Balance Sheet Account	Description
1385	Inventory Reserve-Memo Pre-enc
1386	Inventory Reserve-Memo Encumb
1390	Property Held For Resale
1395	Allowance for Valuation Loss
1416	Prepayment - Ins.-All-Risk
1419	Prepayment - Ins.-STP Nuclear
1420	Prepaid Expenses - Misc
1421	Prepayment - ERCOT
1422	Fayette CWIP
1423	Fayette Clearing
1425	Procurement Card Clearing Acct
1426	STP Clearing
1428	Miscellaneous
1461	Accrued Interest Receivable
1451	Advance ACVB Corp
1455	Advance Paying Agent
1460	Accr Interest On Investments
1462	Interest Receivable - Unrestr
1463	Interest Receivable NSG Loans
1465	Interest Receivable-RMD Loans
1468	Fire LADC Interagency Council
1470	Bank Fees - Clearing
1477	Nations Bank-South
1478	Texas Commerce Bank
1479	Nations Bank-North
1480	First State Bank
1481	Austin Savings & Loan-Adv
1482	Resolution Trust Corp
1483	Cattleman's State Bank
1484	Nations Bank-Downtown
1485	Team Bank
1486	Bank One Arboretum
1487	Union National Bank
1488	First City, Texas
1489	Greater TX Bank
1496	Costs to Be Distributed
1497	Other Assets
1498	G/L Unamort Prior Yr
1510	Risk Mgmt Margin Acct
1511	Deferred Fuel Revenue
1512	Deferred Expense
1513	Deferred TSAR Revenue
1514	Hedging Derivative Instrument
1515	Investment Derivative Instrument

Balance Sheet Account	Description
1516	Deferred Street Light Revenue
1517	Deferred Regulatory 1 Revenue
1518	Deferred CBC-Energy Eff Rev
1519	Dfd CBC-Customer Asst Program
1520	Deferred Regulatory 2 Revenue
1530	Advance Receivable-Other
1547	Investment Held by Trustee Other Decom Costs
1546	Invest Held By Trustee
1600	Property-Land
1601	Property-Art/Treasures
1602	Sanitary Landfills
1603	Property-Library Books
1604	Property-Buildings
1605	Prop-Plant In Service
1606	Property-Furniture & Fixtures
1607	Property-Motored Equipment
1608	Property-Construction Equip
1609	Property-Communication Eqpt
1610	Property-Computer & EDP Eqpt
1611	Property-Machinery/Equipment
1618	Infrastructure-Streets/Roads
1619	Plant Acquisition Adjustment
1620	STP Plant Assets
1626	PP Accumulated Depreciation
1627	Accum Deprec-Plant In Service
1628	Accum Amort Plant Acquis Adj
1630	Prop-Int Capitalzd Constr Othe
1631	PP Plant in Service
1632	LGFS Conversion CWIP
1633	LGFS Conversion RWIP
1634	LGFS Conversion Contra CWIP
1635	CWIP - Taggables
1636	Construction Work In Progress
1637	Investment CIP Fund
1640	Nuclear Fuel in Process
1644	Nuclear Amortization
1641	Nuclear Fuel Stock
1642	Nuclear Fuel In Reactor
1643	Spent Nuclear Fuel
1650	Plant Held For Future Use
1651	Water Rights-LCRA
1652	Accum Amort of Water Rights
1684	FPP Railcar Rental
1686	Other Receivables - Restricted (Noncurrent)

Balance Sheet Account	Description
1700	Advance Misc Deferred
1703	Prepayment-Surety Bond LT
1704	Risk Mgmt Energy Contracts
1708	Other Regulatory Assets
1710	Stores Expense Undistr. STP
1711	CAB Deferred Interest Exp
1712	Deferred Expense STP FAS 158
1713	Deferred Expense Net Pension Liability
1714	Deferred Expense Other Post Employement Benefits
1716	Accum Amort Def Assets
1717	Unreal G/L Inv-GASB53
1718	Deferred Expense GASB 31
1719	Prepayment -Surety Bond LT
1720	Bond Refunding Def Int Exp
1721	Other WIP
1723	STP Misc Deferred Debits
1724	Deferred Depreciation
1726	Deferred Assets
1727	STP Retirement WIP
1728	Deferred Bond Issuance Costs
1729	Accumulated Amortization - Deferred Bond Issuance Costs
1745	Amort of BIC COPs
1757	Amort of BIC NCAGC
1900	Deferred Loss on Refunding - GO Bonds
1901	Deferred Loss on Refunding - Revenue PL SL Bonds
1902	Deferred Loss on Refunding - Sep Lien Bonds
1903	Accum Amort of Loss on Refunding - GO Bonds
1904	Accum Amort of Loss on Refunding - Revenue PL SL Bonds
1905	Accum Amort of Loss on Refunding - Sep Lien Bonds
1906	Accum Amort of Loss on Refunding - PIB Bonds
1907	Accum Amort of Loss on Refunding - Revenue Bonds
1908	Deferred Loss on Refunding - PIB Bonds
1909	Deferred Loss on Refunding - Revenue Bonds
1970	Cash Designated GASB 34
1971	Cash Contra Desig GASB 34
1972	Investment Desg GASB 34
1973	Invest Contra Desg GASB 34
1974	Investment LT GASB 34
1975	GW - Internal Balances
1980	Conversion A/R
1982	Conversion Assets
1983	Deferred Outflow OPEB Assump Change
1984	Deferred Outflow OPEB Actuarial Experience
1985	Deferred Outflow OPEB Contributions

Balance Sheet Account	Description
1991	Fixed Asset Memo Contra Acct
1992	Fixed Asset Memo Account
1993	Fixed Asset Pending Asset
1994	Deferred Outflow Pension Contributions
1995	Deferred Outflow Pension Invest Experience
1996	Deferred Outflow Pension Assump Change
1997	Deferred Outflow Pension Actuarial Experience
1998	Deferred Loss on Hedging Derivatives
Liabilities	
2000	Disbursements Payable
2001	Cancelled Disbursements
2004	Accounts Payable
2006	Reserve for O/S Checks-A/P
2009	A/P-Unrestr-Transmission Cost of Service
2010	Maximo RBNI
2011	A/P-Travis County
2012	A/P-Travis Cty EMS Ambulance
2013	A/P-Unrestricted - FPP
2014	A/P-Unrestricted - STP
2015	A/P-Unrestr-Unvouchered A/P
2016	Other Regulatory Liabilities
2017	EMS Revenue Pending Research
2019	A/P-Travis County-EMS Starflight
2020	Sales Tax Pybl- State
2021	Sales Tax Pybl-Austin
2022	Sales Tax Pybl-Aviation Mntc
2023	Sales Tax Pybl-Aviation Prkg
2024	Sales Tax Pybl-Bee Caves
2025	Sales Tax Pybl-Capital Metro
2026	Sales Tax Pybl-Caswell Tennis
2027	Sales Tax Pybl-Cedar Park
2028	Sales Tax Pybl-Central Stores
2029	Sales Tax Pybl-Convention Ctr
2030	Sales Tax Pybl-Trv Cnty EMS Drt 5
2031	Sales Tax Pybl-EMS Dist #11
2036	Sales Tax Pybl-Lakeway
1986	Deferred Outflow OPEB Proportionate Share
1999	Deferred Outflow Pension Proportionate Share
2007	A/P-Medical TPA
2032	Sales Tax Pybl-EMSDist #4
2033	Sales Tax Pybl-PARD Parking
2034	Sales Tax Pybl-Fleet
2035	Sales Tax Pybl-Health Dept

Balance Sheet Account	Description
2037	Sales Tax Pybl-Lake Travs Libr
2038	Sales Tax Pybl-Library
2039	Sales Tax Pybl-Manor
2040	Sales Tax Pybl-Maps-Public Wrk
2041	Sales Tax Pybl-Morris Williams
2042	Sales Tax Pybl-Oakhill EMS Dis
2043	Sales Tax Pybl-Old Bakery
2044	PARD Suspense Liability
2045	Sales Tax Pybl-Parks & Rec
2046	Sales Tax Pybl-Pflugerville
2047	Sales Tax Pybl-Planning Dept
2048	Sales Tax Pybl-Police Dept
2049	Sales Tax Pybl-Residential
2050	Sales Tax Pybl-Rollingwood
2051	Sales Tax Pybl-FSD Parking
2052	Sales Tax Pybl-Sanitation-Metr
2053	Sales Tax Pybl-Sunset Valley
2054	Sales Tax Pybl-TCESD
2055	Sales Tax Pybl-Uniform Service
2056	Sales Tax Pybl-Urban Transptn
2057	Sales Tax Pybl-East Travis Gateway Library Dist
2058	Sales Tax Pybl-Wells Bran Libr
2059	Sales Tax Pybl-ESD11A
2060	Sales Tax Pybl-Westbank Comm L
2061	Sales Tax Pybl-Villiage Hills
2062	Sales Tax-Austin Westbk Libr
2063	Sales Tax Pybl-Trv Cnty ESD 5A
2064	Sales Tax Pybl-Westlakehills
2065	Sales Tax Pybl-ESD6
2066	Sales Tax Pybl-ESD6A
2067	Sales Tax Pybl-Trv Cnty ESD 8
2068	Sales Tax Pybl-Trv Cnty ESD 8A
2069	Sales Tax Pybl-Trv Cnty ESD 12
2070	Sales Tax Pybl-Trv Cty ESD 12A
2074	Fuel Taxes Payable - Fleet
2071	Sales/Fed Tax Cellular Phones
2072	Sales/Fed Tax Airport Phones
2073	TIF Tax Payable Airport
2075	Sales Tax Pybl-Trv Cnty ESD 14
2076	Sales Tax Pybl-Cemetary Operation
2077	Sales Tax Pybl-Asian American Resource Center
2078	Sales Tax Pybl-Aus/DS Sp Lib D
2079	Sales Tax Pybl-Will Co ESD 1
2080	Maximo Procard Payable

Balance Sheet Account	Description
2081	3rd Party Adm-Outstanding Cks
2082	Sales Tax Pybl-Trv Cnty ESD 10
2083	Sales Tax Pybl-Trv Cnty ESD 2A
2084	Sales Tax Pybl-Trv Cnty ESD 4A
2085	Hotel Occupancy Tax (State)
2086	Sales Tax Pybl-Trv Cnty ESD 9
2087	Sales Tax Pybl-Aus/Hays Cou
2088	Sales Tax Pybl-Aus/Drp Sp/Hays
2089	Sales Tax Pybl-Aus/E Trav Gtwy
2200	Due to Agency
2201	CF-State Consolidated Fee
2208	Comprehensive Rehab Fee
2209	Consolidated Court Costs
2210	Correctional Mgmt. Institute
2211	Court Collection Agency
2212	Court-General Miscellaneous
2213	Crime Victims Compensation
2214	Criminal Justice Fee
2215	Deposit-Mun Court Time Pmt Fee
2216	Deposits-St Crimnl Justce Plng
2217	FTA Denial Of DI
2218	Fugitive Apprehension
2219	Juvenile Crime & Delinquency
2220	Law Enforcement - Muni Court
2221	Muni Ct AISD Failure To Attend
2223	Muni Court State Traffic Fee
2224	Muni Judges C E Fund
2225	Omnibase/DPS Vendor
2226	Operators & Chauffeurs License
2227	Oversize Wt Truck Fees
2228	Seat Belt & Child Safety-State
2229	Indigent Defense Fee
2236	Junvenile Diversion Fee
2230	Civil Justice Fee
2231	Child Safety Seat Fee
2235	Deposits-Water Safety State
2250	A/P-Retainage Payable
2251	Retainage Undistrib Proceeds
2255	Contracts Payable-Long Term
2256	LT Remediation Expense Pybl
2257	Contractual Oblig Due in 1 Yr
2258	Contractual Oblig Outstanding
2270	Accrued Payroll ST
2272	P/R Clearing Acct

Balance Sheet Account	Description
2273	P/R FICA Payable
2274	P/R FICA Payable/City Portion
2275	P/R-FIT
2276	P/R-Ret Contrib/Employee
2277	P/R Ret Contrib/Fire
2278	P/R Ret Contrib/Police
2279	P/R RetContrib/Empl Emp Prtn
2280	P/R Ret Contrib/Fire Emp Prtn
2281	P/R Ret Contrib/Pol Emp Prtn
2282	P/R-Deferred Compensation
2284	P/R-Union Dues & Service Fees
2285	P/R-Insurance Payable
2287	P/R-Garnishments
2288	P/R-Misc Other Payments
2289	P/R-Net Pay
2320	Accrued Comp Absences ST
2321	Accrued Comp Absences LT
2324	Claims Payable Due Within 1 Yr
2325	Claims Payable LT
2480	Due To Other Funds
2511	Deferred Fuel Revenue
2518	Deferred CBC-Energy Eff Rev
2513	Deferred TSAR Revenue
2516	Deferred Street Light Revenue
2517	Deferred Regulatory 1 Revenue
2519	Dfd CBC-Customer Asst Program
2520	Sales Tax Audit Billings
2521	Deferred Regulatory 2 Revenue
2530	Deposits-Customer
2535	Refund Checks Issued-CIS
2540	Refund Checks Subj. To Escheat
2545	N Growth Corridor-Escrow Acct
2550	Interfund Payable Long Term
2561	Deposits-Collected Deposits
2563	Deposits-Building Contractors
2564	Deposits-Cap Metro Bus Pass
2565	Deposits-Confiscation Revenue
2566	Deposits-Contract
2567	Deposits-Customer-Erosion Cont
2568	Deposits-Customer-Subj To Esch
2569	Deposits-AFD Inspect Escrow
2570	Deposits-EMS Endowment
2572	Deposits-Escrow
2574	Deposits-Heating/Air Condition

Balance Sheet Account	Description
2575	Deposits-HHSD Car Seat Deposit
2577	Deposits-Int On Subsequent Use
2579	Deposits-Lost / Found
2581	Deposits-Merch & Credit Escrow
2582	Deposits-Miscellaneous
2583	Deposits-Muni Court Cash Bonds
2585	Deposits-PARD Rental
2586	Deposits-Plumbers
2587	Deposits-Police Escorts
2588	Deposits-Police Evidence
2592	Deposits-Security Deposit-ID
2589	Deposits-Purchasing
2590	Deposits-Rentals
2591	Deposits-Rescue-Animal Shelter
2594	Deposits-Subdivn Wastewtr Inst
2595	Deposits-Subdivn Water Inst
2596	Deposits-Texas Airlines
2597	Deposits-Unrestricted Donation
2598	Donations-Gold Card
2599	Deposits-Surety Bond
2600	Deposits-Tax
2610	AS Travis County Reclaim Fee
2611	Animal Shelter-SNIP
2612	Arbitrage Rebate Payable - IRS
2613	Auto Theft Seizure Monies
2614	BCCP Certificates
2615	Bed Tax Reserve
2616	Contributions-Animal Shelter
2617	Contributions-Pet Placement
2628	Escheat Property-Treas..Office
2630	Family Health Prog Contrib
2631	Graffiti Prog Contributions Hd
2632	Fire Dept Contributions
2633	Flu Campaign-Health Dept
2670	Unearned Revenue
2671	Grant Proceeds Unearned
2672	Grant Proceeds Unearned P & I
2675	Interest Income-Pool-Clearing
2679	Notes Payable Current
2680	Notes Payable Long Term
2681	Other Deferred Credits
2682	Other Liabilities
2683	Overpayments
2684	Overpayments-Reserved

Balance Sheet Account	Description
2685	Other current liabilities - restricted (current)
2694	Property Tax-Debt Serv-P&I
2690	Parent Packet Project--HHSD
2691	Payable to Seton Medical Cntr
2693	Planning Collect-Other Funds
2695	Property Tax-Debt Serv-Del
2697	TCAD Maps Collections
2698	Treasury Cash Clearing
2699	Unidentified Collections
2713	Other Postemployment Benefits Liability - ST
2717	Deferred Expense-Unreal G/L Inv-GASB53
2718	Deferred Expense GASB 31
2780	Deferred InflowOPEB Assumpt Change
2781	Deferred Inflow OPEB Actuarial Experience
2782	Deferred Inflow OPEB Proportionate Share
2783	Deferred Inflow Pension Proportionate Share
2787	Deferred Inflow Service Concession Arrangement
2788	Assumed Bond Acc Int Pay
2789	Int Pybl Commercial Paper-Tax
2790	Accrued Interest Revenue Bonds-CPN
2791	CAB- Interest Payable
2792	Accrued Interest PPFCO
2793	Accrued Interest CO
2794	Accr Int Payable-PIB Bonds
2795	Deferred Gain on Refunding - Revenue Bonds - CPN
2796	Deferred Gain on Refunding - PIB Bonds
2797	Accum Amort of Gain on Refunding - Revenue Bonds - CPN
2798	Accum Amort of Gain on Refunding - PIB Bonds
2799	Amort of Bond Disc Revenue Bonds-CPN
2801	Clearing Account Adjustments
2802	Customer Refund Checks O/S
2804	Amortization of Discount- PPFCO
2805	Amortization of Discount- CO
2806	Excise Tax Payable--IRS
2807	Due To Pebsco
2811	Section 8 Rental Assistance
2808	Flextra Liability (Sec.125)
2809	Deferred Revenue
2810	Proceeds-Vehicle Auction
2813	Amortization of Discount- PIB
2814	Miscellaneous
2815	Accumulated Discount-Revenue Bonds
2816	Discount-PPFCO Bonds
2817	Loan Payable LT

Balance Sheet Account	Description
2818	Loan Payable ST
2819	Mueller KO Payable ST
2820	Net Pension Liability
2823	Bond Coupons Pybl (Unredeemed)
2828	Holly Decommissioning Payable
2829	Decommissioning Assess Pay ST
2831	Other Postemployment Benefits Liability - LT
2832	STP FAS 158 LIABILITY
2833	STP LIABILITY (LT)
2834	DCIAC New Serv Res CTB-2923
2835	DCIAC New Serv Com CTB 2924
2836	DCIAC Meter Fee CTB 2925
2837	DCIAC Street Lights CTB 2926
2838	DCIAC AMD 2928
2839	Discount-CO Bonds
2840	Def Contrib Fm Muni 7700-7811
2841	Def Contrib Fm MUD 7813
2842	Def Contrib St & Fed 7922
2843	Acc Amort Contrib Munic 7952
2844	Acc Amort Contrb Govt 7951
2845	DCIAC Comm Dev 7921
2846	DCIAC Other
2847	DCIAC Water Distr 7927
2848	DCIAC Constr Insp Fee 7928
2852	DCIAC Taps & Connection 7932
2849	DCIAC Approach Main Fee 7929
2850	DCIAC Appr Main Anal Fee 7930
2851	DCIAC Cap Increm Fee 7931
2853	DCIAC Sub Users Fees 7933
2854	DCIAC Privildge Fee 7934
2855	DCIAC Cap Recovery Fee 7935
2856	DCIAC Chnge Order/Ref Fee 7936
2857	DCIAC Acc Amort Dcontr 7950,29
2860	G/L Unamort on GO Bonds
2861	STP Decom-Defer 71
2862	Sec 108 HUD Loan LT
2863	Section 108 Loan
2864	NUCLEAR FUEL-DEFER 71
2865	COAL INVENTORY - DEFER 71
2866	Landfill Closure Costs Payable-ST
2867	Landfill Closure Costs Payable-LT
2868	Interest Income From Pool
2869	Liability For Decommissioning
2870	Acc Amort Disc W/WW Rev Bonds

Balance Sheet Account	Description
2871	Acc Amort Disc-Contr Rev Bnd
2872	Acc Amort G/L Rfd GO Bonds
2874	Acc Amort G/L Revenue Bnd
2875	Acc Amort G/L Sep Lien Rfd Bnd
2876	Acc Amort Prem Separate Lien
2878	Acc Amort Prem Sub Lien
2880	Discount-PIB Bonds
2881	Acc Amort Prem Rev bonds-CPN
2882	Accum Amort Premium PPFCO
2883	Amortization of Premium CO
2884	Amort of Premium PIB Bonds
2885	Premium- Revenue Bonds - CPN
2886	Premium-PPFCO
2887	Premium CO
2888	Premium-PIB Bonds
2889	Non-Nuclear Decom Def Inflow
2890	Hedging Derivative Instrument - Energy Risk Program
2894	Deferred Inflow Assumpt Change
2891	Revenue Bonds-CAB -LT
2892	Revenue Bonds-CAB -ST
2893	Deferred Inflow Pension Invest Experience
2895	Deferred Inflow Actuarial Experience
2896	Bonds Payable-NCAGC
2897	Bonds Payable-NCAGC Current
2898	Revenue Bonds-CPN -ST
2899	Revenue Bonds - CPN-LT
2900	Bonds Payable-Prior Lien Curr
2901	Bonds Payable-Sub Ln Current
2902	Bonds Payable-Premium
2903	Bonds Payable-Prior Lien
2904	Bonds Payable-Sub Lien
2905	Bonds Payable-C.O. Current
2906	Bonds Payable-C.O. Long-Term
2907	Bonds Payable-G.O. Current
2908	Bonds Payable-G.O. Long-Term
2909	Bonds Payable-Separate Lien
2910	Bonds Payable-Sep Lien Current
2911	Bonds Payable-W/WW
2912	Bonds Payable-W/WW Current
2913	Capital Acquisition Payable ST
2914	Capital Acquisition Payable LT
2915	Capital Lease Obligations-Curr
2916	Capital Lease Obligations LT
2917	Cert of Obligation LT (GO)

Balance Sheet Account	Description
2919	Cert of Obligation ST (GO)
2921	Accum Amort Discount Prior Ln
2923	Accum Amort Discount Sub Ln
2924	Accum Amort of Gain/Loss Rfdg
2925	Accr Int Pybl-Sub Lien Bonds
2926	Accr Int Pybl-W/WW Rev Bonds
2927	Accr Interest Expense Var Bond
2929	Accrued Interest Expense
2930	Accrued Interest Sub Lien
2932	Accrued Interest Prior Lien
2936	CAB Bonds Interest Pay-Curr
2933	Accrued Interest CO
2934	Accr Int Payable Contr Oblig
2935	Accr Int Payable-GO Bonds
2937	Gain/Loss on Refunding Bonds
2938	Gain/Loss on Refunding Sep Ln
2939	Premium-GO Bonds
2940	Amort of Premium G.O. Bonds
2941	Accum Amort Premium KO
2942	Acr Int Pybl TaxRev Bnds NCAGC
2943	Accrued Interest Exp-Var Notes
2944	Premium-Contract Rev Bonds
2945	Amort Premium-Rev Bonds
2946	Premium-Revenue Bonds
2947	Premium-KO
2948	Premium-Separate Lien
2949	Premium-Sub Lien
2950	Interest Payable on Loans
2951	Interest Payable Separate Lien
2954	Interest Purchased Deliv Bonds
2955	Interest Pybl Commercial Paper
2956	Commercial Paper Non-taxable
2957	Commercial Paper Payable LT
2958	Commercial Paper Taxable
2959	CAB Interest Payable
2960	Muni Ct Jury Reimbursement Fee
2961	Muni Ct Judges Personnel Comp
2962	Property Tax Reserve
2964	Net Loss on Refdng Prior Lien
2965	Net Loss on Refunding Sub Lien
2966	Constr Contracts Payable-MUDs
2967	Amort of Bond Disc Sep Lien
2968	Amort of Prem/Disc Sep Lien
2969	Amortization of Discount

Balance Sheet Account	Description
2970	Amortization of Premium
2971	Amortization of Premium CO
2972	Premium CO
2974	Discount - Prior Lien
2975	Discount - Separate Lien
2979	Discount-GO Bonds
2976	Discount - Subordinate Lien
2977	Discount Commercial Paper
2978	Discount-Contract Rev Bonds
2980	Discount-W/WW Revenue Bonds
2981	Build America Bonds LT
2982	Build America Bonds ST
2983	Premium- BAB Bonds
2984	Amort of Premium BAB Bonds
2985	Discount-BAB Bonds
2986	Amortization of BAB Discount
2987	Interest Payable-Build America Bonds
2988	Hedging Derivative Instrument
2989	Investment Derivative Instrument
2990	Conversion Vouchers Payable
2991	Conversion-Liabilities
2992	Deferred Gain on Refunding - GO Bonds
2993	Deferred Gain on Refunding - Revenue PL SL Bonds
2994	Deferred Gain on Refunding - Sep Lien Bonds
2995	Accum Amort of Gain on Refunding - GO Bonds
2996	Accum Amort of Gain on Refunding - Revenue PL SL Bonds
2997	Accum Amort of Gain on Refunding - Sep Lien Bonds
2998	Deferred Gain on Hedging Derivatives
2999	Annual Closing Offset
Equity	
3500	Fund Balance / Net Assets
3502	Restricted Fund Balance/Net As
3505	Reserve For Encumbrance
3506	Reserve For Encumbrance - UAP
3507	Reserve For Encumbrance-TK
3515	Designated Fund Bal/Net Assets
3525	Restatement of Prior Period
3533	CIP Clearing Acct For Tran 70
3542	Investment by Water
3543	Investment by Water/Wastewater
3554	Contributions - Fixed Assets
3801	Reserve For Pre-encumbrance
3802	Pre-Encumbrance

Balance Sheet Account	Description
3803	Encumbrance
3804	Reserve for Memo Pre-Encumbran
3805	Reserve for Memo Encumbrance
3807	Expenditure Offset-Automated
3808	Contributed Asset
3809	Adjustment to Fixed Asset
3810	Inventory Offset

requirements under both the cash-needs and utility-basis approach. The nature of the basis for the tax (or PILOT), as applicable to the investor-owned utility or government-owned utility, would determine how it is assigned to functional categories. If the tax is based on assessed property value, it may be appropriate to assign it to the various functions in proportion to the utility's fixed assets, or, if the property has a distinct purpose (e.g., water supply land), it may be allocated directly to the appropriate function. If the tax is based on the total income of the utility (i.e., income taxes), it may be appropriate to assign it to the various functions in proportion to the sum of the overall resulting allocation of both O&M expenses and capital-related costs. The allocation of applicable taxes is often best undertaken following the assignment of the functionalized costs to appropriate cost components, which is discussed in the following section.

ALLOCATING FUNCTIONALIZED COSTS TO COST COMPONENTS

The costs incurred in a water utility are generally responsive to the specific service requirements or cost drivers imposed on the system by its customers. Each of the various water utility facilities are designed and sized to meet one or more of these cost drivers, and the capital costs incurred in the construction/installation of these facilities as well as the O&M expenses incurred in running the system are, in turn, linked to these service requirements. The principal service requirements that drive costs include the annual volume of water consumed, the peak water demands incurred, the number of customers in the system, and the fire services required to maintain adequate fire protection. Accordingly, these service requirements are the basis for the selection of the cost categories, or *cost components*, used in the second step in the cost-of-service allocation process. The manner in which the total annual cost of service is assigned or allocated to each of these cost components is discussed in the remainder of this chapter.

Each class of customers of the water utility has a specific level of service or cost responsibility associated with each of these cost components. The discussion of these class responsibilities and the resulting distribution of the annual cost of service to each class is the subject of chapter III.2.

In allocating the annual costs of service to cost components, the specific cost components vary, depending on the basis of allocation used. The two most widely used methods of allocating costs are the base-extra capacity method and the commodity-demand method. In their respective ways, both methods of cost allocation recognize that the cost of serving customers depends not only on the total volume of water used but also on the rate of use, or peak-demand requirements. In addition, both methodologies recognize customer-related costs as a valid cost function, as well as direct fire service–related costs. Other methods of cost allocation, involving incremental, marginal, or special-use service, apply only in special situations. Legal constraints might limit the application of these other methods.

The overall cost allocation process under either the base-extra capacity or the commodity-demand method includes

- allocation of costs to the cost components of base, extra capacity, customer and fire protection costs (in the base-extra capacity method), or to commodity, demand, customer, and fire protection costs (in the commodity-demand method); and
- distribution of costs allocated to the various cost components to classes of customers according to the respective responsibility of the customer classes for each of the component costs.

The allocation of costs to cost components by the base-extra capacity method and the commodity-demand method are discussed and illustrated in the remainder of this chapter.

volatility through increased fixed charges may reduce the effectiveness of the conservation efforts and the level of water conservation.

Many utilities across North America are prohibited from eliminating rate structures with customer conservation pricing signals, even if they have identified a need for additional revenue stability. However, there are several established approaches that can protect utilities from the impacts of revenue swings even under the most aggressive conservation pricing strategies.

Alternative methods for addressing revenue volatility including the following:

- **Temporary pricing adjustments and surcharges.** As discussed later in chapter V.3, a surcharge is a charge separate from existing permanent rates and is usually implemented to collect a target amount of revenue. Rate surcharges can be a reactive yet effective tool for meeting short-term revenue shortfalls. Notably, these price changes tend to have a twofold effect: while gleaning additional revenue, it can also strengthen the pricing signal to conserve water if applied volumetrically.
- **Reserve funds.** Many utilities manage revenue volatility by funding special reserves that can be used to stabilize temporary revenue shortfalls. Rate stabilization funds are common and provide a source of funds to meet debt-service coverage covenants. Funding for the reserves is included in the utility cost of service and collected through rates or funded from additional funds generated in years where revenue exceeded budget expectations (e.g., dry weather year).
- **Conservative water sales projections in rate-making.** In developing rates, utility rate studies typically base project sales on an average/normalized sales year (three- to five-year average). This exposes the utility's revenue to risks as sales decline in response to both conservation-rate pricing signals and adverse weather. However, if a utility calculates its rates based on worst-case annual sales, this could minimize the risk. This method produces higher rates; thus, it has been suggested that utilities adopting the conservative approach also implement a customer "dividend" program. This program would return some of the funds that may be collected in excess of the utility's revenue requirement. Alternatively, more frequent rate analysis can be completed to adjust rates based on actual water sales if estimates were too conservative.
- **Ratchets.** This method uses the individual customer's peak monthly use to set the customer's base/fixed charges as a financial incentive for conservation (Woodcock 1995). It encourages customers to reduce their peak water use and lower their monthly bills (Eskaf et al. 2014). This alternative method can be burdensome for utility administrations. Thus, recalculation of the customer's base/fixed charge should be infrequent enough to reduce the utility's burden yet frequent enough to permit the customer to realize the benefit of managing water use. Because the increased fixed charge targets customers with high monthly demand, it helps the utility stabilize revenue while still sending the desired price signal.

SUMMARY

In designing rates, there are a number of options that can provide increased revenue stability to a utility. The option selected should be primarily determined based on the underlying cause of revenue erosion or volatility and whether that cause is long term or short term in nature. There are secondary concerns that should also be considered, such as the trade-off between affordability (which is naturally facilitated by low fixed charges) and revenue stability (which is naturally facilitated by high fixed charges). There is also a trade-off between conservation objectives and revenue stability—it is more difficult to

WATER ENVIRONMENT FEDERATION (WEF)

RATE COMPONENTS Wastewater rate structures typically feature some combination of fixed and variable components. Though in some cases, a single charge or rate may be applied. Fixed components are those that do not vary with the quantities of wastewater volumes and strengths contributed by a customer to the wastewater system. Variable components increase with higher flow volume or strength contributed. Additional charges may be assessed to cover specific costs from customers within the service area, or a subset of customers, based on differences in service requirements. For example, separate charges are typically developed for customers subject to industrial pretreatment or industrial waste monitoring and sampling regulation. In general, these charges are assessed on a unit cost basis whereby customers are charged per pound of extra-strength or pollutant loading (biochemical oxygen demand [BOD], total suspended solids [TSS], or other parameters). Rates for industrial surcharge customers may also reflect the direct allocation of industrial program costs to these customers (as discussed in Chapters 6 and 7). In addition, though less commonly, charges may be assessed to customers in a particular geographic area or basin where significant cost differences can be identified.

Fixed Charges. Fixed charges remain the same regardless of the volume or strength of wastewater discharged by a customer. The absence of wastewater service metering and the need to establish a stable revenue stream historically precipitated the use of fixed charges as the predominant rate form. Rate designs based on a single fixed charge component remain common today among small utility systems and in service areas without water metering. However, the use of fixed charges exclusively is steadily declining and being replaced by rate schedules that combine fixed charges with a volume rate. When used in conjunction with volume rates, fixed charges commonly take the form of (1) service charges, (2) meter charges, (3) minimum charges, or combinations thereof.

The terms *service charge* and *customer charge* are often used interchangeably and refer to a charge that is applied equally to all customers in a given billing period. Though far more common in water ratemaking than wastewater rate design, a meter charge may be implemented that establishes a fixed fee that increases with water meter size (to recognize costs for maintaining different size connections, for example).

Finally, a meter charge and service charge may be combined with a quantity allowance to establish a minimum charge. In this case, the fixed charge could recover all or a portion of volume-related costs (including infiltration and inflow [I/I] costs

allocated on a customer basis) as part of the minimum, and the customer and meter costs. The main advantage of a minimum charge approach is revenue stability. As more costs are recovered through the fixed charge, less revenue is subject to fluctuations because of customer usage patterns. The primary disadvantages of revenue recovery largely through fixed charges are potential inequities in distribution of cost responsibilities and lack of affordability for small users (i.e., customers whose usage is below the quantity allowance). Payment for quantities or services not received is contrary to cost-of-service principles. To the extent that small users may use less than the quantity allowance, they would be charged in excess of cost of service. While the amount of this excess may be a small dollar amount, it may be significant to low and fixed-income households.

Volume Rates. Volumetric rates (often referred to as commodity rates) are applied against a customer's estimated service volume (above any quantity allowances provided through minimum charges). A uniform volume rate is the most commonly used rate form for wastewater service, although declining block rates have also been used. A uniform volume rate form assesses a single rate per unit of service volume for all volumes used. In contrast, a declining block rate form applies successively lower rates to successively increasing usage blocks.

Declining block rates have been viewed somewhat more favorably in the past because of the economies of scale characteristic of utility infrastructure construction. Increasing the capacity of utility facilities did not always impose proportionate increases in costs, so lower rates for higher volume use was viewed as consistent with utility cost structures. However, over at least the last decade, there has been a precipitous movement away from declining block rates in favor of uniform volume and, for some water and wastewater utilities, inclining block designs. This trend is symptomatic of the principal disadvantages of declining block rates—namely, their deviation from recent changes in long term utility cost structures and their apparent contradiction to many communities' rate objectives, (i.e., conservation).

Constituent Rates. Whereas volume rates may be used to recover costs of average-strength wastewater, individual constituent rates are generally used for recovering extra-strength waste loads from monitored commercial and industrial customers. To the extent that components of a customer's use of a utility system can be identified and costs can be allocated for handling constituent contributions, rates by constituent may be established. For example, industrial waste customers' contributions of BOD and TSS above specified concentrations are often surcharged. In this case, industrial

[illegible] typically sampled at [illegible] Discharges are calculated by applying [illegible] per pound of [illegible]

Advantages. The advantages of this form of constituent rate are that equity may be enhanced in charges applicable to a group of industrial and commercial customers whose diversity defies development of precise customer class definitions. Wide variances in costs to serve based on significant differences in constituent loadings are addressed directly.

Disadvantages. Constituent rates require collection of customer-specific data on strength contributions. In the case of industrial waste surcharges, wastewater sampling is required. If not required for regulatory compliance, it may be difficult to justify the significant costs for this data collection. Additionally, constituent rates add to the complexity (and expense) of customer billing and administration.

RATE EVALUATION MATRIX. A rate evaluation matrix may be used to summarize the performance of alternative rate forms in terms of the utility's policy objectives. In some cases, the evaluation matrix may be used to provide a qualitative, narrative review of policy considerations, as illustrated in Table 8.2. In other cases, utilities have used a scoring system to rank alternative rate forms and facilitate communication of their selection.

DETERMINATION OF BILLING UNITS

Billing units may be categorized as being customer-, commodity-, volume-, or wastewater strength-related and, to enable cost of service-based ratemaking, are determined in conjunction with the cost allocation process. Customer billing units may be a uniform unit for each customer per billing period or the customer billing units may reflect the varying sizes of customers. Size differentiation may be estimated by using a relationship between the size of the customer's water meter, wastewater discharge connection, front-footage of lot, number of dwelling units (for multifamily housing), or other factors. The customer-related billing unit that is equal for all customers is appropriate when the costs allocated on a customer basis do not vary with customer size. If costs associated with the wastewater collection system, I/I, or other cost elements that would tend to vary with customer size have been allocated directly, a size-related customer cost component may be considered.

Table 5-3 Test requirements for new, rebuilt, and repaired cold-water meters*

Displacement Meters (AWWA C700 and C710)

	Maximum Rate (All Meters)				Intermediate Rate (All Meters)				Minimum Rate (New and Rebuilt)				Minimum (Repaired)
Size	Flow Rate†	Test Quantity††		Accuracy Limits	Flow Rate**	Test Quantity††		Accuracy Limits	Flow Rate	Test Quantity††		Accuracy Limits	Accuracy Limits
in.	*gpm*	*gal*	*ft³*	*percent*	*gpm*	*gal*	*ft³*	*percent*	*gpm*	*gal*	*ft³*	*percent*	*percent (min)*
⅝	8	100	10	98.5–101.5	2	10	1	98.5–101.5	¼	10	1	95–101	90
⅝ × ¾	8	100	10	98.5–101.5	2	10	1	98.5–101.5	¼	10	1	95–101	90
⅝	15	100	10	98.5–101.5	2	10	1	98.5–101.5	¼	10	1	95–101	90
⅝ × ¾	15	100	10	98.5–101.5	2	10	1	98.5–101.5	¼	10	1	95–101	90
¾	25	100	10	98.5–101.5	3	10	1	98.5–101.5	½	10	1	95–101	90
1	40	100	10	98.5–101.5	4	10	1	98.5–101.5	¾	10	1	95–101	90
1½	50	100	10	98.5–101.5	8	100	10	98.5–101.5	1½	100	10	95–101	90
2	100	100	10	98.5–101.5	15	100	10	98.5–101.5	2	100	10	95–101	90

Multijet Meters (AWWA C708)

	Maximum Rate (All Meters)				Intermediate Rate (All Meters)				Minimum Rate (New and Rebuilt)				Minimum (Repaired)
Size	Flow Rate†	Test Quantity††		Accuracy Limits	Flow Rate**	Test Quantity††		Accuracy Limits	Flow Rate	Test Quantity††		Accuracy Limits	Accuracy Limits
in.	*gpm*	*gal*	*ft³*	*percent*	*gpm*	*gal*	*ft³*	*percent*	*gpm*	*gal*	*ft³*	*percent*	*percent (min)*
⅝	15	100	10	98.5–101.5	1	10	1	98.5–101.5	¼	10	1	97–103	90
⅝ × ¾	15	100	10	98.5–101.5	1	10	1	98.5–101.5	¼	10	1	97–103	90
¾	25	100	10	98.5–101.5	2	10	1	98.5–101.5	½	10	1	97–103	90
1	35	100	10	98.5–101.5	3	10	1	98.5–101.5	¾	10	1	97–103	90
1½	70	100	10	98.5–101.5	5	100	10	98.5–101.5	1½	100	10	97–103	90
2	100	100	10	98.5–101.5	8	100	10	98.5–101.5	2	100	10	97–103	90

Singlejet Meters (AWWA C712)

	Maximum Rate (All Meters)				Intermediate Rate (All Meters)				Minimum Rate (New and Rebuilt)				Minimum (Repaired)
Size	Flow Rate†	Test Quantity††		Accuracy Limits	Flow Rate**	Test Quantity††		Accuracy Limits	Flow Rate	Test Quantity††		Accuracy Limits	Accuracy Limits
in.	*gpm*	*gal*	*ft³*	*percent*	*gpm*	*gal*	*ft³*	*percent*	*gpm*	*gal*	*ft³*	*percent*	*percent (min)*
⅝	15	100	10	98.5–101.5	2	10	1	98.5–101.5	¼	10	1	95–101.5	90
⅝ × ¾	15	100	10	98.5–101.5	2	10	1	98.5–101.5	¼	10	1	95–101.5	90
¾	25	100	10	98.5–101.5	3	10	1	98.5–101.5	½	10	1	95–101.5	90
1	40	100	10	98.5–101.5	4	10	1	98.5–101.5	¾	10	1	95–101.5	90
1½	60	100	10	98.5–101.5	8	100	10	98.5–101.5	½	100	10	95–101.5	90
2	100	100	10	98.5–101.5	15	100	10	98.5–101.5	½	100	10	95–101.5	90
3	160	500	50	98.5–101.5	20	100	10	98.5–101.5	½	100	10	95–101.5	90
4	250	500	50	98.5–101.5	40	100	10	98.5–101.5	¾	100	10	95–101.5	90
6	500	1,000	100	98.5–101.5	60	100	10	98.5–101.5	1½	100	10	95–101.5	90

Fluidic-Oscillator Meters (AWWA C713)

	Maximum Rate (All Meters)				Intermediate Rate (All Meters)				Minimum Rate (New and Rebuilt)				Minimum (Repaired)
Size	Flow Rate†	Test Quantity††		Accuracy Limits	Flow Rate**	Test Quantity††		Accuracy Limits	Flow Rate	Test Quantity††		Accuracy Limits	Accuracy Limits
in.	*gpm*	*gal*	*ft³*	*percent*	*gpm*	*gal*	*ft³*	*percent*	*gpm*	*gal*	*ft³*	*percent*	*percent (min)*
½	8	100	10	98.5–101.5	2	10	1	98.5–101.5	¼	10	1	95–101	90
½ × ¾	8	100	10	98.5–101.5	2	10	1	98.5–101.5	¼	10	1	95–101	90
⅝	15	100	10	98.5–101.5	2	10	1	98.5–101.5	¼	10	1	95–101	90
⅝ × ¾	15	100	10	98.5–101.5	2	10	1	98.5–101.5	¼	10	1	95–101	90

(continued)

Table 5-3 Test requirements for new, rebuilt, and repaired cold-water meters* (continued)

Fluidic-Oscillator Meters (AWWA C713)

¾	25	100	10	98.5–101.5	3	10	1	98.5–101.5	½	10	1	95–101	90
1	40	100	10	98.5–101.5	4	10	1	98.5–101.5	¾	10	1	95–101	90
1½	50	100	10	98.5–101.5	8	100	10	98.5–101.5	1½	100	10	95–101	90
2	100	100	10	98.5–101.5	16	100	10	98.5–101.5	2	100	10	95–101	90

Class I Turbine Meters, Vertical-Shaft Type (AWWA C701)

	Maximum Rate (All Meters)				Intermediate Rate (All Meters)				Minimum Rate (New and Rebuilt)				Minimum (Repaired)
Size	Flow Rate†	Test Quantity††		Accuracy Limits	Flow Rate‡‡	Test Quantity††		Accuracy Limits	Flow Rate	Test Quantity††		Accuracy Limits	Accuracy Limits
in.	*gpm*	*gal*	*ft³*	*percent*	*gpm*	*gal*	*ft³*	*percent*	*gpm*	*gal*	*ft³*	*percent*	*percent (min)*
¾	30	100	10	98–102	3	10	1	98–102	1½	10	1	98–102	—
1	50	100	10	98–102	5	10	1	98–102	2	10	1	98–102	—
1½	100	500	50	98–102	10	100	10	98–102	3	100	10	98–102	—
2	160	500	50	98–102	16	100	10	98–102	4	100	10	98–102	—
3	350	1,000	100	98–102	35	100	10	98–102	6	100	10	98–102	—
4	600	1,500	200	98–102	60	100	10	98–102	8	100	10	98–102	—
6	1,250	4,000	500	98–102	125	1,000	100	98–102	15	1,000	100	98–102	—

Class II Turbine Meters, In-Line (High-Velocity) Type (AWWA C701)

	Maximum Rate (All Meters)				Intermediate Rate (All Meters)				Minimum Rate (New and Rebuilt)				Minimum (Repaired)
Size	Flow Rate†	Test Quantity††		Accuracy Limits	Flow Rate‡‡	Test Quantity††		Accuracy Limits	Flow Rate	Test Quantity††		Accuracy Limits	Accuracy Limits
in.	*gpm*	*gal*	*ft³*	*percent*	*gpm*	*gal*	*ft³*	*percent*	*gpm*	*gal*	*ft³*	*percent*	*percent (min)*
1½	100	500	50	98.5–101.5					4	100	10	98.5–101.5	—
2	160	500	50	98.5–101.5					4	100	10	98.5–101.5	—
3	350	1,000	100	98.5–101.5					8	100	10	98.5–101.5	—
4	630	1,500	200	98.5–101.5					15	100	10	98.5–101.5	—
6	1,400	4,000	500	98.5–101.5					30	1,000	100	98.5–101.5	—
8	2,400	7,000	900	98.5–101.5					50	1,000	100	98.5–101.5	—
10	3,800	10,000	1,300	98.5–101.5					75	1,000	100	98.5–101.5	—
12	5,000	15,000	2,000	98.5–101.5					120	1,000	100	98.5–101.5	—
16	10,000	30,000	4,000	98.5–101.5					200	1,000	100	98.5–101.5	—
20	15,000	40,000	5,000	98.5–101.5					300	1,000	100	98.5–101.5	—

Propeller Meters (AWWA C704)

	Maximum Rate (All Meters)				Intermediate Rate (All Meters)				Minimum Rate (New and Rebuilt)				Minimum (Repaired)
Size	Flow Rate†	Test Quantity††		Accuracy Limits	Flow Rate‡‡	Test Quantity††		Accuracy Limits	Flow Rate	Test Quantity††		Accuracy Limits	Accuracy Limits
in.	*gpm*	*gal*	*ft³*	*percent*	*gpm*	*gal*	*ft³*	*percent*	*gpm*	*gal*	*ft³*	*percent*	*percent (min)*
2	100	300	40	98–102					35	200	25	98–102	90
3	250	800	100	98–102					40	200	25	98–102	90
4	500	1,500	200	98–102					50	250	30	98–102	90
6	1,200	2,500	300	98–102					90	500	60	98–102	90
8	1,500	3,000	400	98–102					100	500	60	98–102	90
10	2,000	4,000	500	98–102					125	500	60	98–102	90
12	2,800	6,000	800	98–102					150	750	100	98–102	90
14	3,750	8,000	1,000	98–102					250	1,000	130	98–102	90
16	4,750	10,000	1,300	98–102					350	1,500	200	98–102	90
18	5,625	12,000	1,600	98–102					450	2,000	250	98–102	90
20	6,875	15,000	2,000	98–102					550	2,500	300	98–102	90
24	10,000	20,000	2,500	98–102					800	4,000	500	98–102	90
30	15,000	30,000	4,000	98–102					1,200	6,000	800	98–102	90
36	20,000	40,000	5,000	98–102					1,500	7,500	1,000	98–102	90

(continued)

Table 5-3 Test requirements for new, rebuilt, and repaired cold-water meters* (continued)

Propeller Meters (AWWA C704)

Size	Flow Rate†	Test Quantity††		Accuracy Limits	Flow Rate	Test Quantity††		Accuracy Limits	Flow Rate	Test Quantity††		Accuracy Limits	Minimum (Repaired) Accuracy Limits
in.	*gpm*	*gal*	*ft³*	*percent*	*gpm*	*gal*	*ft³*	*percent*	*gpm*	*gal*	*ft³*	*percent*	*percent (min)*
42	28,000	40,000	5,000	98–102					2,000	10,000	1,300	98–102	90
48	35,000	50,000	6,000	98–102					2,500	12,500	1,500	98–102	90
54	45,000	60,000	8,000	98–102					3,200	16,000	2,000	98–102	90
60	60,000	70,000	9,000	98–102					4,000	20,000	2,500	98–102	90
66	75,000	80,000	11,000	98–102					4,750	25,000	3,000	98–102	90
72	90,000	90,000	12,000	98–102					5,500	28,000	3,500	98–102	90

Compound Meters (AWWA C702)§

Size	Maximum Rate (All Meters) Flow Rate†	Test Quantity††		Accuracy Limits	Change Over Point (All Meters) Flow Rate**	Test Quantity††		Accuracy Limits	Minimum Rate (New and Rebuilt) Flow Rate	Test Quantity††		Accuracy Limits	Minimum (Repaired) Accuracy Limits
in.	*gpm*	*gal*	*ft³*	*percent*	*gpm*	*gal*	*ft³*	*percent*	*gpm*	*gal*	*ft³*	*percent*	*percent (min)*
				Class I Class II									
2	160	400	50	97–103 98.5–101.5				90–103				95–101	90
3	320	1,000	100	97–103 98.5–101.5				90–103				95–101	90
4	500	1,500	200	97–103 98.5–101.5				90–103				95–101	90
6	1,000	3,000	400	97–103 98.5–101.5				90–103				95–101	90
8	1,600	4,000	500	97–103 98.5–101.5				90–103				95–101	90
10	2,300	4,000	500	97–103 98.5–101.5				90–103				95–101	90

Fire-Service Type, Type I and Type II (AWWA C703)
(Test at intermediate rate not necessary.)§

Size	Maximum Rate (All Meters) Flow Rate†	Test Quantity††		Accuracy Limits	Change Over Point (All Meters) Flow Rate**	Test Quantity††		Accuracy Limits	Minimum Rate (New and Rebuilt) Flow Rate	Test Quantity††		Accuracy Limits	Minimum (Repaired) Accuracy Limits
in.	*gpm*	*gal*	*ft³*	*percent*	*gpm*	*gal*	*ft³*	*percent*	*gpm*	*gal*	*ft³*	*percent*	*percent (min)*
				Type I Type II									
3	350	700	100	97–103 98.5–101.5									90
4	700	1,500	200	97–103 98.5–101.5				Not less				Not less	90
6	1,600	3,000	400	97–103 98.5–101.5				than 85%				than 95%	90
8	2,800	5,000	700	97–103 98.5–101.5									90
10	4,400	9,000	1,200	97–103 98.5–101.5									90

Fire Service Type, Type III (AWWA C703)

Size	Maximum Rate (All Meters) Flow Rate†	Test Quantity††		Accuracy Limits	Intermediate Rate (All Meters) Flow Rate**	Test Quantity††		Accuracy Limits	Minimum Rate (New and Rebuilt) Flow Rate	Test Quantity††		Accuracy Limits	Minimum (Repaired) Accuracy Limits
in.	*gpm*	*gal*	*ft³*	*percent*	*gpm*	*gal*	*ft³*	*percent*	*gpm*	*gal*	*ft³*	*percent*	*percent (min)*
3	350	700	100	98.5–101.5	10	100	10	98.5–101.5	4	100	10	95–101.5	—
4	700	1,500	200	98.5–101.5	30	500	50	98.5–101.5	10	100	10	95–101.5	—
6	1,600	3,000	400	98.5–101.5	60	1000	100	98.5–101.5	20	1000	100	95–101.5	—
8	2,800	5,000	700	98.5–101.5	70	1000	100	98.5–101.5	30	1000	100	95–101.5	—
10	4,400	9,000	1,200	98.5–101.5	110	1000	100	98.5–101.5	35	1000	100	95–101.5	—

* A rebuilt meter is one that has had the measuring element replaced with a factory-made new unit. A repaired meter is one that has had the old measuring element cleaned and refurbished in a utility repair shop.

† These are suggested test flows and test quantities. Testing for high rates of flow can be achieved by testing the meter at 25% of the meters rating if the manufacturer's original test certificate indicates a linear curve between 25% and 100% of the rated flow range.

†† Quantity should be one or more full revolutions of the test hand but not less than 3 min running. When limited test capabilities force the use of smaller test quantities, the resultant increase in total test uncertainties and errors need to be recognized when establishing acceptance criteria tolerance.

§ The bypass meter should be tested in accordance with the appropriate test requirements for the type of meter used.

** As this rate varies according to manufacturer, it should be determined for each type of meter tested.

Metric Conversions: in. × 25.4 = mm, gal × 0.003785 = m^3, gpm × 0.2268 = m^3/h, ft^3 × 0.02831 = m^3.

DOCKET NO. 49189

APPLICATION OF THE CITY OF AUSTIN DBA AUSTIN WATER FOR AUTHORITY TO CHANGE WATER AND WASTEWATER RATES	§ § § § §	BEFORE THE PUBLIC UTILITY COMMISSION OF TEXAS

DIRECT TESTIMONY
OF
RICHARD D. GIARDINA

ON BEHALF OF THE CITY OF AUSTIN
D/B/A AUSTIN WATER

APRIL 2019

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ATTACHMENTS

I. INTRODUCTION

Q PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Richard D. Giardina. My business address is 5619 DTC Parkway, Suite 850, Greenwood Village, Colorado 80111.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT POSITION?

A. I am employed by Raftelis Financial Consultants, Inc. (Raftelis) as an Executive Vice President and a member of the Raftelis Board of Directors. Raftelis is a finance, management and data consulting firm serving local government organizations.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. I am testifying on behalf of the City of Austin (City or Austin) doing business as Austin Water (AW).

Q. DID YOU PREPARE THIS TESTIMONY?

A. Yes. This testimony was prepared by me or under my direct supervision.

Q. WOULD YOU PLEASE CLARIFY YOUR REFERENCES TO THE CITY AND AW?

A. Yes. AW is a municipally-owned water and wastewater utility, owned by the City of Austin, a home-rule city. When I refer to AW, I am referring to the utility, which is a department functioning within the City.

Q. PLEASE GIVE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I graduated in May of 1978 from Western State College (now known as Western State Colorado University) in Colorado with a Bachelor of Arts degree with a major in

Business Administration and minors in Accounting and Sociology. That same year I began my professional career as a financial analyst with the State of Colorado Public Utilities Commission (CPUC). My full employment history is contained in Attachment RDG-1.

The opinions I provide are based on my experience in the completion of Cost of Service (COS) studies and analysis for water and wastewater utilities from across the United States, Canada, and Puerto Rico, including having served as the Project Director on AW's detailed 2008 and 2017 COS studies. I have over 40 years of utility finance and rate design experience for local government and privately-owned water, wastewater, stormwater, solid waste, electric, natural gas and telecommunications utility operations. As previously noted, I was a staff member of the CPUC for three years, during which I testified in numerous rate-related hearings. Since leaving the CPUC and in my private sector consulting role, I have provided expert witness testimony in administrative proceedings before state public utility commissions, including the Public Utility Commission of Texas (Commission), and in legal proceedings, in addition to serving on arbitration panels regarding utility rate disputes.

Additionally, I am a Certified Public Accountant licensed and registered in Colorado. I joined Raftelis in 2013 and opened the Denver office. While serving in a national role, I also lead the firm's Rocky Mountain regional practice. I have extensive managerial and financial experience including the completion of over 350 financial planning and rate studies for utilities in both the private and public sectors. My experience covers a variety of industries and technical areas, such as municipal fee development; utility cost-of-service and rate structure studies; litigation support; economic feasibility analyses; privatization feasibility and implementation studies;

impact fee studies; management and operational audits; reviews of policies, procedures, and operating practices; mergers and acquisitions; valuation services; and rate filing and reporting.

As a member of several industry associations, I have also developed industry guidelines regarding utility financial and ratemaking practices. In particular, as a long-standing member and both the Vice-Chair and Chair of the American Water Works Association (AWWA) Rates and Charges Committee, I chaired one group that prepared the first edition of the *Small System Rate* Manual (M54) and another group that re-wrote the *Water Utility Capital Financing* Manual (M29). I also chaired and oversaw re-writes of the AWWA M1 Manual—*Principles of Water Rates, Fees, and Charges*—the Sixth Edition (published in 2012) and the Seventh Edition (published in 2017). I currently serve as a Trustee and the Vice-Chair on the AWWA Management and Leadership Division.

Additionally, in 2017, I received certification as a Municipal Advisor Representative by passing the Series 50 exam. The exam for Municipal Advisor Representatives was developed as a result of the Dodd-Frank Wall Street Reform and Consumer Protection Act. Any person who engages in municipal advisory activities including development of financial forecasts that reflect assumptions about the size, timing, terms, and/or structure of future debt issues, as well as debt issuance support services for specific, proposed bond issues (including feasibility studies and coverage forecasts), must pass the Series 50 exam.

I was also a contributing author to the Water Environment Federation (WEF) book: *Financing and Charges for Wastewater Systems*, 2004. I organized and led WEF-sponsored seminars in 2010 and 2011 titled "Weathering the Storm: Is This the

Right Time for You to Form a Stormwater Utility?" These were seminars on the opportunities and challenges surrounding the creation of a stormwater utility and related funding mechanisms.

In 2011, I was appointed to a three-year term to the United States Environmental Protection Agency Environmental Financial Advisory Board; I was re-appointed in 2013 to a second three-year term.

Q. ARE YOU A MEMBER OF ANY PROFESSIONAL ORGANIZATIONS OTHER THAN THOSE PREVIOUSLY MENTIONED?

A. Yes, I am member of the American Institute of Certified Public Accountants and the Government Finance Officers Association.

Q. IS YOUR FULL EDUCATIONAL AND PROFESSIONAL BACKGROUND SET FORTH IN DETAIL ON ATTACHMENT RDG-1?

A. Yes, please see Attachment RDG-1 for my professional resume containing additional details regarding my education, qualifications and experience.

II. PURPOSE OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. In my testimony, I will address:

1. The overall Cost of Service (COS) process used to determine user charges or rates for water and wastewater service. This will be from an industry perspective and used to set the stage for how the AW approach and methodology conforms to industry practices.

2. The COS analysis and Excel-based model developed by Raftelis and how it reflects the multi-step industry process used by AW in completing the COS analysis.

3. The relevance of the cash and utility approaches to defining revenue requirements, and the use of the cash basis approach by AW in the determination of both retail and wholesale water and wastewater user charges.

4. The appropriateness of including the following items in the revenue requirements for wholesale customers:

   a. Reclaimed Water System Costs;

   b. Drainage Utility Fees Paid by AW;

   c. Debt Service Coverage.

Q. HAVE YOU UNDERTAKEN A COMPLETE COS STUDY?

A. Yes. Raftelis was retained by AW to complete a COS Rate Study (2017 COS Study), to assist in the overall rate study process, and the development of a model that could be used by AW staff in completing the COS and rate design elements of the rate study.

Raftelis also assisted AW through the Public Involvement Committee (PIC) and Wholesale Involvement Committee (WIC) process.

Q. WHAT SERVICES WERE YOU HIRED TO PROVIDE FOR THE CITY IN THIS RATE CASE?

A. Under a Professional Services Agreement dated May 19, 2016, Raftelis was retained by the City to complete a COS study for AW. In August 2017, Raftelis completed this study.

On September 19, 2017, Raftelis was again retained by the City, through an amendment to the May 19, 2016 Professional Services Agreement, to provide

professional rate consultant services in support of the Impartial Hearing Examiner process to be completed by AW. This process was suspended and our contract was later modified on October 29, 2018. At that time, AW asked Raftelis to provide assistance in support of this AW Water Rate Filing Package (RFP) before the Commission for the proposed wholesale rates to be assessed for water and wastewater service by AW to: North Austin Municipal Utility District No. 1, Northtown Municipal Utility District, Travis County Water Control and Improvement District No. 10, and Wells Branch Municipal Utility District (Petitioners).

The services provided in support of the AW RFP can be generally grouped into two areas:

1. An independent review of the COS analysis as prepared by AW Staff with a focus on evaluating the analysis for conformance to industry guidelines and practices; and

2. The review and assessment of specific cost or revenue requirement items in terms of how they should be included in the COS process, and specifically the treatment or allocation of these items for recovery from the wholesale customer class.

III. RATE FILING OVERVIEW

Q. PLEASE DESCRIBE THE COS STUDY AND THE SERVICES PROVIDED BY RAFTELIS.

A. AW initiated its COS Study in July 2016 to review the methodologies for defining and allocating costs associated with its water and wastewater systems and to update and improve the methods for determining fair and defensible rates for service to each of the customer classes—all retail and wholesale customers.

After initiating a procurement solicitation for COS study consulting services, AW hired Raftelis to conduct the rate study and support AW. Raftelis' experience includes significant COS rate consultant engagements for utilities throughout the nation. The COS Study scope of work included conducting a comprehensive COS Study according to industry guidelines and standards, facilitating and actively participating in a public involvement process, developing COS methodologies to determine customer class cost responsibilities, developing COS rate models that implemented the methodologies, and developing COS-based water and wastewater rates which are just, reasonable and defensible before the Commission.

The public involvement process was a critical component of the COS Study. As detailed by AW witness David Anders, AW developed and conducted a comprehensive public involvement process[1] which included two committees—PIC, the retail customer committee, and WIC, the wholesale customer involvement committee. Raftelis facilitated and participated in each of the PIC/WIC meetings. These committee meetings and overall PIC/WIC involvement was invaluable to the successful outcome of the COS Study and the resulting recommendations.

AW also created a website for the general public to participate in the COS Study. There were mailing lists for interested parties, opportunities for the public to submit questions and comments online, access to question responses and all the PIC and WIC meeting materials, and presentations and videos of the meetings available online.

[1] This process has been used by AW during its previous COS Studies. In the past a single committee made up of retail and wholesale customer representatives was used. However, for this particular COS Study a separate wholesale committee was established to address issues and concerns specific to the AW wholesale customers.

The COS Study public involvement process concluded in May 2017 and produced AW's initial COS Study findings and policy recommendations, which were then compiled into a Decision Point Handout that contained a discussion of the issues and a recommendation for resolution of each. AW leadership discussed each of the issues internally and made the final decisions.

Q. DID RAFTELIS UPDATE THE COS STUDY WITH UPDATED DATA?

A. The wholesale water and wastewater rates proposed in this case are the result of an updated COS Study. This updated COS uses the same decision points but with updated, actual data from a test year that concluded on September 30, 2018.

Q. COULD YOU DESCRIBE THE INDUSTRY APPROACH TO CONDUCTING A COS STUDY?

A. Yes. Let me begin by identifying the source of my position regarding the "industry approach" for both water and wastewater COS studies.

There are two definitive, authoritative sources regarding the completion of water and wastewater COS studies. These are:

1. For water: the American Water Works Association (AWWA) Manual of Water Supply Practice M1, Principles of Water Rates, Fees, and Charges, 7th Edition, 2017 (the M1 Manual).
2. For wastewater: the Water Environment Federation (WEF) Manual of Practice No. 27, Financing and Charges for Wastewater Systems, 4th Edition, 2018 (WEF Rate Manual).

While there are subtle, utility-specific terms that are used in both documents, a COS study, whether for water or wastewater, is a three-step process:

STEP 1 Revenue Requirements Analysis – This involves the determination of the utility's operation and maintenance (O&M) expenses, capital-related costs, and as necessary the consideration of other financial metrics impacting the total revenue to be generated, e.g., cash or fund balances and debt service coverage (DSC). Taken together, these items are defined as the revenue requirements of the utility and represent the total costs to be recovered through user charges for service. This description of the revenue requirements represents or is consistent with the cash basis approach. As described later in my testimony, there is a second methodology used to define a utility's revenue requirements known as the utility basis approach.

STEP 2 Cost-of-Service Analysis – The COS analysis is completed to functionalize, allocate, and equitably distribute the utility's revenue requirements or costs to the different types of customer classes served by the utility.

STEP 3 Rate Design Analysis – This involves the development of cost-based user charges (generally some combination of fixed charges and volumetric rates) to recoup the indicated customer class COS and designed to achieve the goals and objectives of the utility.

As noted in the M1 Manual, the rate design or pricing objectives used in establishing cost-based rates should be "tailored" to each utility, but the following are objectives considered by many utilities:[2]

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[2] Attachment RDG-2, American Water Works Association, M1 Manual of Water Supply Practices, *Principles of Water Rates, Fees, and Charges*, 4 (7th ed. 2017) (citing Bonbright, Albert L. Danielsen, and David R. Kamerschen, *Principles of Public Utility Rates,* Public Utilities Reports, 383-384 (2nd ed. 1988)).

- Effectiveness in yielding total revenue requirements (full cost recovery)
- Revenue stability and predictability
- Stability and predictability of the rates themselves from unexpected or adverse changes
- Promotion of efficient resource use (conservation and efficient use)
- Fairness in the apportionment of total costs of service among the different ratepayers
- Avoidance of undue discrimination (subsidies) within the rates
- Dynamic efficiency in responding to changing water supply and demand patterns
- Freedom from controversies as to proper interpretation of the rates
- Simple and easy to understand
- Legal and defensible

The meaning or definition of each objective, as well as other objectives, should be determined considering the unique attributes of the utility—not all objectives, as listed above, are appropriate for every utility. That said, the City has employed many of these objectives in the three-step process outlined in the M1 Manual. Like most utilities, AW has tailored the standard practices described in the M1 Manual to support its objectives and unique utility-community circumstances including the provision of wholesale water and wastewater service to the four wholesale customers impacted by this filing and other similarly situated customers. As previously noted, it is my opinion that the COS process used by AW in establishing the FY 2020[3] water and wastewater rates for service to both retail and wholesale customers, is consistent with industry standard practices and as such, yields reasonable, cost-based rates for service.

[3] FY 2020 is the fiscal year (FY) beginning October 1, 2019 and ending September 30, 2020.

Q. WHAT WAS YOUR ROLE IN THE DEVELOPMENT OF THE COST OF SERVICE MODELS USED BY AW?

A. As part of the AW COS Study process and consultant deliverables, Raftelis developed two COS rate models, one for water and one for wastewater. These models were delivered to AW and are the basis or starting point for filing with the Commission in this docket.

Q. HAVE YOU REVIEWED THE MODELS USED BY AW STAFF AND THE RESULTING SCHEDULES THAT MAKE-UP THE FILING PACKAGE IN THIS DOCKET?

A. Yes I have. This was necessary and required in order to assess the methodology used by AW and provide my opinion that the methodology and results conform to industry standards.

Q. PLEASE PROVIDE AN OVERVIEW OF AW'S COS MODELS.

A. These models are designed to transparently compile all revenue requirements, functionalize, allocate and distribute costs to customer classes in accordance with industry standards and COS Study decisions on methodologies, and design rates to recover the cost of providing water and wastewater service to each customer class. These models with the final methodologies therein incorporated, are expected to be used on an annual basis by AW Staff to develop any recommended rate changes until AW conducts its next COS.

The model includes worksheets containing the following components: enterprise fund summaries showing the test year budgets for the water and wastewater enterprise funds, including known and measureable changes and adjustments for DSC; an "index" showing the model tabs and identifying how each tab is linked to or used in

the COS process (this index shows how the total system gross and net revenue requirements are derived from the enterprise fund summaries); proposed outside city adjustments; existing retail and wholesale rates; test year rate revenues under existing rates; system water production metrics, customer class peaking factors and customer class sewage strengths; total system and customer class units of service data; the allocation of operating costs to customer classes; total COS summaries including the derivation of the additional revenue required from each customer class for DSC; and rate design worksheets to recover the COS for each customer class and residential bill impacts. The worksheet tabs are color coded to indicate the section of the worksheet hierarchy. The worksheet names are numbered and coordinate with individual table names. Input data sources are indicated with table headers.

As the witness who developed the COS Study, I am sponsoring the models. Fully functional Excel versions of each model, along with any supporting data source files will be provided on flash drives to the Commission in accordance with the RFP requirements contemporaneously with the filing of this Application.

IV. REVENUE REQUIREMENT OVERVIEW

Q. CAN YOU PROVIDE AN OVERVIEW OF AW'S PROCESS TO DEVELOP ITS REVENUE REQUIREMENT?

A. Yes. Total revenue requirement is the amount of funding or revenue a utility must recover through its user charges (typically a combination of fixed charges and volumetric or consumption-based rates) to cover its operating expenses and other costs. The development of AW's total revenue requirements is the first step in the COS rate setting process. The determination of the total revenue requirements is the beginning point for the setting of the overall customer class rates. The level of revenue

requirements must be sufficient to fund AW's operating and capital costs while also achieving established financial performance metrics or goals. These goals can include such financial sustainability measures as: DSC, reserve funds, and days-cash-on-hand. To the extent user charge revenue is needed to achieve these goals, it is appropriate to include such amounts in the revenue requirements of the utility. The inclusion in revenue requirements of the dollars to support financial sustainability measures is consistent with the AWWA Policy Statement: Financing, Accounting, and Rates which states:

> Revenues from water and wastewater service charges, user rates, capital charges, and other miscellaneous revenues should be sufficient to pay for annual operation and maintenance expenses, financing of capital costs, maintenance of working capital and required reserves, and achievement of defined financial performance metrics.[4]

One of the most widely used and legally required financial performance metrics for a local municipal utility is DSC; the measure of a utility's ability to repay its debt. As discussed in the Direct Testimonies of Dennis Waley and Dan Wilkerson, DSC has been an important consideration by the rating agencies in assessing the financial performance of AW and ultimately a critical factor in AW's actual cost of borrowing. As such, DSC is an important and discrete element or component of the AW revenue requirements as discussed in the Direct Testimony of Joseph Gonzales.

AW develops its total revenue requirements consistent with this AWWA Policy Statement using a comprehensive strategic financial planning process that includes O&M expenses, capital expenditures, and other funds needed to achieve and maintain its financial performance goals.

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[4] Attachment RDG-3, American Water Works Association, http://www.awwa.org/Policy-Advocacy/AWWA-Policy-Statements/Financing-Accounting-and-Rates.

AW develops its total requirements annually as part of the City's comprehensive budget process as described by AW witness Joseph Gonzales.

Q. CAN YOU DESCRIBE THE DIFFERENCE BETWEEN THE CASH VERSUS UTILITY APPROACH TO DETERMINING REVENUE REQUIREMENTS?

A. One of the fundamental decisions when preparing a COS analysis is the methodology or approach to determining total revenue requirements. There are two generally accepted and practiced methodologies of projecting revenue requirements for municipal or publicly-owned and operated water and wastewater utilities. The methodologies include the cash basis, or cash needs approach, and the utility basis. These approaches are described in detail in the M1 Manual, pages 10-18.[5]

The cash basis method of determining revenue requirements includes providing sufficient revenue to cover the total cash requirements for a given period, e.g., a given test year and/or a multi-year planning horizon. Generally, the cash basis method is used by municipally-owned utilities unless regulation (e.g., a public utility commission or equivalent regulatory body) requires the use of the utility basis. The revenue requirement components of the cash basis generally include O&M expenses, taxes or transfer payments, debt service payments, contributions to specified reserves, and the cost of capital expenditures that are not debt financed. Depreciation expense is not included within the cash basis methodology. As previously noted, the cash basis approach also includes other funds needed to achieve and maintain the utility's financial performance goals.

The utility basis method of determining revenue requirements is generally required for investor-owned utilities regulated by a utility commission or regulatory

[5] Attachment RDG-2, M1 Manual of Water Supply Practices at 10-18.

entity. The revenue requirement components of the utility basis generally include O&M expenses, taxes or transfer payments, depreciation expense, and a fair rate of return on the rate base capital investment. The utility basis is different than the cash basis in how the funding of capital infrastructure is included in the revenue requirements. While the cash basis revenue requirement includes the cash amounts and debt service payments on the debt issued to fund the capital infrastructure, the utility basis includes depreciation expense and a return on rate base.

Based on Raftelis' recommendation and input from the retail and wholesale customers through the PIC and WIC process during the 2017 COS Study, the AW Executive Team recommended the determination of revenue requirements based on the cash basis methodology for both inside city and outside city retail customers, as well as wholesale customers.

Q. HAVE YOU REVIEWED THE COMMISSION RFP FOR CLASS A INVESTOR-OWNED UTILITIES, WATER AND/OR SEWER?

A. Yes.

Q. DO YOU HAVE AN OPINION AS TO THE APPLICABILITY OF THE RFP GIVEN AW'S USE OF THE CASH BASIS METHODOLOGY?

A. Yes. In general, the RFP is intended or designed for use by investor-owned utilities and not generally applicable to municipally-owned utilities using the cash basis methodology of determining revenue requirements. This is readily indicated, and my opinion supported in part, by the title of the RFP: "Class A Investor-Owned Utilities."[6] While there are clearly elements of the RFP applicable to municipally-owned utilities,

[6] Public Utility Commission of Texas, Class A Investor-Owned Utilities, Water and/or Sewer, Rate Filing Package for Cost-of-Service Determination, 2015.

many of the filing requirements do not apply to utilities using the cash basis methodology. Excellent examples of this are sections II-B: Rate Base and II-C: Rate of Return and Financial Information. Most, if not all, of the required RFP information is directly related to use of the utility basis approach and has no relevance for a utility, like AW, using the cash basis method.

More specifically, in Docket No. 42857 the decision rendered by the Commission acknowledged and approved AW's use of the cash basis methodology for determining its revenue requirements.[7] As such, the need to determine rate base, include depreciation (and conduct depreciation studies) in revenue requirements, and derive a rate of return, are all elements of the RFP that are not applicable to AW's filing.

Q. HOW DOES AW TREAT DEPRECIATION USING THE CASH BASIS METHODOLOGY?

A. As discussed above, while depreciation expense is not a component of the cash basis revenue requirement, for AW and in general, most utilities using the cash basis methodology, depreciation does enter the COS process. One step in the COS process under a cash basis revenue requirement methodology, is the allocation of annual cash debt service payments to functional cost components: such as source of supply, treatment, transmission. It is a common practice to allocate debt service to functional cost components using the net book value of the assets by functional category.[8] Net book value is derived by subtracting accumulated depreciation from the original asset

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[7] *Petition of the North Austin Municipal Utility District No. 1, Northtown Municipal Utility District, Travis County Water Control and Improvement District No. 10, and Wells Branch Municipal Utility District from the Ratemaking Actions of the City of Austin and Request for Interim Rates in Williamson and Travis Counties*, Docket No. 42857, Order on Rehearing, Conclusions of Law Nos. 15-17 (Jan. 14, 2016).

[8] Attachment RDG-2, M1 Manual of Water Supply Practices at 60.

cost. For example, if 15 percent of the net book value of all water assets are in the treatment functional area, then 15 percent of the annual debt service amount (revenue requirement) would be allocated to the treatment function. This is exactly the methodology used by AW and this is the only "role" or place that depreciation has in the COS process; in the determination of rates for all AW customers.

Q. DID AW ADJUST THE REVENUE REQUIREMENT FOR THE FOUR PETITIONERS IN DOCKET NO. 42857?

A. As discussed in the Direct Testimonies of David Anders and Joseph Gonzales, in Docket No. 42857, the Commission issued a final Order and an Order on Rehearing which provided final rulings, including a list of required revenue requirement adjustments and the ordered water and wastewater rates for the petitioners. As discussed in more detail in the Direct Testimonies of David Anders and Joseph Gonzales, AW and the petitioners agreed that a number of specific revenue requirements should not be allocated to the four petitioners in that docket. These items were not included in the revenue requirements for the four wholesale customers impacted by this filing and outside city retail customer classes.

The Commission additionally identified fourteen revenue requirement items which were removed from the petitioners' revenue requirements in Docket No. 42857. As part of the 2017 COS Study review, AW conducted and Raftelis participated in, over 25 retail and wholesale customer involvement meetings to discuss specific water and wastewater cost allocation issues. Throughout this process, AW provided detailed information on each of the disallowed revenue requirements ordered by the Commission. Raftelis reviewed each of the revenue requirement items and provided recommendations on whether AW should include any of these items in its revenue

requirements for wholesale customers. Additionally, AW received input from all the retail and wholesale customer participants in the involvement committee meetings regarding the allocation of these revenue requirements to wholesale customers.

AW's treatment in the COS Study and my opinion regarding three of these items is discussed below.

1. Reclaimed Water System Costs

The capital costs and O&M expense costs of the AW reclaimed water system (a/k/a reuse system) are, in my opinion, appropriate for inclusion in the determination of water rates of all AW customers and specifically in the revenue requirements and rates for all wholesale customers. AW witness Stephen Coonan describes the AW reclaimed water system, operations and purpose. The costs or revenue requirements of the reclaimed system are funded from two sources: (1) rate revenues from the sales of reclaimed water; and (2) cash transfers from the water enterprise fund. The transfer from the water enterprise fund results in some portion of the reclaimed cost being included in the water revenue requirements and specifically in both the retail and wholesale revenue requirements.

It is my opinion that it is appropriate for water wholesale customers to bear some cost responsibility for the reclaimed water system in that they derive benefits from this system in terms of the added available water resources "created" by the reclaimed water system; resources available and benefitting all retail and wholesale water customers.

As noted by AW witness Coonan, the reclaimed system provides a primary function and/or benefit: the creation of "new" water resources. To the extent reclaimed water can be used in a manner that eliminates the need for potable water, the "freed-up"

potable water is a new source available to all AW water customers. For this reason, it is appropriate to include that portion of the reclaimed water costs funded via a transfer from the water enterprise fund in the revenue requirements of all AW water customers —retail and wholesale alike.

2. Drainage Utility Fees

As noted in the Direct Testimony of Joseph Gonzales, the City charges drainage utility fees to AW just as it does to all other properties/customers within the City including Austin Energy—the City-owned electric utility. The AW administrative building located within the City is assessed a drainage utility fee based on the related drainage service provided by the City to this building. If this service were not provided by the City, it would compromise/impair AW's ability to provide water and wastewater service.

In terms of inclusion in the revenue requirement in general and specifically the revenue requirement of the wholesale customers, the amount paid by AW to the City for this drainage service is no different than the cost of staff, or power and chemicals incurred to provide treated water service. These costs are a necessary, required business expense appropriately recovered from all water and wastewater customers including wholesale customers.

Q. IS AW SEEKING RECOVERY OF A GENERAL FUND TRANSFER IN THIS FILING?

A. No. AW previously included a "General Fund Transfer" in its water and wastewater cash basis revenue requirements. However, for this rate filing AW has excluded this revenue requirement item. In lieu of this item, AW has included a specific amount related to achieving its target DSC ratio. The Direct Testimonies of Dennis Waley and

Dan Wilkerson speak to the target DSC ratio, and AW witness Joseph Gonzales will describe the determination of the dollar amount and its allocation in the COS process. I will address only the appropriateness of the DSC in the development of the revenue requirement.

As I have previously noted in this testimony, AWWA specifically recognizes the importance in considering financial performance metrics in the determination of a utility's revenue requirements. The previously cited AWWA Finance, Accounting and Rates Policy Statement directly addresses this in its reference to "...defined financial performance metrics."[9] As noted by AW witness Dennis Waley the DSC ratio is a significant and widely used financial performance metric for local municipal water and wastewater utilities like AW. Its inclusion in the AW revenue requirements for both water and wastewater service for all customers—both retail and wholesale—is critical in terms of assigning cost responsibility and benefit; in terms of providing adequate revenues to cover O&M and capital project funding revenue requirements in addition to generating the revenue needed to meet other "...defined financial performance metrics",[10] i.e., DSC.

V. COST OF SERVICE METHODOLOGY

Q. CAN YOU PROVIDE AN OVERVIEW OF HOW AW COMPLETES ITS COS ANALYSIS?

A. Once the total revenue requirements have been determined, the next step in the rate study or COS process is the assignment of the revenue requirements to the customer classes and ultimately for use in the design of rates. The result of this process is to

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[9] Attachment RDG-3, AWWA Policy Statement.

[10] *Id.*

determine the COS responsibility for each of AW's customer classes that is just, reasonable and equitable to all customers. This process must also be defensible before state regulatory agencies and courts of law.

The cost allocation process includes a multiple step process which is outlined in the M1 Manual. As previously noted in my testimony, the M1 Manual provides the guiding principles for the equitable allocation and determination of COS water rates. Similarly, the WEF Rate Manual, provides the guiding principles for equitable allocation and determination of cost service wastewater rates.

The AW water and wastewater COS allocation process generally consists of the following steps:

1. Functionalization – identify annual revenue requirements by function or activity such as source of supply, treatment, pumping.
2. Allocation to Joint or Retail Only Costs – determination of whether costs should be allocated to all customer classes or to retail only which excludes wholesale responsibility.
3. Allocation to Demand and Strength Parameters – allocate functional costs to appropriate cost components such as base demand, peak demands, customer meters and bills, and fire protection.
4. Calculate System Unit Costs for each Demand and Strength Parameter – develop units of service for each demand and strength parameter by dividing total costs of each parameter by the respective total system units of service.
5. Distribute Costs – calculate Customer Class Revenue Requirements – distribute each parameter's costs to customer classes based on the unit COS and each customer classes' units of service.

This COS cost allocation process is standard industry practice based on industry accepted guidelines. AW conducted the COS Study based on these guidelines.

Q. PLEASE EXPLAIN COST FUNCTIONALIZATION.

A. After determining the total revenue requirements, the next step in the COS process is to assign these costs to utility functions. The utility function refers to an operational activity with which the cost is best identified. These functions can include source of supply, raw water pumping, treatment processes, pumping to system, storage, transmission mains, distribution mains, fire hydrants, meters, billing, administrative, and other functions. These functional categories can be further broken down to greater detail if appropriate for allocation purposes.

After revenue requirements are functionalized, the costs identified for each function can be allocated amongst AW's customer classes based on the most appropriate allocation method for that function.

Q. HOW DOES THE UTILITY DETERMINE WHETHER FUNCTIONAL COSTS ARE JOINT OR RETAIL ONLY COSTS?

A. After all the costs have been allocated to operational functions, the next step in the allocation process is to identify whether these functional costs are joint or retail only costs. Allocation of these costs to joint or retail only facilitates the equitable allocation of these costs to the appropriate customer classes based on the unique cost function and whether those functions are necessary to provide water and wastewater service to each class.

Joint costs are those that should be allocated to all customer classes because they represent functions that all customers utilize, benefit from and are necessary to provide water and wastewater services. An example of a joint cost would be water treatment facility costs which provide water treatment to produce water that is available to all customers of the utility.

Retail only costs are those that should be allocated only to retail customer classes due to the nature of these costs, which are not necessary to provide water and wastewater services to AW's non-retail, or wholesale customers. An example of retail only costs would be those related to the distribution mains. AW's wholesale customers operate and maintain their own distribution systems within their entity's boundaries. These wholesale customers do not benefit from the distribution main costs within AW's service area. Consequently, distribution main costs are allocated to retail only customers; are not allocated for recovery from the AW wholesale customers.

Q. PLEASE EXPLAIN THE NEXT STEP IN THE COS PROCESS.

A. After the determination of functional costs by joint and retail only categories, the next step in the COS process is to allocate the functional costs to demand and strength parameters. These demand and strength parameters, or cost components, will vary depending on the allocation methodology chosen. AW has chosen the Base-Extra Capacity allocation method which uses the water demand parameters of base costs, max-day usage, peak-hour usage, meters, customer billing, readiness to serve, and fire protection. For a detailed discussion of this method see the M1 Manual Chapter III.2.[11] Similarly, for wastewater strength parameters, AW uses flow, biochemical oxygen demand strength, total suspended solids, chemical oxygen demand, infiltration and inflow, customer billing, and administration.

Allocating costs to demand (water) and strength (wastewater) parameters provides the means by which unit costs can then be developed for each demand and strength parameter.

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[11] Attachment RDG-2, M1 Manual of Water Supply Practices at Chapter III.2.

Q. WHAT HAPPENS AFTER THE ALLOCATION OF COSTS TO DEMAND AND STRENGTH PARAMETERS?

A. After the allocation of functionalized costs to demand and strength parameters, the next step in the allocation process is to calculate the system unit cost for each of the parameters. To calculate the system unit cost, the total costs identified for each parameter is divided by the appropriate total number of units for that parameter. For example, the total identified water base costs would be divided by the total system water usage for the indicated test year. This calculation would result in the water system unit cost for the base cost parameter. All the unit costs would be calculated in a similar manner for both water and wastewater parameters.

The system unit costs for each parameter will then serve as the basis for calculating, or allocating, the COS for providing water and wastewater service to each of AW's customer classes.

Q. PLEASE DESCRIBE HOW TO CALCULATE CUSTOMER CLASS REVENUE REQUIREMENTS.

A. After calculating the system unit cost for each demand and strength parameter, the next step in the allocation process is to calculate or distribute each customer classes' specific revenue requirement. To calculate each customer class revenue requirement, AW must determine the appropriate number of units for each customer class for each of the demand and strength parameters. The customer class number of units would be multiplied by the unit costs for that specific demand or strength parameter. Each of the other demand and strength parameters, customer class units, and system unit costs would be similarly used to calculate the customer class responsibility for each

parameter; to distribute the revenue requirements to each class based on class-specific demand and strength characteristics.

When the total unit costs for each of the customer classes is compiled for each demand and strength parameter, the total COS for each customer class is derived.

V. RATES AND RATE DESIGN

Q. PLEASE PROVIDE AN OVERVIEW OF AW'S RATES AND RATE DESIGN

A. After revenue requirements have been equitably allocated to each of AW's customer classes, the next step is to develop rate structures and design specific rates for each customer class to recover their COS revenue requirement responsibility. The design of rates and rate structures is as much of an "art" as it is a "science". The design of rates and charges is a "science" in that it must provide adequate revenue recovery/recover the class' COS, but rates can also be designed (the "art") to meet competing price strategies and objectives. These competing price strategies and objectives might include water conservation, affordability, drought response, fixed versus volumetric cost recovery, revenue volatility, and other strategies. The chosen rate structures are likely to be different for some customer classes based on their use of water and/or pricing strategies.

AW's current rate structures include a variety of components and strategies to recover the class identified COS. These include customer charges made up of multiple components, tiered fixed charges, additional fixed charges, tiered volumetric rates, seasonal rates, and uniform flat rates.

A. Wholesale

The wholesale customers consist of individual entities which have a current wholesale contract for AW to provide wholesale water and wastewater service. These

customers are Municipal Utility Districts (MUDs), Water Supply Corporations (WSCs), Water Control and Improvement Districts (WCIDs), and other incorporated cities. Each of these wholesale customers have individual and separate fixed charges and volumetric rates. These customers are served by one or more master meters which are used to bill the wholesale customer. AW is not responsible for billing individual retail customers served by each wholesale entity.

1. Wholesale Water Rate Structure

The AW wholesale customer water rate structure includes a monthly fixed minimum charge which consists of charges for customer billing and meter related costs. These monthly minimum charges vary depending on the size of the water meter for each of the wholesale customers. In addition to this fixed charge is a minimum flat fixed charge designed to meet the fixed charge revenue goals set by AW. Additionally, the wholesale customer class has a uniform volumetric rate per 1,000 gallons of metered water use ($/1,000 gallons).

2. Wholesale Wastewater Rate Structure

The wholesale customer wastewater rate structure includes a monthly fixed customer charge for all customers. Also in place is a uniform volumetric rate per 1,000 gallons. For wholesale customers, the wastewater volumes can be based on two methodologies depending on the meter connection for each customer. If the wholesale customer has single meter connection serving the entire wholesale area, for both domestic and irrigation purposes, these customers are billed based upon a three-month winter water use average set during the December, January and February water billing periods. This winter average is set when there is minimal irrigation demand and, as such, most water consumption is returned to the wastewater system. The winter

average is used from April to March of the following year and then a new average is set. The monthly volume used for wastewater billing is the lower of either the winter average or the actual water usage for that month. By using the lower of these two, a customer would not be billed for more wastewater than what was used in water for the month.

If the wholesale customer is served by two or more master meters, one or more for domestic and one or more for irrigation purposes, then the wholesale customer is billed wastewater on a gallon for gallon basis based on the monthly water usage for the domestic meters. For the irrigation master meters, no wastewater is billed since these are irrigation-only meters, i.e., the water used is not returned to the wastewater system.

VI. RATE CASE EXPENSES

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS SECTION?

A. In this section of my testimony, I will quantify the expenses arising from my work on this case, and support their recovery as being consistent with the applicable standards and other guidance.

Q. WHAT STANDARDS DO YOU APPLY IN EVALUATING THE RATE CASE EXPENSES ASSOCIATED WITH YOU WORK?

A. First, I reviewed the Commission's rule that addresses water utilities' rate case expenses, 16 Tex. Admin. Code (TAC) § 24.44. That rule establishes that a utility may recover rate case expenses, including attorney's fees, that were incurred as a result of the filing of an application or rate change. Section 22.44 states that recoverable rate case expenses must be "just, reasonable, necessary and in the public interest."

For additional guidance, I reviewed 16 TAC § 25.245, which addresses rate case expenses for electric utilities and for municipalities participating in electric rate

case proceedings. While this rule does not apply to this case, as AW is a water and wastewater utility, it still provides helpful guidance in evaluating AW's rate case expense request, and offers a number of more detailed criteria that I use to consider the rate case expenses I quantify in this testimony.

Q. HOW SHOULD RATE CASE EXPENSES BE CONSIDERED IN THIS CASE?

A. As detailed in the Direct Testimony of David Anders, AW has submitted testimony and documentation in support of its rate case expenses incurred in preparing this Application. This includes invoices from my firm, Raftelis, for my own work on this matter. AW's preference is that rate case expenses be severed from this proceeding and considered in a separate matter that would proceed after the conclusion of this case. That way, the entirety of my expenses incurred in this proceeding can be considered by the Commission. However, if the issue is not severed, AW has requested the ability to update its rate case expenses to reflect amounts incurred from just prior to filing to the completion of the case.

Q. WHAT AMOUNT HAVE YOU OR RAFTELIS INCURRED ON BEHALF OF AW THROUGH FEBRUARY 28, 2019?

A. $49,885.95. A copy of my firm's invoices is provided as part of Schedule II-E-4.4 to the RFP.

Q. PLEASE IDENTIFY THE PARTICULAR CONSULTANTS THAT CHARGED YOUR FIRM'S EXPENSES, THEIR HOURLY RATES, AND THE TOTAL HOURS BILLED.

A. As the testifying witness in this case, I have billed approximately 96 hours, through February 28, 2019, at a rate of $310.00 per hour through October 31, 2018 and $325.00

per hour thereafter. John Wright, Manager at Raftelis, has billed 56.5 hours on his work in support of my testimony and reviewing the model, at a rate of $240.00 per hour. Angie Flores, Manager at Raftelis, has billed 9.5 hours on her work in support of my testimony and reviewing the model, at a rate $200.00 per hour through October 31, 2018 and of $210.00 per hour thereafter. The hourly rates in place through October 31, 2018 were the rates from our original contract with AW; our standard, firm-wide rates going back to the calendar year of 2017. The post-October 31, 2018 rates are the Raftelis 2018/2019 standard rates. These rates were accepted by AW when our contract for services was amended on October 29, 2018.

Q. UNDER SECTION 25.245, WHAT CRITERIA DOES THE COMMISSION APPLY TO ELECTRIC UTILITY RATE CASE EXPENSES?

A. This rule establishes more detailed standards than the rule applicable to water utilities. In the electric context, the Commission considers:

- Whether the fees paid to, tasks performed by, or time spent on a task by an attorney or other professional were extreme or excessive;
- Whether the expenses incurred for lodging, meals and beverages, transportation, or other services or materials were extreme or excessive;
- Whether there was duplication of services or testimony;
- Whether the utility's proposal on an issue in the rate case had no reasonable basis in law, policy, or fact and was not warranted by any reasonable argument for the extension, modification, or reversal of Commission precedent;

- Whether rate-case expenses as a whole were disproportionate, excessive, or unwarranted in relation to the nature and scope of the rate case addressed by the evidence pursuant to subsection (b)(5) of this section; or
- Whether the utility failed to comply with the requirements for providing sufficient information pursuant to subsection (b) of this section.

Q. IN CONSIDERING THE RULE'S FIRST CRITERION RECITED IN YOUR PREVIOUS ANSWER, ARE RAFTELIS' BILLING RATES AND THE TIME SPENT ON THE TASKS IN THIS CASE TO DATE REASONABLE?

A. Yes. I charged Raftelis' contracted rates for our work on this case. Those rates are the same rates that Raftelis charges for its other work for AW, and the same rates charged for other clients. The specific amount of time spent on the tasks in this case is, in my opinion, reasonable based on my experience in providing similar services to a number of clients in litigation and administrative proceedings like this one before the Commission.

Q. HAVE YOU REQUESTED ANY EXPENSES FOR LODGING, MEALS AND BEVERAGES, TRANSPORTATION, OR OTHER SERVICES OR MATERIALS THAT ARE EXTREME OR EXCESSIVE?

A. No. My office is located in Colorado, therefore my travel expenses to and from Colorado to Austin are included, but are not extreme or excessive. I attended meetings via teleconference when appropriate and limited travel expenses wherever possible.

Q. DID YOUR WORK ON THIS MATTER RESULT IN ANY DUPLICATION OF SERVICES OR TESTIMONY?

A. No. The coordination among consultants, AW witnesses, and attorneys in the rate case has been for the express intent that we cover all of the necessary facts while not duplicating any testimony. I believe there is no duplication.

Q. DO THE ISSUES RAISED IN YOUR TESTIMONY HAVE A REASONABLE BASIS IN LAW, POLICY, OR FACT?

A. Yes. My testimony reflects the process by which Raftelis conducted a comprehensive COS Study according to industry guidelines and standards. The testimony describes my support for several revenue requirements items, developing the COS methodologies to determine customer class cost responsibilities, developing COS rate models that implemented those methodologies, and developing COS-based water and wastewater rates which are just, reasonable and defensible before the Commission.

Q. WHAT IS YOUR CONCLUSION REGARDING RAFTELIS' ACTUAL CHARGES?

A. Raftelis' charges for the development and the provision of the COS model and testimony are reasonable, consistent with the available guidance, and are properly covered by AW in this rate case (or separate proceeding, should rate case expenses be severed and addressed in another matter).

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

Rick Giardina CPA

Executive Vice President

Mr. Giardina is an Executive Vice President with Raftelis Financial Consultants, Inc. and while serving in a national role, also leads the Rocky Mountain region business practice. His extensive managerial and financial experience spanning over 40 years, includes hundreds of financial studies serving both the private and public sector. His experience covers technical areas and industries such as local government fee development, utility cost of service and rate structure studies, litigation support, economic feasibility analyses, privatization feasibility and implementation studies, impact fee studies, management and operational audits, reviews of policies and procedures and operating practices, mergers and acquisitions, valuation services, and rate filing and reporting. He has also served as an arbitrator for several wholesale rate disputes.

As a member of several industry associations, he has also developed industry guidelines regarding financial and ratemaking practices. As a long-standing member of the American Water Works Association (AWWA) Rates and Charges Committee (chair of the Committee from 2014-2017), he chaired one group that prepared the first edition of the *Small System Rate Manual* (M54) and chaired another group that re-wrote the Water Utility Capital Financing Manual. He also chaired the re-write of *M1 – Principles of Water Rates, Fees, and Charges* (the Sixth Edition was published in June of 2012) and as chair of the Rates and Charges Committee he oversaw the production of the Seventh Edition of M1 (published in January of 2017). He is currently a Trustee and vice-chair of the AWWA Management and Leadership Division.

He was a contributing author to the Water Environment Federation (WEF) *Finances and Charges Manual*. Mr. Giardina also organized and led WEF-sponsored seminars in 2010 and 2011 titled "Weathering the Storm: Is This the Right Time for You to Form a Stormwater Utility?"; a seminar on the opportunities and challenges surrounding the creation of a stormwater utility.

In 2011, he was appointed to the EPA Environmental Financial Advisory Board serving two terms through June of 2017. The EFAB provides ideas and advice to EPA's Administrator and program offices on ways to lower the costs of and increase investments in environmental and public health protection. EFAB's work focuses on:

- Lowering the cost of environmental protection;
- Removing financial and programmatic barriers that raise costs;
- Increasing public and private contribution in environmental facilities and services; and
- Building state and local financial ability to meet environmental laws.

LITIGATION PROJECT EXPERIENCE

Mr. Giardina prepared an expert report and provided expert witness testimony in support of the Fort Collins-Loveland Water District and the South Fort Collins Sanitation District in Case Number: 2015CV030658 in District Court, Larimer County, Colorado in an action brought by a developer regarding water and wastewater Plant Investment Fees and Impact fees. His report and testimony addressed issues around industry practices in the determination and assessment of Plant Investment Fees and Impact Fees.

Mr. Giardina provided expert testimony in PUC Docket No. 42857, SOAH Docket No. 473-14-5138 in support of Austin Water in a matter brought by four of its wholesale customers. The wholesale customers raised numerous concerns including the allocation of

SPECIALTIES

- Cost of service and rate structure studies
- Litigation support
- Economic feasibility analyses
- Impact fee studies
- Management and operational audits
- Reviews of policies, procedures, and operating practices
- Public-Private Partnerships
- Mergers and acquisitions - regionalization
- Valuation services
- Rate filing and reporting

PROFESSIONAL HISTORY

- Raftelis: Executive Vice President (2013-present, 1993-1995)
- Malcolm Pirnie-Arcadis-US (2004-2013)
- Rick Giardina & Associates, Inc. (1995-2004)
- Ernst & Young (1984-1993)
- Stone & Webster Management Consultants, Inc. (1981-1984)
- State of Colorado Public Utilities Commission (1978-1981)

EDUCATION

- Bachelor of Arts in Business Administration - Western State College of Colorado (1978)

PROFESSIONAL MEMBERSHIPS

- American Institute of Certified Public Accountants
- American Water Works Association
- Government Financial Officers Association
- Water Environment Federation

CERTIFICATIONS

- Certified Public Accountant, Colorado
- Series 50 Municipal Advisor Representative

costs between water, wastewater and recycled operations, financial plan preparation, revenue requirements, cost of service and rate design. His testimony addressed issues around industry practices and the equitable assignment of costs between retail and wholesale customer groups.

Mr. Giardina prepared an expert report and provided expert witness testimony in support of the City of Westlake, Ohio in Case No. CV-12-782910 in the State of Ohio, County of Cuyahoga, against the City of Cleveland, Ohio. Consistent with the terms of its agreement, Westlake discontinued receiving wholesale water service from Cleveland and in turn Cleveland sought to recover "stranded costs" from Westlake. Mr. Giardina prepared an expert report and provided expert testimony at trial refuting Cleveland's claims on the grounds that among other things, Cleveland had been fully compensated for all investment costs and no monies were due as a result of Westlake's decision to exercise its contract rights to no longer be a Cleveland wholesale water customer. He used Cleveland's own rate study and cost of service methodology to illustrate his conclusions including how under Cleveland's utility approach to defining revenue requirements and determining rates, Cleveland's claims were without merit.

Mr. Giardina served as an expert witness in support of the El Paso Water Utilities, Public Service Board (EPWU) in a lawsuit brought by the El Paso Apartment Users Association challenging the newly implemented EPWU stormwater user fees. In addition to preparing pre-filed testimony, being deposed and providing expert witness testimony at trial, Mr. Giardina assisted legal counsel for the EPWU in the deposition of the Association's expert witness. The issues addressed by Mr. Giardina included the determination of billing units, financial plan preparation, revenue requirements, cost-of-service and rate design. The Court ruled in favor of the EPWU on all counts.

For the City of Chandler, Arizona Mr. Giardina served as Project Director in completing an outside city cost of service study. For a number of years, the City had charged outside city water customers at twice the inside City rates. The rate differential was repealed when outside city customers sought to litigate this policy. The City retained Mr. Giardina to complete a cost of service study and recommend, if warranted, an outside rate differential. The approach used included the identification of assets serving strictly outside customers and development of an allocation methodology for common facilities. The City's cash revenue requirements were converted to the utility basis for the purposes of determining the cost of outside service. Included in the cost of service was a return component based on the net rate base serving outside customers. Results of this analysis indicated that a differential was justified. The precise differential varied from 1.80 to 2.01 times inside city rates based on a variety of factors including the assignment or allocation of utility assets and the inclusion of contributed property. An automated rate model was delivered to the City and staff training was completed.

In a wholesale rate dispute between Bay City (as the supplier) and Bay County (and other municipal customers) Mr. Giardina was selected and served as the independent, third arbitrator. The rate consultant for each party served on the arbitration panel with Mr. Giardina. As the independent arbitrator Mr. Giardina presided over the hearing and drafted the arbitration decision (with input and comment from the other panel members).

Mr. Giardina was retained to participate on a three-member arbitration panel in a wholesale rate dispute between the cities of Kalamazoo and Portage, Michigan, in an attempt to avoid litigation. The panel received testimony, reviewed briefs and related materials and led a consensus building process culminating in a settlement agreement.

Mr. Giardina was retained to participate on a three-member arbitration panel in a capital recovery fee dispute between the cities of Holland and Zeeland, Michigan. The panel received testimony, reviewed briefs and related documents and rendered a written, binding opinion.

Mr. Giardina provided consulting services to legal counsel of a homeowner's association regarding water rates charged by a large municipally-owned water utility. At issue was the association's designated customer classification and the rates charged for service. The association was served through a single master meter and was responsible for the initial investment and all on-going costs associated with all facilities on their side of the metering point. This included meter reading and billing (under the association's rate structure) activities for their own retail customers. Mr. Giardina completed a comprehensive review of the utility's rate ordinance regarding customer class designations. He also evaluated a utility-prepared analysis on the cost of serving the association. His recommendations included the re-classification of the association from residential to a special "non-retail" service category or the utility's wholesale class and a rate for service reflective of the cost incurred by the utility and the service provided by the association.

Mr. Giardina provided litigation support on a contract rate dispute for one of the largest cities in the United States. For this case, the City was in litigation with ten wastewater contracting agencies (wholesale customers) who disagreed with the way their rates were calculated and implemented. Mr. Giardina assisted this west coast city in evaluating the appropriateness of using settlement amounts for general fund purposes. This included a comprehensive analysis of the City charter and code, EPA and state wastewater grant and user charge regulations, bond ordinances and covenants and governmental accounting and reporting literature.

Mr. Giardina conducted an outside city cost of service study for the City of Prescott, Arizona. In anticipation of litigation the City retained Mr. Giardina to complete a cost of service study and recommend, if warranted, an outside rate differential. The approach used included the identification of assets serving strictly outside customers and development of an allocation methodology for common facilities. The City's cash revenue requirements were converted to the utility basis for determining the cost of outside

service. Included in the cost of service was a return component based on the net rate base serving outside customers.

Mr. Giardina served as Project Manager on an engagement to provide litigation support services in a lawsuit involving the recovery of closure and post-closure costs associated with a California landfill and transfer station. Mr. Giardina was retained by counsel for the plaintiff, the landfill and transfer owner, to provide expert witness testimony relating to the process used to establish rates for the owner and to also estimate damages resulting from the regulator's disallowance of closure and post-closure costs. Mr. Giardina also assisted in the depositions of the defendant's experts and assisted plaintiff's counsel on the development of closure and post-closure litigation strategies.

Mr. Giardina served as Project Manager on an engagement for the Colorado Ute Water District to evaluate (as part of a law suit between the District and the City of Grand Junction) the financial impact if the City were to assume utility service to approximately 20% of the District's service territory. He also assisted legal counsel in preparing deposition questions and trial material.

Mr. Giardina served as an expert witness in Colorado Water Court. Mr. Giardina was retained to evaluate the feasibility of a proposed water supply project. The evaluation included a comprehensive review of work completed by witnesses for the defendant, and the development of independent technical analysis relating to the project feasibility. He assisted legal counsel in deposing other experts and was deposed by defendants outside counsel.

Mr. Giardina served as an expert witness on an engagement to provide litigation support services to the City of Thornton, Colorado. Suit was filed in Adams County District Court against the City asserting that the City violated its agreement with outside City water and sewer customers calling for non-discriminatory rates. Mr. Giardina assisted the City's outside legal counsel in preparing requests for discovery and deposition of plaintiff's witnesses and the development and presentation of expert testimony. A key issue in this case was the cost justification and the evaluation of legal precedents and industry practices regarding the development of outside city rates for utility services.

Mr. Giardina provided litigation support services in an engineering and construction lawsuit involving a major southeastern water utility and claims regarding failure or potential failure of a large diameter transmission pipeline. Mr. Giardina was retained by counsel to provide analysis and evaluation of data for the purpose of assessing damage claims asserted by the plaintiff.

Mr. Giardina served as Project Manager to provide litigation support regarding a suit involving Alpine Cascade Corporation et. al. v. Pagosa Area Water and Sanitation District, Case No. 97CV15, Archuleta County District Court. Mr. Giardina will review and analyze the financial records of the Pagosa Area District and other related tasks. One of the primary issues that will be addressed is whether the District's purported "enterprise" is being operated as a self-supporting business.

For the City of Edmonton, Alberta, Mr. Giardina was retained to provide financial and cost allocation consulting services to the City in a wholesale customer rate dispute before the Alberta Public Utilities Board. Mr. Giardina provided independent advice to the City of Edmonton regarding a broad range of rate-related issues including cost of service determination, cost allocation and rate design. He also assisted the City in the review and preparation of testimony (direct and rebuttal).

Mr. Giardina was retained to evaluate damage claims as part of a law suit regarding a contaminated water treatment plant site. His focus was on the damages, as asserted by the plaintiff, which resulted from the "inability" of the plaintiff to refinance outstanding long-term debt. Additionally, RGA assisted legal counsel and other experts in the evaluation and analysis of finance and rate-related issues.

Mr. Giardina served as Project Manager on several litigation support engagements. Responsibilities have included the development of microcomputer models for use in calculating damage claims and extensive research relating to cost and management accounting issues and preparation of testimony.

Financial Analyst for the Colorado Public Utilities Commission. While employed by the PUC, Mr. Giardina presented expert testimony in a number of rate and cost allocation proceedings before the Commission. Areas of coverage included revenue requirement determination in general and specifically numerous accounting and financial issues relating to rate base, cost of capital and the cost of service. As a member of the PUC staff he conducted several rate-related audits focusing on cost analysis and cost allocation procedures. These audits then became the basis for development of expert testimony and preparation for cross-examination.

RELEVANT PROJECT EXPERIENCE

El Paso Water Utilities Public Service Board (TX)

Mr. Giardina has assisted El Paso Water (EPW) since the late 1980's on a variety of financial topics including several different water and wastewater financial planning and rate studies and a stormwater feasibility and implementation study. He served as Project Director to assist the City of El Paso in identifying and assessing potential organizational and institutional arrangements for the management and funding of stormwater-related activities; and recommend the preferred structure for providing stormwater management and prepare an implementation plan. Subsequently, Mr. Giardina assisted the utility in the creation of the stormwater utility, development of staffing plan and organization structure, preparation of financial plan, rate design and customer billing data base all culminating with the issuance of stormwater bills 18 months after beginning the initial feasibility effort.

Mr. Giardina also served as Project Director for a water and sewer

rate and financial planning study for the City of El Paso Water Utilities Public Service Board. He evaluated several pricing alternatives including the Board's inverted residential block structure and excess use approach for nonresidential customers. Mr. Giardina projected demand reductions based on price elasticity estimates so that, when considered within the spectrum of a comprehensive water conservation program, per capita usage would decrease from 200 to 160 gallons per day by the year 2000. He also developed excess strength sewer surcharges as well as permit fees for significant industrial users and other permitted accounts.

City of Austin Water Utility (TX)

Mr. Giardina served as Project Director on two Water and Wastewater Cost of Service Rate Study contracts for the City of Austin Water Utility (AWU). These projects included cost of service and rate studies for the water and wastewater utilities and development of cost of service and rate models. He supervised the preparation several issue papers to educate and inform Public Involvement Committee (PIC) and Wholesale Involvement Committee (WIC) about issues relating to cost of service methodologies and rate design and presented issue paper topics to PIC and WIC members and the AWU Executive Committee.

Mr. Giardina also served as Project Director for a Revenue Stability Fee Study. He provided expertise relating to revenue stability efforts among water and wastewater utilities throughout the country. In addition, he researched and presented information regarding options for improving utility revenue stability to AWU staff and appointed Joint Subcommittee on AWU's Financial Plan. He assisted in the formulation of the recommendations ultimately adopted by the City including a revenue stability fee structure and associated policies.

City of San Diego (CA)

Mr. Giardina served as Project Director for a Bond Feasibility Study for the City of San Diego Municipal Water and Wastewater Department (MWWD). Mr. Giardina conducted a financial analysis to determine if current rates and proposed future rates could reasonably be expected to provide the revenues necessary to support all costs of the MWWD and City systems, including capital expenditures, O&M expenses, debt payments, debt coverage requirements, and financial reserve requirements.

Additionally, Mr. Giardina served as Project Director for a project for the City's on-going training initiative. Specifically, he led managers and staff of the Utility Department through a comprehensive financial planning and rate study program. He conducted sessions with the groups during which the fundamental concepts and approaches to financial planning, cost of service and rate design were presented.

He also served as the Project Director for a multi-phased study to assess the feasibility of implementing an individualized or water budget rate methodology.

Dallas Water Utilities (TX)

Raftelis was engaged by Dallas Water Utilities (DWU) in early 2017 to conduct a comprehensive water and wastewater cost of service rate study. DWU annually updates their cost of service model, originally developed in 2002. DWU engaged Raftelis for three primary objectives: 1) review the existing cost of service process and how it's changed from the original model, focusing on retail customers, 2) develop a new rate model for DWU's future use, and 3) design an alternative residential rate structure that improved conservation, maintained affordability, and balanced fixed cost recovery. It is anticipated that Dallas City Council and subcommittees will take action on study results in early 2018.

City of Aurora (CO)

Mr. Giardina examined user charges and impact fees as part of a water, wastewater, and stormwater rate and financial study. He developed automated financial plans and cash flow statements for each utility, further segregated into operation and system development. He also examined several alternatives for determining appropriate transfers from the City's utility operations to the General Fund. Subsequently, Mr. Giardina worked with the City to update impact fees and rates and develop a rate structure in response to a drought. He also developed a financial plan to provide the City with reasonable assurance that its costs would be funded with a combination of rate revenue and existing unrestricted cash. Conducted an update for the City utility's financial plans evaluating alternative user fee and impact fee methodologies, and developed a reclaimed water pricing policy/structure.

City of Broomfield (CO)

Mr. Giardina served as Project Director for comprehensive financial planning and system development or an impact fee study for the City's utility. The financial plan covered a five-year horizon and provided the City with revenue and expense projections for its water, sewer, and reclaimed water funds, including debt service coverage, cash position, and fund balance information. The plan encompassed the results of a CIP review, miscellaneous or specific service charge analyses, and system development fees. Mr. Giardina designed system development charges for water and sewer operations to approximate the capital cost of serving a new customer. He evaluated alternative calculation and assessment methodologies. The project also included an evaluation of issues associated with funding storm drainage capital and O&M requirements, as well as potential organizational alternatives. Mr. Giardina evaluated water pricing structures designed to achieve the City's goals and objectives and completed a rate analysis for the City's high-strength discharges and entire industrial pretreatment program. Most recent work included updates to financial planning models for the utility, as well as the preparation of recommended financial policies and development of "drought rates."

City of Chandler (AZ)

Mr. Giardina provided financial consultation to City of Chandler's utilities since 1993. He managed comprehensive rate studies that included development of long-range financial plan, analysis of outside City rate differentials, detailed study reports, and meetings with

City Council. Mr. Giardina managed a study to examine feasibility of alternative solid waste disposal options. He completed a study of water and wastewater development fees that included meeting with the Homebuilders Association of Central Arizona to address their questions.

Mr. Giardina also served as Project Director in reviewing and updating System Development Charges for solid waste, water, and wastewater operations and analyzed the cost associated with water and wastewater extensions. The overall objective of this project included: recommending development fees and charges which more equitably recover water, wastewater, and solid waste capital costs; designing a schedule of Utility System Development Charges for the five-year study period; and evaluating developer paid extension or "buy-in" charges for water and wastewater service and recommending new charges and/or procedures for the assessment, collection and refunding of such charges. Subsequently, Mr. Giardina was retained by the City to update impact fees based on newly modified utility master plans.

Regional Water Cooperation Commission (Fort Collins, CO)

The purpose of this project (completed in 2014) for the Regional Water Cooperation Commission (the RWCC) evaluated the merits of alternative regional water treatment solutions to providing drinking water to customers in Northern Colorado. More specifically, we determined if there is an opportunity to achieve operational and economic benefits for the region at-large through regionalization. Mr. Giardina is serving as Project Manager for the project.

The Tri-Districts (East Larimer County Water District, the North Weld County Water District, and the Fort Collins Loveland Water District) and the City of Fort Collins were looking at the merits of crafting a regional water treatment solution through possible creation of a regional water treatment cooperative involving the Tri-Districts and the City (the stakeholders) versus the continued operation of the two completely autonomous facilities. As was identified in the request for proposals issued by the RWCC, "...the evaluation of each entity will need to include, but not be limited to, equitable financial representation of assets and debt, cost of service equity, equitable treatment of staff and equal representation relative to governance."

During Phase 1 of the project, Mr. Giardina met with key senior representatives, (e.g., managers, directors, elected officials) from each RWCC stakeholder, over a 2-3 day period to identify key issues and opportunities related to the potential regionalization. Mr. Giardina then led all of the economic/financial analysis and worked extensively with the RWCC "working group" to define Status Quo requirements, identify regionalization options, determine data needs, create the analysis frame-work, etc. A key initial activity included the identification of any technical or institutional factors that would be considered as "non-starters" in terms of moving forward with a collaborative arrangement. This was accomplished early in Phase 1 via the interview with key management from the four entities – the conclusion being that there were not any major technical issues that should be considered "non-starters." Based on this finding, the financial analysis was undertaken to demonstrate how the region and the entities would be impacted under the current versus regionalization or collaboration scenario.

The balance of the Phase 1 and 2 efforts centered on the development of demand projections, cost estimates, and the financial plan. Key to this included assumptions regarding historic use and cost responsibility for the Tri-District's Soldier Canyon Plant, a determination of the plant "value" each of the Tri-District's members would bring to the table, and an appropriate means of acknowledging these differences. With input from the client and team, Raftelis' Mr. Giardina developed a series of options for this valuation that quantified the value "shortfall" or "excess" for each entity and included in the financial analysis how this would be recognized along with future capacity additions, financing needs, and plant investment fee or impact fee revenues.

The detailed financial analysis was used to estimate preliminary net present value costs for the region in total, as well as for each entity, over a 30-year study period under both the Status Quo and an alternative Regionalization option. The entities were presented with the preliminary findings and recommendations through a series of two separate validation workshops facilitated by Mr. Giardina that included an impact/sensitivity analysis around the major assumptions, including future demand projections, capacity sharing, and potential savings in operation and maintenance expenses due to regional efficiencies. Stakeholders were also presented with a proposed governance structure (developed and presented by another team member – a local legal firm). Based on the financial analysis, the stakeholders elected to not move forward with the regionalization alternative.

Denver Water (CO)

Mr. Giardina worked with Denver Water in a facilitation and technical assistance capacity as the utility considered changes to its rate structure. It had been over 20 years since Denver Water last made significant changes to its rate structure. Working with Denver Water staff, Mr. Giardina facilitated/lead a series of meetings with a citizen-stakeholder Rate Structure Review Committee. His role included the development of the agenda for each meeting, preparation of meeting materials, facilitation and presentation, post-meeting staff de-briefs, and assistance in the formulation and development of rate structure alternatives.

City and County of Denver (CO)

This project was the first ever bond issue ($30.7 million) for the City of Denver's (City) Wastewater Management Division and, as such, required the development of a number of "bond-related" documents in addition to the financial feasibility plan. The engagement was completed in two phases:

- Reviewed the City's ordinances and regulatory materials concerning the storm drainage utility, including the Denver revised municipal code, wastewater policies and procedures related to the assessment and collection of storm drainage fees within the City. The storm drainage capital projects 6-year and long-term needs were reviewed and the costs of services for maintaining

and operating the storm drainage utility, including assessing the current and projected financial requirements of operating the utility and the planned capital projects was assessed.
- Prepared a plan of finance, including projections of storm drainage fees which supported completion of the planned capital projects.

Seattle Water Department (WA)

Mr. Giardina served as Project Manager on an engagement to assist the Seattle Water Department in conducting a comprehensive water cost-of-service and rate study and another rate study a couple of years later. The base-extra capacity cost allocation approach was used for this study. The Department provides retail service to in-city residents and wholesale service to 29 purveyor customers. Issues examined in this study included marginal cost pricing; seasonal rate development; rate of return; and inside/outside rate differentials. He provided consulting services and direction to the Department on each of these issues.

City of Thornton (CO)

Mr. Giardina served as the Project Director for a financial planning and cost of service study consulting engagement with the City of Thornton. The City, located in the fast growing northern suburbs of the Denver metropolitan area, currently provides water utility service for a population of 125,000. With an estimated service territory population of up to 250,000 at full system build-out, the City's ten-year capital improvement program includes expenditures of approximately $560 million for water resources, treatment facilities and storage projects to meet long-term demand growth. As part of the consulting engagement, Mr. Giardina assisted the City in several key areas including: 1) the development of multiple long-range financial planning scenarios to determine the optimal capital financing strategy, 2) the preparation of a comprehensive cost of service study to identify misalignments between customer class revenue recovery and the actual cost of service; 3) the analysis of alternative water rate structures; and, 4) and an update of the City's system development charges. Throughout the consulting engagement, Mr. Giardina made numerous presentations at City Council workshops. Ultimately, the City Council approved a long-term financial planning strategy that includes the forecast issuance of $280 million in revenue bond financing. In addition, the City Council adopted three straight years of annual 13% increases and new system development charges featuring a $4,255 increase in single family residential connection fees.

Adams County (CO)

Raftelis completed a Stormwater Utility Credit Study for Adams County (County), of which the outcome was to develop guidelines, policies, and procedures for offering utility fee credits to customers in the Adams County Stormwater Utility. The team completed a preliminary review of the stormwater program and utility documentation, financial materials, billing data, and the Stormwater Management Task Force meeting materials and minutes. Raftelis visited sites around the utility service area that were representative of existing stormwater management or special drainage conditions. The team's summary of these site visits and an overview of available credit types were presented to utility staff and the County board along with the preliminary Raftelis recommended program structure. We used program costs and other data to determine maximum available credits and estimate the revenue impacts of implementing the program. Raftelis recommended that the utility implement a limited credit program, focused primarily on incentivizing treatment practices that result in improved water quality or reduced peak flow or runoff volume. Recommendations were based on analyses of the utility's costs and a determination of which costs have the potential to be reduced through customers' stormwater treatment or activities, and which costs could not be further reduced through these means. Finally, Raftelis estimated the potential revenue impact of implementing the recommended credit program.

City of Boulder (CO)

Mr. Giardina served as Project Director for an ongoing water, wastewater, and storm drainage rate study initiated in 2016. The study includes a detailed review of policies and practices incorporated in separate utility rate models maintained and updated by the City for validation and/or modification as well as a comprehensive review of improvements to the utility rate structures. The City implemented an individualized customer water budget based rate structure in 2007 and this study will include a review of how well the rate structure accomplished the intended goals. The City's wastewater utility faces increased capital costs associated with increased regulatory requirements combined with repair and replacement requirements. The City's stormwater collection and drainage systems are faced with equitably recovering increased operating and capital requirements associated with increasing storm drainage service levels following the flooding experienced by the City in the fall of 2013. Alternative water, wastewater and storm drainage rate structures will be developed that incorporate adjustments that better align the rate structures with the City's financial and rate setting goals and objectives. The alternative rate structures will be completed to the existing rate structure updated for increased utility revenue needs and a January 1, 2017 effective date. Raftelis also reviewed the City's revenue requirement and provided recommendations to the Utility debt service coverage and cash reserve policies.

Throughout the project, Raftelis worked extensively with City staff to review and refine study findings and recommendations. Raftelis and City staff will present interim and final study recommendations to the standing Water Resource Advisory Board (WRAB) to provide direction regarding policies, practices and adjustments to the utility rate structure for review and approval by City Council.

Mr. Giardina also served as Project Director on an engagement to conduct a management study of the City's development review process. This study evaluated the organization and operating processes in place and also included a review of the degree to which various functions could be and/or should be automated. A third area of study included a comprehensive review and revision of the City's design standards manual.

Northern Colorado Water Conservancy District (CO)

The Northern Colorado Water Conservancy District and its Munic-

ipal Subdistrict provide water to Northeastern Colorado from the Colorado-Big Thompson and Windy Gap projects. Their customers are primarily cities, towns, rural-domestic water districts and industries with year-round deliveries. Mr. Giardina met with the District Board to provide an overview of the water rate process that the District might use to develop water rates. Virtually all of the customers served by the District are wholesale customers requiring special considerations in the water rate process. He also was the finance/economics team leader on the District's alternatives analysis projecting 2003-2004.

City Council of Salt Lake City (UT)

Mr. Giardina has assisted the City and its Utility since the early 1990's on a variety of financial topics including five different water and wastewater financial planning and rate studies. He led the Council through a process of identifying and ranking water rate or pricing objectives. This effort resulted in the adoption of a seasonal rate approach (the existing method was a uniform rate). Based on the most recent rate study, the City has adopted a combination fixed-block rate for its residential accounts and a customer-specific block approach for nonresidential accounts. This approach was the result of a comprehensive evaluation of rate options using a 20-member citizen committee.

He also assisted the City Council in developing financial policies and leading a discussion regarding pay-as-you-go versus debt financing for capital projects, and in providing a detailed analysis of a bonding proposal. The work included General Fund activities as well as water, sewer, and storm drainage operations. Mr. Giardina analyzed such issues as alternative financing vehicles (including impact fees) and customer/taxpayer impact analyses. He completed a rate alternative workshop with the City Council which led to the implementation of a seasonal (replacing a uniform) water rate structure. Mr. Giardina developed alternative strength-based sewer rate methodology and assisted the Utility in implementation of both user rates and impact fees.

City of Phoenix (AZ)

Mr. Giardina was retained by the City of Phoenix (City) Water Services Department to develop a long-range financial planning model of the City's water and wastewater utilities. The models, to be used by Department Management and the Natural Resources subcommittee of the City Council, had the capability to examine alternative funding sources for the capital improvement program and project results of operations in overall cash flows. The financial parameters of the City were incorporated into the model so that such indicators could be readily reviewed to ensure that debt service coverage requirements were met or that the use of debt to fund capital projects did not exceed target levels.

As part of an on-going contract with the Department, he converted this model for use with the wastewater utility. The wastewater financial planning model was enhanced so that the revenue requirement can be projected by customer class. The primary reason for this enhancement was to provide the Department with the ability to analyze the impact that anticipated upgrades to the City's two wastewater treatment plants would have on various customer classes. These upgrades were necessary to comply with anticipated NPDES permit requirements.

On another project he served as the Project Director for a comprehensive review of the City's water and wastewater utility models and in defining and evaluating affordability concerns. This process included one-on-one meetings with City Council members and their staff to provide a briefing on the rate work and specifically, the topic of affordability.

City of Tucson (AZ)

Mr. Giardina served as Project Manager in providing rate and financial services for Tucson Water under a multi-year contract for services, including cost allocation and alternative rate design considerations. Specifically, he assisted the City in analyzing the rate blocks for its inclining block water rate structure and customer class designations. He developed new impact fees and provided recommendations on revenue projections and financial modeling.

City of Reno (NV)

Mr. Giardina served as Project Director on this comprehensive wastewater rate study. He directed the consulting team in developing a financial model that was used to evaluate revenue sufficiency, determine the cost of providing wastewater service including charges for excess-strength discharges, and determine equitable connection fees based on the cost of expansion. His interactive approach facilitated the development of a rate structure that was legally defensible, and met the City's goals related to rate defensibility and equitably paying for growth. Unanimous consensus was reached in all forums and the project ended with a unanimous vote by the City Council to adopt all recommendations.

City of Santa Fe (NM)

Mr. Giardina served as Technical Advisor on a project to conduct a financial feasibility study. He evaluated the financial implications of City acquisition of the privately-owned water company. Project objectives included: (1) developing operational costs and revenues; (2) analyzing integration and start-up costs; (3) developing a financial plan for acquiring the water company; (4) determining capital improvement funding requirements; (5) computing a probable range of values for the water company; and (6) quantifying the rate impacts of acquisition on existing customers.

Metropolitan Water District of Southern California (CA)

In 2007-2009, Mr. Giardina facilitated a series of workshops with management, member agencies and stakeholders to assess the economic, political and technical feasibility of a growth-related infrastructure charge. He led workshops to inform participants of the prevailing industry standards for adhering to cost of service principles and navigating California's complex legal environment. Again, in 2011, he lead the Long Range Financial Planning process with a focus on better aligning fixed costs with fixed revenue sources in addition to evaluating a number of financial-related issues.

From 2015 to 2016, Mr. Giardina developed alternatives to the current MWD 100% variable rate methodology for treated water service. He lead efforts to frame and develop a number of fixed charge alternatives considering the basis or rationale for historic investments in treatment capacity and the demand characteristics of the MWD Member Agencies, i.e., average, peaking and standby demands. During 2018 he assisted MWD through the evaluation of cost of service and rate methodologies relating to an upcoming recycled water project and the California WaterFix.

City of San Jose (CA)

Mr. Giardina served as Project Director on a study to develop pricing methodologies and rate structures for non-residential water users. He evaluated the range of options available for recovering the cost of providing water service to non-residential customers. The evaluation entailed a conceptual assessment of alternative user charge approaches based on demand characteristics.

Mr. Giardina served as Project Director to conduct a customer class cost-of-service study using a conservation rate approach and developed impact fees to recover costs associated with major facilities required to serve new development in the City's service area. He developed a methodology for determining amounts to be transferred annually to the City's General Fund. He also developed a microcomputer rate and financial planning model to project rates over a five-year time frame. Public input on both the user charges and impact fees were considered when developing the final study recommendations.

Honolulu Board of Water Supply (HI)

Mr. Giardina served as Project Director on an engagement to conduct a comprehensive rate and financial planning study for the Honolulu Board of Water Supply. He developed several alternative rate methodologies that addressed the pricing objectives of the community. These included the development of impact fees by functional area (e.g., supply, treatment). A major interest to the client was the consideration of a conservation pricing structure which included an increasing unit charge for increasing amounts of water consumed.

In addition, he completed a study for the Board to examine the relationship between impact fees, user charges and conservation pricing and develop a recommended rate and financial plan. This was completed with the development and use of an automated rate, financial planning, and customer impact model.

Puerto Rico Aqueduct & Sewer Authority (Puerto Rico)

Mr. Giardina served as Technical Advisor for the review of financial forecasts in support of planned capital financing for the Puerto Rico Aqueduct & Sewer Authority (Authority) multi-year capital needs in support of new money and refunding bond issues, and for completing a comprehensive rate study. Mr. Giardina represented the Authority in meetings and presentations with rating agencies and insurance companies for their first public issue in over a decade. The financial forecast and additional work completed included a comprehensive assessment of efficiency initiatives, resulting increases in revenues and/or decreases in expenditures. This effort proved to be critical in building credibility with the rating agencies as the Authority sought to raise capital through a series of bond issues.

PRASA has made considerable progress becoming more efficient in the last 10 years; reducing its workforces from over 7,000 to now roughly 5,000 employees, eliminating over a dozen treatment facilities, and increasing productivity by over 10 percent. Despite these positive changes, PRASA still deals with a relatively poor service population, high energy costs, and restrictive Commonwealth rules and regulations. Mr. Giardina and the Raftelis team performed an assessment of PRASA's organization, operations and finances to find additional opportunities for efficiency. The project is also providing an independent assessment of the organization for perspective buyers of PRASA bonds and commercial debt.

City of Winnipeg (Canada)

Mr. Giardina served as Project Director for an organizational and financial management study for the City of Winnipeg Waterworks, Waste & Disposal Department to evaluate the potential for creating a stormwater utility and establishing a means of financing both capital and operations and maintenance costs.

Breckenridge Sanitation District (CO)

Mr. Giardina served as Project Manager to develop a Plant Investment Fee unit amount sufficient to ensure that past and future investments made by the District to provide service to new development were recovered from this same group. A phase-in plan was recommended which would increase the current PIF by over 40% between June of 1998 and January of the year 2000. Through a series of public hearings RGA presented information regarding the proposed PIF and implementation plan which was adopted by the District without any opposition from affected stakeholders.

OTHER RELEVANT PROJECT EXPERIENCE

- City of Albuquerque (NM) - Various Rate Studies since the early 1990's
- City of Aurora (CO) – Water, Wastewater, and Stormwater Rate and Financial Study
- City of Austin Water Utility (TX) – Water and Wastewater Cost of Service Rate Study and Revenue Stability Fee Study
- Bear Creek Water and Sanitation District, Lakewood, Colorado – Water and Wastewater Rate and Financial Planning Study
- Bancroft Clover Water & Sanitation District, Lakewood, Colorado – Water and Wastewater Rate and Financial Planning Study
- City of Boulder (CO) – Management Study of the City's Development Review Process
- City of Broomfield (CO) – Financial Planning and System Development or Impact Fee Study
- City of Buckeye (AZ) – Water and Wastewater Rate and Financial Planning Study
- City of Chandler (AZ) – Water, Wastewater, and Solid Waste Rate and Financial Planning Study, and Solid Waste Disposal Study
- Crestview Water & Sanitation District, Denver, Colorado –

Water and Wastewater Rate and Financial Planning Study
- City of Dallas (TX) – Water and Wastewater Rate and Financial Planning Study
- City and County of Denver (CO) – Bond Feasibility and Storm Drainage Financial Planning Study
- Eastern Municipal Water District (CA) – Potable Water System Access Policy and Rate Development
- El Paso Water Utilities Public Service Board (TX) – Stormwater Utility Creation
- Town of Gilbert (AZ) – Solid Waste, Water, and Wastewater Financial Planning Study
- Grand River Dam Authority (TX) – Management Audits
- City of Hobbs (NM) - Rate Study
- Honolulu Board of Water Supply (HI) – Rate and Financial Planning Study
- Town of Jackson (WY) – Water and Sewer Rate Study
- Joint Powers Water Board (WY) – Forecast and Feasibility Study
- City of Lakewood (CO) – Water and Wastewater Rate and Financial Planning Study
- City of Laramie (WY) – Water and Sewer Cost of Service Rate Study and Assisting Privatization of New Wastewater Treatment Facility
- City of Las Vegas (NV) – Solid Waste Financial Planning Study
- Little Rock Water Works (AR) – Management Study
- Metropolitan Water District of Southern California (CA) – Growth-Related Infrastructure Charge Workshops and Cost of Service Review and Litigation Support
- City of Newport Beach (CA) – Water Cost of Service Study, Financial Plan, Evaluation and Implementation of a Conservation Rate Structure
- City of Nogales (AZ) – Water and Wastewater Management Study and Organizational Assessment
- Northern Colorado Water Conservancy District (CO) – Water Rate Process Overview and Alternatives Analysis
- City of Oxnard (CA) – Projection of Water User Charge Revenues
- City of Phoenix (AZ) – Water and Wastewater Rate and Financial Planning Study, Long-Range Financial Planning Model, Bond Feasibility and Parity Debt Studies
- City of Pocatello (ID) – Sanitation, Water, and Wastewater Rate and Cost of Service Study
- Puerto Rico Aqueduct & Sewer Authority (Puerto Rico) – Review of Financial Forecasts and Rate Study
- City of Reno (NV) – Wastewater Rate Study
- Rio Rancho (NM) - Rate and Impact Fee Studies
- City of Rohnert Park (CA) – Impact Fees and Rate Model
- City Council of Salt Lake City (UT) – Conducted Ranking of Water Rates or Pricing Objectives
- City of San Diego (CA) – Bond Feasibility Study and Financial Planning and Rate Study Training Program
- City of San Jose (CA) – Pricing Methodologies and Rate Structure Development
- City of Santa Fe (NM) – Financial Feasibility Study
- Santa Fe Metropolitan Water District (NM) - Rate Study
- City of Santa Rosa (CA) – Water and Wastewater Rate Development
- Seattle Water Department (WA) – Water Cost of Service Study, Water Rate Study, and Revenue Stability Fee Study
- City of Sheridan (WY) – Water, Sewer, and Sanitation Financial Planning Study
- St. Louis Metropolitan Sewer District (MO) – Management Audit
- City of Thornton (CO) – Water and Wastewater Financial Plan and System Development Fee Study
- City of Tucson (AZ) – Cost Allocation and Alternative Rate Design Considerations
- City of Winnipeg (Canada) – Organizational and Financial Management Study
- Woodmoor Water and Sanitation District No. 1, Monument, Colorado – Water and Wastewater Rate and Financial Planning Study

SPECIAL RECOGNITION

- Appointed to the EPA Environmental Financial Advisory Board, 2011-2017
- Member, Vice-Chair and Chair – Rates and Charges Committee, American Water Works Association, 1999 to 2016
- Trustee and Vice-Chair – Management and Leadership Division, American Water Works Association, 2016 - present
- Financing and Charges Task Force, Water Environment Federation
- Water Rates Summit, Invited Expert, Alliance for Water Efficiency (AWE), The Johnson Foundation, August 2012 and April 2014
- Utility Management Committee, Water Environment Federation, 2005 to 2011
- Water For People, Annual Fund Raising Event, Organizing Committee, 2006 to 2012
- Utility Management Conference, AWWA-WEF, past co-chair and organizing committee, 2005 to 2010
- Conference President, the Growth and Infrastructure Consortium (formerly known as the National Impact Fee Roundtable), Annual Conference, Denver, CO, October 2005
- Board Member, East Cherry Creek Valley Water & Sanitation District, CO 2001 to 2002

PUBLICATIONS/PRESENTATIONS

- Giardina, R.D., Teodoro, M., Reid, C., LaFrance, D., "Water Utilities Issues Forum – Affordability," panel discussion at the Annual Conference and Exposition of the American Water Works Association, June 14, 2018.
- Giardina, R.D., Cramer, C., "How Much Does It Cost To Build Here," presented at the Growth and Infrastructure Consortium Annual Conference, Denver, CO, October 13, 2016.
- Giardina, R.D., Gaur, S., Kiger, M.H., Zieburtz, W., "Committee Report: Ripples From the San Juan Capistrano Decision," Journal – American Water Works Association, September 2016, Volume 108, Number 9.
- Giardina, R. D., "What's In Your Rates?", presented at the Colorado Water Congress, 2016 Summer Conference, Steamboat

Springs, CO, August 24, 2016.
- Giardina, R.D., Ash, T., "Constructing Successful Rates: The Art and Science of Revenue and Efficiency," presented at the 5th Annual WaterWise Pre-Conference Workshop, Denver, CO October 24, 2013.
- Giardina, R.D., Ash, T., "Constructing Successful Rates: The Art and Science of Revenue and Efficiency," presented at the 5th Annual WaterWise Pre-Conference Workshop, Denver, CO October 24, 2013.
- Giardina, R.D., Ash, T., Mayer, P., "Constructing Successful Rates," presented at the WaterSmart Innovations Annual Conference, Las Vegas, NV, October 4, 2013.
- Giardina, R.D., Burr-Rosenthal, Kyrsten, "Considering Water Budget Rates? One City's Approach," presented at the 2013 CA-NV AWWA Spring Conference, Las Vegas, NV, March 27, 2013.
- Corssmit, C.W., Editor, and contributing editors, reviewers, and technical editors: Hildebrand, M., Giardina, R.D., Malesky, C.F., Matthews, P.L., Mastracchio, J.M., "Water Rates, Fees, and the Legal Environment," American Water Works Association (AWWA), 2nd Edition, 2010. ISBN 978-1-58321-796-2.
- Giardina, R.D., "Is This the Right Time for You to Form a Stormwater Utility?," presented at a Seminar on Weathering the Storm: Is This the Right Time for You to Form a Stormwater Utility? sponsored by the Water Environment Federation (WEF), Alexandria VA, May 18, 2010. This seminar was also presented in 2011. See also http://www.wef.org/blogs/blog.aspx?id=7312&blogid=17296
- Giardina, R.D., "Financial Viability - Can Budget or Individualized Water Rates Work for You?," presented at the Utility Management Conference sponsored jointly by the American Water Works Association and Water Environment Federation (AWWA/WEF), San Francisco CA, February 21-24, 2010.
- Giardina, R.D., "Attaining Sustainable Business Performance Finance - Water Budget Based Rates," presented at a Meeting of the Association of Metropolitan Water Agencies (AMWA), New Orleans LA, October 20, 2008.
- Jackson, D.E., Giardina, R.D., "Financing Options for Drinking Water CIP Projects," presented at a Seminar sponsored by the Arizona Water and Pollution Control Association (AWPCA) on Treatment Technologies for Compliance with the Stage 2 Disinfection Byproducts Rule, Phoenix AZ, February 16, 2006.
- Giardina, R.D., "Impact Fee with a Defined Short-Term Build-Out Horizon," presented at the National Impact Fee Roundtable, Naples FL, October 22, 2004.
- Giardina, R.D., "Calculating Impact Fees: Methods," presented at the American Planning Association State Conference, Vail CO, September 24, 2004.
- Giardina, R.D., "Funding Local Government Services," presented at the 97th Annual Convention of the Utah League of Cities and Towns, Salt Lake City UT, September 15, 2004.
- Giardina, R.D., "Understanding Water Issues in Arizona," presented at the Government Finance Officers Association Summer Training Program, Tucson AZ, August 20, 2004.
- Giardina, R.D., "Impact Fees: A Vote of Confidence for Economic Growth?," published in Colorado Government Finance Officers Association (GFOA) Footnotes, December 2003, the Arizona GFOA Newsletter, January 2004, and the Illinois Government Finance Leader, Spring 2004.
- Giardina, R.D., "Impact Fee Basics / Impact Fees with a Defined Short-Term Build-Out Horizon," presented at the National Impact Fee Roundtable, San Diego CA, October 16, 2003.
- Giardina, R.D., "Local Government Utilities Establishing Rates for Service," presented at Arizona State University, Phoenix AZ, September 23, 2003.
- Giardina, R.D., "Selecting a Water Rate Structure through Public Involvement," presented at the Annual Conference of the American Water Works Association, Intermountain Section, Jackson Hole WY, September 17, 2003.
- Giardina, R.D., "Ratemaking 101," presented at the Government Finance Officers Association of Arizona, Summer Training, Flagstaff AZ, August 22, 2003.
- Giardina, R.D., "Impact Fees," presented at the Colorado Government Finance Officers Association, Metro Coalition, Golden CO, May 9, 2003.
- Giardina, R.D., "Impact Fees – A Primer," presented at a Conference of the Colorado River Finance Officers Association, Parker AZ, February 4, 2003.
- Giardina, R.D., "Impact Fees and Economic Development," presented at the Annual Conference of the Colorado Government Finance Officers Association, Vail CO, November 20, 2002.
- Giardina, R.D., "Case Study: City of Chandler, Arizona, Utility System Development Charges," presented at the National Impact Fee Roundtable, Phoenix AZ, October 24, 2002.
- Giardina, R.D., "Using Impact Fees to Fund Streets and Roads," presented at the Utah League of Cities and Towns 2001 City Streets and County Road School Convention, St. George UT, April 25, 2001.
- Giardina, R.D., "Addressing Capital Needs," presented at the Utah League of Cities and Towns Mid-Year Conference 2001, St. George UT, April 5, 2001.
- Giardina, R.D., "Fine Tuning Your Rate Structure Using a Citizen Committee," presented at the Annual Conference and Exposition of the American Water Works Association, Denver CO, June 14, 2000.
- Giardina, R.D., "Impact Fees without Getting in Trouble," presented at the Annual Convention of the Utah League of Cities and Towns, St. George UT, April 13, 2000.
- Giardina, R.D., "Impact Fees for Small Communities," presented at the Annual Convention of the Utah League of Cities and Towns, Salt Lake City UT, September 16, 1999.
- Giardina, R.D., "Trends in Privatization," presented at a Conference of the Water Environment Association of Utah, St. George UT, April 24, 1998.
- Giardina, R.D., "Isn't Competition Wonderful?," presented at the Joint Technical Advisory Committee (JTAC) of the American Water Works Association, Rocky Mountain Section and the Rocky Mountain Water Environment Association, Denver CO, February 26, 1998.
- Giardina, R.D., "Strategies and Approaches for the Development of Utility Impact Fees," presented at the Annual Conference of the Rural Water Association of Utah, Park City UT, August 25,

1998; and the Joint Annual Winter Conference of the Water Environment Association of Utah/American Water Works Association, Intermountain Section, Salt Lake City UT, January 21, 1998.

- Giardina, R.D., "Private Sector Competition - What Is It? Who Does It? and Can It Help You?," Workshop presented at the 1997 Joint Annual Conference of the American Water Works Association, Rocky Mountain Section and the Rocky Mountain Water Environment Association, Ruidoso NM, September 14, 1997.
- Giardina, R.D., "Impact Fees as a Capital Financing Approach," presented at a Conference of the Rocky Mountain Water Environment Association, Denver CO, January 30, 1997.
- Giardina, R.D., "Conservation Pricing: Meeting Your Conservation Objectives," presented at the Joint Annual Conference of the American Water Works Association, Rocky Mountain Section and the Rocky Mountain Water Pollution Control Association, Sheridan WY, September 10, 1995; and the Annual Conference of the American Water Works Association, Kansas Section, Wichita KS, September 25, 1996.
- Giardina, R.D., "Turnkey vs. Conventional Approach to Biosolids Facility Construction," presented at the 10th Annual Residuals and Biosolids Management Conference: 10 Years of Progress and a Look Toward the Future, Denver CO, August 20, 1996.
- Giardina, R.D., Ambrose, R.D., Olstein, M., "Private-Sector Financing," Chapter 15, Manual of Water Supply Practices, M47 - Construction Contract Administration, 1996. American Water Works Association.
- Giardina, R.D., "Contract Operations," Chapter 15, Operation of Municipal Wastewater Treatment Plants, Manual of Practice-MOP 11, Fifth Edition, 1996. Water Environment Federation.
- Giardina, R.D., "Selecting an Appropriate Contract Operator," presented at the 1995 WEF/AWWA Joint Management Conference of the Water Environment Federation/American Water Works Association, Tulsa OK, February 13, 1995.
- Giardina, R.D., "Wastewater Reuse Capital Funding and Cost Recovery Approaches," presented at the Rocky Mountain Sections of the American Water Works Association and Water Pollution Control Association, Crested Butte CO, September 14, 1994; and the Annual Conference and Exposition of the Water Environment Association of Utah, St. George UT, April 20, 1995.
- Giardina, R.D., "Private Sector Financing of Public Facilities - When and Why It May Be Appropriate," presented at the Annual Conference of the American Water Works Association, New York NY, June 21, 1994; and Joint Annual Conference of the American Water Works Association, Rocky Mountain Section/ Rocky Mountain Water Environment Federation, Steamboat Springs CO, September 10, 1996.
- Giardina, R.D., "Use of Innovative Pricing Strategies in a Conservation or Demand Management Program," presented at the 67th Annual Conference of the Arizona Water and Pollution Control Association, Prescott AZ, May 6, 1994.
- Giardina, R.D., "Funding Environmental Compliance - One City's Approach," presented at the Annual Conference of the Rocky Mountain Water Pollution Control Association, Denver CO, January 28, 1994.
- Giardina, R.D., "Conservation Pricing - Trends and Examples," presented at the CONSERV 93 Conference and Exposition on The New Water Agenda, Las Vegas NV, December 14, 1993.
- Giardina, R.D., Simpson, S.L., "A Case Study of the Impact of Conservation Measures on Water Use in Boulder, Colorado," presented at the Joint Annual Conference of the Rocky Mountain Sections of the American Water Works Association and Water Environment Federation, Conservation Workshop, Albuquerque NM, September 19, 1993.
- Giardina, R.D., "Creating Water Resources through Conservation Pricing," presented at the Western Water Conference of the National Water Resources Association, Durango CO, August 6, 1993.
- Giardina, R.D., Archuleta, E.G., "A Case Study of the Impact of Conservation Measures on Water Use in El Paso, Texas," presented at the Annual Conference and Exposition of the American Water Works Association, San Antonio TX, June 9, 1993.
- Giardina, R.D., "Trends in Water Rates," presented at the Annual Conference of the American Water Works Association, Pacific Northwest Section, Seattle WA, May 7, 1993.
- Giardina, R.D., Blundon, E.G., "Environmental Impact Fees," presented at the Annual Customer Service Workshop sponsored by the American Water Works Association, Seattle WA, March 29, 1993.
- Giardina, R.D., "Privatization and Other Innovative Approaches to Financing Wastewater Facilities," presented at the Annual Conference of the Nevada Water Pollution Control Association, Las Vegas NV, March 12, 1993.
- Giardina, R.D., "Guidelines to the Pricing of Municipal Water Service," presented at the First National Water Conference, sponsored by the Canadian Water and Wastewater Association, Winnipeg MB, February 5-6, 1993.
- Giardina, R.D., "Rates and the Public - Alternative Rate Approaches," presented at a Workshop sponsored by the American Water Works Association, Rocky Mountain Section, Denver CO, November 4, 1992.
- Giardina, R.D., "Results of the 1992 National Water and Wastewater Rate Survey," presented at the 44th Annual Conference of the Western Canada Water and Wastewater Association, Calgary AB, October 15, 1992; and the 13th Annual Western Utility Seminar, sponsored by the Water Committee of the National Association of Regulatory Utility Commissioners, Redondo Beach CA, April 28, 1993.
- Giardina, R.D., "Economic Feasibility of Waste Minimization: Assessing All Costs, Including 'Hidden Costs' and Indirect Benefits," presented at the Annual Meeting of the Colorado GEM Network, Denver CO, March 17, 1992.
- Giardina, R.D., "State of the Art in Rate Setting: Results of the 1990 Water and Wastewater Rate Survey," presented at the Annual Conference of the Canadian Water and Wastewater Association, Montréal QC, November 4, 1991.
- Giardina, R.D., "Impact of Rates on Water Conservation," presented at Waterscapes'91, an international conference on water management for a sustainable environment, Saskatoon SK, June 2-8, 1991.

- Giardina, R.D., Birch, D., "Stormwater Management – A Technical and Financial Case Study," presented at the Symposium on Urban Hydrology of the American Water Resources Association, Denver CO, November 8, 1990.
- Giardina, R.D., "Financing Environmental Site Cleanup Liabilities," presented at the Annual Conference of the Colorado Hazardous Waste Management Society, Denver CO, October 18, 1990.
- Giardina, R.D., "Rate Making with Conservation in Mind: Results of the 1990 National Water Rate Survey," presented at the CONSERV 90 Conference and Exposition on Water Supply Solutions for the 1990s, Phoenix AZ, August 14, 1990.
- Giardina, R.D., "Water Marketing – A Case Study," presented at the Profiting from Water Seminar, Santa Monica CA, May 11, 1989.
- Giardina, R.D., "Landfill Development – the Planning and Management Process," presented at the American Bar Association's Solid Waste Integrated Management Workshop, San Francisco CA, March 1989.
- Giardina, R.D., "Developing an Equitable Water Rate Structure," published in the American Water Works Association's monthly Opflow, February 1989.
- Giardina, R.D., "Alternative Techniques for Financing Water and Wastewater Capital Expansions," presented at the Joint Annual Conference of the American Water Works Association and Water Pollution Control Association, Rocky Mountain Sections, Snowmass CO, September 14-17, 1988.
- Giardina, R.D., "Excess Deferred Income Taxes Under the New Tax Law," Public Utilities Fortnightly, January 8, 1987.
- Giardina, R.D., "Trends in Capital Financing for Environmental Facilities," presented at the 1987 Annual Conference of the Missouri Water Pollution Control Association and the 1987 Annual Conference of the Rocky Mountain WPCA Clean Water Conference.

NON-UTILITY PROJECT EXPERIENCE

Town of Castle Rock (CO)

Mr. Giardina prepared a comprehensive service and activity analysis for the purpose of determining fees and charges to recoup costs associated with the Town's land use and review process. A survey was completed and a fee comparison developed using several local com-munities.

City of Boulder (CO)

Mr. Giardina served as Project Director on an engagement to conduct a management study of the City of Boulder development review process. This study evaluated the organization and operating processes in place and also included a review of the degree to which various functions could be and/or should be automated. A third area of study included a comprehensive review and revision of the City's design standards manual.

City of Dallas (TX)

Mr. Giardina assisted with a two-phased user fee study that involved the evaluation of all general fund services (including solid waste collection and disposal fees), and, as appropriate, the development of specific user fee recommendations. Our study process included strategic planning sessions with the City to identify objectives and policies to be followed in setting cost recovery levels for all services. The goals of the study included identifying full costs (direct, indirect, capital) for all City services with user fee potential and developing of full and recommended cost recovery fee schedules. The study included a review of Emergency Medical Services (EMS) for the Dallas Fire Department as well as various permit and alarm fees. New fee areas, such as fire code re-inspections, were examined for this and other departments. The study was conducted with the cooperation of all general fund departments and their appointed boards.

Salt Lake City Corporation (UT)

Consistent with the requirements of Utah legislation, Mr. Giardina assisted in the development of an impact fee system for the City that covered the costs of needed park and recreation, fire, police and street infrastructure. The project team worked closely with the City in identifying appropriate infrastructure costs to be recovered by the fees and in designing an equitable fee structure. In addition to designing the fee structure, Mr. Giardina worked closely with City staff in the development of an impact fee ordinance. Fees were adopted by Council and scheduled to be effective June 1, 2000.

City of Indianapolis (IN)

Mr. Giardina served as Technical Advisor to review services provided in all City departments in order to determine where the potential for increased revenues existed. The study reviewed over 300 fees and determined that over $18 million could be recovered if City policies were revised and fees were updated.

El Paso Water Utilities Public Service Board (TX)

Mr. Giardina served as Project Director to complete an Analysis of Engineering and Other Non-User Charges. The purpose of this study was to (1) review existing service areas in terms of current services provided, fees assessed and the methodology used for calculating existing fees; (2) identify costs for existing and new service or fee areas; and (3) develop a spreadsheet model for determining recommended fees. Some of the fee areas reviewed during this study included: water and sewer connections and extensions, and extension and off-site refunds policies and procedures.

City of Santa Rosa (CA)

Mr. Giardina served as Project Manager to prepare a revenue and expenditure study of the City's Parking Department. The City was anticipating the construction of two major (500 space) parking garages during the five year study period. We analyzed the City's existing parking fee structure including meter charges, "turnover" parking rates and monthly permit fees. Additionally, we worked with the City to develop a financing plan which included the use of long-term bond financing. Debt service is to be paid from a combination of assessments and parking rates and fees. The financial

and cost-of-service model was automated for future use by the City.

Mr. Giardina also served as Project Director on a series user fee and cost of service studies. During this study we evaluated existing fees and considered new fees for the City's Departments, Com-munity Development, Public Works, and Recreation and Parks. These projects involved the comprehensive review of the City's current rate-setting methodologies and policies and the development of an automated model for calculating costs and fees. Selected fees were analyzed in terms of direct salary and budget allocations as the costs incurred to administer the fee. The study was completed with an analysis of the potential for additional revenues and the impact of user fee increases upon various customer categories.

Town of Prescott Valley (AZ)

Mr. Giardina prepared a development impact fee for various categories of the Town's infrastructure. Development impact fees were calculated for facilities in the following service areas:

- Public Safety
- Civic-General Government
- Cultural-Library
- Recreation, Parks and Open Space
- Circulation System

City of Prescott (AZ)

Mr. Giardina assisted in a development services cost allocation and service level study for the City of Prescott. The following tasks were performed:

- Flowcharts of Prescott's private development service processes and service levels was developed
- Description of private development service-related revenue currently received by the City;
- Matrices outlining current costs associated with the City's private development services (including costs associated with desired service level enhancements, if applicable)
- Recommended fee schedules to make the private development services "self-sufficient" (fee schedules will include an analysis of private development services that could be considered for the general benefit of the community)
- Comparison of the current and proposed City fee structures with five or six comparable communities

Town of Chino Valley (AZ)

Mr. Giardina served as Project Director to calculate impact fees for various categories of the Town infrastructure. Impact fees were calculated for facilities in the following areas: police, library, parks and recreation, general government and roads. The fee calculations developed were based on three sets of information: 1) cost of necessary infrastructure to deliver services to current service levels as the Town grew, based on a current inventory of assets or an updated CIP; 2) projected land use distribution through build-out; and 3) current units and square feet of developed land for residential and commercial land uses.

City of Chandler (AZ)

Mr. Giardina served as Project Director to review and update system development charges for water, wastewater and solid waste operations and analyzed the cost associated with water and wastewater extensions. The overall objective of this project included:

- Recommending development fees and charges which more equitably recover water, wastewater, and solid waste capital costs
- Designing a schedule of Utility System Development Charges for the five-year study period
- Evaluating developer paid extension or "buy-in" charges for water and wastewater service and recommending new charges and/or procedures for the assessment, collection and refunding of such charges
- Subsequently retained by the City to update impact fees based on newly modified utility master plans

Holladay City (UT)

Mr. Giardina served as Project Director for Holladay City's business license fee study. He developed a business license fee schedule for all businesses, identified businesses that received a disproportionate amount of municipal services; identified businesses for which the City provided enhanced level of municipal services; and specified the cost that was reasonably related to those costs of the municipal services provided by the City to all businesses.

Oklahoma State University's Telecommunications Center (OK)

Mr. Giardina served as Project Manager on a user fee study for Oklahoma State University's telecommunications center. This study involved a review of the Center's existing fee structure and spreadsheet model. Key issues were 1) determining the accuracy of the automated model used in allocating costs and determining fees, and 2) analyzing the role of indirect costs in calculating fees for both internal and external users.

City of Kingman (AZ)

Mr. Giardina completed a comprehensive revenue study to examine and recommend a broad range of revenue mechanisms for both general and utility enterprise funds. He developed Police, Fire, Parks and Recreation, General Government, Transportation and Stormwater Investment or impact fees. Existing water and sanitary sewer user charges and investment or impact fees were also updated as part of the study.

public outreach and communication, and the legal environment as it may relate to setting rates, fees, and charges.

OBJECTIVES OF COST-BASED RATE-MAKING

Water rates developed using the methodologies discussed in this manual, when appropriately applied, are generally considered to be fair and equitable because these rate-setting methodologies result in cost-based rates that generate revenue from each class of customer in proportion to the cost to serve each class of customer. Water rates are considered fair and equitable when each customer class pays the costs allocated to the class and, consequently, cross-class subsidies are avoided.

While recovery of the full revenue requirement in a fair and equitable manner is a key objective of a utility using a cost-of-service rate-making process, it is often not the only objective. The following list contains the typical objectives in establishing cost-based rates (Bonbright, Danielsen, and Kamerschen 1988):

- Effectiveness in yielding total revenue requirements (full cost recovery)
- Revenue stability and predictability
- Stability and predictability of the rates themselves from unexpected or adverse changes
- Promotion of efficient resource use (conservation and efficient use)
- Fairness in the apportionment of total costs of service among the different ratepayers
- Avoidance of undue discrimination (subsidies) within the rates
- Dynamic efficiency in responding to changing supply-and-demand patterns
- Freedom from controversies as to proper interpretation of the rates
- Simple and easy to understand
- Simple to administer
- Legal and defendable

GENERALLY ACCEPTED RATE-SETTING METHODOLOGY

This manual outlines the methodologies and analyses that are used to establish cost-based rates. As displayed in Figure I.1-1, the generally accepted rate-setting methodology includes three categories of technical analysis. The first is the revenue requirement analysis. This analysis examines the utility's operating and capital costs to determine the total revenue requirements and the adequacy of the utility's existing rates. Next, a cost-of-service analysis is used to functionalize, allocate, and equitably distribute the revenue requirements to the various customer classes of service (e.g., residential, commercial) served by the utility. The final technical analysis is the rate-design analysis. It uses the results from the revenue-requirement and cost-of-service analyses to establish cost-based water rates that meet the overall rate-design goals and objectives of the utility.

Sections of this manual have been dedicated to providing detailed discussions of the three types of analysis. Section II of this manual discusses the various technical components of establishing a utility's revenue requirements. Section III discusses the various methodologies that may be used to conduct a cost-of-service analysis. Finally, section IV reviews the various issues and technical considerations in designing water rates.

strategic financial planning or revenue-adequacy standpoint, projections beyond 10 years tend to be quite speculative and are of questionable value. Accordingly, a projection period of about five years is generally considered adequate for near-term financial planning purposes. This time frame provides a reasonable forecast of anticipated future revenue needs, thereby assisting management, policymakers, and the public to foresee potential revenue shortfalls under existing rates and to avoid surprises when future changes in rate levels are requested or announced. Additionally, many utilities have capital improvement plans that use a comparable five-year time frame. When a utility adequately plans ahead, the projections in a five-year planning horizon are typically sufficient to satisfy investors, bond-rating agencies, and other interested parties. These projections are indicative of the security of potential investment in the utility system. The other advantage of projecting revenue requirements over a five-year planning horizon is that it may allow the utility to better anticipate any major changes in rates, and take action immediately to help mitigate or lessen those projected changes in rate levels.

Regardless of the projection period used, the utility should review its projections at least annually to incorporate changed conditions. A financial projection model should be considered a living document subject to change as conditions change. The projection period used in this chapter is assumed to be the utility's next five fiscal years. However, the principles discussed apply to any projection period appropriate for the particular circumstances. In making projections for more than one year, measures of revenue adequacy (i.e., indicated annual deficiencies) do not necessarily imply that an immediate rate change sufficient to cover deficiencies for the entire projection period (e.g., five-year period) is required or recommended. Rate changes for only a portion of the projection period may be appropriate. At the same time, implementation of smooth rate transitions is generally preferable to large one-time rate adjustments.

Other Adequacy Studies

The adequacy of water revenues is measured and studied to aid the process of rate-making for future service. Studies can be made for other purposes, including

- input for overall financial planning and budgeting;
- support for (and often part of) documentation for issuance of debt securities to be financed from utility revenues; and
- measurement or evaluation of the adequacy of revenues in the past or future as a part of contractual, litigation, rate-proceeding, bond covenant compliance, or other requirements.

Rate-making and planning require projections of future revenue needs. The issuance of debt securities and contractual, litigation, or rate-proceeding requirements may necessitate both evaluation of past performance and projections of future adequacy.

APPROACHES TO PROJECTING REVENUE REQUIREMENTS

The two generally accepted and practiced approaches to projecting total revenue requirements of a water utility are the cash-needs approach and the utility-basis approach. Each has a proper place in utility practice, and each, when properly used, can provide for sound utility financial strategies. A broad overview of the elements of revenue requirements to be considered under each of these two accepted approaches is presented in the following section. These approaches are discussed further in section VI, with regard to consideration

Table II.1-1 Normalization factors

Factors Affecting Revenues	Factors Affecting Revenue Requirements
Number of customers served	Number of customers served
Customers' water-use trends	Customers' water-use trends
Rate changes	Non-recurring sales
Non-recurring sales	Weather
Weather	Conservation
Conservation	Use restrictions
Use restrictions	Inflation
Price elasticity	Interest rates
Wholesale contractual terms	Wholesale contractual terms
	Capital finance needs
	Changes to tax laws
	Other changes in operating and economic conditions

of retail and wholesale rates applicable to customers located outside the jurisdictional boundaries of the owner utility.

General Techniques

Utilities should realize that it is acceptable to measure total revenue requirements using one approach and, subsequently, allocate those costs among customer classes using another approach (e.g., use a cash-needs approach for revenue requirements and then convert it to a utility basis for purposes of the cost-of-service analysis). Historical data must be normalized or adjusted to reflect conditions that may not continue into the future. Such factors include, but are not limited to, those listed in Table II.1-1. Each of these factors as well as other appropriate factors must be considered when projecting revenues and revenue requirements.

Actual performance will generally vary from projected performance. The projections are intended to forecast, as nearly as practicable, the future levels of revenue and revenue requirements so that the utility may make adequate, but not excessive, adjustments in rate and other revenue sources in a timely manner.

TEST YEAR

An important starting point for establishing a utility's revenue requirements is determining the test year or test period to be reviewed. The test year may represent a specific 12-month period of time or it may be an annualization of a rate-design period of more or less than one year.

Test-year periods are usually of three general types: historical, projected (future), or pro forma. A historical test-year period is defined as a prior 12-month period for which actual costs and data are available. The advantage of the historical test year is the use of actual costs and data. The disadvantage is that the costs and data may actually lag behind the utility's current costs. In contrast to a historical test year, a projected test period is a future time period in which all of the costs and data are projected, except perhaps fixed costs such as existing debt-service schedules. The advantage of a projected test year is that the rates to be developed for the test year will likely match up to the utility's budget or anticipated costs. The disadvantage of this approach is that it may be difficult to project costs, and it lacks the certainty of a historical test year. Finally, a pro forma test year is a

combination of the historical and projected test year. A pro forma test period begins with historical data and costs and then adjusts only for those "known and measurable" costs or changes. An example of a known and measurable change would be a labor agreement that specifies a certain percentage adjustment to labor rates. Simple inflation is not considered a known and measurable change in costs. The disadvantage of the pro forma test year is that it may not fully capture changes in costs, but the advantage is that it has adjusted for only those costs that can clearly be documented as needing adjustment in the test year.

Generally, government-owned utilities are free to set their own policies regarding test-year periods. However, investor-owned utilities and those government-owned utilities that are under the jurisdiction of utility commissions are subject to particular legislative and regulatory practices that must be followed. These practices vary from jurisdiction to jurisdiction.

Methods of Accumulating Costs

Once the test year or time period for establishing the revenue requirements has been determined, the next decision is the method that will be used to accumulate costs within the revenue requirement analysis. The two generally accepted methods of accumulating costs for the revenue requirements are the *cash-needs approach* and the *utility-basis approach*. Each of these methods and the component costs contained within each method is discussed in more detail in the following sections.

Cash-Needs Approach

The objective of the cash-needs approach for developing revenue requirements is to provide revenues sufficient to recover total cash requirements for a given time period. Generally, the cash-needs approach is used by government-owned utilities (except in those jurisdictions where regulation requires the use of the utility-basis approach). In this manual, the term *cash needs*, as it applies to measuring revenue requirements of a utility, should not be confused with accounting terminology of the *cash-basis* accounting method of revenue and expense recognition. From a rate-making perspective, *cash needs* refers to the total revenues required by the utility to meet its annual cash expenditures, whereas the accounting term *cash basis* refers to revenues being recognized as earned when cash is received and expenses charged when cash is disbursed. The cash-needs approach to measuring revenue requirements of a utility may be evaluated on the cash, accrual, or modified accrual basis of accounting.

Generally, revenue requirement studies using the cash-needs approach are more straightforward to calculate than revenue requirement studies using the utility-basis approach. Many utilities budget in a format that may be very similar to the cash-needs approach.

Revenue requirement components. Basic revenue requirement components of the cash-needs approach include O&M expenses, taxes or transfer payments, debt-service payments, contributions to specified reserves, and the cost of capital expenditures that are not debt financed or contributed (i.e., capital improvements funded directly from rate revenues). Depreciation expense is not included within the cash-needs revenue requirement.

Operation and maintenance expenses. Depending on the test year selected, the O&M expense component can be projected based on actual expenditures and adjusted to reflect anticipated changes in expenditures during the projected test-year period. Adjustments to historical O&M expenses are determined by incorporating known and measurable changes to recorded expenses, and by using well-considered estimates of future expenses.

Generally O&M expenses include salaries and wages, fringe benefits, purchased power, purchased water, other purchased services, rent, chemicals, other materials and

supplies, small equipment that does not extend the useful life of major facilities, and general overhead expenses. For a government-owned utility, other elements of O&M expense might also include the costs of support services rendered by the municipality to the utility, such as the use of computer facilities, assistance in collecting water bills, procurement activities, human resources administration, fleet management, and other support services.

Taxes or transfer payments. A utility may be required to pay certain taxes as part of their normal operations (e.g., a state utility tax on gross revenues). A utility may have several tax payments for their locality. In contrast to a tax payment, a transfer payment may be for items such as a payment in lieu of taxes (PILOT). AWWA's policy statement on Financing, Accounting, and Rates states that "Water and wastewater utility funds should not be diverted to uses unrelated to water and wastewater utility services. Reasonable taxes, payments in lieu of taxes, and/or payments for services rendered to the water utility by a local government or other divisions of the owning entity may be included in the utility's revenue requirements after taking into account the contribution for fire protection and other services furnished by the utility to the local government or to other divisions of the owning entity" (AWWA 2015). Accordingly, payments made to a municipality's general fund should reimburse the general fund for the necessary cost of goods and/or services required by the water utility to provide water service. Transfers from the water fund to a municipal general fund, in addition to those specifically identified above, may be applicable to unique local situations and should be considered in conjunction with legal requirements and in conformance with the previously referenced AWWA policy statement.

Debt-service payments and specified reserves. The debt-service component of the cash-needs approach usually consists of principal and interest payments on bonds or other outstanding debt instruments. It may also include debt-service reserve requirements as established by the indenture or covenant. Other reserves are often required to provide for operating working capital, emergency repairs and replacements, as well as for routine replacements and extensions. In addition to debt service and payments to reserve fund accounts, many utilities are required to provide net revenues sufficient to cover the bonded debt, particularly if revenue bonds are involved. Typically, debt-service coverage requirements specify that revenues be sufficient to meet O&M expenses and taxes and, at a minimum, to equal or exceed a stated percentage of the annual debt-service payments. Coverage requirements are a test of the adequacy of utility revenues and do not necessarily represent a specific cash requirement, unless debt-service coverage is the controlling factor in terms of the overall annual revenue needs of the utility, which may be the case in a particular year. The coverage requirements are intended to provide a measure of security for bondholders. As such, coverage requirements must also be considered in determining the total annual revenue needed to comply with the utility's debt covenant agreements.

Rate-funded capital expenditures. This component of the cash-needs approach is not all capital expenditures, but rather, only that portion of the capital expenditures to be paid during the test year from current rate revenues. Capital expenditures may be classified into three broad categories: normal annual (routine) replacement of existing facilities, normal annual extensions and improvements, and major capital replacements and improvements. A utility should periodically review and update its needs in each of these areas to recognize changing conditions. Projections for such needs are essential in developing overall revenue requirement projections. These projections of total capital needs should be accompanied by estimates of contributions received from developers or customers, government grants, and other nonutility sources.

Government-owned utilities commonly use current revenues to finance

- normal annual replacements,
- extensions, and

- improvements (such as meters, services, vehicles, smaller mains, valves, hydrants, and similar items that occur regularly each year).

Major capital projects are typically financed with a combination of long-term debt and equity or cash generated from annual utility revenues. Capital costs are distributed over the term of the bonds by repaying the debt over several years and using equity. An advantage of using long-term debt to fund major capital expenditures is that it results in a better matching of customers' charges with the use of the facilities so that existing customers will not be paying 100 percent of the initial cost of facilities that will be used for many years. Debt-service coverage compliance may result in the generation of annual revenues that may be available for funding of a portion of major capital improvements from annual revenues.

Utility-Basis Approach

The utility-basis approach to measuring revenue requirements is typically mandated for investor-owned water utilities. It is mandated or permitted for government-owned utilities in jurisdictions where the utility is regulated by a utility commission or other similar regulatory body.

The utility-basis approach for determining revenue requirements consists of O&M expenses, taxes or transfer payments, depreciation expense, and a "fair" return on rate base investment. While the utility-basis approach is in some ways similar to the cash-needs approach, where these two methods diverge is in how capital infrastructure is funded within the rates. The cash-needs approach uses debt-service and capital expenditures funded from rates. In contrast, the utility-basis approach uses depreciation expense and a return on rate base.

Municipal or government-owned utilities may also use the utility-basis approach for purposes of cost allocation. It is considered an appropriate method for calculating the costs of service applicable to all classes of customers, but it is particularly applicable to those customers located outside the geographical limits of a government-owned utility. When a government-owned utility provides service to customers outside its geographical limits or corporate boundary, the situation is similar to the relationship of an investor-owned utility to its customers because the owner (political subdivision) provides services to nonowner customers (customers outside its geographical limits). In this situation, the government-owned utility, like an investor-owned utility, is entitled to earn a reasonable return from nonowner customers based on the value of its plant investment required to serve those customers. Some jurisdictions have laws or guidelines to regulate the rates that government-owned utilities charge customers located outside their limits. Section VI discusses the considerations in using the utility-basis approach for determining rates for outside-city retail and wholesale customers.

Utility-Basis Projections for Government-Owned Utilities

For a government-owned utility, the total level of annual revenue required may be similar under either the cash-needs approach or the utility-basis approach. The O&M expense component of total revenue requirements is usually the same under both approaches. Under the utility-basis approach, the annual requirement for capital-related costs consists of two components: depreciation expense and return on rate base. Using the cash-needs approach, capital infrastructure-related costs are recovered through total debt service (principal and interest), cash financed capital additions and extensions, and debt-service coverage considerations.

Depreciation expense. Depreciation is a real part of the cost of operating a utility, whether government owned or investor owned. Depreciation is the loss in value of facilities not restored by current maintenance that occurs to the property because of wear and tear, decay, inadequacy, and obsolescence. The annual depreciation expense component of revenue requirements allows the utility to recover its capital investment over the anticipated useful life of the depreciable assets. Therefore, it is fair that this expense be borne by the customers benefiting from the use of an asset during its useful life.

Depreciation expense should be based on the depreciable plant investment that is in service during the period for which rates are being established. Because depreciation expense is a noncash requirement, the inclusion of depreciation expense in calculating revenue requirements provides the utility with funds that are available for use as a source of capital for replacing, improving, and expanding systems or for repaying debt.

Return on rate base. The return component is intended to pay the annual interest cost of debt capital and provide a fair rate of return for the total equity capital employed to finance facilities used to provide water service. Although the annual interest costs can be readily ascertained, the cost of equity capital is more difficult to determine. The return to the equity owner should be in keeping with the return in other enterprises having corresponding risks. Moreover, the return should be sufficient to ensure confidence in the financial integrity of the enterprise so as to maintain its credit and to attract and hold capital. More discussion of the considerations in establishing a fair rate for return for service to customers located outside the political boundaries of the owner utility system is provided in section VI of this manual.

The utility basis of determining revenue requirements usually necessitates establishing a *rate base* (defined as the value of the assets on which the utility is entitled to earn a return) and setting a fair rate of return on the rate base. The rate base is primarily composed of the depreciated value of the utility's property devoted to serving the public. In addition, the utility may be permitted to include an allowance in the rate base for working capital and, in limited instances, construction work in progress. On the other hand, grants and contributions (such as government grants, developer-donated facilities, and other nonutility supplied funds) are generally deducted from the utility's rate base.

As previously mentioned, another element of utility-basis revenue requirements for a government-owned utility may be payments for services to the general fund of the municipality or PILOT to other government entities.

Utility-Basis Projections for Investor-Owned Utilities

The total annual revenue requirements of an investor-owned utility include O&M expenses, depreciation expense, income taxes, other taxes, and return on rate base. The O&M expenses, depreciation expense, and return on rate base for an investor-owned utility involve the same considerations discussed for a government-owned utility using the utility-basis approach.

Federal, state, provincial, or local income taxes must be paid by an investor-owned utility and, therefore, are properly included in determining total revenue requirements. Other taxes, such as property taxes, gross receipts taxes, and payroll taxes, must also be recognized.

Each utility commission and regulatory body has its own rules, regulations, and policies for determining total revenue requirements. In preparing for any rate matter within a specific jurisdiction, the utility must determine the procedures and policies of the regulatory body and follow those policies in determining its revenue requirements.

Revenue Requirements for Government-Owned Utilities

Government-owned utilities typically select a projected test year in recognition of budgetary requirements, bond indentures, and rates being designed for a *future* period. The test year may simply correspond to an upcoming fiscal year or represent the annualization of the period for which rates are intended to be effective. For example, if projected revenue requirements and revenues indicate that an overall 18 percent increase in revenues would meet the revenue requirements over a 36-month period, the utility may wish to use a test year that averages the revenue requirements and revenues for the 36-month period or separate the test-year period into three separate 12-month test-year periods to phase the rates in over that time. The selection of the test-year period in this instance would be dependent on the timing and magnitude of annual increases required.

When selecting a test year for a government-owned utility, legislative or debt-indenture requirements may need to be considered. Certain government-owned utilities are required by their ordinance or governing documents to establish rates and charges that are adequate to provide for specific revenue requirements and coverages for certain projected test periods. These revenue requirements and coverages generally require projections based on historical data to develop a future test year in evaluating the adequacy of revenues under proposed rates and charges.

Debt-related agreements may include provisions that could influence the selection of the test year. The specified debt-service coverage tests and conditions for the issuance of additional bonds must often be considered when selecting a test year. Some debt indentures specify that rates be enacted for each upcoming fiscal year or for a specific period in the future.

Revenue Requirements for Investor-Owned Utilities

Most investor-owned utilities must follow the established practices and requirements of the applicable utility commission or regulatory agency when selecting a test year. Many regulations require the use of a historical test year, which may be adjusted for known or reasonably anticipated changes (i.e., a pro forma test year). Some regulatory agencies allow a current test year that includes a combination of historical and projected data while others may accept a future test year.

A comparison of example test-year revenue requirements for a government-owned utility on both the cash-needs and utility-basis approaches is shown in Table II.1-2. A parallel statement of the revenue requirements for a similarly sized investor-owned utility is also included.

As shown in Table II.1-2, the O&M expense component of the total test-year revenue requirement is the same for the investor-owned utility as for the government-owned utility using either the cash-needs or the utility-basis approach. Using the utility-basis approach, the annual depreciation expense component of total revenue requirements, shown on line 5 in Table II.1-2, is $1,242,000. This is determined by applying a proper schedule of depreciation rates to the total depreciable plant investment in service. In the example, the depreciation value is calculated by multiplying the composite depreciation rate, about 1.85 percent, by the total depreciable plant investment ($67,185,000—from Table II.5-2, line 1; year 2 is the test year used in this example). Under the utility-basis approach, the annual depreciation expense allowance is the same for either an investor-owned or a government-owned utility.

For a government-owned utility to meet the total cash-revenue requirements under the utility-basis approach, the level of return to be derived from rates in the example is required to be $2,545,000 ($2,623,000 – $78,000), as shown on lines 8 and 9 of Table II.1-2. Assuming a rate base of $48,558,000 (year 2 from Table II.5-2, line 9), the overall rate of

Table II.1-2 Summary of test-year revenue requirements (in $1,000)

Line No.	Item	Government-Owned Utility		Investor-Owned Utility
		Cash-Needs Approach	Utility-Basis Approach	Utility-Basis Approach
1	O&M Expenses	$6,837	$6,837	$6,837
2	Debt Service	2,580		
3	Debt-Service Reserve	180		
4	Capital Improvements	1,141		
5	Depreciation Expense		1,242	1,242
6	Other Taxes			1,080
7	Income Taxes			1,150
8	Return (Operating Income)		2,623	3,325
9	Other Operating Revenues	(78)	(78)	(78)
10	Nonoperating Revenues	(159)		
11	Net Balance From Operations	123		
12	Total Revenue Requirements From Rates	$10,624	$10,624	$13,556

return for the hypothetical government-owned utility is about 5.2 percent. In any particular government-owned utility, the magnitude of existing debt service and the policy regarding the amount of revenue financing of capital improvements will influence the required level of return. This may result in an indicated need for an overall rate of return markedly different from the example shown later in chapter II.5.

For the same example utility on an investor-owned basis, income taxes and other taxes must be considered when determining annual revenue requirements. The element of other taxes, shown on line 6 of Table II.1-2, amounts to $1,080,000 and could include business, occupational, gross receipts, and other types of taxes.

The income-tax element of the investor-owned utility's cost of service is based on the application of a composite tax-rate allowance for both federal and state income taxes to total taxable income. In this example, taxable income equals total revenue less O&M expense, depreciation expense, other taxes, and interest expense. Income tax is shown on line 7 to be $1,150,000.

The rate base for the investor-owned utility is less than that for the government-owned utility by the amount of accumulated deferred income taxes.

An overall rate of return of 8 percent on the rate base of $41,460,000 was assumed, resulting in a requirement for return (operating income) of $3,325,000 as noted on Table II.6-5 (year 2, lines 16 and 15, respectively). The higher return for the investor-owned utility assumed in Table II.1-2 results from the weighted cost of debt and equity capital. This return would be expected to be greater than the resulting overall 5.2 percent rate of return shown for the government-owned utility. The rate of return for the government-owned utility in this example is adequate only to provide for cash needs beyond O&M expense and capital requirements covered by depreciation expense.

Where a government-owned utility is serving customers outside its jurisdiction who are considered to be nonowners, the applicable rates of return may properly reflect a differential between owners and nonowners. For a government-owned utility providing service to nonowners, developing an appropriate rate of return may reflect embedded interest cost and return on system equity. Once established, the rate of return assigned to system owners would be developed to recognize residual cash needs to meet the utility's cash-based

revenue requirements. Consideration of differential rates of return is addressed subsequently in section VI of this manual.

From the example shown in Table II.1-2, it is apparent that the overall revenue requirement to be obtained from water rates varies with the type of ownership and other system requirements. In the example, the overall level of revenue requirements varies from $10,624,000 for the government-owned utility paying no income taxes, financed with tax-free bonds, and in which the customers have made the equity investment for which no return is required, to $13,556,000 for an investor-owned utility paying all taxes, with no tax-free financing available, and having to pay a fair and reasonable return to equity investors who provided a portion of the investment requirements.

REFERENCE

AWWA. 2015. AWWA Statements of Policy on Public Water Supply Matters. In *AWWA Officers and Committee Directory.* (Revised June 7, 2015.) Denver, Colo.: AWWA. www.awwa.org/about-us/policy-statements.aspx (accessed May 20, 2016).

Chapter III.2

Distributing Costs to Customer Classes

The preceding chapters explained how utilities determine revenue requirements and how to allocate both operating and capital-related costs to cost components (e.g., base, extra capacity). This chapter presents the final step in the cost-of-service process: distributing allocated cost components to customer classes of service (e.g., residential, commercial).

The ideal solution to developing rates for water utility customers is to assign cost responsibility to each individual customer served and to develop rates that reflect that cost. Unfortunately, it is neither economically practical nor often possible to determine the cost responsibility and applicable rates for each individual customer served. However, the cost of providing service can be reasonably determined for groups or classes of customers that have similar water-use characteristics and for special customers having unusual or unique water-use or service requirements. Rate-making endeavors to assign costs to classes of customers in a nondiscriminatory, cost-responsive manner so that rates can be designed to closely meet the cost of providing service to such customer classes.

CUSTOMER CLASSES

In establishing customer classes, water utilities consider service characteristics, demand patterns, and whether service is provided to customers both inside and outside the owning city's jurisdictional limits. Service characteristic differences may be illustrated by recognizing that customers using treated water require facilities that raw-water customers do not need. Similarly, large-volume industrial customers, wholesale customers, and other large users are often served directly from major treated-water transmission mains, whereas smaller users are served by both large and small distribution mains. Utilities should consider these and other factors when establishing customer classes and their costs of service.

Demand patterns of various customers differ, depending on their maximum-day and maximum-hour rates of demand relative to average demands. For example, the residential customer class, placing summer lawn irrigation loads on the system, typically has a

much higher peak-demand requirement, relative to the average demand, than does a large manufacturing facility, which may require water on a relatively uniform basis throughout the year. These differences in demand patterns can create differences in the cost to serve those customers.

The classification of water customers as either inside or outside the city limits is related to each major group's responsibility for overall costs. As explained in section VI, this classification is important in the allocation of costs of service for government-owned utilities and, in some instances, may have a bearing on investor-owned utilities.

Utilities may need to recognize certain customer classifications from an accounting standpoint because of legal requirements or customs; such requirements can be accommodated in rate studies. However, general service characteristics, facility requirements, demand patterns, and location with regard to city limits are generally the principal considerations in customer classification.

General Classes

It is common for water utilities to have three principal customer classes: residential, commercial, and industrial. Utilities may define these general customer classes differently, but, in very broad terms, the following definitions are common.

- **Residential:** One- and two-family dwellings, usually physically separate
- **Commercial:** Multifamily apartment buildings and nonresidential, nonindustrial business enterprises
- **Industrial:** Manufacturing and processing establishments

Some utilities may break down these general classes into more specific groups. For example, the commercial customer group may be separated into multifamily customers and commercial customers, or multifamily apartments may be considered part of the residential class. Sometimes this distinction is based on ownership with small owner-occupied apartments considered to be in the residential class and larger nonowner-occupied buildings are part of the commercial class. Similarly, the industrial customer group may be subdivided into small industry, large industry, and special, the latter typified by some unique characteristic(s). Lastly, municipal accounts may be considered separately in some studies.

Many systems, particularly larger ones, have customers with individual water-use characteristics, service requirements, or other factors that differentiate them from other customers with regard to cost responsibility. These customers should have a separate class designation. These classes may include large hospitals, universities and colleges, military establishments, and other such categories.

Because the classification of some customers may be difficult and because there may be large variations within the commercial class, some utilities now classify customers based on meter size. In this case there may be a small meter class (e.g., ⅝-in. and ¾-in. meters), a medium meter class (1–3 in.), and a large meter class (>3 in.). Classifying customers in this manner can eliminate any confusion between a bank and water park that may both be commercial but have very different demand characteristics.

Other Classes

In addition to the general classes of service previously described, water utilities often provide service to certain special classes of customers. Four such classes are wholesale service, fire protection service, irrigation, and outside city limits.

Wholesale service. Wholesale service is usually defined as a situation in which water is sold to a customer through a master meter at one or more major points of delivery for resale to individual retail customers within the wholesale customer's service area. Usually, the wholesale customer is a separate municipality or water district adjacent to the supplying utility, but it may be in an area within the jurisdiction of the supplying utility. A more detailed discussion of outside-city and wholesale service considerations is provided in section VI.

Fire protection service. Fire protection service has characteristics that are markedly different from other types of water service. The service provided is principally of a standby nature—that is, readiness to deliver relatively large quantities of water for short periods of time at any of a large number of points in the water distribution system.

Costs allocated to fire protection service as a class can be subdivided to those related to public fire protection service and private fire protection service. The reader should refer to chapter IV.8 for further discussion of fire protection rates and charges.

Irrigation. Irrigation is characterized by the relatively high demands it places on the water system, usually during the early morning and evening hours. Throughout most of the United States, both lawn and agricultural irrigation are very seasonal in nature. Such usage is most pronounced during the summer months and, in some areas, virtually nonexistent during the winter months.

In many instances, irrigation service is not separately metered from other service; therefore, the high peaking characteristics of lawn irrigation need to be recognized as a part of each class's water-use characteristics. However, establishment of a separate class designation is warranted when separate metering for lawn irrigation is available, as is often the case for automatic lawn sprinkling systems, parks, fields, and golf courses, and where such loads are significant in the system. In this case, the significant demands caused by irrigation can be recognized and reflected in the cost to provide this service.

Service outside city limits. Many government-owned utilities recognize in their rate structures the differences in costs of serving water users located outside the corporate limits of the supplying city or jurisdiction compared with those located within the corporate limits. In many cases, a government-owned utility may be considered to be the property of the citizens within the city. Customers within the city are effectively the owner customers, who sometimes must bear the risks and responsibilities of utility ownership. Outside-city customers are nonowner customers and, as such, may bear a different responsibility for costs than do owner customers.

The costs to be borne by outside-city (nonowner) customers are similar to those attributed to the customers (nonowners) of an investor-owned utility. Such costs include operation and maintenance (O&M) expense, depreciation expense, and an appropriate return on the value of property devoted to serving the outside-city customers. Section VI provides a more in-depth discussion of the treatment of outside-city or nonowner customers.

UNITS OF SERVICE

The total cost of each cost component, such as the base cost, is divided by the appropriate total customer service requirements or units of service for all customer classes for each cost component to express a unit cost of service for each cost component. The unit costs of each component serve as a basis for calculating the cost of serving each customer class as well as for designing rates. As a basis for distributing component costs to customer classes, the units of service attributable to the respective classes must be established for the test year. To do so, the utility must determine or estimate the total quantity of water to be used by each class in the test year and the peak rates of use by the class. Peak rates of

use are usually designated by maximum-day and maximum-hour rates of use. (In some systems, maximum-week or other peak use periods may be appropriate.) In addition, the utility must determine the number of equivalent meters and services by class, as well as the number of bills by class.

Maximum rates of use may be expressed in terms of a *peaking factor,* that is, a percentage relationship of the estimated class maximum rate of use to average annual rate of use. Thus, if a customer class maximum-day rate of use is 2.5 times its average annual daily rate, it is said to have a maximum-day peaking factor of 250 percent. Stated another way, using this same example, a class with an average day use of 1.0 million gallons would have a maximum-day peak use of 2.5 million gallons.

To estimate customer class peaking factors, utilities need to investigate and study all pertinent sources of information. Such data should include daily and hourly system pumping records, recorded rates of flow in specific areas of the system, studies and interviews of large users regarding individual and group characteristics of use, special demand metering programs, and experience in studies of other utilities exhibiting like characteristics. Recent technology improvements in automated meter reading have provided utilities with far greater opportunities to collect demand data applicable to cost-of-service studies. In addition, sound and logical inferences can be drawn from customer billing information, provided billing periods are sufficiently short to reflect seasonal differences, usually not to exceed three-month periods, with monthly billing being preferable for these analyses. Appendix A provides some techniques that can be used to determine reasonable estimates of the maximum-day and maximum-hour peaking factors for each customer class using available system demand data for the utility and customer class billing records.

The total annual volume of water used for fire service is usually negligible, at least in relation to that of other classes; however, peak requirements for fire service can be quite significant. The Insurance Services Office periodically defines desired rates of flow for fire service, which is a good source of maximum-capacity requirements for fire service. These data must be applied judiciously to achieve practical cost allocations.

Customer-related costs for meters and services may be properly distributed among customer classes by recognizing factors that are generally responsible for those costs being incurred. As an example, one method for distributing meter-and-service costs to customer classes is in proportion to the investment in meters and services installed for each customer class, based on the number of equivalent meters. Distribution of customer costs by equivalent meter-and-service ratios recognizes that meter-and-service costs vary, depending on considerations such as size of service pipe, materials used, locations of meters, and other local characteristics for various sized meters as compared to ⅝-in. meters and services. In this example, typical customer meter-and-service equivalent ratios based on investment are as follows:

Meter Size, in.	Equivalent Meter Size Ratios Based on Investment
⅝	1.0
¾	1.1
1	1.4
1½	1.8
2	2.9
3	11.0
4	14.0
6	21.0
8	29.0

Table III.2-1 Units of service—Base-extra capacity method (test year)

Line No.	Customer Class	Base Units		Maximum-Day Units			Maximum-Hour Units			Customer Units	
		Annual Use, 1,000 gal	Average Rate, 1,000 gpd	Peaking Factor, %	Total Capacity, 1,000 gpd	Extra Capacity, 1,000 gpd	Peaking Factor, %	Total Capacity, 1,000 gpd	Extra Capacity, 1,000 gpd	Equivalent Meters & Services	Bills
	Inside City:										
1	Retail Service										
2	Residential	968,000	2,652	250	6,630	3,978	400	10,608	3,978	15,652	185,760
3	Commercial	473,000	1,296	200	2,592	1,296	325	4,212	1,620	1,758	14,640
4	Industrial	1,095,000	3,000	150	4,500	1,500	200	6,000	1,500	251	420
5	Fire Protection				840	840		5,040	4,200		
6	Total Inside City	2,536,000	6,948		14,562	7,614		25,860	11,298	17,661	200,820
	Outside City:										
7	Residential	95,000	260	280	729	468	420	1,093	364	1,580	18,240
8	Wholesale	230,000	630	225	1,418	788	375	2,363	945	34	48
9	Total	2,861,000	7,838		16,708	8,870		29,316	12,608	19,275	219,108

Appendix B further discusses how to develop the meter-and-service cost ratios previously shown, as well as equivalent meter ratios based on factors such as meter demand capacity.

Costs related to meter reading, billing, and collecting may be distributed among customer classes based on the total number of bills or equivalent billing units rendered to the respective classes in a test year. In some instances, billing ratios are used to recognize that billing, metering, and collection costs for larger services may be greater than for smaller meter-size services. This may be due to difficulty in accessing the meter facility, replacement of meters, multiple dial meters, more customer service time associated with dealing with larger meter customers, and other factors.

Table III.2-1 illustrates the development of the test-year units of service for the example utility, using the base-extra capacity method of cost allocation and distribution. Test-year units of service reflect the prospective average annual customer water use and other service requirements during the test-year study period considered in this example. For purposes of the examples in this manual, it is assumed that retail service and fire protection service are provided inside the city to residential, commercial, and industrial classes. Outside-city service is provided on both a retail and wholesale basis (see section VI for a more detailed discussion). The annual usage and number of customers by customer class were previously developed in Table II.2-2.

DISTRIBUTING COST COMPONENTS TO CUSTOMER CLASSES

Table III.2-1 shows, under the heading "Base Units," the total annual water use in thousand gallons for each customer class, as well as the average rate in thousand gallons per day. Maximum-day peaking factors are applied to average-day rates of flow to develop total maximum-day capacity by class. *Maximum-day extra capacity* is defined as the difference between total maximum-day capacity and the average day rate of use. Fire protection service is considered to require negligible flow on an average annual basis but 840 thousand gallons per day (1,000 gpd) on a maximum daily basis (3,500 gpm for 4 hours).

Maximum-hour extra peaking factors for each customer class are applied to average-day rates of flow, and the *maximum-hour extra capacity units* are defined as the difference in

Table III.2-2 Units of service—Commodity-demand method (test year)

Line No.	Customer Class	Commodity		Maximum Day			Customer Units		
		Annual Use, 1,000 gal	Average Rate, 1,000 gpd	Peaking Factor, %	Total Capacity, 1,000 gpd	Peaking Factor, %	Total Capacity, 1,000 gpd	Equivalent Meters & Services	Bills
	Inside City:								
1	Retail Service								
2	Residential	968,000	2,652	250	6,630	400	10,608	15,652	185,760
3	Commercial	473,000	1,296	200	2,592	325	4,212	1,758	14,640
4	Industrial	1,095,000	3,000	150	4,500	200	6,000	251	420
5	Fire Protection				840		5,040		
6	Total Inside City	2,536,000	6,948		14,562		25,860	17,661	200,820
	Outside City:								
7	Residential	95,000	260	280	729	420	1,093	1,580	18,240
8	Wholesale	230,000	630	225	1,418	375	2,363	34	48
9	Total	2,861,000	7,838		16,708		29,316	19,275	219,108

the total maximum-hour capacity and the maximum-day capacity. Maximum-hour units for fire protection service assumes that flow for fires is 5,040 thousand gpd (3,500 gpm expressed as a gpd rate = 3,500 gpm × 60 min × 24 hours). *Maximum-hour extra capacity units for fire protection* is defined as the total maximum-hour capacity less total maximum-day capacity, similar to the other classes of service.

Equivalent meters and services are derived by applying equivalent meter-and-service cost ratios to the number of meters of each size by class. The number of bills is simply the total number of bills rendered annually for each class. If customers are billed at different frequencies, care must be taken to reflect this. For example, large-volume customers may get 12 bills per year and smaller-volume customers may get 4 bills per year.

Table III.2-2 shows the development of the units of service that apply to the commodity-demand method of cost allocation. Table III.2-2 differs from Table III.2-1 only in that the incremental maximum-day and maximum-hour extra capacity columns are excluded. Under the commodity-demand method, the total maximum day or maximum hour is used.

In this example, the maximum total capacity, on both a maximum-day and maximum-hour basis, for the total system (shown in Tables III.2-1 and III.2-2) is an estimate of the sum of noncoincident peaking requirements on the system. That is, it is the sum of the peaks for each class, regardless of the day or hour in which such peaks may occur. Again, appendix A provides a more thorough discussion of the noncoincident peaking requirements by customer class and their development.

UNIT COSTS

Unit costs of service are based on total costs previously allocated to each of the cost components and divided by the total number of applicable units of service for the test year. The development of unit costs of service for the base-extra capacity method is presented in Table III.2-3. As explained in the previous chapter, the following tables contain capital cost allocations based on the utility-basis method of determining revenue requirements. This is because the example includes outside-city, nonowner customers. As described more fully in section VI, it is appropriate to use the utility basis of revenue requirements for nonowner customers to assess them a fair rate of return in determining the costs of

Table III.2-3 Unit costs of service—Base-extra capacity method (test year)

Line No.	Unit Cost Component	Rate of Return Percentage	Total	Base	Extra Capacity		Customer Costs		Direct Fire Protection Service
					Maximum Day	Maximum Hour*	Meters & Services	Billing & Collection	
	Units of Service								
1	Total System			2,861,000 1,000 gal	8,870 1,000 gpd	12,608 1,000 gpd	19,275 equiv. meters	219,108 bills	
	O&M Expense								
2	Total		$6,837,000	$3,202,390	$955,048	$319,072	$989,367	$1,288,624	$82,498
3	Unit Cost, $/Unit			$1.1193	$107.6701	$25.3081	$51.3290	$5.8812	
	Depreciation Expense								
4	Total		$1,242,000	$548,063	$271,740	$167,816	$216,789		$37,592
5	Unit Cost, $/Unit			$0.1916	$30.6353	$13.3107	$11.2472		
	Nonrate Revenue								
6	Total		($78,000)	($29,000)	($12,000)	($4,000)	($14,000)	($18,000)	($1,000)
7	Unit Rate Base, $/Unit			–$0.0101	–$1.3529	–$0.3173	–$0.7263	–$0.0822	
	Rate Base								
8	Total Rate Base		$48,558,000	$23,572,110	$11,175,548	$6,558,537	$5,974,569		$1,277,236
9	Unit Rate Base, $/Unit			$8.2391	$1,259.9070	$520.2078	$309.9647		
	Unit Return on Rate Base								
10	Outside City, $/Unit Return on Rate Base (Input)	8.00%		$0.6591	$100.7926	$41.6166	$24.7972		
11	Outside-City Units of Service			325,000	1,256	1,310	1,614		
12	Outside-City Rate Base		$5,441,904	$2,677,713	$1,582,650	$681,258	$500,283		
13	Outside-City Return on Rate Base		$435,352	$214,217	$126,612	$54,501	$40,023		
14	Inside City, $/Unit Return on Rate Base (Input)	5.07%		$0.4181	$63.9352	$26.3984	$15.7295		
15	Inside-City Units of Service			2,536,000	7,614	11,298	17,661		
16	Inside-City Rate Base		$43,116,096	$20,894,398	$9,592,898	$5,877,279	$5,474,286		$1,277,236
17	Inside-City Return on Rate Base		$2,187,968	$1,060,306	$486,801	$298,248	$277,798		$64,815
18	Total System Return on Rate Base (Calculated)	5.40%	$2,623,320	$1,274,523	$613,413	$352,749	$317,821		$64,815
19	Inside City, $/Unit (Line 3 + 5 + 7 + 14)		$1.7189	$200.8877	$64.7000	$77.5793	$5.7991	$183,905	
20	Outside City, $/Unit (Line 3 + 5 + 7 + 10)		$1.9599	$237.7451	$79.9182	$86.6471	$5.7991		

*Maximum-hour demand in excess of maximum-day demand.

providing service to such customers. The residual cash needs are the total cash expenses after deducting the revenues from outside-city customers. These residual cash needs may then be recovered from the "owners" or inside-city customers.

Most government-owned utilities, particularly those that do not have outside-city service, may choose to allocate their costs based on their cash needs, because most of these utilities use the cash basis of revenue requirement determination. In using the cash-needs

revenue requirements, instead of including depreciation and return on rate base as the capital costs, a government-owned utility can replace these items with debt service (including any coverage requirements) and annual capital outlays. Because the annual costs of debt service or cash-financed capital outlays can vary significantly from year to year, revenue requirements under the cash-needs approach can also vary significantly. To conform to the objective of rate continuity, those capital costs can be allocated to base and extra capacity components, or to commodity and demand cost components, in the same overall proportion or ratio as the allocation of total net plant investment or rate base. It is assumed that future capital projects (whether debt or cash financed) will be in rough proportion to the past investments in the system, or the net plant value, and the use of the cumulative net plant-value allocation basis for annual capital costs will tend to "dampen out" the variations in the annual additions to the net plant value and will provide for rate continuity.

Unit costs are determined simply by dividing the test-year O&M and capital cost components by the respective total system units of service for the test year. For example, in Table III.2-3 under the base-extra capacity method, the base unit cost for O&M expense of $1.1193 per thousand gallons may be derived by dividing the allocated base O&M expense of $3,202,390 by the total base-component units of service of 2,861,000 thousand gallons. Similar computations are made to determine unit costs for all other O&M expense and depreciation expense. Using the utility-basis approach, the resulting average unit costs for O&M expense and depreciation expense apply to all customers, both inside and outside the city. Allocation of O&M expense and depreciation expense to cost components is presented in chapter III.1. As shown in Table III.2-3, unit return on rate base is determined by first calculating the unit cost for rate base. The rate base for each cost component is divided by the respective total system units of service to yield unit costs for rate base. Subsequently, unit return on rate base is derived by applying the appropriate inside-city and outside-city rates of return to the unit costs for rate base. As discussed in chapters I.1 through II.5, for the government-owned utility to meet total cash revenue requirements under the hybrid utility-basis approach or residual cash-needs approach, the required level of return in the example would be $2,623,320. Based on a total rate base of $48,558,000, the overall required rate of return is approximately 5.40 percent. In this example, it is assumed that the utility provides service to both inside-city and outside-city customers. Generally, where inside-city owners provide service to outside-city nonowners, a differential rate of return is appropriate. In this example, a rate of return of 8.0 percent is assumed and applied to component unit costs for rate base to determine the outside-city unit return on rate base.

In some cases, it may be desirable to calculate the outside-city and inside-city rates of return under the hybrid approach. Total outside-city return is calculated by determining total outside-city rate base and applying the 8.0 percent rate of return. According to the base-extra capacity method, total outside-city rate base is derived by applying the unit costs for rate base from Table III.2-3 to the respective outside-city units of service presented in Table III.2-1. Application of the 8.0 percent rate of return to an outside-city rate base of $5,441,904 results in an outside-city return of approximately $435,352. Once outside-city return is determined, the inside-city rate of return can be calculated as a level sufficient to derive the balance of the total required return or cash needs. In the example, the total required return is $2,793,000. Subtracting the outside-city return of $435,352 leaves a residual amount of $2,187,968, which is the net revenue requirement for inside-city customers.

The inside-city rate of return can be determined by dividing the total return from inside-city customers of $2,187,968 by the inside-city rate base. The inside-city rate base is calculated in a manner similar to that described for developing the outside-city rate base and totals $43,116,096. As a result, the total inside-city rate of return is determined to be 5.07 percent.

Returning to the unit-cost approach presented in Table III.2-3, inside-city unit return on rate base is developed by applying the 5.07 percent rate of return to the unit costs for

rate base. The differential in inside-city versus outside-city rates of return reflects in part the municipality's risk in the ownership of facilities constructed to serve outside-city customers, as well as a return on paid-up equity in system facilities to inside-city customers.

Total unit costs of service are comprised of the O&M, depreciation, the credit for nonrate revenues, and return on rate-base unit costs of service and are shown at the bottom of Table III.2-3 for inside-city and outside-city customers on Lines 19 and 20, respectively. Also included in the table are the costs of service directly allocated to fire protection service. See chapter IV.8 for details on direct and indirect fire protection costs.

Unit costs of service for the commodity-demand method are developed using an approach similar to that used for the base-extra capacity method. Total unit costs of service for inside-city and outside-city customers under the commodity-demand method are summarized at the bottom of Table III.2-4.

DISTRIBUTING COSTS BY BASE-EXTRA CAPACITY METHOD

The costs of service are distributed to the utility's customer classes by applying unit costs of service to individual customer class units of water service. The total units of service and the unit costs of service for the test year, from Tables III.2-1 and III.2-3, respectively, are summarized in Table III.2-5.

As discussed previously, base costs are costs that would be incurred in supplying water at a perfect load factor (i.e., at a continuous, uniform rate), without costs incurred in providing extra plant capacity for variation in the rate of use beyond a uniform rate. The resulting distribution of cost responsibility for base costs is simply a function of the volume of water used by each class.

As shown in Table III.2-5, residential customers are projected to use 968,000 thousand gallons of water in the test year; commercial customers, 473,000 thousand gallons; and industrial customers 1,095,000 thousand gallons. Applying the inside-city unit base cost of $1.7189 per thousand gallons to the respective units of service yields the distributed customer-class base cost of service. By definition, the *unit base cost* is the minimum rate at which water could be sold (if perfect load-factor use could be achieved) after customer costs are recovered. Outside-city distributed base costs are derived from applying the unit base cost of $1.9599 per thousand gallons to the outside-city base unit-of-service requirements. The higher unit base cost reflects the rate of return differential discussed previously.

Extra capacity costs for maximum-day and maximum-hour service are incurred in providing facilities to furnish water at varying rates above the average. Customer class responsibility for extra capacity costs is determined by applying the unit costs of service to the individual customer-class units of service in a manner similar to that used for determining customer class base costs.

Customer costs, which include the categories of meters and services and billing and collection costs, are generally treated separately in rate studies. Customer costs associated with meters and services (both capital and O&M costs) may be distributed to customer classes on the basis of equivalent meter-and-service cost factors. Meter-and-service costs are based on the total number of equivalent ⅝-in. meters and are applied to customer class equivalent meter units of service to determine allocated costs of service. Units based on equivalent ⅝-in. meters allow for the fact that customer costs will vary and tend to increase with the size of the customer meter and service.

Billing and collection costs may be related to the number of bills issued and, in turn, distributed to customer classes on the basis of the number of bills rendered to customers within each class. For the example, customer class responsibility is determined by

Table III.2-4 Unit costs of service—Commodity-demand method (test year)

Line No.	Unit Cost Component	Rate of Return Percentage	Total	Commodity	Capacity		Customer Costs		Direct Fire Protection Service
					Maximum Day	Maximum Hour*	Meters & Services	Billing & Collection	
	Units of Service								
1	Total System			2,861,000 1,000 gal	16,708 1,000 gpd	29,316 1,000 gpd	19,275 equiv. meters	219,108 bills	
	O&M Expense								
2	Total		$6,837,000	$1,414,105	$2,450,547	$614,083	$987,143	$1,288,624	$82,498
3	Unit Cost, $/Unit			$0.4943	$146.6647	$20.9470	$51.2136	$5.8812	
	Depreciation Expense								
4	Total		$1,242,000	$36,828	$563,790	$387,000	$216,789		$37,592
5	Unit Cost, $/Unit			$0.0129	$33.7427	$13.2010	$11.2472		
	Nonrate Revenue								
6	Total		($78,000)	($7,000)	($30,000)	($8,000)	($14,000)	($18,000)	($1,000)
7	Unit Rate Base, $/Unit			-$0.0024	-$1.7955	-$0.2729	-$0.7263	-$0.0822	
	Rate Base								
8	Total Rate Base		$48,558,000	$2,633,508	$24,002,797	$14,667,890	$5,976,569		$1,277,236
9	Unit Rate Base, $/Unit			$0.9205	$1,436.5626	$500.3369	$310.0684		
	Unit Return on Rate Base								
10	Outside City, $/Unit Return on Rate Base (Input)	8.00%		$0.0736	$114.9250	$40.0270	$24.8055		
11	Outside-City Units of Service			325,000	2,147	3,456	1,614		
12	Outside-City Rate Base		$5,612,545	$299,158	$3,083,690	$1,729,247	$500,450		
13	Outside-City Return on Rate Base		$449,004	$23,933	$246,695	$138,340	$40,036		
14	Inside City, $/Unit Return on Rate Base (Input)	5.06%		$0.0466	$72.7328	$25.3319	$15.6987		
15	Inside-City Units of Service			2,536,000	14,562	25,860	17,661		
16	Inside-City Rate Base		$42,945,456	$2,334,351	$20,919,107	$12,938,644	$5,476,118		$1,277,236
17	Inside-City Return on Rate Base		$2,174,316	$118,188	$1,059,129	$655,080	$277,254		$64,666
18	Total System Return on Rate Base (Calculated)	5.40%	$2,623,320	$142,120	$1,305,824	$793,420	$317,290		$64,666
19	Inside City, $/Unit (Line 3 + 5 + 7 + 14)			$0.5513	$251.3447	$59.2070	$77.4332	$5.7991	$183,756
20	Outside City, $/Unit (Line 3 + 5 + 7 + 10)			$0.5783	$293.5370	$73.9021	$86.5400	$5.7991	

*Maximum-hour demand in excess of maximum-day demand.

applying the billing and collection unit cost to the total estimated number of bills in each customer class rendered for the average rate year.

The base-extra capacity and customer costs, summarized by customer class, constitute the costs of service to be recovered from the respective classes of customers involved. This summation also identifies the responsibility of each class for the functional costs.

Table III.2-5 Cost distribution to customer classes—Base-extra capacity method (test year)

Line No.	Item	Total Cost of Service	Base Demand	Extra Capacity		Customer Costs		Direct Fire Protection Service
				Maximum Day	Maximum Hour*	Meters & Services	Billing & Collection	
	Inside City:							
1	Unit Costs of Service, $/Unit		$1.7189 1,000 gal	$200.8877 1,000 gal	$64.7000 1,000 gal	$77.5793 per equiv. meters	$5.7991 per bill	
	Residential							
2	Units of Service		968,000	3,978	3,978	15,652	185,760	
3	Allocated Costs of Service	$5,011,689	$1,663,851	$799,148	$257,382	$1,214,272	$1,077,236	
	Commercial							
4	Units of Service		473,000	1,296	1,620	1,758	14,640	
5	Allocated Costs of Service	$1,399,435	$813,018	$260,328	$104,805	$136,384	$84,898	
	Industrial							
6	Units of Service		1,095,000	1,500	1,500	251	420	
7	Allocated Costs of Service	$2,302,435	$1,882,146	$301,332	$97,050	$19,472	$2,436	
	Fire Protection Service							
8	Units of Service			840	4,200			
9	Allocated Costs of Service	$624,390		$168,746	$271,740			$183,905
10	Total Inside-City Allocated Cost-of-Service	$9,338,150	$4,359,015	$1,529,554	$730,977	$1,370,129	$1,164,570	$183,905
11	Outside City:							
12	Unit Costs of Service, $/Unit		$1.9599 1,000 gal	$237.7451 1,000 gal	$79.9182 1,000 gal	$86.6471 per equiv. meters	$5.7991 per bill	
13	Residential							
14	Units of Service		95,000	468	364	1,580	18,240	
15	Allocated Costs of Service	$569,369	$186,189	$111,382	$29,121	$136,902	$105,775	
16	Wholesale							
17	Units of Service		230,000	788	945	34	48	
18	Allocated Costs of Service	$716,801	$450,773	$187,265	$75,539	$2,946	$278	
19	Total System Allocated Costs of Service	$10,624,320	$4,995,977	$1,828,201	$835,637	$1,509,977	$1,270,624	$183,905

*Maximum-hour demand in excess of maximum-day demand.

DISTRIBUTING COSTS BY COMMODITY-DEMAND METHOD

As noted in the previous chapter, there are two generally accepted methods of allocating costs to cost components: the base-extra capacity method and the commodity-demand method. Costs are distributed to customer classes under the commodity-demand method using the same process previously discussed to distribute base-extra capacity costs. Table III.2-6 summarizes the application of units of service to unit costs of service, as developed in Tables III.2-2 and III.2-4 for the commodity-demand method.

In the commodity-demand method, commodity costs are distributed to customer classes on the basis of total annual use. Demand-related costs are distributed to the various classes in proportion to the class total-demand responsibility; this is not the extra or incremental demand over the base use, but the total maximum-day or maximum-hour demand. The method of distribution demand cost responsibilities is an important differentiator between the base-extra capacity method and the commodity-demand method.

Table III.2-6 Cost distribution to customer classes—Commodity-demand method (test year)

Line No.	Item	Total Cost of Service	Commodity	Capacity		Customer Costs		Direct Fire Protection Service
				Maximum Day	Maximum Hour*	Meters & Services	Billing & Collection	
	Inside City:							
1	Unit Costs of Service, $/Unit		$0.5513 1,000 gal	$251.3447 1,000 gal	$59.2070 1,000 gal	$77.4332 per equiv. meters	$5.7991 per bill	
	Residential							
2	Units of Service		968,000	6,630	10,608	15,652	185,760	
3	Allocated Costs of Service	$5,117,409	$533,658	$1,666,450	$628,081	$1,211,984	$1,077,236	
	Commercial							
4	Units of Service		473,000	2,592	4,212	1,758	14,640	
5	Allocated Costs of Service	$1,382,580	$260,764	$651,430	$249,359	$136,128	$84,898	
	Industrial							
6	Units of Service		1,095,000	4,500	6,000	251	420	
7	Allocated Costs of Service	$2,111,837	$603,673	$1,131,051	$355,242	$19,436	$2,436	
	Fire Protection Service							
8	Units of Service			840	5,040			
9	Allocated Costs of Service	$693,289		$211,130	$298,403			$183,756
10	Total Inside-City Allocated Costs of Service	$9,305,116	$1,398,095	$3,660,062	$1,531,085	$1,367,547	$1,164,570	$183,756
	Outside City:							
11	Unit Costs of Service, $/Unit		$0.5783 1,000 gal	$293.5370 1,000 gal	$73.9021 1,000 gal	$86.5400 per equiv. meters	$5.7991 per bill	
12	Residential							
13	Units of Service		95,000	729	1,093	1,580	18,240	
14	Allocated Costs of Service	$592,156	$54,942	$213,920	$80,786	$136,733	$105,775	
15	Wholesale							
16	Units of Service		230,000	1,418	2,363	34	48	
17	Allocated Costs of Service	$727,048	$133,017	$416,179	$174,632	$2,942	$278	
18	Total System Allocated Costs of Service	$10,624,320	$1,586,053	$4,290,161	$1,786,503	$1,507,223	$1,270,624	$183,756

*Maximum-hour demand in excess of maximum-day demand.

As noted previously, the base-extra capacity method uses the difference between class contribution to the average demand and peak demand, whereas the commodity-demand method uses the class contribution to the total maximum demand. These are clearly two separate and distinct perspectives regarding customer class demand responsibilities.

Customer costs are distributed based on equivalent meter and billing requirements. Commodity costs, which tend to vary with the annual quantity of water produced, are distributed to inside-city customer classes by applying the inside-city commodity unit cost of $0.5513 per thousand gallons to the respective inside-city class units of service. Likewise, demand-related costs for maximum-day and maximum-hour service requirements are distributed to the classes based on the application of total estimated class service demands and the unit costs of demand.

Customer costs for meters and services and for billing and collection are the same under both the base-extra capacity and commodity-demand methods and are distributed similarly in both methods. Meter-and-service costs are distributed to classes in

Table III.2-7 Allocated cost to customer classes—Base-extra capacity and commodity-demand comparison

Line No.	Customer Class	Base-Extra Capacity		Commodity-Demand	
		Allocated Cost of Service	Percentage of Total	Allocated Cost of Service	Percentage of Total
	Inside City:				
1	Residential	$5,011,889	47.2%	$5,117,409	48.2%
2	Commercial	1,399,435	13.2%	1,382,580	13.0%
3	Industrial	2,302,435	21.7%	2,111,837	19.9%
4	Fire Protection Service	624,390	5.9%	693,289	6.5%
5	Total Inside-City Allocated Cost of Service	9,338,150	87.9%	9,305,116	87.6%
	Outside City:				
6	Residential	$569,369	5.4%	$592,156	5.6%
7	Wholesale	716,801	6.7%	727,048	6.8%
8	Total System Allocated Cost of Service	$10,624,320	100.0%	$10,624,320	100.0%

proportion to the number of equivalent ⅝-in. meters, whereas billing and collection costs are distributed on the basis of the number of bills rendered. Cost of service for outside-city service may also be derived by applying the outside-city unit costs of service to outside units of service.

A summation of the distributed costs for each cost component for inside-and outside-city customers yields the total distributed customer class cost-of-service responsibility and appears in the "Total Cost of Service" column in Table III.2-6.

A word of caution should be added that may prevent misinterpretation of the commodity cost of $0.5513 per thousand gallons. Under no circumstances does the commodity cost equate to the base cost of service for water. Even with perfectly uniform use, demand or capacity costs must be added. The base-extra capacity method clearly identifies the base cost of service for water.

A summary comparison of the distribution of costs to customer classes under the base-extra capacity and commodity-demand methods is provided in Table III.2-7. As discussed in chapter III.1, depending on the unique total demand and customer peaking factor characteristics of the utility in question, the base-extra capacity and commodity-demand methods may result in reasonably similar allocation of cost of service to class and the resulting water rates.

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The American Water Works Association (AWWA) believes that the public can best be provided water and wastewater services by self-sustaining enterprises adequately þnanced with rates and charges based on sound utility accounting, management and þnancial principles.

Utilities should not implement any policy or practice that compromise the long-term þnancial integrity of the utility or its ability to provide quality service to customers.

Utilities should follow the generally accepted national accounting principles of their country and adopt a standard uniform system of accounts, modified as necessary to meet the requirements of legislative, judicial, or regulatory bodies. Internal controls should be adequate to ensure that the financial statements present fairly, in all material respects, the financial position, results of operations and cash flows of the utility.

Revenues from water and wastewater service charges, user rates, and capital charges should be sufþcient to pay for annual operation and maintenance expenses, financing of capital costs, maintenance of working capital and required reserves, and achievement of defined financial performance metrics. Maintenance and capital costs should include the support of an asset management program that preserves utility assets at desired service levels.

Rates should be designed to distribute the cost of service equitably among each type and class of service. Non-cost of service rate-setting practices that achieve public policy goals and utility objectives may be appropriate in some situations.

Utilities should provide information annually to customers, the financial community, and the general public about the financial condition of the utility and the revenues necessary to provide service and to maintain utility assets on a sustained basis.

Utilities should account for and maintain their funds in separate accounts from other governmental or owning entity operations. Water and wastewater utility funds should not be diverted to uses unrelated to water or wastewater utility services. Reasonable taxes, payments in lieu of taxes, and payments for services rendered to the utility by a local government or other divisions of the owning entity may be included in the utility's revenue requirements after taking into account the contribution for þre protection and other services furnished by the utility to the local government or to other divisions of the owning entity.

Adopted by the Board of Directors Jan. 25, 1965, revised Jan. 31, 1982, reaffirmed Jan. 25, 1987, revised Jan. 26, 1992, June 21, 1998, Jan. 16, 2005 and revised Jan. 17, 2010. Revised June 7, 2015.

Contact

AWWA Headquarters
6666 W. Quincy Ave.
Denver, CO 80235 USA
Phone: 303.794.7711 or 800.926.7337
Fax: 303.347.0804

AWWA Government Affairs Office
1300 I St. NW Suite 701
Washington, DC 20005-3314 USA
Phone: 202.628.8303

AWWA India
203, Wing B, Citi Point, J. B. Nagar
Andheri-Kurla Road
Andheri (East) Mumbai – 400059
Phone: +91-22-6127-3639

Contact AWWA

DOCKET NO. 49189

APPLICATION OF THE CITY OF AUSTIN DBA AUSTIN WATER FOR AUTHORITY TO CHANGE WATER AND WASTEWATER RATES	§ § § § §	BEFORE THE PUBLIC UTILITY COMMISSION OF TEXAS

DIRECT TESTIMONY
OF
DAN WILKERSON

ON BEHALF OF THE CITY OF AUSTIN
D/B/A AUSTIN WATER

APRIL 2019

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ATTACHMENTS

I. INTRODUCTION

Q PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Dan Wilkerson. My business address is P.O. Box 11136, College Station, Texas, 77842.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT POSITION?

A. I am a Principal of Associated Power Analysts, Inc. (Associated Power) and have been hired by the City of Austin (City) as an expert witness for Austin Water (AW).

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. I am testifying on behalf of the City doing business as AW.

Q. DID YOU PREPARE THIS TESTIMONY?

A. Yes. This testimony was prepared by me or under my direct supervision.

Q. WOULD YOU PLEASE CLARIFY YOUR REFERENCES TO THE CITY AND AW?

A. Yes. AW is a municipally-owned water and wastewater utility, owned by the City of Austin, a home-rule city. When I refer to AW, I am referring to the utility, which is a department functioning within the City.

Q. PLEASE GIVE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I have a BS in Mechanical Engineering from Texas A&M University in 1972. I am a Member of the American Society of Mechanical Engineers. My resume is included as Attachment DW-1.

I worked for General Electric from 1972 until late 1978 installing and maintaining gas and steam turbines, primarily in power plants. In 1978 I became Director of Electric Utilities for the City of Bryan (Bryan), then in 2001 my title changed to General Manager of Bryan Texas Utilities. In these capacities I had the overall responsibility for the generation, transmission, distribution, billing, and wholesale sales of electricity for the Municipal Electric System owned by the City of Bryan. This included fuel procurement and wholesale sales both as bilateral contracts and in the daily market. Retail rate design was a major responsibility to insure adequate revenues, bond covenant requirements for debt service coverage, and equitable charges for a number of customer classes.

The billing service was for electric, water, wastewater, and solid waste, so that I have a great deal of experience both in understanding rates for water and wastewater and in answering customer queries about these rates. I have given or provided testimony at the Public Utility Commission of Texas (Commission or PUC) on Transmission Cost of Service and at the Federal Energy Regulatory Commission on the same subject. I represented the Municipal Segment at the Electric Reliability Council of Texas (ERCOT) in the following capacities: Operating Subcommittee, Technical Advisory Committee (two separate stints), Board of Texas Regional Entity, and ERCOT Board, as well as a number of working groups. While on the ERCOT Board I served on the Finance Committee. I was President of Texas Public Power Association (TPPA) during the writing of Senate Bill 7, the deregulation bill, and helped with its drafting. I also worked with other municipal electrics to help draft and implement the Transmission Cost of Service (TCOS) rules which were implemented

by the Commission and gave municipalities a rate of return on invested capital similar to the investor-owned transmission providers.

Q. DO YOU HAVE EXPERIENCE IN WATER UTILITY RATE SETTINGS?

A. Yes. When I began my career as the Director of Electric Utilities, Bryan was just beginning a rate study for electric, water, and wastewater services. I completed the cost of service and rate design that was part of that process, and implemented the new structures with City Council approval. I continued updating all of these rates until the late 1990's when water and wastewater rates went under the Public Works Director. I was responsible for electric rate design and for the regulatory filings for TCOS until my retirement in 2012. I also participated in the rate design for the Texas Municipal Power Agency. Upon joining Associated Power Analysts I began a study of the wholesale rates charged by the Lower Colorado River Authority (LCRA) to its municipal and cooperative customers and gave expert testimony in their rate dispute with LCRA, Cause No. D-1-GN-12-002156. Though I did more cost of service and rate design with electric rates, both retail and wholesale, as stated above, I had considerable experience with both water and wastewater. The rate work of all of these services, electric, water, and wastewater, is almost identical in that one must complete a cost of service analysis by customer class, check the actual revenues in a test year for these classes, and then design rates to correct any over or under recovery.

Q. PLEASE DESCRIBE YOUR EXPERIENCE IN FINANCIAL PLANNING FOR UTILITIES.

A. Throughout my career in Bryan I was responsible for the long- range financial planning to ensure that rates were sufficient to provide adequate cash for maintenance and capital and give adequate debt service coverage. I presented the metrics in these financial

plans on many occasions to the rating agencies Bryan used: Standard and Poor's (S&P), Fitch, and Moody's. These presentations were made in both New York and in Bryan. I also did updates with representatives of the rating agencies by phone annually. I came to understand what was important for the ratings we would receive, and worked to improve those ratings.

Q. ARE YOU A MEMBER OF ANY PROFESSIONAL ORGANIZATIONS?

A. Yes. I am a Member of the American Society of Mechanical Engineers. I am Past President of the TPPA, and Past Section Chair of the American Public Power Association. I was awarded TPPA's Distinguished Service Award in 1998 and 2008.

Q. HAVE YOU PREVIOUSLY SUBMITTED TESTIMONY BEFORE THE PUBLIC UTILITY COMMISSION OF TEXAS?

A. Yes. I have previously testified before the Commission on rates and on other matters. I have also testified and submitted testimony before other agencies and in the courts in Texas. A list of the testimonies I have provided can be found at Attachment DW-2 to this testimony.

Q. WHAT DOCUMENTS DID YOU REVIEW BEFORE PREPARING YOUR TESTIMONY?

A. I primarily reviewed information from the challenge to the 2013–2014 AW rates for wholesale water and wastewater pressed by the wholesale customers at issue in this case. This challenge was filed with the Commission in Docket No. 42857. In particular, I read the Proposal for Decision (PFD), the Order and Order on Rehearing, and the written testimonies of: Michael Castillo, David Anders, Richard Giardina, Jay Joyce, Joseph Healy, and Emily Sears. I also looked at portions of the M1 Manual of