La Capra Associates

FULLY ALLOCATED COST OF SERVICE STUDY FOR THE TOWN OF BAR HARBOR, MAINE

Technical Report

PREPARED FOR

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August 1, 2012

TABLE OF CONTENTS

I. Executive Summary

The Town of Bar Harbor's Water Division ("BHWD") hired La Capra Associates in 2011 to develop a fully allocated cost-of-service ("FACOS") study. As part of the study, La Capra Associates was also asked to review the Division's existing rate structure and recommend a new rate design. The cost-of-service study also satisfies an outstanding request to conduct such a study by the Maine Public Utilities Commission ("PUC") when the Town of Bar Harbor purchased the Bar Harbor Water Company in 2001.

La Capra Associates performed a FACOS study to determine the overall level of revenue responsibility for each of Bar Harbor Water Division's customer classes (Residential, Commercial, Industrial, Public Authority, Public Fire, Private Fire). Developing a FACOS study first requires that a utility develop a revenue requirement. The total annual cost of providing water service is the utility's revenue requirement, the majority of which is usually generated through water sales to its customers.

La Capra Associates used the Base-Extra Capacity[1] method of cost allocation as recommended by the American Water Works Association M1 Manual of Water Supply Practices.[2] This method is employed by both private and municipal water utilities for determining class revenue requirements, and the PUC is both familiar with and has approved the use of this method.

The FACOS study used the most recent cost and account data available, for calendar year 2011. In BWHD's last rate filing, the Public Utilities Commission approved a total revenue requirement of $1,489,542 to be collected in 2011 rates. Actual rate revenue collected in 2011 totaled $1,499,407, just 0.7% above the rate filing projection. Therefore, $1,499,407 was the allocated revenue requirement used in the FACOS study.

In addition to Bar Harbor Water Division's actual customer data, the Base-Extra Capacity FACOS model requires the input of estimated *capacity factors* for each customer class.[3] Capacity factors represent the "*maximum-use-to-the- average-use*" on a daily and hourly basis for each customer class. The pattern typically seen in water systems is that the Residential class has the highest capacity factors, followed by the Commercial and then the Industrial classes. This is typically due to summertime uses such as lawn irrigation leading to higher peak-demand requirements, relative to average demand, compared to a typical industrial user which may use high volumes, but on a relatively uniform basis throughout the year. In many cases, cost-of-service studies borrow capacity factor estimates from similar systems, but La Capra Associates found that borrowed data understated BHWD's

[1] See Glossary
[2] "Principles of Water Rates, Fees and Charges," Fifth Edition (2000), American Water Works Association
[3] See Glossary

peak class loads and did not adequately reflect class usage patterns. Based on the Division's number of unique customers and class characteristics, BHWD conducted a three-month study of its own customer class' usage, focusing on peak season consumption.

The study results showed that the Division's Commercial users, particularly seasonal Commercial users, actually have the highest capacity factors. Furthermore, the Jackson Lab, which is the only industrial customer, had actual capacity factors only slightly different than Residential users. While these results are not typical, they are also not surprising given the makeup of BHWD's customer base. Many of the large commercial users are hotels. In addition to mimicking Residential class daily usage profiles (early morning/late day showering), many of these users also have swimming pools and lawn irrigation, causing usage to rise during the peak summer months and adding to system load. Kebo Valley golf course, which is classified as a commercial customer, also has significant summer lawn irrigation use particularly during dry summers. Due to the nature of Jackson Lab's business, its water use also increases during the warmer summer months. Importantly, these results do not support the declining block structure which Bar Harbor currently has in place.

The table below presents the FACOS study results. As shown, the Residential, Commercial and Public Authority classes currently contribute more rate revenue than their cost-of-service, while the Industrial class (Jackson Lab) and Private Fire charges contribute less than their cost of service.

Class	2011		Allocated COSS		$ Change from 2011	% change from 2011
	Actual	% of Total	COS	% of Total		
RES	$ 433,721	28.9%	$ 376,731	25.1%	$ (56,990)	-13.1%
COM	$ 419,435	28.0%	$ 390,689	26.1%	$ (28,746)	-6.9%
IND-LAB	$ 105,520	7.0%	$ 127,391	8.5%	$ 21,871	20.7%
PA	$ 50,060	3.3%	$ 44,550	3.0%	$ (5,510)	-11.0%
PUB Fire	$ 402,968	26.9%	$ 402,524	26.8%	$ (444)	-0.1%
PRIV Fire	$ 87,703	5.8%	$ 157,523	10.5%	$ 69,820	79.6%
Total	$ 1,499,407	100.0%	$ 1,499,407	100%	$ 0	0.0%

When the FACOS study was completed, La Capra Associates reviewed BHWD's rate design and recommended changes to achieve administrative simplicity, better customer understanding, and better pricing signals reflecting a more fair distribution of costs. When developing rates it is important to allocate costs to the rate classes that cause those costs to be incurred. However, there are other considerations that are important when developing rates such as minimizing rate and bill shocks to the existing rate classes while providing price signals to meet policy goals. Often these three rate design considerations conflict with each other and require some judgment to find a balance among them.

"Full" cost-of-service rates were developed where cost causation was the only rate design goal considered. Immediately instituting rates based on the results of the FACOS study (referred to as "overnight rate transition") is problematic as some customers would experience unacceptable bill impacts. Instead, full cost-of-service rates were developed as a reference point to start from; final rates move toward this result, but gradually, to minimize bill impacts.

Developing a rate design that balances rate impacts and still reflects cost causation is the ultimate goal. Additionally, the rate design should include a simplified rate structure. The current rate structure features a rate that declines as the level of consumption increases, and minimum meter charges that include varying amounts of water allowances. To accomplish both fairness and simplicity in its rates, we recommend BHWD move, over time, to a uniform rate for water consumption (i.e. elimination of declining blocks) and an equivalent, modest water allowance for all meter sizes. These rate design changes would ease customer understanding, simplify the billing process and send effective price signals to customers. Starting with the elimination of one or more rate blocks and then moving towards a uniform rate over time would offer a balance between sending appropriate price signals and minimizing customer impacts.

In addition to our recommendation of a phased-in approach for the new rate design, we also recommend that BHWD retain separate tariffs for Quarterly and Seasonal customers based on the FACOS study results. Ultimately, the rates adopted should be expected to collect revenues that are reasonably close to the FACOS study results, but will not likely be exact because rates are based on meter size and water usage, and are not customer class differentiated except by billing type (i.e. quarterly vs. seasonal).

The FACOS study report outlines the impact of two scenarios, an *Overnight Transition to Uniform Rates*, and a three-step *Rate Transition Phase-in* which would occur over a number of years. The report and the corresponding appendices discuss the impacts of both the overnight transition and the phased-in scenarios. Ultimately, it will be up to the Bar Harbor Water Division and the Town Council to determine if the overnight transition or the phased-in approach is the most appropriate method to pursue.

II. Introduction

A. Project Scope

The Bar Harbor Public Works Department - Water Division engaged La Capra Associates in 2011 to develop a fully allocated cost-of-service study to review and possibly alter the Division's current rate design, and then to develop new rates to be phased-in through future rate filings.

A FACOS study is used by utilities to develop rates that collect a utility's revenue requirement (or cost of providing service) and to charge each customer class appropriately based on how each class consumes water. The Water Division has never previously performed a cost-of-service evaluation or a rate design study, both of which are recommended by the Division's regulating entity, the Maine Public Utilities Commission.

B. Goals

In discussions with the Water Division, two main goals for the study emerged. The goals of the study are:

- Develop a fully allocated cost-of-service study so that the Water Division can fairly and equitably generate sufficient funds from its various customer classes (the FACOS study will also provide comparison information to the Division on how the results differ from current customer class contributions to total revenues)
- Review and possibly simplify the existing rate structure

The first goal is addressed in the FACOS study while the second goal is addressed through rate design. Additionally, conducting a cost-of-service study will satisfy an outstanding request made by the PUC when the Town of Bar Harbor purchased the Bar Harbor Water Company in 2001.

C. Background

On a daily basis, the Water Division supplies water to customers in whatever quantities the customers demand. At the same time, it incurs various capital costs and expenses to meet these customer demands. Since the needs for total volume of water and peak rates of water use vary among customers, the Division's costs of providing service also vary among its customers or classes of customers. Developing a fully allocated cost-of-service study is the basis for establishing rate schedules that are fair and equitable to different customers or customer classes.

The guiding text in the water industry for rates, fees and charges is the American Water Works Association M1 Manual of Water Supply Practices ("AWWA M1"). With regard to an allocated cost-of-service study, the Manual states, *"This approach recognizes differences in the costs of providing service to different types of customers. For example, a customer with a higher than average peak rate of use requires larger capacity pumps, pipes, and other system facilities than a customer with an equal total volume of use who takes water at a uniform rate. Accordingly, cost allocation procedures should recognize the particular service requirements of the customers for total volume of water, peak rates of use, and other factors."*[4]

Developing a fully allocated cost-of-service study first requires that a utility develop a revenue requirement. To provide water service to all of its customers, a utility must receive adequate revenues to operate and maintain its system on an on-going basis, including routine operation and maintenance expenses, capital expenditures and/or debt service, contributions to reserve accounts and taxes. The total annual cost of providing water service is the utility's revenue requirement, the majority of which is usually generated through water sales to its customers.

The process of determining a utility's revenue requirement, allocating that revenue requirement to each class, and designing rates to recover the desired revenues involves both a number of mathematical steps and also a full understanding of the utility system's characteristics (e.g. differences between the various classes, differences between seasonal versus year-round users, etc).

III. Methodology

La Capra Associates performed a cost-of-service study in order to determine the overall level of revenue responsibility for each of Bar Harbor Water Division's customer classes:

- Residential
- Commercial
- Industrial – Jackson Lab
- Public Authority
- Public Fire
- Private Fire

The summary page of the FACOS study is included as Appendix 1, and supporting work papers are included as Appendix 2 and Appendix 3.

[4] "Principles of Water Rates, Fees and Charges," Fifth Edition (2000), American Water Works Association, p.49

La Capra Associates used the Base-Extra Capacity[5] method of cost allocation as recommended by the American Water Works Association M1 Manual of Water Supply Practices.[6] This method is employed by both private and municipal water utilities for determining class revenue requirements, and the Maine Public Utilities Commission is both familiar with and has approved the use of this method.

For Bar Harbor's FACOS study, the cost allocation methodology began by developing system demand and allocation ratios. Actual Water Division data from 2011, and methodologies outlined in the AWWA M1 manual, were used to develop the direct allocators[7] used in the cost-of-service model. These direct allocators are used to distribute the Division's investment in plant assets (as of December 31, 2011) to water, customer costs and fire protection. Then 2011 Operation & Maintenance "O&M" costs are assigned to their related production, transmission and distribution functions of water service (source of supply and pumping, water treatment, transmission and distribution, customer costs and administrative and general expenses). The direct allocation ratios are then used to allocate the functionalized O&M costs to water, customer costs and fire protection.

Some costs are easily identified by function based on the account designation or as being caused by measureable characteristics, such as customer usage. For instance, transmission plant accounts are clearly costs incurred for the transmission function. However, other of the utility's costs, such as general plant or administrative and general costs, are jointly caused by a number of activities or functions, and are allocated on what are called "internal allocators" (also known as "joint allocators" because they are fundamentally derived from the combined effects of direct allocators). These costs are split between the functions based on an internally-developed allocation factor, such as all directly allocable expenses within a cost category or total direct labor expense.

A utility's total cost-of-service is represented by 4 major cost components: recurring annual expenses (including O&M expenses and Administrative & General "A&G" expenses), depreciation expense (the return *of* invested capital), taxes (excluding income taxes for a municipality) and net margin or return (the return *on* invested capital).

Most components of O&M and depreciation expense can be allocated directly to cost components, while A&G expenses are allocated based on the resulting allocation of all directly allocable O&M expenses (i.e. internally or jointly allocated). Return is the remainder of capital costs not recovered through depreciation and is expressed as a percentage of rate base.[8] Return and taxes are allocated on the basis of the distribution of

[5] See Glossary
[6] "Principles of Water Rates, Fees and Charges," Fifth Edition (2000), American Water Works Association
[7] Direct allocators refer to costs that are readily identified as caused/related to a specific function.
[8] See Glossary

rate base to the appropriate cost components. The resulting allocation serves as the basis for the subsequent recovery of return from customer classes.[9]

As noted, above, Bar Harbor Water Division's plant-in-service and depreciation expense are allocated on both direct and internal allocators. The resulting sum of these cost allocations is used to develop new internal allocators which are then used to allocate taxes, debt service and the Division's contingency allowance.

Finally, the Water Division's O&M expenses combined with depreciation, taxes and its debt service are totaled and result in the FACOS revenue requirement.

In a cost-of-service study, costs incurred in a typical year are allocated to customer classes based on usage characteristics related to cost-of-service (cost function) and cost causation by each customer class during the same time period. The "typical year" chosen by Bar Harbor Water Division for this study was the year ending December 31, 2011.[10] Allocators developed in the process described above are used to allocate the FACOS revenue requirement components to average and peaking water consumption (base or average day, maximum day and maximum hour), customer costs (customer service and meters) and fire protection.

After allocating the revenue requirement, the model develops units costs associated with water consumption and customer costs (fire protection costs are charged separately). These unit costs are developed based on the usage of each customer class for average day use, as well as estimated maximum day and maximum hour use.[11] Customer costs are distributed according to the number of customers and meter sizes. The customer costs and the water use costs are then combined to develop a fully allocated cost-of-service/revenue requirement for each customer class.

IV. Cost of Service Inputs

Bar Harbor Water Division instituted new rates, effective January 1, 2011. In the Division's rate filing with the PUC,[12] the Test Year used was 2009 and the Pro Forma (or "Rate Year," or "Adjusted Test Year") was 2011.

For the FACOS study, the Utility chose to use the most recent reported data available, calendar year 2011. All consumption and other billing determinants in the study were

[9] Municipal utilities like Bar Harbor do not collect a return on equity per se, but do recover their debt costs and are allowed to collect a contingency allowance in lieu of a return. The rate base allocator is used to distribute debt costs, contingency allowance and taxes.

[10] 2011 was also the Pro Forma Year (or Rate Year) in Bar Harbor Water Division's most recent water rate filing at the PUC.

[11] Average day use, as well as estimated maximum day and maximum hour use were developed from 2011 actual system data. These estimates are the basis for developing capacity factors (see Glossary) for each class.

[12] Docket 2010-329, filed October 12, 2010 with the Maine Public Utilities Commission

based on 2011 actual billing information. To ensure these were good data, a proof of revenue was performed for 2011 and the variance between booked revenues and calculated revenues was less than one percent.

The Public Utilities Commission approved a total revenue requirement of $1,489,542 to be collected in 2011 rates. Actual rate revenue collected in 2011 totaled $1,499,407, just 0.7% above the rate filing projection. For rate-making purposes, this difference ($9,865) was pro formed into the Water Division's cost-of-service by allocating the additional revenues on a pro rata basis across all major cost-of-service cost components. Therefore, $1,499,407 was the allocated revenue requirement to be collected in rates. This was the only adjustment to the PUC rate case Pro Forma Year. The FACOS study is intended to be revenue neutral,[13] and therefore, no additional pro forma adjustments were made.

In addition to Bar Harbor Water Division's customer data, the Base-Extra Capacity FACOS model requires the input of *capacity factors* for each customer class.[14] Capacity factors represent the "*maximum-use-to-the- average-use*" on a daily and hourly basis for each customer class (this is also known as "extra capacity"). Capacity factors are non-coincident with the overall annual system peak, and figure heavily in the cost-of-service model as they are the drivers for fixed peak costs allocated to each of the Utility's classes.

In many cases, cost-of-service studies borrow capacity factor estimates from similar systems, but La Capra Associates found that borrowed data understated Bar Harbor Water Division's peak class loads and did not adequately reflect class usage patterns. Bar Harbor Water Division's seasonal customers comprise roughly a quarter of the annual customers and usage (24.6%), and almost a third of annual revenue (31%). Based on the Division's number of unique customers and class characteristics, a three-month study of class usage was prepared, focusing on peak season consumption.

The peak season consumption study included a sampling of monthly readings compiled by the Water Division staff for July, August and September in 2011. This sample included 95% of all quarterly meters and 51% of all seasonal meters.[15] A true-up process was used for the seasonal meters, based on actual meter readings completed during the summer quarter, to more closely estimate July-September usage, and resulted in an 11% upward adjustment of usage for the seasonal meters. Actual usage for quarterly meters was increased by a factor developed from comparing the percentage of meters read to the total number of active meters for any given meter size. The result was an upward adjustment of 3% for quarterly meters.

[13] See Glossary
[14] See Glossary
[15] Meters were read based on the meter-readers ability to access the meters at customer locations.

This data was then used to estimate total peak season usage and peak month usage for all classes. Finally, maximum day and maximum hour capacity factors were developed using the methodology outlined in the AWWA M1 manual.[16] These capacity factors were input into the COS model; the model uses the capacity factors to develop estimated usage by each class, with quarterly and seasonal usage broken out, on a maximum day and maximum hour basis. Details on the development of Bar Harbor Water Division's capacity factors can be found in the Appendix 3 attached to this report.

The pattern typically seen in water systems is the Residential class having the highest capacity factors, followed by the Commercial and then the Industrial classes. This is typically due to summertime uses such as lawn irrigation leading to higher peak-demand requirements, relative to average demand, compared to a typical industrial user who may use high volumes, but on a relatively uniform basis throughout the year. Additionally, residential users often have "peakier" use throughout the day with customer use spiking early in the morning and again late in the day. A cost-of-service study reflecting this traditional pattern (using the base-extra capacity methodology) would reflect capacity factors that decline from residential to commercial to industrial classes, and that result in a declining block volumetric rate structure similar to the current rate structure that is in place in Bar Harbor. This is reflected in Table 1 below, which shows typical capacity factors.

Table 1

Range of Typical Capacity Factors by Class							
CLASS	Low Example				High Example		
	Max Day		Max Hour		Max Day		Max Hour
RES	300%		400%		300%		700%
COM/PA	200%		275%		250%		500%
IND	125%		140%		175%		350%

However, the Bar Harbor summer usage study we performed, and the resulting capacity factors developed for quarterly and seasonal users for each class, shows that the Division's Commercial users, particularly seasonal Commercial users, actually have the highest capacity factors. Furthermore, the one Industrial user (Jackson Lab) had actual capacity factors only slightly different than Residential users. These results do not support the declining block structure which Bar Harbor currently has in place.

The maximum day and maximum hour capacity factors developed from the Water Division's peak-season study, shown in Table 2, indicate that Bar Harbor's customer classes do not follow the typical water utility pattern.

[16] "Principles of Water Rates, Fees and Charges," Fifth Edition (2000), American Water Works Association, p.297-301

Table 2

Capacity Factors Used in Bar Harbor COS Study			
CLASS	**Bar Harbor 2011**		
	Max Day		**Max Hour**
RES			
Qu	300%		470%
Seas	490%		770%
COM/PA			
Qu	330%		520%
Seas	590%		920%
IND			
Combined	310%		440%

While these results are not typical, they are also not surprising given the makeup of the Water Division's customer base. Many of the large commercial users are hotels. In addition to mimicking Residential class daily usage profiles (early morning/late day showering), many of these users also have swimming pools and lawn irrigation, causing usage to rise during the peak summer months and adding to system load. Kebo Valley golf course, which is classified as a commercial customer, also has significant summer lawn irrigation use particularly during dry summers. Jackson Lab's capacity factor was developed on a combined quarterly/seasonal basis because more than 99% of its use is through quarterly meters. While the Lab currently has only two of its meters classified as "seasonal," the 2011 peak summer season (July-September) accounted for 35% of its annual water use while the winter months (January-March) accounted for just under 20% of its annual water use. Due to the nature of its business, Jackson Lab's water use increases during the warm summer months; a particularly hot summer would result in higher use and increased load on the water system.

Initially, the FACOS results may seem confusing because Bar Harbor does not differentiate its customer charges based on a customer belonging to a specific class. Currently, all users pay for their meter (based on size) and their usage according to either the seasonal or quarterly tariffs currently in place.[17] The purpose of the cost-of-service study is to allocate the utility's revenue requirement based purely on the class usage behavior and the utility's cost to serve each class, regardless of meter size. The underlying concept is that customers who have similar water-use characteristics will incur similar costs to the utility to serve them.

The FACOS model uses the total cost to serve all customers (the revenue requirement) and distributes the dollars into "buckets" (or categories) in two steps. The first step of

[17] The current rate structure (minimum allowances, block sizes, etc) were established prior to the Town's purchase of the water company, so the methodology used to establish these rates is unknown.

allocation is done through system demand ratios[18] and allocates the revenue requirement into average day, maximum day, maximum hour, customer costs and fire protection buckets. The second step of allocation takes the total dollars in the water use (average day, maximum day and maximum hour) and the customer cost buckets and allocates them to customer classes. The maximum day and maximum hour capacity factors are employed as part of the second round of allocation when a unit cost per millions of gallons is developed for water use in each bucket based on the estimated average daily use and the excess use (maximum day and maximum hour) developed using the capacity factors.

V. Summary of Findings

A. Cost-of-Service Study Results

A summary of the results of the fully allocated cost of service by class are shown in Tables 3 and 4 below. (As mentioned in Section 3, the total revenue requirement to be allocated to all classes is based upon the PUC-approved rates in Bar Harbor's last rate filing plus a 0.7% upward adjustment to reflect actual 2011 revenues collected).

Table 3

Summary Detail - Bar Harbor COSS 2011		
Class	**Allocated Cost of Service**	**% of Total**
RES	$376,731	25.1%
COM	$390,689	26.1%
IND-LAB	$127,391	8.5%
PA	$44,550	3.0%
PUB Fire	$402,524	26.8%
PRIV Fire	$157,523	10.5%
Total	$1,499,407	100.0%

[18] System demand ratios were developed using Bar Harbor Water Division's 5-year historical averages for total annual pumpage, average daily pumpage and maximum day pumpage.

Table 4

Summary Detail - Bar Harbor COSS 2011		
Class	**Allocated Cost of Service**	**% of Total**
RES Qu	$294,969	19.7%
RES Seas	$81,761	5.5%
COM Qu	$193,958	12.9%
COM Seas	$196,731	13.1%
IND - Lab	$127,391	8.5%
Public Auth Qu	$17,648	1.2%
Public Auth Seas	$26,902	1.8%
Public Fire	$402,524	26.8%
Private Fire	$157,523	10.5%
Total	$1,499,407	100.0%

A more detailed breakdown of costs by class is shown in the FACOS study summary table in Appendix 1. Detailed exhibits from the cost-of-service model are attached in Appendix 2.

To provide a point of reference, Table 5, below, presents a comparison of recent historic revenue collection by class. This allows a comparison of the FACOS study results with the actual breakdown of revenues which Bar Harbor's current rates have collected in the last three years, as well as with the breakdown shown in the Division's last rate filing with the PUC (2010-329). As shown in Table 5, the Water Division's current tariffs do not collect the correct class revenue requirements as developed on a fully allocated cost-of-service basis.

Table 5

Comparative Results - Bar Harbor Water Department Allocation of Revenue										
Class	**Historical Actual**						**PUC Docket**		**Allocated COSS**	
	2009	**% of Total**	**2010**	**% of Total**	**2011**	**% of Total**	**2010-329**	**% of Total**	**COS**	**% of Total**
RES	$ 361,395	28.6%	$ 385,829	29.1%	$ 433,721	28.9%	$ 427,248	28.7%	$376,731	25.1%
COM	$ 355,915	28.1%	$ 384,359	29.0%	$ 419,435	28.0%	$ 420,770	28.3%	$390,689	26.1%
IND-LAB	$ 90,780	7.2%	$ 93,311	7.0%	$ 105,520	7.0%	$ 107,321	7.2%	$127,391	8.5%
PA	$ 39,072	3.1%	$ 41,294	3.1%	$ 50,060	3.3%	$ 46,192	3.1%	$44,550	3.0%
PUB Fire	$ 346,992	27.4%	$ 346,992	26.2%	$ 402,968	26.9%	$ 402,968	27.1%	$402,524	26.8%
PRIV Fire	$ 71,483	5.6%	$ 72,762	5.5%	$ 87,703	5.8%	$ 84,509	5.7%	$157,523	10.5%
Total	$ 1,265,637	100.0%	$ 1,324,547	100.0%	$ 1,499,407	100%	$ 1,489,008	100.0%	$1,499,407	100.0%

Table 6 presents the COS results on a revenue-neutral basis with 2011 actual revenues collected. As shown, the Residential, Commercial and Public Authority classes currently contribute more rate revenue than their cost-of-service, while the Industrial class (Jackson Lab) and Private Fire charges contribute less than their cost of service.

Table 6

Class	PUC Docket		2011		Allocated COSS		$ Change from 2011	% change from 2011
	2010-329[1]	% of Total	Actual	% of Total	COS	% of Total		
RES	$ 427,248	28.7%	$ 433,721	28.9%	$ 376,731	25.1%	$ (56,990)	-13.1%
COM	$ 420,770	28.3%	$ 419,435	28.0%	$ 390,689	26.1%	$ (28,746)	-6.9%
IND-LAB	$ 107,321	7.2%	$ 105,520	7.0%	$ 127,391	8.5%	$ 21,871	20.7%
PA	$ 46,192	3.1%	$ 50,060	3.3%	$ 44,550	3.0%	$ (5,510)	-11.0%
PUB Fire	$ 402,968	27.1%	$ 402,968	26.9%	$ 402,524	26.8%	$ (444)	-0.1%
PRIV Fire	$ 84,509	5.7%	$ 87,703	5.8%	$ 157,523	10.5%	$ 69,820	79.6%
Total	$ 1,489,008	100.0%	$ 1,499,407	100.0%	$ 1,499,407	100%	$ 0	0.0%

While the Commercial class should see a reduction in its revenue requirement responsibility, it should be noted that the significant increase in Private Fire charges would mainly impact many of the same individual Commercial customers. Commercial customers also own more of the larger-pipe sprinklers which would place more Private Fire cost responsibility on this class if an overall adjustment is made to the charge-per-inch of pipe connection. The Lab would also be impacted by the large increase in private fire charges. The chart below shows the breakdown of private fire users (based on 2011 information):

Table 7

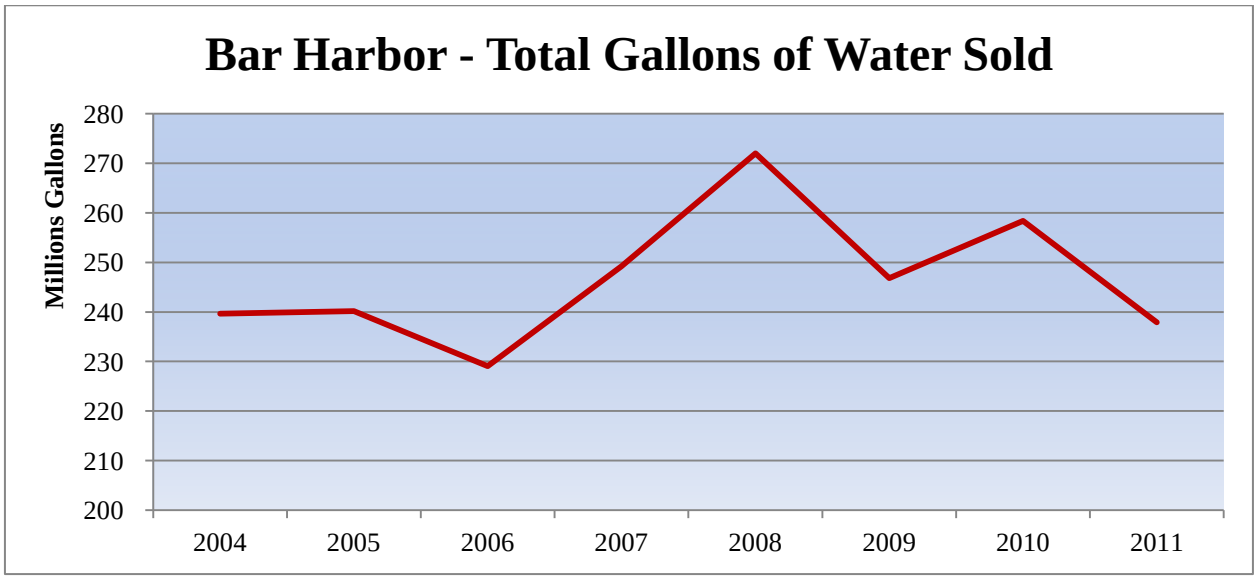
Private Fire Users				
Class	Sprinklers		Hydrants	
	Number	%	Number	%
RES	0	0%	1	4%
COM	82	75%	8	32%
IND-LAB	21	19%	12	48%
PA	6	6%	4	16%
Total	109	100%	25	100%

VI. Discussion of Rates and Rate Design

Bar Harbor Water Division has regularly adjusted its rates to keep up with rising costs, but it has never adjusted its revenue requirements by class using the results of an allocated cost-of-service study. The current rate structures were adopted by the Water Division

when it purchased the Bar Harbor Water Company in 2001 and it is not known how the minimum charges and block structures were established. Overall, the Division's cash needs have increased over the last seven years for both capital projects and regular operating expenses, while water sales have been fairly flat. Growth in water sales provides additional revenues that can be used to cover increases in the cost to serve customers' needs. Declines in water sales, on the other hand, result in reduced revenues and eventually revenue shortfalls. Table 8 below shows the historical trends in Bar Harbor's water sales. Water sales in 2011 are similar to levels experienced pre-2007.

Table 8



Bar Harbor has a reliable water supply which places less pressure on conservation, though some Water Division customers have installed low flow devices to conserve water, and the Town continues to make an effort to reduce lost water from broken mains and service lines. Overall, the Water Division does not anticipate any large, new customers or loss of existing customers in the future.

As was mentioned in the introduction, the second goal of the study is to consider simplifying the rate structures. The benefits of this goal are 1) administrative simplicity, 2) better customer understanding, and 3) better pricing signals reflecting a more fair distribution of costs. In developing rates it is important to allocate costs to the rate classes that cause those costs to be incurred. For example, the cost to read meters is a direct function of the number of customers therefore the rate classes that have the largest number of customers should get allocated the largest share of the total meter reading expense. However, there are other considerations that are important when developing rates such as minimizing rate and bill shocks to rate classes or customer segments while providing price signals to meet policy goals. Often these three rate design considerations conflict with each other and require some judgment to find a balance among them.

As a starting point "full cost-of-service" rates were developed where cost causation was the only rate design goal considered. Full cost-of-service rates would result in Residential, Commercial and Public Authority customer classes paying less towards Bar Harbor's revenue requirement going forward, while Jackson Lab, and private fire customers would all pay more. Abruptly setting rates in this manner could be problematic as some customers may experience an unacceptable impact to their bills. Full cost-of-service rates were developed as a reference point to start from. The final rate design should move toward this result, but over time if minimization of customer bill impacts is an objective.

Developing a rate design that balances rate impacts and still reflects cost causation is the ultimate goal. Additionally, the rate design should include a simplified rate structure. The current rate structure features a rate that declines as the level of consumption increases as well as minimum meter charges that include varying amounts of usage (referred to as the usage allowance). Discussions with Water Division management indicated rate design objectives of simplicity and fairness. To accomplish this, the Division could move to a uniform rate for water consumption (i.e. elimination of declining blocks) and establishing a set water allowance for all meter sizes over time. These changes in rate structure would ease customer understanding, simplify the billing process and send effective price signals to customers.

From a customer perspective, bills with numerous rate blocks as in the current rate structure can be confusing. Additionally, multiple rates and rate blocks and varying usage allowances can be administratively challenging during the billing cycle. Fewer rate blocks and flat usage allowances are becoming more common rate components of water utility rate structures nationwide. The benefit to the Water Division of simplified rate structures is a clear sense that the system is fair.

The make-up of the Bar Harbor Water Division's customers and sensitivity to their usage patterns and needs should be taken into consideration and will likely impact the speed with which changes to the rate structure can be introduced. We recommend that the Water Division move incrementally towards a new rate structure. As is described below, moving from declining rate blocks to a flatter structure (i.e. fewer blocks) impacts higher use customers especially hard, and may cause results that contradict both the FACOS study results and the rate design goal of minimizing impacts to customer segments. Starting with the elimination of one or more rate blocks (referred to as "flattening of the blocks") and then moving towards a uniform rate over time would offer a balance between sending appropriate price signals and minimizing customer impacts.

VII. Rate Design Overview

Bar Harbor Water Division's goal is to simplify its rates while maintaining fair and equitable charges for all customers. We recommend that Bar Harbor retain separate tariffs for Quarterly and Seasonal customers based on the allocated cost-of-service study results which indicate that excess capacity costs are seasonally driven. We also recommend a phased-in approach for the new rate design which will soften the impact to users during the transition period. Ultimately, the rates adopted should be expected to collect revenues that are reasonably close to the FACOS study results, but will not likely be exact because rates are applied to meter size and water usage, not by customer classification.

To develop a uniform rate, the water charges (average day, maximum day and maximum hour) for all classes were totaled, on a Quarterly and Seasonal basis, using data from the COS study as shown in Table 9.

Table 9

Summary Allocations - Bar Harbor Cost of Service Study							
Class	Total COS	Average Day	Max. Day	Max. Hour	Customer Billing	Meters	Total Volume Charges	Customer Charges
Residential - Quarterly	$ 294,969	$ 53,638	$ 57,825	$ 29,489	$ 138,322	$ 15,695	$ 140,952	$ 154,017
Residential - Seasonal	$ 81,761	$ 10,865	$ 22,840	$ 10,816	$ 33,310	$ 3,931	$ 44,520	$ 37,241
Commercial - Quarterly	$ 193,958	$ 53,280	$ 66,054	$ 33,251	$ 35,004	$ 6,369	$ 152,585	$ 41,373
Commercial - Seasonal	$ 196,731	$ 35,396	$ 93,489	$ 43,128	$ 20,889	$ 3,830	$ 172,012	$ 24,719
Industrial - Combined	$ 127,391	$ 45,573	$ 51,588	$ 23,024	$ 5,434	$ 1,771	$ 120,185	$ 7,205
Public Auth - Quarterly	$ 17,648	$ 4,551	$ 5,642	$ 2,840	$ 3,740	$ 875	$ 13,032	$ 4,616
Public Auth - Seasonal	$ 26,902	$ 4,930	$ 13,021	$ 6,007	$ 2,399	$ 545	$ 23,958	$ 2,945
TOTAL	$ 939,360	$ 208,231	$ 310,458	$ 148,555	$ 239,100	$ 33,016	$ 667,244	$ 272,116

The water charges are divided by the total customer water use in 2011 to arrive at a uniform rate per hcf ("hundred cubic feet"). This calculation is shown in Table 10.

Table 10

Bar Harbor Uniform Rates - Quarterly & Seasonal Rates		
	Quarterly	Seasonal
Cost of Service $	$ 426,754	$ 240,490
Anticipated Sales, hundreds of CuFt	239,777	78,319
Uniform Charge, $/hundred CuFt	$ 1.78	$ 3.07

A. Immediate Transition to Uniform Rates

As noted above, if the Water Division chose to move immediately to a uniform rate and a lower/uniform allowance many customers, Seasonal users especially would experience harsh bill impacts. Customer bill impacts for both Quarterly and Seasonal customers at varying usage levels are shown in Appendices 4 and 5. The uniform rates developed in Table 10 are adjusted slightly to obtain revenue results that more closely approximate the revenue targets in the FACOS study.

The adjusted uniform rates, as shown in Table 11 below, would produce estimated revenues (assuming 2011 usage levels for all customers) as shown in Table 12.

Table 11

Overnight Transition to Uniform Rates and Reduced Water Allowance					
Quarterly Blocks				**Quarterly Rates**	
Block	**Current**	**Proposed**		**5/8" Meter - Minimum Charge w/allowance per quarter**	
				Current	**Proposed**
First	1,200	600		$56.39	$49.34
				Charge for Excess Usage per hcf per quarter	
Up to	12,000			$ 3.27	
Up to	90,000			$ 1.53	
Over	90,000	600		$ 1.00	$ 1.75
Seasonal Blocks				**Seasonal Rates**	
Block	**Current**	**Proposed**		**5/8" Meter - Minimum Charge w/allowance per season**	
				Current	**Proposed**
First	1,600	800		$149.26	$180.18
				Charge for Excess Usage per hcf per season	
Up to	12,000			$ 6.57	
Up to	90,000			$ 3.06	
Up to	390,000			$ 1.53	
Over	390,000	800		$ 1.17	$ 3.10

Table 12

Revenue Results - Overnight Transition to Uniform Rates and Reduced Water Allowance				
QUARTERLY				
Class	**Rate Test Results**	**COS Study Targets**	**Diff $ over/(under) target**	**Diff % over/(under) target**
RES	$ 297,370	$ 294,969	$ 2,401	1%
COM	$183,778	$193,958	($10,180)	-5%
IND	$129,117	$127,391	$1,727	1%
PA	$16,779	$17,648	($869)	-5%
SEASONAL				
Class	**Rate Test Results**	**COS Study Targets**	**Diff $ over/(under) target**	**Diff % over/(under) target**
RES	$88,682	$81,761	$6,921	8%
COM	$192,307	$196,731	($4,424)	-2%
PA	$26,286	$26,902	($616)	-2%
Public Fire	$402,524	$ 402,524	$0	0.0%
Private Fire	$157,523	$ 157,523	$0	0.0%

In the *Overnight Transition to Uniform Rates* scenario, the rapid transition to a significantly higher usage charge for seasonal users for all consumption over 800 cubic feet results in high volume users being hit hard with water bill increases. As shown in Appendix 4, pages 1 and 2, the increases over current bills range from a .1% increase for a 4" meter using 100,000 cubic feet to a 93% increase for a customer with a 6" meter who consumes 700,000 cubic feet per season.

Appendix 5, pages 3 and 4, shows Quarterly customers faring better in the *Overnight Transition to Uniform Rates* scenario. Usage at most levels and meter sizes results in bill decreases. Only high water consumption by larger meter customers would see bill increases, and the magnitude of the increases is substantially lower than those experienced by Seasonal customers. Quarterly customer increases over current bills range from 2% for a customer with a 6" meter using 70,000 cubic feet per quarter to 11% for a customer with a 6" meter consuming 300,000 cubic feet per quarter.

B. Phased-In Transition to Uniform Rates

To develop a phased-in approach, the ultimate revenue targets were broken into equal, incremental steps. Table 13 shows the revenue targets for each phase of the transition to the new, uniform rate design.

Table 13

Bar Harbor Water Division Rate Design - Phased-In Target Revenues										
Class	2011 Actual Revenue	Allocated COSS Revenue	$ Change from 2011		Change 1 Adjustment	Change 2 Adjustment	Change 3 Adjustment		Phase 1 Target Revenue	Phase 2 Target Revenue	Phase 3 Target Revenue
RES Quarterly	$340,825	$ 294,969	($45,856)		$ (15,285)	$ (15,285)	$ (15,285)		$325,540	$ 310,255	$ 294,969
RES Seasonal	$92,896	$ 81,761	($11,135)		$ (3,712)	$ (3,712)	$ (3,712)		$89,184	$ 85,473	$ 81,761
COM Quarterly	$226,484	$ 193,958	($32,527)		$ (10,842)	$ (10,842)	$ (10,842)		$215,642	$ 204,800	$ 193,958
COM Seasonal	$192,951	$ 196,731	$3,781		$ 1,260	$ 1,260	$ 1,260		$194,211	$ 195,471	$ 196,731
IND - Lab	$105,520	$ 127,391	$21,871		$ 7,290	$ 7,290	$ 7,290		$112,810	$ 120,100	$ 127,391
Public Auth Quarterly	$24,111	$ 17,648	($6,463)		$ (2,154)	$ (2,154)	$ (2,154)		$21,957	$ 19,802	$ 17,648
Public Auth Seasonal	$25,949	$ 26,902	$953		$ 318	$ 318	$ 318		$26,267	$ 26,584	$ 26,902
Public Fire	$402,968	$ 402,524	($444)		$ (148)	$ (148)	$ (148)		$402,820	$ 402,672	$ 402,524
Private Fire	$87,703	$ 157,523	$69,820		$ 23,273	$ 23,273	$ 23,273		$110,976	$ 134,250	$ 157,523
Total	$1,499,407	$ 1,499,407							$1,499,407	$ 1,499,407	$ 1,499,407

Table 14 shows the block adjustments and interim rates used during the phase-in period.

Table 14

Phased-In Transition to Uniform Rates and Reduced Water Allowance									
Quarterly Blocks					Quarterly Rates				
Quarterly	Current	Phase 1	Phase 2	Phase 3	5/8" Meter - Minimum Charge w/allowance per				
					Current	Phase 1	Phase 2	Phase 3	
First	1,200	1,200	1,200	600	$56.39	$59.48	$59.48	$49.34	
					Charge for Excess Usage per hcf per quarter				
Up to	12,000	60,000			$ 3.27	$ 2.14			
Up to	90,000				$ 1.53				
Over	90,000	60,000	1,200	600	$ 1.00	$ 1.12	$ 1.60	$ 1.75	
Seasonal Blocks					Seasonal Rates				
Seasonal	Current	Phase 1	Phase 2	Phase 3	5/8" Meter - Minimum Charge w/allowance per				
					Current	Phase 1	Phase 2	Phase 3	
First	1,600	1,600	1,600	800	$149.26	$198.26	$198.26	$180.18	
					Charge for Excess Usage per hcf				
Up to	12,000	60,000	60,000		$ 6.57	$ 3.40	$ 3.25		
Up to	90,000	150,000			$ 3.06	$ 2.95			
Up to	390,000				$ 1.53				
Over	390,000	150,000	60,000	800	$ 1.17	$ 1.95	$ 2.95	$ 3.10	

The first phase of the rate design implementation, as shown in Table 13, produces the following revenue results shown in Table 15.

Table 15

Revenue Results - Phase I				
QUARTERLY				
Class	**Rate Test Results**	**COS Study Targets**	**Diff $ over/(under) target**	**Diff % over/(under) target**
RES	$ 329,172	$ 325,540	$ 3,632	1%
COM	$214,961	$215,642	($681)	0%
IND	$111,417	$112,810	($1,394)	-1%
PA	$21,143	$21,957	($814)	-4%
SEASONAL				
Class	**Rate Test Results**	**COS Study Targets**	**Diff $ over/(under) target**	**Diff % over/(under) target**
RES	$90,710	$89,184	$1,526	2%
COM	$190,539	$194,211	($3,672)	-2%
PA	$25,226	$26,267	($1,040)	-4%
FIRE PROTECTION				
Class	**Rate Test Results**	**COS Study Targets**	**Diff $ over/(under) target**	**Diff % over/(under) target**
Public Fire	$402,820	$402,820	$0	0%
Private Fire	$110,976	$110,976	$0	0%

Bill impacts for *Rate Transition - Phase I* can be found in Appendix 6 and 7 for Seasonal and Quarterly use, respectively, at varying levels. High volume Seasonal customers will experience bill impacts of 25%-40% increases over current bills, but the magnitude of the increase is less than these customers would experience under the overnight transition scenario outline in section A. above. During *Rate Transition – Phase I*, Quarterly customers using high volumes of water and those with large water meters would also experience bill increases in the range of 10%-20% above their current bill.

The second phase of the rate design implementation, as shown in Table 13, produces the revenue results shown in Table 16.

Table 16

Revenue Results - Phase II				
QUARTERLY				
Class	**Rate Test Results**	**COS Study Targets**	**Diff $ over/(under) target**	**Diff % over/(under) target**
RES	$ 316,484	$ 310,255	$ 6,229	2%
COM	$188,197	$204,800	($16,603)	-8%
IND	$122,783	$120,100	$2,682	2%
PA	$17,524	$19,802	($2,278)	-12%
SEASONAL				
Class	**Rate Test Results**	**COS Study Targets**	**Diff $ over/(under) target**	**Diff % over/(under) target**
RES	$90,731	$85,473	$5,258	6%
COM	$194,125	$195,471	($1,346)	-1%
PA	$26,406	$26,584	($179)	-1%
FIRE PROTECTION				
Class	**Rate Test Results**	**COS Study Targets**	**Diff $ over/(under) target**	**Diff % over/(under) target**
Public Fire	$402,672	$402,672	$0	0%
Private Fire	$134,250	$134,250	$0	0%

Bill impacts for *Rate Transition - Phase II* can be found in Appendix 8 and 9 for Seasonal and Quarterly use, respectively, at varying levels. In *Rate Transition - Phase II*, fewer Seasonal customers experience large increases to their bills, though some users at higher volumes do see increases ranging from 12% to 29% per season. During *Rate Transition - Phase II*, only those Quarterly customers using the highest volumes of water experience bill increases. The increases are approximately 20% above the bill received in *Rate Transition - Phase I.*

The final phase of the rate design implementation (*Rate Transition – Phase III*), as shown in Table 13, produces the revenue results shown in Table 17.

Table 17

Revenue Results - Final Phase to Uniform Rates and Reduced Water Allowance				
QUARTERLY				
Class	**Rate Test Results**	**COS Study Targets**	**Diff $ over/(under) target**	**Diff % over/(under) target**
RES	$ 297,370	$ 294,969	$ 2,401	1%
COM	$183,778	$193,958	($10,180)	-5%
IND	$129,117	$127,391	$1,727	1%
PA	$16,779	$17,648	($869)	-5%
SEASONAL				
Class	**Rate Test Results**	**COS Study Targets**	**Diff $ over/(under) target**	**Diff % over/(under) target**
RES	$88,682	$81,761	$6,921	8%
COM	$192,307	$196,731	($4,424)	-2%
PA	$26,286	$26,902	($616)	-2%
Public Fire	$402,524	$ 402,524	$0	0.0%
Private Fire	$157,523	$ 157,523	$0	0.0%

Bill impacts for *Rate Transition – Phase III* can be found in Appendix 10 and 11 for Seasonal and Quarterly use, respectively, at varying usage levels. In this final transition phase to uniform rates and reduced allowances, most Seasonal customers experience a rate decrease in their seasonal bill. Customers with usage at very high levels will see a relatively small increase of approximately 4%. In *Rate Transition – Phase III*, when the quarterly allowance drops to 600 cubic feet for all meter sizes, some Quarterly customers will experience bill increases, but all increases are less than 10% over *Rate Transition – Phase II* bills.

While the multi-phase transition does not eliminate bill shock, especially to the highest use seasonal customers, it does soften the impacts as compared to an overnight transition to uniform rates which some water utilities have proposed and implemented. Ultimately, it will be up to the Bar Harbor Water Division and the Town Council to determine if the competing objectives of realizing fully allocated revenue requirement responsibility, and acceptable bill impacts, are satisfied under this rate phase-in plan.

VIII. Next Steps

Bar Harbor Water Division should assess whether the revenue requirement used in the cost-of-service study provides sufficient revenue for operations on an on-going basis. If a revenue shortfall is anticipated, whether due to an increase in operating costs or capital

improvements, the Water Division will need to update the cost-of-service revenue requirements for each class and file for a rate increase with the PUC. The PUC prefers rate increases to be filed separately from adjustments to rate design. If a rate increase is needed, the recommended sequence is to file for the new revenue requirement, followed by a second filing for the rate design changes. These two steps could be completed in back-to-back filings in late 2012 and/or early 2013.

IX. Glossary[19]

Base-Extra Capacity - The method of cost allocation in which the costs of service are classified to the functional cost components of base, extra capacity, customer costs and fire protection. *Base* costs tend to vary with the total quantity of water used plus O&M expenses and capital costs associated with service to customers under average load conditions. *Extra capacity* costs are associated with meeting rate of use requirements in excess of average, and may be subdivided into costs necessary to meet maximum-day extra demand and maximum-hour demand in excess of maximum day demand. Customer costs are costs associated with serving customers, regardless of the amount or rate of water they use, including meter reading, billing, accounting and collecting expenses, and capital costs related to meters and services. Fire protection includes direct costs (those that apply solely to fire protection, such as hydrants) and indirect costs related to fire protection extra capacity requirements.

Capacity Factors – The ratio of peak demand to the average rate of demand over a specified period of time (e.g. day or hour) for a customer, class or system. Demand patterns of various customers differ, depending on their peak-day and peak-hour rates of demand relative to average demands. For instance, a class that has high summer use for lawn irrigation would typically have a higher peak demand requirement, relative to average demand, than an industrial user which requires water on a relatively uniform basis throughout the year.

Customer Class – A group of users that have similar water-use characteristics, or a special customer that has unusual water-use or service requirements. When establishing customer classes, demand patterns and service characteristics are the driving consideration. Most water utilities have three general classes (Residential, Commercial and Industrial) and may also have special classes (e.g. wholesale service, fire protection, lawn irrigation).

Rate Base - The value of a water utility's property used in computing an authorized return under the applicable laws and/or regulatory policies of the agency setting rates for the utility. In general, rate base consists primarily of plant-in-service less accumulated depreciation. (Individual regulatory agencies have specific requirements as to whether some items are allowed into or excluded from rate base, such as, construction-work-in- progress, materials and supplies, working capital, contributions-in-aid-of-construction, customer advances, deferred taxes, etc.).

Revenue Neutral – The concept of revenue neutrality means that adjustments made will not result in an increase or decrease in the overall revenue requirement. In Bar Harbor's case, we have proposed that revenue generated in 2011 should be the Water Division's revenue requirement.

[19] All definitions and examples are taken from "Principles of Water Rates, Fees and Charges," Fifth Edition (2000), American Water Works Association.