFIGURATION:

Appurtenances	Elev.	Mount
(1) Typical Antenna	43'-8"	Top of Pole Extension
(1) Demark Box	17'-6"	Side of Wood Pole
(1) Upper RRH Unit	14'-9"	Side of Wood Pole
(1) Lower RRH Unit	12'-9"	Side of Wood Pole
(1) Load Center	10'-2"	Side of Wood Pole
(1) Elec. Meter	8'-9"	Side of Wood Pole

* Proposed equipment shown in bold.

ANALYSIS RESULTS SUMMARY:

Component	Max. Stress Ratio	Elev. of Component (ft.)	Pass/Fail
SP 3 (Existing)	**67.1%**	**0 – 38'-5"**	**PASS**

DESIGN CRITERIA:

National Electric Safety Code 2017 (NESC) and 780 CMR MA Building Code, 9th Edition.		
Wind		
City/Town:	Andover	
County:	Middlesex	
NESC Rule	Rule 250B	NESC Section 25
Construction Grade	C	NESC Section 25
Wind Load:	39.53 mph	NESC Table 230-2
Ice		
Loading District	Heavy	NESC Figure 250-1
Radial Ice Thickness:	0.50 in	NESC Table 230-1

1. Approximate height above grade to center of the proposed antenna: 43'-8" +/-

***Calculations and referenced documents are attached.**

EXISTING STRUCTURE:

The existing 38'-5" +/- wood pole is assumed to be Southern Pine Class 3 (Fb = 8000 psi) with a 12.0" diameter base. If field conditions differ from what is assumed in this report, then the engineer of record is to be notified as soon as possible.

ANTENNA SUPPORT RECOMMENDATIONS:

The proposed antenna is to be installed on a proposed mount kit secured to the proposed pole extension using thru bolts.

RRH SUPPORT RECOMMENDATIONS:

The proposed RRH's are to be installed on a proposed RRH mounting bracket secured to the existing pole using thru bolts.

EQUIPMENT SUPPORT RECOMMENDATIONS:

The proposed equipment is to be installed on the existing wood pole using the approved manufacturer's mount.

Limitations and assumptions:

1. Reference the latest HDG construction drawings for all the equipment locations details.
2. Mount all equipment per manufacturer's specifications.
3. All structural members and their connections are assumed to be in good condition and are free from defects with no deterioration to its member capacities. Contractor to perform pre-inspection prior to construction.
4. All antennas and waveguide cables are assumed to be properly installed and supported as per the manufacturer requirements.
5. HDG is not responsible for any modifications completed prior to and hereafter which HDG was not directly involved.
6. If field conditions differ from what is assumed in this report, then the engineer of record is to be notified as soon as possible.
7. HDG did not perform any geotechnical analysis / or / investigation. Soil Information is unknown.

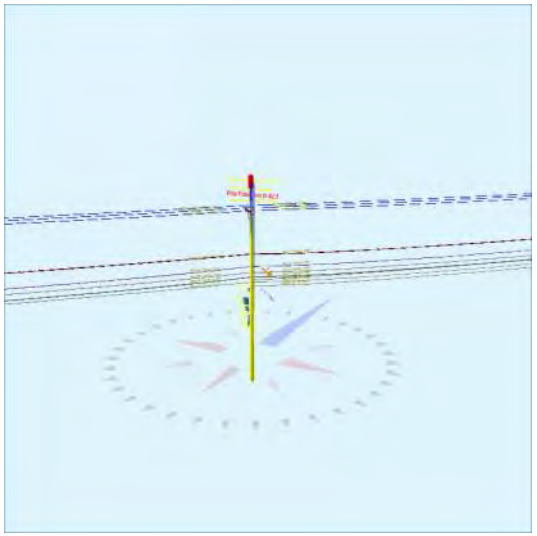
FIELD PHOTOS:

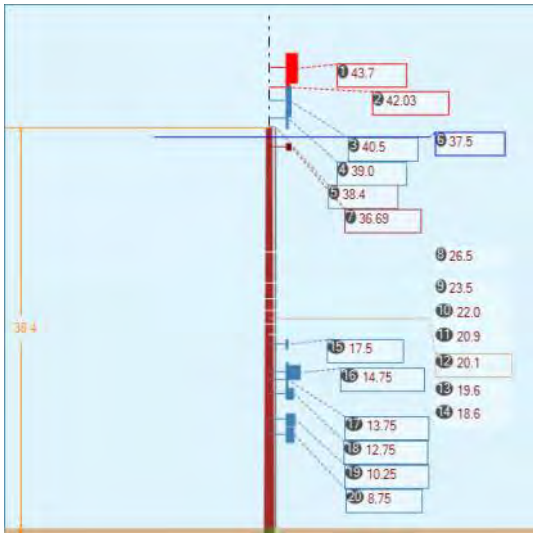
Photo 1: Sample photo illustrating the existing wood pole.

HUDSON
Design Group LLC

Calculations

Pole Num:	**MECO 2857/19-20**	Pole Length / Class:	**45 / 3**	Code:	**NESC**	Structure Type:	**Unguyed Tangent**
Pole Number	**MECO 2857/19-20**	Species:	**SOUTHERN PINE**	NESC Rule:	**Rule 250B**	Status	**Unguyed**
Site Name	**ANDOVER_MA_SC35**	Setting Depth (ft):	**6.6**	Construction Grade:	**C**	Pole Strength Factor:	**0.85**
Address	**59 Dascomb Road**	G/L Circumference (in):	**37.70**	Loading District:	**Heavy**	Transverse Wind LF:	**1.75**
Town, State	**Andover, MA**	G/L Fiber Stress (psi):	**8,000**	Ice Thickness (in):	**0.50**	Wire Tension LF:	**1.00**
Zip Code	**01810**	Allowable Stress (psi):	**6,800**	Wind Speed (mph):	**39.53**	Vertical LF:	**1.90**
Designed By	**LBW**	Fiber Stress Ht. Reduc:	**No**	Wind Pressure (psf):	**4.00**		
Latitude:	**42.634078**	Longitude:		**-71.166726**		Elevation:	**0'**





Pole Capacity Utilization (%)		Height (ft)	Wind Angle (deg)
Maximum	**67.1**	0.0	134.1
Groundline	**67.1**	0.0	134.1
Vertical	**15.6**	22.6	134.1

Pole Moments (ft-lb)		Load Angle (deg)	Wind Angle (deg)
Max Cap Util	**63,677**	115.8	134.1
Groundline	**63,677**	115.8	134.1
GL Allowable	**96,140**		

Groundline Load Summary - Reporting Angle Mode: Load - Reporting Angle: 115.8°

	Shear Load* (lbs)	Applied Load (%)	Bending Moment (ft-lb)	Applied Moment (%)	Pole Capacity (%)	Bending Stress (+/- psi)	Vertical Load (lbs)	Vertical Stress (psi)	Total Stress (psi)	Pole Capacity (%)
Powers	-116	-4.0	**1,101**	1.7	**1.2**	**75**	1,018	9	**84**	**1.2**
Comms	2,722	93.8	**55,983**	87.9	**58.2**	**3,796**	2,789	25	**3,820**	**56.2**
GenericEquipments	83	2.8	**2,260**	3.6	**2.4**	**153**	612	5	**159**	**2.3**
Pole	206	7.1	**4,130**	6.5	**4.3**	**280**	2,272	20	**300**	**4.4**
Crossarms	2	0.1	**58**	0.1	**0.1**	**4**	101	1	**5**	**0.1**
Risers	1	0.0	**2**	0.0	**0.0**	**0**	73	1	**1**	**0.0**
Insulators	4	0.1	**143**	0.2	**0.2**	**10**	101	1	**11**	**0.2**
Pole Load	2,901	100.0	**63,677**	100.0	**66.2**	**4,317**	6,965	62	**4,379**	**64.4**
Pole Reserve Capacity			**32,463**		**33.8**	**2,483**			**2,421**	**35.6**

Load Summary by Owner - Reporting Angle Mode: Load - Reporting Angle: 115.8°

	Shear Load* (lbs)	Applied Load (%)	Bending Moment (ft-lb)	Applied Moment (%)	Pole Capacity (%)	Bending Stress (+/- psi)	Vertical Load (lbs)	Vertical Stress (psi)	Total Stress (psi)	Pole Capacity (%)
Existing	2,060	71.0	**46,491**	73.0	**48.4**	**3,152**	3,839	34	**3,186**	**46.9**
Proposed	635	21.9	**13,056**	20.5	**13.6**	**885**	854	8	**893**	**13.1**
Pole	206	7.1	**4,130**	6.5	**4.3**	**280**	2,272	20	**300**	**4.4**
Totals:	2,901	100.0	**63,677**	100.0	**66.2**	**4,317**	6,965	62	**4,379**	**64.4**

Detailed Load Components:

Power		Owner	Height (ft)	Horiz. Offset (in)	Cable Diameter (in)	Sag at Max Temp (ft)	Cable Weight (lbs/ft)	Lead/Span Length (ft)	Span Angle (deg)	Wire Length (ft)	Tension (lbs)	Tension Moment* (ft-lb)	Offset Moment* (ft-lb)	Wind Moment* (ft-lb)	Moment at GL* (ft-lb)
Primary	AAAC 123.3 KCM AZUSA	Existing	37.50	44.34	0.3980	1.21	0.115	106.8	47.4	106.8	1,570	22,626	230	1,582	24,438
Primary	AAAC 123.3 KCM AZUSA	Existing	37.50	44.34	0.3980	0.73	0.115	138.6	226.4	138.6	1,570	-21,595	298	2,069	-19,228
Primary	AAAC 123.3 KCM AZUSA	Existing	37.50	44.34	0.3980	1.21	0.115	106.8	47.4	106.8	1,570	22,626	-254	1,582	23,954
Primary	AAAC 123.3 KCM AZUSA	Existing	37.50	44.34	0.3980	0.73	0.115	138.6	226.4	138.6	1,570	-21,595	-330	2,069	-19,856
Primary	AAAC 123.3 KCM AZUSA	Existing	37.50	6.81	0.3980	1.21	0.115	106.8	47.4	106.8	1,570	22,626	-34	1,582	24,174
Primary	AAAC 123.3 KCM AZUSA	Existing	37.50	6.81	0.3980	0.73	0.115	138.6	226.4	138.6	1,570	-21,595	-45	2,069	-19,571
Secondary	DUPLEX 1/0	Existing	26.45	6.89	0.9540		0.260	106.8	47.4	106.8			46	578	624

Secondary	DUPLEX 1/0	Existing	26.55	6.89	0.9540		0.260	106.8	47.4	106.8			46	580	626
Secondary	DUPLEX 1/0	Existing	26.45	6.89	0.9540		0.260	138.6	226.4	138.6			59	756	816
Secondary	DUPLEX 1/0	Existing	26.55	6.89	0.9540		0.260	138.6	226.4	138.6			59	759	819
Overlashed Bundle	10M	Existing	26.50	6.89	0.3060	1.58	0.165	106.8	47.4	106.8	1,953	19,875	40	1,378	21,294
Overlashed Bundle	10M	Existing	26.50	6.89	0.3060	0.81	0.165	138.6	226.4	138.6	3,999	-38,843	52	1,803	-36,987
											Totals:	**-15,875**	**168**	**16,809**	**1,101**

Comm		**Owner**	**Height (ft)**	**Horiz. Offset (in)**	**Cable Diameter (in)**	**Sag at Max Temp (ft)**	**Cable Weight (lbs/ft)**	**Lead/Span Length (ft)**	**Span Angle (deg)**	**Wire Length (ft)**	**Tension (lbs)**	**Tension Moment* (ft-lb)**	**Offset Moment* (ft-lb)**	**Wind Moment* (ft-lb)**	**Moment at GL* (ft-lb)**
Overlashed Bundle	8M	Existing	23.50	7.07	0.2720	1.17	0.131	106.8	47.4	106.8	3,023	27,286	27	999	28,311
Fiber	TELE 1.0	Existing	23.47	6.56	1.0000		0.400	106.8	47.4	106.8			39	290	329
CATV	CATV .50	Existing	23.48	7.35	0.5700		0.600	106.8	47.4	106.8			56	290	346
CATV	CATV .50	Existing	23.43	7.18	0.5700		0.600	106.8	47.4	106.8			55	289	344
Overlashed Bundle	8M	Existing	23.50	7.07	0.2720	1.12	0.131	138.6	226.4	138.6	4,682	-40,338	35	1,306	-38,997
Fiber	TELE 1.0	Existing	23.47	6.56	1.0000		0.400	138.6	226.4	138.6			51	379	430
CATV	CATV .50	Existing	23.48	7.35	0.5700		0.600	138.6	226.4	138.6			73	379	452
CATV	CATV .50	Existing	23.43	7.18	0.5700		0.600	138.6	226.4	138.6			71	378	449
Overlashed Bundle	8M	Existing	22.00	7.16	0.2720	1.40	0.131	106.8	47.4	106.8	2,080	17,573	38	1,111	18,722
Telco	TELE 1.0	Existing	21.96	6.67	1.0000		0.400	106.8	47.4	106.8			50	446	497
Fiber	TELE 1.0	Existing	21.96	7.67	1.0000		0.400	106.8	47.4	106.8			58	446	504
Overlashed Bundle	8M	Existing	22.00	7.16	0.2720	1.02	0.131	138.6	226.4	138.6	3,600	-29,027	50	1,453	-27,524
Telco	TELE 1.0	Existing	21.96	6.67	1.0000		0.400	138.6	226.4	138.6			65	584	649
Fiber	TELE 1.0	Existing	21.96	7.67	1.0000		0.400	138.6	226.4	138.6			75	584	659
Overlashed Bundle	8M	Existing	20.90	7.23	0.2720	1.28	0.131	106.8	47.4	106.8	2,589	20,783	32	972	21,787
Telco	TELE 1.0	Existing	20.87	6.73	1.0000		0.400	106.8	47.4	106.8			45	341	386
Telco	TELE 1.0	Existing	20.87	7.73	1.0000		0.400	106.8	47.4	106.8			51	341	392
Telco	TELE 1.0	Existing	20.79	7.23	1.0000		0.400	106.8	47.4	106.8			48	340	388
Overlashed Bundle	8M	Existing	20.90	7.23	0.2720	1.24	0.131	138.6	226.4	138.6	3,844	-29,450	42	1,271	-28,136
Telco	TELE 1.0	Existing	20.87	6.73	1.0000		0.400	138.6	226.4	138.6			58	446	504
Telco	TELE 1.0	Existing	20.87	7.73	1.0000		0.400	138.6	226.4	138.6			67	446	513
Telco	TELE 1.0	Existing	20.79	7.23	1.0000		0.400	138.6	226.4	138.6			62	444	507
Overlashed Bundle	6M	Existing	19.60	7.31	0.2420	1.47	0.104	106.8	47.4	106.8	1,324	9,966	38	950	10,954
Fiber	TELE 1.0	Existing	19.55	7.31	1.0000		0.400	106.8	47.4	106.8			56	358	414
Overlashed Bundle	6M	Existing	19.60	7.31	0.2420	0.71	0.104	138.6	226.4	138.6	2,846	-20,452	49	1,243	-19,160
Fiber	TELE 1.0	Existing	19.55	7.31	1.0000		0.400	138.6	226.4	138.6			72	468	541
Overlashed Bundle	6M	Proposed	18.60	7.37	0.2420	1.47	0.104	106.8	47.4	106.8	1,324	9,457	39	902	10,398
Fiber	TELE 1.0	Proposed	18.55	7.37	1.0000		0.400	106.8	47.4	106.8			57	340	396
Fiber	TELE 1.0	Existing	20.10	7.28	1.0000	1.56	0.400	106.8	47.0	106.8	4,512	34,170	79	1,216	35,465
Fiber	TELE 1.0	Existing	20.10	7.28	1.0000	1.56	0.400	106.8	47.0	106.8	4,512	34,170	79	1,216	35,465
											Totals:	**34,138**	**1,616**	**20,229**	**55,983**

GenericEquipment		Owner	Height (ft)	Horiz. Offset (in)	Offset Angle (deg)	Rotate Angle (deg)	Unit Weight (lbs)	Unit Height (in)	Unit Depth (in)	Unit Diameter (in)	Unit Length (in)	Offset Moment* (ft-lb)	Wind Moment* (ft-lb)	Moment at GL* (ft-lb)
Cylinder	Typical Antenna	Proposed	43.70	1.34	0.0	0.0	35.00	35.40	--	14.00	--	-3	1,043	1,040
Cylinder	Top Mount Bracket	Proposed	42.03	0.16	180.0	0.0	5.00	20.00	--	5.00	--	0	210	211
Cylinder	Pole Extension	Proposed	40.50	0.10	0.0	0.0	40.00	36.00	--	6.86	--	0	482	481
Cylinder	Top Mount Kit	Proposed	39.00	0.37	0.0	0.0	15.16	24.00	--	3.50	--	0	158	157
Box	Mounting Bracket	Proposed	13.75	9.16	223.0	0.0	32.20	42.00	2.00	--	3.00	-14	89	74
Box	Upper RRH	Proposed	14.75	17.91	223.0	0.0	128.10	17.30	11.50	--	17.30	-112	210	98
Box	Lower RRH	Proposed	12.75	14.56	223.0	0.0	29.00	13.90	4.80	--	9.80	-21	70	50
Box	Elec. Meter	Proposed	8.75	7.97	223.0	0.0	15.00	19.00	5.00	--	10.00	-6	64	58
Box	Load Center	Proposed	10.25	7.23	223.0	0.0	19.80	14.50	3.70	--	11.30	-7	42	35
Box	Verizon Fiber Demarc	Proposed	17.50	6.63	223.0	0.0	3.00	12.30	3.40	--	3.00	-1	56	55
											Totals:	**-165**	**2,424**	**2,260**

Crossarm		Owner	Height (ft)	Horiz. Offset (in)	Offset Angle (deg)	Rotate Angle (deg)	Unit Weight (lbs)	Unit Height (in)	Unit Depth (in)	Unit Length (in)	Offset Moment* (ft-lb)	Wind Moment* (ft-lb)	Moment at GL* (ft-lb)
Normal	CROSSARM 3-1/2 X 4-1/2 X 8	Existing	36.69	-5.51	48.0	48.0	53.00	4.50	3.50	96.00	-18	77	58
										Totals:	**-18**	**77**	**58**

Riser		Owner	Height (ft)	Horiz. Offset (in)	Offset Angle (deg)	Rotate Angle (deg)	Unit Weight (lbs)	Unit Height (in)	Unit Depth (in)	Unit Diameter (in)	Unit Length (in)	Offset Moment* (ft-lb)	Wind Moment* (ft-lb)	Moment at GL* (ft-lb)
2" U-Guard 313.0° H:38.4	2" U-Guard	Proposed	38.40	6.16	313.0	313.0	38.40	460.80	2.00	2.00	460.80	-19	21	2
											Totals:	**-19**	**21**	**2**

Insulator		Owner	Height (ft)	Horiz. Offset (in)	Offset Angle (deg)	Rotate Angle (deg)	Unit Weight (lbs)	Unit Diameter (in)	Unit Length (in)	Offset Moment* (ft-lb)	Wind Moment* (ft-lb)	Moment at GL* (ft-lb)
Pin	Pin Insulator - 5 kV	Existing	36.88	44.00	145.1	0.0	6.00	3.50	7.50	0	47	47
Pin	Pin Insulator - 5 kV	Existing	36.88	-44.00	310.9	0.0	6.00	3.50	7.50	0	47	47
Pin	Pin Insulator - 5 kV	Existing	36.88	-4.00	264.0	0.0	6.00	3.50	7.50	0	47	47
Bolt	Single Bolt	Existing	26.50	0.00	138.0	48.0	5.00	3.00	0.10	0	0	0
Bolt	Three Bolt	Existing	23.50	0.00	138.0	48.0	5.00	3.00	0.10	0	0	0
Bolt	Three Bolt	Existing	22.00	0.00	138.0	48.0	5.00	3.00	0.10	0	0	0
Bolt	Three Bolt	Existing	20.90	0.00	138.0	48.0	5.00	3.00	0.10	0	0	0
Bolt	Three Bolt	Existing	19.60	0.00	138.0	48.0	5.00	3.00	0.10	0	0	0
Bolt	Three Bolt	Proposed	18.60	0.00	136.9	46.9	5.00	3.00	0.10	0	0	0
J-Hook	J-Hook	Existing	20.10	0.00	138.0	138.0	5.00	3.00	0.10	0	0	0
									Totals:	**0**	**143**	**143**

Pole Buckling

Buckling Constant	Buckling Column Height* (ft)	Buckling Section Height (% Buckling Col. Hgt.)	Buckling Section Diameter (in)	Minimum Buckling Diameter at GL (in)	Diameter at Tip (in)	Diameter at GL (in)	Modulus of Elasticity (psi)	Pole Density (pcf)	Ice Density (pcf)	Pole Tip Height (ft)	Buckling Load Capacity at Height (lbs)	Buckling Load Applied at Height (lbs)	Buckling Load Factor of Safety
2.00	22.65	33.45	11.08	7.54	7.32	12.01	2.13e+6	60.00	57.00	38.40	44,696	**446.50**	**6.41**

EXHIBIT 4:

NATIONAL GRID LETTER OF AUTHORIZATION

nationalgrid

July 1, 2022

Attn: Town of Andover, MA

To Whom It May Concern:

National Grid, as owner of certain utility poles in public rights-of-way in Andover, MA, is aware and authorizes Verizon Wireless to complete the process of permitting for the installation of necessary telecommunications equipment and corresponding aerial fiber optic cable on a National Grid-owned utility pole at the following location:

ANDOVER_MA_SC17	39 Stinson	Pole # 6821
ANDOVER_MA_SC18	36 Vine Street	Pole # 4540
ANDOVER_MA_SC30	164 Andover Street	Pole # 4266/39
ANDOVER_MA_SC33	2 Hanscom Road	Pole # 7167/32
ANDOVER_MA_SC35	59 Dascomb Road	Pole # 2857, 19/20

Accordingly, National Grid hereby submits its authorization for Verizon Wireless to install its antennae and appurtenant equipment and aerial fiber routes to the National Grid pole at the above location. Please be advised that the undersigned has entered into a master lease agreement authorizing Verizon Wireless to install, attach, maintain, repair, upgrade and use wireless communications equipment and appurtenances on certain utility poles. The installations on National Grid utility poles will be subject to the underlying terms and conditions of the aforementioned agreement by and between National Grid and Verizon Wireless, as the same may be in effect from time to time.

Sincerely,

Keith Amelin
National Grid

EXHIBIT 5:

RADIO FREQUENCY ENGINEER AFFIDAVIT

verizon

AFFIDAVIT OF RADIO FREQUENCY ENGINEER

The undersigned, in support of the application to install five (5) small wireless communications facilities (SWF) consisting of one antenna array and associated radio equipment on existing utility poles located in the Town of Andover, Massachusetts, states the following:

1. My name is Syed Ali. I have a Bachelor of Science degree in Science and Information Technology from the Preston Institute of Management Science and Technology. I have been employed by Verizon Wireless for five (5) year as Network Assurance Engineer and for the past one (1) year as an RF (Radio Frequency) Engineer. I am responsible for network design in the area of Massachusetts that includes the Town of Andover, MA.

2. Verizon Wireless is a federally licensed provider of wireless communications services with a national footprint.

3. The proposed small wireless facilities are within areas where Verizon Wireless has identified a need to install additional facilities in order to provide reliable wireless service for customers and emergency responders. The search areas for the proposed facilities was determined with reference to Verizon's existing network serving the Andover area and by identifying those areas in need of improved service. Furthermore, it was determined that the areas served by the facility would interact well with those of existing and proposed facilities in the surrounding areas.

   The following table provides details of the proposed sites:

SITE NAME	ADDRESS	POLE #
ANDOVER_MA_SC17	39 Stinson Road	6821
ANDOVER_MA_SC18	36 Vine Street (Pole on Andover Bypass Road)	4540
ANDOVER_MA_SC30	164 Andover Street	4266/39
ANDOVER_MA_SC33	2 Hanscom Road (Pole on LoveJoy Road)	7167/32
ANDOVER_MA_SC35	59 Dascomb Road	2857, 19/20

4. Small cell deployments are intended to complement, not replace, macro network sites, and are typically target areas of heavy network usage (a.k.a "hotspots"). In doing so, small cells serve to offload the demand on the existing sites serving these hotspots. This not only improves service to the targeted area, but also improves overall system performance elsewhere in the network. In addition, small cells allow for Verizon's deployment of new technologies that will further enhance the network experience and reliability, including faster download time and lower latency.

5. Pursuant to its Federal Communications Commission (FCC) licenses, Verizon Wireless is required to ensure that all radio equipment operating at the proposed communications facilities and the

resulting radio frequency exposure levels are compliant with FCC requirements as well as federal and state health and safety standards.

6. Providing wireless communications services is a benefit to the residents of the Town of Andover, as well as to mobile customers traveling through the area. The proposed facilities reflect the locations and designs required to meet Verizon Wireless' network objectives with respect to capacity and coverage enhancement and deployment of new technologies, including 5G. Without the proposed facilities, Verizon Wireless will be unable to provide reliable wireless communication services in these areas of Andover; therefore, Verizon Wireless respectfully requests that the Town of Andover act favorably upon the proposed facilities.

Signed and sworn under the pains and penalties of perjury this 28 day of June, 2022.

Syed Ali
RF Design Engineer
Verizon Wireless
900 Chelmsford Street
Lowell, MA 01851

EXHIBIT 6:

CERTIFICATE OF INSURANCE

CERTIFICATE OF LIABILITY INSURANCE

DATE(MM/DD/YYYY)
07/05/2022

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER
Aon Risk Services Northeast, Inc.
New York NY Office
One Liberty Plaza
165 Broadway, Suite 3201
New York NY 10006 USA

CONTACT NAME:
PHONE (A/C. No. Ext): (866) 283-7122 **FAX (A/C. No.):** (800) 363-0105
E-MAIL ADDRESS:

INSURER(S) AFFORDING COVERAGE		NAIC #
INSURER A:	Liberty Mutual Fire Ins Co	23035
INSURER B:	LM Insurance Corporation	33600
INSURER C:	Liberty Insurance Corporation	42404
INSURER D:		
INSURER E:		
INSURER F:		

INSURED
Cellco Partnership dba Verizon Wireless
1095 Avenue of the Americas
New York NY 10036 USA

COVERAGES **CERTIFICATE NUMBER:** 570094417718 **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS,

Limits shown are as requested

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X **COMMERCIAL GENERAL LIABILITY**			TB2691550588142	06/30/2022	06/30/2023	EACH OCCURRENCE	$2,000,000
	CLAIMS-MADE X OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$2,000,000
	X XCU Coverage is Included						MED EXP (Any one person)	$10,000
							PERSONAL & ADV INJURY	$2,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$2,000,000
	X POLICY PRO-JECT LOC						PRODUCTS - COMP/OP AGG	$2,000,000
	OTHER:							
A	**AUTOMOBILE LIABILITY**			AS2-691-550588-122 AOS	06/30/2022	06/30/2023	COMBINED SINGLE LIMIT (Ea accident)	$2,000,000
A	X ANY AUTO			AS2-691-550588-132 NH - Primary	06/30/2022	06/30/2023	BODILY INJURY (Per person)	
A	OWNED AUTOS ONLY / SCHEDULED AUTOS						BODILY INJURY (Per accident)	
	HIRED AUTOS ONLY / NON-OWNED AUTOS ONLY			TL2-691-550588-182 NH - Excess	06/30/2022	06/30/2023	PROPERTY DAMAGE (Per accident)	
	UMBRELLA LIAB OCCUR						EACH OCCURRENCE	
	EXCESS LIAB CLAIMS-MADE						AGGREGATE	
	DED RETENTION							
B	**WORKERS COMPENSATION AND EMPLOYERS' LIABILITY** Y / N			WA569D550588092 AOS	06/30/2022	06/30/2023	X PER STATUTE OTH-ER	
B	ANY PROPRIETOR / PARTNER / EXECUTIVE OFFICER/MEMBER **(Mandatory in NH)** N	N / A		WC5691550588082 WI, MN	06/30/2022	06/30/2023	E.L. EACH ACCIDENT	$1,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE-EA EMPLOYEE	$1,000,000
							E.L. DISEASE-POLICY LIMIT	$1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)
RE: Verizon Wireless Small Cell locations in Andover, MA.

CERTIFICATE HOLDER
The Town of Andover MA
36 Bartlet St.
Andover MA 01810 USA

CANCELLATION
SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE
Aon Risk Services Northeast, Inc.

Holder Identifier :
Certificate No : 570094417718

AGENCY CUSTOMER ID: 570000027366

LOC #:

ADDITIONAL REMARKS SCHEDULE

AGENCY	NAMED INSURED
Aon Risk Services Northeast, Inc.	Cellco Partnership dba Verizon Wireless
POLICY NUMBER: See Certificate Numbe 570094417718	
CARRIER: See Certificate Numbe 570094417718 / NAIC CODE	EFFECTIVE DATE:

ADDITIONAL REMARKS

THIS ADDITIONAL REMARKS FORM IS A SCHEDULE TO ACORD FORM,
FORM NUMBER: ACORD 25 **FORM TITLE:** Certificate of Liability Insurance

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER	
INSURER	
INSURER	
INSURER	

ADDITIONAL POLICIES If a policy below does not include limit information, refer to the corresponding policy on the ACORD certificate form for policy limits.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YYYY)	POLICY EXPIRATION DATE (MM/DD/YYYY)	LIMITS	
	WORKERS COMPENSATION							
C		N/A		WA769D550588072 MA	06/30/2022	06/30/2023		

EXHIBIT 7:

PROJECT ENGINEER AFFIDAVIT

AFFIDAVIT OF PROJECT ENGINEER

The undersigned, in support of the application to install small wireless telecommunications facilities consisting of antennas and associated radio equipment on the existing wooden utility poles located in the public rights of way in the Town of Andover, Massachusetts, states the following:

1. My name is Sean Conway. I am a 4G and 5G Small Cell Project Network Engineer for Verizon Wireless in Eastern Massachusetts.
2. Verizon Wireless is a federally licensed provider of wireless communications services with a national footprint.
3. Verizon Wireless certifies that it will be maintain the installations attached to the National Grid poles in Andover in good repair and in accordance to FCC standards.
4. Verizon Wireless certifies that it will remove any installation not in such good repair, or not in use, within 60 days of being taken out of service.

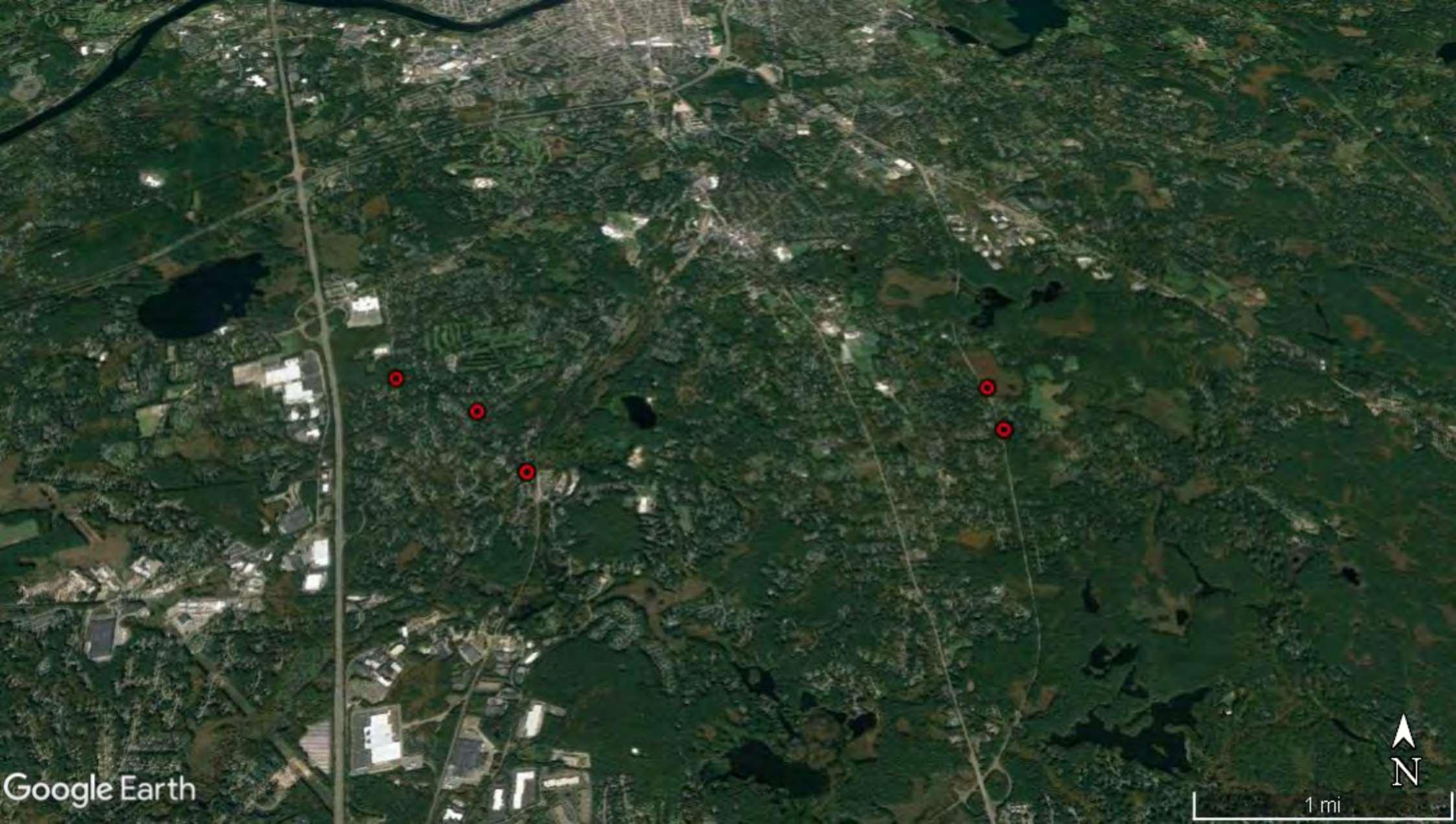
Signed and sworn under the pains and penalties of perjury this 28th day of June 2022.

Sean Conway

_____

Sean Conway
Engineer IV Specialist Real Estate / Regulatory
Verizon Wireless
900 Chelmsford Street
Lowell, MA 01851

EXHIBIT 8:
COMPOSITE MAP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