

MEMORANDUM

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TO: UTILITIES ADVISORY COMMISSION

FROM: UTILITIES DEPARTMENT

DATE: AUGUST 1, 2018

SUBJECT: Staff Request for Direction and Feedback on Utility Rules and Regulations Requiring Pad-mounted Equipment in all Underground Electric Construction, Including Green Acres

REQUEST

Staff seeks Utilities Advisory Commission direction and feedback on Utility Rules and Regulations requiring pad-mounted equipment in all new underground electric construction, including new or rebuilt underground districts.

EXECUTIVE SUMMARY

Underground Utility District 15 (UUD 15), the area bounded by Arastradero Road, Pomona Avenue, Glenbrook Drive, and Los Palos Avenue (also known as “Green Acres I”), was constructed and completed in 1973. After almost 45 years of service in order to maintain reliability of the electric system, City of Palo Alto’s Utilities Department (CPAU) needs to replace the transformers and cables, and bring the system up to CPAU’s current design standards. In 1973 UUD 15 was constructed using all subsurface equipment in concrete vaults. The current standard for underground construction is to install pad-mounted equipment (above ground equipment sitting on a concrete pad) with only the cables installed below ground. This design aligns with CPAU’s responsibility to build a safe, reliable, and cost effective electric system that will minimize the risk of injuries and outages, and keep electric rates as low as possible. The proposed design using pad-mounted equipment has prompted resistance from the residents in Green Acres I, who have expressed concerns over aesthetics, safety and property values. CPAU engineering staff prepared this memorandum to address these concerns and explain the various safety, reliability and cost factors which support adherence to the City’s current rule requiring all new equipment in areas with underground electric facilities be pad-mounted, unless doing so is infeasible or impractical.

BACKGROUND

CPAU started undergrounding overhead utility lines in the mid 1960’s and has completed 43 underground districts throughout the city. Underground districts are created under one of three

categories as described in City of Palo Alto Rule and Regulation 17 – Conversion of Electric and Communication Facilities to Underground (RR 17): Section B: Areas of General Public Interest and Benefit; Section C: Areas Primarily of Local Public Benefit; or Section D: Areas of Insufficient Public Benefit to Qualify Under Section B or C. Each section defines the extent of CPAU’s financial contribution to the project. UUD 15 was established under Section C - Areas Primarily of Local Public Benefit. In these situations there is cost sharing between the city and the residents of the underground district. At that time the costs were split 25/75 between the property owners and the city, whereas currently the cost split under RR 17 is 50/50 between the property owners and the city.

CPAU staff not only develops new underground districts but, because of the limited life expectancy of equipment, proactively rebuilds older districts to minimize the risk of unplanned outages. This rebuild program aligns with CPAU’s 2018 Strategic Plan for a proactive infrastructure replacement program, based on planned replacement before failure to support reliability and resiliency (Priority 4, Strategy 1). The 45-year old infrastructure of UUD 15 has been identified by CPAU as in need of replacement due to the age of the equipment. The expected longevity for subsurface equipment is approximately 15 years for transformers, and 35-40 years for high voltage cable. Though the equipment in UUD 15 has proven reliable over the years and exceeded the longevity expectations, the probability of failure increases over time passed beyond the facilities’ expected life. Waiting for the facilities to start to fail carries risk, because engineering experience is that when a system of this age begins to have failures, they come in multiple occurrences; typically a failing system will not have just one outage. The design prepared by CPAU for the rebuild used pad-mounted equipment and aligns with current design and construction industry standards. The rebuild would consist of eight (8) pad-mounted transformers serving approximately 100 residences. This design follows past residential underground district rebuilds, namely Underground Districts 6 and 7 rebuilds, where pad-mounted equipment replaced the original subsurface equipment.

In March of 2018 the electric utility reached out to the residents of Green Acres I by letter to inform them of proposed work to rebuild the electrical equipment in UUD 15. The reaction from the residents prompted staff to postpone the work in order to communicate with residents about the need and necessity of the work, as well as evaluate alternatives.

After the initial letter there was an impromptu meeting with a few home owners from Green Acres I and CPAU staff to explain the proposed work and why the rebuild required a different design from the current configuration. After that meeting there were follow up questions from the residents and in order to ensure that the CPAU could reach all the residents of UUD 15, staff held a community meeting on April, 25 2018.

DISCUSSION

At the time UUD 15 was constructed, subsurface equipment was the standard equipment type installed by CPAU. In 1996, staff presented information to the UAC and Council requesting that for safety, reliability, and cost reasons, pad-mounted equipment should be the standard installation for all new underground construction. In April 1996, Council approved Resolution

7580 requiring the above ground location of pad-mounted equipment for new underground electric facilities. Section B(3) of City of Palo Alto Rule and Regulation 3 (Description of Utility Services) sets forth the pad-mount standards and requirements, specifically that “All new equipment in underground areas required to provide electric service to a customer shall be pad-mounted.” The Utilities Director may authorize an exception to this requirement in cases where pad-mounted equipment is not feasible or practical, and in those situations the customer would be responsible for additional costs related to sub-surface construction, in the form of a Special Facilities fee.

The justification for pad-mounted equipment presented back in 1996 still applies today. Pad-mounted equipment is the industry standard for underground construction. Utilities that installed subsurface equipment in the past are replacing it with pad-mounts when they can, and new installations are all pad-mounted unless there are extenuating circumstances, such as when there is no physical space for pad-mount equipment, e.g. the downtown University and Cal Avenue area that has zero lot line building construction and would require pad-mounted equipment to be installed in alleys, sidewalks or streets obstructing pedestrians and vehicles.

It should be noted that in the 1996 recommendation to require pad-mounted equipment for future installations, the staff report noted that “The Electric Utility does not plan to retrofit existing residential underground districts”. However, as equipment standards have evolved since 1996, current functional and safety requirements cannot be met by simply reusing existing vaults in the Green Acres I neighborhood. Putting aside the safety and reliability justification for pad-mounted equipment, CPAU’s current construction and safety standards require installing just one piece of equipment in a vault; multiple pieces of equipment in a single vault results in reduced clearances and increases the chances of misoperation of the equipment. As a result, in the Green Acres I neighborhood, simply maintaining the existing load serving capacity would still require extensive subsurface construction, because the transformers have to be located in separate vaults from the secondary connections. Staff is exploring one option to minimize the number of pad-mounts, which would use the existing vaults, if appropriately sized, for the secondary connections and place just the transformers above ground.

Comparison of Subsurface and Pad-mounted Equipment

Safety:

The most important reason for the utility change from subsurface to pad-mounted equipment is the worker safety. Subsurface equipment is installed in below ground vaults, often with openings only large enough to allow access by workers. This creates a confined space with limited room to work or, in the unfortunate event of a subsurface transformer or connector failure, quickly exit the vault. Transformers in vaults typically run hotter due to the limited ventilation and the hot oil in the transformer along with the nature of confined spaces would result in serious consequences to workers and even members of the public. The use of pad-mounted equipment, when there is sufficient space to safely install it, eliminates the confined space aspect increasing worker and public safety.

Reliability:

The use of subsurface equipment creates complications not associated with pad-mounted equipment. Vaults that hold subsurface transformers tend to accumulate water and run off which include oils, pesticides and general debris that effect the transformers in a multitude of ways. Oils and corrosives attack the metal shell of the transformer while debris creates an additional layer of insulation preventing heat to escape the equipment. Excessive temperature resulting from an inability for the transformer to shed the heat will result in premature transformer failure. In comparison, pad-mounted equipment does not suffer from cooling issues as it is always exposed to ambient air flow unlike the subsurface equipment. Pad-mounted equipment is also less susceptible to water intrusion and contaminants.

Purchase and Maintenance Costs:

Pad-mounted equipment has a lower purchase cost compared to subsurface equipment. When comparing the proposed design for UUD 15, subsurface transformers cost 31% more than the comparable pad-mounted transformers. The cost difference is not limited to just the equipment cost. The installation of subsurface equipment also impacts other construction costs and a comparison to the estimated cost of the project designed with subsurface equipment is 70% more than the design with pad-mounted equipment.

All facilities require inspection and maintenance. CPAU follows the prescribed timelines listed in California Public Utilities Commission General Order 165 to schedule and complete inspections on equipment. Pad-mounted equipment must have a detailed inspection every 5 years, whereas subsurface equipment is required to have a detailed inspection every 3 years. The life expectancy of pad-mounted equipment is typically twice the life of subsurface, reducing future replacement costs.

Capacity and System Flexibility:

Pad-mounted equipment can be upgraded to increase capacity quicker and easier than subsurface because the concrete pad that CPAU specifies is designed to support different transformer designs that are used for residential distribution. The vaults that are used to house subsurface transformers may not be capable of supporting upgraded transformers without the need to replace the vault which is an expensive, time consuming and labor intensive process.

Subsurface distribution design does not allow the same system flexibility as pad-mounted equipment. Pad-mounted equipment can be installed and designed with switches that can isolate parts of the circuit. This design capability provides CPAU the ability to reduce the amount of equipment installed, as a separate switch is not necessary, and to isolate sections of the circuit, minimizing affected customers during planned and unplanned outages.

POLICY ALTERNATIVE

If the UAC recommends a change from the current Rule and directs staff to present Council with the option to allow subsurface equipment when rebuilding underground districts, a variety of administrative and logistical impacts would need to be addressed, in addition to the issues described above. The first issue would be how to collect the additional cost of the subsurface

equipment. If equipment in UUD 15 is placed completely underground, then a Special Facilities fee, as described in Rule and Regulation 20¹, would apply. , With an equal allocation to each owner in the underground district, the cost to install subsurface equipment in UUD 15 is currently estimated at \$3,500 for each residence. Logistically, a method will need to be determined for collecting the fee, and addressing situations in which some owners would not want to pay the extra cost of subsurface equipment.

Secondly, continuing to support a subsurface configuration for the neighborhood could affect reliability, resulting in larger and long outages for residents during an outage, either planned or unplanned. The neighborhood has to date experienced a very high level of reliability; however this cannot be assured in the future if pad-mounts are not permitted. The subsurface equipment, as described earlier, does not allow the same system flexibility as pad-mounted equipment.

NEXT STEPS

After receiving the UAC's feedback, staff would proceed on one of two paths. Affirmation of the City's current Rule requiring pad-mounted equipment for new underground construction would allow staff to complete the design and construction of the UUD 15 rebuild project, with a projected completion date of 2019. Additional resident communication and work to maximize visual screening of the equipment will be a priority, along with continued assessment of the aforementioned option to use the existing vaults for the secondary connections thereby minimizing the number of pad-mounts. Alternatively, if the UAC recommends revising current policy, staff will take the UAC's recommendation to Council, which could result in the implementation of the Special Facilities fee and a delay in the project completion date. A revised schedule will be set once an approval process is determined.

RESOURCE IMPACT

Affirmation of the current Rule would reduce CPAU's electric operations and maintenance costs by installing equipment with a longer lifespan, better reliability, reduced inspection intervals, and lower installation and maintenance costs. The resource impact of the alternative option would depend on the allocation of the incremental installation and maintenance costs, and the costs of creating a system to administer and allocate the expense of proceeding with subsurface equipment in Green Acres I.

POLICY IMPLICATIONS

There is no recommendation for policy change. Rule and Regulations 3 states that "All new equipment in underground areas required to provide electric service to a customer shall be pad-mounted." The only exception that allows for subsurface equipment is when, in the

¹ Rules and Regulation 20, Section J, 1. "Special Facilities are facilities requested by an Applicant in addition to or in substitution for standard facilities which CPAU would normally provide."

Utilities Director's opinion it would not be feasible or practical, or in locations with limited access. UUD 15 does not fit the criteria for an exception to the pad-mount requirement.

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