

Exhibit 3 Sizing and Selection of Water Meters

Intent: This standard is intended to be used as a guideline in sizing and selecting water meters for all services connected to systems owned and/or operated by the City of Savannah. Although, this standard will not cover every situation which may be encountered in the sizing and selecting of water service meters, it is applicable to the majority of installations within the areas served by the City of Savannah. This guide is not intended to preclude the knowledge and experience of the engineer, nor does it relieve the engineer from the responsibility to use good engineering practice in sizing and selecting of water service meters. However, where a valid engineering basis cannot be provided to show just cause to vary from this guide, it shall be used as the criteria for design. Design engineers are requested to refer to AWWA Manuals M6 and M22 and AWWA Standards C700, C701, and C702.

Basis: The basis for this guide is taken from the above references.

The Safe Maximum Operating Capacity given in AWWA C700 (Table 1) was used directly as the “Maximum Operational Limit” for each given size of positive displacement meter.

The Minimum Adjusted Average Daily Flow has been set as a minimum of 15 percent of the “Safe Maximum Operating Capacity” of Class II turbine meters as specified in AWWA C701.

The equation for determining “Adjusted Average Daily Flow” was developed to account for high peaks of limited duration.

Meter Sizing: Although, service lines may be sized to accommodate anticipated long term growth, service meters shall be sized for initial conditions plus a minimum of 12 months anticipated growth.

Meter Selection: Meters shall be selected on the basis of flow rate as follows:

Sustained Low Flows (Positive Displacement Meter)

- All single residential units including single family residences, duplexes, triplexes, quadraplexes, apartments, and condominiums with individual unit meters shall use a positive displacement meter.
- Use of positive displacement meters in other residential, commercial, industrial or institutional developments shall be limited by the “Maximum Operational Limit” for peak and/or average daily flow as shown below:

Maximum Operational Limit

Meter Size	Safe Maximum Operating Capacity (gpm)	Recommended Maximum Rate for Continuous Operation (gpm)
5/8”	20	10
1”	50	25
1 1/2”	100	50

Sustained High Flows (Turbine Meters)

- Use of turbine meters shall be reserved for sustained high flows and shall be limited by the following:

Minimum Adjusted Average Daily Flow (AADF)

Meter Size	Minimum Adjusted ADF (gpm)
1 ½"	30
2"	30
3"	113
4"	188
6"	375
8"	450

Adjusted Average Daily Flow (AADF) shall be calculated using the following equation:

$$\text{AADF (gpm)} = [\text{ADF (gpd)} - \text{ADF (gpm)} \times \text{Fp} \times 60 \times \text{n}] / 1440$$

Where: Fp = Peaking factor*

N = Total duration of peaking in a 24 hour period expressed in units of hrs / day.

*Minimum peaking factor shall be 3.0 unless specific information is available. Where peaking factor adjustment is desired, the engineer shall submit calculations and basis for adjustment for approval.

Example: A 250 unit apartment complex is to be served with a master meter. It has been determined that a 4" service and meter are required. Can a turbine meter be used?

Assume: Average daily flow = 300 gal/unit/day
Peak Flows occur 6:00 a.m. - 8:00 a.m and 5:00 p.m. - 8:00 p.m.

$$\text{ADF (gpd)} = 300 \text{ gal/unit/day} \times 250 \text{ units} = 75,000 \text{ gpd}$$

$$\text{ADF (gpm)} = 75,000 \text{ gpd} / 1440 = 52 \text{ gpm}$$

$$\text{Fp} = 3.0$$

$$\text{N} = 2 \text{ hrs (am)} + 3 \text{ hrs (pm)} = 5 \text{ hrs/day}$$

$$\begin{aligned} \text{AADF (gpm)} &= [75,000 \text{ gpd} - (52 \text{ gpm} \times 3 \times 60 \text{ min/hr} \times 5 \text{ hrs/day})] / 1440 \\ &= [75,000 \text{ gpd} - 46,800 \text{ gpd}] / 1440 \\ &= 19.6 \text{ gpm} \end{aligned}$$

Minimum adjusted average daily flow for a 4" turbine meter is 188 gpm. Therefore, a turbine meter cannot be used.

Intermediate and/or Variable Flows (Compound Meters)

- Applications with peak flow above the maximum operational limits given for positive displacement meters or below the minimum adjusted average daily flows for turbine meters shall require a compound meter.