Summary

Applicability: Each utility must be metered at each building. UNL buildings may use utilities provided from the central campus utility systems, municipal providers, or a combination of the two. All meters must be connected to the UNL BAS.

Applicable Utilities: For purposes of these Guidelines, "utilities" include electricity, steam and/or steam condensate, chilled water, natural gas and potable water. In some situations, a building may use heating water produced in a different UNL building, and that too shall be metered according to this section. Where landscape irrigation systems are served from a building potable water system, a deduct water submeter is required.

Submeters: Some UNL buildings serve spaces occupied by separate administrative units or even non-UNL entities. In those cases, submeters must be provided to correctly apportion utility costs among the various entities. Submeters may also be required as part of LEED certification, or to separate intended uses (eg: potable water vs. irrigation).

Sizing, Design and Installation: The AE determines design loads for each utility and provides that information to the utility provider which will be UNL Utility and Energy Management (UEM) or a municipal utility, which then selects the meter(s), and provides the AE with that selection information for final design. Meter costs are included in the total project construction costs.

Details

General Requirement: Each utility shall be metered at each building or facility. When electricity is provided to the building at several voltages, each voltage is considered a separate utility requiring its own meter.

Meter Location, Number and Type

- *Building with no Auxiliary Enterprise*: There shall be a single meter at the service entrance of each utility serving the building.
- *Building Housing Auxiliary Enterprises*: A separate meter shall be installed for each utility serving each enterprise, as well as meters for each utility serving any non-auxiliary enterprise portion of the building. When specifically permitted by UEM, the entire building may be metered by master meters for each utility, with individual meters for each auxiliary enterprise serving as deduct submeters.
- *Submeters*: UEM may require submeters for utilities that serve specific portions of a building or specific purposes within a building. Such direction be provided at or before the schematic design stage.
- *Meter Accessibility*: Each meter shall be located and oriented so that it can be read by a person standing on the floor. Make sure that all parts of the meter are accessible for connection, adjustment, calibration and repair.

Meter Selection and Provision: Each meter be selected by the particular utility provider. When buildings are served directly from a municipal electric, water or natural gas provider, their design procedures shall be followed. In all other cases, UNL is the utility provider and these procedures shall be followed:

(1) The designer shall determine maximum design flow or demand for each utility. This shall be done no later than the design document stage.

(2) UEM selects the meter and notifies the designer of what meter will be used.

(3) The designer shall incorporate selected meters, along with appropriate piping and wiring drawings, into the 95% review documents.

(4) UEM purchases the selected meters and provides them to the contractor for installation.

(5) The cost of each meter is assessed against the project.

Meter Outputs. Each meter shall have a local display showing instantaneous and/or total values in digital form. In addition, each meter shall be connected to the UNL Building Automation System (BAS). Meter outputs are transmitted to the BAS using low-voltage analog signals, switch (pulse) closures or digitally, depending on the meter. In some cases, low-voltage AC or DC power to the meter may also be transmitted in the same cables or the same conduit.

Connection to BAS. The 95% drawings shall include continuous conduit paths from each meter connection point to the UNL BAS. When possible, meters provided by a municipal utility shall include a connection for use by the BAS. If this is not possible, then an additional meter, selected by UEM, shall be installed to provide that connection.

Electric Meters

(1) Buildings Served by UNL, General Requirements:

a. Meter socket will be provided as part of the Project. Meter will be furnished and installed by UNL.
b. For all electrical services provide a 20 amp rated, instrument transformer type meter socket with integral test switch and with current transformers.
c. Meter sockets shall be installed outside of the building. It is UNL preference that the meter socket be installed directly onto the service transformer enclosure. Where not possible to install onto the transformer, meter socket shall be mounted on the building exterior and a CT cabinet shall be provided.
d. Panel Mounted Meter: In addition to the main electric meter described above, the Project shall provide a second meter integral to the building main distribution panel, switchboard or switchgear.

Natural Gas Meters

Buildings Served by UNL, meter requirements be based on the meter selected by UNL. In general, gas meters have minimal straight run requirements. Install a 4”x4” electrical box (weatherproof if outside) within 36” of meter for connection to the BAS.

Building Served by Municipal Natural Gas Utility Provider: UNL obtain an output signal from the municipal meter. Install a 4”x4” weatherproof box within 36” of the municipal meter location. A reliable switch closure signal, scaled to a specific gas volume, is required. Generally, this requires a rotary meter. If a diaphragm meter is selected, the pulse must be generated by an electronic register intended for that purpose.

Thermal (BTU) Meters for Chilled and Heating Water

Flow Meter, meter loop: The meter shall be installed in a separate pipe loop, parallel to the supply, as near the building service entrance as possible and ahead of any branches. Provide manual valves (normally open) to isolate the meter loop at both ends, and a bypass valve (normally closed) in the supply main parallel to the meter.

Flow Meter, diameter: Design for a fluid velocity between 15 and 25 ft/sec at the metering point under full flow conditions. This may require reducing the pipe diameter in the meter loop.

Flow Meter, straight pipe: The meter loop shall provide straight, unobstructed pipe for at least 10 pipe diameters upstream and 5 pipe diameters downstream of the meter.

Temperature Sensors: Install a pair of RTD thermowells (provided by UNL) for temperature measurement in the supply and another pair in the return pipe. Locate these as near the building service entrance and exit as possible. RTD wells are 4" long and installed in ½" thread-o-lets or tees.

Pressure Sensors: Install ½" pipe taps with ball valves, located as near the building service entrance and exit as possible, for installation of pressure sensors.

Note the conduit path to the BAS must be sized large enough to carry low-voltage output signals from the flow meter, three temperature sensors, two pressure sensors, and low-voltage power supply to the flow meter.

See Drawing XX-XX-XX for a schematic diagram of the required components.

Steam Meters

Steam Meter, general: Metering of live steam is usually not required except when processes within the building utilize steam without returning it as condensate. UEM will determine, no later than design document stage, if steam metering is required. When required, the AE shall consult directly with UEM to determine the correct meter.

(Steam) Condensate Meters

Condensate Meter: This shall be installed downstream of all condensate receivers, and as near the building service exit as possible (after all branches have joined together). Design for the minimum meter size that exceeds the total capacity of the condensate pumps.

Flow Meter, meter loop: The meter shall be installed in a separate pipe loop, parallel to the condensate return, as near the building service exit as possible and after any branches. Provide manual valves (normally open) to isolate the meter loop at both ends, and a bypass valve (normally closed) in the return main parallel to the meter.

Flow Meter, straight run: Provide the same straight pipe and bypass requirements as for thermal meters (above). In addition, piping must be designed so the meter is always completely flooded. An extra check valve shall be provided at the beginning of the straight pipe to prevent backflow. Tees with full-port ball valves (capped) shall be provided at both ends of the straight pipe for calibration purposes.

See Drawing XX-XX-XX for a schematic diagram of the required components.

Potable Water Meters

Water Meter: This shall be installed as near as possible to the building service entrance, after the backflow preventers but before any unmetered takeoffs. Isolation valves (normally open) shall be provided both upstream and downstream.

UNL-provided water, straight run: Provide straight pipe of the same diameter as the meter, extending at least 5 pipe diameters upstream and 3 pipe diameters downstream of the meter, with no valves, elbows, tees, or other devices which could disrupt uniform fluid flow.

Submeters: When there are significant water uses which do not return water to the sanitary sewer system (such as irrigation or process use), additional deduct sub meters be required at the

point(s) of service. UEM will determine whether and where these additional water meters are required no later than design document stage.

Fire Service: A separate meter is not required.