**ATTACHMENT A**

A RESOLUTION RECEIVING A REPORT FROM OWASA ON
INCREASING AVAILABILITY FEES
Resolution No. 168/2006-07

WHEREAS, at least one member of the Board of Aldermen has expressed an interest in the reasons behind increasing water and sewer availability fees, and

WHEREAS, OWASA personnel have provided a report explaining of these increases,

NOW THEREFORE BE IT RESOLVED that the Board of Aldermen do hereby receive the report.

OWASA

ORANGE WATER & SEWER AUTHORITY

*Quality Service Since 1977*

April 4, 2007

Mayor Mark Chilton and Members of the Board of Aldermen
Town of Carrboro
301 West Main Street
Carrboro, NC 27510

**SUBJECT: EXPLANATION OF OWASA'S PLANS TO INCREASE CONNECTION FEES FOR NEW CUSTOMERS**

Dear Mayor Chilton and Members of the Board of Aldermen:

I am writing to provide background information regarding OWASA's consideration of potential increases in the water and sewer service availability fees charged when a location is initially connected to the public water and/or sewer system. These and other potential modifications to our rates and fees are being considered as part of our ongoing comprehensive water and sewer rate study that is nearing completion. If approved by the OWASA Board of Directors, it is likely that the new rates would become effective October 1, 2007.

Availability fees are the one-time charges established by OWASA to recover the proportionate share of the cost of providing "backbone" (off-site) capital facilities. Typically, service availability fees apply to new development but they are also charged when an existing residence or other building is first connected to the OWASA system. Backbone facilities include raw water supplies and transmission mains; water treatment facilities; water pumping, storage and distribution facilities; wastewater collection and pumping facilities; and wastewater treatment and biosolids disposal facilities.

The backbone facilities of OWASA's water and sewer systems will have an estimated value of nearly $142 million and $173 million, respectively, upon completion of the five-year capital improvement program (CIP) from Fiscal Year 2008 through Fiscal Year 2012. This does not include the value of the sewer collector lines and water distribution lines that are typically installed and paid for by developers, and for which the costs are not recovered by the availability fees.

In developing the proposed service availability fees, the OWASA Board of Directors has considered two important policy questions:

1. To what extent should new customers be required to pay the cost of water and sewer infrastructure required to serve new development?

   *OWASA's Agreements of Sale and Purchase with the Town of Carrboro, Town of Chapel Hill, and The University of North Carolina specifically require OWASA to set rates and*

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*fees based on the cost-of-service principle; that is, customers are charged the full cost of the services and facilities that are required to meet their water and sewer needs.*

*Put simply, growth – rather than our existing customers – should pay for growth.*

2. What methodology should be used to ensure that growth pays for growth, and that new homes, businesses, institutions and other facilities pay their fair share of the cost of OWASA's backbone water and sewer facilities?

   *The proposed water and sewer availability fees are calculated by first determining the respective total values of the backbone facilities in the water and sewer systems upon completion of the five-year CIP, then establishing the total cost per unit of capacity that each system can support. The availability fee is based on the customer's expected demand, in gallons per day (based on the size of the meter serving the property or the square footage of the dwelling unit in the case of residential properties), multiplied by the unit capital cost of the water and/or sewer system.*

   *In calculating the fees, an allowance is made to ensure that the customers served by the new connections are not "double-charged" for the future debt service they will pay for those same facilities.*

   *The total value of the system is determined using the "Total Plant-in-Service" methodology, which is the replacement cost of the system backbone facilities less depreciation.*

OWASA's last comprehensive rate study was completed in 1998. Since that time, water and sewer availability fees have increased at the same percentages; however, our rate of spending for sewer system capital improvements has been much greater than for the water system (more than $93 million for sewer; nearly $54 million for water). This means that our sewer availability fees need to be increased substantially in accord with the cost-of-service rate principle, and at a much greater percentage compared to water availability fees (more than 40 percent vs. 11 percent). The increase now under consideration by OWASA reflects:

- ✓ The recent, more than $50 million expenditure for the upgrade and expansion of the Mason Farm Wastewater Treatment Plant now nearing completion. The project includes expanded capacity to meet the needs of planned growth of the service area; advanced treatment facilities for nutrient removal (to protect Jordan Lake); safer, more environmentally acceptable disinfection of effluent using ultraviolet light; major improvements to older facilities such as biosolids digesters; installation of a methane gas capture and use system; and increased reliability and odor elimination measures.
- ✓ More than $11 million in wastewater collection system rehabilitation and replacement projects completed in the last ten years.
- ✓ More than $28 million in sewer system improvements now underway or that will be under construction within the next five years.

We realize these fees contribute to the cost of new development, such as new housing (including affordable housing); schools; essential public facilities; University buildings; etc. However, to the extent that service availability fees are not increased, monthly water and sewer charges for existing customers will need to be further increased to pay for the water and sewer infrastructure improvements that are required to be available to serve new growth and development.

As you know, to address affordability concerns while still following cost-of-service rate-making requirements, in the late 1990s OWASA implemented a tiered schedule of availability fees for single family homes, whereby fees are increased as the size of the home increases. Enclosed for your information is a paper that describes that approach. The paper was written in 2000; however, the general overview of the purpose and approach of the methodology is still relevant.

OWASA is open to considering other cost-of-service based strategies for offsetting the impact of water and sewer availability fee increases on new customers while ensuring that growth pays for growth. One potential strategy that we have identified and will consider is the possible implementation of a system of "conservation credits" on the service availability fees for new buildings that are much more water-efficient compared to new buildings that simply comply with current plumbing code requirements. Such a credit would reflect the fact that the new, more efficient customer requires less capacity, and therefore less cost, to meet their projected water and sewer needs.

In follow-up to our presentations to local governing boards early in 2006, our staff has been working with the planning and building inspections staffs from Carrboro, Chapel Hill, and Orange County to discuss potential "water smart" building standards that could either be required as conditions of service and approval for new development in our community, or be the benchmark for qualifying for a conservation credit on availability fees, if such an approach is adopted in the future. We will provide you with further information and a conceptual proposal once the staff working group is further along in its evaluation of alternative conservation strategies for consideration by OWASA and the local governments.

We look forward to discussing this matter with you on April 10, 2007. As stated in my April 2, 2007 letter to Mayor Chilton, Chapel Hill Mayor Kevin Foy, and County Commissioner Chair Moses Carey, we also look forward to having the opportunity to meet with you in the near future to explain and discuss all of the key recommendations from the rate study.

Sincerely,

Mac Clarke, Chair
OWASA Board of Directors

Enclosure
c: Steve Stewart, Carrboro Town Manager (w/enclosure)
OWASA Board of Directors (w/enclosure)
Ed Kerwin, Executive Director (w/enclosure)

# Making Your Infrastructure Program Affordable: Service Availability Fees Based On Finished Area of New Homes

**Edward A. Holland, Planning Director**

**Ed Kerwin, Executive Director**

**Orange Water And Sewer Authority**
**Carrboro/Chapel Hill, NC**

## ABSTRACT

This paper describes the development of a tiered system of water and sewer service availability fees based on the finished area of single family homes.

Orange Water and Sewer Authority (OWASA) customer data exhibit a consistent pattern of increased average and seasonal water use with increasing home size, as indicated by building permit and utility billing records. Customers with more modest homes generally use less total water and exert a lower summer demand than those with larger homes.

OWASA's service availability fees – utility capital recovery charges (or impact fees) assessed to new development – were traditionally based on meter capacity factors, and all single family homes were charged the same one-time fee when connecting to the water or sewer system, regardless of home size or expected water use patterns. Data developed for this analysis provided a valid utility basis for establishing availability fees that are more responsive to the actual patterns of water and sewer use that characterize different subsets of residential customers.

A new tiered approach adopted by OWASA's Board of Directors established five separate size classes for new single family homes. Availability fees for homes in the smallest size class (less than 1700 square feet) are now 38 percent lower than under the previous rate structure, while new fees for the largest homes (greater than 3800 square feet) are 70 percent higher than previously. The analysis of water use patterns also provided a basis for revising service availability fees for multi-family residences (apartments, townhouses, and condominiums with individually metered units), which use an average of 35 percent less water than single family detached homes.

The tiered approach represents a more precise cost-of-service focus than uniform availability fees, because it considers the actual demand patterns of different residential user groups, rather than treating all residential customers in the same way. Another benefit has been the reduction of fees charged for smaller homes, thus lowering one of the economic barriers to more affordable housing in OWASA's service area.

## BACKGROUND

Orange Water and Sewer Authority (OWASA) provides utility service to approximately 65,000

people in the Towns of Carrboro and Chapel Hill and to the University of North Carolina at Chapel Hill, which represents nearly 30 percent of OWASA's 8 million gallon average day demand. The rest of the customer base is primarily residential and retail/commercial, representing approximately 55 and 15 percent of total demand, respectively.

Capital improvements are managed through a 15-year Capital Improvements Plan (CIP), which is updated annually. Anticipated project costs are programmed for the upcoming five years through a Capital Improvements Budget (CIB), with capital expenditures typically ranging from $7 million to $10 million per year. OWASA recovers a portion of these costs through service availability fees. These one-time, upfront charges for new customer connections help finance "backbone" projects that support major water and wastewater treatment facilities and their supporting infrastructure.

OWASA's availability fees are based on the System Buy-In approach, under which new customers connecting to the system "buy in" to the existing capacity that has already been provided and financed by existing customers. Thus, after buying in, new customers receive service in an equity position comparable to that of existing customers. Availability charges based on this method recognize the current value of existing backbone facilities, which is determined by a variety of factors, including original construction cost, depreciation, renovations, upgrades, and capacity expansions.

In general, the System Buy-In method is most appropriate for utilities such as OWASA that are experiencing only moderate growth, and desire to have new and old customers share equally in costs of the entire system. Other methods, such as Marginal/ Incremental pricing, are sometimes used by utilities experiencing significant customer growth and capital expansion, but seeking to minimize the rate impacts of system growth and investment on existing customers.

## LOCAL HOUSING FACTORS AND WATER USE

In December 1997 OWASA staff conducted a reconnaissance level survey of water consumption and housing parameters among 165 single family detached homes. This preliminary analysis, which was based on 36 consecutive months of customer billing data, indicated a strong relationship between water consumption, lot size, and tax value. Based on these findings, staff developed additional data to support possible changes to the service availability fees.

Because availability fees are applied primarily to new construction, information was collected on all new homes built in the OWASA service area during calendar year 1994, and then linked to the subsequent billing records for each of the corresponding customer accounts. Primary information sources included local building permits and tax files. After deleting incomplete or unmatched records, the resulting data set included 305 valid entries containing consistent information on lot size, finished area, number of bedrooms, bathrooms, and 31 months of water consumption from June 1995 through December 1997. Finished area, as recorded in local building permits, represents total heated floor space.

As with the preliminary findings for existing homes, data for the new homes displayed positive

correlations between water use and tax value (r = 0.571), finished area (r = 0.485), and lot size (r = 0.267). Although the correlation was somewhat stronger between water use and tax value than between water use and finished area, subsequent fee structure analyses were based on finished area, because this parameter was thought to represent a more defensible utility-based indicator of water consumption than tax value. The general findings of the analyses are presented in Exhibit 1 and discussed below.

## GENERAL METHOD FOR CALCULATING AVAILABILITY FEES

Tiered availability fees were calculated with the same factors used in a recently completed OWASA rate study to adjust water and sewer use estimates for lost water, infiltration and inflow, and maximum day demands (1). The general form of the calculation is expressed in Equations 1 and 2:

**Water = [Average Use] x [Loss Factor] x [Peak Factor] x [Unit Value]** **(eq. 1)**

**Sewer = [Average Use] x [Sewer Use Factor] x [I/I Factor] x [Combined Use and I/I Peak Factor] x [Unit Value]** **(eq. 2)**

Adjustment factors for water and sewer use and capacity unit values are presented in Exhibit 2. The sources and derivations of these factors are described in Exhibits 3 and 4.

The OWASA staff analysis separated customer accounts into three user classes: (1) single family detached homes; (2) multi-family individually metered apartments, townhouses, condominiums; and (3) a combined non-residential customer class that included master-metered apartment complexes plus all other commercial and institutional (University) accounts. The use of these three classes is justified by their distinctive consumption patterns summarized in Exhibit 3.

OWASA's former rate structure treated all single family residential accounts as one customer class and based availability fees on an average water consumption of 208 gallons per day (gpd) for all 5/8-inch meter accounts, which typically represent single family residences and small businesses. By contrast, the present analysis separated consumption records for all 5/8-inch accounts into the three classes described above and found the daily averages for the 24 months of FY 1996-97 to be 193 gpd, 127 gpd, and 322 gpd, respectively, for single family detached, multi-family individually metered, and non-residential 5/8-inch meter accounts (see Exhibit 3).

These consumption rates, along with the modified adjustment factors, are the basis for the tiered availability fees that were subsequently adopted as shown in Exhibit 5.

### Average Water Use

Water consumption data for the calculation of availability fees is described below and in Exhibits 1 through 3. Data reported for all classes represents the same time base of two

OWASA fiscal years, FY 96-97 (July 1, 1995 through June 30, 1997).

**Single Family Detached -** Average water use for each of the five size groups (finished area) of the single family detached class were derived from the FY 96-97 water use data presented in Exhibit 1. These groupings were selected to optimize several considerations. Each class spans an equal size range of 700 square feet. The upper and lower-most size classes (less than 1701 and greater than 3800 square feet) represent substantial differences in size and value, yet contain sufficient sample data to support a credible statistical pattern. Finally, the size class with the largest number of new homes (2401 to 3100 square feet) represents the midrange of both the finished area and water use variables; i.e., the mean values of this range are nearly identical to the average values of the entire sample set.

**Multi-Family Individually Metered -** Average water use (127 gpd) for this class was obtained from OWASA customer billing records, as described in notes to Exhibit 3.

**Non-Residential 5/8-Inch Meter Accounts -** Actual account data for this class were not analyzed for FY 96-97. The reported annual (322 gpd) and winter (302 gpd) averages were obtained by adjusting the observed annual and winter FY 95 non-residential 5/8-inch account averages (334 gpd and 313 gpd, respectively) in proportion to the reduction from 200 gpd to 193 observed in annual use for the single family residential class between the FY 95 and the FY 96-97 sampling periods. *Examples: Annual average = 334 gpd x 193/200 = 322 gpd. Winter average = 313 gpd x 193/200 = 302 gpd.*

The resulting availability fees calculated for non-residential 5/8-inch accounts are the basis for all other non-residential fees, which were scaled up by meter capacity ratios, as in the previous rate structure, and as recommended by in the recent OWASA rate study[(1)].

## Water Loss and Peaking Factors

The need for backbone water system capacity is a function of short term (peak) customer demands and longer term demands represented by losses from the system. The loss factor of 1.08 applied to the average day demands of all user classes reflects OWASA's actual unaccounted-for loss of eight percent of total finished water production.

The recent rate study report applied one-day peaking factors of 2.0, 1.4, and 1.5, to the average day demands of single family detached, multi-family individually metered, and non-residential 5/8-inch accounts, respectively, in its analysis of backbone capacity needs[(1)]. OWASA's present analysis incorporated modifications to the single family peaking factor in order to reflect actual summertime differences observed among the size classes, as described below.

**Single Family Detached -** Peaking factors highlighted with gray shading in Column 7 of Exhibit 3 were derived by normalizing the average summer demands of each finished area size class to the summer average (248 gpd) of the entire single family detached class as a whole, to which the recent rate study had assigned a peaking factor of 2.0. For example, the peaking factor of 1.3 applied to the <1701 square foot subclass was obtained by multiplying

2.0 (the average peaking factor for the class) by 160/248 (average summer demand of the <1701 square foot subclass divided by average summer demand for the entire class): *1.3 = 160/248 x 2.0*.

**Multi-Family Individually Metered and Non-Residential 5/8-Inch Meter Accounts -** The peaking factors of 1.4 and 1.5 used for these customer classes are the same as those used in the recent rate study report[1].

**Sewer Use Factors**

Sewer system availability fees are based on adjusted water use. The rate study report applied a sewer use factor of 0.875 to all customer classes, which is consistent with OWASA's historic estimate that 87.5 percent of billed water returns to the sewer system as wastewater.

In developing the tiered availability fees, OWASA staff applied different sewer factors to each customer class to better reflect actual differences in seasonal use observed for each group. Sewer use was estimated as the ratio of average winter to average annual water consumption for each class, reflecting the assumption that most winter use occurs indoors and is returned to the sewer system as wastewater, while a substantial portion of summer demand is for outdoor use on lawns and gardens. The inverse relationship between the sewer use factor and peak water demand is apparent in Exhibit 2 and in comparisons among columns 7, 10, and 12 of Exhibit 3.

**Infiltration/Inflow, Combined Sewer Use & I/I Factors**

Additional adjustment factors were employed in calculating sewer availability fees to account for periodic high flows related to customer peaks, as well as the unwanted entry of stormwater (infiltration and inflow) into the collection system. As noted, these are the same factors used in the recent rate study report (see Exhibits 2 and 4).

**Unit Capacity Factors**

The total value of water and sewer backbone assets was determined by adding the value of recently completed major capital improvements and projects that were either underway or programmed for completion within the next two years, to the total value of water and sewer assets reported at the end of FY 96. These "reproduction cost less depreciation" (RCLD) values had been compiled for the recent rate study report[1]. Additional information is presented in Exhibit 4.

## IMPLEMENTATION OF NEW FEE STRUCTURE

Tiered service availability fees, as outlined in Exhibit 5, were implemented in October 1998 after the proposal had been discussed in several public meetings and news articles. Customer response was generally positive, due to the understandable logic and perceived fairness of the approach. Local housing advocates praised the new fee structure for its benefits to housing affordability. Administration of the tiered fees has required no internal changes at OWASA

other than the submittal of a building permit application or floor plans for new home construction.

## SUMMARY AND CONCLUSIONS

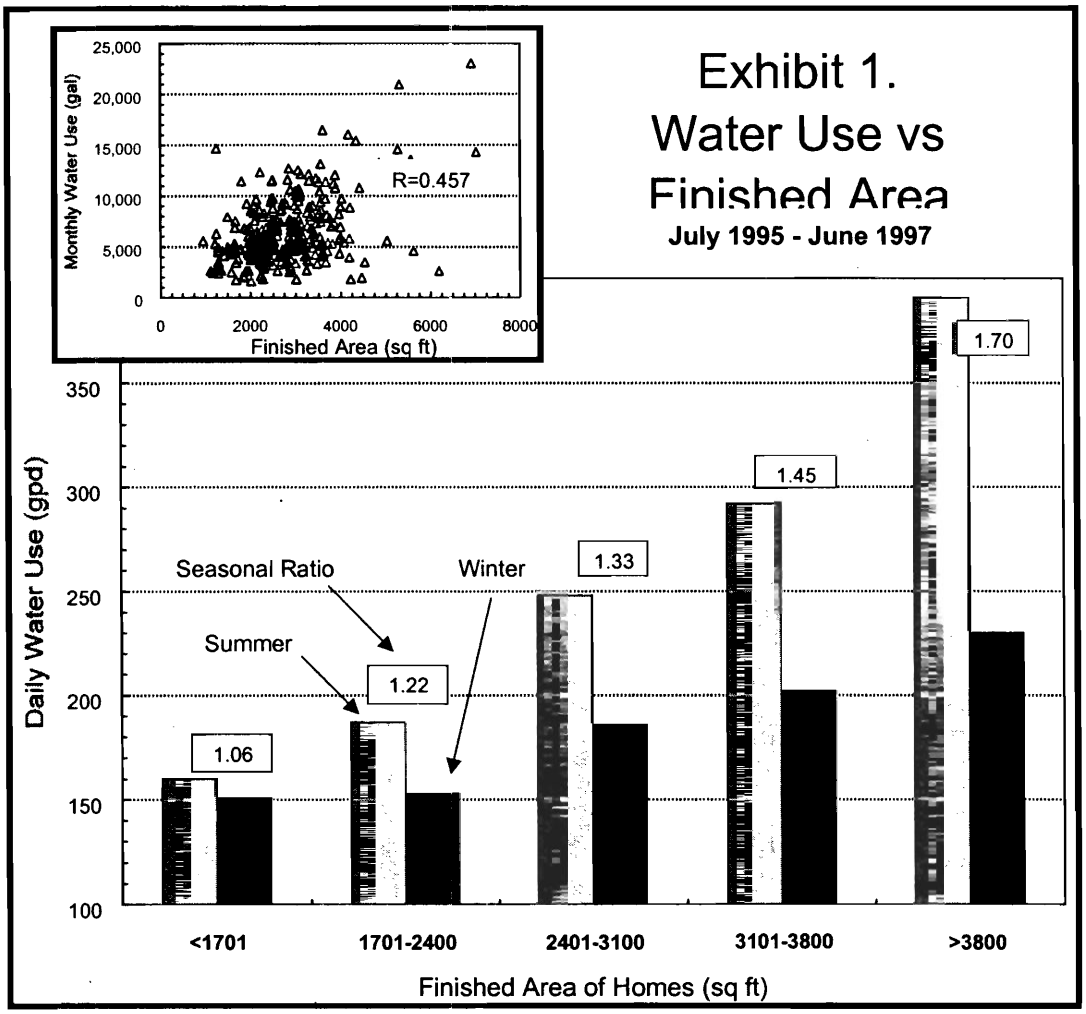
OWASA customer billing data, in conjunction with information derived through local building permits and tax records, demonstrated a consistent pattern of increased average and seasonal water use with increasing home size. Customers with more modest homes generally use less total water and exert a lower summer demand than those with larger homes. These findings provided a valid utility basis for a tiered system of one-time service availability fees based on the finished area of new homes connecting to the public water and sewer system. The new fee structure has been straightforward to administer, well received by the public, and is credited with lowering one of the economic barriers to more affordable housing in the OWASA service area.

## ACKNOWLEDGEMENTS

The authors wish to thank Mr. Michael Mussman and Mr. William Stannard of Black & Veatch, LLP and Mr. George Raftelis of Raftelis Financial Consultants, PA for their technical support and guidance during the development of OWASA's tiered availability fees.

## REFERENCES

1. *Final Report, Water and Sewer Rates for the Orange Water and Sewer Authority*, Black & Veatch, LLP, January 1998.




| Finished Area (square feet) | Sample Size (# accts) | Pct Homes | 24-Month Mean (gpd) | Pct 24-Month Demand | Summer Mean (gpd) | Pct Summer Demand | Winter Mean (gpd) | Pct Winter Demand | Seasonal Ratio |
|---|---|---|---|---|---|---|---|---|---|
| <1701 | 28 | 9% | 155 | 7% | 160 | 6% | 151 | 8% | 1.06 |
| 1701-2400 | 81 | 27% | 170 | 21% | 187 | 20% | 153 | 22% | 1.22 |
| 2401-3100 | 104 | 34% | 218 | 35% | 248 | 34% | 186 | 35% | 1.33 |
| 3101-3800 | 59 | 19% | 247 | 22% | 292 | 23% | 202 | 21% | 1.45 |
| >3800 | 33 | 11% | 311 | 16% | 391 | 17% | 230 | 14% | 1.70 |
| **Overall:** | 305 | 100% | 215 | 100% | 248 | 100% | 182 | 100% | 1.36 |
| **Mean Finished Area:** | 2,820 sq ft | | | | | | | | |

*Data Set: 305 homes built in Carrboro/Chapel Hill during 1994, from building permit and tax records.*
*Water Use: 24 Months, July 1995 - June 1997, from OWASA customer records.*
*Summer: May - October; Winter: November - April.*

## Exhibit 2. Standard and Derived Usage and Unit Value Factors

| Customer Class | Area (sq ft) | Water: Loss Factor | Water: Peak Factor | Water: Unit Value ($/gpd) | Sewer: Sewer Factor | Sewer: I/I Factor | Sewer: Combined Use & I/I Factor | Sewer: Unit Value ($/gpd) |
|---|---|---|---|---|---|---|---|---|
| ↑ | <1701 | 1.08 | 1.3 | $3.38 | 0.97 | 1.20 | 1.75 | $4.06 |
| | 1701-2400 | 1.08 | 1.5 | $3.38 | 0.90 | 1.20 | 1.75 | $4.06 |
| Single Family Detached | 2401-3100 | 1.08 | 2.0 | $3.38 | 0.86 | 1.20 | 1.75 | $4.06 |
| | 3101-3800 | 1.08 | 2.4 | $3.38 | 0.82 | 1.20 | 1.75 | $4.06 |
| ↓ | >3800 | 1.08 | 3.2 | $3.38 | 0.74 | 1.20 | 1.75 | $4.06 |
| Multi-Family Individually Metered | | 1.08 | 1.4 | $3.38 | 0.98 | 1.30 | 1.75 | $4.06 |
| Non-Residential 5/8" | | 1.08 | 1.5 | $3.38 | 0.95 | 1.05 | 1.75 | $4.06 |

**Notes:** *The derivation of unit values is presented in Exhibit 4.*

*Shaded peak and sewer use factors are derived from data presented in Exhibits 1 and 3. All other factors are as presented in Reference 1.*

# Exhibit 3. Average Water Use In Gallons Per Day, Peak and Sewer Use Factors for 5/8" Meter Accounts

## Fiscal Years 1995 and 1996-97 *

| Customer Class | (1) Sample Size FY95 | (2) Sample Size FY96-97 | (3) Annual Avg FY95 | (4) Annual Avg FY96-97 | (5) Summer Avg FY95 | (6) Summer Avg FY96-97 | (7) Peak Factor | (8) Winter Avg FY95 | (9) Winter Avg FY96-97 | (10) Sewer Factor | (11) Seasonal Ratio FY95 | (12) Seasonal Ratio FY96-97 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **All Single Family Detached:** | 9,808 | 10,372 | 200 | 193 | 221 | 212 | N/D | 178 | 174 | 0.90 | 1.24 | 1.22 |
| **New Homes Built in CY 1994** | | | | | | | | | | | | |
| <1701 | N/D | 28 | N/D | 155 | N/D | 160 | 1.3 | N/D | 151 | 0.97 | N/D | 1.06 |
| 1701-2400 | N/D | 81 | N/D | 170 | N/D | 187 | 1.5 | N/D | 153 | 0.90 | N/D | 1.22 |
| 2401-3100 | N/D | 104 | N/D | 218 | N/D | 248 | 2.0 (a) | N/D | 186 | 0.86 | N/D | 1.33 |
| 3101-3800 | N/D | 59 | N/D | 247 | N/D | 292 | 2.4 | N/D | 202 | 0.82 | N/D | 1.45 |
| >3800 | N/D | 33 | N/D | 311 | N/D | 391 | 3.2 | N/D | 230 | 0.74 | N/D | 1.70 |
| **Total New Homes:** | N/D | 305 | N/D | 215 | N/D | 248 | 2.0 (a) | N/D | 182 | 0.85 | N/D | 1.36 |
| **Multi-Family Individually Metered:** | 3,113 | 3,142 | 126 | 127 | 127 | 129 | 1.4 (a) | 125 | 125 | 0.98 | 1.02 | 1.03 |
| **Non-Residential 5/8" Accounts:** | 575 | N/D | 334 | 322 (b) | 354 | N/D | 1.5 (a) | 313 | 302 (b) | 0.94 | 1.13 | N/D |

**Notes:**

* *FY 95 annual average computed for 12 months of July, 1994 through June, 1995.*
*Summer: July-October, 1994 and May-June, 1995; Winter: November-December, 1994 and January-April, 1995.*

*FY 96-97 annual average computed for 24 months of July, 1995 through June, 1997.*
*Summer: July-October, 1995; May-October, 1996; and May-June, 1997.*
*Winter: November-December, 1995; January-April, 1996; November-December, 1996; and January-April, 1997.*

*(a) Standard peaking factors from Reference 1.*

*(b) Non-residential 5/8" account data were not analyzed for FY 96-97. The 322 gpd annual (column 4) and 302 gpd winter (column 9) averages reported for this class were derived by adjusting (reducing) the observed FY 95 5/8" non-residential averages of 334 (column 3) and 313 gpd (column 8) proportionally to the reduction from 200 gpd to 193 gpd observed for the single family residential class between the FY 95 and FY 96-97 sampling periods (columns 3 and 4). Annual Avg = 334 gpd x 193/200 = 322 gpd. Winter Avg = 313 gpd x 193/200 = 302 gpd.*

***Shaded Peak Factors (column 7):*** *Derived by normalizing the average summer demands of each single family subclass to the summer average (248 gpd) for the entire SFD group (column 6), to which Black & Veatch assigned a peak factor of 2.0.*
*Example: Peak Factor for the <1701 sq ft subclass =160 gpd/248 gpd x 2.0 = 1.3*

***Shaded Sewer Factors (column 10):*** *Derived by dividing average winter use (column 9) by average annual use (column).*

# Exhibit 4. Calculation of Unit Capacity Values for Water and Sewer Backbone Facilities

| | Notes | Water | Sewer |
|---|---|---|---|
| RCLD value as of 6/30/96: | (a) | $58,645,000 | $36,675,000 |
| Plus CWIP & CIB from 7/1/96 through 6/30/00: | (b) | $11,176,000 | $27,191,000 |
| Less credit for existing debt as of 6/30/00: | (c) | ($19,185,000) | ($5,100,000) |
| Less credit for projected new debt: | (c) | $0 | ($10,000,000) |
| Projected asset value as of 6/30/00: | (d) | $50,636,000 | $48,766,000 |
| System capacity as of 6/30/00 (mgd): | (e) | 15 | 12 |
| Unit capacity value ($/gpd): | (f) | $3.38 | $4.06 |

**Notes:**

(a) *RCLD (Reproduction Cost Less Depreciation) is the asset value of backbone facilities. RCLD values at the end of FY 96 were compiled in OWASA's 1998 rate study report[1].*

(b) *Includes all backbone-related construction work in progress (CWIP) not booked as assets in (a), plus backbone-related improvements programmed from FY 97 through FY 2000 in OWASA's Capital Improvements Budget (CIB). Values have not been depreciated.*

(c) *Represents outstanding debt principle for backbone water and sewer facilities. Debt service costs are recovered through regular monthly service and/or commodity charges and are credited against availability fee calculations to avoid double-charging new customers who pay service availabilit fees. Existing debt as of June 30, 2000 is outstanding from OWASA's 1993 bond sale. Projected new debt respresents $10 million of anticipated bond sales to finance major improvements underway at the wastewater plant.*

(d) *Total asset value as of June 30. 2000 is calculated as (a) + (b) + (c).*

(e) *Represents maximum sustainable daily flow permitted through the water plant and maximum monthly flow permitted through the wastewater plant upon completion of all improvements.*

(f) *Unit capacity value is derived by dividing (d) by (e).*

# Exhibit 5. Comparison of Uniform and Tiered Service Availability Fees

## Orange Water and Sewer Authority, October 1998

| Customer Class | Meter Size | Finished Area | Avg Use (gpd) | WATER Uniform | WATER Tiered | WATER Change | SEWER Uniform | SEWER Tiered | SEWER Change | COMBINED Uniform | COMBINED Tiered | COMBINED Change |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ↑ | 5/8" | <1701 | 155 | $1,928 | $731 | -62% | $1,323 | $1,284 | -3% | $3,251 | $2,015 | -38% |
| | 5/8" | 1701-2400 | 170 | $1,928 | $940 | -51% | $1,323 | $1,306 | -1% | $3,251 | $2,246 | -31% |
| **Single Family Detached** | 5/8" | 2401-3100 | 218 | $1,928 | $1,591 | -17% | $1,323 | $1,589 | 20% | $3,251 | $3,180 | -2% |
| ↓ | 5/8" | 3101-3800 | 247 | $1,928 | $2,119 | 10% | $1,323 | $1,719 | 30% | $3,251 | $3,838 | 18% |
| | 5/8" | >3800 | 311 | $1,928 | $3,577 | 86% | $1,323 | $1,962 | 48% | $3,251 | $5,539 | 70% |
| **Multi-Family Individ Metered** | 5/8" | | 127 | $1,928 | $649 | -66% | $1,323 | $1,155 | -13% | $3,251 | $1,804 | -45% |
| | | **Meter Ratio** | | | | | | | | | | |
| ↑ | 5/8" | 1 | 322 | $1,928 | $1,763 | -9% | $1,323 | $2,258 | 71% | $3,251 | $4,021 | 24% |
| | 1" | 3 | * | $4,820 | $4,408 | -9% | $3,308 | $5,645 | 71% | $8,128 | $10,053 | 24% |
| | 1.5" | 5 | * | $9,640 | $8,816 | -9% | $6,615 | $11,290 | 71% | $16,255 | $20,106 | 24% |
| **Non-Residential** | 2" | 8 | * | $15,424 | $14,105 | -9% | $10,584 | $18,065 | 71% | $26,008 | $32,170 | 24% |
| | 3" | 16 | * | $30,848 | $28,210 | -9% | $21,168 | $36,129 | 71% | $52,016 | $64,339 | 24% |
| | 4" | 25 | * | $48,200 | $44,079 | -9% | $33,075 | $56,452 | 71% | $81,275 | $100,530 | 24% |
| | 6" | 50 | * | $96,400 | $88,157 | -9% | $66,150 | $112,903 | 71% | $162,550 | $201,061 | 24% |
| ↓ | 8" | 80 | * | $154,240 | $141,051 | -9% | $105,840 | $180,645 | 71% | $260,080 | $321,697 | 24% |

**Water Availability Fees = [avg use] x [loss factor] x [peak factor] x [unit value]**

**Sewer Availability Fees = [avg use] x [sewer use factor] x [I/I factor] x [combined use & I/I peak factor ] x [unit value]**

*All adjustment factors are presented in Exhibit 2.*

* *Non-residential fees are based on meter capacity multiples of the average daily use (322 gpd) of non-residential 5/8-inch meter accounts.*