EAST BAY MUNICIPAL UTILITY DISTRICT

DATE: July 16, 2026

MEMO TO: Board of Directors

THROUGH: Clifford C. Chan, General Manager CCC

FROM: Serge V. Terentieff, Director of Engineering and Construction SVT

SUBJECT: Peak Demand Methods for Water Meter Sizing

SUMMARY

On June 9, 2026, the Board adopted revisions to water and wastewater rates, charges, and fees not subject to Proposition 218 for Fiscal Year 2027, including proposed changes to Schedule M – Water Service Estimate Application Fees, to replace the current fee structure with fixed cost-based application fees to reflect current costs. During the public hearing on June 9, 2026, Director of Governmental Affairs for the Building Industry Association Lisa Vorderbrueggen provided a number of comments including questioning the District's method for sizing water service lines and meters and asking the District to adopt the California Plumbing Code Appendix M Water Demand Calculator (WDC) as a basis for meter sizing for townhome, condo and duet projects.

In response to this public comment, the Board requested additional information regarding methods for sizing water meters. This memorandum provides information on the methods used by the District to calculate peak demand for the purpose of water meter sizing.

DISCUSSION

Water meter and service line sizing prioritizes capacity, reliability, and long-term performance. Undersized water meters and service lines create risks of excessive pressure loss, mechanical wear, and premature meter failure.

The District sizes water meters based on estimated peak water demands that would be served by the water meter. For residential applications, indoor and outdoor (e.g., hose bibbs) peak demand estimates derived from plumbing fixture units combined with irrigation demands, where applicable, to determine the total peak demand required by the water meter. For non-residential applications, indoor and outdoor demand estimates derived from plumbing fixture units combined with irrigation demands and any process-related demands (e.g., specialized brewery process, syrup manufacturing process, aggregate washing process, etc.), where applicable, to determine the total peak demand required by the water meter.

To estimate peak demand for the plumbing fixtures, the District applies the Hunter's Curve method, as outlined in Appendix A of the California Plumbing Code (CPC). CPC Appendix A is based on the Uniform Plumbing Code and has been amended for state use. To determine meter size, the resulting total peak demand is compared with the flow capacity values provided in the District's Engineering Standard Practice (ESP) 521.2, Equivalent Meter Sizes that are consistent with American Water Works Association (AWWA) values.

The AWWA M22 *Sizing Water Service Lines and Meters* Manual (4th Edition, 2024) introduced alternate methods to estimate projected peak water demands that reflect modern plumbing fixture characteristics and observed usage patterns, including the WDC for residential applications and the Fixture Value Method for nonresidential applications.

In general, water meters are sized based on an estimation of peak flow for a building or premise. All estimation methods rely on underlying assumptions such as fixture flow rates, usage probabilities, and the likelihood of simultaneous fixture use. Regardless of whether a method is derived from a probability model or from empirical flow studies, the reported design flow is always defined as the 99^{th} percentile flow which represents the estimated demand level that exceeds only one percent of the time and serves as the basis for designing plumbing and water service systems.

Hunter's Curve (CPC Appendix A)

The Hunter's Curve method uses probability and usage patterns to reflect real-world conditions by accounting for the likelihood that multiple fixtures will be used at the same time, randomness of use, and average flow rates, making this method a reliable and widely used tool for sizing water supply systems. The method assigns each plumbing fixture a Water Supply Fixture Unit (WSFU) value, which represents its relative water demand and likelihood of simultaneous use. The number of each fixture type is multiplied by its corresponding WSFU value to determine the total fixture unit count for the building or premise, which is used to determine the peak flow.

Water Demand Calculator (CPC Appendix M)

The WDC was developed as an alternative to Hunter's Curve method and is included in the CPC as Appendix M. The WDC has been peer reviewed and field validated and is intended to provide a revised method for estimating peak flow, potentially supporting smaller plumbing and water heating system designs. The WDC applies the same probability-based modeling principles as Hunter's Curve method but with modern fixture flow rates, durations of fixture use, and probabilities of simultaneous operation. Inputs include fixture counts, customized or default fixture flow rates, and residence type. Certain parameters, such as a fixture's "probability of use" values, are derived from empirical data.

Effective July 1, 2024, the California Building Standards Commission approved the WDC for *voluntary* statewide use and incorporated it into the CPC as Appendix M. Nine other states have also adopted the WDC for voluntary use. Although the WDC is starting to be used in plumbing system design, it is important to distinguish between a building's internal plumbing system sizing

and the sizing of water service lines and water meters, which address different performance criteria. The WDC relies on assumptions such as fixture flow rates, usage probabilities, and likelihood of simultaneous fixture use which decrease with the addition of units. For the District, this peak demand estimation method results in smaller lateral and meter sizes, and potentially higher-pressure losses across these components and decreased service reliability.

Peer Agency Review

Staff conducted a survey of six Bay Area water agencies (Alameda County Water District, Contra Costa Water District, Dublin San Ramon Services District, Marin Municipal Water District, San Francisco Public Utilities Commission, and San Jose Water) and two large water agencies (Los Angeles Department of Water and Power, and Denver Water), which found that most agencies continue to rely on Hunter's Curve method for meter sizing. None of the eight agencies surveyed had adopted the WDC as their exclusive residential meter sizing method.

Conclusion

While plumbing system sizing using the WDC emphasizes efficiency and resource conservation, meter and service line sizing prioritize flow capacity, reliability, and system integrity. Under-sized components can result in excessive pressure losses, mechanical wear, or early failure, particularly when demand consistently exceeds a water meter’s capacity. For these reasons, the District continues to use the Hunter’s Curve method for estimating peak demand for water meter sizing.

Staff will continue to monitor practices for estimating peak demands for water meter sizing and review the engineering basis supporting those practices, including recommendations regarding potential applications, limitations, or implementation criteria that may help with alternative practices.

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