Project Memorandum

SKYLINE ENGINEERING LLC

Date: 2-21-17
To: Aaron Baker, Good Samaritan
From: James Stampe, PE

Project: Good Samaritan Elderly Housing - Rapid City, SD
Project No.: Skyline Engineering, #16034

Re: Master Metering – Support for Application for Variance

A. This facility, according to SD codified law 20:10:26:03, individual metering is required. The law requires individual gas and electric metering for each tenant of a Multiple-Occupancy building. SD codified law 20:10:26:04 provides conditions in which individual metering is not required.

B. This objective of this memo is to demonstrate why Master Metering within this affordable housing facility for the elderly is in the best interest of all parties. The project objective is to provide affordable housing to the elderly. Affordable housing is directly related to the initial cost of the project. Construction with individual metering circumvents the "affordable" objectives. Master metering provides significant efficiency and resultant cost advantages to all parties.

C. The project design/parameters –
   1. Common utilities costs are anticipated to be allocated per the standard practices of the Good Samaritan Society. This approach uses master metering.
   2. The project includes 50 units of elderly housing and contains significant areas of common use. Hence a significant level of common areas will utilize "common" metering. Utility cost allocation is required to support the common spaces.
   3. For efficiency and maintenance reasons, central gas-fired water heating has been utilized. Hence some level of "common" metering and utilities allocation is required. This affects both gas and electricity utilities.
   4. For efficiency and maintenance reasons, central laundry facilities have been utilized. Hence some level of "common" metering and utilities allocation is required. Both gas and electricity driven.
   5. For efficiency reasons, a common water service entrance has been utilized. Hence some level of "common" metering and utilities allocation is required.

D. We note these specific items in which individual metering is not required:
   1. For facilities of a transient nature. This elderly housing facility could be considered transient.
   2. For existing buildings in which conversion to individual metering is not economically feasible. While this is not an existing building, individual metering is not feasible and does not support the project objectives.
   3. Individual metering is not required for facilities using central ventilation systems. This facility is using common HVAC for corridors, stairwells, and a significant quantity of common spaces, such as laundry and lunchroom services.
   4. Individual metering is not required for facilities using central water heating. This facility is using central water heating.

E. **With specific regard to gas utilities -** The design uses central water heating on the ground floor. This is an allowed exception. Gas is not used in each apartment.

F. **With specific regard to the Electrical Utilities** – For efficiency, physical and aesthetic reasons, a master metering design is the directive from the Good Samaritan Society.

1. **As designed;** the power risers and panels are able to be significantly reduces in size due to the allowance demand factors which may be applied to feeders and services as outlined in the *National Electric Code*, NEC table 220.84. This can only be applied if the power equipment and feeders provide power to multiple units – which is not possible with individually metered units. As an example, a demand factor of 75% means the breakers are 25% smaller and the feeders are 25% smaller.
    i. Specific application to this project -
        1. The panels and their associated feeders provide power to multiple living units. As such, the demand factor applies.
        2. As designed, the feeders and breakers demand factors range from 38% to s 45%.
        3. In addition, as a result of combining the unit laterals, the number of breakers and size of feeders are significantly less. In addition, the available fault current specifications on each unit panel are much less – resulting in the use of a less expensive "loadcenter".
        4. The use of common panels and feeders results in significantly less building materials and less expensive materials as well. The quantity of steel and copper for the electrical system is 30-40% less. In fact, the designed risers combined are 2400 amps as opposed to a little over 6000 amps that would be required by individual living unit feeders 200 amps or 125 amps.

2. **Under and individual metering design**:
    i. Each of the 50 living units would be metered at the grade level and a dedicated feeder required to each living unit panel. Each panel is 125 amps or 200 amps per the connected loads. This would require a combined electrical capacity of a little over 6000 amps in feeders if the design used individual living unit feeders of 125 amps.
    ii. The risers associated cannot use any diversity since the feeder is required to go directly from the living unit meter to the living unit panelboard.
    iii. The loadcenters in each living unit may need to be revised to panelboards to brace the increased fault current – more copper lets through more fault current. That will make arc-fault breaker and GFCI breakers MUCH more expensive.
    iv. Since meters come in 100 and 200 amp frames without anything between, each unit would require a 200 amp meter. In total, 51 Meters would be required. Fifty meters for the units and one for the common/house power.
    v. Physical limitations will nearly prevent the installation of an individual meters and feeders within this building.
        1. First, the meter array(s)
            a. A meter array is typically 4 meters high (maximum height), 12" each meter for a total meter array height of 48" high. Typically a meter is 18"-24" wide. The total array size would be approximately 4 ft high x 21 ft long plus the mains in the array (each about 24" wide and we would not have less than 3). **Total about 4ft x 27 ft long.** Not a desired result.
        2. Second, the feeder's space through the corridor. Due to the living units construction, all feeders would need to rough through the corridor ceilings. We believe this would result in the entire building needing to be raised by at least 3ft.

G. A comparative analysis was performed by an electrical contractor for a relatively recent project that was nearly identical to this facility. The analysis determined the cost difference between the two design solutions described above. The analysis indicated the cost difference for these two solutions would be approximately $161,000. In perspective, individual metering would result in this facility's

electrical construction costing at least 1/3 more. As such, individual metering does not seem feasible and certainly is not efficient.

H. In addition, individual metering would increase the cost of the electricity to the tenants for the same quantity of electricity. This is because each tenant would be required to pay a meter charge, every month. This is certainly not an objective of the project.

I. In conclusion, common metering is already required for several of the utilities. The use of a common meter complies with the physical limitations of the design and supports the economical objectives for affordable housing. The use of a common electricity meter for this facility allows for significantly less construction materials and is significantly less expensive, thus resulting in Affordable Elderly Housing.

J. Questions regarding this memo may be directed to Jamie Stampe, PE.

End of memo.