DRAPER IRRIGATION COMPANY

CULINARY WATER MASTER PLAN UPDATE

WATER RATE AND FEE DETERMINATION

Master Planning

September, 2000

EPIC ENGINEERING, P.C.
Consulting Engineers
2880 W. 4700 S., Suite D
West Valley City, Utah 84118

ACKNOWLEDGMENTS

Successful completion of this study was made possible by the cooperation and assistance of the Draper Irrigation Company Staff, as shown below. We sincerely appreciate the cooperation and assistance provided by these individuals.

Draper Irrigation Company

Board of Directors

President, Thomas Flowers
Vice President, Steve Tripp
Secretary, Richard Skeen

Director, Noel Enniss
Director, D. Lynn Cutler
Director, Sherman Fitzgerald
Director, Curtis DeYoung

Company Staff
Bruce Cupett - C.E.O.
David Gardner - Development Manager
Darren Jensen - Comptroller
Troy Shinsel - Operations Manager

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

The Need for Culinary Water Master Plan

Introduction

Draper Irrigation Company had a Master Plan generated for its Culinary Water System in 1997 by Sunrise Engineering. Rapid growth in Draper has placed an additional burden on the Water Company's abilities to continue providing residents with efficient service. Therefore, to continue to provide adequate service to the residents within the incorporated area of the Company, the Company determined the need to update it's Culinary Water Master Plan.

The Company has retained Epic Engineering to evaluate and update the Culinary Water Master Plan to ensure financial soundness of the culinary water system throughout the planning period to the year 2020. In this study, the capacity of the existing culinary water system will be evaluated and improvements recommended which meet the projected population growth. Present water rates and impact fees will also be analyzed to determine the feasibility of implementing the recommendations.

This study provides a detailed look at the future conditions of the Company including a short history of the area and the Company, the projected population, potential areas of development, and historical and projected flows and demands. The feasibility analysis will consist of a study of both the Operations, Maintenance, and Replacement (OMR) and Capital Project funds. OMR operations and spending will be discussed by analyzing the present water rates and the projected OMR expenditures through the next five years. Impact fees will be recalculated to determine updated impact fees to fund the recommended improvements. Water rates will be reviewed and the future adjustments will be recommended to ensure that the Company will have sufficient revenue to remain financially healthy.

Authority and Scope

Draper Irrigation Company authorized Epic Engineering (Epic) to assist them in updating the Water Master Plan. Epic's responsibilities included developing a Capital Improvements Plan of recommended facilities; performing an Impact Fee analysis; performing a Water Rate analysis and preparing the text of the Water Master Plan report, proposing the impact fees, water rates and other pertinent fees. This study has been completed in accordance with the agreement between the Company and Epic Engineering.

Development of the Culinary Water Plan was completed under the direction of and cooperation of Company staff. Specific objectives and activities to be performed in the Master Plan included the following:

1) Update Culinary Water System Mapping
2) Evaluate Future Growth Projections
3) Generate Estimated Future Demands
4) Hydraulic Modeling of the Water System
5) Review Storage Requirements
6) Prepare Recommended Improvements to the Water System
7) Prepare Cost Estimates for Recommended Improvements
8) Prepare a Development and Operating Analysis Time Line
9) Update Impact Fees
10) Update Water Rates
11) Prepare an Updated Master Plan Report

CHAPTER 2

Executive Summary and Recommended Improvements

Overview

This Master Plan study provides a detailed look at the future conditions of the Company including the projected year 2020 population, potential areas of development, historical and projected water demands and needed capital facilities improvements to meet the anticipated demands for the culinary water system. Impact fees are recalculated to reflect the updated list of recommended improvements. Lastly, water user rates are reviewed and adjustments are recommenced to ensure that the Company will have sufficient revenue to remain financially healthy. A brief summary of each chapters conclusions and recommendations follows.

Chapter 4 - System User Analysis

Population projections were obtained from several sources to project the future population of the Company. The Company's culinary water system is expected to increase by approximately 4,763 connections by the year 2020. This growth will be at an average annual rate of 5.00% to 2010 and at 1.55% from 2010 to 2020. These 4,763 connections are used throughout this study for future connections and their associated impacts to the existing water system.

Chapter 5 - Water Usage

Draper Irrigation Company receives its culinary water from three sources, which are Company owned water rights and Salt Lake County Metropolitan water through the Irrigation Company's water treatment plant, from Jordan Valley Water Conservancy District, and from an Irrigation Company owned well. The average daily residential water demand is calculated to be 715 gallons per connection per day. Daily water usage rates vary from season to season with the maximum water usage in the summer at peaking factor of 2.24 times greater than the average water demand.

Culinary water usage patterns for connections having pressure irrigation connections is similar to the usage patter of connections without pressure irrigation connections, indicating that residential connections with pressure irrigation connections are not likely using their pressure irrigation services to their full potential.

Growth within the corporation limits of the Irrigation Company to the year 2020 will require additional water storage capacity. The storage capacity required by the year 2020 will be 19,601,807 gallons. When compared to the 12,370,000 gallon capacity of the existing and planned storage facilities, it is determined that an additional 7,231,807 gallons will be required.

It is recommended that a five million gallon reservoir be installed in the year 2010 and that a second three to five million gallon reservoir should then be built between 2015 and 2020.

Chapter 6 - Culinary Water Operation Costs

Costs associated with maintaining and operating the culinary water system have been growing at a rate of 26.6% per year for the last four years. The current cost of operating the culinary water system (1999 cost) is $2,210,676, including depreciation. It is projected that system costs will increase to $3,795,391 by the year 2010 and to $5,456,386 by the year 2019.

Chapter 7 - Capital Facility Improvements

The Company's culinary water system was analyzed using the computer model CYBERNET 3.0. The water system was modeled for several different operating conditions to determine if adequate operating pressures are being maintained throughout the system. Solutions to areas showing pressure inadequacies were added to the computer model and analyzed. As a result of this analysis it was determined that pipeline and pressure vault improvements will be required at thirty different locations within the system network. The projected cost of these improvements is $1,551,284. The improvements are to be completed over a five year period from 2001 to 2005.

Study of the Irrigation Company's water treatment plant has determined that the plant will need to be upgraded to comply to upcoming water quality requirement and be expanded to meet future water demands. The cost of these improvements is projected to be $11,700,000.

Two future water storage reservoirs will be required as determined in Chapter 6. The cost of these reservoirs is calculated to be approximately $3,000,000.

Chapter 8 - Connection Fees

The purpose of an impact fee is to equitably recover a share of capital costs from new development so that existing customers are not caused to subsidize the construction of infrastructure needed to support the new development. The impact fee calculation must include the expected future demand on the system, the value of the existing facilities from which new development will benefit, the cost of improving the existing facilities to increase capacity for new development, and any contributions that existing customers have already paid towards the construction of existing and planned facilities.

The new connection fee required for a 3/4-inch meter is calculated to be $2,963. The new connection fee for a 1-inch meter is $4,687. Connection fees for water meters larger than 1-inch are determined using a formula that calculates the relative impact on the system based on the expected average water usage and the peak usage of the connections specific water usage characteristics. This formula can be used for water meters ranging from 1 ½-inches to 8-inches. The minimum possible connection fees for these meter sizes are shown below. The actual

connection fee is determined separately for each individual connection by applying the formula to the connection's specific water usage characteristics.

1 ½-inch Meter = $7,822
2-inch Meter = $11,757
3-inch Meter = $23,966
4-inch Meter = $39,810
6-inch Meter = $80,683
8-inch Meter = $115,500

Chapter 9 - Water Rate Analysis

A rate study was conducted to determine if any rate changes are needed, in addition to the impact fees, to provide sufficient funding support for the construction of the recommended new and improved facilities included in this Master Plan, and to support increased operation costs through the twenty year planning period. It is determined that the existing water rate will not provide sufficient funds to support these projected financial demands.

It is recommended that the Company change the rate structure to an ascending tiered rate structure applied equally to all culinary water users. The first tiered rate is applied within a monthly water usage range consistent with indoor water usage. The second tiered rate is applied to a monthly water usage range consistent with average outdoor water usage. The third tiered rate is used to recover costs of supplying water for excessive usage and is applied only to water used in excess to the outdoor watering range of tier 2. The proposed water rate base fees and overage rates are summarized below:

Component	Rate	Description
Residential Monthly Fee	$23	for first 5,000 gallons each month
Lifeline Monthly Fee	$16	for first 5,000 gallons each month
Multi-plex Monthly Fee	$23	First unit. Covers 5,000 gpmo per unit
	+ $16	each unit there after. Covers 2,500 gpmo per unit
Apartment Monthly Fee	$23	First Unit. Covers 5,000 gpmo per unit
	+ $16	each unit there after. Covers 2,500 gpmo per unit
Additional Usage Fees		
Tier 1	$1.15	per 1,000 gallons > 5,000 gpmo & < 18,000 gpmo
Tier 2	$1.70	per 1,000 gallons > 18,000 gpmo < 57,000 gpmo
Tier 3	$2.25	per 1,000 gallons > 57,000 gpmo

Gpmo = gallons per month

Chapter 10 - Development Fees

A set of development fees should be adopted my Draper Irrigation Company to pay for the reasonable cost of services incurred by the Company in ensuring that new development is designed and installed according to Draper Irrigation standards and in accordance with Master Planned growth. Separate fee structures are established for Subdivision development and Single Lot development. The Company should assess the effective cost coverage of the proposed fees after one year to determine if any adjustment of fees is required.

Chapter 11 - Miscellaneous Fees

Draper Irrigation Company has several miscellaneous fees to cover costs of various services. These miscellaneous fees were reviewed and all existing miscellaneous fees were determined to be relevant and adequate to cover the cost of their particular service. Additional fees are proposed to be added to the list 1) to cover the cost of relocating water meter boxes, 2) to penalize the relocation of water meter boxes without notifying the Company for inspection, and 3) for meter flow tests. The Company should make it Company policy to require customers modifying landscape be required to reset all effected fire hydrants and meters to the new grade.

CHAPTER 3

Historical Setting

Project Planning Area

The culinary water service area of the Draper Irrigation Company (the "Company") is located in Draper City in the southeastern portion of the Salt Lake Valley, Salt Lake County, Utah. Draper Irrigation Company is the primary supplier of culinary water within the City of Draper. The incorporate area for culinary water services of the Draper Irrigation Company is shown in Figure 3.1. The portions of Draper City to the south and west of the Company's incorporated area are supplied culinary water by Draper City.

Background & History

Draper Irrigation Company was established in 1888 when its founding members contributed their flow rights from five mountain streams for the benefit of all members. The Company was later incorporated under the laws of the State of Utah and is a mutual irrigation company. The Company provides culinary water and pressure irrigation to its members located in the southeastern portion of Salt Lake Valley, Salt Lake County, Utah.

In 1911 the Company started providing culinary water to residences within the Draper area. The Company constructed a water treatment plant in 1970 to treat surface runoff water from some of its mountain stream water rights. The area was mainly rural farmland and undeveloped land until the 1970's. In the 1970s the Draper area started residential development as part of a general suburbanization trend, as the greater Salt Lake urban area developed southward along the Wasatch Front. In the 1990s the community experienced dramatic growth as Draper became a primary location for residential development in Salt Lake County. This increased population has had a significant impact on the Company's culinary water system.

In 1993 the Draper Irrigation Company constructed a pressure irrigation system within the same service area as most of the culinary water system. The purpose of the pressure irrigation system is to decrease the outdoor demand for culinary water by using lower quality irrigation water on lawns and gardens. In 1997 the Company had a culinary water master plan prepared. Since then the population has continued to grow at a rapid rate. While population and expenses have both grown at significant rates, revenues have not kept pace with this growth. Because of these factors and because major capital expenditures will soon be required to upgrade the Water Treatment Plant to place it in compliance with new EPA water quality requirements, the Company has determined that it will need to update the Master Plan.

Climate

Draper has a semi-arid climate with low relative humidity, relatively light precipitation, and a large variation in temperatures during the year. Average annual precipitation is 15 inches, with approximately 55 percent occurring during the growing season from April to October. Temperatures range from 50°F to 100°F during the summer, and from 0°F to 60°F during the winter. Extreme lows and highs are around -20°F and 105°F, respectively. The mean annual temperature is 52°F, with a frost-free period of normally 150 to 200 days. Winds are generally light and either from the northwest or southwest, associated with the prevailing westerlies experienced in Utah.

Topography

Draper is located in the southeastern portion of Salt Lake County at the foot of the Wasatch Mountains on the east and Steep Mountain on the south. The elevation within the service area ranges between 4400 and 5600 feet with the "downtown" elevation at approximately 4500 feet. Approximately 30 percent of the service area is on steep mountain sides and benches of the Wasatch front.

CHAPTER 4

System User Analysis

Overview

Draper Irrigation Company's future growth conditions were analyzed to model the Company's culinary water system improvements and develop the master plan. Future conditions include projected population, factors of growth, potential areas of development, and utility improvements. Population data was obtained from the Utah State Bureau of Census and the Wasatch Front Regional Council for the Draper City area. With the population projections, areas of potential development were identified. This chapter discusses the historical and projected population trends and the associated potential increase in connections for the Company.

Population Trends and Projections

Draper is currently experiencing a fast growth rate. Figure 4.1 shows the recent historical population growth up to 1998 for the City. During the period between 1970 and 1990, the population increased at a relatively constant rate from 4,000 to 7,143 people, which is an annual growth rate of 2.94 percent. In the early nineties the population growth started to increase as Draper was now at the fringe of the developing Salt Lake Metropolitan area. Population grew between 1990 and 1994 from 7,143 to 8,674, an average annual rate of 4.97 percent. From 1994 to 1998 the population growth in Draper has taken off, as the area has become a popular location for new development of the Salt Lake Metropolitan community. During this period from 1994 to 1998 the population increased from 8,674 to 19,147, an average annual growth rate of 21.89 percent. The historic population for Draper City and the historic number of connections to the Company's culinary water system from the year 1970 to 1998 are listed in Table 4.1 below.

TABLE 4.1
Historical Population Growth, 1970 to 1998

Item	1970	1980	1990	1991	1992	1993	1994	1995	1996	1997	1998	Growth	Average
Population	4,000	5,521	7,143	7,236	7,472	7,833	8,674	10,050	12,321	16,373	19,147		
Pop. Increase		1,521	1,622	93	236	361	841	1,376	2,271	4,052	2,774	11,626	1,501
% Increase		3.28%	2.61%	1.30%	3.26%	4.83%	10.74%	15.86%	22.60%	32.89%	16.94%	168.05%	13.55%
Connections	N/A	N/A	1,357	1,463	1,581	1,761	2,103	2,490	2,849	3,467	3,906		
Conn Increase				106	118	180	342	373	338	653	439	3,629	403
% Increase				7.81%	8.07%	11.39%	19.42%	18.40%	14.42%	21.69%	12.66%	252.54%	15.15%

The Wasatch Front Regional Council projects the population in Draper to continue to grow at 5 percent per year till the year 2010, after which they estimate the population to grow at 1.55 percent per year. For general comparison, Salt Lake County's projected 20-year annual average growth rate is approximately 1.9 percent. The Council's future population numbers are projected from the year 1998. Available growth data for the Company shows that from 1998 to 2000 the population has grown at a rate of 10 percent per year instead of the Council's projected 5 percent. Figure 4.2 shows the projected population for Draper from 2000 to 2020. The lower line is the Wasatch Front Regional Council's projection from 1998 and the upper line is an adjustment taking into account the population growth from 1998 to 2000.

The incorporated area of Draper Irrigation Company lies mostly within the boundaries of Draper City but does not encompass the entire area, therefore the previous population data cannot be equated directly with the number of culinary water connections to the Company's system. It can be assumed, however, that the Regional Council's growth projections for Draper City are applicable to the Company. Figure 4.3 shows the projected number of connections for the Company through the year 2020 using the future growth rates discussed above. Also shown in Figure 4.3 is the estimated maximum number of connections possible at full buildout. The projected number of connections are shown for each year from 2000 to 2010 and for 2020 in Table 4.2 below.

TABLE 4.2
Future Population (Draper City) and Future Connections (Draper Irrigation)

Item	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2020
Population	21,062	23,168	24,326	25,543	26,820	28,161	29,569	31,047	32,600	34,229	35,941	37,738	44,013
Pop. Increase	1,915	2,106	1,158	1,216	1,277	1,341	1,408	1,478	1,552	1,630	1,711	1,797	6,275
% Increase	10.00%	10.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	1.55%
Connections	4,784	5,294	5,559	5,837	6,128	6,435	6,757	7,094	7,449	7,822	8,213	8,623	10,057
Conn Increase	878	510	265	278	292	306	322	338	355	372	391	411	1,434
% Increase	22.48%	10.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	1.55%

Areas of Potential Development

There are still large areas within the Company boundaries which are not yet fully developed. The Draper Irrigation incorporated area contains approximately 7,866 acres. About 47 percent of the area is developed, and the other 53 percent is vacant or in agricultural use. The most prevalent developed land is residential, which occupies just over 5,900 acres, or about 75 percent of the area. Commercial and Industrial use occupies approximately 712 acres, or 9 percent of the area, and parks/ open space use occupies approximately 1,216 acres, or about 15 percent of the area. Potential areas of development were identified in this study to assist with planning the future culinary water system recommendations. The selection of the areas was based upon pending

subdivisions, zoning, and speculated land development. Several major areas were established within the Company which possessed the greatest potential for growth. These areas, shown on Figure 4.4, amount to approximately 3,500 acres which could be developed by 2020.

Existing User Structure

There are several types and sizes of connections on the Company's culinary water system. The Company groups connections according to two criteria which are, 1) whether the connection has a pressure irrigation connection and 2) the number of residential units served by the connection. Currently the Company has nineteen connection classes which are shown below:

CLASS	DESCRIPTION
101	Residences with PI Connection
102	Lifeline residences with PI Connection
103	Triplex with PI Connection
104	Fourplex with PI Connection
105	Sixplex with PI Connection
106	Duplex with PI Connection
107	Community Compound Meter
108	Apartments with PI Connection
109	Fiveplex with PI Connection
110	2 Homes on 1 meter
111	Residences refused PI Connection
112	Lifeline residences refused PI Connection
113	Triplex refused PI Connection
114	Fourplex refused PI Connection
116	Duplex refused PI Connection
119	Fiveplex refused PI Connection
120	Residences, PI not available
121	Compound Meter
122	Eightplex, PI not available

Commercial and industrial and institutional connections are included in these residential connection categories. Figures 4.4 and 4.5 show the percentage of different types of connections. Figure 4.4 shows the percentage of the Company's user connections that are homes, multiplexes and large compound meters. Figure 4.5 shows the percentage of connections that have pressure irrigation, refused pressure irrigation and do not have pressure irrigation available. The number of recorded connections for each connection class for each month from March 1988 through June 2000 are shown in the Appendix.

CHAPTER 5

Water Usage

Overview

Future water use can be determined by studying present water use and detecting trends. In this chapter, historical water use records will be used along with the projected population to project the water uses throughout the planning period. Peak water use will also be determined by looking at monthly water use percentages and typical design factors. Of particular interest is the water usage pattern of the residential connections using pressure irrigation water for outdoor watering compared to those using only culinary water.

Water Sources

Draper Irrigation Company receives culinary water from three sources which are, the Company Water Treatment Plant located at 2700 East 11600 South, the Jordan Valley Water Conservation District (JVWCD) and the Company's well on 1300 East.

Treatment Plant

The water treatment plant at 2700 East 11600 South is owned and operated by the Company. This water treatment plant supplies most of the water necessary to operate the culinary water system. This plant treats surface runoff water. The capacity of the treatment plant is 3.3 million gallons per day (MGD). The treatment plant operates near or at capacity during the spring runoff and during the summer season high demand, as seen in Figure 5.1.

JVWCD

The Company receives water from JVWCD at connection points located at 700 East and at Autumn Ridge. The Company has contracted with JVWCD to receive a perpetual yearly supply of 950 ac-ft of water. The Company has the option to use an additional 20 percent or 190 ac-ft of water. Additional water greater than 20 percent over the contract amount may be taken, as long as the water is available. The Company receives water from JVWCD mostly in the summer to help supply the high water demands of outdoor watering users, as seen in Figure 5.1.

Well

The Company has one well located at approximately 12600 South on 1300 East in Draper, Utah. The capacity of the well is 1,100 gallons per minute. The well is used to provide extra water, as needed, above the capacity of the treatment plant and that provided by JVWCD during times of high demand.

Water Usage

Water supply data was collected and reviewed for the most recent years from 1998 through June 2000. The data shows a generally increasing amount of water used each consecutive year which is consistent with the growth of the system. The year 1999 is used as the base year for trend analysis and for future projections. The monthly distribution of water usage follows a bell curve distribution with the peak summer monthly usage being approximately twice the average monthly usage. Table 5.1 presents the monthly amount of water supplied to the culinary water system in 1999 from each water source. Figure 5.1 shows these monthly quantities.

TABLE 5.1
Monthly and Annual water supply (Million Gallons) - 1999 Base Year

Source	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
WTP	42.397	38.151	46.078	44.332	61.809	89.891	99.805	86.787	89.148	84.841	62.743	47.316	793.389
JVWCD	.001	0	2.244	2.777	44.664	86.219	133.027	79.778	62.907	40.047	3.181	0	454.844
TOTAL	42.398	38.151	48.322	47.109	106.473	176.110	232.832	166.656	152.055	124.888	65.924	47.316	1,248.233

The amount and nature of culinary water used by the connections to the Company's culinary water system are typical for a community along the Wasatch front. The Company's average usage is 238 gallons per capita per day (715 gal/day/conn.) compared to 295 gal/cap/day for Salt Lake County and 308 gal/cap/day for Utah.

Residential Demands

In most urbanized areas, including Draper, water use per connection has increased over the years. This increase can be due to additional home facilities such as washing machines, dish washers, and air conditioners; increased yard landscaping and automatic sprinkler systems; and larger homes with more bathrooms. Also, in any water system, there are inherent losses such as normal line losses and meter losses due to meters becoming sluggish with use and age. Worn or sluggish meters allow more flow through than is metered. Residential connection demands for 1999 are tabulated in Table 5.2.

TABLE 5.2
1999 Residential Culinary Water Demands

Average Residential Connections*	4,784	
Total Annual culinary Water Usage (MG)	1,248	
Unit Usage (Gal/Connection-Day)	715	

* From Table 4.2

The Company's 1999 average daily water use per connection of 715 gallons is less than the metropolitan Utah average of approximately 750 gpd/connection. This may be because of the use of pressure irrigation water for outdoor watering by some of the culinary water users. However, as shown in the previous chapter, a very large percentage of the residential connections currently have connections to the pressure irrigation system. The use of this

pressure irrigation water by these users should show a more significant decrease in the average daily water use than the current 35 gpd decrease from 750 gpd to 715 gpd. This may be because of the large average Lot size of connections to the water system. Before the installation of the pressure irrigation system, the average daily water use per connection to the water system was greater than the 750 gpd State average.

Pressure Irrigation users Vs. Non-PI users

As stated in the previous chapter, some of the residential connections also have connections to the Company's pressure irrigation (PI) system for outdoor watering. Other connections are within the area of the pressure irrigation system but have decided to not connect. Furthermore, there are some connections in areas where the PI system is not available.

The connections using the pressure irrigation water should have a water usage characteristic throughout the year that is relatively uniform. They may experience some increased usage in the summer time but shouldn't require any significant increase in demand if outdoor watering is provided by the pressure irrigation. The other connections should experience a bell shaped water usage characteristic with significant increased usage in the summer. The actual monthly water usage for each of the PI user/non-user categories in 1999 is shown in Figure 5.2.

As shown in Figure 5.2, the homes with pressure irrigation connections use water in almost the same way as those who refused the PI water. This is probably an indication that there are many users with PI connections that still use culinary water for outdoor watering.

The average monthly water usage for all connections, as calculated from water usage data collected for the last 3 years, is 16,000 gallons (gal). The average usage in the winter, which is commonly equated with indoor usage, is 8,400 gal. Looking at types of connections, the average monthly usage for homes is 15,000 gal and the average for all multi-plexes and apartments is 9,700 gal. When the connections are grouped as connections with PI, connections refused PI and connections where PI is not available; the average monthly usage for connections with PI is 12,000 gal, the average usage for connections who refused PI is 12,500 gal.

Projected Demands

The future residential culinary water demand is determined by multiplying the current unit demand rate by the number of future connections. Table 5.3 shows the projected water use per connection from the year 2000 through the year 2020. The number of active connections shown is taken from Table 4.2.

TABLE 5.3
Projected Residential Culinary Water Use Per Connection

Year	Gal Conn-Day	Active Connections	Annual Demand (MG)
2000	715	5,294	1,382
2005	715	6,757	1,763
2010	715	8,623	2,250
2015	715	9,312	2,430
2020	715	10,057	2,625

A monthly breakdown of the future water demands is shown in Table 5.4. The percentages in column 2 are the current percentages of the annual water usage for each month. The percentages, also graphically displayed on Figure 5.3, indicate how the monthly water demand is proportioned throughout the year. The projected monthly residential demands shown in Table 5.4 were determined by multiplying these monthly annual percentages by the annual demands from Table 5.3.

As shown on Figure 5.3, the peak month for culinary water demand is July. The average percent of the year of each month is 8.3 percent (1/12), but the July water usage percent of the year is 18.7 percent (Table 5.4), which is more than 2 times the average percent of 8.3 percent. This means that even with the pressure irrigation system, the culinary water system is experiencing a significant increase in water usage in the summer months for outdoor watering. The peaking factor is calculated below.

$$\textbf{Peaking Factor} = \frac{232.832\ \text{MG (July)}}{104.019\ \text{MG (Average)}} = \textbf{2.24}$$

TABLE 5.4
Draper Irrigation Company's Projected Residential Monthly Water Demands (MG)

Month	% Annual	2000	2005	2010	2015	2020
Jan	3.4	46.94	59.68	76.42	82.54	89.16
Feb	3.1	42.24	53.88	68.77	74.27	80.23
Mar	3.9	53.50	68.25	87.10	94.07	101.62
Apr	3.8	52.16	66.54	84.92	91.71	99.07
May	8.5	117.88	150.38	191.92	207.28	223.91
June	14.1	194.98	248.74	317.45	342.84	370.35
July	18.7	257.78	328.85	419.69	453.27	489.64
Aug	13.4	184.52	235.38	300.41	324.44	350.47
Sept	12.2	168.35	214.76	274.09	296.01	319.77
Oct	10.0	138.27	176.39	225.12	243.13	262.64
Nov	5.3	72.99	93.11	118.83	128.34	138.64
Dec	3.8	52.39	66.83	85.29	92.11	99.50
Total	100.0	1,382.00	1,762.79	2,250.01	2,430.01	2,625.00

Reservoir Storage Analysis

Utah State Drinking water rules require that the Company supply enough water storage to provide for peak day demands for indoor and outdoor usage, fire suppression volume and for emergencies. The required storage has been sized with the capacity to provide one peak month average day indoor and outdoor demand along with a fire flow storage of 4,500 gpm for two hours and a suggested 20 percent operating reserve for emergencies. The indoor and outdoor storage is calculated by taking the maximum month's demand from Table 5.4 and dividing by the number of days in the month to get the peak month average daily usage.

Draper Irrigation Company owns and operates several water storage facilities for the culinary water system. The Company has a 10 percent interest in the 1.2 million gallon reservoir, operated by Draper City, located above the Centennial development on South Mountain. The Company cannot use the Southeast Bench tank because its location places the service elevation between Zones 1 and 2. The Company is in the process of constructing a 3-million gallon reservoir along Traverse Ridge Road on South Mountain. The Company will also construct a 7-million gallon reservoir as part of the Water Treatment Plant Improvements, as will be discussed in Chapter 7. The existing and proposed storage reservoirs are listed in Table 5.5.

TABLE 5.5
Existing Water Storage Capacity

Tank Description	Tank Location	Storage Capacity (Gallons)
Northeast Bench Tank (WTP)	11700 South 2600 East	1,000,000
Southeast Bench Tank	13800 South 1100 East	500,000*
Cove of Bear Canyon Sub. Tank	12300 South 3000 East	250,000
South Mountain Tank	13800 South 1300 East	3,000,000
Centennial Tank (10% of tank)	15400 South 300 East	120,000
Traverse Ridge Road Tank	700 East Traverse Ridge Rd.	3,000,000
Treatment Plant Tank	2700 East 11600 South	7,000,000
Little Valley Tank	Traverse Ridge Rd	750,000
Total Storage		**15,120,000**

* The South Bench Tank does not contribute to the System's storage Capacity

Table 5.6 shows the storage requirements at five year increments from the year 2000 to the year 2020 using the criteria described above. Also shown in the table is the existing storage and the storage surplus/shortfall.

TABLE 5.6
Water Storage Requirements

	Storage (gallons)				
	2000	2005	2010	2015	2020
Equalization Storage	8,315,484	10,608,065	13,538,387	14,621,613	15,794,839
Fire Suppression Storage	540,000	540,000	540,000	540,000	540,000
Emergency Storage	1,771,097	2,229,613	2,815,677	3,032,323	3,266,968
Total Required Storage	10,626,581	13,377,678	16,894,064	18,193,936	19,601,807
Existing Storage	12,370,000	15,120,000	15,120,000	15,120,000	15,120,000
Surplus(Shortfall)	**1,743,419**	**1,742,322**	**(1,774,064)**	**(3,073,936)**	**(4,481,807)**

It is recommended that a five million gallon reservoir be installed in the year 2010. It is suggested that this reservoir be located to directly serve Zone 1. A second three to five million gallon reservoir should then be built between 2015 and 2020.

CHAPTER 6

Culinary Water Operation Costs

Overview

The current operation costs that Draper Irrigation Company incurs in operating and maintaining the culinary water system are calculated and future growth rates of these costs are determined in this chapter. These costs are then used as part of the calculations in determining the water use rate and the Connection Fee in subsequent chapters.

Historical Costs

Expenses are incurred to operate and maintain the culinary water system. Expenses that the Company incurs can generally be divided into five categories, namely (1) Direct costs, (2) operation & maintenance (O & M) expenses, (3) professional services, (4) Construction expenses, and (5) depreciation. Direct expenses include administration, office support, wages, insurance, taxes, training, transportation, general expenses and other expenses. Operation and maintenance expenses include water purchase costs, treatment and distribution costs. Professional expenses include engineering services, legal services and independent auditing costs. Some engineering services, such as design and construction management for capital facility projects and subdivision design review fees, are not included in this chapter. Construction expenses are covered separately in the next chapter.

The direct, professional, operating and depreciation costs for the previous four years are shown in Table 6.1. These costs are taken from the audited financial reports for the years from fiscal years 1996 to fiscal year 1999.

TABLE 6.1
Culinary Water System Expenses

Category	1996	1997	1998	1999
Direct Costs	$323,795	$476,275	$368,038	$714,172
Professional Costs	$120,965	$189,843	$125,582	$161,394
Operation Costs	$217,727	$244,488	$775,018	$865,106
Depreciation	$426,220	$437,971	$456,998	$470,004
TOTAL	$1,088,707	$1,348,577	$1,725,636	$2,210,676

Culinary water system expenses have increased at a significant rate the last four years. Costs increases by 23.9% between 1996 and 1997, then by 27.9% the next year, and finally by 28.1% between 1998 and 1999.

Future Costs

The twenty year operating fund cost projections are shown in Table 6.2. Direct costs are assumed to increase by 4 percent annually. Operation costs are assumed to increase by 8 percent annually to the year 2010 and thereafter increase by 4.55 percent to the year 2020. The higher increase in operating expenses is because of system user increases and anticipated annual increases of purchasing water. It is anticipated that the majority of the additional water required by the Company will need to be purchased from JVWCD. This source is currently the Company's most expensive source of water and is projected to increase in cost at a rate of 4 percent per year over inflation. The value of the water system to be depreciated is assumed to increase by 3 percent every year.

Depreciation costs cover the expenses of replacing old, worn or broken parts of the existing Culinary Water System, including Water Meters, Fire Hydrants, waterlines, and moving equipment such as pumps.

TABLE 6.2
Water System expense projections

Costs	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Direct	$875,566	$910,588	$947,012	$984,892	$1,024,288	$1,065,259	$1,107,870	$1,152,184	$1,198,272	$1,246,203
Operation	$865,106	$934,315	$1,009,060	$1,089,785	$1,176,967	$1,271,125	$1,372,815	$1,483,640	$1,601,251	$1,729351
Depreciation	$470,00	$484,100	$498,632	$513,582	$528,989	$544,859	$561,205	$578,041	$595,382	$613,243
TOTAL	$2,210,672	$2,329,003	$2,454,704	$2,588,259	$2,730,244	$2,881,243	$3,041,890	$3,213,865	$3,394,905	$3,588,797

TABLE 6.2 (Continued)
Water System expense projections

Costs	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Direct	$1,296,051	$1,347,893	$1,401,809	$1,457,881	$1,516,196	$1,576,844	$1,639,918	$1,705,514	$1,773,735	$1,844,684
Operation	$1,867,699	$1,952,680	$2,041,527	$2,231,532	$2,231,532	$2,333,067	$2,439,221	$2,439,221	$2,666,240	$2,787,554
Depreciation	$631,641	$650,590	$670,108	$690,211	$710,917	$732,245	$754,212	$754,212	$800,144	$824,148
TOTAL	$3,795,391	$3,951,163	$4,113,444	$4,379,624	$4,458,645	$4,642,156	$4,833,351	$4,898,947	$5,240,119	$5,456,386

OPERATION COSTS

CHAPTER 7

Capital Facility Improvements

Overview

The Company's culinary water system was analyzed by the computer model Cybernet Version 3.0 with AutoCAD. The distribution, water source, and reservoir improvements needed to meet the demands of the projected population growth were identified. The system was examined to find if adequate working pressures are currently being provided and if they can be provided in the future. Working pressures are defined as the condition when maximum daily flow and fire flow are combined, or, the dynamic pressures provided when the maximum demand is required.

Source Supply

Expanding water supply needs and upcoming water quality regulation changes has caused the Company to look at upgrading their water treatment plant. An expansion of the plant from it's existing 3.3 MGD capacity to a 6.0 MGD plant has been studied. The upgrade project includes a 5 MG reservoir on the plant site and a 20-inch waterline backbone several miles along the east bench of Draper to Rambling Road. The estimated cost of the Project is $11,700,000. It is anticipated that 80 percent of the construction cost will be payed through low interest loans from the Division of Drinking Water and the Division of Water Quality. The Company will get a $6,000,000 loan from the Division of Drinking Water at 2.26% interest for fifteen years. It is anticipated that the Company will also get a $3,360,000 loan from the Division of Water Quality at about 5% interest for twenty years. The anticipated annual income requirements to pay off these loans are presented in Table 7.1.

These improvements will benefit both current and future users of the water system. Most of the costs of the plant upgrade will be to get the treatment plant to conform to water quality regulations and to provide for the water needs of the current users. Therefore, it is proposed that 80% of the plant upgrade be paid by water rates. The other 20 percent is to be funded by impact fees. A site plan of the proposed improvements at the treatment plant is shown in Figure 7.1.

Distribution System

Several capital improvements have been identified to correct existing deficiencies in the water supply network and provide better capacity for future growth. The required improvements are shown in Table 7.2. The improvements are listed in the table in order of priority and are grouped into five groups of approximate equal cost. The projects are planned to be completed in five years from 2001 to 2005. The location of these projects are shown in Figure 7.2. Beyond these first five years it is projected that budget for capital improvement projects start at $200,000 in

2006 and increase by 5 percent every year thereafter. The anticipated annual income requirements to fund these projects are also presented in Table 7.1.

TABLE 7.1
Annual Revenue Requirements for Capital Projects

Description	Treatment Plant	Waterlines*	Water Storage**
Construction Amount **$16,251,284**	$11,700,000	$1,551,284	$3,000,000
Loan Percentage	80%	0%	0%
Loan Amount	$9,360,000	$0	$0
DIC Funds	$2,340,000	$1,551,284	$3,000,000
Interest Rate	2.26% & 5%	N/A	N/A
Loan Terms	15 & 20 years	N/A	N/A
Annual Payment	$747,113	$200,899	$300,000
Water Rate Percentage	80%	25%	0%
Water Rate Revenue	$597,690	$50,225	$0
Impact Fee Percentage	20%	75%	100%
Impact Fee Revenue	$149,423	$150,674	$300,000

* From Table 7.2
** From Table 5.6

CHAPTER 8

Connection Fees

Overview

This section revises Draper Irrigation Company's connection fees to ensure their consistency with Utah statutory guidelines and to reflect the completed master planning for the culinary water system. The scope of services included the following tasks:

1. **Collect Data.** Identify and review financial and system data required for this study.

2. **Perform Connection Fee Analysis**. Construct an analysis of existing and future system costs, identify current and projected customer bases, and develop impact fee alternatives.

3. **Document and Present the Connection Fee Findings.** Document the methodology and calculation steps in constructing the impacts fees for water and sewer. This element of the project includes recommendations on the management and administration of these fees including the annual indexing of inflationary impacts on the capital costs contained in the impact fee eligible project lists.

Background - Connection Fees

A connection fee within the State of Utah is defined as:

> "a one-time charge on new development for the purpose of raising revenue for new or expanded public facilities necessitated by that development."

The Utah State Legislature established Senate Bill 4, effective 1 July 1995 concerning the methodology to be used in constructing connection fees. The Bill, embodied in Title 11, Chapter 35 of the Utah Code, solidified local government's authority to impose impact fees in their jurisdictions by regulating those fees within their individual boundaries. However, it also mandates procedural requirements for local governments to follow when establishing and collecting an impact fee.

The purpose of a connection fee is to equitably recover a share of capital costs from new development, so that existing customers are not caused to subsidize the construction of infrastructure needed to support that development. The methodology is also intended to avoid overcharging new development, a situation which would result if there was a subsidy of existing

customers. The connection fee may consider the cost of existing facilities which provide needed capacity for growth, as well as the cost of new expansion projects to accommodate that growth.

This one-time charge is imposed on new development as a condition of service. The fee may also only be applied within the system for which it is collected (e.g., water connection fees cannot fund pressure irrigation projects). Not only can the fee fund new improvements to a system, but it can also be charged to recover costs incurred by that system. This is consistent with the statute in that new development benefits from already-existing capacity paid for by existing customers.

The connection fee calculation must consider several factors:

1. The expected future demand on the system and the requirements that Draper Irrigation Company's facilities, existing and planned, must meet;

2. The value of Draper Irrigation Company's existing facilities from which new development benefits;

3. The cost of improving those facilities to increase capacity for development whose demand will exceed the limits of existing facilities; and

4. Any contributions that existing customers and new development have already paid towards the construction and/or improvement of existing and planned facilities.

This analysis has taken into account the statutory guidelines for developing a funding mechanism that supports the Company's growth. The study results in an equitable impact fee on new development activity that creates an added demand on the Company's existing system facilities and also requires the Company to expand facilities in order to meet future need.

Existing Connection Fee

The Company has a separate connection fee amount for the 3/4-inch and 1-inch meter connections. The amount of the existing connection fees and its components are shown below:

Existing Connection Fees

Component	3/4" Meter	1" Meter
B Stock	$50	$50
Existing Facility	$700	$1,115
Meter Set Fee	$300	$400
Construction Water	$100	$100
Capital Facilities	$1,100	$1,100
Total	$2,250	$2,765

The Company has estimated that the existing connection fees will be inadequate to cover the costs for which they are intended. This is essentially because the capital facility portion of the connection fee will not pay for the future development's portion of the required system improvements. A revised connection fee needs to be calculated.

3/4-inch Meter Connection Fee Calculations

As shown above with the existing connection fee, the fee consists of several components. The connection fee is generally divided into two parts, which are 1) the impact fee and 2) direct connection costs. The impact fee consists of the fee for new capital facility improvements and the fee for existing capacity costs. The direct connection costs consist of the B stock price, the Meter set fee and the average construction water costs. The connection fee is first determined for a standard 3/4-inch metered connection.

The capital improvement portion of the impact fee is calculated by dividing the cost of new capital facility improvements directly benefitting future connections by the number of future connections benefitted. The denominator used in this formula is the projected growth, in new connections, to Draper Irrigation's culinary water system from the year 2000 through the 2010 planning period. This growth was estimated to be 3,329 new connections in Table 4.2. The master planned project cost for the water system including distribution, supply and treatment was estimated to be $16,251,284 in Table 7.1. A secondary analysis evaluated each of these capital projects in terms of whether they were necessary specifically to accommodate future growth. This methodology then takes the capital cost component attributable only to growth as the basis for the improvement portion of the fee. The percentages of the treatment plant upgrade, capital improvements and reservoir storage costs directly attributed to future growth are shown at the bottom of Table 7.1. Using the capital costs born by the Company and these contributory percentages the future growth cost is estimated to be $6,035,463. The resulting division produces an impact fee of $1,813 for a 3/4-inch connection or equivalent dwelling unit.

Impact Fee Costs = ($9,360,000*0.20)+($1,551,284*0.75) + ($3,000,000*1.0) = $6,035,463

Impact Fee = $\frac{\$6,035,463}{3,329 \text{ Conns.}}$ = **$1,813/Connection**

The recommended impact fee calculation recognizes that the existing system provides capacity which is valuable to new development, while system expansion is also necessary to accommodate anticipated future growth. The Company had sold assets to directly pay for several large items such as the Water Treatment Plant, several waterlines and water rights. The "existing Facilities" item on the connection fee reimburses the existing system for these expenses. Use of the existing fee of $700 per connection for 3/4-inch connections and $1,115 per connection for 1-inch connections is appropriate to allow new development to pay only its fair share of existing facility costs.

The direct connection portion of the connection fee has been determined to be adequate and will remain the same, at $450 for a 3/4-inch meter. Therefore, the new 3/4-inch Connection Fee is summarized below:

New 3/4-inch Connection Fee

B Stock	$50
Existing Facility	$700
Meter Set Fee	$300
Construction Water	$100
Impact Fee	$1,813
TOTAL	**$2,963**

1-inch Meter Connection Fees

When designing impact fees for non-standard water connections, both expected annual water use and peak meter capacity are considered. It is assumed that the water use characteristics for a 3/4-inch connection and a 1-inch connection are similar, so the recommended fee for a 1-inch meter connection is based on the maximum meter capacity. The maximum safe capacity of a 3/4-inch meter is 30 gallons per minute, and the maximum safe capacity of a 1-inch meter is 50 gallons per minute. Therefore the connection fee for a 1-inch meter is calculated as follows:

1-inch Capital Facilities Impact Fee = $1,813 * (50/30) = $3,022

Therefore, the total connection fee for a 1-inch connection is:

New 1-inch Connection Fee

B Stock	$50
Existing Facility	$1,115
Meter Set Fee	$400
Construction Water	$100
Impact Fee	$3,022
TOTAL	**$4,687**

1-inch Connection Fee = $4,687

Non-Standard Size Meter Connection Fees

A non-standard connection is any connection that is not a 3/4-inch or 1-inch connection. Non-standard connections include 1 ½-inch, 2-inch, 3-inch and larger metered connection. Most of the components of the connection fee are the same for non-standard meter sizes as they are for the standard connection. The portion of the connection fee that changes for different meter sizes is the capital facilities portion of the impact fee.

Impact fees for water connections larger than 1-inch diameter should be set individually based on a formula that considers the expected average water use of the improvement and the peak capacity for the desired size of water meter. The expected average annual water use and the desired meter size must be known or estimated to calculate impact fees. The following formula is recommended to calculate the impact costs.

Water Impact Fee = $1,813 * [(0.48 * RE) + (0.52 * MC/30 * (PF/59 - 1/59))]

Where: RE = Residential Equivalent (expected annual average demand in gal per day divided by the residential average usage of 715 gal/day)

MC = Maximum Safe Intermittent Meter Capacity (gpm)

PF = Peaking Factor (MC divided by average annual demand in gpm)

The factors 0.48 and 0.52 were assumed to allocate system depreciation costs to base capacity and to extra capacity. Base costs are costs of service that would result from delivery of water at a constant rate. Extra capacity costs are costs of service that result from delivery of water at peak hourly and peak daily rates. System depreciation costs were allocated using master planned peaking factors and the base-extra capacity methodology outlined by the AWWA. The factor of 0.48 represents the ratio of base depreciation costs to total depreciation costs, and the factor of 0.52 represents the ratio of extra-capacity depreciation costs to total capacity depreciation costs. The constant 30 is the maximum safe capacity in gpm of a 3/4-inch meter and the constant 59 is one less than the peaking factor for a typical single residential connection.

The projected annual expense/income balance from the year 2000 to the year 2020 is shown in Table 8.1. The expenses in this table are the impact fee portion of the capital facility improvement costs shown in Table 7.1. The Income is the projected impact fee income, as determined by multiplying the number of future connections from Table 4.2 by the new impact unit fees. Income calculations in Table 8.1 assume 80% of future connection will be 3/4-inch connections and 20% will be 1-inch connections.

TABLE 8.1
Water System Impact Fee Expense/Income Projections

YEAR	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Expenses										
WTP			$149,423	$149,423	$149,423	$149,423	$149,423	$149,423	$149,423	$149,423
Waterlines	$305,415	$316,654	$353,533	$290,509	$285,173	$200,000	$210,000	$220,500	$231,525	$243,101
Storage	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000
Existing facility	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000
Total Expenses	$705,415	$716,654	$902,956	$839,932	$834,596	$749,423	$759,423	$769,923	$780,948	$792,524
New Connections	265	278	292	306	322	338	355	372	391	411
Existing Facility	$207,495	$217,674	$228,636	$239,598	$252,126	$264,654	$277,965	$291,276	$306,153	$321,813
Income	$544,522	$571,234	$600,002	$628,769	$661,646	$694,522	$729,454	$764,386	$803,427	$844,523
Total Income	$752,017	$788,908	$828,638	$868,367	$913,772	$959,176	$1,007,419	$1,055,662	$1,109,580	$1,166,336
Ending Balance	$46,602	$118,856	$44,538	$72,973	$152,148	$361,902	$609,898	$895,636	$1,224,268	$1,598,080

CONNECTION FEES

The meter capacity for different meter sizes and meter types is shown in Table 8.2 below.

TABLE 8.2
Meter Capacities

Meter Size	Meter Type	AWWA Safe Max. Operation Capacity (gpm)
3/4"	Positive Displacement	30
1"	Positive Displacement	50
1 1/2"	Positive Displacement	100
2"	Turbine	160
1 1/2"	Turbine	100
2"	Turbine	160
3"	Turbine	350
4"	Turbine	600
6"	Turbine	1,250
8"	Turbine	1,800
2"	Compound	160
3"	Compound	320
4"	Compound	500
6"	Compound	1,000
8"	Compound	1,600

Administration of Charges

The impact fees, when imposed, should be separately accounted and restricted to capital purposes. This should be done in a manner which provides a clear audit trail which can demonstrate that they were used only for capital purposes within the system for which they were collected.

Whenever a developer constructs system facilities which are included in the capital improvement project list, Draper Irrigation should compensate that developer in one of two ways:

1. Through payment toward the portions of the project (such as over-sizing) which provides general Company benefit and are included in the impact fee basis; or

2. Through issuance of impact fee credits for those project costs, which the developer(s) may use toward their impact fees. Such credits should have a finite life (e.g. ten years), be non-transferable, and be limited to the specific system for which issued (e.g. water versus sewer).

The Company's compensation to the developer should be limited to the lesser of the developer's actual costs for the Company share of the project, or the Company engineer's cost estimate.

Finally, it is recommended that Draper Irrigation annually adjust the costs of planned capital improvement projects based on an inflationary index such as the "Engineering News Record." This should be stipulated in a Board Motion and become an automatic cost adjustment that would not require a formal hearing process. In summary, recommended impact fees are as shown in Table 8.3 below.

TABLE 8.3
Connection Fee Summary

Component	3/4"	1"	1 1/2"	2"	3"	4"	6"	8"
B Stock	$50	$50	$50	$50	$50	$50	$50	$50
Existing Facility	$700	$1,115	$1,115	$1,115	$1,115	$1,115	$1,115	$1,115
Meter Set Fee	$300	$400	$500	$800	$1,500	$2,200	$3,700	$5,200
Construction Water	$100	$100	$100	$100	$100	$100	$100	$100
Impact Fee	$1,813	$3,022	$6,057*	$9,692*	$21,201*	$36,345*	$75,718*	$109,035*
TOTAL	$2,963	$4,687	$7,822	$11,757	$23,966	$39,810	$80,683	$115,500

* These Impact fee values for meters 1 ½-inch and larger are minimum fees per the formula

CHAPTER 9

Water Rate Analysis

Overview

This section uses the projected operation costs discussed in Chapter 6 and the recommended capital projects provided in Chapter 7, Company-provided financial and budget information, and new Company customer base growth estimates to update required rates for water services.

Revenue Requirements

A revenue requirements analysis is designed to determine the amount of rate revenues needed in a given year to meet that year's expected financial obligations. At least two separate conditions must be satisfied for rates to be sufficient: cash needs must be met, and the coverage requirement associated with revenue bond indebtedness must be realized. The revenue requirements analysis results in an estimate of water sales income required to meet an enterprise's financial obligations, including its own fiscal policy guidelines.

The Draper Irrigation Company follows a policy of net depreciation funding for culinary water facilities replacement. Under this policy, the Company sets aside, or spends on replacement, annual depreciation expense less debt service principal. Philosophically, this approach assures that utility equity does not decline as a result of operations.

It is important to note that replacement reserve funding may result in substantial cash balances at times. The Company should periodically review the consistency of cash reserves against anticipated capital expenditures, and adjust funding levels accordingly. These funds can be considered a down payment toward funding replacement projects if the use of debt is factored into the funding strategy. It is recommended that the Company start a policy of setting aside funds collected to cover net depreciation. This approach has been incorporated into the revenue requirements analyses for the entire study period.

Several other key policy, economic, and financial assumptions have been made that affect projected revenue requirements:

1. Operating Reserve. It is assumed that the Company will maintain minimum and maximum balances of 10% and 15%, respectively, of total annual cash operating expenses in the water operating reserve as a cushion against fluctuating revenues and unanticipated swings in expenditures. Balances over the maximum are assumed to be transferred to the capital account.

2. Impact Fees. It is assumed that the proposed impact fees are adopted and implemented for the year 2000. The projected revenues from these fees shall be tracked separately and spent on applicable capital projects only.

3. Customer Growth. It is assumed that the Company customer base will grow at an annual rate of 5% to the year 2010 after which growth will slow down to 1.55% annually to the year 2020.

4. Cost Escalation. Inflation on operating costs is assumed to occur at 8% annually; inflation on construction costs is assumed to occur at 3.5% annually.

5. Fund Earnings. Interest earned in reserve accounts is forecasted at 4% per year.

6. Financing Terms. Revenue bonds, when applicable, are assumed to be issued at 5% per year and for twenty-year terms. Coverage is assumed to be 1.25 times debt service. The funding for the water treatment plant upgrade will be a fifteen-year loan at 2.30 percent. Load payback will start at the end of construction, in the year 2002.

7. Revenue / Expense Allocation. The Company has historically tracked certain revenues in the general fund. Company should keep track of impact funds, depreciation funds and reserve funds separately.

The Company's annual budget, the capital costs and schedules contained in this document, and the historical and year-to-date financials were used as the basis for projecting expenses for each service. All projected costs were escalated over the study period to allow for inflation and growth, as necessary.

Existing Water Rate

The Company sustains the majority of its operation expenses through the sales of culinary water. The culinary water rate structure consists of a monthly "base" charge to cover non-operating expenses and depreciation, and a overage rate per 1,000 gallons used over the monthly base volume. After the implementation of the pressure irrigation system, the Company created a second rate structure for users of the Pressure Irrigation system. This second rate structure had a lower overage unit cost to encourage users to connect to the pressure irrigation system.

The Board of Directors of Draper Irrigation Company recently implemented an intercessory increase in the exiting rate structure based upon the Master Plan produced in 1997. This intercessory increase went into effect June 1, 2000 and was to remain into effect until a complete determination of revenue requirements is accomplished with this report.

The old rate structure and the implemented rate increases are shown in Table 9.1

TABLE 9.1
Existing Water Rate Structure

	Prior to June 1, 2000			Existing Increase after June 1	
Description	Rate with PI or PI not available	Rate without PI		Rate with PI or PI not available	Rate without PI
Residential Base	$18.00	$18.00		$21.00	$21.00
Lifeline Base	$12.00	$12.00		$15.00	$15.00
Apartment Base	$9.00	$9.00		$10.50	$10.50
Overage (per 1000 gal)	$0.75	$1.25		$1.05	$1.61

Projecting income using the projected number of connections from Chapter 4, the current water usage pattern and the old water rate structure prior to June 1, 2000 shows that the old water rate would not provide sufficient income to cover operation costs and the proposed construction debts. The projected annual expense/income balance from the year 2000 to the year 2020 is shown in Table 9.2. The financial shortfall of the old water rate would have been over $700,000 in 2001 and increasing each year there after.

Next the existing water rate was analyzed with the same debts and was also found to provide insufficient funds. The projected annual expense/income balance from the year 2000 to the year 2020 is for the existing water rates is shown in Table 9.3. The financial shortfall of the old water rate would be over $180,000 in 2001 and increasing each year there after. Therefore, it is concluded that further increase or revision to the water rates is required.

Water Rate Revision Options

There are several options available to revise the water rates. First, the base fee can be increased; second, the overage rate can be increased; third, the amount of water provided for the base fee can be lowered; fourth, a combination of the above can be implemented simultaneously; or fifth, a new rate structure can be implemented.

As discussed earlier, the average water usage pattern for users with PI connections is very similar to that of the users who do not use the PI water. If all of the PI users were watering their yards with the pressure irrigation water this would not be the case. Therefore it is concluded that many of the residences with PI connections are probably still using culinary water outdoors instead of the pressure irrigation water. These residences would be purchasing the large amounts of water required to water their lawns in the summer at the discounted rate provided for PI users. This situation results in a very large loss of revenue to the Company.

Rate Recommendations

It is recommended that the structure of the water rates be modified to one that will encourage conservation of water, encourage use of the pressure irrigation system where available, prevent abuse of the Company and provide an equitable means of generating revenue. We propose implementing an ascending tiered rate structure applicable equally to all culinary water users. A tiered rate structure is similar to the Company's existing rate structure, with a monthly base fee and water usage rates. The difference between a rising tiered rate structure and the existing rate structure is that the tiered rate structure has several overage unit costs. Each unit cost is applied to a range of water usage. Each increasing range of water usage incurs a higher unit cost because the residences that are using the larger volumes of water, typically in the summer, are using the more expensive JVWCD water, and to encourage conservation.

The proposed Rate Structure and rate values: are presented in Table 9.4 below. Table 9.5 shows the total expenses and income for each year from 2000 to 2010. The required minimum loan coverage ratio is maintained through the study period.

TABLE 9.4
Summary of Proposed Water Rates (2000)

Component	Rate	Description
Residential Monthly Fee	$23	for first 5,000 gallons each month
Lifeline Monthly Fee	$16	for first 5,000 gallons each month
Multi-plex Monthly Fee	$23	First unit. Covers 5,000 gpmo per unit
	+ $16	each unit there after. Covers 2,500 gpmo per unit
Apartment Monthly Fee	$23	First Unit. Covers 5,000 gpmo per unit
	+ $16	each unit there after. Covers 2,500 gpmo per unit
Additional Usage Fees		
Tier 1	$1.15	per 1,000 gallons > 5,000 gpmo & < 18,000 gpmo
Tier 2	$1.70	per 1,000 gallons > 18,000 gpmo < 57,000 gpmo
Tier 3	$2.25	per 1,000 gallons > 57,000 gpmo

Gpmo = gallons per month

The first of the overage tiers represents the typical range of indoor water usage of users on the Company's culinary water system. The tier 2 water usage range from 18,000 gallons to 57,000 gallons represents the range of outdoor water usage for a typical lot in Draper, as determined in the 1997 Master Plan. Tier 3 represents excessive residential water usage. It should also be noted that additional multi-units are not given the full 5,000 gal deduction.

Local Water Rate Comparison

Water rates for several water suppliers in the vicinity of Draper Irrigation are shown below.

	Base Rate	Base Volume	Overage to 40,000 gal	40,001+ gal
South Jordan	$18.50	8,000 gal	$1.00	same
West Jordan (3/4")	$9.71	6,000 gal	$0.80	$1.10
West Jordan (1")	$24.28	6,000 gal	$0.80	$1.10
Bluffdale	$12.00	1,000 gal	$1.20	same
Taylorsville Bennion I.D.	$3.00	0 gal	$0.80	same
Highland	$6.00	0 gal	$0.60	$1.00
Lehi	$6.00	0 gal	$0.80	same

	Base Rate	Base Volume	to 30,000	to 60,000 gal	to 100,000 gal	100,001+ gal
Riverton	$13.00	10,000 gal	$1.00	$1.10	$1.25	$1.50

Table 9.6 below compares Draper Irrigation's proposed water rate to the water rates of each of the above water suppliers. This compares the monthly water bill for usage of 5,000; 10,000; 15,000; 20,000; 40,000 and 60,000 gallons. It should be noted that these water bill comparisons do not include taxes. It is common that the municipal water suppliers use taxes to help pay for their water system expenses.

TABLE 9.6
Monthly Water Bill Comparison

Water Supplier	Monthly Water Usage (Gallons)						
	5,000	10,000	15,000	20,000	30,000	40,000	60,000
DIC Existing with PI	$21.00	$26.25	$31.50	$36.75	$47.25	$57.75	$78.75
DIC Existing refuse PI	$21.00	$29.05	$37.10	$45.15	$61.25	$77.35	$109.55
Draper Irrigation Proposed	$23.00	$28.75	$34.50	$41.35	$58.35	$75.35	$111.00
Riverton	$13.00	$13.00	$18.00	$23.00	$33.00	$44.00	$66.00
South Jordan	$18.50	$20.50	$25.50	$30.50	$40.50	$50.50	$70.50
West Jordan (3/4" Meter)	$9.71	$12.91	$16.91	$20.91	$28.91	$36.91	$58.91
West Jordan (1" Meter)	$24.28	$27.48	$31.48	$35.48	$43.48	$51.48	$73.48
Bluffdale	$16.80	$22.30	$27.80	$33.30	$44.30	$55.30	$77.30
Taylorsville Bennion I.D.	$7.00	$11.00	$15.00	$19.00	$27.00	$35.00	$51.00
Highland	$9.00	$12.00	$15.00	$18.00	$24.00	$30.00	$50.00
Lehi	$10.00	$14.00	$18.00	$22.60	$30.00	$38.00	$46.00

As seen in Table 9.6 the new water rate will be one of the highest in the area. Several other communities, such as Riverton City are also in the process of raising water rates. The average cost to all water users will be $44.08 per month. The average cost for the average home will be $49.00. The average cost for the average multi-plex user will be $13.80. The average cost to PI users will be $29.70. And the average cost to the average non-PI user will be $45.00 a month.

Surcharge Rates

There are two pressure zones up the mountain side in the southeast portion of the Culinary Water System service area that cannot be gravity fed water. Water needs to be pumped up into these two pressure zones. The cost of pumping water is an extra expense over the regular system fixed and operation expenses.

The Company currently charges a surcharge to cover the costs of pumping into these two pressure zones. The surcharge is applied to the connections located in each of the pressure zones. The charge per connection is currently calculated by dividing the monthly operation expenses by the number of expenses. Using this calculation method, every connection is charged the same surcharge, independent of how much water the connection uses. A connection that uses lots of water pays the same surcharge as a connection that uses next to nothing.

It can be shown that the operation costs of pumping the water into these pressure zones is directly related to the amount of water pumped. A connection that uses lots of water causes the pumps to work more than the connection that uses little water. Therefor, this larger water using connection is causing more pumping expenses and should be assessed a larger surcharge accordingly.

We recommend that the Company change the method of applying the surcharge to connections using water in the pumped pressure zones. The surcharge should be applied to each connection according to their portion of the total gallons pumped in any given month. The calculation is described as follows:

$$\text{Connection Surcharge} = \frac{\text{Gallons used by connection}}{\text{Gallons pumped to pressure zone}} * \text{Pumping Costs}$$

CHAPTER 10

Development Fees

Overview

There are several expenses that the Company experiences for special services relating to new subdivisions and commercial developments. Currently the Company pays for these expenses through the water general fund, which is financed from water usage. It is typically accepted practice to have the Developer of a new subdivision pay the expenses incurred by the Company for special services through Development Fees, instead of having existing water users pay these expenses through the general fund. This is especially advisable when a private water supplier, such as the Company, cannot collect taxes to pay for such services. **We, therefore, propose that Draper Irrigation Company adopt a set of Development Fees to pay for the reasonable cost of services to ensure the proper design and installation of new culinary water improvements.**

These special services include reviewing the subdivision's engineered plans for compliance with Company standards and for inspection of waterline installation for quality control. Specific tasks that these fees cover include but are not limited to the expenses of coordinating development with the Developer; reviewing subdivision plans; producing extension agreements; having a pre-construction meeting; inspecting the installation of waterline connections, water mains, fire hydrants, and laterals; and to witness pressure and bacteria testing.

For the purpose of this study, each fee and charge was analyzed to determine a charge that accurately reflects the Company's current average costs of performing each special service. The resulting proposed Subdivision fees are shown in Table 10.1. The proposed fees for single Lots are shown in Table 10.2. Since the Company has not accurately tracked all the costs associated with these special services in the past, **we recommend that the Company assess the effective cost coverage of the proposed fees after one year to determine if any adjustment of fees is required.**

The developer should be made aware that these fees cover the normal amount of service generally required for development and that extra fees can also be charged if special or difficult circumstances cause additional time and involvement on the part of Company staff and/or consultants. Any extra fees will be assessed as the actual cost of additional services. Any extra fees should be assessed and collected from the Developer before meters are set by the Company.

TABLE 10.1
Culinary Water Subdivision Development Fees

Service	**Fee Amount**
General Administration/ Processing	$515
General Engineering	$430
Engineering Plan Review	$375 + $0.40/foot over 500 feet of pipe
Large Meter Impact Fee Determination	$150
Legal Fees (As required)	Actual Cost ($100 minimum)
Mainline Inspection	$200 + $0.35/foot over 100 feet of pipe

Mainline Hot Tap or Cut In Inspection	$650
Water Service Line Inspection	$50
1 ½ “or 2" Water Service Line Inspection	$100
Large Vault Inspection Fee	$500

TABLE 10.2
Culinary Water Single Lot Development Fees

Service	**Fee Amount**
General Administration/ Processing	$300
Large Meter Impact Fee Determination	$150
Single Fire Hydrant Mainline Connection Inspection Fee	$100
Water Service Line Inspection	$150
1 ½ “or 2" Water Service Line Inspection	$250

CHAPTER 11

Miscellaneous Fees

Overview

Draper Irrigation Company has several miscellaneous fees and charges for various services. These fees are summarized in table 11.1 below.

TABLE 11.1
Existing Miscellaneous Culinary Water Fees

Service	Fee Amount
Returned Check Fee	$25.00
Turn Off/ Turn On Fee	$15.00 each
After hrs. turn on	$50.00
Door Tag.	$25.00
Processing: Residential	$75.00
Processing: Business	$130.00
Processing: Restaurants	$300.00
Late Fee	$2.00 min. Or 1.5%
Stock Assessment	$0.50 per share per month, billed monthly
Spec Books	$15.00 each
Spec CD	$25.00 each
Fire Hydrant (FH) rental deposit	$1000
FH Daily Rental Rate	$10 per day ($50.00 Minimum)
FH Usage Rate	$1.25 per 1,000 gallons
Estimated Water out of FH without Meter	$1000 each incident
Illegal Jumper Fee	$100
Meter Tampering Fee	$500
Buried Meter Usage Assessment	$500

Other costs are occasionally incurred for miscellaneous services not currently charged. These costs include inspection in the installation of a fire hydrant on an existing waterline, water meter relocation inspection, and meter flow testing. The proposed charge for these services are shown in Table 11.2.

We recommend that it be made Company policy to require customers that modify landscaping to be required to reset all effected fire hydrants and meters.

TABLE 11.2
Additional Miscellaneous Culinary Water Fees

Service	Fee Amount
Relocation of Water Meter Box	$200.00
Relocation of Water Meter Box without inspection	$400.00
Water Meter Flow Test Fee	$50.00

References

“Principles of Water Rates, Fees, and Charges,” American Water Works Association (M1); 2000; Denver, Colorado.

“Sizing Water Service Lines and Meters,” American Water Works Association (M22); 1975; Denver, Colorado.

“Draper Irrigation Company - Independent Auditor’s Report,” 1996 and 1997; Scott L. Jenson, PC, Certified Public Accountant; Salt Lake City, Utah.

“Draper Irrigation Company - Report of Independent Certified Accountants and Consolidated Financial Statements,” 1998 and 1999; Hansen, Barnett and Maxwell; Salt Lake City, Utah.

“Draper Water Service - Culinary Water System Master Plan,” 1997; Sunrise Engineering, Inc.; Draper, Utah.

APPENDIX

Appendix A - Water Usage Source Data

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

Appendix B - State Commercial Indoor Water Usage Estimates

.....

Appendix C - Total Expense to Income Balance Table

.....

Appendix D - Impact Fee Cost/Use Curves

.....
.....
.....
.....
.....
.....

APPENDIX A

APPENDIX B

TABLE B.1

Daily Water Demand For Various Water Usages

Type of Establishment	Peak Day Demand (gpd)
Airports	
a. per passenger	3
b. per employee	15
Boarding Houses	
a. for each resident boarder and employee	50
b. for each nonresident boarders	10
Bowling Alleys, per alley	
a. with snack bar	100
b. with no snack bar	85
Churches, per person	5
Country Clubs	
a. per resident member	100
b. per nonresident member present	25
c. per employee	15
Dentist's Office	
a. per chair	200
b. per staff member	35
Doctor's Office	
a. per patient	10
b. per staff member	35
Fairgrounds, per person	1
Fire Stations, per person	
a. with full-time employees and food prep.	70
b. with no full-time employees and no food prep.	5
Gyms	
a. per participant	25
b. per spectator	4

TABLE B.1 (Continued)
Daily Water Demand For Various Water Usages

Type of Establishment	Peak Day Demand (gpd)
Hairdresser	
a. per chair	50
b. per operator	35
Hospitals, per bed space	250
Industrial Buildings, per 8 hour shift, per employee (exclusive of industrial waste)	
a. with showers	35
b. with no showers	15
Launderette, per washer	580
Movie Theaters	
a. auditorium, per seat	5
b. drive-in, per car space	10
Nursing Homes, per bed space	280
Office Buildings and Business Establishments, per shift, per employee (sanitary wastes only)	
a. with cafeteria	25
b. with no cafeteria	15
Picnic Parks, per person (toilet wastes only)	5
Restaurants	
a. ordinary restaurants (not 24 hour service)	35 per seat
b. 24 hour service	50 per seat
c. single service customer utensils only	2 per customer
d. or, per customer served (includes toilet and kitchen wastes)	10
Rooming House, per person	40

TABLE B.1 (Continued)

Daily Water Demand For Various Water Usages

Type of Establishment	Peak Day Demand (gpd)
Schools, per person	
a. boarding	75
b. day, without cafeteria, gym or showers	15
c. day, with cafeteria, but no gym or showers	20
d. day, with cafeteria, gym and showers	25
Service Stations[b] ,per vehicle served	10
Skating Rink, Dance Halls, etc., per person	
a. no kitchen wastes	10
b. Additional for kitchen wastes	3
Ski Areas, per person (no kitchen wastes)	10
Stores	
a. per public toilet room	500
b. per employee	11
Swimming Pools and Bathhouses[c] ,per person	10
Taverns, Bars, Cocktail Lounges, per seat	20
Visitor Centers, per visitor	5
Recommended Outdoor water application rate	3.5 ac*ft/irrigated Acre/Year

NOTES FOR TABLE B.1

1. Information Source is Table 203-2 of Drinking Water Rule R309-203 of the Utah Administrative Code
2. Peak instantaneous demands may be estimated by fixture unit analysis as per the Uniform Plumbing Code.

(a) When more than one use will occur, the multiple use shall be considered in determining total demand. Small industrial plants maintaining a cafeteria and/or showers and club houses or motels maintaining swimming pools and/or laundries are typical examples of multiple uses. Uses other than those listed above shall be considered in relation to established demands from known or similar installations.

(b) or 250 gpd per pump,

(c) 20 x {Water Area (Ft^2) / 30} + Deck Area (Ft^2)

TABLE B.2
Plumbing Fixture Value[1]

Fixture Type	Fixture Value[2]
Bathtub	8
Bedpan washers	10
Combined sink and tray	3
Dental unit	1
Dental Lavatory	2
Drinking Fountain (cooler)	1
Drinking Fountain (public)	2
Kitchen sink: ½-inch connection	3
....3/4-inch connection	7
Lavatory: 3/8-inch connection	2
....½-inch connection	4
Laundry tray: ½-inch connection	3
....3/4-inch connection	7
Shower head (Shower only)	4
Service sink: ½-inch connection	3
....3/4-inch connection	7
Urinal: Pedestal flush valve	35
....Wall or stall	12
.... Trough (2-ft wall)	2
Wash sink (each set of faucets)	4
Water closet: Flush valve	35
.... Tank type	3
Dishwasher: ½-inch connection	4
....3/4-inch connection	10
Washing machine: ½-inch connection	5
....3/4-inch connection	12
....1-inch connection	25
Hose connections (wash down): ½-inch	6
.... 3/4-inch	10
Hose (50-ft length-wash down): ½-inch	6
.... 5/8-inch	9
.... 3/4-inch	12

NOTES FOR TABLE B.2

1. Information Source is Table 4.3 of “Sizing Water Service Lines and Meters (AWWA M22)
2. Based on 35 psi at Meter Outlet.

APPENDIX C

TABLE C.1
Total Expense to Income Balance Table - 10 Year Projection

YEAR	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Beginning Balance	$2,082,884	$2,388,847	$2,587,083	$2,660,280	$2,857,832	$3,127,579	$3,548,969	$4,028,986	$4,566,117	$5,164,122
EXPENSES										
Fixed Expenses	$910,588	$947,012	$984,892	$1,024,288	$1,065,259	$1,107,870	$1,152,184	$1,198,272	$1,246,203	$1,296,051
Operation Expenses	$934,315	$1,009,060	$1,089,785	$1,176,967	$1,271,125	$1,372,815	$1,482,640	$1,601,251	$1,729,351	$1,867,699
Depreciation	$484,100	$498,623	$513,582	$528,989	$544,859	$561,205	$578,041	$595,382	$613,243	$631,641

WTP Upgrade	$597,690	$597,690	$747,113	$747,113	$747,113	$747,113	$747,113	$747,113	$747,113	$747,113
Waterline Improvements	$305,415	$316,654	$353,533	$290,509	$285,173	$200,000	$210,000	$220,500	$231,525	$243,101
StorageImprovements	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000	$300,000
Existing facility	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000
Total Expenses	$3,632,108	$3,769,039	$4,088,905	$4,167,866	$4,313,529	$4,389,003	$4,569,978	$4,762,518	$4,967,435	$5,185,605
New Connections	265	278	292	306	322	338	355	372	391	411
INCOME										

Base Income	$1,456,236	$1,529,048	$1,605,501	$1,685,776	$1,770,064	$1,858,568	$1,951,496	$2,049,071	$2,151,524	$2,259,101
Overage Income	$1,535,385	$1,442,454	$1,514,577	$1,590,306	$1,669,821	$1,753,312	$1,840,978	$1,933,027	$2,029,678	$2,131,162
Interest Income	$93,730	$103,141	$106,550	$110,928	$116,278	$122,594	$129,857	$138,038	$147,091	$156,952
Other Income	$100,703	$103,724	$106,836	$110,041	$113,342	$116,742	$120,245	$123,852	$127,567	$131,394
Existing Facility Fee Income	$207,495	$217,674	$228,636	$239,598	$252,126	$264,654	$277,965	$291,276	$306,153	$321,813
Impact Fee Income	$544,522	$571,234	$600,002	$628,769	$661,646	$694,522	$729,454	$764,386	$803,427	$844,523
Total Income	$3,938,071	$3,967,275	$4,162,102	$4,365,418	$4,583,277	$4,810,392	$5,049,995	$5,299,650	$5,565,440	$5,844,945

Annual Surplus (Shortfall)	$305,963	$198,236	$73,197	$197,552	$269,748	$421,389	$480,017	$537,132	$598,005	$659,340
Ending Balance	$2,388,847	$2,587,083	$2,660,280	$2,857,832	$3,127,579	$3,548,969	$4,028,986	$4,566,117	$5,164,122	$5,823,462

APPENDIX D