

AN EXERCISE IN DEVELOPING A USER RATE AND FEE SYSTEM

The following series of worksheets were developed to aid those local governments that own and operate water and/or sewer enterprises in defining an adequate user rate that will recover all costs of operations and maintenance, long term capital needs and debt service. Sample worksheets are provided as a model. Each worksheet is fairly self-explanatory; however, listed below are brief instructions that outline each worksheet. You may refer to these if necessary. The worksheets were designed to progressively build upon each other, with latter worksheets calling for data generated by earlier worksheets. These worksheets are available from the Division of Local Government as computer spreadsheet files or from <http://www.dlg.oem2.state.co.us/tech/WFEESYTM.HTM>.

Worksheet 1 is a capital inventory list--a separate list each for water and sewer systems. Underneath each line is a description of what information is required. For example, question number one asks you to enter the **number of miles of collection lines** and then multiply that by the **cost per mile**. Enter the result of that calculation on this line. Then enter the **remaining life** on the line to the right of that answer. Continue to fill in the other blanks like this. You should have a good idea when replacement may occur. Try to use available data from your auditor or your best estimate to determine remaining life of each capital item.

Worksheet 2 shows capital improvement requirements for the next five years which may have been tabulated on worksheet 1. The revenues generated as a direct result of capital improvements will be projected five years also. Under each **project description**, you may list up to three items per year. **Totals** (project) is the total of all projections for each year. Under **revenues** you must list various fees, bond proceeds, transfer funds, or taxes that need to be used in computing the **total capital portion user fee revenues**. The **totals** (revenue) line is the accumulated amount of revenue necessary to be collected per year.

Worksheet 3 shows costs of operations, administration and debt service and related general revenues projected for each of the next five years. User charges will be calculated here, so they are not listed in the revenue section. The operation and maintenance expenses are divided into four subdivisions: personnel, administrative, operations, and debt service. Under **personnel** are costs for staff, FICA, insurance, overtime, pensions, and other related costs. Under the **administrative** heading are blanks for the board expense, consultant, administrative supplies, training, membership, and other related costs. Under the **operations** heading are testing, permit, fuel, chemicals, and other miscellaneous costs. Each section is concluded by adding all the numbers and placing the result on the **subtotal** line. The **total O & M** line is the result of adding the three subtotals for each year. The **debt service** section details what type of loans (new and existing) and payments the system requires. The **total cost of service** is the result of adding **debt service** to **total O & M**. The **revenues** section determines the amount of funding to be generated through user charges. (The spreadsheet version of this document totals these figures automatically.)

Worksheet 4 employs the calculations from the other worksheets to compute the most equitable user charge for inside city users. Each year should be calculated independently so that customers and board members will know when rates need to be raised and by what amount. The first thing this worksheet does is determine the number of equivalent 5/8" taps. Then rates are computed for metered customers. Line IV, A, 3 allows you to calculate a cost per cubic foot, if applicable. Next, the uniform volume rate plus service charge is calculated by multiplying each the **5/8" service charge** by the **volume equivalency ratio** to determine the appropriate **service charge**. Then compute rates for unmetered customers. This section follows the same convention as that for the metered customers; however, the **equivalency ratio** is multiplied by a **5/8" unit rate** which yields an annual charge. There is one sample copy of this worksheet with data filled in for your reference.

Worksheets 5 & 6 can be used when calculating sewer plant investment fees and rates for outside-city customers. (5) System Buy-in method 1 - Enter the original cost, accumulated depreciation, and net investment (present value of investment) for the plant, pumping stations, the collection systems and the general structures. Add each of the columns and enter those numbers on the **total** line. Accumulated depreciation should be available from your auditor. System Buy-in method 2 - Follow the same instructions as for method 1, except be sure to compute net equity investment instead of outstanding debt. Incremental cost pricing method 1 - First, estimate annual water volume billed for a customer with a 5/8" tap. A regulator can require that a gain or other reduction of net allowable costs be given to customers over future periods. That would be accomplished, for rate-making purposes, by amortizing the gain or other reduction of net allowable costs over those future periods and reducing rates to reduce revenues in approximately the amount of the amortization. If a gain or other reduction of net allowable costs is to be amortized over future periods for rate-making purposes, the regulated enterprise shall not recognize that gain or other reduction of net allowable costs in income of the current period. Instead, it shall record it as a liability for future reductions of charges to customers that are expected to result. Compute **annual revenue** by multiplying the entry on number one by 12. Obtain both **projected O & M** and **total system revenue requirement** from worksheet 3. Incremental cost pricing method 2 - Enter estimated cost of future expansion required to serve new customers. Determine average daily capacity of the expansion.

(6) Wholesale or outside city rates are applicable when service is provided to customers outside the boundaries of the municipality or district that owns and operates the utility. These customers are considered to be non-equity users of the system and, therefore, are generally assessed a higher fee for service. Under **method A** compute wholesale or outside charges, by multiplying the **fixed charge-inside** by the **multiple** (the number entered on question two) to get the fixed charge-outside, and multiply the **volume charge-inside** by the **multiple** to get the volume charge-outside. This helps determine both the fixed and volume charge for outside customers. Under **method B** determine the proportion of users that are outside the city. First enter the estimated outside volume amount and divide it by the total billable volume and write that number on the **ratio** line.

Worksheet 7 is used to calculate pollutant surcharge rates. Pollutant Surcharge Rates are applicable when identifiable customers discharge wastewater having concentrations of pollutant(s) significantly greater than would be found in domestic (residential) wastewater. They are also applicable when identifiable customers discharge the pollutant(s) that require special treatment provisions. Recently, many utilities have been requiring pretreatment of these pollutants by the customer. Surcharge rates for each pollutant can be developed using the four-step method on the worksheet. First determine the annual volume of pollutant to be treated by calculating the **unit cost per pound**. That number is then used in calculating both the **allowable loading** and **surchargeable loading** of the pollutant. Then by multiplying the **surchargeable loading** amount and the **unit cost** the revenue this will generate can be forecasted.

Worksheet 8 is used to calculate waste control charges. Industrial Waste Control Charges are applicable when a utility has required heavy pollutant discharges to provide a certain level of pretreatment before discharging to the system. These fees are intended to recover the costs of monitoring, sampling and administering the pretreatment program. If only a few discharges are subject to the pretreatment program, the costs of monitoring and sampling can be billed directly to the appropriate customer. When a utility serves a large number of customers that pretreat prior to discharging to the system, the costs of the IWC program can be allocated as indicated on the worksheet. The number of **5/8" taps** must be first determined. The number of customers is multiplied by the **volume equivalency ratio**. Then sum the total number of equivalent 5/8" taps. To compute the **5/8" unit rate** we multiply **estimated cost** by **total 5/8" taps** needed. Then multiply the **5/8" unit rate** by the **volume equivalency ratio** to determine the **IWC charge**.

Contact the **Division of Local Government** for assistance in calculating user rates and fees.

WATER CAPITAL INVENTORY

I. COLLECTION LINES

_____	_____
(# of miles x cost per mile)	(remaining life)

II. DISTRIBUTION LINES

_____	_____
(# of miles x cost per mile)	(remaining life)

III. TREATMENT PLAN

_____	_____
(replacement cost)	(remaining life)

IV. RESERVOIR (major dredging, lining, dam reconstruction, etc.)

_____	_____
(replacement cost)	(remaining life)

V. WATER TANK

_____	_____
(replacement cost)	(remaining life)

VI. WELLS/PUMPS

_____	_____
(replacement cost)	(remaining life)

VII. DITCHES

_____	_____
(replacement cost)	(remaining life)

VIII. MAJOR EQUIPMENT (Backhoe, Trucks, etc.)

_____	_____
(replacement cost)	(remaining life)

SEWER CAPITAL INVENTORY

I. COLLECTION LINES

(# of miles x cost per mile)

(remaining life)

II. TREATMENT PLANT

(replacement cost)

(remaining life)

III. LAGOONS
(major dredging, lining, reconstruction, etc.)

(replacement cost)

(remaining life)

IV. LIFT STATIONS

(replacement cost)

(remaining life)

V. MAJOR EQUIPMENT
(Backhoe, Trucks, Aerators, etc.)

(replacement cost)

(remaining life)

CAPITAL IMPROVEMENT REQUIREMENT

Water _____ Sewer _____

Capital Needs
(Summarize projected costs by Year of Project Initiation)

PROJECT DESCRIPTION	1998	1999	Year 2000	2001	2002
Collection Lines					
1.					
2.					
3.					
Distribution Lines					
1.					
2.					
3.					
Treatment Plant					
1.					
2.					
3.					
Reservoir					
1.					
2.					
3.					
Water Tank					
1.					
2.					
3.					
Wells/Pumps					
1.					
2.					
3.					
Ditches					
1.					
2.					
3.					
Major Equipment (Backhoe, Trucks, etc.)					
1.					
2.					
3.					

CAPITAL IMPROVEMENT REQUIREMENT

PROJECT DESCRIPTION	1998	1999	Year 2000	2001	2002
Lift Stations					
1.					
2.					
3.					
Lagoons (major dredging, lining, reconstruction, etc.)					
1.					
2.					
3.					
Meters, Services & Administration					
1.					
2.					
3.					
Source of Supply (water rights, adjudication, etc.)					
1.					
2.					
TOTALS					
REVENUES					
1. Beginning Balance					
2. Plant Investment Fees					
3. Grants _____					
4. New Revenue Bond Proceeds					
5. New G.O. Bond Proceeds					
6. New Lease/Purchase Proceeds					
7. Transfer from O&M Fund					
8. Property Tax					
9. Specific Ownership Tax					
10. Other					
11. TOTALS					
(Total Expenses)	-	(Total Revenues)	=	(Total Capital Portion User Fee Revenues)	

CALCULATION OF THE TOTAL SYSTEM REVENUE REQUIREMENT

Water _____ Sewer _____

COST OF SERVICE REQUIREMENT	1998	1999	Year 2000	2001	2002
Operation & Maintenance Expenses:					
PERSONNEL					
1. Office Staff					
2. Public Works Staff					
3. FICA					
4. Health Insurance					
5. Workman's Comp.					
6. Overtime					
7. Pension					
8. Other					
9. Subtotal					
ADMINISTRATIVE					
10. Board Expense					
11. Publication Expense					
12. Consultant					
13. Audit					
14. Legal					
15. Admin. Supplies					
16. Surety/Liability Insurance					
17. Training					
18. Membership/Dues					
19. Mileage					
20. Postage					
21. Telephone					
22. Utilities					
23. County Treas. Fees					
24. Subtotal					
OPERATIONS					
25. Testing					
26. Permit					
27. Repairs and Maint. - System					
28. Repairs and Maint. - Plant					
29. Repairs and Maint. - Vehicles					
30. Fuel					
31. Chemicals					
32. Equip./Supplies					
33. Utilities					
34. Other					
35. Subtotal					
36. Total O & M					

CALCULATION OF THE TOTAL SYSTEM REVENUE REQUIREMENT

COST OF SERVICE REQUIREMENT	1998	1999	Year 2000	2001	2002
DEBT SERVICE					
37. Current Principal Payment					
38. Current Interest Payment					
39. New Principal					
40. New Interest					
41. Current Lease Payments					
42. Reserve Fund					
43. Total Current Capital Cost					
44. TOTAL COST OF SERVICE					
Revenues					
1. Beginning Balance					
2. Property Taxes					
3. Availability of Service Fees					
4. Sales Taxes					
5. Tap and Inspection Fees					
6. Sale of Supplies					
7. Maps and Publications					
8. Interest Income					
9. Delinquency Payments					
10. Specific Ownership Tax					
11. Other					
12. TOTAL REVENUES					

(Total Cost of Service)	-	(Total Revenues)	=	(Total Oper. & Maint. User Fee Revenues)
(Total O & M User Fee Revenues)	+	(Total Current Capital Portion User Fee Revenues)	=	(Total User Fee Revenues)

CALCULATING WATER USER FEES

I. Compute Number of Equivalent 5/8" Taps

Tap Size	Number of Customers		Volume Equivalency Ratio	=	Equivalent 5/8" Taps
5/8"	900	x	1.00	=	900
3/4"	0	x	1.50	=	0
1"	20	x	2.50	=	50
1 1/2"	30	x	5.00	=	150
2"	25	x	8.00	=	200
3"	25	x	16.00	=	400
TOTAL	<u>1,000</u>				<u>1,700</u>

II. Project Billable Volume

Projected volume of water billed (including growth in gallons) 160,000,000

III. Determine Total Revenue Required from Rates

(last item on worksheet #3) \$303,500

Enter variable costs (worksheet #3) \$64,400

IV. Compute Rates For Metered Customers

A. Uniform Volume Rate

1.	<u>\$303,500</u> <small>(Revenue Required from Rates)</small>	/	<u>160,000,000</u> <small>(Projected Billable Volume)</small>	=	<u>\$0.0019</u> <small>(Cost Per Gallon)</small>
2.	<u>\$0.0019</u> <small>(Cost Per Gallon)</small>	x	1000	=	<u>\$1.90</u> <small>(Cost Per 1000 Gallons)</small>
3.	<u>\$0.0019</u> <small>(Cost Per Gallon)</small>	x	7.48	=	<u>\$0.0142</u> <small>(Cost Per Ccf)</small>

* 1 Cu. Ft. water = 7.48 gallons

B. Uniform Volume Rate Plus Service Charge

1. Service Charge

a.	<u>\$303,500</u> <small>(Revenue Required from Rates)</small>	-	<u>\$64,400.00</u> <small>(Variable Costs)*</small>	=	<u>\$239,100.00</u> <small>(Fixed Costs)</small>
b.	<u>\$239,100.00</u> <small>(Fixed Costs)</small>	/	<u>1,700</u> <small>(5/8" Equivalent Taps)</small>	=	<u>\$140.65</u> <small>(5/8" Service Charge)</small>
c.	<u>\$140.65</u> <small>(5/8" Service Charge)</small>	x	1.5 <small>(3/4" Equivalency Ratio)</small>	=	<u>\$210.97</u> <small>(3/4" Service Charge)</small>

* Variable costs can include utilities, repairs, fuel, supplies, etc. which may change from year to year.

CALCULATING WATER USER FEES

<u>\$140.65</u> <small>(5/8" Service Charge)</small>	x	<u>2.5</u> <small>(1" Equivalency Ratio)</small>	=	<u>\$351.62</u> <small>(1" Service Charge)</small>
<u>\$140.65</u> <small>(5/8" Service Charge)</small>	x	<u>5</u> <small>(1 1/2" Equivalency Ratio)</small>	=	<u>\$703.24</u> <small>(1 1/2" Service Charge)</small>
<u>\$140.65</u> <small>(5/8" Service Charge)</small>	x	<u>8</u> <small>(2" Equivalency Ratio)</small>	=	<u>\$1,125.18</u> <small>(2" Service Charge)</small>
<u>\$140.65</u> <small>(5/8" Service Charge)</small>	x	<u>16</u> <small>(3" Equivalency Ratio)</small>	=	<u>\$2,250.35</u> <small>(3" Service Charge)</small>

2. Uniform Volume Rate

a. <u>\$64,400.00</u> <small>(Variable Costs)*</small>	/	<u>160,000,000</u> <small>(Projected Billable Volume)</small>	=	<u>\$0.0004</u> <small>(Cost Per Gallon)</small>
b. <u>\$0.0004</u> <small>(Cost Per Gallon)</small>	x	<u>1000</u>	=	<u>\$0.40</u> <small>(Cost Per 1000 Gallons)</small>
c. <u>\$0.0004</u> <small>(Cost Per Gallon)</small>	x	<u>7.48</u>	=	<u>\$0.0030</u> <small>(Cost Per Ccf)</small>

V. Compute Rates for Unmetered Customers

a. <u>\$303,500</u> <small>(Revenue Required from Rates)</small>	/	<u>1,700</u> <small>(5/8" Equivalent Taps)</small>	=	<u>\$178.53</u> <small>(5/8" Unit Rate)</small>
b. <u>\$178.53</u> <small>(5/8" Unit Rate)</small>	x	<u>1.5</u> <small>(3/4" Equivalency Ratio)</small>	=	<u>\$267.79</u> <small>(3/4" Annual Charge)</small>
<u>\$178.53</u> <small>(5/8" Unit Rate)</small>	x	<u>2.5</u> <small>(1" Equivalency Ratio)</small>	=	<u>\$446.32</u> <small>(1" Annual Charge)</small>
<u>\$178.53</u> <small>(5/8" Unit Rate)</small>	x	<u>5</u> <small>(1 1/2" Equivalency Ratio)</small>	=	<u>\$892.65</u> <small>(1 1/2" Annual Charge)</small>
<u>\$178.53</u> <small>(5/8" Unit Rate)</small>	x	<u>8</u> <small>(2" Equivalency Ratio)</small>	=	<u>\$1,428.24</u> <small>(2" Annual Charge)</small>
<u>\$178.53</u> <small>(5/8" Unit Rate)</small>	x	<u>16</u> <small>(3" Equivalency Ratio)</small>	=	<u>\$2,856.47</u> <small>(3" Annual Charge)</small>

CALCULATING WATER USER FEES

I. Compute Number of Equivalent 5/8" Taps

Tap Size	Number of Customers	Volume Equivalency Ratio	Equivalent 5/8" Taps
5/8"	x	1.00	=
3/4"	x	1.50	=
1"	x	2.50	=
1 1/2"	x	5.00	=
2"	x	8.00	=
3"	x	16.00	=
TOTAL			

II. Project Billable Volume

Projected volume of water billed (including growth in gallons) _____

III. Determine Total Revenue Required from Rates

(last item on worksheet #3) _____

Enter variable costs (worksheet #3) _____

IV. Compute Rates For Metered Customers

A. Uniform Volume Rate

1.	_____ / _____ = _____
	<small>(Revenue Required from Rates) (Projected Billable Volume) (Cost Per Gallon)</small>
2.	_____ x 1000 = _____
	<small>(Cost Per Gallon) (Cost Per 1000 Gallons)</small>
3.	_____ x 7.48 = _____
	<small>(Cost Per Gallon) (Cost Per Ccf)</small>

* 1 Cu. Ft. water = 7.48 gallons

B. Uniform Volume Rate Plus Service Charge

1. Service Charge

a.	_____ - _____ = _____
	<small>(Revenue Required from Rates) (Variable Costs)* (Fixed Costs)</small>
b.	_____ / _____ = _____
	<small>(Fixed Costs) (5/8" Equivalent Taps) (5/8" Service Charge)</small>
c.	_____ x 1.5 = _____
	<small>(5/8" Service Charge) (3/4" Equivalency Ratio) (3/4" Service Charge)</small>

* Variable costs can include utilities, repairs, fuel, supplies, etc. which may change from year to year.

CALCULATING SEWER USER FEES

I. Compute Number of Equivalent 5/8" Taps

Tap Size	Number of Customers	Volume Equivalency Ratio	Equivalent 5/8" Taps
5/8"	x	1.00	=
3/4"	x	1.50	=
1"	x	2.50	=
1 1/2"	x	5.00	=
2"	x	8.00	=
3"	x	16.00	=
TOTAL			

II. Project Billable Volume

Projected volume of water billed (including growth in gallons) _____

III. Determine Total Revenue Required from Rates

(last item on worksheet #3) _____

Enter variable costs (from worksheet #3) _____

IV. Compute Rates For Metered Customers

A. Uniform Volume Rate

1.	$\frac{\text{____}}{\text{(Revenue Required from Rates)}}$	/	$\frac{\text{____}}{\text{(Projected Billable Volume)}}$	=	____
	(Cost Per Gallon)		1000	=	(Cost Per 1000 Gallons)
	x		7.48	=	(Cost Per Ccf)

* 1 Cu. Ft. water = 7.48 gallons

B. Uniform Volume Rate Plus Service Charge

1. Service Charge

a.	$\text{____} - \text{____}$	=	____		
	(Revenue Required from Rates)	-	(Variable Costs)*		
	(Fixed Costs)	=	(Fixed Costs)		
b.	$\frac{\text{____}}{\text{(Fixed Costs)}}$	/	$\frac{\text{____}}{\text{(5/8" Equivalent Taps)}}$	=	____
	(Fixed Costs)		(5/8" Equivalent Taps)		(5/8" Service Charge)

* Variable costs can include utilities, repairs, fuel, supplies, etc. which may change from year to year.

CALCULATING SEWER USER FEES

c.
$$\frac{\text{_____}}{\text{(5/8" Service Charge)}} \times \frac{1.5}{\text{(3/4" Equivalency Ratio)}} = \frac{\text{_____}}{\text{(3/4" Service Charge)}}$$

$$\frac{\text{_____}}{\text{(5/8" Service Charge)}} \times \frac{2.5}{\text{(1" Equivalency Ratio)}} = \frac{\text{_____}}{\text{(1" Service Charge)}}$$

$$\frac{\text{_____}}{\text{(5/8" Service Charge)}} \times \frac{5}{\text{(1 1/2" Equivalency Ratio)}} = \frac{\text{_____}}{\text{(1 1/2" Service Charge)}}$$

$$\frac{\text{_____}}{\text{(5/8" Service Charge)}} \times \frac{8}{\text{(2" Equivalency Ratio)}} = \frac{\text{_____}}{\text{(2" Service Charge)}}$$

$$\frac{\text{_____}}{\text{(5/8" Service Charge)}} \times \frac{16}{\text{(3" Equivalency Ratio)}} = \frac{\text{_____}}{\text{(3" Service Charge)}}$$

2. Uniform Volume Rate

a.
$$\frac{\text{_____}}{\text{(Variable Costs)*}} \div \frac{\text{_____}}{\text{(Projected Billable Volume)}} = \frac{\text{_____}}{\text{(Cost Per Gallon)}}$$
b.
$$\frac{\text{_____}}{\text{(Cost Per Gallon)}} \times 1000 = \frac{\text{_____}}{\text{(Cost Per 1000 Gallons)}}$$
c.
$$\frac{\text{_____}}{\text{(Cost Per Gallon)}} \times 7.48 = \frac{\text{_____}}{\text{(Cost Per Ccf)}}$$

V. Compute Rates for Unmetered Customers

a.
$$\frac{\text{_____}}{\text{(Revenue Required from Rates)}} \div \frac{\text{_____}}{\text{(5/8" Equivalent Taps)}} = \frac{\text{_____}}{\text{(5/8" Unit Rate)}}$$
b.
$$\frac{\text{_____}}{\text{(5/8" Unit Rate)}} \times \frac{1.5}{\text{(3/4" Equivalency Ratio)}} = \frac{\text{_____}}{\text{(3/4" Annual Charge)}}$$

$$\frac{\text{_____}}{\text{(5/8" Unit Rate)}} \times \frac{2.5}{\text{(1" Equivalency Ratio)}} = \frac{\text{_____}}{\text{(1" Annual Charge)}}$$

$$\frac{\text{_____}}{\text{(5/8" Unit Rate)}} \times \frac{5}{\text{(1 1/2" Equivalency Ratio)}} = \frac{\text{_____}}{\text{(1 1/2" Annual Charge)}}$$

$$\frac{\text{_____}}{\text{(5/8" Unit Rate)}} \times \frac{8}{\text{(2" Equivalency Ratio)}} = \frac{\text{_____}}{\text{(2" Annual Charge)}}$$

$$\frac{\text{_____}}{\text{(5/8" Unit Rate)}} \times \frac{16}{\text{(3" Equivalency Ratio)}} = \frac{\text{_____}}{\text{(3" Annual Charge)}}$$

CALCULATION OF PLANT INVESTMENT FEES - SEWER UTILITY

A. System Buy-In Method 1

1. Compute net investment in plant facilities*

	Original Cost		Accumulated Depreciation		Net Investment
Source of Supply	\$3,000,000		\$800,000		\$2,200,000
Treatment & Pumping	\$5,000,000		\$1,400,000		\$3,600,000
Transmission System	\$3,000,000		\$600,000		\$2,400,000
General Structures	\$1,000,000		\$200,000		\$800,000
Total	\$12,000,000	-	\$3,000,000	=	\$9,000,000

2. Determine portion of outstanding debt related to these facilities

\$7,000,000

3. Compute Total Net Equity Investment (Subtract Line 2 from Line 1)

\$2,000,000

4. Determine number of 5/8" equivalent customers (from worksheet 4)

1,700

5. Compute Average Net Equity per 5/8" equivalent (Divide line 3 by Line 4)

\$1,176

6. Develop a Plant Investment Fee Schedule based on meter capacity:

Tap Size	Equity per 5/8" Equivalent		Volume Equivalency Ratio		Plant Investment Fee
5/8"	\$1,176	x	1.00	=	\$1,176
3/4"	\$1,176	x	1.50	=	\$1,765
1"	\$1,176	x	2.50	=	\$2,941
1 1/2"	\$1,176	x	5.00	=	\$5,882
2"	\$1,176	x	8.00	=	\$9,412
3"	\$1,176	x	16.00	=	\$18,824

B. System Buy-In Method 2

1. Compute net investment in plant facilities*

	Original Cost		Accumulated Depreciation		Net Investment
Source of Supply	\$3,000,000		\$800,000		\$2,200,000
Treatment & Pumping	\$5,000,000		\$1,400,000		\$3,600,000
Transmission System	\$3,000,000		\$600,000		\$2,400,000
General Structures	\$1,000,000		\$200,000		\$800,000
Total	\$12,000,000	-	\$3,000,000	=	\$9,000,000

* Exclude lateral sewers and other on-site facilities, assuming the new customers will be paying for such facilities directly.

CALCULATION OF PLANT INVESTMENT FEES - SEWER UTILITY

2.	Determine portion of outstanding debt related to these facilities	<u>\$7,000,000</u>
3.	Compute Total Net Equity Investment	<u>\$2,000,000</u>
4.	Determine average daily capacity of the system (gpd)	<u>800,000</u>
5.	Compute average equity per capacity unit (Divide Line 3 by Line 4)	<u>\$2.50</u>
6.	Estimate average daily capacity requirement for an average 5/8" equivalent resident customer	<u>500</u>
7.	Compute Plant Investment Fee for 5/8" equivalent residential customer (gpd)	<u>\$1,250</u>

8. Develop a Plant Investment Fee Schedule based on meter capacity:

<u>Tap Size</u>	<u>Equity per 5/8" Equivalent</u>		<u>Volume Equivalency Ratio</u>		<u>Plant Investment Fee</u>
5/8"	\$1,250	x	1.00	=	\$1,250
3/4"	\$1,250	x	1.50	=	\$1,875
1"	\$1,250	x	2.50	=	\$3,125
1 1/2"	\$1,250	x	5.00	=	\$6,250
2"	\$1,250	x	8.00	=	\$10,000
3"	\$1,250	x	16.00	=	\$20,000

or 8. If preferred, repeat steps 6 and 7 for Commercial, Industrial and/or Agricultural customers.

C. Incremental Cost Pricing Method 1

1.	Estimate Annual Water Volume billed for a 5/8" customer (gal)	<u>182,500</u>
2.	Compute annual revenue under effective rates for a typical 5/8" residential customer	<u>\$215.48</u>
3.	Total projected O&M and additional balance (Worksheet 3)	<u>\$276,500</u>
4.	Total system revenue requirement (last item on Worksheet 3)	<u>\$575,500</u>
5.	Divide Line 3 by Line 4	<u>48.05%</u>

CALCULATION OF PLANT INVESTMENT FEES - SEWER UTILITY

6.	Multiply Line 2 by Line 5	<u>\$103.53</u>
7.	Compute revenue available to service new debt (Subtract Line 6 from Line 2)	<u>\$111.95</u>
8.	Compute level of New Debt that can be serviced per 5/8" equivalent customer	
a.	estimate term in years	<u>20</u>
b.	estimate annual interest rate	<u>10%</u>
c.	compute amortization factor*	<u>0.48644</u>
	* Assuming equal annual payments this factor may be computed as: where a = the value on Line 8a where b = the value on Line 8b	$1 - \frac{1}{(1 + b)^a}$ b
d.	compute level of additional debt (multiply Line 7 by Line 8c)	<u>\$54</u>
9.	Estimate Total Investment in new facilities	<u>\$800,000</u>
10.	Estimate number of new 5/8" equivalent customers	<u>300</u>
11.	Compute average new investment per new 5/8" equivalent customer (Divide Line 9 by Line 10)	<u>\$2,667</u>
12.	Compute 5/8" equivalent Plant Investment Fee (Subtract Line 8d from Line 11)	<u>\$2,612</u>
13.	Develop a Plant Investment Fee Schedule based on meter capacity:	

<u>Tap Size</u>	<u>Equity per 5/8" Equivalent</u>		<u>Volume Equivalency Ratio</u>		<u>Plant Investment Fee</u>
5/8"	\$2,612	x	1.00	=	\$2,612
3/4"	\$2,612	x	1.50	=	\$3,918
1"	\$2,612	x	2.50	=	\$6,531
1 1/2"	\$2,612	x	5.00	=	\$13,061
2"	\$2,612	x	8.00	=	\$20,898
3"	\$2,612	x	16.00	=	\$41,795

*8c calculates the payment amortization factor by adding 1 to the annual interest rate, then raising it to the power of the number of years the debt will be outstanding. Next, it is divided by 1 and the resulting number is then divided by the interest rate. Last, the result of those calculations will be subtracted from 1 (The number used for principal is found on D, 1, and interest and term are found on 8a and 8b.)

CALCULATION OF PLANT INVESTMENT FEES - SEWER UTILITY

D. Incremental Cost Pricing Method 2

1.	Cost of recent system expansion or estimated cost of future expansion required to serve new customers	\$800,000
2.	Determine average daily capacity of the expansion (gpd)	200,000
3.	Compute average cost per capacity unit (gpd) (Divide Line 1 by Line 2)	\$4
4.	Estimate average daily capacity requirement for an average (gpd) 5/8" equivalent residential customer	500
5.	Compute Plant Investment Fee for a 5/8" equivalent residential customer (Multiply Line 3 by Line 4)	\$2,000
6.	Develop a Plant Investment Fee Schedule based on meter capacity:	

Tap Size	Equity per 5/8" Equivalent		Volume Equivalency Ratio		Plant Investment Fee
5/8"	\$2,000	x	1.00	=	\$2,000
3/4"	\$2,000	x	1.50	=	\$3,000
1"	\$2,000	x	2.50	=	\$5,000
1 1/2"	\$2,000	x	5.00	=	\$10,000
2"	\$2,000	x	8.00	=	\$16,000
3"	\$2,000	x	16.00	=	\$32,000

or 6. If preferred, repeat steps 4 and 5 for Commercial, Industrial and/or Agricultural customers.

CALCULATION OF PLANT INVESTMENT FEES - SEWER UTILITY

A. System Buy-In Method 1

1. Compute net investment in plant facilities*

	<u>Original Cost</u>		<u>Accumulated Depreciation</u>		<u>Net Investment</u>
Source of Supply					
Treatment & Pumping					
Transmission System					
General Structures					
Total		-		=	

2. Determine portion of outstanding debt related to these facilities

3. Compute Total Net Equity Investment (Subtract Line 2 from Line 1)

4. Determine number of 5/8" equivalent customers (from worksheet 4)

5. Compute Average Net Equity per 5/8" equivalent (Divide line 3 by Line 4)

6. Develop a Plant Investment Fee Schedule based on meter capacity:

<u>Tap Size</u>	<u>Equity per 5/8" Equivalent</u>		<u>Volume Equivalency Ratio</u>		<u>Plant Investment Fee</u>
5/8"		x	1.00	=	
3/4"		x	1.50	=	
1"		x	2.50	=	
1 1/2"		x	5.00	=	
2"		x	8.00	=	
3"		x	16.00	=	

B. System Buy-In Method 2

1. Compute net investment in plant facilities*

	<u>Original Cost</u>		<u>Accumulated Depreciation</u>		<u>Net Investment</u>
Source of Supply					
Treatment & Pumping					
Transmission System					
General Structures					
Total		-		=	

* Exclude lateral sewers and other on-site facilities, assuming the new customers will be paying for such facilities directly.

CALCULATION OF PLANT INVESTMENT FEES - SEWER UTILITY

2. Determine portion of outstanding debt related to these facilities _____
3. Compute Total Net Equity Investment _____
4. Determine average daily capacity of the system (gpd) _____
5. Compute average equity per capacity unit (Divide Line 3 by Line 4) _____
6. Estimate average daily capacity requirement for an average 5/8" equivalent resident customer _____
7. Compute Plant Investment Fee for 5/8" equivalent residential customer (gpd) _____

8. Develop a Plant Investment Fee Schedule based on meter capacity:

Tap Size	Equity per 5/8" Equivalent		Volume Equivalency Ratio		Plant Investment Fee
5/8"		x	1.00	=	
3/4"		x	1.50	=	
1"		x	2.50	=	
1 1/2"		x	5.00	=	
2"		x	8.00	=	
3"		x	16.00	=	

or 8. If preferred, repeat steps 6 and 7 for Commercial, Industrial and/or Agricultural customers.

C. Incremental Cost Pricing Method 1

1. Estimate Annual Water Volume billed for a 5/8" customer (gal) _____
2. Compute annual revenue under effective rates for a typical 5/8" residential customer _____
3. Total projected O&M and additional balance (Worksheet 3) _____
4. Total system revenue requirement (last item on Worksheet 3) _____
5. Divide Line 3 by Line 4 _____

CALCULATION OF PLANT INVESTMENT FEES - SEWER UTILITY

- 6. Multiply Line 2 by Line 5 _____
- 7. Compute revenue available to service new debt
(Subtract Line 6 from Line 2) _____
- 8. Compute level of New Debt that can be serviced per 5/8" equivalent customer
 - a. estimate term in years _____
 - b. estimate annual interest rate _____
 - c. compute amortization factor* _____

* Assuming equal annual payments this factor may be computed as:
 where a = the value on Line 8a
 where b = the value on Line 8b

$$1 - \frac{(1 + b)^a}{b}$$
 - d. compute level of additional debt
(multiply Line 7 by Line 8c) _____
- 9. Estimate Total Investment in new facilities _____
- 10. Estimate number of new 5/8" equivalent customers _____
- 11. Compute average new investment per new 5/8" equivalent customer (Divide Line 9 by Line 10) _____
- 12. Compute 5/8" equivalent Plant Investment Fee (Subtract Line 8d from Line 11) _____
- 13. Develop a Plant Investment Fee Schedule based on meter capacity:

<u>Tap Size</u>	<u>Equity per 5/8" Equivalent</u>	<u>Volume Equivalency Ratio</u>	<u>Plant Investment Fee</u>
5/8"	x	1.00	=
3/4"	x	1.50	=
1"	x	2.50	=
1 1/2"	x	5.00	=
2"	x	8.00	=
3"	x	16.00	=

*8c calculates the payment amortization factor by adding 1 to the annual interest rate, then raising it to the power of the number of years the debt will be outstanding. Next, it is divided by 1 and the resulting number is then divided by the interest rate. Last, the result of those calculations will be subtracted from (The number used for principal is found on D, 1, and interest and term are found on 8a and 8b.)

CALCULATION OF PLANT INVESTMENT FEES - SEWER UTILITY

D. Incremental Cost Pricing Method 2

1. Cost of recent system expansion or estimated cost of future expansion required to serve new customers _____
2. Determine average daily capacity of the expansion (gpd) _____
3. Compute average cost per capacity unit (gpd)
(Divide Line 1 by Line 2) _____
4. Estimate average daily capacity requirement for an average (gpd)
5/8" equivalent residential customer _____
5. Compute Plant Investment Fee for a 5/8" equivalent residential customer (Multiply Line 3 by Line 4) _____
6. Develop a Plant Investment Fee Schedule based on meter capacity:

Tap Size	Equity per 5/8" Equivalent	Volume Equivalency Ratio	Plant Investment Fee
5/8"	x	1.00	=
3/4"	x	1.50	=
1"	x	2.50	=
1 1/2"	x	5.00	=
2"	x	8.00	=
3"	x	16.00	=

or 6. If preferred, repeat steps 4 and 5 for Commercial, Industrial and/or Agricultural customers.

CALCULATING SEWER RATES FOR WHOLESALE OR OUTSIDE CITY CUSTOMERS

The rates for wholesale or outside city customers can be computed using either of the two methods presented below:

Method A - Retail or Inside City Multiple

- Determine revenue required from rates for retail users (Worksheet #4)

Fixed costs			\$/yr
Volume charge			\$/Mg

- Determine applicable multiple (typically in the range of 115% - 135%)

Multiple

- Compute wholesale or outside city rate

	X		=	
(Fixed Charge-Inside)		(Multiple)		(Fixed Charge-Outside)
	X		=	
(Volume Charge-Inside)		(Multiple)		(Volume Charge-Outside)

Method B - Utility Basis

- Compute ratio of outside city billable volume to total billable volume

	/		=	
(Estimated Outside Volume)		(Total Billable Volume)		(Ratio)

- Allocate appropriate O&M costs to outside city customers (Line 36, Wksht #3)

	X		=	
(Total O&M costs)		(Ratio)		(Outside City Share of O&M)

- Allocate appropriate depreciation costs

	X		=	
(Total Depreciation)		(Ratio of Billable Volume)		(Outside City Share of Depreciation)

- Determine allocated return on rate base

A. Determine Rate Base:

Gross Assets	
Inventory	
less: accumulated depreciation	
less: contributions	
Rate Base	

B. Determine reasonable rate of return as weighted average cost of debt

CALCULATING SEWER RATES FOR WHOLESALE OR OUTSIDE CITY CUSTOMERS

1. Estimate market rate on G.O. Bonds _____

2. Compute outstanding long-term debt

	Amount Outstanding	Annual Payment
Existing Debt		
Proposed Debt		
Lease Agreements		
Subtotal		

3. Compute System Equity

$$\frac{\text{Rate Base}}{\text{(Rate Base)}} - \frac{\text{Subtotal L-T Debt}}{\text{(Subtotal L-T Debt)}} = \frac{\text{System Equity}}{\text{(System Equity)}}$$

4. Compute total return on rate base

$$\frac{\text{System Equity}}{\text{(System Equity)}} \times \frac{\text{G.O. Bond Rate}}{\text{(G.O. Bond Rate)}} = \frac{\text{Capital Return}}{\text{(Capital Return)}}$$

$$\frac{\text{Capital Return}}{\text{(Capital Return)}} + \frac{\text{Annual Payment L-T Debt}}{\text{(Annual Payment L-T Debt)}} = \frac{\text{Total Return on Rate Base}}{\text{(Total Return on Rate Base)}}$$

C. Compute allocated return on rate base

$$\frac{\text{Total Return on Rate Base}}{\text{(Total Return on Rate Base)}} \times \frac{\text{Ratio of Billable Volume}}{\text{(Ratio of Billable Volume)}} = \frac{\text{Allocated Share of Return on Rate Base}}{\text{(Allocated Share of Return on Rate Base)}}$$

D. Compute Total Outside City Customer Revenue Required

$$\frac{\text{Outside City Share of O\&M}}{\text{(Outside City Share of O\&M)}}$$

$$+ \frac{\text{Total Depreciation}}{\text{(Total Depreciation)}}$$

$$+ \frac{\text{Allocated Return on Rate Base}}{\text{(Allocated Return on Rate Base)}}$$

$$= \frac{\text{Total Revenue Required}}{\text{(Total Revenue Required)}}$$

E. Compute Outside City User Charges

Use the total revenue requirement computed above as input to Section III of Worksheet #4 making adjustments in Sections I and II to reflect only Outside City customers and volumes.

CALCULATION OF POLLUTANT SURCHARGE RATES

1. Identify Surchargeable Pollutant (BOD, TSS, Phos, Lead, etc.) _____

2. Estimate Average Unit Cost of Treatment

A. Costs directly attributable to treatment _____

B. Projected annual volume of pollutant to be treated (lbs.) _____

C. $\frac{\text{_____}}{\text{(Cost of Treatment)}} \div \frac{\text{_____}}{\text{(Volume)}} = \frac{\text{_____}}{\text{(Unit Cost)}} \text{ /lb.}$

3. Projected Surchargeable Pollutant Loadings

A. Estimate allowable pollutant concentration in domestic sewage (ppm) _____

B. $\frac{\text{_____}}{\text{(Projected Domestic Volume)}} \times \frac{\text{_____}}{\text{(Concentration)}} = \frac{\text{_____}}{\text{(Allowable Loading)}}$

$\frac{\text{_____}}{\text{(Total Loading)}} - \frac{\text{_____}}{\text{(Allowable Loading)}} = \frac{\text{_____}}{\text{(Surchargeable Loading)}}$

4. Projected Revenue from Surcharge Rates

$\frac{\text{_____}}{\text{(Surchargeable Loading)}} \times \frac{\text{_____}}{\text{(Unit Cost)}} = \frac{\text{_____}}{\text{(Revenue)}}$

This revenue should be recognized on Worksheet #3, line 11 of the Revenues section as "other " revenue. It will be used to offset the total revenue required from rates.

CALCULATION OF INDUSTRIAL WASTE CONTROL CHARGES

1. Estimate Total Costs of Monitoring, Sampling and Administering the IWC Program _____

2. Determine the number of participating equivalent taps

<u>Tap Size</u>	<u>Number of IWC Customers</u>		<u>Equivalency Ratio</u>		<u>Equivalent 5/8" Taps</u>
5/8"		x	1.00	=	
3/4"		x	1.50	=	
1"		x	2.50	=	
1 1/2"		x	5.00	=	
2"		x	8.00	=	
3"		x	16.00	=	
TOTAL					

3. Compute Unit Charge per Equivalent 5/8" Tap

$$\frac{\text{_____ (Estimated Cost)}}{\text{_____ (Equivalent 5/8" Tap)}} = \text{_____ (5/8" Unit Rate)}$$

4. Develop an IWC Rate Schedule

<u>Tap Size</u>	<u>5/8" Unit Rate</u>		<u>Volume Equivalency Ratio</u>		<u>IWC Charge</u>
5/8"		x	1.00	=	
3/4"		x	1.50	=	
1"		x	2.50	=	
1 1/2"		x	5.00	=	
2"		x	8.00	=	
3"		x	16.00	=	
TOTAL					