ORDINANCE NO. 908

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF GIG HARBOR, WASHINGTON, RELATING TO WATER AND SEWER CONNECTION CHARGES, ADOPTING THE WASTEWATER GENERAL FACILITIES CHARGE ANALYSIS AND THE WATER GENERAL FACILITIES CHARGE ANALYSIS BY REFERENCE AS THE BASIS FOR THE CITY'S WATER AND SEWER CONNECTION CHARGES AND STATING THE CITY COUNCIL'S INTENT TO INCLUDE SUCH ANALYSES IN THE CITY'S SEWER AND WATER COMPREHENSIVE PLANS DURING THE ANNUAL COMPREHENSIVE PLAN UPDATES.

WHEREAS, the City recently commissioned studies to be made of its water utility and sewer facility system, in order to analyze the water and sewer General Facilities Charge; and

WHEREAS, on April 22, 2002 the City Council held a public hearing on the reports from those studies, entitled the "Wastewater General Facilities Charge Analysis" and "Water General Facilities Charge Analysis", dated April 2002, both of which are attached hereto as Exhibits A and B, performed by Gray and Osborne, Inc.; and

WHEREAS, the City's SEPA Responsible Official has determined that this ordinance is categorically exempt from SEPA under WAC 197-11-800(20); and

THE CITY COUNCIL OF THE CITY OF GIG HARBOR, WASHINGTON, ORDAINS AS FOLLOWS:

Section 1. Adoption of Analyses by Reference. The City Council hereby adopts the April 2002 Wastewater General Facilities Charge Analysis (Exhibit A hereto), by reference, as if the same were fully set forth herein. The City Council hereby adopts the April 2002 Water General Facilities Charge Analysis (Exhibit B hereto), by reference, as if the same were fully set forth herein.

Section 2. Intent to Include in Comprehensive Plan. The two analyses described above shall be used by the City in computing water and sewer connection fees in the City, as soon as this ordinance is effective. The City Council intends to include the two analyses in the City's sewer and water comprehensive plans, to be adopted therein at the next annual comprehensive plan update. The Community Development Director is directed to include these analyses in the draft ordinances for adoption at that time.

Section 3. Severability. If any portion of this Ordinance or its application to any person or circumstances is held by a court of competent jurisdiction to be invalid or unconstitutional, such invalidity or unconstitutionality shall not affect the remainder of the Ordinance or the application of the remainder to other persons or circumstances.

Section 4. Effective Date. This ordinance shall take effect and be in full force five (5) days after passage and publication of an approved summary consisting of the title.

PASSED by the Council and approved by the Mayor of the City of Gig Harbor this 13th day of May, 2002.

CITY OF GIG HARBOR

Gretchen A. Wilbert

GRETCHEN WILBERT, MAYOR

ATTEST/AUTHENTICATED:

By: Molly M Towslee

MOLLY TOWSLEE, CITY CLERK

APPROVED AS TO FORM:
OFFICE OF THE CITY ATTORNEY:

By: ______________________________
CAROL A. MORRIS

FILED WITH THE CITY CLERK: 4/22/02
PASSED BY THE CITY COUNCIL: 5/13/02
PUBLISHED: 5/22/02
EFFECTIVE DATE: 5/27/02
ORDINANCE NO. 908

EXHIBIT: ORD # 908

CITY OF GIG HARBOR

PIERCE COUNTY **WASHINGTON**

WATER GENERAL FACILITIES CHARGE ANALYSIS

G & O NO. 00679

APRIL 2002

Gray & Osborne, Inc.
CONSULTING ENGINEERS
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EXECUTIVE SUMMARY

This study provides the City of Gig Harbor with a schedule of water general facility charges (GFCs) based on the value of the existing system and planned capital improvements. The recommended water GFCs are the maximum amounts the City should charge, however the City may elect to charge less in order to reconcile the proposed GFC schedule with other City economic policies.

Chapter 1 defines a GFC and summarizes the regulatory authority and guidance documents upon which this analysis is based. Chapter 2 shows the City's existing schedule of GFCs. Chapter 3 identifies the pro rata share of existing and future facilities to be included in the GFC, and Chapter 4 presents the proposed water GFCs.

The City's current GFC schedule (Municipal Code 13.04.080) establishes a GFC for a ¾ inch meter and utilizes American Water Works Association (AWWA) capacity factors to generate GFCs for meters of up to 2 inches. The City GFCs are applied uniformly to all new customers within City limits, regardless of the location of the connection.

This analysis develops a GFC for a single-family residential ¾ inch connection and utilizes AWWA capacity factors to establish rates for larger meters up to 2 inches. Table E-1 lists the proposed GFCs that are recommended by this analysis. The recommended GFCs are also stated in terms of a dollar cost per residential ¾ inch meter.

TABLE E-1

Recommended GFCs

[illegible]	[illegible]	[illegible]
3/4 Inch Meter	1.00	$ 3,740
1 Inch Meter	1.67	$ 6,250
1-1/2 Inch Meter	3.33	$12,450
2 Inch Meter	5.33	$19,930
Meters Over 2 Inches	(2)	(2)

(1) All GFC amounts shown in Table E-1 have been rounded to the nearest 10 dollars.

(2) These fees are negotiable.

CHAPTER 1

DESCRIPTION OF GENERAL FACILITY CHARGES, REGULATORY AUTHORITY, & GUIDANCE DOCUMENTS

INTRODUCTION

A new customer can be assessed a connection charge for hooking up to a water system. A connection charge can include three components, a general facility charge (GFC), a local facility charge (LFC), and a site facility charge (SFC). A GFC is the proportionate share of the cost of facilities of general benefit to a given service area. Examples of such facilities are sources of supply, storage, and transmission lines. A local facility charge (LFC) is the proportionate share of facilities that are a specific benefit to a customer or customers and are not considered to be of general benefit to the entire service area. A site facility charge (SFC) covers on-site costs such as installation of meters, service lines, and local distribution lines.

The City's current connection charge schedule includes a GFC represented by a "Hook-Up" fee, a SFC represented by the "Meter" charge, but no LFC. The City's current schedule of GFCs (Municipal Code 13.04.080) specifies GFCs for meters from ¾ inches to 2 inches in size. GFC charges for meters greater than ¾" are based on American Water Works Association meter capacity factors that compare flow for larger meters to the flow through a ¾" meter. GFCs for meters greater than 2 inches are negotiable. For new connections occurring outside of City limits, the City imposes a surcharge based on a 1.5 multiplier. Finally, the City adjusts GFCs annually for the effects of inflation based on the Engineering News Record, Construction Cost Index (CCI).

REGULATORY AUTHORITY & GUIDANCE DOCUMENTS

RCW 35.92.025, which authorizes cities to make charges for connecting to a water/wastewater system, requires that the charge be an equitable share of the cost of the system. It also allows the municipality to include ten years of interest from the date of construction of existing facilities. There is no statutory authority for a City to include planned facilities in the calculation of a GFC, however there is statutory authority (RCW 57.08.010) for a District to include facilities planned to be constructed within ten years. Case law supports allowing Cities to include planned facilities and at the direction of the City this analysis includes facilities planned to occur within ten years and contained in the City's February 2001 Water System Comprehensive Plan (WSCP).

Recently, the Washington State Supreme Court ruled that calculation of the connection fee as provided in RCW 35.92.025 for the cost of existing facilities, may include those portions of the system which were donated or paid for by grants. Landmark Development, Inc. v. Roy, 138 Wn.2d 561, 980 P2d 1234 (1999). City staff asked that this analysis include existing facilities, which were funded from grants or by donations from developers, as allowed by the Landmark Development case.

COMPONENTS OF A GFC

The recommended general facility charge (GFC) includes pro-rata shares of the following two major components:

- Existing facilities that will benefit future customers;

- Future facilities that will benefit future customers, are planned to be constructed in the next ten years as identified in an adopted comprehensive plan, and are planned to be paid for by the City (as directed by City staff).

The pro-rata share of the value of existing facilities is determined by dividing the calculated cost of existing water facilities that will benefit future customers by the number of current water customers. The value of existing facilities that will benefit future customers is calculated in this analysis using the following steps:

- Adding the calculated costs of all existing facilities that have capacity to serve projected water demand over the next 20 years.

- Adding 10 years of interest charges for all facilities not funded by grants or developers that have capacity to serve projected water demand over the next 20 years.

- Subtracting all current outstanding debt principal being paid for by water utility rates or fees.

The second major component of the GFC is the pro rata share of future facilities. The pro rata share of future facilities is determined by:

- Identifying the cost of each future facility that is planned to occur within the next ten years as specified in the comprehensive plan and that will benefit future customers and will be paid for by the City.

- Divide the cost of each of these facilities by the number of customers that will benefit from each planned facility.

CHAPTER 2

EXISTING WATER GFCs

Current connection charges are established by City of Gig Harbor Municipal Code Section 13.04.080 and are shown in Table 2-1. New connections occurring outside City limits are charged 1.5 times the inside City charge. The current schedule of GFCs is based on calculating the appropriate charge resulting from the demands placed on the system by a single ¾ inch meter. This ¾ meter GFC is then used in combination with AWWA capacity factors to determine GFCs for 1-inch, 1 1/2-inch, and 2-inch meters.

TABLE 2-1

Existing Water GFCs[(1)]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3/4 Inch	1	$1,305	$ 1,960	$ 450
1 Inch	1.67	$2,175	$ 3,260	$ 555
1-1/2 Inch	3.33	$4,350	$ 6,525	$1,130[(3)]
2 Inch	5.33	$6,960	$10,440	$1,260[(3)]
Over 2 Inch	(2)	(2)	(2)	(2)

(1) Source: City of Gig Harbor Municipal Code Section 13.04.080.
(2) These fees are negotiable.
(3) These are charged the greater of the stated amount or time and materials plus 10 percent.
(4) A meter charge represents the cost to install a service meter and is part of a site facility charge (SFC) which is in addition to a GFC.

CHAPTER 3

EXISTING & FUTURE FACILITY GFC COMPONENTS

INTRODUCTION

This GFC analysis utilizes existing and future water demands and future facilities as identified in the Water System Comprehensive Plan (WSCP) of February 2001. This analysis uses the year 2000 as the baseline for determining current water demands and number of existing ERUs since the WSCP utilizes the year 2000 as its baseline for determining existing facilities that will be at capacity and therefore will require replacement or additional facilities.

As mentioned previously, a GFC includes two major components. These are pro rata shares of the costs of existing and future facilities divided by the number of existing and/or future customers benefiting respectively. The existing and future numbers of customers are quantified in terms of equivalent residential units (ERUs). An ERU is defined as the water consumption from a single-family residential customer. City single-family customers are typically served by ¾ inch meters. Therefore this analysis assumes that the flow of an ERU is equivalent to the demands placed on the system by a customer with a ¾ inch meter.

This chapter is segregated into three sections. The first section details the number of ERUs that will be used in calculating pro rata shares of both the existing and future facilities components of the GFC. The second section summarizes the value of existing facilities that will be included in the GFC and calculates the resulting pro rata share of existing facilities. The third section summarizes the value of future facilities that are included in the GFC and the resulting pro rata share of future facilities.

EXISTING AND FUTURE WATER ERUS

The WSCP defines the average consumption of an ERU as 314 gallons per day (gpd). According to the WSCP (Table 2-13), in the year 2000 the existing service area and Gig Harbor North will require an average day production of 824,605 gpd or 766,883 gpd in consumption (assuming 7% annual lost and unaccounted for water as identified in the WSCP). Therefore, dividing the required average day consumption of 766,883 gpd by 314 gpd/ERU results in 2,442 existing water system ERUs.

Also needed to calculate a GFC is the number of ERUs that will benefit from facility improvements. All future facilities recommended in the WSCP are planned to meet projected demands in the 2019. Therefore this analysis utilizes the projected number of ERUs in the year 2019 as the maximum number of customers that may benefit from future facilities. According to the WSCP, the total average day water production in the year 2019 is estimated to be 1,738,186 gpd (Table 2-13) or 1,616,513 gpd of consumption, or 5,148 ERUs (1,616,513 gpd divided by 314 gpd/ERU). Table 3-1 summarizes the existing and projected average day water production requirements and corresponding ERUs that are utilized in this analysis.

TABLE 3-1

Existing and Future ERUs(1)

[illegible]	[illegible]	[illegible]	[illegible]
Year 2000	766,883	2,442	N/A
Year 2019	1,616,513	5,148	2,706

(1) This data is from Chapter 2 of the WSCP.

(2) Recommended capital improvement projects detailed in the WSCP are designed to meet 2019 flows from both the existing service area and Gig Harbor North developments.

(1) The number of ERUs is calculated by dividing the average day consumption by the defined flow of an ERU of 314 gpd.

PRO RATA SHARE OF EXISTING FACILITIES

VALUE OF EXISTING FACILITIES

At the direction of the City, this analysis includes all existing facilities that will benefit future customers regardless of how these facilities were financed. All existing facilities were analyzed to determine which facilities have capacity to serve future customers through the year 2019. These facilities include sources of supply, storage, transmission/distribution components (pipes, valves, PRVs, and hydrants). This analysis only includes transmission/distribution piping as any pipe of at least 8 inches diameter. Whenever possible, this analysis uses original costs for facilities from City records. In cases where original cost data for facilities are unavailable, replacement costs based on engineering estimates deflated to the year of installation are used in place of original costs.

The resulting cost of all existing facilities not due to be replaced that will benefit future customers is $7,888,000. Table 3-2 shows the cost of the existing facilities included in the GFC. See Appendix A for a more detailed discussion of the existing facilities included in the GFC and documentation of the derivation of each the costs and percentages listed in Table 3-2.

TABLE 3-2

Existing Water Facilities Included in GFC[1]

[illegible]	[illegible]	[illegible]	[illegible]
Sources of Supply[2]	$ 110,743	100%	$ 110,700
320-Zone Storage	$ 243,000	91%	$ 221,100
450-Zone Storage	$ 585,442	94%	$ 550,300
Pipes & Valves	$6,136,000	100%	$6,136,000
PRVs	$ 151,000	100%	$ 151,000
Hydrants	$ 476,000	100%	$ 476,000
Chlorine Monitoring System	$ 18,000	100%	$ 18,000
Pioneer Grandview 8" Loop	$ 14,080	100%	$ 14,080
SR16 Transmission Main Crossing	$ 120,000	100%	$ 120,000
Bayridge Ave. Water Main Installation	$ 90,886	100%	$ 90,886
Total[3]	**$7,945,000**		**$7,888,000**

(1) The information listed in this table is documented in Appendix A.

(2) The sources of supply cost of $110,743 is the total cost to date spent on drilling and partially equipping Well No. 6.

(3) The total cost benefiting future customers of $7,888,000 is rounded to the nearest 1,000 dollars.

Interest Charges and Outstanding Debt Principal

At the direction of the City, the amount of interest charges to be included in the existing facilities component of the GFC will be calculated by summing ten years of accrued interest charges only on facilities benefiting future customers that were debt financed. Table 3-3 lists the total ($134,000) of ten-years of accrued interest associated with each facility that was debt financed and that is included in the existing facilities that benefit future customers. See Appendix B for a discussion of how the data in Table 3-3 was calculated.

✓

TABLE 3-3

Interest Charges[1]

[illegible]	[illegible]	[illegible]
1948 Revenue Bond	Harbor Heights No. 1 Tank	$ 7,600
1973 Revenue Bond	East tank & Harbor Heights No.2 Tanks	$ 37,000
1978 Revenue Bond	Shurgard Tank	$ 65,600
1985 Revenue Bond	Shurgard Tank	$ 24,200
Total[2]	**Total**	**$134,000**

(1) See Appendix B for a detailed discussion of how accumulated interest for each asset in Table 3-3 is derived.

(2) The total accumulated interest has been rounded to the nearest thousand dollars.

The water utility does not have any outstanding water utility debts that were used to finance any facility that has been included in the GFC. Therefore, there is no outstanding debt principal to subtract from the pro rate share of existing facilities.

Pro Rata Share of Existing Facilities

In order to determine the pro rata share of existing facilities that will benefit future customers, the sum of the value of existing facilities and interest charges is divided by the number of existing ERUs of 2,442. Table 3-4 lists the pro rata share of each existing facility component of the GFC.

TABLE 3-4

Pro Rata Share of Existing Facilities

[illegible]	[illegible]	[illegible]
Total Cost of Existing Facilities[1]	$7,888,000	
(Plus) 10 Years of Accrued Interest[2]	$ 134,000	
Total Existing Facility GFC Component[3]	**$8,022,000**	**$ 3,290**

(1) The total cost of existing facilities is from Table 3-2.

(2) The total cost of ten years of accrued interest is from Table 3-3.

(3) The total pro rata share of existing facilities has been rounded to the nearest ten dollars.

PRO RATA SHARE OF FUTURE FACILITIES

The WSCP identifies planned capital improvement projects as either being funded by developers or the City. At the direction of the City, this analysis only includes capital improvement projects identified in the WSCP to be funded by the City and planned to be constructed within 10-years.

Table 3-5 summarizes the planned improvements identified in the WSCP that will be funded by the City that are included in the future facility component of the GFC. Also shown in Table 3-5 is the number of ERUs benefiting from each planned facility and the resulting pro rata share included in the GFC. See Appendix C for a more detailed discussion of why projects are included or excluded from the GFC and the number of customers that will benefit each project.

TABLE 3-5

Pro Rata Share of Future Facilities[(1)]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	Telemetry SCADA System Improvements	$ 102,000	5,148	$ 20
7	Skansie/72nd Str. 12" Loop	$ 299,000	5,148	$ 58
8	Equipping of Well No. 6	$ 263,000	1,454	$ 181
10	Rushmore 8" Upsize	$ 289,000	5,148	$ 56
11	28th Ave. NW 12" Loop	$ 110,000	5,148	$ 21
12	Harborview/WWTP Water Main Repl.	$ 41,000	5,148	$ 8
14	Woodworth Water Main Extension	$ 210,000	5,148	$ 41
	Total[(2)]	**$ 1,314,000**		**$ 390**

(1) See Appendix C for a more in depth discussion of the data contained in this table.

(2) The total of future facilities has been rounded to the nearest ten dollars.

CHAPTER 4

PROPOSED WATER UTILITY GENERAL FACILITY CHARGES

Table 4-1 shows a summary of the existing and future facility components of the proposed GFC and the State Business and Occupation Excise Tax (1.5%) that is applied to all revenues generated from general facility charges. Table 4-2 lists the corresponding GFC schedule for all meters up to 2 inches based on the ¾ inch meter GFC shown in Table 4-1 and AWWA meter capacity factors.

TABLE 4-1

Proposed General Facility Charge for a ¾" Meter

[illegible]	[illegible]
Existing Facility Component(1)	$3,290
Future Facility Component(2)	$ 390
Subtotal	$3,680
State Business & Occupation Tax (@ 1.5%)	$ 60
Total Recommended GFC	**$3,740**

(1) The existing facility component of $3,300 is as calculated in Table 3-4.
(2) The future facility component of $390 is as calculated in Table 3-5.

TABLE 4-2

Proposed Schedule of General Facility Charges by Meter Size

[illegible]	[illegible]	[illegible]
3/4 Inch Meter	1.00	$ 3,740
1 Inch Meter	1.67	$ 6,250
1-1/2 Inch Meter	3.33	$12,450
2 Inch Meter	5.33	$19,930
Meters Over 2 Inches	(2)	(2)

(1) All GFC amounts have been rounded to the nearest ten dollars.
(2) These fees are negotiable.

As discussed previously, the City may elect to set GFCs lower than the amounts listed in Table 4-2 in order to reconcile the proposed GFCs with other City economic policies. Additionally, the GFCs listed in Table 4-2 reflect future facility costs in the year they are planned to occur and therefore have incorporated the effects of inflation. Therefore, it is recommended that the City not apply an annual inflation factor to the proposed GFCs.

APPENDIX A

This appendix details the derivation and documentation of original costs for all existing water utility facilities included in the proposed GFC. Existing facilities included in the GFC consist of sources of supply, storage, pipes and valves, PRVs, hydrants, and those capital improvement projects specified in the WCSP that have already been completed. Where data is available, original facility costs from City records are utilized. Where original costs are unavailable, original facility costs are based on estimated replacement costs deflated to the installation year facility costs using construction cost indexes from the Engineering News Record.

SOURCES OF SUPPLY

The City has eight sources of supply, however, Well No. 1 has been abandoned, Well No. 7 is City owned and serves a private Group B non-community water system of approximately 5 residential connections, and Well No. 8 is temporarily out of service pending an upgrade. Therefore, Wells No.1, No. 7, and No. 8 have not been included in the existing facility component of the GFC since they will not benefit future customers. Additionally, Well No. 6 is currently non-operational. The total available pumping capacity of the wells that are currently operational (Nos. 2, 3, 4, & 5) is 1,620 gpm. It is assumed that well pumps will be limited to a maximum daily run time of 18 hours. Therefore, the maximum daily pumping capacity of Well Nos. 2, 3, 4 & 5 is 1,749,600 gpd (1,620 gpm * 18 hours per day * 60 minutes per hour). Current peak day demand is estimated by converting the existing average day demand of 824,605 gpd (as documented in the WCSP) into peak day demand by multiplying by an average day demand to peak day demand conversion factor of 2.2. The resulting current peak day demand from existing customers is 1,814,130 gpd (2.2*824,605 gpd) as shown in Table A-1. Therefore all capacity from existing operational wells is fully utilized and these facilities will not benefit future customers.

TABLE A-1

Peak Day Demand

[illegible]	[illegible] Production (gpd)	[illegible]	[illegible]
2000	824,605	2.2	1,814,130

(1) The average day to peak day conversion factor of 2.2 is from the WSCP.

However, funds have been spent to drill and partially equip Well No. 6. Also, there is a capital improvement project in the six year plan to complete Well No. 6, and therefore, once the project is done the well will benefit future customers and therefore money spent to date on the well will also benefit future customers. Table A-2 lists the total cost spent to date on drilling and partially equipping Well No. 6. The total cost of $111,000 spent on Well No. 6 to date will benefit future customers.

TABLE A-2

Sources of Supply Included in the GFC(1)

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6 (Drilling)(2)	600	1,000	1992	$ 86,830
6 (Partial Equiping)(2)	600	N/A	1999	$ 23,913
Total(3)		**1,000**		**$ 111,000**

(1) Existing wells are fully utilized by existing customer demands. Therefore, only costs spent on Well No. 6 will benefit future customers.

(2) The costs to drill and partially equip Well No. 6 are from City inventory records.

(3) The total has been rounded to the nearest $1,000 dollars.

STORAGE

Storage Costs

The City currently operates five storage facilities (reservoirs) that serve the 320 and 450 pressure zones. The original cost of the Skansie reservoir, from City inventory records, is $323,442. Original costs for the other four reservoirs are unavailable and therefore these original costs are calculated based on a formula (cost/gallon) developed from 20 historical reservoir construction projects. Figure A-1 shows a graph of historical reservoir costs per gallon plotted against capacity. The resulting cost per gallon equation as listed in Figure A-1 is

$$\text{Total Cost} = \left[(0.7417)\times\left(Capacity\langle MG\rangle\right)\right]^{-.444}\times Capacity\langle Gallons\rangle$$

FIGURE A-1

Reservoir Cost Curve

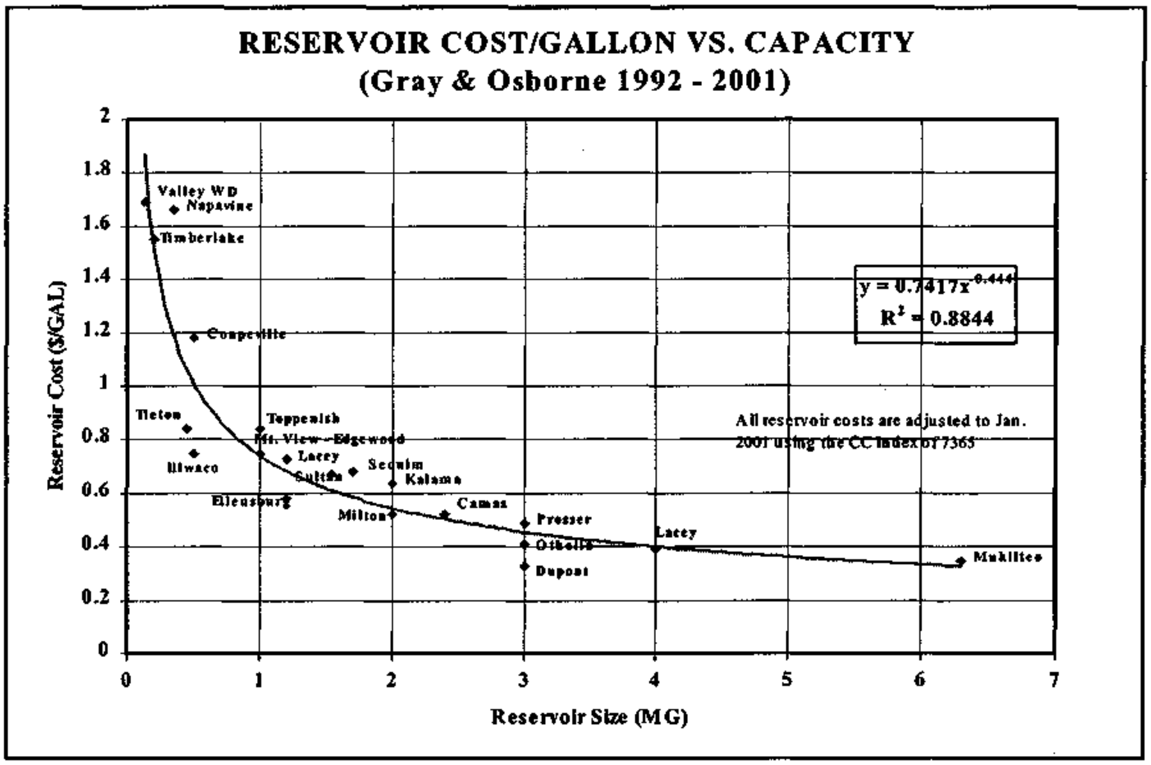

Table A-3 lists the estimated construction costs (including sales taxes) for the Shurgard tank, Harbor Heights tanks No. 1 and No. 2, and the East tank based on the capacity of each respective reservoir and the reservoir cost equation. Total replacement costs for each reservoir listed in Table A-3 include construction costs and design engineering costs (25%). Original costs for each reservoir are then calculated by deflating total replacement costs by the average construction cost index from the Engineering News Record for the year each reservoir was constructed.

TABLE A-3

Estimated Reservoir Costs

Storage Facility	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Shurgard	1978	Steel	500,000	$ 504,000	$ 630,000	3,056	$ 262,000
Harbor Height No. 1	1948	Steel	250,000	$ 343,000	$ 428,750	461	$ 27,000
Harbor Height No. 2	1973	Steel	250,000	$ 343,000	$ 428,750	1,844	$ 108,000
East	1973	Steel	250,000	$ 343,000	$ 428,750	1,844	$ 108,000
Total				**$ 1,533,000**	**$ 1,916,250**		**$ 505,000**

(1) Construction costs are based on each reservoir's capacity and the reservoir cost equation. Total replacement costs are construction costs increased for 25% engineering/design costs.

(2) Original cost estimates are calculated by multiplying the total replacement cost by the ratio of the average CC index in the year built by the average CC index from 2001 of 7,342.

Table A-4 lists estimated original reservoir costs from Table A-3 and the cost of the Skansie tank provided by the City.

TABLE A-4

Original Reservoir Costs

Storage Facility	[illegible]	[illegible]	[illegible]	Total Cost
Shurgard(1)	1978	Steel	500,000	$ 262,000
Harbor Height No. 1(1)	1948	Steel	250,000	$ 27,000
Harbor Height No. 2(1)	1973	Steel	250,000	$ 108,000
East(1)	1973	Steel	250,000	$ 108,000
Skansie(2)	1989	Steel	1,000,000	$ 323,442
Total(3)				**$ 828,000**

(1) Original costs for these reservoirs is unavailable and therefore original costs are estimated using the reservoir cost curve equation as shown in Figure A-1.

(2) The original cost for the Skansie reservoir of $323,442 is from City inventory records.

(3) The total cost of $828,000 has been rounded to the nearest thousand dollars.

Percentage of Storage Costs that Benefit Future Customers

According to the Department of Health, storage facilities serve the following functions in a water system:

- Operational Storage
- Dead Storage
- Equalizing Storage
- Standby Storage
- Fire Suppression Storage

Operational storage is capacity available to meet daily customer demands after all other storage requirements are met and is set in conjunction with source capacities to optimize system operations and minimize pump cycling. Dead storage is the amount of water in a storage reservoir needed to maintain the elevation of the other storage components for pressure considerations in the distribution system. Equalizing storage is required when the source capacity cannot meet the peak hour demands of the system. Standby Storage is used to provide a measure of reliability should the City's source of supply fail or unusual conditions increased system demands. Fire suppression Storage requirements are specified in local ordinances and are intended to ensure 3,000 gpm of flow for three hours while maintaining a minimum system pressure of 20 psi.

This analysis assumes that operational, fire suppression, and dead storage capacity benefit both existing and future customers equally since all customers benefit from minimizing pump cycling and fire protection, and since dead storage is required to enable all aspects of a reservoir to operate at required system pressures. Therefore, 100% of all costs associated with operational, fire suppression, and dead storage capacities are included in existing facilities that benefit future customers. This analysis does not include the costs of standby capacity since DOH allows "nesting" which allows a utility to only meet the larger of fire suppression or standby requirements. Standby storage requirements do increase with increasing average day demands. Therefore standby requirements were calculated using the average day demand in the year 2019 to verify that fire suppression requirements remain larger throughout the 20-year timeline of the improvements and therefore only fire suppression capacity requirements need be considered. Per the WSCP, fire suppression capacity requirements in the 320 zone in the year 2019 are 540,000 gallons compared to 344,300 gallons of required standby storage. According to the WSCP standby storage in the 450 zone in the year 2019 is larger than fire suppression requirements, however, the WSCP did not include the future capacity of Well No. 6 in calculating required standby storage in the year 2019. When the capacity of Well No. 6 is included, the required standby in the 450 zone in 2019 is zero and fire suppression storage capacity is 540,000. Note that in calculating standby storage requirements in the year 2019, demands from the Gig Harbor North area have not been included since all Gig Harbor North area storage requirements will be provided by a new reservoir that will be developer financed.

The remaining reservoir function is equalizing storage. DOH does require a minimum amount of equalizing storage. Available equalizing storage capacity that will benefit future customers is equal to all storage capacity remaining after operational, fire suppression, and dead storage requirements are met. Well No. 6 has been included in calculating the equalizing storage for the 450 zone since it is expected that this source will be on line in the next six years.

Table A-4 shows the available storage capacity by zone after fire suppression and dead storage requirements are met.

TABLE A-4

Available Storage Capacity for Equalizing Requirements

[illegible]	[illegible]	[illegible]
Reservoir Capacity	750,000	1,500,000
Minus Operational Storage Requirements$^{(1)}$	59,000	109,000
Minus Dead Storage Requirements$^{(1)}$	0	630,000
Minus Fire Flow Requirements$^{(1)}$	540,000	540,000
Total Available Capacity (with Nesting)	**151,000**	**221,000**

(1) Fire suppression and dead storage requirements for the 310 and 450 pressure zones are as identified in the WSCP.

<u>Equalizing storage</u> is defined by the equation $V_{ES} = (Q_{PH} - Q_s)*150$, where:

V_{ES}	=	Equalizing storage component (gallons)
Q_{PH}	=	Peak Hourly Demand (gpm)
Q_S	=	Sum of all Source of Supply Capacities (except emergency sources) (for the 320 zone the sum of all source capacity is 480 gpm) (for the 450 zone the sum of all source capacities is 2,140 gpm and includes Well No. 6's capacity of 1,000 gpm)

Using the equation for equalizing storage and the available storage capacity listed in Table A-4, Table A-5 shows the capacity in peak hour demand (PHD) (gpm) that could be served from available capacity identified in Table A-4. In order to determine the amount of available equalizing capacity that benefits future customers, the percentage of available equalizing storage in terms of PHD is divided by the PHD due to existing customers.

In order to calculate existing PHD, the average day demand (ADD) in the year 2000 for the water system needs to be converted into a PHD. In considering storage capacity available to serve future customers, the future demands from the Gig Harbor North area have not been included. This is due to the fact that according to the WSCP, storage requirements in the Gig Harbor North area will be provided by a new reservoir that will be developer financed.

PHD is defined by the equation PHD = (PDD/1440)*[(C*N) + F] + 18, where:

PHD	=	Peak Hour Demand (gpm)
C	=	1.6 for Systems with ERUs > 500
N	=	Number of ERUs
F	=	225 for Systems with ERUs > 500
PDD	=	Peak Day Demand (gpd/ERU)

The WSCP estimates PDD by multiplying ADD by a factor of 2.2. Also needed to calculate a PDD for each zone is a measure of how much of the total system ADD flows to the 320 and 450 zone respectively. The WSCP assumes that flows for each zone are calculated based on 30% of total system ADD and PDD being attributable to the 320 zone and 70% being attributable to the 450 zone. Using the equation and data above, PHD from existing customers (including Gig Harbor North) in the 320 zone is 645 gpm and in the 450 zone is 1,505 gpm. In each zone, dividing the available PHD by the PHD that could be served by available equalizing capacity results in the percentage of capacity in each zone that is available for equalizing storage. Multiplying this percentage by the available equalizing capacity for each zone results in the number of gallons of storage that is available to meet future customer demands and will therefore benefit future customers.

TABLE A-5

Available Equalizing Capacity Benefiting Future Customers

Equalizing Storage	320 Zone	450 Zone
Capacity Available for Equalizing Storage (gallons)[1]	151,000	221,000
PHD that can be Served by Equalizing Capacity (gpm)[2]	1,487	3,613
Existing PHD (gpm)[3]	645	1505
Available PHD Capacity (gpm)[4]	842	2,108
Percentage of Equalizing Capacity Available[5]	57%	58%
Available Equalizing Capacity (gallons)[6]	86,000	128,000

(1) The capacity available for equalizing requirements is as listed in Table A-4.

(2) Peak hour demands (PHD) that can be served by equalizing capacity in each zone are computed by setting V_{ES} equal to either 151,000 gallons or 221,000 gallons and solving for Q_{PH} using the equation and data listed above under Equalizing Storage.

(3) Existing PHD is calculated using the equation and data listed under PHD.

(4) Available PHD capacity is calculated by subtracting the existing PHD from the PHD that can be served by Equalizing Capacity (e.g. 842 = 1,487-645).

(5) The percentage of equalizing capacity available is calculated by dividing the existing PHD by the PHD that can be served by equalizing capacity for each pressure zone (e.g. 57% = 842 gpm/1,487 gpm).

(6) The available equalizing capacity is calculated by multiplying the percentage of equalizing capacity available by the capacity available for equalizing requirements (e.g. 86,000 gallons = 151,000 gallons* 57%).

Table A-6 shows the resulting percentage of total storage capacity (by zone) that will benefit future customers. The percentage of storage capacity that will benefit future customers is calculated by summing total fireflow and dead capacity plus the equalizing capacity benefiting future customers identified in Table A-5, all divided by the total storage capacity. The percentage of existing storage capacity that benefits future customers in the 320 zone is 91% and the percentage benefiting future customers in the 450 zone is also 94%.

TABLE A-6

Reservoir Capacity that Benefits Future Customers by Pressure Zone

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
320-Zone	750,000	59,000	540,000	0	86,000	685,000	91%
450-Zone	1,500,000	109,000	540,000	630,000	128,000	1,407,000	94%

(1) The total capacity benefiting future customers is the sum of fireflow capacity plus dead storage capacity plus equalizing capacity.

(2) The percentage of existing capacity that will benefit future customers is the total capacity benefiting future customers divided by the total capacity (e.g. 685,600 gallons/750,000 gallons).

TRANSMISSION PIPING & VALVES

Piping & Valves Costs

This analysis utilizes information concerning existing pipe lengths, material, and size from the hydraulic model developed in the WSCP. Piping data from the hydraulic model was reviewed and all pipes less than 8-inches in diameter were removed. Also removed were all pipe lengths associated with existing piping planned to be replaced by a capital improvement project so that future customers are not charged for both a future component and the existing component that it is replacing. Capital projects that will replace existing piping are the Rushmore 8-inch Upsizing and the Harborview/WWTP Water Main Replacement. No adjustment is required for the Rushmore 8-inch Upsizing project since it is replacing pipe lengths less than 8-inches and therefore this pipe has already been excluded. Pipe lengths associated with the Harborview/WWTP project have been removed.

The number and size of valves included in this analysis as benefiting future customers is based on a minimum of 2 valves for every pipe node as documented in the hydraulic model in the WSCP, or 2 valves for every 600 lineal feet of pipe 8-inches or greater in diameter. The type of valve is assumed to be either a gate valve or butterfly valve with box. All pipes of 8-inch to 12-inch diameter are assumed to have gate valves with all 14-inch and 16-inch diameter pipe having butterfly valves.

Original costs for piping and valve components are estimated using replacement costs for pipes based on material and size and valves based on type (butterfly/gate) and size deflated to the year of installation using construction cost indexes from the Engineering News Record. Appendix D documents the replacement costs for various pipe materials and sizes and for various valve types and sizes. City staff provided installation years for a majority of pipe lengths in the model. Those pipe lengths for which installation dates are unknown are assigned the weighted average installation date of 1983. The weighted average installation date of 1983 is calculated by summing the product of each pipe length (for which a date is known) multiplied by its installation year and then dividing by the sum of the total pipe lengths.

Tables A-7 and A-8 calculate total original cost estimates for each length of pipe listed in the model using the pipe and valve component costs listed in Appendix D and the adjusted pipe data from the hydraulic model. Table A-7 shows the calculation of current construction costs to install each length of pipe. Table A-8 shows the calculation of total replacement costs (construction costs plus 8.1% taxes, 20% contingency, and 25% engineering costs) and the conversion of replacement costs into original costs using average construction cost indexes for the year each length of pipe was installed. The resulting total original cost estimate for the entire transmission system is $6,136,000.

Percentage of Piping & Valve Costs that Benefit Future Customers

The entire transmission system original cost of $6,136,000 will benefit future customers since (1) only transmission components are included (2) according to the hydraulic analysis the existing system with the recommended improvements has capacity to serve future flows (3) a major design criteria for sizing transmission components is fire flow which benefits all existing and future customers.

TABLE A-7

Pipe & Valve Replacement Construction Costs

Pipe Type	Pipe Model Description	Diameter (Inches)	Length (ft)	Pipe Cost ($/ ft)	Pipe Replacement Cost (2001)	No. of Valves	Valve Replacement Cost (2001)	Total Valve Costs	Total Valve & Pipe Costs
AC	P-47	8	1,097	40	$ 43,900	2	$ 790	$ 1,600	$ 45,500
AC	P-48	8	428	40	$ 17,100	2	$ 790	$ 1,600	$ 18,700
AC	P-49	8	261	40	$ 10,400	2	$ 790	$ 1,600	$ 12,000
AC	P-74	8	307	40	$ 12,300	2	$ 790	$ 1,600	$ 13,900
AC	P-76	8	287	40	$ 11,500	2	$ 790	$ 1,600	$ 13,100
AC	P-108	8	578	40	$ 23,100	2	$ 790	$ 1,600	$ 24,700
AC	P-286	8	313	40	$ 12,500	2	$ 790	$ 1,600	$ 14,100
AC	P-93	8	614	40	$ 24,600	2	$ 790	$ 1,600	$ 26,200
AC	P-10	8	414	40	$ 16,600	2	$ 790	$ 1,600	$ 18,200
AC	P-11	8	359	40	$ 14,400	2	$ 790	$ 1,600	$ 16,000
AC	P-12	8	198	40	$ 7,900	2	$ 790	$ 1,600	$ 9,500
AC	P-15	8	304	40	$ 12,200	2	$ 790	$ 1,600	$ 13,800
AC	P-2	8	1,263	40	$ 50,500	4	$ 790	$ 3,200	$ 53,700
AC	P-392	8	202	40	$ 8,100	2	$ 790	$ 1,600	$ 9,700
AC	P-393	8	314	40	$ 12,600	2	$ 790	$ 1,600	$ 14,200
AC	P-4	8	226	40	$ 9,000	2	$ 790	$ 1,600	$ 10,600
AC	P-6	8	287	40	$ 11,500	2	$ 790	$ 1,600	$ 13,100
AC	P-7	8	269	40	$ 10,800	2	$ 790	$ 1,600	$ 12,400
AC	P-199	8	542	40	$ 21,700	2	$ 790	$ 1,600	$ 23,300
AC	P-207	8	214	40	$ 8,600	2	$ 790	$ 1,600	$ 10,200
AC	P-88	8	446	40	$ 17,800	2	$ 790	$ 1,600	$ 19,400
AC	P-89	8	529	40	$ 21,200	2	$ 790	$ 1,600	$ 22,800

TABLE A-7 – (continued)

Pipe & Valve Replacement Construction Costs

Pipe Type	Pipe Model Designation	Diameter (Inches)	Length (ft)	Pipe Cost ($/ft)	Pipe Replacement Cost (2001)	No. of Valves	Gate Valve Replacement Cost (2001)	Total Valve Costs	Total Valve & Pipe Costs
AC	P-91	8	270	40	$ 10,800	2	$ 790	$ 1,600	$ 12,400
AC	P-236	8	95	40	$ 3,800	2	$ 790	$ 1,600	$ 5,400
AC	P-237	8	484	40	$ 19,400	2	$ 790	$ 1,600	$ 21,000
AC	P-260	8	208	40	$ 8,300	2	$ 790	$ 1,600	$ 9,900
AC	P-261	8	613	40	$ 24,500	2	$ 790	$ 1,600	$ 26,100
AC	P-283	8	179	40	$ 7,200	2	$ 790	$ 1,600	$ 8,800
AC	P-284	8	183	40	$ 7,300	2	$ 790	$ 1,600	$ 8,900
AC	P-355	8	322	40	$ 12,900	2	$ 790	$ 1,600	$ 14,500
AC	P-356	8	345	40	$ 13,800	2	$ 790	$ 1,600	$ 15,400
AC	P-73	8	466	40	$ 18,600	2	$ 790	$ 1,600	$ 20,200
AC	P-75	8	368	40	$ 14,700	2	$ 790	$ 1,600	$ 16,300
AC	P-87	10	804	44	$ 35,400	2	$ 1,110	$ 2,200	$ 37,600
AC	P-126	10	685	44	$ 30,100	2	$ 1,110	$ 2,200	$ 32,300
AC	P-127	10	1,482	44	$ 65,200	4	$ 1,110	$ 4,400	$ 69,600
AC	P-125	12	847	48	$ 40,700	2	$ 1,280	$ 2,600	$ 43,300
AC	P-128	12	287	48	$ 13,800	2	$ 1,280	$ 2,600	$ 16,400
AC	P-129	12	165	48	$ 7,900	2	$ 1,280	$ 2,600	$ 10,500
AC	P-130	12	203	48	$ 9,700	2	$ 1,280	$ 2,600	$ 12,300
AC	P-132	12	599	48	$ 28,800	2	$ 1,280	$ 2,600	$ 31,400
AC	P-221	12	168	48	$ 8,100	2	$ 1,280	$ 2,600	$ 10,700
AC	P-227	12	357	48	$ 17,100	2	$ 1,280	$ 2,600	$ 19,700

TABLE A-7 – (continued)

Pipe & Valve Replacement Construction Costs

[illegible] Pipe Type	Pipe Model Designation	Diameter (inches)	Length (ft)	Pipe Cost ($/ft)	Pipe Replacement Cost (2001)	No. of Valves	Valve Replacement Cost (2001)	Total Valve Costs	Total Valve & Pipe Costs
AC	P-228	12	559	48	$ 26,800	2	$ 1,280	$ 2,600	$ 29,400
AC	P-133	12	493	48	$ 23,700	2	$ 1,280	$ 2,600	$ 26,300
AC	P-124	12	491	48	$ 23,600	2	$ 1,280	$ 2,600	$ 26,200
DI	P-278	8	270	47	$ 12,700	2	$ 790	$ 1,600	$ 14,300
DI	P-341	8	284	47	$ 13,300	2	$ 790	$ 1,600	$ 14,900
DI	P-342	8	736	47	$ 34,600	2	$ 790	$ 1,600	$ 36,200
DI	P-343	8	297	47	$ 14,000	2	$ 790	$ 1,600	$ 15,600
DI	P-386	8	376	47	$ 17,700	2	$ 790	$ 1,600	$ 19,300
DI	P-387	8	583	47	$ 27,400	2	$ 790	$ 1,600	$ 29,000
DI	P-310	8	138	47	$ 6,500	2	$ 790	$ 1,600	$ 8,100
DI	P-315	8	546	47	$ 25,700	2	$ 790	$ 1,600	$ 27,300
DI	P-338	8	272	47	$ 12,800	2	$ 790	$ 1,600	$ 14,400
DI	P-340	8	84	47	$ 3,900	2	$ 790	$ 1,600	$ 5,500
DI	P-345	8	121	47	$ 5,700	2	$ 790	$ 1,600	$ 7,300
DI	P-348	8	1,073	47	$ 50,400	2	$ 790	$ 1,600	$ 52,000
DI	P-349	8	1,200	47	$ 56,400	4	$ 790	$ 3,200	$ 59,600
DI	P-350	8	292	47	$ 13,700	2	$ 790	$ 1,600	$ 15,300
DI	P-351	8	683	47	$ 32,100	2	$ 790	$ 1,600	$ 33,700
DI	P-1	8	187	47	$ 8,800	2	$ 790	$ 1,600	$ 10,400
DI	P-240	8	411	47	$ 19,300	2	$ 790	$ 1,600	$ 20,900
DI	P-241	8	409	47	$ 19,200	2	$ 790	$ 1,600	$ 20,800
DI	P-242	8	651	47	$ 30,600	2	$ 790	$ 1,600	$ 32,200

TABLE A-7 – (continued)

Pipe & Valve Replacement Construction Costs

Pipe Type	Pipe Model Designation	Diameter (Inches)	Pipe Length (ft)	Pipe Cost ($/ft)	Pipe Replacement Cost (2001)	No. of Valves	Gate Valve Replacement Cost (2001)	Total Valve Costs	Total Valve & Pipe Costs
DI	P-247	8	300	47	$ 14,100	2	$ 790	$ 1,600	$ 15,700
DI	P-248	8	141	47	$ 6,600	2	$ 790	$ 1,600	$ 8,200
DI	P-26	8	586	47	$ 27,500	2	$ 790	$ 1,600	$ 29,100
DI	P-28	8	817	47	$ 38,400	2	$ 790	$ 1,600	$ 40,000
DI	P-29	8	561	47	$ 26,400	2	$ 790	$ 1,600	$ 28,000
DI	P-302	8	315	47	$ 14,800	2	$ 790	$ 1,600	$ 16,400
DI	P-303	8	369	47	$ 17,300	2	$ 790	$ 1,600	$ 18,900
DI	P-31	8	115	47	$ 5,400	2	$ 790	$ 1,600	$ 7,000
DI	P-32	8	375	47	$ 17,600	2	$ 790	$ 1,600	$ 19,200
DI	P-33	8	721	47	$ 33,900	2	$ 790	$ 1,600	$ 35,500
DI	P-394	8	776	47	$ 36,500	2	$ 790	$ 1,600	$ 38,100
DI	P-43	8	508	47	$ 23,900	2	$ 790	$ 1,600	$ 25,500
DI	P-44	8	523	47	$ 24,600	2	$ 790	$ 1,600	$ 26,200
DI	P-140	8	873	47	$ 41,000	2	$ 790	$ 1,600	$ 42,600
DI	P-69	8	435	47	$ 20,400	2	$ 790	$ 1,600	$ 22,000
DI	P-198	8	461	47	$ 21,700	2	$ 790	$ 1,600	$ 23,300
DI	P-229	8	296	47	$ 13,900	2	$ 790	$ 1,600	$ 15,500
DI	P-279	8	667	47	$ 31,300	2	$ 790	$ 1,600	$ 32,900
DI	P-312	8	532	47	$ 25,000	2	$ 790	$ 1,600	$ 26,600
DI	P-313	8	251	47	$ 11,800	2	$ 790	$ 1,600	$ 13,400
DI	P-314	8	401	47	$ 18,800	2	$ 790	$ 1,600	$ 20,400
DI	P-316	8	243	47	$ 11,400	2	$ 790	$ 1,600	$ 13,000

TABLE A-7 – (continued)

Pipe & Valve Replacement Construction Costs

Pipe Type	Pipe Model Designation	Diameter (inches)	Length (ft)	Pipe Cost ($/ft)	Pipe Replacement Cost ([illegible])	No. of Valves	Valve Replacement Cost ([illegible])	Total Valve Costs	Total Valve & Pipe Costs
DI	P-325	8	371	47	$ 17,400	2	$ 790	$ 1,600	$ 19,000
DI	P-357	8	1,280	47	$ 60,200	4	$ 790	$ 3,200	$ 63,400
DI	P-376	8	416	47	$ 19,600	2	$ 790	$ 1,600	$ 21,200
DI	P-377	8	252	47	$ 11,800	2	$ 790	$ 1,600	$ 13,400
DI	P-380	8	671	47	$ 31,500	2	$ 790	$ 1,600	$ 33,100
DI	P-381	8	244	47	$ 11,500	2	$ 790	$ 1,600	$ 13,100
DI	P-388	8	407	47	$ 19,100	2	$ 790	$ 1,600	$ 20,700
DI	P-46	8	829	47	$ 39,000	2	$ 790	$ 1,600	$ 40,600
DI	P-70	8	745	47	$ 35,000	2	$ 790	$ 1,600	$ 36,600
DI	P-95	8	338	47	$ 15,900	2	$ 790	$ 1,600	$ 17,500
DI	P-96	8	287	47	$ 13,500	2	$ 790	$ 1,600	$ 15,100
DI	P-135	8	427	47	$ 20,100	2	$ 790	$ 1,600	$ 21,700
DI	P-141	8	283	47	$ 13,300	2	$ 790	$ 1,600	$ 14,900
DI	P-321	8	226	47	$ 10,600	2	$ 790	$ 1,600	$ 12,200
DI	P-322	8	327	47	$ 15,400	2	$ 790	$ 1,600	$ 17,000
DI	P-385	8	875	47	$ 41,100	2	$ 790	$ 1,600	$ 42,700
DI	P-1000	8	795	47	$ 37,400	2	$ 790	$ 1,600	$ 39,000
DI	P-379	8	257	47	$ 12,100	2	$ 790	$ 1,600	$ 13,700
DI	P-101	8	328	47	$ 15,400	2	$ 790	$ 1,600	$ 17,000
DI	P-102	8	367	47	$ 17,200	2	$ 790	$ 1,600	$ 18,800
DI	P-103	8	523	47	$ 24,600	2	$ 790	$ 1,600	$ 26,200
DI	P-104	8	653	47	$ 30,700	2	$ 790	$ 1,600	$ 32,300

TABLE A-7 – (continued)

Pipe & Valve Replacement Construction Costs

Pipe Type	Pipe Model Designation	Diameter (inches)	Length (ft)	Pipe Cost ($/ft)	Pipe Replacement Cost (2011)	No. of Valves	Gate Valve Replacement Cost (2011)	Total Valve Costs	Total Valve & Pipe Costs
DI	P-105	8	114	47	$ 5,400	2	$ 790	$ 1,600	$ 7,000
DI	P-1001	8	845	47	$ 39,700	2	$ 790	$ 1,600	$ 41,300
DI	P-1002	8	638	47	$ 30,000	2	$ 790	$ 1,600	$ 31,600
DI	P-1003	8	404	47	$ 19,000	2	$ 790	$ 1,600	$ 20,600
DI	P-1004	8	729	47	$ 34,300	2	$ 790	$ 1,600	$ 35,900
DI	P-1005	8	174	47	$ 8,200	2	$ 790	$ 1,600	$ 9,800
DI	P-1006	8	352	47	$ 16,500	2	$ 790	$ 1,600	$ 18,100
DI	P-1007	8	320	47	$ 15,000	2	$ 790	$ 1,600	$ 16,600
DI	P-1008	8	302	47	$ 14,200	2	$ 790	$ 1,600	$ 15,800
DI	P-1009	8	167	47	$ 7,800	2	$ 790	$ 1,600	$ 9,400
DI	P-1010	8	921	47	$ 43,300	2	$ 790	$ 1,600	$ 44,900
DI	P-1012	8	641	47	$ 30,100	2	$ 790	$ 1,600	$ 31,700
DI	P-1014	8	295	47	$ 13,900	2	$ 790	$ 1,600	$ 15,500
DI	P-1015	8	519	47	$ 24,400	2	$ 790	$ 1,600	$ 26,000
DI	P-1016	8	301	47	$ 14,100	2	$ 790	$ 1,600	$ 15,700
DI	P-358	8	324	47	$ 15,200	2	$ 790	$ 1,600	$ 16,800
DI	P-360	8	467	47	$ 21,900	2	$ 790	$ 1,600	$ 23,500
DI	P-259	8	909	47	$ 42,700	2	$ 790	$ 1,600	$ 44,300
DI	P-339	8	471	47	$ 22,100	2	$ 790	$ 1,600	$ 23,700
DI	P-60	8	330	47	$ 15,500	2	$ 790	$ 1,600	$ 17,100
DI	P-64	8	533	47	$ 25,100	2	$ 790	$ 1,600	$ 26,700
DI	P-65	8	228	47	$ 10,700	2	$ 790	$ 1,600	$ 12,300

TABLE A-7 – (continued)

Pipe & Valve Replacement Construction Costs

Pipe Type	Pipe Model Designation	Diameter (inches)	Length (ft)	Pipe Cost ($/ft)	Pipe Replacement Cost [illegible]	No. of Valves	Valve Replacement Cost [illegible]	Total Valve Costs	Total Valve [illegible] Costs
DI	P-81	8	206	47	$ 9,700	2	$ 790	$ 1,600	$ 11,300
DI	P-82	8	478	47	$ 22,500	2	$ 790	$ 1,600	$ 24,100
DI	P-165	10	193	55	$ 10,600	2	$ 1,110	$ 2,200	$ 12,800
DI	P-378	10	859	55	$ 47,200	2	$ 1,110	$ 2,200	$ 49,400
DI	P-167	10	1,818	55	$ 100,000	6	$ 1,110	$ 6,700	$ 106,700
DI	P-224	12	425	61	$ 25,900	2	$ 1,280	$ 2,600	$ 28,500
DI	P-225	12	810	61	$ 49,400	2	$ 1,280	$ 2,600	$ 52,000
DI	P-1052	12	1,305	61	$ 79,600	4	$ 1,280	$ 5,100	$ 84,700
DI	P-123	12	259	61	$ 15,800	2	$ 1,280	$ 2,600	$ 18,400
DI	P-164	12	319	61	$ 19,500	2	$ 1,280	$ 2,600	$ 22,100
DI	P-163	12	1,257	61	$ 76,700	4	$ 1,280	$ 5,100	$ 81,800
DI	P-1051	16	390	93	$ 36,300	2	$ 3,600	$ 7,200	$ 43,500
DI	P-162	16	1,151	93	$ 107,000	2	$ 3,600	$ 7,200	$ 114,200
DI	P-168	16	2,322	93	$ 215,900	6	$ 3,600	$ 21,600	$ 237,500
DI	P-1054	16	2,168	93	$ 201,600	6	$ 3,600	$ 21,600	$ 223,200
DI	P-1055	16	2,593	93	$ 241,100	8	$ 3,600	$ 28,800	$ 269,900
DI	P-1056	16	2,533	93	$ 235,600	8	$ 3,600	$ 28,800	$ 264,400
DI	P-1057	16	1,612	93	$ 149,900	4	$ 3,600	$ 14,400	$ 164,300
DI	P-169	16	957	93	$ 89,000	2	$ 3,600	$ 7,200	$ 96,200
DI	P-170	16	1,034	93	$ 96,200	2	$ 3,600	$ 7,200	$ 103,400
PVC	P-56	8	224	40	$ 9,000	2	$ 790	$ 1,600	$ 10,600
PVC	P-83	8	221	40	$ 8,800	2	$ 790	$ 1,600	$ 10,400

TABLE A-7 – (continued)

Pipe & Valve Replacement Construction Costs

Pipe Type	Pipe Model Designation	Diameter (Inches)	Length (feet)	Pipe Cost ($/ft)	Pipe Replacement Cost (2001)	No. of Valves	Gate Valve Replacement Cost (2001)	Total Valve Costs	Total [illegible] Costs
PVC	P-84	8	567	40	$ 22,700	2	$ 790	$ 1,600	$ 24,300
PVC	P-85	8	638	40	$ 25,500	2	$ 790	$ 1,600	$ 27,100
PVC	P-5	8	306	40	$ 12,200	2	$ 790	$ 1,600	$ 13,800
PVC	P-264	8	1,132	40	$ 45,300	2	$ 790	$ 1,600	$ 46,900
PVC	P-146	8	337	40	$ 13,500	2	$ 790	$ 1,600	$ 15,100
PVC	P-175	8	393	40	$ 15,700	2	$ 790	$ 1,600	$ 17,300
PVC	P-213	8	464	40	$ 18,600	2	$ 790	$ 1,600	$ 20,200
PVC	P-214	8	298	40	$ 11,900	2	$ 790	$ 1,600	$ 13,500
PVC	P-223	8	812	40	$ 32,500	2	$ 790	$ 1,600	$ 34,100
PVC	P-319	8	763	40	$ 30,500	2	$ 790	$ 1,600	$ 32,100
PVC	P-361	8	633	40	$ 25,300	2	$ 790	$ 1,600	$ 26,900
PVC	P-362	8	218	40	$ 8,700	2	$ 790	$ 1,600	$ 10,300
PVC	P-94	8	1,108	40	$ 44,300	2	$ 790	$ 1,600	$ 45,900
PVC	P-265	8	1,196	40	$ 47,800	2	$ 790	$ 1,600	$ 49,400
PVC	P-266	8	595	40	$ 23,800	2	$ 790	$ 1,600	$ 25,400
PVC	P-267	8	269	40	$ 10,800	2	$ 790	$ 1,600	$ 12,400
PVC	P-268	8	1,799	40	$ 72,000	4	$ 790	$ 3,200	$ 75,200
PVC	P-150	8	349	40	$ 14,000	2	$ 790	$ 1,600	$ 15,600
PVC	P-151	8	373	40	$ 14,900	2	$ 790	$ 1,600	$ 16,500
PVC	P-153	8	197	40	$ 7,900	2	$ 790	$ 1,600	$ 9,500
PVC	P-154	8	314	40	$ 12,600	2	$ 790	$ 1,600	$ 14,200
PVC	P-157	8	199	40	$ 8,000	2	$ 790	$ 1,600	$ 9,600

TABLE A-7 – (continued)

Pipe & Valve Replacement Construction Costs

[illegible] Pipe Type	Pipe Model Designation	Diameter (inches)	[illegible]	Pipe Cost ($/ft)	[illegible] Replacement Cost [illegible]	No. of Valves	[illegible] Valve Replacement [illegible]	[illegible] Costs	[illegible] & Pipe Costs
PVC	P-158	8	306	40	$ 12,200	2	$ 790	$ 1,600	$ 13,800
PVC	P-320	8	539	40	$ 21,600	2	$ 790	$ 1,600	$ 23,200
PVC	P-215	8	884	40	$ 35,400	2	$ 790	$ 1,600	$ 37,000
PVC	P-217	8	631	40	$ 25,200	2	$ 790	$ 1,600	$ 26,800
PVC	P-166	10	1,557	44	$ 68,500	4	$ 1,110	$ 4,400	$ 72,900
PVC	P-86	10	1,761	44	$ 77,500	4	$ 1,110	$ 4,400	$ 81,900
PVC	P-149	10	1,374	44	$ 60,500	4	$ 1,110	$ 4,400	$ 64,900
PVC	P-212	10	338	44	$ 14,900	2	$ 1,110	$ 2,200	$ 17,100
PVC	P-299	10	434	44	$ 19,100	2	$ 1,110	$ 2,200	$ 21,300
PVC	P-137	10	477	44	$ 21,000	2	$ 1,110	$ 2,200	$ 23,200
PVC	P-142	10	785	44	$ 34,500	2	$ 1,110	$ 2,200	$ 36,700
PVC	P-317	10	447	44	$ 19,700	2	$ 1,110	$ 2,200	$ 21,900
PVC	P-318	10	503	44	$ 22,100	2	$ 1,110	$ 2,200	$ 24,300
Total			**106,019**		**$ 5,517,000**	**422**	**$ 186,000**	**$ 480,000**	**$ 5,997,000**

TABLE A-8

Original Pipe & Valve Costs

Pipe Type	Pipe Model Designation	Diameter (Inches)	Length (ft)	Adm., Cont. & Eng.	Total Replacement Cost [illegible]	Year Installed	CC Index for Year Installed	Estimated Original Cost
AC	P-47	8	1,097	$ 28,300	$ 73,800	1955	660	$ 6,600
AC	P-48	8	428	$ 11,600	$ 30,300	1955	660	$ 2,700
AC	P-49	8	261	$ 7,500	$ 19,500	1955	660	$ 1,800
AC	P-74	8	307	$ 8,600	$ 22,500	1955	660	$ 2,000
AC	P-76	8	287	$ 8,100	$ 21,200	1955	660	$ 1,900
AC	P-108	8	578	$ 15,400	$ 40,100	1960	853	$ 4,700
AC	P-286	8	313	$ 8,800	$ 22,900	1960	853	$ 2,700
AC	P-93	8	614	$ 16,300	$ 42,500	1960	853	$ 4,900
AC	P-10	8	414	$ 11,300	$ 29,500	1973	1844	$ 7,400
AC	P-11	8	359	$ 9,900	$ 25,900	1973	1844	$ 6,500
AC	P-12	8	198	$ 5,900	$ 15,400	1973	1844	$ 3,900
AC	P-15	8	304	$ 8,600	$ 22,400	1973	1844	$ 5,600
AC	P-2	8	1,263	$ 33,400	$ 87,100	1973	1844	$ 21,900
AC	P-392	8	202	$ 6,000	$ 15,700	1973	1844	$ 3,900
AC	P-393	8	314	$ 8,800	$ 23,000	1973	1844	$ 5,800
AC	P-4	8	226	$ 6,600	$ 17,200	1973	1844	$ 4,300
AC	P-6	8	287	$ 8,100	$ 21,200	1973	1844	$ 5,300
AC	P-7	8	269	$ 7,700	$ 20,100	1973	1844	$ 5,000
AC	P-199	8	542	$ 14,500	$ 37,800	1983	4569	$ 23,500
AC	P-207	8	214	$ 6,300	$ 16,500	1983	4569	$ 10,300
AC	P-88	8	446	$ 12,100	$ 31,500	1983	4569	$ 19,600

TABLE A-8 – (continued)

Original Pipe & Valve Costs

Pipe Type	Pipe Model Designation	Diameter (inches)	Length (ft)	[illegible] Tax, Cont & Eng	Total Replacement Cost ([illegible])	Year Installed	CC Index for [illegible]	[illegible] Cost
AC	P-89	8	529	$ 14,200	$ 37,000	1983	4569	$ 23,000
AC	P-91	8	270	$ 7,700	$ 20,100	1983	4569	$ 12,500
AC	P-236	8	95	$ 3,400	$ 8,800	1993	5491	$ 6,600
AC	P-237	8	484	$ 13,100	$ 34,100	1993	5491	$ 25,500
AC	P-260	8	208	$ 6,200	$ 16,100	1993	5491	$ 12,000
AC	P-261	8	613	$ 16,200	$ 42,300	1993	5491	$ 31,600
AC	P-283	8	179	$ 5,500	$ 14,300	2000	7199	$ 14,000
AC	P-284	8	183	$ 5,500	$ 14,400	2000	7199	$ 14,100
AC	P-355	8	322	$ 9,000	$ 23,500	2000	7199	$ 23,000
AC	P-356	8	345	$ 9,600	$ 25,000	2000	7199	$ 24,500
AC	P-73	8	466	$ 12,600	$ 32,800	2000	7199	$ 32,200
AC	P-75	8	368	$ 10,100	$ 26,400	2000	7199	$ 25,900
AC	P-87	10	804	$ 23,400	$ 61,000	1980	3682	$ 30,600
AC	P-126	10	685	$ 20,100	$ 52,400	1983	4569	$ 32,600
AC	P-127	10	1,482	$ 43,300	$ 112,900	1985	4568	$ 70,200
AC	P-125	12	847	$ 26,900	$ 70,200	1979	3375	$ 32,300
AC	P-128	12	287	$ 10,200	$ 26,600	1979	3375	$ 12,200
AC	P-129	12	165	$ 6,500	$ 17,000	1979	3375	$ 7,800
AC	P-130	12	203	$ 7,600	$ 19,900	1979	3375	$ 9,100
AC	P-132	12	599	$ 19,500	$ 50,900	1979	3375	$ 23,400
AC	P-221	12	168	$ 6,700	$ 17,400	1979	3375	$ 8,000

TABLE A-8 – (continued)

Original Pipe & Valve Costs

Pipe Type	Pipe Model Designation	Diameter (inches)	Length (ft)	Tax, Cont. & Engr.	Total Replacement Cost	Year Installed	CCI Index ... Installed	Estimated Original Cost
AC	P-227	12	357	$ 12,200	$ 31,900	1979	3375	$ 14,700
AC	P-228	12	559	$ 18,300	$ 47,700	1979	3375	$ 21,900
AC	P-133	12	493	$ 16,300	$ 42,600	1980	3682	$ 21,400
AC	P-124	12	491	$ 16,300	$ 42,500	1983	4569	$ 26,400
DI	P-278	8	270	$ 8,900	$ 23,200	1955	660	$ 2,100
DI	P-341	8	284	$ 9,300	$ 24,200	1955	660	$ 2,200
DI	P-342	8	736	$ 22,500	$ 58,700	1955	660	$ 5,300
DI	P-343	8	297	$ 9,700	$ 25,300	1955	660	$ 2,300
DI	P-386	8	376	$ 12,000	$ 31,300	1955	660	$ 2,800
DI	P-387	8	583	$ 18,000	$ 47,000	1955	660	$ 4,200
DI	P-310	8	138	$ 5,000	$ 13,100	1960	853	$ 1,500
DI	P-315	8	546	$ 17,000	$ 44,300	1960	853	$ 5,100
DI	P-338	8	272	$ 8,900	$ 23,300	1960	853	$ 2,700
DI	P-340	8	84	$ 3,400	$ 8,900	1960	853	$ 1,000
DI	P-345	8	121	$ 4,500	$ 11,800	1960	853	$ 1,400
DI	P-348	8	1,073	$ 32,300	$ 84,300	1960	853	$ 9,800
DI	P-349	8	1,200	$ 37,000	$ 96,600	1960	853	$ 11,200
DI	P-350	8	292	$ 9,500	$ 24,800	1960	853	$ 2,900
DI	P-351	8	683	$ 20,900	$ 54,600	1960	853	$ 6,300
DI	P-1	8	187	$ 6,500	$ 16,900	1973	1844	$ 4,200
DI	P-240	8	411	$ 13,000	$ 33,900	1973	1844	$ 8,500
DI	P-241	8	409	$ 12,900	$ 33,700	1973	1844	$ 8,500

TABLE A-8 – (continued)

Original Pipe & Valve Costs

Pipe Type	Pipe Model Designation	Diameter (inches)	Length [illegible]	[illegible] & Eng.	Replacement [illegible]	Year Installed	[illegible] Installed	Original [illegible]
DI	P-242	8	651	$ 20,000	$ 52,200	1973	1844	$ 13,100
DI	P-247	8	300	$ 9,800	$ 25,500	1973	1844	$ 6,400
DI	P-248	8	141	$ 5,100	$ 13,300	1973	1844	$ 3,300
DI	P-26	8	586	$ 18,100	$ 47,200	1973	1844	$ 11,900
DI	P-28	8	817	$ 24,900	$ 64,900	1973	1844	$ 16,300
DI	P-29	8	561	$ 17,400	$ 45,400	1973	1844	$ 11,400
DI	P-302	8	315	$ 10,200	$ 26,600	1973	1844	$ 6,700
DI	P-303	8	369	$ 11,700	$ 30,600	1973	1844	$ 7,700
DI	P-31	8	115	$ 4,400	$ 11,400	1973	1844	$ 2,900
DI	P-32	8	375	$ 11,900	$ 31,100	1973	1844	$ 7,800
DI	P-33	8	721	$ 22,100	$ 57,600	1973	1844	$ 14,500
DI	P-394	8	776	$ 23,700	$ 61,800	1973	1844	$ 15,500
DI	P-43	8	508	$ 15,800	$ 41,300	1973	1844	$ 10,400
DI	P-44	8	523	$ 16,300	$ 42,500	1973	1844	$ 10,700
DI	P-140	8	873	$ 26,500	$ 69,100	1979	3375	$ 31,800
DI	P-69	8	435	$ 13,700	$ 35,700	1980	3682	$ 17,900
DI	P-198	8	461	$ 14,500	$ 37,800	1983	4569	$ 23,500
DI	P-229	8	296	$ 9,600	$ 25,100	1983	4569	$ 15,600
DI	P-279	8	667	$ 20,400	$ 53,300	1983	4569	$ 33,200
DI	P-312	8	532	$ 16,500	$ 43,100	1983	4569	$ 26,800
DI	P-313	8	251	$ 8,300	$ 21,700	1983	4569	$ 13,500
DI	P-314	8	401	$ 12,700	$ 33,100	1983	4569	$ 20,600

TABLE A-8 – (continued)

Original Pipe & Valve Costs

Pipe Type	Pipe Model Designation	Diameter (inches)	Length (ft)	Pav. Cont. & Eng. [illegible]		Total Replacement Cost (2001)		Year Installed	[illegible] Index for Year Installed	[illegible] Original Cost	
DI	P-316	8	243	$	8,100	$	21,100	1983	4569	$	13,100
DI	P-325	8	371	$	11,800	$	30,800	1983	4569	$	19,200
DI	P-357	8	1,280	$	39,400	$	102,800	1983	4569	$	64,000
DI	P-376	8	416	$	13,200	$	34,400	1983	4569	$	21,400
DI	P-377	8	252	$	8,300	$	21,700	1983	4569	$	13,500
DI	P-380	8	671	$	20,600	$	53,700	1983	4569	$	33,400
DI	P-381	8	244	$	8,100	$	21,200	1983	4569	$	13,200
DI	P-388	8	407	$	12,900	$	33,600	1983	4569	$	20,900
DI	P-46	8	829	$	25,200	$	65,800	1983	4569	$	40,900
DI	P-70	8	745	$	22,700	$	59,300	1983	4569	$	36,900
DI	P-95	8	338	$	10,900	$	28,400	1983	4569	$	17,700
DI	P-96	8	287	$	9,400	$	24,500	1983	4569	$	15,200
DI	P-135	8	427	$	13,500	$	35,200	1985	4568	$	21,900
DI	P-141	8	283	$	9,300	$	24,200	1985	4568	$	15,100
DI	P-321	8	226	$	7,600	$	19,800	1985	4568	$	12,300
DI	P-322	8	327	$	10,600	$	27,600	1985	4568	$	17,200
DI	P-385	8	875	$	26,500	$	69,200	1985	4568	$	43,100
DI	P-1000	8	795	$	24,200	$	63,200	1990	4937	$	42,500
DI	P-379	8	257	$	8,500	$	22,200	1990	4937	$	14,900
DI	P-101	8	328	$	10,600	$	27,600	1993	5491	$	20,600
DI	P-102	8	367	$	11,700	$	30,500	1993	5491	$	22,800
DI	P-103	8	523	$	16,300	$	42,500	1993	5491	$	31,800

TABLE A-8 – (continued)

Original Pipe & Valve Costs

Pipe Type	Pipe Model Designation	Diameter (inches)	Length (ft)	Tax, Cont. & Eng. [illegible]	Replacement Cost (2000)	Year Installed	[illegible] for Year Installed	Original Cost
DI	P-104	8	653	$ 20,100	$ 52,400	1993	5491	$ 39,200
DI	P-105	8	114	$ 4,400	$ 11,400	1993	5491	$ 8,500
DI	P-1001	8	845	$ 25,700	$ 67,000	1995	5854	$ 53,400
DI	P-1002	8	638	$ 19,600	$ 51,200	1995	5854	$ 40,800
DI	P-1003	8	404	$ 12,800	$ 33,400	1995	5854	$ 26,600
DI	P-1004	8	729	$ 22,300	$ 58,200	1995	5854	$ 46,400
DI	P-1005	8	174	$ 6,100	$ 15,900	1995	5854	$ 12,700
DI	P-1006	8	352	$ 11,200	$ 29,300	1995	5854	$ 23,400
DI	P-1007	8	320	$ 10,300	$ 26,900	1995	5854	$ 21,400
DI	P-1008	8	302	$ 9,800	$ 25,600	1995	5854	$ 20,400
DI	P-1009	8	167	$ 5,800	$ 15,200	1995	5854	$ 12,100
DI	P-1010	8	921	$ 27,900	$ 72,800	1995	5854	$ 58,000
DI	P-1012	8	641	$ 19,700	$ 51,400	1995	5854	$ 41,000
DI	P-1014	8	295	$ 9,600	$ 25,100	1995	5854	$ 20,000
DI	P-1015	8	519	$ 16,200	$ 42,200	1995	5854	$ 33,600
DI	P-1016	8	301	$ 9,800	$ 25,500	1995	5854	$ 20,300
DI	P-358	8	324	$ 10,400	$ 27,200	1995	5854	$ 21,700
DI	P-360	8	467	$ 14,600	$ 38,100	1995	5854	$ 30,400
DI	P-259	8	909	$ 27,500	$ 71,800	1999	6956	$ 68,000
DI	P-339	8	471	$ 14,700	$ 38,400	1999	6956	$ 36,400
DI	P-60	8	330	$ 10,600	$ 27,700	2000	7199	$ 27,200
DI	P-64	8	533	$ 16,600	$ 43,300	2000	7199	$ 42,500

TABLE A-8 – (continued)

Original Pipe & Valve Costs

[illegible] Pipe Type	Pipe Model Designation	Diameter (inches)	Length (ft)	[illegible] Tax, Cont & Eng	Total Replacement Cost [illegible]	Year Installed	CCI Index for Year [illegible]	[illegible] Cost
DI	P-65	8	228	$ 7,600	$ 19,900	2000	7199	$ 19,500
DI	P-81	8	206	$ 7,000	$ 18,300	2000	7199	$ 17,900
DI	P-82	8	478	$ 15,000	$ 39,100	2000	7199	$ 38,300
DI	P-165	10	193	$ 8,000	$ 20,800	1983	4569	$ 12,900
DI	P-378	10	859	$ 30,700	$ 80,100	1983	4569	$ 49,800
DI	P-167	10	1,818	$ 66,300	$ 173,000	1990	4937	$ 116,300
DI	P-224	12	425	$ 17,700	$ 46,200	1980	3682	$ 23,200
DI	P-225	12	810	$ 32,300	$ 84,300	1980	3682	$ 42,300
DI	P-1052	12	1,305	$ 52,600	$ 137,300	1983	4569	$ 85,400
DI	P-123	12	259	$ 11,400	$ 29,800	1983	4569	$ 18,500
DI	P-164	12	319	$ 13,700	$ 35,800	1983	4569	$ 22,300
DI	P-163	12	1,257	$ 50,800	$ 132,600	1989	4731	$ 85,400
DI	P-1051	16	390	$ 27,000	$ 70,500	1983	4569	$ 43,900
DI	P-162	16	1,151	$ 71,000	$ 185,200	1992	5223	$ 131,700
DI	P-168	16	2,322	$ 147,600	$ 385,100	1992	5223	$ 274,000
DI	P-1054	16	2,168	$ 138,700	$ 361,900	2001	7342	$ 361,900
DI	P-1055	16	2,593	$ 167,700	$ 437,600	2001	7342	$ 437,600
DI	P-1056	16	2,533	$ 164,300	$ 428,700	2001	7342	$ 428,700
DI	P-1057	16	1,612	$ 102,100	$ 266,400	2001	7342	$ 266,400
DI	P-169	16	957	$ 59,800	$ 156,000	2001	7342	$ 156,000
DI	P-170	16	1,034	$ 64,300	$ 167,700	2001	7342	$ 167,700
PVC	P-56	8	224	$ 6,600	$ 17,200	1955	660	$ 1,500

TABLE A-8 – (continued)

Original Pipe & Valve Costs

Pipe Type	Pipe Model Designation	Diameter (inches)	Length (ft)	Tax, Cont. & Eng.		Total Replacement Cost (2001)		Year Installed	CCI for Year Installed	Original Cost	
PVC	P-83	8	221	$	6,500	$	16,900	1955	660	$	1,500
PVC	P-84	8	567	$	15,100	$	39,400	1955	660	$	3,500
PVC	P-85	8	638	$	16,800	$	43,900	1955	660	$	3,900
PVC	P-5	8	306	$	8,600	$	22,400	1973	1844	$	5,600
PVC	P-264	8	1,132	$	29,100	$	76,000	1980	3682	$	38,100
PVC	P-146	8	337	$	9,400	$	24,500	1983	4569	$	15,200
PVC	P-175	8	393	$	10,800	$	28,100	1983	4569	$	17,500
PVC	P-213	8	464	$	12,600	$	32,800	1983	4569	$	20,400
PVC	P-214	8	298	$	8,400	$	21,900	1983	4569	$	13,600
PVC	P-223	8	812	$	21,200	$	55,300	1983	4569	$	34,400
PVC	P-319	8	763	$	20,000	$	52,100	1983	4569	$	32,400
PVC	P-361	8	633	$	16,700	$	43,600	1983	4569	$	27,100
PVC	P-362	8	218	$	6,400	$	16,700	1983	4569	$	10,400
PVC	P-94	8	1,108	$	28,500	$	74,400	1983	4569	$	46,300
PVC	P-265	8	1,196	$	30,700	$	80,100	1985	4568	$	49,800
PVC	P-266	8	595	$	15,800	$	41,200	1985	4568	$	25,600
PVC	P-267	8	269	$	7,700	$	20,100	1985	4568	$	12,500
PVC	P-268	8	1,799	$	46,700	$	121,900	1985	4568	$	75,800
PVC	P-150	8	349	$	9,700	$	25,300	1990	4937	$	17,000
PVC	P-151	8	373	$	10,300	$	26,800	1990	4937	$	18,000
PVC	P-153	8	197	$	5,900	$	15,400	1990	4937	$	10,400
PVC	P-154	8	314	$	8,800	$	23,000	1990	4937	$	15,500

TABLE A-8 – (continued)

Original Pipe & Valve Costs

Pipe Type	Pipe Model [illegible]	Diameter (Inches)	Length [illegible]	[illegible] Tax, Cont & Eng [illegible]	Total Replacement Cost [illegible]	Year Installed	CCI [illegible]	[illegible]
PVC	P-157	8	199	$ 6,000	$ 15,600	1990	4937	$ 10,500
PVC	P-158	8	306	$ 8,600	$ 22,400	1990	4937	$ 15,100
PVC	P-320	8	539	$ 14,400	$ 37,600	1990	4937	$ 25,300
PVC	P-215	8	884	$ 23,000	$ 60,000	1995	5854	$ 47,800
PVC	P-217	8	631	$ 16,700	$ 43,500	1998	6745	$ 40,000
PVC	P-166	10	1,557	$ 45,300	$ 118,200	1980	3682	$ 59,300
PVC	P-86	10	1,761	$ 50,900	$ 132,800	1980	3682	$ 66,600
PVC	P-149	10	1,374	$ 40,300	$ 105,200	1983	4569	$ 65,500
PVC	P-212	10	338	$ 10,600	$ 27,700	1983	4569	$ 17,200
PVC	P-299	10	434	$ 13,200	$ 34,500	1983	4569	$ 21,500
PVC	P-137	10	477	$ 14,400	$ 37,600	1985	4568	$ 23,400
PVC	P-142	10	785	$ 22,800	$ 59,500	1985	4568	$ 37,000
PVC	P-317	10	447	$ 13,600	$ 35,500	1985	4568	$ 22,100
PVC	P-318	10	503	$ 15,100	$ 39,400	1985	4568	$ 24,500
Total			**106,019**	**$ 3,727,000**	**$ 9,724,000**			**$ 6,136,000**

HYDRANTS & PRESSURE RELIEF VALVES

Hydrant and PRV Costs

According to City staff there are 213 hydrants owned and maintained by the City and per the WSCP there are 6 pressure relief valves (PRVs). The construction cost to install a hydrant is $2,770 per hydrant and the construction cost to install a PRV is estimated at $25,000 per PRV. Installation dates are not available for either hydrants or PRVs and therefore this analysis uses the weighted average year of 1983 calculated for all installed pipe lengths as the installation year for all hydrants and PRVs.

Table A-9 shows the total original cost to install 213 hydrants of $476,000 and Table A-10 shows the total original cost to install 6 PRVs of $151,000.

TABLE A-9

Original Hydrant Costs

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1983	213	$ 2,770	$ 590,000	$ 175,300	$ 765,300	4,569	$ 476,000

(1) No engineering costs are added to hydrant installation costs.

(2) Original cost is calculated by multiplying the replacement cost by the ratio of the CC index from 1983 of 4,569 divided by the CC index from January of 2002 of 7,342.

TABLE A-10

Original PRV Costs

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
PRV	6	$ 25,000	$ 150,000	$ 93,200	$ 243,200	4,569	$ 151,000

(1) The total cost of taxes, contingencies, and engineering are based on tax rate of 8.1%, a contingency factor of 20% and engineering factor of 25%.

(2) Original cost is calculated by multiplying the replacement cost by the ratio of the CC index from 1983 of 4,569 divided by the CC index from January of 2002 of 7,342.

Hydrant & PRV Costs that Benefit Future Customers

100% of all hydrant and PRV costs will benefit future customers since hydrants provide fire protection and PRV's are necessary to safely operate the water system.

COMPLETED CAPITAL IMPROVEMENT PROJECTS

Original Capital Improvement Costs

Some of the capital improvement projects specified in the WSCP have been completed since the writing of the plan. Since existing customers paid for these costs they need to be added to the existing facility component of the GFC. Completed capital improvement projects identified in the WSCP are installation of the chlorine monitoring system, the Pioneer Grandview 8-inch loop, Bayridge Avenue water main, and the SR16 transmission.

The total cost of the chlorine monitoring system is $18,000, the cost for the Bayridge water main is $90,886, and the cost for the Pioneer/Grandview loop is $14,080. The SR16 transmission main crossing was funded from developers and the City. At this time the total cost paid for by the City is unavailable therefore the cost is assumed to be the estimated cost of the City's share in the WSCP of $120,000.

TABLE A-11

Completed Capital Improvement Projects from the WSCP

Completed Capital Improvement Projects	Total Cost
Chlorine Monitoring System	$ 18,000
Pioneer Grandview 8" Loop	14,080
SR16 Transmission Main Crossing	120,000
Bayridge Ave. Water Main Installation	90,886
Total	**$ 242,966**

Completed Capital Improvement Projects Costs that Benefit Future Customers

All projects listed in Table A-11 benefit both existing and future customers. Therefore, the entire amount of $242,966 will benefit future customers and is included in the existing facility component of the GFC.

APPENDIX B

ACRUED INTEREST CHARGES

This appendix documents the derivation of the 10 years of accrued interest charges associated with existing facilities that were funded by debt and included in the existing facility component of the GFC. Note that the water utility does not currently have any outstanding debt on facilities that have been included in this GFC.

The process to determine 10 years of accumulated interest charges for facilities that will benefit future customers and were debt funded is as follows:

1. Identify each facility that has been debt funded and is included in the GFC as benefiting future customers (Table B-1)

2. Identify accumulated interest charges over the first ten years for each debt issue used to fund existing facilities that are included in the GFC as benefiting future customers (summarized in Table B-8)

3. Calculate the percentage of each debt that is associated with funding existing facilities that will benefit future customers (Table B-9)

4. Calculate ten years of accumulated interest charges, only associated with the cost of existing facilities included in the GFC (Table B-9)

City ordinances were reviewed and Table B-1 shows existing water facilities that were funded by debt and the amount of debt issued.

TABLE B-1

Debt Issues Used to Fund Existing Facilities Included in the GFC

[illegible]	[illegible]	[illegible]
1948 Revenue Bond	Harbor Hts No. 1 tank & Original Dist. System	$ 120,000
1973 Revenue Bond	East tank, Harbor Hts, No.2 tank, and 3,000 ft. of 8-inch Pipe	$ 90,000
1978 Revenue Bond	Shurgard tank, Well No. 3, & 6,000 ft. of 10 & 12-inch Pipe	$ 220,000
1985 Revenue Bond[(1)]	Shurgard tank, Well No. 3, & 6,000 ft. of 10 & 12-inch Pipe	$ 740,000

(1) The 1985 Revenue Bonds refunded all of the 1978 Revenue Bonds and therefore financed the same facilities.

BOND DEBT INTEREST CHARGES

All debts associated with existing facilities that have been included in the existing facility component of the GFC are revenue bond debts and are documented in Bond Issue Ordinances No.s 16, 170, 278, and 468.

Revenue Bonds (1948) Issue Ordinance No. 16

The 1948 Revenue Bonds funded construction of the original water system that included construction of the Harbor Heights No. 1 tank. Table B-2 shows the total accumulated interest charges over the first ten years of $39,800, The interest rate for the 1948 Bonds was a uniform 2% semi annual rate, the bonds totaling $120,000 were issued December 1, 1949 and the maturity dates and amounts for the first ten years are as listed in Table B-2.

TABLE B-2

Ten Years of Interest Charges for the 1948 Revenue Bonds

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
June	1949	$ 120,000	$ -	2%	$ 2,400
Dec	1949	$ 120,000	$ -	2%	$ 2,400
June	1950	$ 120,000	$ -	2%	$ 2,400
Dec	1950	$ 117,000	$ 3,000	2%	$ 2,400
June	1951	$ 114,000	$ 3,000	2%	$ 2,340
Dec	1951	$ 111,000	$ 3,000	2%	$ 2,280
June	1952	$ 108,000	$ 3,000	2%	$ 2,220
Dec	1952	$ 105,000	$ 3,000	2%	$ 2,160
June	1953	$ 102,000	$ 3,000	2%	$ 2,100
Dec	1953	$ 99,000	$ 3,000	2%	$ 2,040
June	1954	$ 96,000	$ 3,000	2%	$ 1,980
Dec	1954	$ 93,000	$ 3,000	2%	$ 1,920
June	1955	$ 90,000	$ 3,000	2%	$ 1,860
Dec	1955	$ 87,000	$ 3,000	2%	$ 1,800
June	1956	$ 84,000	$ 3,000	2%	$ 1,740
Dec	1956	$ 81,000	$ 3,000	2%	$ 1,680
June	1957	$ 78,000	$ 3,000	2%	$ 1,620
Dec	1957	$ 75,000	$ 3,000	2%	$ 1,560
June	1958	$ 71,000	$ 4,000	2%	$ 1,500
Dec	1958	$ 67,000	$ 4,000	2%	$ 1,420
Total					**$ 39,800**

(1) Interest charges are calculated by multiplying the interest rate for a given year by the total outstanding principal balance from the previous year.

Revenue Bonds (1973) Issue Ordinance No. 170

The 1973 Revenue Bonds funded construction of the East tank and Harbor Heights No. 2 tank in addition to other miscellaneous piping. Table B-3 shows the total accumulated interest charges over the first ten years of $46,200. The interest rate for the 1948 bonds was a uniform 5.625% annual rate, the bonds totaling $90,000 were issued November 1, 1973, and the maturity dates and amounts for the first ten years are as listed in Table B-3.

TABLE B-3

Ten Years of Interest Charges for the 1948 Revenue Bonds

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Dec	1974	$ 90,000	$ -	5.625%	$ 5,484
Dec	1975	$ 90,000	$ -	5.625%	$ 5,063
Dec	1976	$ 90,000	$ -	5.625%	$ 5,063
Dec	1977	$ 90,000	$ -	5.625%	$ 5,063
Dec	1978	$ 85,000	$ 5,000	5.625%	$ 5,063
Dec	1979	$ 79,000	$ 6,000	5.625%	$ 4,781
Dec	1980	$ 73,000	$ 6,000	5.625%	$ 4,444
Dec	1981	$ 67,000	$ 6,000	5.625%	$ 4,106
Dec	1982	$ 60,000	$ 7,000	5.625%	$ 3,769
Dec	1983	$ 53,000	$ 7,000	5.625%	$ 3,375
Total					**$ 46,200**

(1) The first year interest charge is based on 13 months since the effective bond issuance date is from November of the previous year. Subsequent year's interest charges are calculated by multiplying the interest rate for a given year by the total outstanding principal balance from the previous year.

Revenue Bonds (1978) Issue Ordinance No. 278

The 1978 Revenue Bonds totaling $220,000 funded construction of the Shurgard tank along with other facilities not included in this GFC. The 1978 Revenue Bonds were refunded by 1985 Revenue Bonds on December 1st, 1985. The 1978 Revenue Bonds were issued on April 1st, 1978 and therefore interest associated with the 1978 Revenue Bonds only accumulated for 7.8 years, from April 1st, 1978 to December 15th, 1985, before the debt was refunded by the 1985 Bonds. Additionally, due to the early refunding, no debt principal for the 1978 Bonds was retired as shown by the first bond maturity date of 1989. Therefore since no debt principal was retired, the total interest charged over the first 7 years and 9.5 months can be calculated by multiplying the associated interest rate by the bond amount and then multiplying by 7.8 years. Table B-4 shows the total accumulated interest charges over the first 7.8 years of $107,600.

TABLE B-4

7.8 Years of Interest Charges for the 1948 Revenue Bonds (April 1, 1978 to December 15, 1985)

[illegible]	[illegible]	[illegible]	[illegible]
1989	$ 10,000	6.000%	$ 4,680
1990	$ 10,000	6.000%	$ 4,680
1991	$ 10,000	6.000%	$ 4,680
1992	$ 15,000	6.250%	$ 7,313
1993	$ 15,000	6.250%	$ 7,313
1994	$ 15,000	6.250%	$ 7,313
1995	$ 15,000	6.250%	$ 7,313
1996	$ 15,000	6.250%	$ 7,313
1997	$ 15,000	6.250%	$ 7,313
1998	$ 20,000	6.375%	$ 9,945
1999	$ 20,000	6.375%	$ 9,945
2000	$ 20,000	6.375%	$ 9,945
2001	$ 20,000	6.375%	$ 9,945
2002	$ 20,000	6.375%	$ 9,945
Total	**$ 220,000**		**$ 107,600**

Revenue Bonds (1985) Issue Ordinance No. 468

The 1985 Revenue Bonds with a total principal of $740,000 were issued December 15th, 1985 and refunded 100% of the $220,000 in outstanding 1978 Bonds and several other unrelated bonds. Since 7.8 years of interest has already been included for the Shurgard tank under the 1978 Bonds, only 2.2 additional years are eligible to be included under RCW 35.92.025. However, the 1985 Bonds started retiring debt principal in 1986 and because there are different interest rates associated with each bond maturity date, separate calculations are required to calculate the interest charge for each year in question. Therefore, Table B-5 shows the total interest charge for December 15th, 1985 to December 15th, 1986. Table B-6 shows the total interest charge for December 15th, 1986 to December 15th, 1987. Table B-7 shows the total interest charge for December 15th, 1987 to March 1st, 1987. The time period from December 15th, 1985 to March 1st, 1987 represents the additional 2.2 years of interest charges for the Shurgard tank that added to the 7.8 years of interest charges for the 1978 Bond total the allowed ten years of interest. Note that bonds maturing in 1986 are removed in Table B-6 and bonds maturing in 1986 and 1987 are removed in Table B-7.

TABLE B-5

One Year of Interest Charges for the 1985 Revenue Bonds (December 15, 1985 to December 15, 1986)

[illegible]	[illegible]	[illegible]	[illegible]
1986	$ 40,000	6.25%	$ 2,500
1987	$ 40,000	6.75%	$ 2,700
1988	$ 45,000	7.25%	$ 3,263
1989	$ 50,000	7.50%	$ 3,750
1990	$ 50,000	8.00%	$ 4,000
1991	$ 55,000	8.20%	$ 4,510
1992	$ 60,000	8.40%	$ 5,040
1993	$ 65,000	8.60%	$ 5,590
1994	$ 70,000	8.80%	$ 6,160
1995	$ 35,000	9.00%	$ 3,150
1996	$ 40,000	9.20%	$ 3,680
1997	$ 40,000	9.40%	$ 3,760
1998	$ 45,000	9.60%	$ 4,320
1999	$ 50,000	9.75%	$ 4,875
2000	$ 55,000	9.75%	$ 5,363
Total	$ 740,000		$ 62,700

TABLE B-6

One Year of Interest Charges for the 1985 Revenue Bonds (December 15, 1986 to December 15, 1987)

[illegible]	[illegible]	[illegible]	[illegible]
1987	$ 40,000	6.75%	$ 2,700
1988	$ 45,000	7.25%	$ 3,263
1989	$ 50,000	7.50%	$ 3,750
1990	$ 50,000	8.00%	$ 4,000
1991	$ 55,000	8.20%	$ 4,510
1992	$ 60,000	8.40%	$ 5,040
1993	$ 65,000	8.60%	$ 5,590
1994	$ 70,000	8.80%	$ 6,160
1995	$ 35,000	9.00%	$ 3,150
1996	$ 40,000	9.20%	$ 3,680
1997	$ 40,000	9.40%	$ 3,760

TABLE B-6 – (continued)

One Year of Interest Charges for the 1985 Revenue Bonds (December 15, 1986 to December 15, 1987)

[illegible]	[illegible]	[illegible]	[illegible]
1998	$ 45,000	9.60%	$ 4,320
1999	$ 50,000	9.75%	$ 4,875
2000	$ 55,000	9.75%	$ 5,363
Total	$ 700,000		$ 60,200

TABLE B-7

0.2 Years of Interest Charges for the 1985 Revenue Bonds (December 15, 1987 to March 1, 1988)

[illegible]	[illegible]	[illegible]	[illegible]
1988	$ 45,000	7.25%	$ 653
1989	$ 50,000	7.50%	$ 750
1990	$ 50,000	8.00%	$ 800
1991	$ 55,000	8.20%	$ 902
1992	$ 60,000	8.40%	$ 1,008
1993	$ 65,000	8.60%	$ 1,118
1994	$ 70,000	8.80%	$ 1,232
1995	$ 35,000	9.00%	$ 630
1996	$ 40,000	9.20%	$ 736
1997	$ 40,000	9.40%	$ 752
1998	$ 45,000	9.60%	$ 864
1999	$ 50,000	9.75%	$ 975
2000	$ 55,000	9.75%	$ 1,073
Total	$ 660,000		$ 11,500

Table B-8 shows a summary of ten years of accumulated interest charges for all bond issues used to finance existing facilities included in the GFC as benefiting future customers.

TABLE B-8

Summary of Ten Years of Accumulated Interest Charges for Debt Funded Existing Facilities that Benefit Future Customers

[illegible]	[illegible]	[illegible]
1948 Revenue Bond	Harbor Hts No. 1 Tank	$ 39,800
1973 Revenue Bond	East & Harbor Hts No.2 Tanks	$ 46,200
1978 Revenue Bond	Shurgard Tank	$107,600 [1]
1985 Revenue Bond	Shurgard Tank	$134,400[1]
Total		**$328,000**

(1) Note that only 7.8 years and 2.2 years of accumulated interest are included for these two debts since the 1985 Bond refunded the 1978 Bond before ten years had passed

The final step is to determine the amount of total interest for each debt summarized in Table B-8 that is associated with the existing facilities also listed in Table B-8 since as previously discussed these revenue bonds funded additional facilities that are not part of this GFC analysis.

The percentage of the 1948 Bonds associated with facilities included in the GFC is 21%. This percentage is calculated by dividing the amount of the original cost of the Harbor Heights No. 1 tank that is included in the GFC of $24,600 divided by the total amount of bonds issued of $120,000. Since only 91% of 320 zone storage will benefit future customers, only 19% (91% of 21%) of interest associated with the 1998 bond is included.

The 1973 Bonds of $90,000 and a $47,600 grant were used to help finance the construction of the East tank, Harbor Heights No. 2 tank, and 3,000 feet of 8-inch pipe. The total estimated original cost for the two reservoirs is $216,000 (from Table A-4). The estimated original cost to install 3,000 feet of pipe (assumed to be AC/PVC) is $120,000 in 2001 dollars ($40/lf from Table D-1 multiplied by 3,000 feet). This cost of $120,000 in 2001 dollars is the converted into a cost of $30,100 in 1973 dollars using a deflation factor based on a CC index of 7,342 for 2001 and 1,844 for 1973. Therefore, the estimated original cost of the entire project is $246,100 ($216,000 + $30,100) and the two reservoirs represented 88% of the total cost of the project ($216,000/$246,100). Therefore, 88% of the interest associated with the 1973 Bonds is assumed to be associated with the two reservoirs and since only 91% of the reservoirs will benefit future customers, only 80% (91% * 88%) of the accumulated interest from the 1973 Bonds are included in the GFC.

The 1978 Bonds issued a total debt of $220,000 that was used along with total grant funds of $164,316 to construct the Shurgard tank, Well No. 3, and miscellaneous piping. According to City records, the total cost of the project was $401,000. Therefore, the

Shurgard tank which from Table A-4 has an estimated original cost of $262,000 represented 65% of the total project cost of $401,000 and therefore 65% of the 1978 Revenue Bonds are assumed to be associated with constructing the Shurgard tank. Since only 94% of the cost of the Shurgard tank is estimated to benefit future customers, only 94% of interest charges associated with the Shurgard tank are included, or 61% (94% * 65%).

The 1985 Bonds of $740,000 refunded all of the $220,000 1978 Bonds in addition to refunding other bonds. Therefore 30% of the 1985 Bonds are associated with refunding the 1978 Bonds ($220,000/$740,000). As previously determined, only 61% of the 1978 Bonds are associated with existing facilities that benefit future customers, therefore the total percentage of the 1985 Bonds associated with facilities that will benefit future customers is 18%, or 61% of 30%.

Table B-9 summarizes the percentage of each debt issue related to funding the total cost of existing facilities that will benefit future customers. Table B-9 also shows the total amount of 10 years of accumulated interest charges of $134,000 that is included in the GFC. Ten years of accumulated interest is calculated by multiplying the respective percentage of each bond that is associated with funding existing facilities that well benefit future customers by the total amount of interest over ten years for each bond as summarized in Table B-8.

TABLE B-9

Ten Years of Accumulated Interest Charges Included in the GFC

[illegible]	[illegible]	[illegible]	[illegible]
1948 Revenue Bond	Harbor Hts No. 1 Tank	19%	$ 7,600
1973 Revenue Bond	East & Harbor Hts No.2 Tanks	80%	$ 37,000
1978 Revenue Bond	Shurgard Tank	61%	$ 65,600
1985 Revenue Bond	Shurgard Tank	18%	$ 24,200
Total	**Total**		**$134,000**

(1) These percentages are as outlined in the above section.

(2) The total interest cost included in the GFC is calculated by multiplying the respective percentages in this table by the respective total accumulated interest over ten years as listed in Table B-8.

APPENDIX C

FUTURE FACILITY COMPONENTS OF THE GFC

This appendix documents the derivation of the cost per ERU calculated for the planned capital improvements as specified in the WSCP and planned to be constructed within the next ten years. Table C-1 shows the capital improvements listed in the six-year plan in the WSCP. The years planned for Projects No. 7, 8, and 14 have been changed from 2001 as specified in the WSCP to 2002 at the direction of City staff. Costs in the year planned have been estimated by inflating the year 2000 costs to 2001 costs using CCI indexes and costs have been adjusted from 2001 to the year planned using an annual inflation rate of 3%.

Projects No. 3, 9, and 13 are not included in the GFC as benefiting future customers because they merely replace existing components (without increasing capacity) that are already included in the cost of existing facilities included in the GFC. Projects No. 1, 4, 5, and 6 are not included in the future facility component because they have already been completed and therefore are accounted for in the existing facility component of the proposed GFC. All other projects listed in Table C-1 are included in the GFC because they increase fireflow capacity, install new piping, enhance water quality, or improve system operations which benefit future as well as existing customers.

TABLE C-1

Future Facility Component of the GFC[1]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	Chlorine Monitoring System	$ 25,000	2000	$ 25,000	(4)
2	Telemetry SCADA System Improvements	100,000	2001	102,000	Y
3	AC Pipe Replacement Program	100,000	2001	102,000	N
4	Pioneer Grandview 8" Loop	60,000	2000	60,000	(4)
5	Bayridge AVE. Water Main Installation	160,000	2000	160,000	(4)
6	SR16 Transmission Crossing	120,000	2000	120,000	(4)
7	Skansie/72nd Str. 12" Loop[1]	285,000	2002	299,000	Y
8	Equipping of Well No. 6[1]	250,000	2002	263,000	Y
9	Emergency Replacement of Well No. 5 Pump	75,000	2000	75,000	N
10	Rushmore 8" Upsize	275,000	2002	289,000	Y
11	28th Ave. NW 12" Loop	102,000	2003	110,000	Y
12	Replace Harborview/WWTP Water Main	36,000	2005	41,000	Y
13	Replacement of Well No. 3 Pump	75,000	2000	75,000	N
14	Woodworth Water Main Extension[1]	200,000	2002	210,000	Y
Total		$ 1,863,000		$1,931,000	

(1) The projects listed in this table are from the WSCP.

(2) The planned year for project No. 7, 8, and 14 have been changed from the year 2001 to 2002 at the direction of the City.

(3) Costs in the year planned are estimated by inflating costs from the year 2000 to 2001 using CCI values of 7,342 (Avg. 2001 CCI) and 7,199 (Avg. 2000 CCI), and an annual inflation rate of 3% for adjusting costs from the year 2001 to the year planned.

(4) These projects have been completed and are accounted for in the existing facility component of the proposed GFC. See Appendix A for more discussion of these projects.

Table C-2 shows the planned capital improvement projects that benefit future customers and therefore have been included in the future facility component of the GFC. Also shown in Table C-2 is the number of ERUs each project will benefit.

Project No. 2, Telemetry SCADA System Improvements, benefits all existing and future customers since it improves the operational control of all sources of supplies and storage facilities. Project Nos. 7, 10, and 11 install larger pipes to increase fireflow capacity, which also benefits all existing and future customers. Project No. 12, replace Harborview/WWTP Water Main, replaces 600 feet of existing 8-inch and 10-inch pipe with 10-inch pipe. Even though part of the project does increase capacity, to be conservative the entire project is assumed to benefit both existing and future customers. Project No. 14, Woodworth Water Main Extension, installs new pipe that will both serve existing customers and future customers. The existing customers are within the City's service area, however they are currently supplied water by an adjacent water purveyor (Washington Water Company). Therefore, all of the aforementioned projects are considered to benefit both existing and future customers and therefore the number of ERUs benefiting is the total number of customers in the year of 2019 of 5,148.

The number of ERUs benefiting from the equipping of well No. 6 is calculated by determining the number of ERUs that the well is capable of serving on a peak day. The well is planned to provide an average pumping capacity of 1,000 gpm. If the well is run 18 hours during a peak day, it is capable of producing 1,080,000 gallons. Assuming an average lost an unaccounted water rate of 7%, well No. 6 will provide 1,004,400 gallons (1,080,000*93%) of water at customer taps. Per the WSCP an ERU consumes 314 gpd on an average day. Therefore, using an average day to peak day conversion factor of 2.2, an ERU will consume 691 gpd on a peak day (2.2*314 gpd). Therefore, well No. 6 can serve 1,454 ERUs on a peak day (1,004,400 gallons / 691 gpd per ERU). Table C-2 shows the resulting cost per ERU for all future facilities that will benefit future customers.

TABLE C-2

Future Facility Component of the GFC

Project No.	[illegible] Supply Improvement Projects	Cost [illegible]	Customers Benefiting	Cost Per ERU
2	Telemetry SCADA System Improvements	$ 102,000	5,148	$ 20
7	Skansie/72nd St. 12" Loop	$ 299,000	5,148	$ 58
8	Equipping of Well No. 6	$ 263,000	1,454	$ 181
10	Rushmore 8" Upsize	$ 289,000	5,148	$ 56
11	28th Ave. NW 12" Loop	$ 110,000	5,148	$ 21
12	Replace Harborview/WWTP Water Main	$ 41,000	5,148	$ 8
14	Woodworth Water Main Extension	$ 210,000	5,148	$ 41
Total(1)		**$ 1,314,000**		**$ 390**

(1) The total cost per ERU of $390 has been rounded to the nearest ten dollars.

APPENDIX D

PIPE, VALVE, & HYDRANT COSTS

This appendix documents the pipe, valve, and hydrant costs used to value the existing transmission system in Appendix A. Cost estimates are developed using the RS Means Facility Cost Index (1999) and adjusted for the Tacoma Washington area. Tables D-1 through D-11 document pipe, valve, and hydrant costs derived using the RS Means Facility Index. Since data from the RS Means Facility Cost Index are in 1999 dollars, all costs have been adjusted to 2001 costs using an average CCI of 7,342 for the year 2001 and an average CCI for the year 1999 of 6,956. Table D-1 shows a summary of the pipe, valve, and hydrant costs from the RS Means Facility Cost Index and the resulting costs when inflated to 2001 dollars.

TABLE D-1

Summary of Pipe, Valve, and Hydrant Costs

[illegible]	[illegible]	[illegible]	[illegible]
DI 8-inch	$ 44.24	1.055	$ 47.00
DI 10-inch	$ 52.58	1.055	$ 55.00
DI 12-inch	$ 58.21	1.055	$ 61.00
DI 16-inch	$ 88.22	1.055	$ 93.00
AC/PVC 8-inch	$ 38.30	1.055	$ 40.00
AC/PVC 8-inch	$ 41.77	1.055	$ 44.00
AC/PVC 8-inch	$ 45.75	1.055	$ 48.00
AC/PVC 8-inch	$ 60.48	1.055	$ 64.00
Gate Valve 8-inch	$ 752.78	1.055	$ 790
Gate Valve 8-inch	$ 1,052.35	1.055	$ 1,110
Gate Valve 8-inch	$ 1,216.90	1.055	$ 1,280
Butterfly Valve 16-inch	$ 3,396.00	1.055	$ 3,600

(1) These costs are as listed in Tables D-2 through D-11.

(2) The CCI adjustment factor is based on the average CC index form 2001 of 7,342 divided by the average CC index in 1999 of 6,956.

(3) Final pipe costs have been rounded to the nearest dollar, gate valves to the nearest ten dollars, and butterfly valves to the nearest 100 dollars.

TABLE D-2

Ductile Iron 8-Inch Pipe Cost Estimate

Materials	[illegible]	[illegible]	Quantity (CY/LF)	Price	[illegible]	Cost (1999 Dollars)
Ductile Iron	022-254-0060	Excavation	135	$ 4.84	$ 5.48	$ 739.65
	022-254-3020	Backfill	80	$ 1.93	$ 2.18	$ 174.78
	022-254-1900	Compaction	80	$ 4.11	$ 4.65	$ 372.20
	026-666-3040	**8" D.I. Pipe**	300	$ 19.20	$ 21.73	$ 6,520.32
	026-666-8040	8" Dia. Bend	1	$300.00	$339.60	$ 339.60
	026-012-0100	Bedding	50	$ 27.50	$ 31.13	$ 1,556.50
	022-266-0560	Hauling	50	$ 19.85	$ 22.47	$ 1,123.51
		Sawcutting	600	$ 2.00	$ 2.00	$ 1,200.00
		AC Pavement (TN)	19	$ 40.00	$ 40.00	$ 760.00
		CSTC (TN)	27	$ 18.00	$ 18.00	$ 486.00
Total						**$13,272.56**
Cost Per LF						**$ 44.24**

TABLE D-3

Ductile Iron 10-Inch Pipe Cost Estimate

[illegible] Materials	[illegible]	[illegible]	Quantity (CY/LF)	[illegible] Price	[illegible]	Cost [illegible]
Ductile Iron	022-254-0060	Excavation	135	$ 4.84	$ 5.48	$ 739.65
	022-254-3020	Backfill	90	$ 1.93	$ 2.18	$ 196.63
	022-254-1900	Compaction	90	$ 4.11	$ 4.65	$ 418.73
	026-666-3060	**10" D.I. Pipe**	300	$ 27.00	$ 30.56	$ 9,169.20
	026-666-8060	10" Dia. Bend	1	$345.00	$390.54	$ 390.54
	026-012-0100	Bedding	45	$ 27.50	$ 31.13	$ 1,400.85
	022-266-0560	Hauling	45	$ 19.85	$ 22.47	$ 1,011.16
		Sawcutting	600	$ 2.00	$ 2.00	$ 1,200.00
		AC Pavement (TN)	19	$ 40.00	$ 40.00	$ 760.00
		CSTC (TN)	27	$ 18.00	$ 18.00	$ 486.00
Total						**$15,772.75**
Cost Per LF						**$ 52.58**

TABLE D-4

Ductile Iron 12-Inch Pipe Cost Estimate

Material	Index	[illegible]	Quantity (CY/LF)	[illegible]	Price [illegible]	[illegible] Dollars
Ductile Iron	022-254-0060	Excavation	160	$ 4.84	$ 5.48	$ 876.62
	022-254-3020	Backfill	115	$ 1.93	$ 2.18	$ 251.25
	022-254-1900	Compaction	115	$ 4.11	$ 4.65	$ 535.04
	026-666-3080	**12" D.I. Pipe**	300	$ 30.50	$ 34.53	$10,357.80
	026-666-8080	12" Dia. Bend	1	$515.00	$582.98	$ 582.98
	026-012-0100	Bedding	45	$ 27.50	$ 31.13	$ 1,400.85
	022-266-0560	Hauling	45	$ 19.85	$ 22.47	$ 1,011.16
		Sawcutting	600	$ 2.00	$ 2.00	$ 1,200.00
		AC Pavement (TN)	19	$ 40.00	$ 40.00	$ 760.00
		CSTC (TN)	27	$ 18.00	$ 18.00	$ 486.00
Total						**$17,461.70**
Cost Per LF						**$ 58.21**

TABLE D-5

Ductile Iron 16-Inch Pipe Cost Estimate

[illegible] Material	[illegible]	[illegible]	Quantity (CY/LF)	[illegible]	[illegible]	[illegible]
Ductile Iron	022-254-0060	Excavation	195	$ 4.84	$ 5.48	$ 1,068.38
	022-254-3020	Backfill	120	$ 1.93	$ 2.18	$ 262.17
	022-254-1900	Compaction	120	$ 4.11	$ 4.65	$ 558.30
	026-666-3120	**16" D.I. Pipe**	300	$ 52.50	$ 59.43	$17,829.00
	026-666-8120	16" Dia. Bend	1	$840.00	$950.88	$ 950.88
	026-012-0100	Bedding	60	$ 27.50	$ 31.13	$ 1,867.80
	022-266-0560	Hauling	60	$ 19.85	$ 22.47	$ 1,348.21
		Sawcutting	600	$ 2.00	$ 2.00	$ 1,200.00
		AC Pavement (TN)	21	$ 40.00	$ 40.00	$ 840.00
		CSTC (TN)	30	$ 18.00	$ 18.00	$ 540.00
Total						**$26,464.75**
Cost Per LF						**$ 88.22**

TABLE D-6

Asbestos Concrete & PVC 8-Inch Pipe Cost Estimate

Material	[illegible]	Title	[illegible]	Price [illegible]	Price [illegible]	[illegible]
PVC & AC	022-254-0060	Excavation	135	$ 4.84	$ 5.48	$ 739.65
	022-254-3020	Backfill	80	$ 1.93	$ 2.18	$ 174.78
	022-251900	Compaction	80	$ 4.11	$ 4.65	$ 372.20
	026-678-2210	**8" PVC/AC Pipe**	300	$ 13.95	$ 15.79	$ 4,737.42
	026-666-8040	8" Dia. Bend	1	$300.00	$339.60	$ 339.60
	026-012-0100	Bedding	50	$ 27.50	$ 31.13	$ 1,556.50
	022-266-0560	Hauling	50	$ 19.85	$ 22.47	$ 1,123.51
		Sawcutting	600	$ 2.00	$ 2.00	$ 1,200.00
		AC Pavement (TN)	19	$ 40.00	$ 40.00	$ 760.00
		CSTC (TN)	27	$ 18.00	$ 18.00	$ 486.00
Total						**$11,489.66**
Cost Per LF						**$ 38.30**

TABLE D-7

Asbestos Concrete & PVC 10-Inch Pipe Cost Estimate

Material	[illegible]	[illegible]	Quantity [illegible]	[illegible]	[illegible]	[illegible]
PVC & AC	022-254-0060	Excavation	135	$ 4.84	$ 5.48	$ 739.65
	022-254-3020	Backfill	90	$ 1.93	$ 2.18	$ 196.63
	022-254-1900	Compaction	90	$ 4.11	$ 4.65	$ 418.73
	026-678-1040	**10" PVC/AC Pipe**	300	$ 17.45	$ 19.75	$ 5,926.02
	026-666-8060	10" Dia. Bend	1	$345.00	$390.54	$ 390.54
	026-012-0100	Bedding	45	$ 27.50	$ 31.13	$ 1,400.85
	022-266-0560	Hauling	45	$ 19.85	$ 22.47	$ 1,011.16
		Sawcutting	600	$ 2.00	$ 2.00	$ 1,200.00
		AC Pavement (TN)	19	$ 40.00	$ 40.00	$ 760.00
		CSTC (TN)	27	$ 18.00	$ 18.00	$ 486.00
Total						**$12,529.57**
Cost Per LF						**$ 41.77**

TABLE D-8

Asbestos Concrete & PVC 12-Inch Pipe Cost Estimate

Material	Index#	[illegible]	Quantity [illegible]	Price	Price [illegible]	Cost [illegible]
PVC & AC	022-254-0060	Excavation	160	$ 4.84	$ 5.48	$ 876.62
	022-254-3020	Backfill	115	$ 1.93	$ 2.18	$ 251.25
	022-254-1900	Compaction	115	$ 4.11	$ 4.65	$ 535.04
	026-678-1050	**12" PVC/AC Pipe**	300	$ 19.50	$ 22.07	$ 6,622.20
	026-666-8080	12" Dia. Bend	1	$515.00	$582.98	$ 582.98
	026-012-0100	Bedding	45	$ 27.50	$ 31.13	$ 1,400.85
	022-266-0560	Hauling	45	$ 19.85	$ 22.47	$ 1,011.16
		Sawcutting	600	$ 2.00	$ 2.00	$ 1,200.00
		AC Pavement (TN)	19	$ 40.00	$ 40.00	$ 760.00
		CSTC (TN)	27	$ 18.00	$ 18.00	$ 486.00
Total						**$13,726.10**
Cost Per LF						**$ 45.75**

TABLE D-9

Asbestos Concrete & PVC 16-Inch Pipe Cost Estimate

[illegible] Material	[illegible]	[illegible]	Quantity (CY/LF)	[illegible] Price	[illegible] Price [illegible]	[illegible] Cost ([illegible] Dollars)
PVC & AC	022-254-0060	Excavation	195	$ 4.84	$ 5.48	$ 1,068.38
	022-254-3020	Backfill	120	$ 1.93	$ 2.18	$ 262.17
	022-254-1900	Compaction	120	$ 4.11	$ 4.65	$ 558.30
	026-678-3040	**16" PVC/AC Pipe**	300	$ 28.00	$ 31.70	$ 9,508.80
	026-666-8120	16" Dia. Bend	1	$840.00	$950.88	$ 950.88
	026-012-0100	Bedding	60	$ 27.50	$ 31.13	$ 1,867.80
	022-266-0560	Hauling	60	$ 19.85	$ 22.47	$ 1,348.21
		Sawcutting	600	$ 2.00	$ 2.00	$ 1,200.00
		AC Pavement (TN)	21	$ 40.00	$ 40.00	$ 840.00
		CSTC (TN)	30	$ 18.00	$ 18.00	$ 540.00
Total						**$18,144.55**
Cost Per LF						**$ 60.48**

TABLE D-10

Hydrant Cost Estimate

Material	Index #	Title	Quantity	Unit Price	Cost	Cost [illegible]
Hydrants	026-454-2080	5 1/4" Valve Depth 4'-0"	1	$1,175.00	$1,175.00	$1,330.10
	026-404-3814	6" Gate Valve With Box	1	$ 510.00	$ 510.00	$ 577.32
	(1)	8" or 12" X 6" Tee	1	$ 605.00	$ 605.00	$ 684.86
	022-254-3020	Backfill	2.5	$ 1.93	$ 4.83	$ 5.46
	022-054-0060	Excavation	2.5	$ 4.84	$ 12.10	$ 13.70
	022-254-1900	Compaction	2.5	$ 4.11	$ 10.28	$ 11.63
Total						**$2,623.07**

TABLE D-11

Valve Cost Estimate

[illegible]	[illegible]	Size	Quantity	[illegible]	[illegible]
Gate Valve	026-404-3816	8-Inch	1	$ 665.00	$ 752.78
Gate Valve	026-404-3818	10-Inch	1	$ 929.64	$1,052.35
Gate Valve	026-404-3820	12-Inch	1	$1,075.00	$1,216.90
Butterfly Valve w/Box	026-404-3400	16-Inch	1	$3,000.00	$3,396.00