Introduction:

Hage & Hage, Law and Consulting has retained the services of Jade Stone Engineering PLLC, to provide the electrical engineering services pertaining to the Village of Clayton Overhead Utility Line Safety Assessment. The specific purpose of this letter report is to evaluate the Village's overhead electrical supply facilities with their respect to current codes, standards, regulations, and provide a letter report of our findings. This letter report outlines existing conditions, current issues, and identifies violations as noted during our cursory site visit noted below. This letter report includes the evaluation of overhead electrical supply facilities only, all communication (voice, data, fiber, etc.) supply facilities are not part of this evaluation.

Existing Conditions:

Jade Stone Engineering conducted a site visit on January 26th 2017 to examine the existing overhead electrical supply facilities located downtown within the Village of Clayton and observed several issues. Note, the extent of this evaluation includes overhead supply facilities along Riverside Dr. from Webb St. to James St. as well as a one block section along James St. (Riverside Dr. to Hugunin St.) only.

The area observed during our cursory site visit (boundaries indicated above) is served by a 13.2kV, 3ϕ overhead distribution system which is owned and maintained by National Grid (utility). The overhead electrical distribution system contains several secondary service laterals to serve customers along the area in question. The majority of secondary service laterals are single phase and overhead, however it was noted there was at least one customer who has a three-phase (3ϕ) electrical service lateral or underground service laterals. All overhead electrical supply facilities observed during our cursory site visit are utility owned/maintained. Typically, the customer does not takes ownership of electrical equipment/systems until the services reaches the building.

Codes References:

There are three (3) primary codes/rules which were evaluated as part of this report:

- IEEE National Electrical Safety Code 'NESC', (Latest Version)
- NFPA 70 National Electric Code, 'NEC'. (Latest Version)
- High Voltage Proximity Act,

The NESC and the NEC are nationally recognized standards and generally guide the utility regarding the safe installation of overhead electrical infrastructure. The High Voltage Proximity Act is a section of the Industrial Code Rule (No.57) and is primarily applicable for untrained persons working in or around existing electrical infrastructure.

The IEEE National Electric Safety Code (NESC) is a code that is published by the Institute of Electrical and Electronics Engineers (IEEE). It has defined safe practices for installing, operating and maintaining electrical supply and communication lines for nearly a century. Every 5 years the code is updated. Utilities typically use the NESC to safeguard themselves and the public while installing and maintaining electrical infrastructure. The NESC only applies to electric utility facilities and operations up to the service point (typical a utility meter) at which then the National Electric Code (see below) takes precedence. To clarify, the NESC essentially contains requirements associated with getting electric services to a site or facility. It is specifically applicable when it comes to overhead electrical supply infrastructure. The NESC was the primary code used to analyze the overhead supply facilities within the Village of Clayton.

The National Electric Code (NEC or NFPA 70E) The NEC addresses the installation of electrical conductors, equipment, and raceways; signaling and communications conductors, equipment, and raceways; and optical fiber cables and raceways in commercial, residential, and industrial occupancies. To clarify, the NEC typically applies to electrical systems after the service point throughout the premises. For the purposes of this report, the NEC was primarily utilized to review the secondary service conductors from the utility pole mounted transformer secondary bushings, to the residential/commercial facility in question. This includes both overhead (aerial service laterals) as well as any underground service laterals (From riser pole to the facility).

The High Voltage Proximity Act (HVPA) is a NY statute which falls under the jurisdiction of the NYS Department of Labor. In general, the rule was established to protect untrained workers and the general public from electric shock while operating or acting around unknown or known electrical infrastructure, such as aerial high voltage lines. The HVPA prevents untrained persons from participating in any activity which results in them coming within a distance of 10 feet of any high voltage conductor. Prohibited activity includes:

"The operation, erection, transportation, handling, or storage of any tools, machinery, equipment, supplies, materials or apparatus, or the moving of any building, if in the course of such operation, erection, transportation, handling, storage or moving it is possible for such tools, machinery, equipment, supplies, materials, apparatus or building, to come within dangerous proximity of a high-voltage line"

The HVPA does not apply to the construction, reconstruction, operations, and maintenance of overhead electrical supply conductors, their supporting structures, and associated equipment by an authorized/qualified electrical worker, and it is therefore not applicable to National Grid, trained utility workers.

To further clarify some common confusion, the HVPA applies to active overhead electrical supply facilities in excess of 600 volts (touch potential). Technically speaking, the secondary electrical service laterals to the building (typically 240V) along with the mid pole communication utilities are not applicable to the HVPA rule. Thus, with respect to the HVPA we are concerned only with the lines at the highest point on the utility poles. Refer to figure 1 for additional information.

Perceived Issues/Violations:

NESC Compliance

1. The NESC outlines several clearance requirements that overhead electric supply facilities must adhere to. During our site visit, measurements were taken to determine compliance with current code requirements. Our findings indicate that the existing overhead supply facilities are in compliance with current NESC requirements. Items reviewed and measurements taken during our site visit that were found to be in compliance include but are not limited to the following:
    - Overhead supply facility structures (utility poles) to fire hydrants.
    - Overhead supply facility structures (utility poles) to curbs/roadways.
    - Equipment heights (street lights) on overhead supply facility structures (utility poles).
    - Anchor markers clearly identified.
    - Overhead supply conductor vertical clearance to surface beneath.
    - Overhead supply conductor horizontal clearance to structures.
    - Overhead conductor clearances phase to ground
    - Overhead conductor clearances phase to phase

2. It was observed that there are utility poles that are located on the roadside of the curb along the one block section of James St. Under normal circumstances the NESC requires all overhead supply facility structures (utility poles, guy wires, etc.) to be installed a minimum of 6" on the premise side of the curb (6" off the paved roadway surface). Normally this would be considered in violation. However, there is an exception within the NESC that reads as follows "where governmental authority exercising jurisdiction over structure location has issued a permit for, or otherwise approved, specific locations for supporting structures, that permit or approval shall govern". It is not known to us, if National Grid received approval for these specific locations during the installation process. Refer to Figure 5 for additional information.

3. It was also observed during our site visit that there is a supporting structure (utility pole) near the intersection of James St. and Riverside Dr. that contains readily accessible climbable rungs/steps. Per NESC these climbing rungs/steps shall be equipped with barriers to inhibit climbing by unqualified persons or posted with appropriate safety signs. Refer to Figure 6 for further information.

4. Our team noted a few down guy strands which were left un-bonded to the MGN conductor. However, it should be noted that some other utility companies regularly leave guy conductors ungrounded by design. These should be investigated by National Grid and fixed to match the utility company guying and grounding standards.

NEC Compliance

1. The NEC outlines clearance requirements specifically applicable to the secondary service laterals to properties/buildings. It was observed that there are overhead secondary service laterals attached to buildings that do not meet current NEC clearance requirements.
   Secondary service laterals are required to be a minimum of three feet from windows, doors, porches, balconies, ladders, stairs, fire escapes, or similar locations.
   That being said, the overhead secondary service laterals in violations will be very difficult to adjust to be within compliance. It appears the only modification that will allow these laterals to be in compliance is a transition to an underground secondary service lateral. Refer to Figure 7 and Figure 8 for further information.

HVPA Compliance

As noted earlier, the HVPA does not apply to the construction, reconstruction, operations, and maintenance of overhead electrical supply conductors, their supporting structures, and associated equipment by *an authorized/qualified electrical worker*. That being said National Grid is generally exempt from compliance with the HVPA, as their workers are almost exclusively Union trained IBEW workers or internally trained and certified high line workers.

Since the HVPA is not technically applicable to National Grid, it is difficult for our team to provide an engineering code compliance analysis. However, our casual observations from the standpoint of an affected building owner are bulleted below:

- It was observed during our site visit that there are a few instances in which the existing overhead supply facilities would create difficulties for property owners to maintain their properties without having to employ certified & trained workers. The one block section of James St. as well as the section of Riverside Dr. from James St. to John St. contains buildings that are close to being within the 10 foot setback of high voltage conductors as outlined within the HVPA. Specifically, property owners would likely find it difficult to maintain the higher portions of their buildings while using scaffolding, a scissor lift or similar bucket lift type equipment. Refer to Figure 2, Figure 3, and Figure 4 for additional information.

- Firefighting and rescue operations along the area in question may also be difficult and potentially pose a safety concern, depending on the firefighting and rescue equipment needed.

- Our site observations noted that National Grid has installed some form of 'Tree Wire' in select areas along James St and Riverside Dr. Tree wire, while not required by code, provides an extra level of fault protection and if lucky, accidental shock protection. While not officially recognized by any code body as being "insulated", it does provide a small level of increased safety due to the multi-layer 15kV XLPE insulation that is installed around the conductor.

Conclusion:

Our evaluation of the National Grid electrical infrastructure in the Village of Clayton was performed from an engineering and code related perspective only. Our goal was to evaluate the existing infrastructure and determine if it was generally compliant with the applicable code bodies regulating the installation of this type of electrical infrastructure.

Any code violations or inconsistencies that were observed were noted within the report. These items should be further evaluated by National Grid and corrected, if applicable.

In conclusion, we feel that underground medium voltage electrical facilities would be a safer and more reliable solution for power distribution throughout the area in question. It goes without saying, that an underground solution would also offer a more aesthetic installation and eliminate the non-trained worker restrictions imposed by the HVPA.

FIGURE #1

FIGURE #2

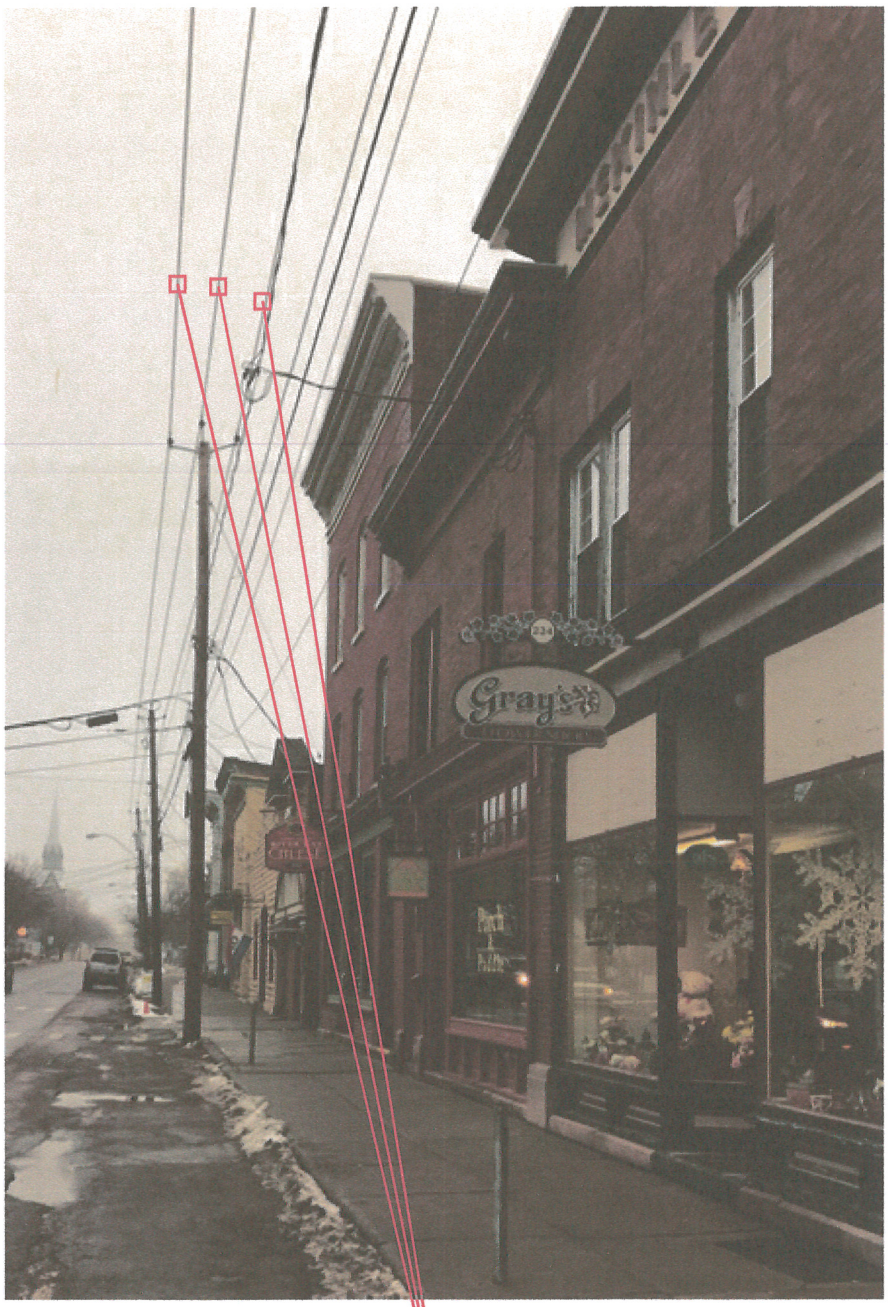


FIGURE #3

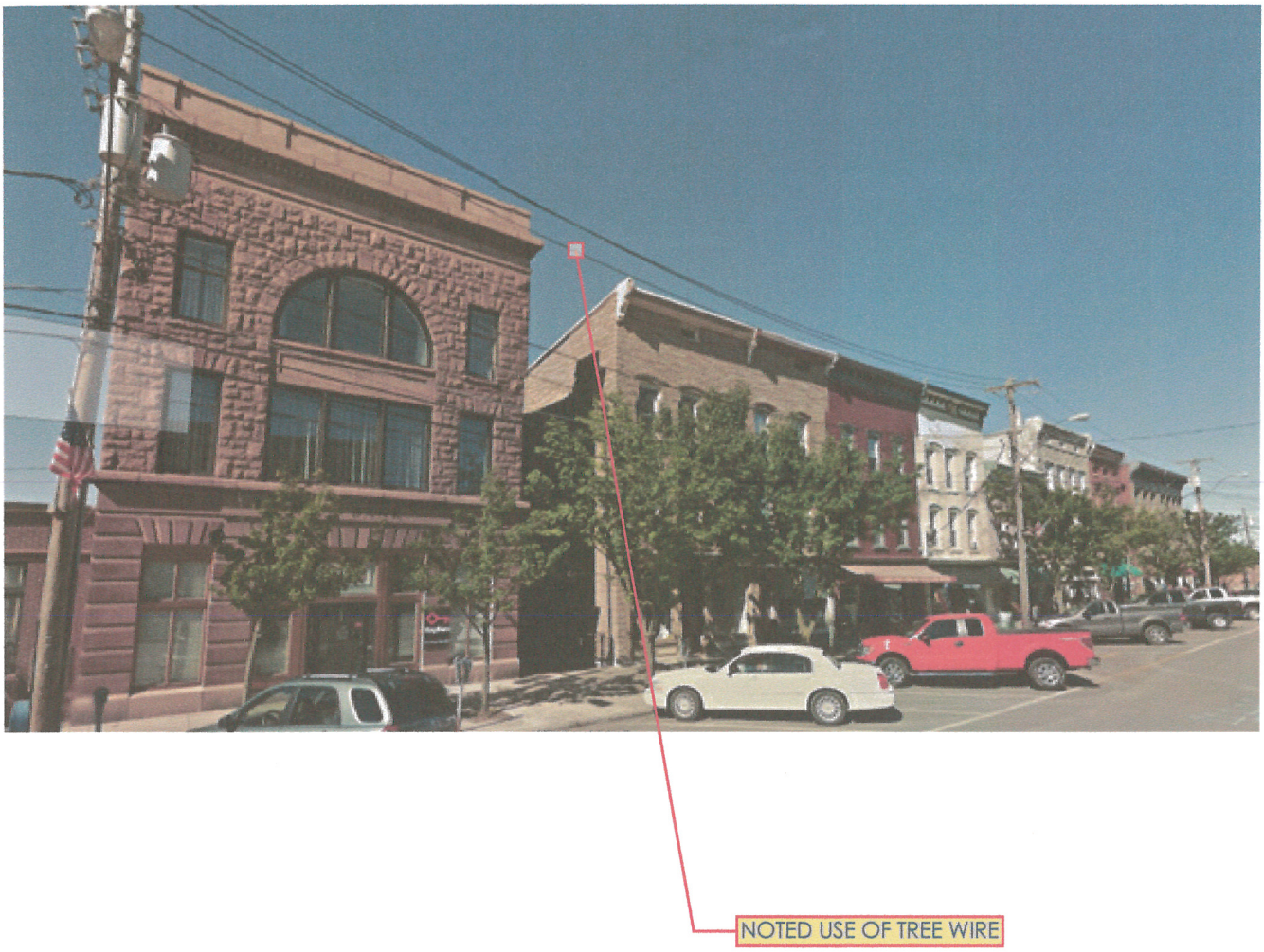


FIGURE #4

FIGURE #5

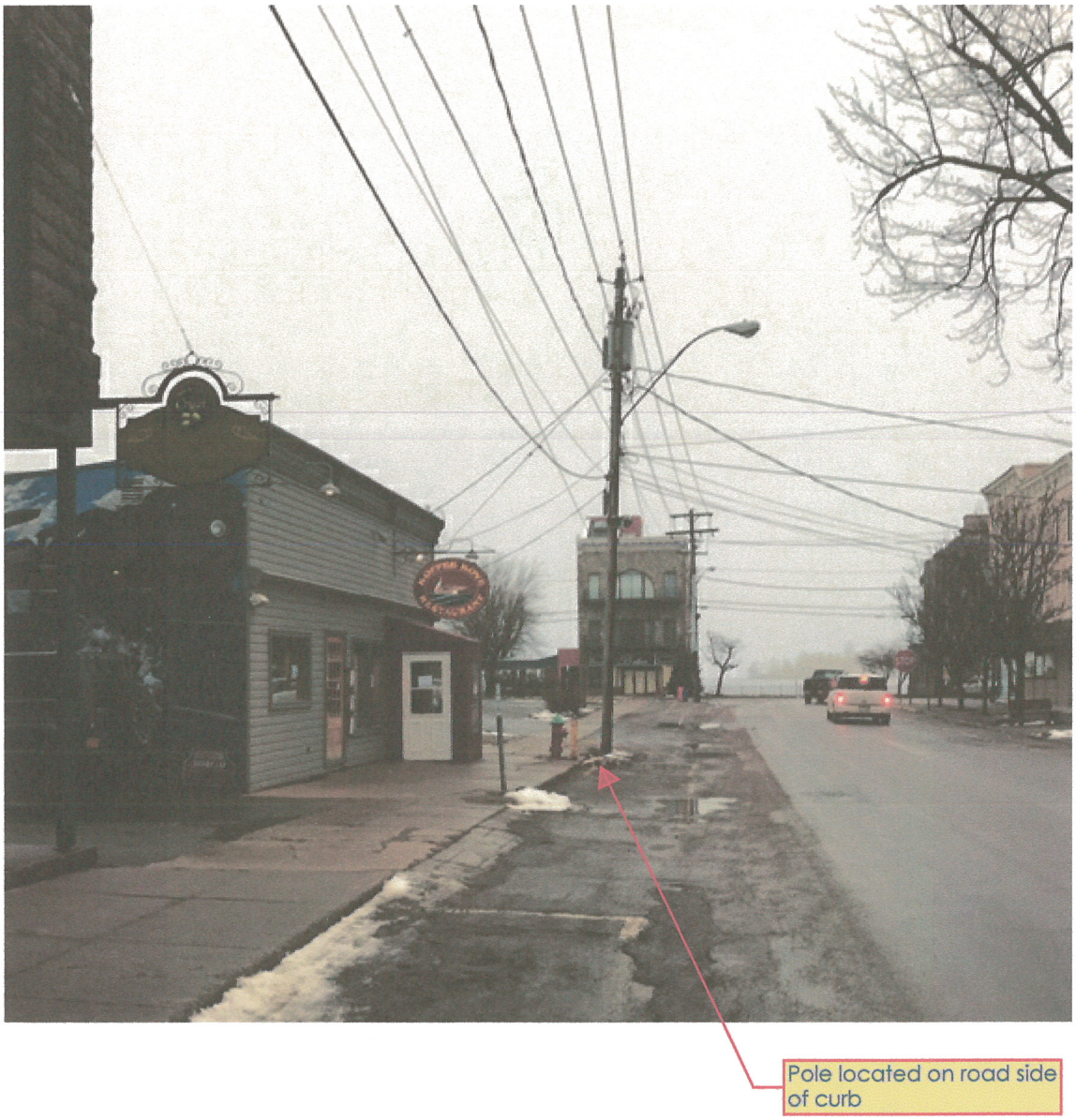


FIGURE #6

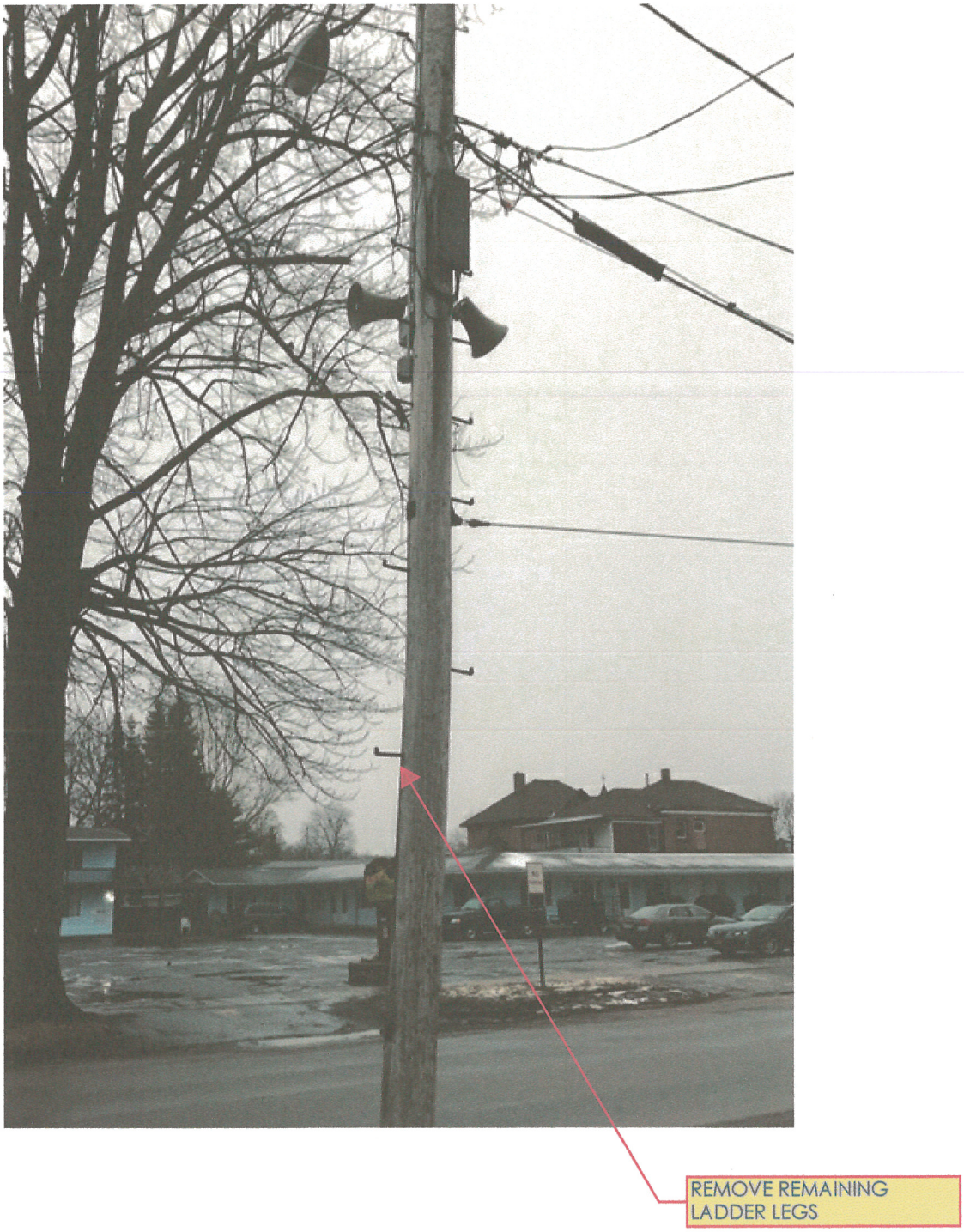
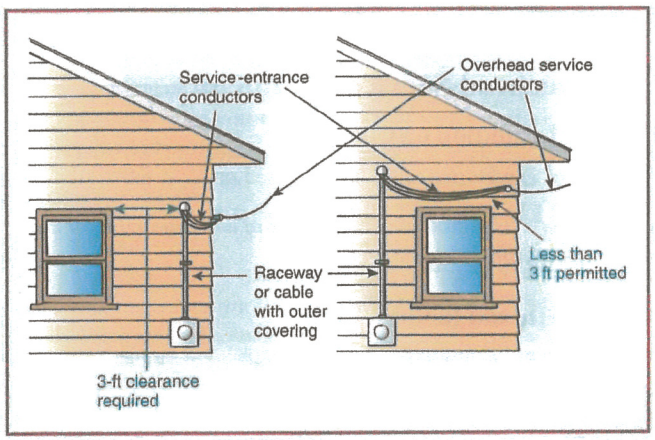


FIGURE #7A



NEC A.230

EXHIBIT 230.17 *Required dimensions for service conductors located alongside a window (left) and overhead service conductors above the top edge of a window designed to be opened (right).*

FIGURE #7

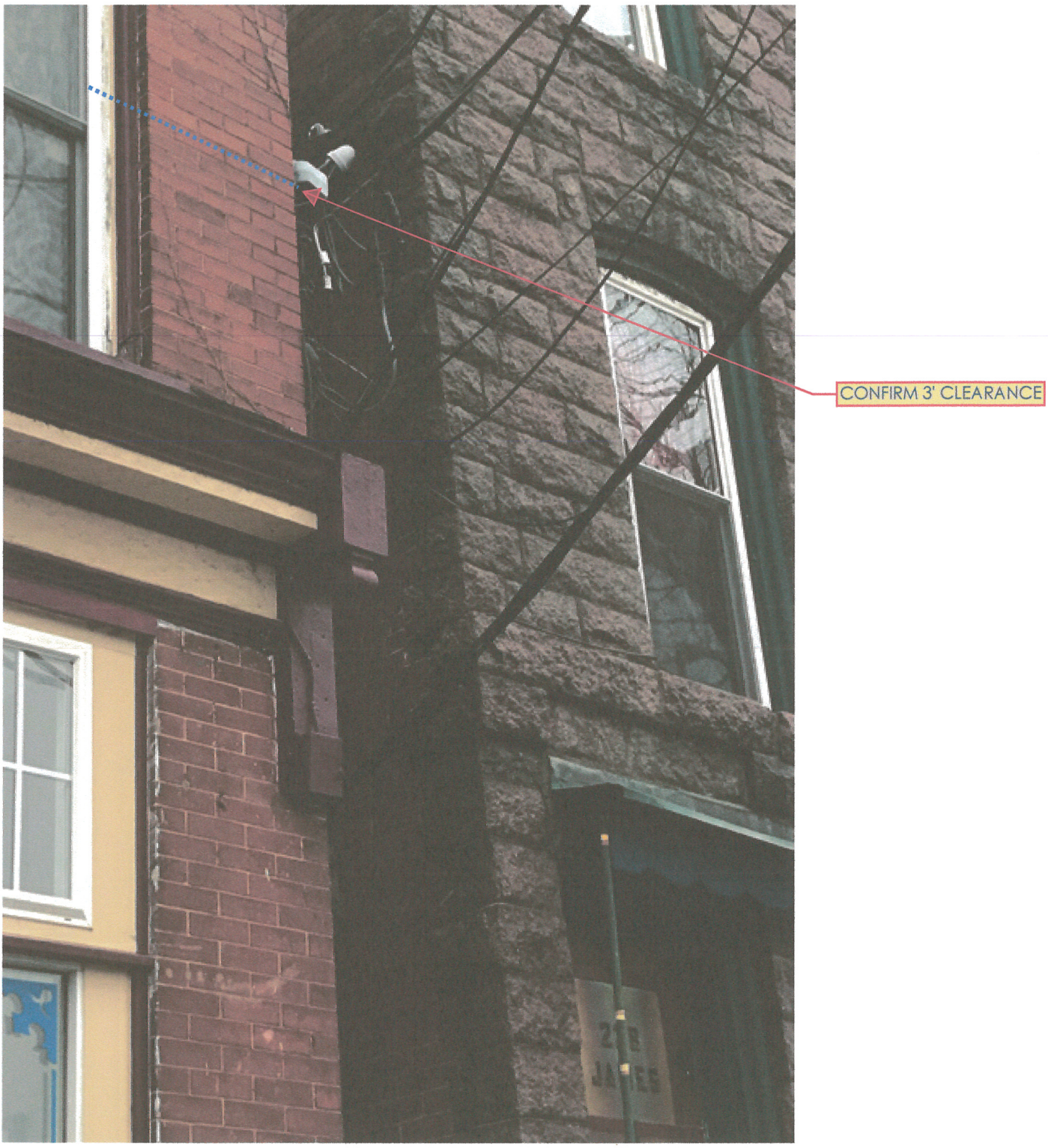



FIGURE #8