

TECHNICAL MEMORANDUM

To: John Kmiec, Interim Utility Director, Tucson Water

From: Harold Smith, Raftelis Financial Consultants, Inc.

Subject: Outside Differential Analysis

CC: Deborah Galardi, Galardi Rothstein Group

On June 22, 2021, the City of Tucson Mayor and Council approved a rate differential for Tucson Water customers located within unincorporated Pima County (Outside City Customers). This decision was policy based and goes into effect on December 1, 2021. Mayor and Council further directed Tucson Water to conduct a cost-of-service analysis using standard industry practices to determine the cost basis for differential rates. The results of the cost-of-service analysis are supplemental to the policy basis already used to approve the differential rate.

Tucson Water engaged Raftelis to develop a range of possible cost-based differentials as the first step in this cost-of-service analysis. The analysis performed by Raftelis involved using readily available data to develop revenue requirements for the entire Tucson Water system using the utility basis, allocating those revenue requirements between inside city customers and Outside City Customers and then comparing the revenue requirements for Outside City Customers to the revenue generated by Outside City Customers under Tucson Water's existing rates. The difference between the calculated revenue requirements and revenue at existing rates serves as an approximation of a cost-based rate differential. The second phase of the cost-of-service analysis will refine the differential rate range presented in this Memorandum and will address the detailed information now decided by Mayor and Council, namely the differential rate schedule to be implemented (Option 7 from the original Notice of Intent), the projected differential rate revenues, and the projects and programs within the utility where Mayor & Council directed that the revenues be used.

Overview of the Utility Approach

The utility approach for determining revenue requirements is typically utilized by investor-owned utilities, and also for governmental utilities that are regulated by state public service agencies. The utility approach provides for a utility to recover operating and capital costs as determined by generally accepted accounting principles. In addition, the utility is provided a return on its investment in utility plant-in-service and other capital facilities. O&M costs are typically based on the utility's operating budget and capital costs are estimated based on actual or projected depreciation and adjusted for additions, retirements, "contributions in aid of construction," and "customer capital advances."

Under the utility approach, a return is calculated by applying a rate of return on the investment by the owner of the utility (typically the original cost of assets less accumulated depreciation and adjustments). The utility's investment is defined as a "rate base." In situations where outside-city service is provided, two separate rate base values can be determined, the rate base for inside-city service and the rate-base for outside city service. The utility's return should provide for the payment of interest on outstanding

debt, the funding of certain capital items, and a payback (dividend) to the investors of the utility. In situations where a municipal utility is the service provider, this dividend is sometimes used to offset the revenue requirement to be recovered from inside-city rates, thereby lowering the rates paid by inside-city customers. Tucson Water has been directed to use the differential rate revenues within the utility to fund programs in the areas of financial resilience, water resources resilience, and infrastructure resilience.

The most widely recognized method for selecting an appropriate rate of return is the weighted average cost of capital (WACC) approach. This approach can be used by both public and private utilities and represents the weighted average of the utility's cost of debt (outstanding bonds) and cost of equity. A utility's average cost of debt is the average interest rate that it pays on all its outstanding bonds and loans. Since a utility is often required to issue debt at various times to meet capital needs, the average cost of debt reflects both the utility's financial strength and the prevailing market interest rates at the time each bond series is issued. Therefore, the average cost of a utility's debt should be weighted based on the duration of payments and the amount of funds outstanding for each bond series. The cost of equity for an investor-owned utility represents its average cost of debt, as well as a risk premium and return on investment, or dividend for its investors. For a government utility, the cost of equity generally represents its average cost of debt and a risk premium. Once the average cost of debt and average cost of equity are determined for a utility, the WACC is determined by weighting the cost of debt and equity by the proportion of debt to equity as presented in the utility's balance sheet.

As mentioned previously, if the utility is governmental, the return is still appropriate, although the utility is "nonprofit." As with investor-owned utilities, the return is used to pay interest, and possibly, along with depreciation, retire principal on debt and fund certain capital items. In some instances, however, the dividend component for government utilities may be eliminated because a return or profit component may be excluded from revenue requirements. However, if the government utility has customers who are "non-owners" of the system, a return to the utility (such as the treasury bill rate or the municipality's current investment rate) may be appropriate to be charged to the non-owner customers.

The major advantage of the utility approach is that there is typically less interpretation when establishing revenue requirements than under the cash-needs approach. In other words, the utility approach provides for a less subjective methodology for identifying revenue requirements. A major disadvantage of the utility approach is that in a governmental environment, revenue requirements that would be recovered under the utility approach could be significantly more or less than is required for cash flow purposes.

When setting outside-city rates, use of the utility approach is most appropriate when there is a clear distinction between owner customers and non-owner customers because the utility approach allows for the development of rates that recover a return on the owner's investment in the system thereby compensating them for the risk incurred to construct the utility system. In cases where the distinction between owner and non-owner customers is not clear, for instance when the utility's legal or policy driven service area extends beyond the parent municipality's corporate limits, justification of a return on investment may be complicated by a number of factors.

Data Used In the Analysis

Data used for the analysis was derived from a variety of sources and brief descriptions of each data set are provided below:

- *Customer Demand Data* – Customer demand data for FY2019 was used for this analysis. However, detailed demand data regarding consumption within each of Tucson Water’s rate tiers was not available for FY2019 so the FY2019 data was calibrated based on actual revenue generated by water sales to the Outside City Customers in FY2019. This calibration involved determining the percentage of consumption for customer classes with tiered rates that fell within each rate tier. These percentages were then applied to FY2019 demand to develop an approximation of consumption within each tier for FY2019.
- *Operation & Maintenance (O&M) Expenses* – O&M expenses were derived from Tucson Water’s FY2019 budget. FY2019 was chosen as the test year because it was the rate year for cost of service analysis used to develop the rates currently in effect.
- *Rate Base and Depreciation* – Rate base and depreciation was determined using asset data from FY2019. Similar to the customer demand and O&M expense data, FY2019 was chosen as the test year because existing rates are based on FY2019 data. Additionally, asset data that excluded contributed capital was readily available for FY2019.
- *Cost of Capital*- Tucson Water’s weighted average cost of debt was based on outstanding water debt as of July 1, 2020 included in “City of Tucson, Arizona; 2020-21 Summary of Outstanding Debt” prepared by Piper/Sandler.

Revenue Requirements

For this analysis, revenue requirements for the entire Tucson Water system were determined using the utility approach and then a portion of the system revenue requirements were allocated to the Outside City Customers. Under the utility approach, a utility’s revenue requirements are comprised of O&M expenses, depreciation, and a return on rate base.

Operation & Maintenance Expenses

As mentioned previously, for this analysis Tucson Water’s O&M expense are based on the FY2019 budget. Costs associated with operating and maintaining the reclaimed water system were excluded from the analysis. A portion of the FY2019 budgeted O&M expenses are allocated to the Outside City Customers based on their proportionate share of consumption.

Schedule 1 shows the system O&M expenses and the allocation to Outside City Customers.

Rate Base

The rate base, or the value of the assets used to provide service to the Outside City Customers, was determined by first excluding the value of contributed assets from Tucson Water’s net plant in service. Additionally, the value of all reclaimed water assets was excluded from rate base. The value of the remaining assets was then allocated between inside city customers and Outside City Customers based on each group’s proportionate share of consumption.

Schedule 2 shows the development of rate base and the allocation to Outside City Customers.

Rate of Return

Given time constraints for the analysis, Raftelis did not perform a cost of capital study. As mentioned previously, the rate of return is typically set equal to the utility's WACC. As discussed previously, a utility's WACC is comprised of its weighted average cost of debt (WACD) and the cost of equity. The determination of Tucson Water's WACD is demonstrated in Schedule 3. As shown, Tucson Water's WACD is 4.57%.

Since Tucson Water is a municipally owned water system, it is difficult to determine a cost of equity. AWWA's M-1 manual suggests four different options for determining an appropriate cost of equity for municipally owned systems. These options include:

1. Base the cost of equity on the return allowed by regional regulatory bodies in recent rate cases for similar utilities.
2. Perform a discounted cash-flow analysis.
3. Use a risk-free rate with an appropriate risk premium.
4. Use a multiplier on top of the WACD.

Given the time constraints for performing the analysis the only feasible option was to use recently allowed costs of equity for water utilities regulated by the Arizona Corporation Commission as a proxy for Tucson Water's cost of equity. However, review of recent rate cases did not reveal any decisions for utilities that would be considered similar to Tucson Water. Therefore, it was decided to calculate cost justified outside differentials using a range of cost of equity values. Research of recent ACC rate cases did reveal a wide range of approved rates of return on rate base. Given this information it was decided to calculate outside city differentials using cost of equity values ranging between 5% and 10%.

In order to recognize that Outside City Customers have contributed to the equity in the system by virtue of paying rates and system equity fees that funded the assets that comprise the system, the calculation of system equity includes a downward adjustment commensurate with the Outside City customer's share of revenue.

Schedule 3 shows the development of the rate of return on rate base.

Depreciation

Depreciation was derived from Tucson Water's asset records and only depreciation on those assets included in rate base was included in the system revenue requirements. Similar to O&M expenses and rate base, depreciation was allocated to Outside City Customers based on consumption.

Table 1 below shows the revenue requirements under five different cost of equity scenarios.

Table 1
Outside City Revenue Requirements Under Various Cost of Equity Assumptions

	Cost of Equity					
	5.0%	6.0%	7.0%	8.0%	9.0%	10.0%
Operation & Maintenance Expenses	\$ 35,834,858	\$ 35,834,858	\$ 35,834,858	\$ 35,834,858	\$ 35,834,858	\$ 35,834,858
Depreciation	\$ 8,750,060	\$ 8,750,060	\$ 8,750,060	\$ 8,750,060	\$ 8,750,060	\$ 8,750,060
Return on Rate Base	\$ 17,601,576	\$ 19,897,029	\$ 22,192,482	\$ 24,487,935	\$ 26,783,388	\$ 29,078,841
Total Outside City Revenue Requirements	\$ 62,186,494	\$ 64,481,947	\$ 66,777,400	\$ 69,072,853	\$ 71,368,307	\$ 73,663,760

Determination of Outside City Differential

To determine the appropriate outside city differential, outside city revenue requirements are compared to the revenue that is generated by Outside City Customers at the existing rates that are assessed to all customers, both inside and outside the city limits. The percent difference between these two values is the percent increase to existing rates that would be required for revenue from Outside City Customers to equal outside city revenue requirements. Table 2 below shows the resulting outside differentials under each cost of equity assumption.

Table 2
Outside City Differential Under Various Cost of Equity Assumptions

	Cost of Equity					
	5.0%	6.0%	7.0%	8.0%	9.0%	10.0%
Outside City Revenue Under Existing Rates	\$ 58,607,302	\$ 58,607,302	\$ 58,607,302	\$ 58,607,302	\$ 58,607,302	\$ 58,607,302
Outside City Revenue Requirements	\$ 62,186,494	\$ 64,481,947	\$ 66,777,400	\$ 69,072,853	\$ 71,368,307	\$ 73,663,760
Cost Justified Differential	6.1%	10.0%	13.9%	17.9%	21.8%	25.7%

Conclusions

Results of the limited analysis described in this memo indicate that by using standard industry practices for determining rates for outside city customers an outside city differential can be cost based, but that the magnitude of the justified differential is highly dependent upon the assumed value for Tucson Water’s cost of equity. Additionally, a more detailed analysis of O&M expenses and rate base could yield different allocations of costs to the Outside City Customers resulting in outside city revenue requirements that are different from those that resulted from this analysis.

Phase 2 of this cost-of-service analysis will be to assess an outside city differential based on cost-of-service principles alone. It should be noted, however, that it is not uncommon for utilities to charge a higher rate to outside city customers on a policy basis and Arizona law allows for the assessment of higher outside city rates as long as the higher rates are “reasonable”. That is the basis of the action already taken by the City of Tucson Mayor and Council. Measures of reasonableness may include comparisons of rate differentials in other communities, as well as general considerations of risk, ownership relationship, and cost of service. Recent surveys of other Arizona utilities indicate that many utilities that assess rates to outside city customers have no cost justification for the higher rates, and rate differentials range from 10% to 50%. This cost of service analysis is supplemental to the recently established policy basis for Tucson’s differential rate.