

M1

Principles of Water Rates, Fees, and Charges

Seventh Edition



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Manual of Water Supply Practices—M1, Seventh Edition

Principles of Water Rates, Fees, and Charges

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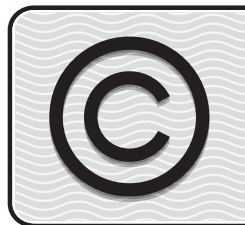
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Contents



List of Figures, ix

List of Tables, xi

Preface, xv

Acknowledgments, xvii

Introduction, xix

Section I Introduction, 1

Chapter I.1	Overview of Cost-Based Water Utility Rate-Making 3
	Objectives of Cost-Based Rate-Making, 4
	Generally Accepted Rate-Setting Methodology, 4
	Key Technical Analyses of Cost-Based Rate-Making, 5
	Other Water Rate Issues and Considerations, 6
	References, 6

Section II Revenue Requirements, 7

Chapter II.1	General Concepts for Establishing Revenue Requirements 9
	Adequacy of Revenues, 9
	Approaches to Projecting Revenue Requirements, 10
	Test Year, 11
	Reference, 18
Chapter II.2	Revenues 19
	Sources of Revenue, 19
	Cash Versus Accrual Revenues, 21
	Unbilled Revenues, 21
	Projecting Revenue, 22
	Example, 24
Chapter II.3	Operation and Maintenance Expenses 27
	Classifying O&M Expenses, 28
	Identifying Non-Recurring O&M Expenses, 28
	Identifying Capitalized O&M Expenses, 29
	Identifying Special Considerations for Government-Owned Utilities, 29
	Estimating O&M Expenses, 30
	Example, 30
Chapter II.4	Taxes 33
	Local Taxes, 33
	State Taxes, 34
	Federal Taxes, 34
	Tax Issues in Rate Cases, 35
Chapter II.5	Capital-Related Costs 39
	Cash-Needs Approach, 39
	Utility-Basis Approach, 42

	Rate of Return, 46	
	Capital Structure, 47	
Chapter II.6	Examples of Revenue Requirements	51
	Government-Owned Utilities, 51	
	Investor-Owned Utilities, 54	
Section III	Cost Allocation, 57	
Chapter III.1	Allocating Revenue Requirements to Cost Components	59
	Assigning Revenue Requirements to Functional Costs, 60	
	Allocating Functionalized Costs to Cost Components, 61	
	Special Considerations, 71	
Chapter III.2	Distributing Costs to Customer Classes	73
	Customer Classes, 73	
	Units of Service, 75	
	Distributing Cost Components to Customer Classes, 77	
	Unit Costs, 78	
	Distributing Costs by Base-Extra Capacity Method, 81	
	Distributing Costs by Commodity-Demand Method, 83	
Chapter III.3	Emerging Trends in Water Rate-Making	87
	Revenues, 89	
	Reserves, 90	
	Revenue Requirements, 90	
	Cost Allocation, 92	
	Rate Design, 95	
	Summary and Conclusions, 99	
	References, 100	
Section IV	Rate Design, 101	
Chapter IV.1	Selecting Rate Structures	103
	Planning the Rate Structure Study, 103	
	Rate Structure Variables and Considerations, 106	
	Summary, 108	
	References, 108	
Chapter IV.2	Uniform Rates	109
	General Considerations, 109	
	Historical Perspectives, 110	
	Advantages and Disadvantages, 111	
	Determining a Uniform Rate, 112	
	Example, 112	
	Summary, 113	
Chapter IV.3	Decreasing Block Rates	115
	General Considerations, 115	
	Historical Perspectives, 116	
	Advantages and Disadvantages, 117	
	Determining Decreasing Block Rates, 119	
	Example, 119	
	Summary, 121	

Chapter IV.4	Increasing Block Rates.....	123
	General Considerations, 123	
	Historical Perspectives, 124	
	Advantages and Disadvantages, 125	
	Setting Block Size and Pricing, 126	
	Examples, 127	
	Summary, 128	
Chapter IV.5	Seasonal Rates.....	129
	General Considerations, 129	
	Historical Perspectives, 131	
	Advantages and Disadvantages, 132	
	Determining Seasonal Rates, 133	
	Examples, 135	
	Summary, 137	
Chapter IV.6	Water-Budget Rates	139
	General Considerations, 140	
	Historical Perspectives, 141	
	Advantages and Disadvantages, 141	
	Implementing Water-Budget Rates, 143	
	Example, 147	
	Summary, 148	
	References, 148	
Chapter IV.7	Revenue Stability—Fixed Charges and Other Considerations	149
	General Considerations, 149	
	Fixed Charges, 151	
	Other Considerations, 153	
	Summary, 154	
	References, 155	
Chapter IV.8	Rates for Fire Protection Service	157
	General Considerations, 157	
	Historical Perspectives, 158	
	Public Versus Private Fire Protection, 161	
	Determining Fire Protection Costs, 162	
	Rate Design, 165	
	Emerging Issues, 169	
	References, 171	
Section V	Other Rate Issues, 173	
Chapter V.1	Water Reuse Rates and Other Considerations.....	175
	Background and Terminology, 176	
	Water Reuse Considerations, 176	
	Financial Analysis Versus Economic Analysis, 178	
	Types of Water Reuse Customers, 178	
	Financial Planning for Reuse, 180	
	Cost Allocation of Water Reuse Rates, 182	
	Pricing Reuse Water, 188	
	References, 189	
Chapter V.2	Standby Rates	191
	General Considerations, 191	
	Historical Perspectives, 192	

	Advantages and Disadvantages, 192	
	Example, 194	
	Summary, 194	
Chapter V.3	Drought and Surcharge Rates.....	195
	General Considerations, 195	
	Historical Perspectives, 197	
	Advantages and Disadvantages, 197	
	Determining Rate Surcharges, 198	
	Determining Drought Surcharges, 199	
	Drought Surcharge Considerations, 199	
	Drought Surcharge Example, 203	
	Summary, 205	
Chapter V.4	Low-Income Affordability Programs	207
	Defining Affordability, 209	
	Affordability Programs, 212	
	Business Case for Creating Affordability Programs, 217	
	Funding for Affordability Program Assistance, 218	
	Summary and Future Direction, 219	
	References, 220	
Chapter V.5	Negotiated Contract and Economic Development Rates.....	223
	General Considerations, 224	
	Historical Perspectives, 227	
	Advantages and Disadvantages, 228	
	Negotiated Contract Rate Example, 230	
	Economic Development Rate Example, 231	
	Summary, 233	
Chapter V.6	Indexed Rates.....	235
	General Considerations, 235	
	Advantages and Disadvantages, 236	
	Example, 237	
	Summary, 237	
Chapter V.7	Price Elasticity	239
	General Considerations, 240	
	Historical Perspectives, 240	
	Examples, 242	
	Summary, 243	
Chapter V.8	Marginal Cost Pricing	245
	General Considerations, 245	
	Practical Considerations, 246	
	Advantages, 248	
	Disadvantages, 249	
	Summary, 250	
	Reference, 251	
Chapter V.9	Miscellaneous and Special Charges	253
	Definition of Service Charges, 254	
	Example, 255	
	Legal Authority for Service Charges, 255	
	Selecting and Implementing Service Charges, 255	

	Cost Basis and Rationale, 257	
	Determining the Cost of Providing Service, 258	
	Example Service Charges, 261	
	Summary, 272	
	Reference, 272	
Section VI	Outside Customer Rates, 273	
Chapter VI.1	Overview of Outside Customer Rates.....	275
	Benefits of Providing Outside Customer Service, 276	
	Nature of the Relationship, 276	
	Outside-Customer Rate Methodologies, 278	
	Implementation and Administration Considerations, 287	
	Stakeholder Involvement and Public Communications, 289	
	Summary, 290	
Chapter VI.2	Outside Retail Rates.....	291
	Benefits of Providing Outside Retail Service, 291	
	Outside Retail Rate Methodologies, 292	
Chapter VI.3	Outside Wholesale Rates.....	297
	Definition of Wholesale Service, 297	
	Types of Wholesale Service, 298	
	Benefits of Providing Outside Wholesale Service, 299	
	Wholesale Service Relationship and Financial Considerations, 299	
	Determining Wholesale Revenue Requirements, 301	
	Rate Design for Wholesale Customers, 305	
	Implementation and Administration Considerations, 305	
	Stakeholder Involvement and Public Communications, 309	
	Summary, 309	
	Reference, 310	
Section VII	Capacity and Development Charges, 311	
Chapter VII.1	Connection and Customer Facility Charges	313
	Allocating Costs, 315	
	Capital Cost Component, 316	
	Calculating Connection and Customer Facility Charges, 317	
	Examples, 319	
Chapter VII.2	System Development Charges	321
	Financial Goals and Objectives, 322	
	Methodology and Legal Considerations, 323	
	Information and Documentation for Calculations, 326	
	New Customer Demands (Level of Service), 327	
	Approaches to Calculating SDCs, 328	
	Examples of SDC Methodologies, 330	
	Other SDC Technical and Administrative Issues, 340	
	Administrative and Accounting Policies and Procedures, 343	
	Best Management Practices, 345	
	Updates of the SDC Analysis, 346	
	References, 347	
Chapter VII.3	Availability Charges	349

Section VIII	Implementation Issues, 351	
Chapter VIII.1	Public Involvement in Rate-Making	353
	General Considerations and Policy Issues, 353	
	Historical Perspectives, 354	
	Public Involvement Planning, 355	
	Communication Tools, 359	
	Evaluating Communications, 360	
	Summary, 361	
	Reference, 361	
Chapter VIII.2	Data Requirements.....	363
	Customer Records, 363	
	Plant Investment, 366	
	Operation and Maintenance Expenses, 367	
	Periodic Cash Flow for the Utility, 368	
	Customer Survey Information, 368	
	Summary, 368	
	Reference, 368	
Appendixes, 371		
Appendix A	Development of Peaking Factors by Customer Class	373
Appendix B	Equivalent Meter Ratios.....	383
Appendix C	Bill Tabulation Methods	389
Appendix D	Example of Citizens Advisory Committee Guidelines	397
Glossary, 399		
Index, 409		
List of AWWA Manuals, 417		

Figures



I.1-1	Analytical steps of cost-based rate-making, 5
IV.2-1	Uniform rate by customer classification, 110
IV.3-1	Decreasing block rate, 116
IV.4-1	Increasing block rate, 124
IV.5-1	Seasonal rate, 130
IV.6-1	Water-budget rates, 140
IV.8-1	Percentage of total revenue allocated as fire protection costs, 159
IV.8-2	Maine Public Utilities Commission fire protection curve, 160
V.1-1	Evaluation of potential water reuse projects, 179
V.8-1	Typical average and marginal cost curves, 246
VII.1-1	Typical water system components, 314
VIII.1-1	10-step approach to public involvement, 355
A-1	Annual usage pattern, 374
A-2	Peaks that occur at different times, 375

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Tables

II.1-1	Normalization factors, 11
II.1-2	Summary of test-year revenue requirements, 17
II.2-1	Typical revenue classifications, 20
II.2-2	Number of customers and water consumption, 24
II.2-3	Water sales and miscellaneous revenues, 25
II.3-1	O&M expenses, 31
II.4-1	Tax versus book depreciation, 37
II.5-1	Total (gross) plant in service—Year end, 41
II.5-2	Test-year rate base, 47
II.6-1	Flow of funds—Existing rates, 52
II.6-2	Flow of funds—Increased rates, 53
II.6-3	Calculation of cash-basis user charge revenue requirements, 54
II.6-4	Operating income statement—Existing rates, 55
II.6-5	Operating income statement—Increased rates, 55
III.1-1	Allocation of rate base—Base-extra capacity method (test year), 64
III.1-2	Allocation of depreciation expense—Base-extra capacity method (test year), 65
III.1-3	Allocation of O&M expense and nonrate revenue—Base-extra capacity method (test year), 66
III.1-4	Allocation of rate base—Commodity-demand method (test year), 68
III.1-5	Allocation of depreciation expense—Commodity-demand method (test year), 69
III.1-6	Allocation of O&M expense and nonrate revenue—Commodity-demand method (test year), 70
III.1-7	Summary comparison of allocated costs, 71
III.2-1	Units of service—Base-extra capacity method (test year), 77
III.2-2	Units of service—Commodity-demand method (test year), 78
III.2-3	Unit costs of service—Base-extra capacity method (test year), 79
III.2-4	Unit costs of service—Commodity-demand method (test year), 82
III.2-5	Cost distribution to customer classes—Base-extra capacity method (test year), 83
III.2-6	Cost distribution to customer classes—Commodity-demand method (test year), 84
III.2-7	Allocated cost to customer classes—Base-extra capacity and commodity-demand comparison, 85
IV.2-1	Uniform rates for all customers, 112
IV.2-2	Uniform rates by customer class, 112
IV.3-1	Derivation of typical inside-city cost per 1,000 gallons by water-use blocks (test year), 119

- IV.3-2 Summary of customer water use by rate block and application of proposed rates (test year), 120
- IV.4-1 Increasing block rate design—Residential class, 128
- IV.4-2 Increasing block rate design—Residential class marginal cost-based rate, 128
- IV.5-1 Seasonal residential class rates—Peak and off-peak approach, 136
- IV.5-2 Seasonal residential class rates—Excess-use approach, 136
- IV.6-1 Water-budget rates, 148
- IV.7-1 Fixed charges by meter size, 152
- IV.7-2 Fixed charges—Minimum charge, 153
- IV.8-1 Fire protection cost calculation—Base-extra capacity method (test year), 162
- IV.8-2 Allocation of fire service costs to public and private fire service—Base-extra capacity method (test year), 163
- IV.8-3 Customer class fire flow demands and unit cost—Base-extra capacity method (test year), 164
- IV.8-4 Public fire protection cost distribution to customer classes—Base-extra capacity method (test year), 165
- IV.8-5 Public fire protection rate design—Base-extra capacity method (test year), 166
- IV.8-6 Public fire protection rate design for municipalities per hydrant—Base-extra capacity method (test year), 166
- IV.8-7 Public fire protection for municipalities, inch-foot hydrant charge—Base-extra capacity method (test year), 168
- IV.8-8 Private fire protection rate design for municipalities, per hydrant—Base-extra capacity method (test year), 168

- V.1-1 Evaluation of water supply resources, 178
- V.1-2 Operation and maintenance expense, allocation to cost components—Combined potable and reuse costs, 184
- V.1-3 Operation and maintenance expense, allocation to cost components—Combined potable and reuse costs with subsidy, 186
- V.1-4 Operation and maintenance expense, allocation to cost components—Combined potable and reuse costs with reuse costs as source of supply, 187
- V.2-1 Example of standby charges, 194
- V.3-1 Drought surcharge pricing example, 204
- V.5-1 Example of contract rate determination, 231
- V.5-2 Annual revenue requirements, 232
- V.5-3 Short-term variable operation and maintenance expenses, 232
- V.5-4 Impact of the addition of a new industrial customer, 232
- V.6-1 Simple rate indexing based on inflation, 237
- V.8-1 Examples of three different marginal cost pricing rate schedules, 248

- VI.1-1 Comparison of the cash-needs and utility-basis revenue requirements, 278
- VI.1-2 Treated-water customer rate classes for a hypothetical public water utility, 287
- VI.2-1 Calculating outside-customer rate multipliers, 293

VII.1-1	Calculation of connection and customer facility charges, 318
VII.1-2	Calculation of connection charges, 319
VII.1-3	Calculation of customer facility charges, 320
VII.2-1	Illustrative example of the development of the SDC for a pumping plant using the buy-in method and RCNLD valuation approach for a ¾-in. connection, 333
VII.2-2	Illustrative example of the summary of the net allowable SDC using the buy-in method and RCNLD valuation approach for a ¾-in. connection, 334
VII.2-3	Illustrative example of the development of the SDC for a pumping plant using the incremental cost method for a ¾-in. connection, 336
VII.2-4	Illustrative example of the development of the SDC for a pumping plant using the combined cost method for a ¾-in. connection, 337
VII.2-5	Meter equivalencies based on meter capacity and establishing SDCs by meter size using the buy-in method and RCNLD valuation approach, 338
VII.2-6	Sample debt-service expansion percentage calculations, 345
VII.3-1	Example calculation of availability charge, 350
VIII.2-1	Data requirements checklist, 369
B-1	Example costs of meter installations, 384
B-2	Safe maximum operating capacity by meter type, per current AWWA standards, 386
C-1	Example of customer-account billing records, 391
C-2	Example of a water bill tabulation sheet, 392
C-3	Development of cumulative billed usage for residential ¾-in. meters, 394

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Preface



In 1954, AWWA published the report *Determination of Water Rate Schedules*, which later was issued as the first AWWA manual on water rates. Since then, AWWA Manual M1, *Water Rates*, has been updated several times, most recently in 2012. The fifth edition, titled *Principles of Water Rates, Fees, and Charges*, consolidated several previous publications into what has been referred to as the M1 Super Manual. For a more complete history of AWWA's rate manual publications, see "A Brief History of Water Rates Manuals and Publications—The New England Water Works' Involvement" in the December 2013 edition of the *NEWWA Journal*.

The issues associated with water rates and charges have continued to evolve, and this update of M1, the seventh edition, is a reflection of that evolution. For example, this edition makes current the numeric examples used throughout the manual, consolidates chapters where appropriate, and includes new material reflective of changes in the industry (e.g., chapter III.3, "Emerging Trends"). In the future, the AWWA Rates and Charges Committee will continue to update this manual as new issues and questions arise.

As with the other manuals prepared by the Rates and Charges Committee and AWWA in general, this manual will not prescribe a solution. Rather, it is intended to provide guidance and advice. The examples presented are used only to demonstrate the generally accepted methodologies discussed in this manual. The underlying data and assumptions are not endorsed or recommended either by AWWA or the Rates and Charges Committee for use elsewhere. The purpose of this manual is to describe and present issues associated with developing water rates, fees, and charges; to enumerate the advantages and disadvantages of various alternatives; and to provide information to help users determine water rates, fees, and charges that are most relevant to a particular situation.

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Introduction



During the last 20 years of the 20th century and now into the second decade of the 21st century, the cost of supplying potable water increased significantly. This rapid increase can be attributed to many factors, including the passage and implementation of the US Safe Drinking Water Act and corollary legislation in other countries, population growth, the need to develop more remote and expensive water supplies, the need to replace aging infrastructure, and rapid economic development in some areas. The amplified costs of meeting water quality requirements and utility plant needs have resulted in increased water rates and charges.

Historically, customers generally paid little attention to their water bills or the rate structure. However, as the rates and charges increased and water bills became a more significant percentage of customers' overall expenses, consumers have become increasingly interested in the rate-setting process. And with the heightened focus on conservation and water-use efficiency, water utilities are also recognizing the effect that rates and charges can have on customer use patterns.

With this recognition, new challenges in customer engagement, revenue stability, and the use of accepted cost-of-service and rate-design approaches become apparent. As the challenges of the industry change, so do the "tools" available, including how customers are charged for service. To this end, the types of rate structures used by utilities and discussed in this manual now include emerging trends in cost-based rate design.

In the past, rates were developed for broad classes of customers with similar usage patterns. With enhanced meter reading capabilities and more powerful billing software, water utilities are more able to tailor rates to individual customer use. The new data and faster computing abilities are enabling the development and implementation of new forms of rates that can better reflect the cost to serve customers and send proper economic signals for the use of our most precious resource.

This seventh edition of AWWA Manual M1 includes an update to the rates charged to retail and wholesale customers outside an "owning city's" boundaries (new section VI), an update to the rates for fire protection service (chapter IV.8), additional treatment of fixed charges and declining revenue (chapter IV.7), an update regarding system development charges (chapter VII.2), new guidance on the growing issue of affordability (chapter V.4), and new chapters on water reuse (chapter V.1) and emerging trends (chapter III.3). The chapter on legal considerations has been removed; readers are referred to AWWA's publication titled *Water Rates, Fees, and the Legal Environment* for more on that matter.

The AWWA Rates and Charges Committee believes that a utility's full revenue requirements should be equitably recovered from customers or classes of customers in proportion to the cost of serving those customers. However, the committee also recognizes that other considerations may, at times, be equally important in determining rates and charges and may better reflect emerging objectives of the utility or the community it serves, including water-use efficiency, revenue stability, and affordability.

The emergence of new rate and pricing policies has brought a continuing evolution in rate structures. In some cases, water rates and charges may have been adopted to achieve certain goals without a full understanding of the impacts or resulting implications. Some rate alternatives, if not properly designed, may even have effects that counteract what was intended.

This manual is intended to help policymakers, managers, and rate analysts consider all relevant factors when evaluating and selecting rates, charges, and pricing policies. It is a comprehensive collection of discussions and guidance on a variety of issues associated with designing and developing water rates and charges.

This manual contains eight sections:

- Section I provides an overview of the rate-setting process and the key steps in completing a cost-of-service analysis.
- Section II discusses the determination of revenue requirements.
- Section III presents the process in which costs are functionalized, allocated, and distributed to classes of customers as well as a discussion of emerging trends.
- Section IV presents various rate structures and how they are developed.
- Section V presents pricing alternatives related to specific customers or groups of customers and a number of rate-design considerations.
- Section VI is a new section devoted to matters associated with rates charged to customers outside a city's or owner's territorial limits, including both retail and wholesale rate considerations.
- Section VII discusses the derivation and implementation of capacity and development charges.
- Section VIII presents various implementation considerations and data requirements.

Section I

Introduction

I.1 Overview of Cost-Based Water Utility Rate-Making

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Chapter **I.1**

Overview of Cost-Based Water Utility Rate-Making

Establishing cost-based rates, fees, and charges is an important component in a well-managed and operated water utility. Cost-based rates provide sufficient funding to allow communities to build, operate, maintain, and reinvest in the water system that provides the community with safe and reliable drinking water and fire protection. Properly and adequately funded water systems also allow for the economic development and sustainability of the local community. The purpose of this manual is to discuss standard practices in financial planning and rate-making that a utility can use to establish cost-based rates, fees, and charges to recover the full costs associated with its water system.

The methods and analyses used to establish cost-based rates, fees, and charges have a long history within the water utility industry. Operators of some of the earliest water systems recognized the need for sufficient funding and rates to properly operate, maintain, and expand their water systems. AWWA appointed the Committee on Water Rates in 1949. As time passed, the utility industry recognized the need for a manual of standard practice. Through the work of this committee, the first AWWA M1 manual, *Water Rates Manual*, was published in 1954. (For a more complete history, see Woodcock 2013.) Many of the same concepts, methodologies, and analyses used in 1954 remain relevant today. As time has passed, AWWA Manual M1 has been updated and expanded to reflect the changing industry and its current financial and rate issues. The development of this seventh edition continues the efforts of many dedicated rate professionals to provide a manual of standard practice for the development and establishment of cost-based water rates, fees, and charges.

As a manual of standard practice, AWWA advocates the use of the generally accepted cost-based principles and methodologies for establishing rates, charges, and fees contained and discussed within this manual. Establishing cost-based and equitable rates is technically challenging and requires, at some level, knowledge and understanding of finance, accounting, budgeting, engineering, system design and operations, customer service,

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, Danielsén, 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 defensible

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.

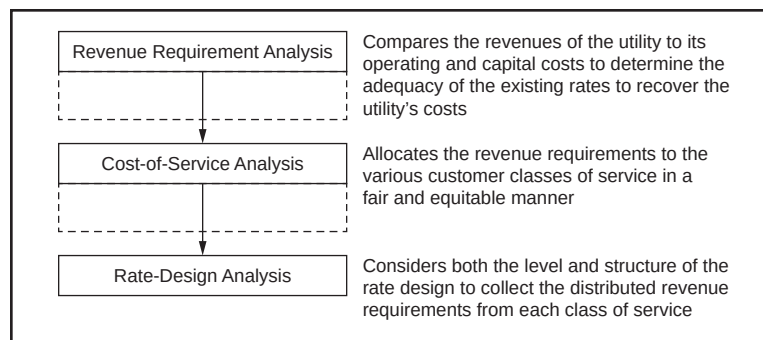


Figure I.1-1 Analytical steps of cost-based rate-making

KEY TECHNICAL ANALYSES OF COST-BASED RATE-MAKING

In establishing cost-based water rates, it is important to understand that a cost-of-service methodology does not prescribe a single approach. Rather, as the first edition of AWWA's Manual M1 noted, "the [M1 manual] is aimed at outlining the basic elements involved in water rates and suggesting alternative rules of procedure for formulating rates, thus permitting the exercise of judgment and preference to meet local conditions and requirements" (AWWA 1954). This manual, like those before it, provides the reader with an understanding of the options that make up the generally accepted methodologies and principles used to establish cost-based rates. From the application of these options within the principles and methodologies, a utility may create cost-based rates that reflect the distinct and unique characteristics of that utility and the values of the community.

Revenue Requirement Analysis

The purpose of the revenue requirement analysis is to determine the adequate and appropriate funding of the utility. Revenue requirements are the summation of the operation, maintenance, and capital costs that a utility must recover during the time period for which the rates will be in place. Two generally accepted approaches for establishing a utility's revenue requirements are discussed in this manual: the cash-needs approach and the utility-basis approach. Section II of the manual provides a detailed discussion and numerical examples about how to establish a utility's revenue requirements using these two approaches, and this section provides a framework for determining how to select between the two approaches.

Cost-of-Service Analysis

The purpose of the cost-of-service analysis is to equitably distribute the revenue requirements between the various customer classes of service served by the utility. The cost-of-service analysis determines what cost differences, if any, exist between serving the various customer classes. The two generally accepted methodologies for conducting the cost-of-service analysis are called the base-extra capacity method and the commodity-demand method. The functionalization, allocation, and distribution process of the base-extra capacity and commodity-demand methodologies are generally considered fair and equitable because both approaches result in the revenue requirements being distributed to each class in proportion to each class's contribution to the system cost components. Discussions of both cost-of-service methodologies, along with numerical examples to illustrate their differences, are provided in section III of this manual.

Rate-Design Analysis

The final technical analysis is the rate-design analysis. This analysis determines how to recover the appropriate level of costs from each customer class of service. There are different rate structures that may be used to collect the appropriate level of revenues from each customer class of service. Section IV of this manual covers the selection and development of rate designs in detail.

OTHER WATER RATE ISSUES AND CONSIDERATIONS

In addition to the topics previously discussed, this manual also contains guidance on a variety of other water rate and cost recovery issues, capacity and development charges, and water rate implementation issues. These topics are discussed in sections V through VIII.

Section V provides an overview of many distinct situations and pricing considerations that utilities may need to address. It is not unusual for a utility to face situations where a customer or group of customers has unique characteristics and circumstances. These situations include reuse rates and charges, standby rates, drought and surcharge rates, low-income affordability rates, negotiated contract and economic development rates, indexed rates, price elasticity, marginal cost pricing, and miscellaneous and special charges. Regardless of the distinctive situation and pricing considerations, the cost-based principles and methodologies as discussed within this manual should be adapted for the cost analysis to provide proper support for the rates.

Section VI is devoted to the development of rates for customers outside a municipality that owns the system. It has been expanded to include an overview of setting rates for outside customers, with chapters on wholesale (or bulk) charges and retail sales.

In recent years, the cost of system expansion and customer growth has had a significant financial impact on utilities. The development of cost-based connection fees, system development charges, or dedicated capacity charges are the topics reviewed in section VII.

Finally, while cost-of-service principles for rate-making and related fees and charges rely on significant amounts of financial analysis, engineering analysis, and policy decisions, it is necessary to engage the public. These topics, along with the data needs for developing cost-based rates, are discussed in section VIII of the manual.

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- Bonbright, J.C., A.L. Daniels, and D.R. Kamerschen. 1988. *Principles of Public Utility Rates*, 2nd ed. Arlington, Va.: Public Utilities Reports. pp. 383–384.
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Section II

Revenue Requirements

- II.1 General Concepts for Establishing Revenue Requirements
- II.2 Revenues
- II.3 Operation and Maintenance Expenses
- II.4 Taxes
- II.5 Capital-Related Costs
- II.6 Examples of Revenue Requirements

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Chapter **II.1**

General Concepts for Establishing Revenue Requirements

The development of a utility's revenue requirements is the first analytical step of the comprehensive rate-setting process. The determination and establishment of a utility's revenue requirements is the basis for setting the overall level of the utility's rates, while providing the utility with adequate and sustainable funding levels for both operating and capital costs. The revenue requirement analysis provides the utility with an understanding of the size and timing of needed rate adjustments to existing rate levels and perhaps the rate structure.

In providing adequate water service to its customers, every water utility must receive sufficient total revenue to ensure proper operation and maintenance (O&M), development and sustainability of the system, and preservation of the utility's financial integrity. The total revenue requirements for most utilities are largely financed from revenues derived from selling water to their customers. Other revenue not derived from the sale of water may come from a variety of sources such as rentals, provision of various services to other utilities or entities, and system development charges or impact fees.

ADEQUACY OF REVENUES

The overall adequacy of water revenues can be measured by comparing projected annual revenue requirements to be met from rates with projected revenues under existing or authorized rates.

Length of Projections

Revenue projections can be made for any length of time, depending on the purpose of the projection. For budgetary purposes, utilities may project only one year ahead. From a

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 of 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 **II.2**

Revenues

Revenues are the lifeblood of a water utility. Without adequate revenues, the quality of service will deteriorate from the lack of proper maintenance and system improvements, and the utility will not be financially or operationally sustainable.

SOURCES OF REVENUE

Two basic sources of revenue are available to a water utility: operating revenues and non-operating revenues. *Operating revenues* include sales of water to general customers and other services that are usually provided under standard rate schedules or by contractual arrangements. *Nonoperating revenues* can include tax revenues, gains or losses from the sale of property, rental of nonoperating property, interest income, and other items not usually directly related to the provision of water service.

Additionally, in some government-owned utilities, transfers from the government entity's general fund are used as a revenue source to fund such items as debt service, various capital outlays, and, in some cases, operation and maintenance (O&M) expenses. With the exception of dedicated funds, utilities that use such transfers are not considered to be adequately financed, self-sustaining enterprises.

Revenue Classifications

Table II.2-1 shows typical revenue classifications. As noted in the table, sales to general retail customers may be subdivided into unmetered (if applicable) and metered sales, and each category is usually further subdivided into customer classes such as residential, commercial, and industrial. Additional subdivisions or alternative classifications may include such categories as governmental, apartments, and single-family and multifamily dwellings. Some utilities use the customer's meter size to classify retail customers (e.g., small, medium, and large meters).

Where applicable to government-owned utilities, each of these general water service classes is considered separately in determining whether it is inside or outside the jurisdictional limits of the owning agency.

Sales for resale generally consist of deliveries to customer groups, such as suburban cities or water districts, on a wholesale basis through master meters. Other special sales

Table II.2-1 Typical revenue classifications

Operating Revenues	Nonoperating Revenues	Contributions to Capital
General Water Service	Merchandising and contract services (jobbing)	Developer and customer contributions
Unmetered sales	Rents from nonoperating property	Grants
Metered sales	Interest and dividend income	System development charges
Sales for resale (wholesale)	Gains or losses from disposition of property	
Other special sales	Tax revenues	
Private fire protection service	Transfers from other government funds	
Public fire protection service	Allowance for funds used during construction	
Other	Other nonoperating revenues	
Miscellaneous service revenues		
Forfeited discounts		
Rents from water property		
Other water revenues		

may include irrigation, air conditioning, standby, off-peak, interruptible, and individual contract service where special rates may apply.

Private fire protection service revenues include charges for sprinkler-service connections, standpipes, private fire hydrants, and other fire protection facilities located on the customers' premises. Public fire protection service revenues generally include charges for service provided through public fire hydrants or user charges (see chapter IV.8, "Rates for Fire Protection Service").

Miscellaneous service revenues include any revenues resulting from other services regularly provided by the utility. This includes, among other elements, revenues from charges for connecting or disconnecting service, special meter readings, temporary hydrant use, new account charges, and collection-related charges.

Forfeited discounts include revenues from discounts foregone as a result of untimely payment of water bills. They can also include penalties assessed for late payment of water bills.

Rents from water property include rental income from the lease or rental of operating property and equipment.

Other water revenues may include providing billing services for other outside utilities or providing other services such as laboratory testing, and other such services generally established as the cost of providing such services.

Nonoperating revenues is the income that is derived from sources that are not generally related to the ongoing day-to-day operating activities of the utility. Rents from nonoperating property include rental income from utility property not used for operating purposes (such as the rental of buildings on land purchased to acquire water rights). If the utility has investments that earn interest or dividends, such income should be reported in the interest and dividend income account.

If a utility sells or otherwise disposes of an item of utility property, the net proceeds are reported as gains or losses from sale or disposition of utility property. The net gain or loss is measured by the net selling price less the net book cost (book cost less accumulated depreciation) of the property sold.

Tax revenues usually consist of ad valorem or other taxes assessed for the benefit of the water utility. Transfers from other government funds are often considered to be similar to grants and are usually treated the same; these transfers would not include payments for water service.

Allowance for funds used during construction (AFUDC) is an accounting entry designed to permit the utility to recover the costs associated with financing ongoing,

long-term construction activities. Typically, AFUDC cannot be included in the current-period revenue requirement but instead is added to the cost of the construction and capitalized.

Other nonoperating revenues is an all-encompassing term for items of nonoperating revenues that do not warrant a separate, individual accounting. Nonoperating revenues are considered to be “below-the-line” items; that is, they are not necessarily treated as available to meet the O&M or debt-service revenue requirements of the utility.

Developer and customer contributions consist of cash or property donated for plant construction. These contributions may include such items as the investment in the distribution system associated with a new subdivision, the cost of tapping into the water main, and the cost of a customer’s service connection, meter, and meter installation.

It is common for utilities to impose connection charges, system development charges (SDCs), or other such charges (section VII) on developers or property owners to pay for capital improvements required to serve growth and new or expanded development. These charges transfer the cost burden related to growth to new customers and help mitigate the cost of growth to existing customers. SDCs are accounted for as capital contributions and are reported separately in the Statement of Revenues and Expenses and in the Statement of Net Assets in accordance with Governmental Accounting Standards Board Statement No. 34 requirements. To the extent that this income is included in the utility’s financial tests, such as for calculating debt-service coverage, the utility should refer to its specific bond covenants. However, it is suggested that such tests or ratios should be computed both with and without the inclusion of these revenue sources. Because such growth-related revenues are subject to potential significant annual variation, it may be necessary to adjust water service rate levels upward to accommodate for the potential reduction or loss in SDC revenues to maintain necessary debt-service coverage levels, if such revenues had been counted for in meeting the minimum debt-service coverage requirement. In the case of investor-owned utilities, such fees and charges have usually been treated as contributions in aid of construction on the utility’s books and not as a revenue item.

Grants are usually considered to be contributions made by the granting agency, such as the federal government.

CASH VERSUS ACCRUAL REVENUES

Cash receipts are sometimes used as a basis for setting and adjusting water rates. However, most investor-owned water utilities and many government-owned utilities maintain their accounting records on an accrual basis. The accrual method of accounting provides a better matching of revenues and expenses and a more accurate assessment of the profitability of the utility than cash-basis accounting.

Some government-owned water utilities operate on a cash basis of accounting because of bond indenture or other requirements. Recognizing that cash revenues often lag accrued revenues, government-owned utilities must account for this lag in cash receipts and provide resources for it, particularly if they operate strictly on a cash basis of accounting. As noted in chapter II.1, accounting terminology should not be confused with rate-making terminology. The cash-needs approach to measuring the revenue requirements of a utility and setting rates may be, and often is, used whether the utility’s accounting records follow the cash, accrual, or modified-accrual basis of accounting.

UNBILLED REVENUES

All water meters are not typically read and billed at the same time, because most water utilities cycle their billing process throughout the month. Under any cycle-billing system,

there are unbilled revenues at the end of each accounting period, representing the water sales from the last billing of each customer to the end of the accounting period. Thus, earned revenues do not typically equal the billed revenues for any accounting period. The difference between the unbilled revenues at the end and at the beginning of an accounting period is the accrued amount to be applied to the billed revenues to determine the earned revenues for the accounting period.

If there is no growth in the number of customers, no rate change during the accounting period, and customer usage is stable, there will be little difference between earned revenues and billed revenues. However, if customer growth is significant or if a rate change takes effect during the period, the unbilled revenues at the end of the accounting period will differ from those at the beginning. Therefore, this accrued amount may be large, and earned revenues may be significantly different from billed revenues.

Some utilities bill service charges or minimum charges in advance. In such cases, some billed, but unearned, revenues could exist at the end of each accounting period. Therefore, if the unearned revenues at the end of the accounting period exceed the unearned revenues at the beginning of the accounting period, a negative revenue accrual would result.

For rate-making purposes, the accrued amount must be excluded from base revenues because rate changes and customer growth are annualized and added to the billed revenues. Thus, if the accrual adjustment is not excluded, base revenues would be adjusted twice for rate changes and growth.

PROJECTING REVENUE

In projecting revenue that may be available to the utility from the sources listed in Table II.2-1, the utility must first develop adequate historical data as a basis for projecting future revenues.

Historical Data

The amount of revenue that may be derived from water rates under any particular rate schedule can be appropriately projected based on historical data regarding customer billing. The amount and detail of needed data vary, depending on the local situation. The most accurate projections result from separately summarizing and analyzing billing data for each customer classification.

For metered accounts, the utility may need to compile the number of bills rendered by customer class and meter size, and the water sales by rate block. This compilation usually includes adjustments for credits, additional billings, partial bills, final bills, and changes in the number of customers served. The compilation should include a verification procedure, such as a comparison with billed revenues. The verification procedure should also include confirmation of the days billed. A change in the billing cycle or in the makeup of the billing routes could result in test-year billings for more or less than 365 days. To properly analyze billed revenues, the utility must have billings for 365 days.

Flat-rate revenues and fire-service revenues can be annualized by establishing the average number of billing units for each rate level during the historical base year. Growth projections can be added if applicable.

In many situations, particularly for smaller utilities, detailed billing data are not available. In such cases, the utility must estimate a satisfactory basis for projection of anticipated revenues.

Projection Considerations

Reasonable projections of each revenue category listed in Table II.2-1 must be considered and made as appropriate. As previously noted, it is often necessary to normalize or adjust historical data to reflect abnormal conditions that may have caused unusual variations. Some of the most common areas for adjustment are discussed in the following sections.

Growth in number of customers. Growth in the number of customers served can be projected by recognizing historical growth patterns, growth restrictions and changes in economic conditions, and by awareness of proposed developments in the service area. Historical customer class average water use and/or revenues per customer are normally adequate to project revenues in growth situations. However, if the current rates have not been in effect for a sufficient period to establish valid average revenue per customer, historical average revenues need to be adjusted to reflect rate changes. Also, it is often necessary to perform special analyses of projected future revenues from existing or new industrial or other large-use customers.

The number of customers served at any particular point in time, such as historical year end, needs to be annualized so that projections ultimately reflect a full year's service. Often the trend in the average of beginning and end-of-year number of customers of record provides a satisfactory method of projection. A factor that would require adjustments includes the effects of past annexation of new customers, an occurrence not likely to be repeated with regularity. Another factor that would necessitate an adjustment would be the effects of a major area-wide economic downturn or upturn that is not typical of a long-term trend.

Non-recurring sales. Sales not expected to continue in the future should be eliminated from projections. This would include a large-volume water user going off the system, abnormally high sales caused by an incorrect meter reading if not credited during the base year, leakage of customers' plumbing, and temporary purchases. Sufficient data must be accumulated to calculate the volume of non-recurring sales and an appropriate adjustment made to revenue projections.

Weather normalization. In many areas, weather conditions can greatly affect water sales. Thus, the utility should consider adjusting past sales when weather conditions have been abnormal. It is useful to follow a procedure that correlates average water use per customer over a period of years with temperature, rainfall, and other climatic conditions. These data are used together with normal climatic data to project water sales under normal weather conditions. Normal climatic conditions may be established using long-term averages as reported by the National Weather Service for the service area.

Care should be exercised when attempting to normalize water sales for weather. Other variables that affected the historical data may have more effect on the results than the weather normalization itself and, therefore, should be reflected in the revenue study.

Conservation. Revenue projections may need to be adjusted to reflect conservation measures installed in the past or to reflect conservation measures to be used in the future. These projections can be difficult to adjust. Past conservation measures may permanently reduce water sales, so comparing water sales before the conservation measures were installed could overstate future projections. The effects of future conservation measures can be difficult to quantify and support. However, a diligent attempt should be made to estimate the effect of conservation efforts on revenues; otherwise, actual revenues may differ significantly from projections.

Price elasticity. Most water use is considered to be relatively insensitive to changes in the price of water (price inelastic). However, uses such as outdoor lawn watering and industrial sales may be somewhat more sensitive to the price of water. Many utilities have experienced water-use reductions due to, at least in some measure, increases in the price of water. Major rate increases have, at times, reduced industrial water sales. The addition

Table II.2-2 Number of customers and water consumption

Line No.	Customer Class	Number of Customers (average)					
		Historical Year	Projected Years				
			1	2	3	4	5
1	Residential	15,180	15,330	15,480	15,630	15,780	15,930
2	Commercial	1,200	1,210	1,220	1,230	1,240	1,250
3	Industrial	35	35	35	35	35	35
4	Wholesale	4	4	4	4	4	4
5	Private Fire	150	150	150	150	150	150
6	Public Fire	1	1	1	1	1	1
7	Total	16,570	16,730	16,890	17,050	17,210	17,370

Line No.	Customer Class	Water Consumption (1,000 gallons)					
		Historical Year	Projected Years				
			1	2	3	4	5
1	Residential	950,000	958,000	968,000	977,000	986,000	996,000
2	Commercial	465,000	469,000	473,000	477,000	481,000	484,000
3	Industrial	1,095,000	1,095,000	1,095,000	1,095,000	1,095,000	1,095,000
4	Wholesale	230,000	230,000	230,000	230,000	230,000	230,000
5	Private Fire	N/A*	N/A	N/A	N/A	N/A	N/A
6	Public Fire	N/A	N/A	N/A	N/A	N/A	N/A
7	Total	2,740,000	2,752,000	2,766,000	2,779,000	2,792,000	2,805,000

*N/A = not available

of billings for other utility services based on water usage, such as wastewater services, can also affect water use.

Water utilities are investigating, and many have implemented, pricing techniques intended to modify water demand. Some regulatory agencies are also considering this method to promote water conservation. Extreme care should be used in projecting revenues that reflect these pricing techniques because generalized water price-elasticity information may not apply to specific circumstances. See chapter V.7 for a more comprehensive discussion of this topic.

EXAMPLE

Tables II.2-2 and II.2-3 illustrate an example projection of utility revenues. These tables, and additional tables presented in chapters II.3, II.4, and II.5, are intended to assist the reader in recognizing customer base, water use, revenues, O&M expenses, capital structure, and associated capital costs as part of the projection process. The information and methodology used in developing these tables apply equally to government-owned and investor-owned water utilities. The adequacy of projected five-year revenues according to existing rates is presented in a flow-of-funds analysis for the government-owned utility and an operating income statement for the investor-owned utility.

Revenue sources typically available to utilities have been discussed in this chapter. Included in the tables are water sales revenue from residential, commercial, industrial, and wholesale customer classes; revenue from charges for private and public fire protection; other miscellaneous operating revenues; and nonoperating income. Table II.2-2 summarizes a projection of the average number of customers served and the associated

Table II.2-3 Water sales and miscellaneous revenues

Line No.	Customer Class	Historical Year	Projected Revenues				
			1	2	3	4	5
1	Residential	\$4,980,000	\$5,031,000	\$5,082,000	\$5,130,000	\$5,178,000	\$5,229,000
2	Commercial	1,500,000	1,521,000	1,533,000	1,545,000	1,557,000	1,569,000
3	Industrial	1,860,000	1,860,000	1,860,000	1,860,000	1,860,000	1,860,000
4	Wholesale	360,000	360,000	360,000	360,000	360,000	360,000
5	Private Fire	120,000	120,000	120,000	120,000	120,000	120,000
6	Public Fire	810,000	810,000	810,000	810,000	810,000	810,000
7	Subtotal	9,630,000	9,702,000	9,765,000	9,825,000	9,885,000	9,948,000
8	Other Operating Revenues	60,000	75,000	78,000	81,000	84,000	87,000
9	Nonoperating Income	165,000	150,000	159,000	168,000	177,000	186,000
10	Total	\$9,855,000	\$9,927,000	\$10,002,000	\$10,074,000	\$10,146,000	\$10,221,000

water use by customer class for each of the years in the example study period. As noted, the projections for the number of customers and water use are equally applicable to both government-owned and investor-owned utilities.

The number of customers and water use by customer class for the most recent historical year are presented in Table II.2-2 to serve as a reference point for the reader. As previously discussed, a review of historic changes in customer growth, use per customer, and variance in usage patterns caused by weather and other factors is necessary for sound projections. In Table II.2-2, these underlying factors are assumed to have been recognized in preparing the forecast. It may be noted that not all classes are expected to experience growth.

Table II.2-3 shows projected revenues under existing rates for a government-owned utility. In projecting revenues under existing rates, service charges or minimum bill charges and fire protection charges are applied to the projected number of customers/bills, and average unit revenues applicable to water usage (volume charges) are applied to the projected water use (both number of customers and water usage as previously developed in Table II.2-2). A similar procedure would be followed in projecting revenues under existing rates for an investor-owned utility.

Projected revenues from miscellaneous operating and nonoperating sources are based on historical average revenue levels from these sources. In some instances, such as revenue from forfeited discounts or late payment penalties, projected revenues from these sources may be directly related to projected water sales revenues. Other miscellaneous revenue sources, such as charges for connecting and disconnecting service, may vary directly with the projected number of customers or the growth in number of customers. Such relationships should be determined based on an analysis of the applicable revenue accounts.

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Chapter **II.3**

Operation and Maintenance Expenses

For any utility to be self-sufficient, the utility must recover its full revenue requirements on a continuing basis. Chapter II.1 provided an overview of revenue requirements and how they are determined under both a cash-needs approach and a utility-basis approach. As noted in chapter II.1, O&M expenses include a major part of revenue requirements. In this chapter, O&M expenses for both government-owned and investor-owned utilities are discussed. Specific items include

- classifying O&M expenses by functional cost category;
- identifying non-recurring O&M expenses;
- identifying capitalized O&M expenses;
- identifying special considerations for government-owned utilities, including interdepartmental O&M expenses and payments to the general fund; and
- estimating O&M expenses.

O&M expenses are the prudent and necessary costs to operate and maintain source of supply, treatment, pumping, transmission and distribution facilities; as well as the cost of customer service, and administrative and general expenses. O&M expenses are typically measured and reported for a period of one year corresponding to the fiscal time period of the entity being reported.

In this chapter, O&M expenses exclude depreciation expense and expenditures that would significantly extend the lives of the facilities beyond those first contemplated, as well as taxes. A review and discussion of these items are covered in chapters II.4 and II.5.

CLASSIFYING O&M EXPENSES

To properly account for O&M expenses, it is necessary to develop a common accounting method for classifying expenses consistently from year to year. Specifically, O&M expenses should be classified in a manner to achieve the following goals:

- Permit proper monitoring and reporting of each O&M expense item.
- Separate capital expenditures from O&M expenses.
- Provide appropriate information to utility managers for operating the utility in a cost-effective manner.
- Provide historical data in a format that facilitates projections.
- Support cost-of-service and rate-making calculations.
- Enhance comparability or benchmarking of expenses among water utilities.

Chart of Accounts

The most effective way to classify and track O&M expenses on a consistent basis is through a detailed chart or system of accounts. For an O&M expense to be appropriately classified, the chart of accounts is used to properly code the expense item; that is, as a water utility completes each financial transaction, a record of that transaction is tracked into the appropriate account within the chart of accounts. Typically, the larger and more complex the utility, the greater the need for a more detailed chart of accounts.

The National Association of Regulatory Utility Commissioners has recommended a “Uniform System of Accounts,” which is widely used by regulated utilities and can be modified for government-owned utilities. Other charts of accounts that meet the goals previously set forth are also used.

IDENTIFYING NON-RECURRING O&M EXPENSES

Some O&M expenses do not have the characteristics of ongoing annual expenses. These expenses are not incurred repeatedly from year to year but rather occur infrequently. A good example of a non-recurring O&M expense is the cost of painting a water storage tank. Tank painting does not create a new asset but provides maintenance to an existing asset. This expense is an O&M expense even though it might only be incurred once every 10 years.

Amortization

Many utilities amortize infrequently occurring O&M expense over the expected period between expenditures to minimize major fluctuations in annual expenses. Non-recurring O&M expenses that might be amortized include certain maintenance activities (such as tank painting), regulatory expenses, and planning studies. For example, a utility that has one tank might paint that tank every 10 years. In this case, the cost of painting the tank would be amortized over 10 years, and the annual expense would be one-tenth of the total cost.

Scheduling

If possible, groups of non-recurring O&M expenses should be scheduled in such a way that approximately the same expense is incurred annually. For example, a utility may have 10 storage tanks, and one tank is painted each year. By the time the tenth tank is painted

in the tenth year, it is time to repaint the first tank, and so on. In this case, the cost of tank painting would be expensed annually rather than amortized over a 10-year period.

IDENTIFYING CAPITALIZED O&M EXPENSES

From a revenue requirement standpoint, it is important to recognize that some expenditures that might normally be considered O&M expenses must be capitalized. An example of such an expenditure would be salaries and wages of employees who devote time to a project that is a capital investment. Such salaries, wages, and accompanying overhead (e.g., related payroll taxes, workers' compensation, materials and supplies, and transportation expenses) are capitalized as a part of the cost of the project. When capitalized, such expenditures are not included as O&M expenses but are accounted for and depreciated in the same manner as other capitalized costs associated with the project.

IDENTIFYING SPECIAL CONSIDERATIONS FOR GOVERNMENT-OWNED UTILITIES

The accounting system and related chart of accounts should be structured to provide each utility manager with information to track expenses by organizational unit. Government-owned utilities may also adopt the chart of accounts used by the local government accounting system. In some cases, an appropriate chart of accounts may be mandated by state or other governing law. In these situations, specific "object" expense accounts are applied across the organizational units of the local government. An example of how O&M items might be grouped in a government environment is

- personal services,
- contractual services,
- commodities,
- administration, and
- interdepartmental expenses.

Each category could contain numerous expenses to provide further detail.

Many utilities adopt more than one chart of accounts for O&M expenses. One chart might provide for effective rate setting and utility comparability (i.e., more functional in nature; source of supply, treatment, pumping), and another might provide for cost accountability by organizational unit, which permits consistency with state and local government-mandated accounting systems. As long as the utility meets the goals of classification of expenses described at the beginning of this chapter, any one or more expense accounting systems may be satisfactory. However, for cost allocation purposes, a more functional set of O&M accounts (e.g., source of supply, treatment) can facilitate a more equitable allocation and distribution of costs.

Interdepartmental O&M Expenses

Many government-owned water utilities are a part of a city or county government. In such cases, these local governments may provide support services to the utility department. Support services might include planning, purchasing, personnel, accounting, legal, fleet management, and data processing.

To recognize all O&M expenses, it is important to identify interdepartmental O&M expenses incurred on behalf of the water department by other city or county departments. Otherwise, the total expense of providing water service is not identified and, therefore,