

30 September 2016

Mr. Ihab Tadros
Deputy Executive Director, CFO
Metropolitan Sewer District of Greater Cincinnati
1600 Gest Street
Cincinnati, OH 45204

Subject: 2016 Comprehensive Cost of Service & Rate Design Study – Draft Final Report

Dear Mr. Tadros:

Attached please find our draft final report, summarizing a comprehensive review and analysis of the District's wastewater cost of providing service and alternative rate design. Based upon your review and input, appropriate changes will be made, as necessary, and a final report will be developed.

We appreciate the opportunity to continue to be of service to the District in this very important matter. If you have any questions, please do not hesitate to contact me at 636-536-5813 or email me at lemoinepr@bv.com.

Very truly yours,
BLACK & VEATCH MANAGEMENT CONSULTING LLC



Pamela Lemoine
Principal Consultant

DRAFT

COMPREHENSIVE WASTEWATER REVENUE REQUIREMENT, COST OF SERVICE AND RATE DESIGN STUDY

B&V PROJECT NO. 192517

PREPARED FOR

Metropolitan Sewer District of Greater Cincinnati

30 SEPTEMBER 2016

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1 Introduction

The Metropolitan Sewer District of Greater Cincinnati and the Department of Sewers, City of Cincinnati was created through legislation, enacted April 10, 1968, by the Board of Hamilton County Commissioners and the City Council of Cincinnati. The legislation provided for consolidation of sanitary wastewater service embracing most of the political subdivisions of Hamilton County including the City of Cincinnati, and all unincorporated areas in the County. Warren County is a participant in the District on the basis of an agreement signed in 1970. The City of Cincinnati, through the Department of Sewers, is the sole and complete management agency of the Metropolitan Sewer District, hereinafter referred to as the District, for the Hamilton County “Commissioners.”

1.1 GENERAL BACKGROUND

The present wastewater system has been developed and constructed over the years in a continuing effort to improve water quality in area streams and provide better service to the metropolitan community. In order to comply with increasingly stringent state and federal environmental regulations, to provide for renewal and replacements, and to accommodate growth, the District has been required to construct major improvements to existing facilities which will enable the District to meet these requirements. A significant portion of the cost of these improvements in the past, which were required to meet the requirements of the Federal Clean Water Act, were partially financed through the receipt of U.S. Environmental Protection Agency (EPA) grants. Inasmuch as the federal grants program has been phased out, the local share of the District’s major capital improvement costs, especially those to correct future known capacity problems and to address special compliance project needs, are to be financed primarily through the issuance of municipal bonds.

In June of 2004, MSD entered into a Global Consent Decree with the U.S. EPA, U.S. Department of Justice, and the State of Ohio (“Regulators”) to significantly reduce the number of Sanitary Sewer Overflows, Combined Sewer Overflows, and Sewer-In-Basement issues. In June of 2006, the District submitted a Long Term Control Plan, intended to meet the requirements of the consent decree. Subsequently, the District and Regulators met regularly to negotiate a final Wet Weather Improvement Program (“WWIP”). On June 5, 2009, the District received conditional approval of its final Wet Weather Improvement Program. This study incorporates the impact of the consent decree as well as all other funding needs, including on-going asset management (i.e., renewal and replacement of the system). A phased approach was developed to implement the WWIP, with Phase 1 to be completed in 2018 and Phase 2 beginning in 2019.

Costs of operating, maintaining, and financing system improvements are met primarily from revenue derived from charges to users. Increased requirements due to new programs associated with the compliance of the consent decree, financing costs of major new facilities, and recognition of inflationary costs associated with day to day operation require more revenue than can be recovered under the schedule of rates implemented January 9, 2015.

Additional requirements of the EPA, related to federal grant funding of construction costs, require that the District comply with specific regulations regarding “user charges.” The system of user charges must be in accordance with the Federal Clean Water Act of 1977 (PL 95-217) as amended, and EPA rules and regulations. In order to comply with these requirements and to assure adequate revenue for system operation, maintenance, replacement (OM&R), and capital requirements, the

District authorized this comprehensive study of revenue, revenue requirements, cost of service, and development of charges for wastewater service.

1.2 PURPOSE

This report presents the results of an analysis of the costs of providing wastewater service in the District with projected revenue from the various classes of customers under existing rates.

Revenue shown for 2016 reflects the previously approved rate increase effective January 9, 2015. Revenue needs, including required system-wide revenue increases, are projected for years 2017-2021 that are estimated to provide adequate funds to meet the revenue requirements of the District in each year of the study period, and which will meet EPA requirements for Phase 1 and Phase 2 of the Long Term Control Plan with Phase 2 starting in 2019. The needs for annual revenue adjustments subsequent to 2016 have also been identified.

This report includes a summary of the evaluation of alternative rate structures recommended by the Hamilton County Rate Affordability Task Force, as outlined in the Task Force's May 13, 2016 report to the Board of County Commissioners.

1.3 SCOPE

Included in this report are the results of comprehensive studies of projected revenue under existing rates, revenue requirements, customer cost of service, and alternative rates for wastewater service.

The comparison of projected revenue requirements with projected revenue under existing rates is indicative of the degree of adequacy of the overall level of those rates to meet projected costs. The costs to be met during an initial period of adequacy are allocated to classes of customers and type of service, and rates adequate to meet those costs are designed. The proposed rates will provide sufficient revenue to meet system needs and provide for charging each class of customer its proportionate share of system costs. Recognition is also given to meeting EPA user charge criteria related to the receipt of grant awards on construction projects.

1.4 HAMILTON COUNTY RATE AFFORDABILITY TASK FORCE RECOMMENDATIONS

As previously mentioned, this report provides a summary of analysis of certain recommendations outlined by the Hamilton County Rate Affordability Task Force. District staff and Black & Veatch met with County Administration to discuss the task force recommendations and how to best move forward with evaluation of all options. While certain recommendations fall within the scope of the Cost of Service Analysis and Rate Design Study, others do not and will require further study by the District and County Administration. Following are the recommendations outlined in the task force's May 13, 2016 report.

1.4.1 Billing and Rates: Structural Changes

Three recommendations were provided related to structural changes to the rate structure and the method in which customers are billed.

1.4.1.1 Monthly Billing

The task force recommended that all residential customers be moved to monthly billing. Subsequently, the Board of County Commissioners adopted a resolution instructing the move to monthly billing on October 1, or as soon as possible.

Greater Cincinnati Water Works (GCWW) provides billing services to approximately 90 percent of the District's service area. GCWW has recently implemented a new billing system, and is planning to move to monthly billing by April of 2017. Therefore, while there seems to be broad consensus to move to monthly billing, it will not be possible until GCWW's billing system is adjusted to accommodate monthly billing. Therefore, for all rate options discussed within this report, monthly billing is assumed.

While GCWW plans to move to monthly billing, 10 percent of the District's customers are billed by other political jurisdictions. Based upon initial discussions with some of the jurisdictions, monthly billing may be difficult, or impossible to accommodate for the foreseeable future, or if implemented, would result in increased costs for the jurisdictions. Therefore, it may be necessary to develop an alternative rate structure that accommodates existing billing systems.

1.4.1.2 Reduce Volumetric Allocation

Currently, the minimum charge for quarterly customers includes 9 Ccf of volume allowance, and the minimum charge for monthly customers includes 5 Ccf of volume allowance. The task force recommended that under monthly rates, the minimum charge be based on 3 Ccf/month allowance. This option has been included as Option #2 in Section 6 of this report.

1.4.1.3 Eliminate Volumetric Allocation

The task force also recommended consideration of an alternative option whereby no volume allowance be included in the minimum charge. Instead, customers would be billed based on a service charge and be charge for all billed volume. This option has been included as Option #3 in Section 6 of this report.

1.4.2 Billing and Rates - Equity Changes

Two additional recommendations were provided related to structural changes to the rate structure for specific customer classes and/or types, as follows.

1.4.2.1 Multi-Family Billing

Currently, multi-family customers are billed a minimum charge based on the greater of either the meter size or number of units, whichever is greater. The task force recommended that the rate structure be changed to reflect meter size only. This is an option that has been evaluated in previous District rate studies and would be beneficial for several reasons, including:

- Improve equity
- Simplify billing
- Eliminate the need to maintain data on number of units

While no multi-family customers would see an increase in bills based on this change, some customers would see a decrease in their bills. Analysis provided previously to the task force indicated that the District would see an approximate reduction of \$4 million in revenues due to this change.

This structure option has been discussed for some time, and there is broad support to make this change. Therefore, based upon District and County Administration recommendation, this rate structure change has been reflected in all rate structures discussed in Section 6 of this report.

1.4.2.2 Correction to Meter Size Billing

Within the service area, there are a small number of customers who currently have a larger meter size than would normally be required to serve them, in order to maintain adequate water pressure. These are generally customers with service a distance and/or elevation from the main line significant enough to warrant the larger line. The task force recommended that these customers be charged based on the size line they normally would have used if not for the shape/nature of their parcel. The Board of County Commissioners subsequently approved a rate resolution to implement this change.

Based on evaluation of existing data, it appears that it will be difficult to identify these customers. Further, it is uncertain at this time how GCWW would implement this change, as GCWW would presumably continue to bill customers based on actual meter size. Based upon discussion with District Staff and County Administration, it was decided to address this situation as a policy matter and not try to estimate the number of customers (and related meter sizes) for these customers through this study. While this adjustment would result in decreased revenues for the District, it is not possible at this time to quantify and therefore has not been included in this study.

1.4.3 Inflow/Infiltration (Stormwater)

The task force recommended that consideration be made to recover infiltration/inflow (I/I) through as separate charge based on either impervious area, and included on customer bills, or through an assessment similar to the existing Hamilton County Stormwater District Assessment.

A “wet weather fee” of this type has been implemented by other utilities across the country, and would serve to recover the costs associated with wet weather in a manner more consistent with how such flows are contributed to the system. An analysis of this type of charge is complex and it is important that an appropriate schedule be developed to allow for the in-depth analysis of costs to be recovered through the fee, make necessary policy decisions, and develop the data and billing database necessary to successfully implement such a charge. In addition, substantial public outreach is recommended, as such a charge would require education, awareness, and planning for customers. A conceptual analysis of such a charge is being prepared as a separate document. No change in rates due to implementation of a wet weather fee has been included in this study.

1.4.4 Customer Assistance Programs

The final category of recommendations from the task force relate to the evaluation and potential development of a customer assistance program. The task force recommended the evaluation of the following options:

- Discount Program, whereby eligible customers would be provided a discounted rate

- Emergency Funding, whereby the District could provide a credit for eligible customers who demonstrate a verifiable hardship.

Neither the District nor GCWW currently have a customer assistance program. Development of such a program is complex and requires adequate time to develop and implement. Development of such a program is outside the scope of this cost of service and rate design study and therefore, has not been included in this report.

2 Summary of Findings

The findings of the report are summarized in this section. During the completion of this study, Black & Veatch has made certain assumptions with respect to conditions, events and circumstances which may occur in the future. The methodology utilized by Black & Veatch in performing the analyses follows generally accepted practices for such projections. While Black & Veatch believes the assumptions are reasonable and appropriate, and the projection methodology valid, actual results may differ materially from those projected, as influenced by the conditions, events and circumstances that actually occur that are unknown at this time and/or which are beyond the control of Black & Veatch.

The following summarizes the principal assumptions and findings from Black & Veatch's studies and the overall indicated revenue increases that will be required to support MSD operations.

1. The District is estimated to be currently serving approximately 227,000 customer accounts based on 2015 billing records. The projected number of customers, by customer class, is based on a detailed evaluation of past trends in the number of accounts as well as an evaluation of the impact of implementation of the capital improvement program, and associated necessary rate increases, on individual customer classes. The resulting projections reflect the assumption that the number of customers served by the District will remain unchanged during the study period.
2. The District has experienced a trend of declining volume per customer for many years, and this trend is expected to continue, at least in the near term, with the pace of reduction declining over time. As a result of an analysis of historical trends, this study incorporates an assumed decrease in billed volume per account as follows:
 - Single Family Residential:
 - 2016 = 3.0% decline over prior year
 - 2017 = 2.0% decline over prior year
 - 2018 = 1.5% decline over prior year
 - 2019 = 1.0% decline over prior year
 - 2020 = 0.5% decline over prior year
 - 2021 = 0.0% decline over prior year
 - Multi-family:
 - 2016 = 1.5% decline over prior year
 - 2017 = 1.0% decline over prior year
 - 2018 = 0.75% decline over prior year
 - 2019 = 0.5% decline over prior year
 - 2020 = 0.25% decline over prior year
 - 2021 = 0.0% decline over prior year
 - Commercial:
 - Held constant during the study period
 - Industrial:
 - Held constant during the study period
3. Revenues of the District required to meet the costs of providing wastewater service to customers is derived principally from sewerage service charges, excess strength surcharges, industrial

pretreatment, and septic tank disposal charges. Other revenue sources include the sale of permits and licenses, plan review and inspection fees, connection charges, interest earned from the investment of available funds and other miscellaneous sources. Future revenue levels are predicated on a no-growth scenario, declining volume per customer, and revenue derived from charges for service which are estimated to be approximately to \$281,078,000 in 2016 under present rates.

4. The study reflects a capital improvement program totaling \$1.161 billion for the period 2016 to 2021. These capital costs include initial estimated costs for Phase 2 of the Long Term Control Plan starting in 2019. It is important to note, that once Phase 2 costs are finalized, required increases for 2017 and beyond could vary from those projected herein, depending on the size and timing of Phase 2 related projects. The District is budgeting for project contingency of \$72 million over the 2016-2021 projection period and is included in the Asset Management totals in Table 4-2. To finance the capital program, several funding sources are planned to be used including funds on hand, the sale of proposed revenue bonds, low interest loans, annual connection fees, net operating revenues, and interest earnings from the construction fund. It is projected that the District will be required to issue \$455 million in proposed revenue bonds and \$345.2 million in proposed low interest loans over the study period. It is important to note that the annual amount funded is equal to 50 percent of the prior year's CIP and 50 percent of the current year's CIP. This is to estimate the actual amount that will be spent each year.
5. The District's annual revenue requirements consist of operation and maintenance expenses, debt service payments for existing and proposed bonds, annual equipment purchases, and the necessity to generate sufficient excess net operating revenues to maintain desired debt service coverage levels. These annual revenue requirements are projected to increase over the study period. Operating expenses, as forecasted, are projected to escalate from \$109,545,000 to \$129,452,000 due to general inflationary increases as well as projection of increased operating costs due to implementation of the capital program. Debt service payments are projected to increase from \$108,869,000 to \$129,095,000 during the study period due to the issuance of additional long-term debt.
6. System-wide revenue increases, and ultimately rate increases to customers, are largely being driven by capital program requirements. Such capital projects include both those set forth in the WWIP as well as asset management projects, as committed to under the WWIP. As shown in Figure 2-1, operation and maintenance expenses and debt service requirements comprise approximately 77 percent of the District's total revenue requirements over the planning period. While operation and maintenance expenses are projected to increase due to inflation and the impact of the capital program on operations, debt service requirements are projected to increase substantially to provide funding for the capital program. Debt Service alone increases from approximately 36 percent of total revenue requirements in 2016 to approximately 41 percent of total revenue requirements in 2018. Debt Service then declines in 2019-2021 due to the retirement of a portion of outstanding debt. Total capital requirements, including the transfer to the Surplus fund, debt service, and equipment purchases, average 61 percent.

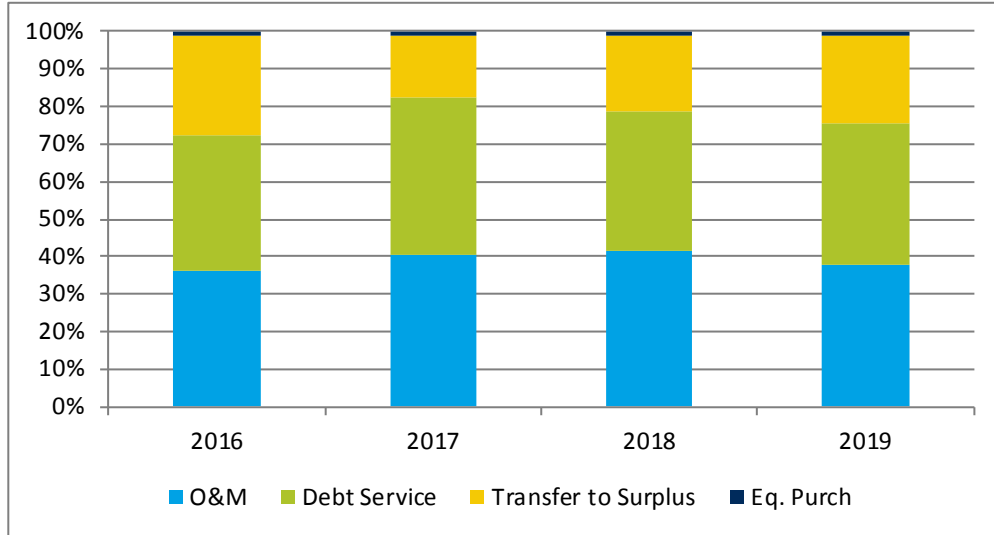


Figure 2-1 Breakdown of Annual Revenue Requirements

7. A 5.5 percent revenue increase effective in January 9, 2015, was approved by the Hamilton County Commissioners, and reflected a 6 percent increase in minimum charges and volume charges. Surcharge rates were held constant, resulting in the overall system-wide revenue increase of 5.5 percent. The same rates were applied to 2016 as no rate increase was approved by the Hamilton County Commissioners. The rates for 2015 were based on a 2014 analysis of system-wide revenue requirements, and incorporated in calculating projected wastewater revenues under existing rates. The Hamilton County Commissioners concluded the 2015 rates to be sufficient for 2016; however, the rates are indicated to be insufficient to recover the District’s future revenue requirements during the remainder of the proposed study period. As such, a series of subsequent annual revenue adjustments are indicated to be required, as follows:

- 2017 = 4.25 percent
- 2018 = 4.25 percent
- 2019 = 4.25 percent
- 2020 = 4.25 percent
- 2021 = 4.25 percent

As indicated, the projected system-wide revenue increase for 2017 is estimated to be 4.25 percent. The projected adjustments in the level of wastewater service charge revenues are projected to produce sufficient revenues to meet the District’s cash obligations or revenue requirements and provide adequate debt service coverage and minimum fund balances. The projected adjustments reflect the impact of on-going asset management (e.g., renewals and replacements) as well as Phase 1 and estimated Phase 2 (starting in 2019) costs of the Long Term Control Plan. It is important to note, that once Phase 2 costs are finalized, required increases for 2017 and beyond could vary from those projected herein, depending on the size and timing of Phase 2 related projects.

8. The total revenue requirements to be derived from charges for wastewater service are synonymous with, and are the definition of, the total cost of service. The District’s estimated

annual cost of service to be met from wastewater charges, totaling \$283,943,600 for the 2017 test year, or the period of adequacy for which the rates are to be in effect, consist of the operation and maintenance expenses, user charge replacements, and capital costs, as summarized in Table 2-1.

Table 2-1 Cost of Service Requirements – Test Year 2017

Line No.	Description	Test Year 2017
1	Operation and Maintenance Expense	\$107,103,300
2	User Charge Replacements	0
3	Capital Costs	176,840,300
4	Total Cost of Service to be Met from Rates	\$283,943,600

9. Detailed cost of service studies were made for the 2017 test year to establish costs of providing wastewater service to the individual customer classes served. Such studies involved an analysis of costs by system function including those related to the volume, capacity, and strength of wastewater, and to customer billing and industrial pretreatment program requirements. A summary of the District’s allocated cost of service by these functional classifications is shown in Table 2-2.

Table 2-2 Summary of Functional Cost Components - 2017 Test Year

Line No.	Cost Component	Total Cost of Service
		\$
1	Volume Related Cost	32,376,549
2	Capacity Related Cost	160,317,807
3	Strength Related Cost	
4	Suspended Solids	29,041,726
5	BOD	34,799,148
6	TKN	3,529,067
7	Customer Cost	5,326,981
	Industrial Monitoring & Surveillance	
8	Surcharge	1,104,254
9	Pretreatment	2,175,592
10	Sewer In Basement	15,272,476
11	Total Cost of Service	283,943,600

10. A comparison of the resultant total cost of service allocated to each customer class based upon their respective service requirements with revenue under existing rates and the indicated revenue increase required from each class is shown in Table 2-3.

Table 2-3 Summary of Functional Cost Components – 2017 Test Year

Line No.	Customer Class	Revenue Under Existing Rates	Total Cost of Service	Adjusted Cost of Service	Indicated Revenue Increase Required	Indicated Revenue Adjustment
		\$	\$	\$	\$	%
1	Residential	117,223,451	125,632,248	135,073,986	17,850,535	15.23%
2	Commercial	48,835,753	50,966,982	53,826,314	4,990,561	10.22%
3	Industrial	31,944,824	28,585,214	29,306,931	(2,637,893)	-8.26%
4	Multifamily	52,379,645	44,310,639	46,560,328	(5,819,317)	-11.11%
5	Surcharge	20,192,310	15,325,509	15,325,509	(4,866,801)	-24.10%
6	Septic Tank Disposal	1,792,000	3,850,533	3,850,533	2,058,533	114.87%
7	Sewer In Basement (a)	0	15,272,476	0		
8	Total	272,367,983	283,943,600	283,943,600	11,575,617	4.25%

(a) Sewer In Basement costs allocated to Residential, Commercial, and Multi Family classes based on number of connections

- Based upon results from the detailed cost of service study for the 2017 test year, three (3) alternative rate schedules have been developed in such a manner as to achieve a system-wide revenue increase of 4.25 percent. Based upon review and discussion, it is anticipated that additional alternatives may be evaluated prior to adoption of a final 2017 rate schedule.

3 Revenue

The revenue for the District to meet costs of wastewater service is derived principally from sewerage service charges, excess strength surcharges, and septic tank disposal charges. Other revenue sources include pretreatment charges, the sale of permits and licenses, plan review and inspection charges, connection charges, interest earned from the investment of available funds and other miscellaneous sources. The level of future revenue is projected through an analysis of historical system growth in terms of number of customers, wastewater volume, and revenue derived from charges for service.

3.1 CUSTOMER GROWTH

Table 3-1 presents a summary of the historical and projected average number of customer accounts, billable wastewater flow volume, and overall average flow per account. Customer classification (i.e., residential, commercial, multi-family and industrial) is based upon data maintained by the Greater Cincinnati Water Works (GCWW).

The projected number of customers served by MSD, by customer class, is based on a detailed evaluation of past trends in the number of accounts as well as an evaluation of current economic conditions, the impact of implementation of the capital improvement program, and associated necessary rate increases, on individual customer classes. The resulting projections reflect no change in customer accounts during the study period.

The GCWW provides water service to residences and businesses in the City of Cincinnati and to areas outside the City in Hamilton County. As such, the GCWW bills approximately 90 percent of the District's wastewater customers, with the remaining 10 percent billed by other political subdivisions in the County.

Table 3-1 Historical and Projected Accounts

Line No.	Description	Historical		Projected					
		2014	2015	2016	2017	2018	2019	2020	2021
CWW									
Bi-Monthly Customers									
1	Residential	59	59	59	59	59	59	59	59
2	Commercial	0	0	0	0	0	0	0	0
3	Industrial	0	0	0	0	0	0	0	0
4	Multi-Family	0	0	0	0	0	0	0	0
5	Subtotal	59	59	59	59	59	59	59	59
Monthly									
6	Residential	18	17	17	17	17	17	17	17
7	Commercial	381	365	365	365	365	365	365	365
8	Industrial	283	280	280	280	280	280	280	280
9	Multi-Family	295	280	280	280	280	280	280	280
10	Resid-Pmt Plan	7,008	3,143	3,143	3,143	3,143	3,143	3,143	3,143
11	Subtotal	7,985	4,085	4,085	4,085	4,085	4,085	4,085	4,085
Quarterly									
12	Residential	160,809	164,870	164,870	164,870	164,870	164,870	164,870	164,870
13	Commercial	12,302	12,292	12,292	12,292	12,292	12,292	12,292	12,292
14	Industrial	130	131	131	131	131	131	131	131
15	Multi-Family	21,114	21,329	21,329	21,329	21,329	21,329	21,329	21,329
16	Subtotal	194,354	198,622	198,622	198,622	198,622	198,622	198,622	198,622
17	Total CWW	202,398	202,765	202,765	202,765	202,765	202,765	202,765	202,765
Political Bodies									
18	Residential	21,733	21,776	21,776	21,776	21,776	21,776	21,776	21,776
19	Commercial	2,377	2,382	2,382	2,382	2,382	2,382	2,382	2,382
20	Industrial	38	38	38	38	38	38	38	38
21	Warren Co.	1	1	1	1	1	1	1	1
22	Subtotal	24,149	24,197	24,197	24,197	24,197	24,197	24,197	24,197
23	Total	226,547	226,962	226,962	226,962	226,962	226,962	226,962	226,962

Table 3-2 presents a summary of the historical and projected billable wastewater flow volume. The projection of total billable wastewater volume requires an analysis of not only historical total billable volume, but also an analysis of billed volume per customer. This is necessary in order to fully reflect any change in customer behavior that could impact total billable volume. During this study, a detailed analysis of historical billing data was conducted. Based upon the analysis, it was determined that billed volume per customer continues to decline. This is a trend that has been occurring for many years, and is consistent with the trend being experienced by utilities across the United States. Several factors are likely contributing to a decline in billed volume per customer, including the installation of higher efficiency fixtures and appliances, and increased awareness of environmental concerns and resulting changes in behavior. Economic conditions can also have an impact on billed volume per customer, and current economic conditions likely also contribute to the magnitude of the recent decline.

Based on this analysis, volume per customer has been projected to continue to decline over the study period as follows:

- Single Family Residential:
 - 2016 = 3.0% decline over prior year
 - 2017 = 2.0% decline over prior year
 - 2018 = 1.5% decline over prior year
 - 2019 = 1.0% decline over prior year

- 2020 = 0.5% decline over prior year
- 2021 = 0.0% decline over prior year
- Multi-family:
 - 2016 = 1.5% decline over prior year
 - 2017 = 1.0% decline over prior year
 - 2018 = 0.75% decline over prior year
 - 2019 = 0.5% decline over prior year
 - 2020 = 0.25% decline over prior year
 - 2021 = 0.0% decline over prior year
- Commercial:
 - Held constant during the study period
- Industrial:
 - Held constant during the study period

As shown in Table 3-2, total water usage or billable wastewater volume is projected at 31,300,800 hundred cubic feet (Ccf) for 2017. As previously discussed, billable wastewater volume is projected to continuously decrease over the study period, reflecting no change in the number of customers and the above assumptions regarding volume per customer.

Table 3-2 Historical and Projected Billable Volumes

Line No.	Description	Historical					Projected				
		2014 ccf	2015 ccf	2016 ccf	2017 ccf	2018 ccf	2019 ccf	2020 ccf	2021 ccf		
CWW											
Bi-Monthly Customers											
1	Residential	3,864	4,129	4,005	3,925	3,866	3,828	3,809	3,809		
2	Commercial	0	0	0	0	0	0	0	0		
3	Industrial	0	0	0	0	0	0	0	0		
4	Multi-Family	0	0	0	0	0	0	0	0		
5	Subtotal	3,864	4,129	4,005	3,925	3,866	3,828	3,809	3,809		
Monthly											
6	Residential	142,748	139,534	135,348	132,641	130,651	129,345	128,698	128,698		
7	Commercial	1,620,327	1,494,849	1,494,849	1,494,849	1,494,849	1,494,849	1,494,849	1,494,849		
8	Industrial	5,248,856	5,137,797	5,137,797	5,137,797	5,137,797	5,137,797	5,137,797	5,137,797		
9	Multi-Family	1,880,142	1,925,560	1,896,677	1,877,710	1,863,627	1,854,309	1,849,673	1,849,673		
10	Resid-Pmt Plan	581,934	269,849	261,754	256,518	252,671	250,144	248,893	248,893		
10	Subtotal	9,474,006	8,967,589	8,926,424	8,899,515	8,879,595	8,866,444	8,859,911	8,859,911		
Quarterly											
11	Residential	9,754,215	10,007,274	9,707,056	9,512,915	9,370,221	9,276,519	9,230,136	9,230,136		
12	Commercial	4,076,080	4,177,552	4,177,552	4,177,552	4,177,552	4,177,552	4,177,552	4,177,552		
13	Industrial	514,434	557,315	557,315	557,315	557,315	557,315	557,315	557,315		
14	Multi-Family	4,856,213	4,916,532	4,842,784	4,794,356	4,758,399	4,734,607	4,722,770	4,722,770		
15	Subtotal	19,200,941	19,658,673	19,284,707	19,042,138	18,863,486	18,745,992	18,687,773	18,687,773		
16	Total CWW	28,678,811	28,630,391	28,215,136	27,945,579	27,746,948	27,616,264	27,551,492	27,551,492		
Political Bodies											
17	Residential	1,169,004	1,535,024	1,488,974	1,459,194	1,437,306	1,422,933	1,415,818	1,415,818		
18	Commercial	1,148,339	1,507,889	1,507,889	1,507,889	1,507,889	1,507,889	1,507,889	1,507,889		
19	Industrial	133,298	175,034	175,034	175,034	175,034	175,034	175,034	175,034		
20	Warren Co.	242,658	213,105	213,105	213,105	213,105	213,105	213,105	213,105		
21	Subtotal	2,693,299	3,431,053	3,385,003	3,355,223	3,333,335	3,318,962	3,311,848	3,311,848		
22	Total	31,372,110	32,061,445	31,600,139	31,300,802	31,080,283	30,935,226	30,863,340	30,863,340		

3.2 WASTEWATER REVENUE UNDER EXISTING RATES

The District primarily derives revenues from a schedule of wastewater rates that includes a minimum bill, a block quantity volume charge, an extra strength surcharge for excess pollutant customers, and septic tank disposal. A schedule of current rates is shown in Table 3-3.

Currently, the minimum charge per quarter includes the first 900 cubic feet (500 cubic feet for monthly bills) of contributed wastewater volume and is based upon the size of water service meter associated with the service. Two additional declining rate blocks are applied to those volumes exceeding the minimum. The Extra Strength Surcharges are applied to specific monitored and tested customers and apply rates per hundred cubic feet for the strength components Biochemical Oxygen Demand (BOD), Suspended Solids (SS) and Total Kjeldahl Nitrogen (TKN), each exceeding 300, 240 and 25 milligrams per liter (mg/l) respectively. All septic tanks are charged per 1,000 gallons based on the size of their tank and this charge reflects treatment of the average strength of BOD, SS, and TKN for all septic tank haulers.

In January 2015, the District implemented a 5.5 percent revenue increase as previously approved by the County Commissioners, reflecting a 6.0 percent increase in minimum charges and volume charges for all rates except for the Extra Strength Surcharges, which did not change from 2014. Revenues under these same rates are reflected in the 2016 total revenue from user charges.

The District's sewer service revenue is projected by applying the wastewater rate structure to the appropriate projected unit of measure for each customer class. These revenue projections are summarized in Table 3-4. Total projected sewer service revenue, from user rates, is expected to average \$249,829,600 for the 2016 to 2021 projection period.

Revenues from extra strength and industrial wastes are projected to contribute an additional \$20,192,000 and Septic Tank Disposal account for \$1,792,000. per year to the operating revenues

Other operating and non-operating revenues of the District consist of revenues derived from other fees including connection charges, plan review, and tap permits. As shown on Table 3-5, other operating revenue is projected to remain constant at \$4,783,000 per year throughout the study period, connection charges and tap fees is projected to remain constant at \$2,674,000 per year throughout the study period, and revenue from interest earnings on all funds is projected to average approximately \$3.6 million during the study period.

Table 3-3 Existing Rates

Minimum Monthly Charge - \$/Bill - 2016

Line No.	Meter Size Inches	Number of Family Units	Quarterly Usage Cf	Quarterly Charge \$	Monthly Usage Cf	Monthly Charge \$
1	5/8"	1	900	\$ 117.35	500	\$ 59.54
2	3/4"	2-3	900	\$ 151.32	500	\$ 68.49
3	1"	4-5	900	\$ 207.44	500	\$ 88.14
4	1 1/2"	6-12	900	\$ 352.51	500	\$ 135.90
5	2"	13-20	900	\$ 499.33	500	\$ 187.29
6	3"	21-50	900	\$ 1,281.49	500	\$ 459.03
7	4"	51-115	900	\$ 2,122.30	500	\$ 760.08
8	6"	116-250	900	\$ 4,139.17	500	\$ 1,487.10
9	8"	Over 250	900	\$ 6,256.78	500	\$ 2,210.47
10	10"		900	\$ 8,360.75	500	\$ 2,970.50
11	12"		900	\$ 9,653.24	500	\$ 3,458.83

Volume Charge - \$/ccf - 2016

	Quarterly Cf	Monthly Cf	Rate \$
12 First (cf)	900	500	\$ 0
13 To (cf)	15,000	5,000	\$ 5.879
14 Over (cf)	15,000	5,000	\$ 4.701

Extra Strength Charges - \$ per mg/l per 1,000 cubic feet - 2016

	Rate \$
15 Suspended Solids (TSS)	\$ 0.002756
16 Biochemical Oxygen Demand (BOD)	\$ 0.004707
17 Nitrogen Oxygen Demand (TKN)	\$ 0.004122

Septic Tank Disposal - \$ per 1,000 gallons - 2016

	Rate \$
18 All Septic Tank Disposal Haulers	\$ 50.00

Table 3-4 Projected User Charge Revenues Under Existing Rates

Line No.	Description	Projected					
		2016	2017	2018	2019	2020	2021
		\$	\$	\$	\$	\$	\$
CWW							
Bi-Monthly Customers							
1	Residential	45,730	47,314	47,229	47,174	47,146	47,146
2	Commercial	0	0	0	0	0	0
3	Industrial	0	0	0	0	0	0
4	Multi-Family	0	0	0	0	0	0
5	Subtotal	45,730	47,314	47,229	47,174	47,146	47,146
Monthly							
6	Residential	807,574	795,026	785,800	779,741	776,742	776,742
7	Commercial	8,306,089	8,306,551	8,306,551	8,306,551	8,306,551	8,306,551
8	Industrial	27,428,793	27,428,793	27,428,793	27,428,793	27,428,793	27,428,793
9	Multi-Family	11,325,529	11,236,731	11,170,798	11,127,172	11,105,469	11,105,469
10	Resid-Pmt Plan	2,086,585	2,075,046	2,066,565	2,060,996	2,058,239	2,058,239
11	Subtotal	49,954,571	49,842,147	49,758,507	49,703,254	49,675,794	49,675,794
Quarterly							
12	Residential	103,580,830	103,062,417	102,681,384	102,431,172	102,307,317	102,307,317
13	Commercial	32,991,704	32,991,704	32,991,704	32,991,704	32,991,704	32,991,704
14	Industrial	3,954,895	3,954,895	3,954,895	3,954,895	3,954,895	3,954,895
15	Multi-Family	41,365,539	41,142,914	40,977,615	40,868,243	40,813,830	40,813,830
16	Subtotal	181,892,968	181,151,931	180,605,598	180,246,014	180,067,746	180,067,746
17	Total CWW	231,893,269	231,041,392	230,411,335	229,996,441	229,790,686	229,790,686
Political Bodies							
18	Residential	10,305,337	10,305,337	10,305,337	10,305,337	10,305,337	10,305,337
19	Commercial	7,537,497	7,537,497	7,537,497	7,537,497	7,537,497	7,537,497
20	Industrial	561,136	561,136	561,136	561,136	561,136	561,136
21	Warren Co.	938,311	938,311	938,311	938,311	938,311	938,311
22	Subtotal	19,342,281	19,342,281	19,342,281	19,342,281	19,342,281	19,342,281
23	Total	251,235,550	250,383,673	249,753,616	249,338,722	249,132,968	249,132,968

Table 3-5 Operating and Non-Operating Revenue

Line No.	Description	Projected					
		2016	2017	2018	2019	2020	2021
		\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
1	Sewerage Service Charge	251,236	250,384	249,754	249,339	249,133	249,133
2	Sewerage Surcharges	20,192	20,192	20,192	20,192	20,192	20,192
3	Septic Tank Disposal	1,792	1,792	1,792	1,792	1,792	1,792
4	Pretreatment Monitoring	401	401	401	401	401	401
5	Subtotal	273,621	272,769	272,139	271,724	271,518	271,518
6	Other Operating Revenue						
7	Rental Income	207	207	207	207	207	207
8	Tap Permits-Licenses	40	40	40	40	40	40
9	Inspection-Plan Review	195	195	195	195	195	195
10	Other (a)	4,341	4,341	4,341	4,341	4,341	4,341
11	Total Other Operating Revenue	4,783	4,783	4,783	4,783	4,783	4,783
12	Connection Fee Revenue (b)	2,674	2,674	2,674	2,674	2,674	2,674
13	Build American Bond Discount	4,125	4,125	4,125	4,125	4,125	4,125
14	Interest-Trust Accounts (c)	3,693	4,041	3,702	3,919	3,784	3,881
15	Total Revenue	288,896	288,392	287,423	287,225	286,884	286,982

- (a) Includes fines, assessments, purchasing agent sales, expense reimbursements, and other miscellaneous revenue sources.
- (b) Connection charges and tap-in fees are shown separate from other operating revenues as these funds are used as a source of financing for the District's capital improvement program. Projected revenues beginning in 1997 reflect an increase in connection fee charges.
- (c) Reflects interest income on operating, surplus, and trusteed accounts.

4 Revenue Requirements

The revenue required to adequately provide for the continued operation of the District must be sufficient to meet the cash requirements of operation and maintenance (O&M) of the system; principal, interest, and reserve payments on revenue and other bond indebtedness; and recurring annual capital expenditures for replacements, system betterments, and extensions not debt financed.

Operation and maintenance expenses are those expenditures necessary to transport and treat customers' wastes as well as maintain the system in good working order. Routine annual capital expenditures, which include equipment replacements, consist of recurring annual replacements, minor extensions, and betterments which are normally revenue financed. Other capital costs include principal and interest payments, bond covenant-required payments, and the costs of infrequent major capital improvements paid directly from annual operating revenues.

4.1 OPERATION AND MAINTENANCE EXPENSE

Table 4-1 presents a summary of actual and projected O&M expenditures for 2016 through 2021 by operating division. Major cost items for each division generally include personal services and employee fringe benefits; the cost of purchased electric power, gas and other treatment chemicals; and other contractual service and material costs.

Operation & maintenance expenditures for 2016 are based on the 2016 approved budget and expenditures for 2017 are based on the proposed 2017 budget submitted to the County in August 2016. Years 2018-2021 operation and maintenance expenditures are projected to increase based on assumed annual price escalation over the 2017 proposed budget. Benefits¹ are forecasted to increase at a rate of 4.48 percent per year during the study period. Chemical, gas/oil/fuel, and power costs² are projected to increase 3.12 percent per year. Personnel costs are forecasted to increase by 4 percent for 2018 and 2019 as approved by the City. All other operation and maintenance expense elements³ (including Personnel for 2020 and 2021) are assumed to increase at a rate of 2.30 percent per year to recognize the effects of inflation. Project encumbrance cancellations (shown on Table 4-1, Line 26) are estimated to be 5 percent annually, resulting in a reduction to the total budget compared to prior studies. As indicated in Table 4-1, annual operating and maintenance costs are projected to increase from \$109,545,000 in 2016 to \$129,452,000 in 2021.

¹ 25 year historical average escalation for Consumer Price Index (CPI), Cincinnati-Hamilton, OH-KY-IN, Medical Care.

² 25 year historical average escalation for Consumer Price Index (CPI), Cincinnati-Hamilton, OH-KY-IN, Fuel & Utilities.

³ 25 year historical average escalation for Consumer Price Index (CPI), Cincinnati-Hamilton, OH-KY-IN, All items.

Table 4-1 Projected Operation and Maintenance Expense

Line No.	Description	Projected					
		2016 \$1,000	2017 \$1,000	2018 \$1,000	2019 \$1,000	2020 \$1,000	2021 \$1,000
1	Office of the Director	7,858	8,363	8,600	8,844	9,060	9,282
2	Wastewater Administration						
3	Billing & Collecting	5,000	5,000	5,115	5,233	5,353	5,476
4	All Other	4,941	4,522	4,700	4,886	5,022	5,163
5	Total	9,941	9,522	9,815	10,118	10,375	10,640
6	Information Technology	6,185	6,644	6,847	7,057	7,238	7,423
7	Project/Business Development	2,840	3,717	3,854	3,997	4,112	4,230
8	Project Delivery	4,864	5,941	6,168	6,404	6,578	6,758
9	Wastewater Collection	21,020	21,220	21,899	22,601	23,189	23,794
10	Wastewater Treatment						
11	Superintendent	1,330	1,309	1,352	1,396	1,432	1,469
12	Mill Creek	21,125	20,239	20,886	21,554	22,157	22,778
13	Little Miami	6,364	7,588	7,821	8,062	8,277	8,497
14	Muddy Creek	3,594	3,976	4,107	4,242	4,359	4,480
15	Sycamore	2,193	2,382	2,457	2,535	2,605	2,677
16	Taylor Creek	1,781	1,817	1,876	1,937	1,991	2,046
17	Polk Run	1,716	1,778	1,835	1,893	1,944	1,996
18	MSD Pump Stations	1,601	1,483	1,519	1,556	1,594	1,634
19	Equipment Maintenance	7,786	7,972	8,256	8,552	8,786	9,027
20	Total Wastewater Treatment	47,489	48,543	50,108	51,728	53,145	54,604
21	Industrial Waste Management	7,075	7,494	7,760	8,036	8,257	8,485
22	Sewer in Basement	11,633	12,033	12,348	12,672	12,977	13,290
23	Total O&M	118,905	123,477	127,400	131,457	134,932	138,506
24	Incremental Expenditures	0	0	400	1,109	1,435	1,868
25	Office Equipment & Motorized Vehicles	(3,414)	(3,649)	(3,733)	(3,819)	(3,907)	(3,996)
26	Projected Encumbrance Cancellation	(5,945)	(6,174)	(6,370)	(6,573)	(6,747)	(6,925)
27	Total Net O&M Expense	109,545	113,654	117,697	122,174	125,714	129,452

Note: Each department includes an allocated portion of the General Fund overhead

- (a) Reflects actual cash expenditures.
- (b) Net of Force Account.

4.2 CAPITAL IMPROVEMENT PROGRAM

The District has developed a multi-year capital improvement program (CIP) covering its anticipated commitments for the period from 2016 through 2021. These capital costs include estimated costs for Phase 2 of the Long Term Control Plan beginning in 2019. A summary of the capital improvement program, totaling \$1,161,685,000 is shown in Table 4-2. The approved capital program reflects spent or encumbered monies as well as the planned contract certifications for each year over the study period. For 2016, annual expenditures are based on the approved 2016 CIP budget. For years 2017-2021, annual expenditures are based on the proposed CIP budget submitted to the County in August 2016 including adjustments for estimated Phase 2 projects. It is important to note, that once Phase 2

costs are finalized, required increases for 2017 and beyond could vary from those projected herein, depending on the size and timing of Phase 2 related projects.

Table 4-2 Capital Improvement Program ^(a)

Line No.	Description	Projected					Total Cost	
		2016	2017	2018	2019	2020		2021
		\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
Capital Projects								
1	WWIP Projects	197,371	97,801	36,449	54,900	84,420	45,660	516,601
2	Asset Management Projects	90,214	104,208	87,501	100,220	90,527	172,414	645,084
3	Total Approved Capital Program	287,585	202,009	123,950	155,120	174,947	218,074	1,161,685

(a) Reflects proposed annual certification of projects as developed by Metropolitan Sewer District staff. Annual project expenditures will deviate from scheduled certifications and includes program contingency.

4.2.1 Capital Improvement Program Financing Plan

Annual expenditures for the CIP are anticipated to be met from a combination of available funds on hand, interest earnings, connection fee revenues, and transfers from the Surplus Fund as shown in Table 4-3. It is important to note that the annual amount funded is equal to 50 percent of the prior year’s CIP and 50 percent of the current year’s CIP. This is to estimate the actual amount that will be spent each year. Connection fee revenue is anticipated to remain at 2016 levels throughout the study period, at \$2,674,000 per year, as shown in Line 2 of Table 4-3. Transfers from the Surplus Fund are the primary source of funding for the capital program and are anticipated to vary in each year of the study period as shown in Line 3 of Table 4-3, reflecting projected annual encumbrances in each year. Surplus Fund revenues include proceeds from revenue bonds and cash financed capital from the Operating Fund, as well as interest earnings on balances within the Surplus Account, Bond Reserve Fund and Replacement and Improvement Account. Interest on the average balance within Fund 704 is projected at a rate of one percent annually as indicated on Line 4 of Table 4-3.

Table 4-3 Capital Improvement Financing Plan (Fund 704)

Line No.	Description	Projected					2021
		2016	2017	2018	2019	2020	
		\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
Source of Funds							
1	Beginning of Year Balance	(4,835)	23,758	26,384	26,090	29,254	31,949
2	Connection Fees	2,674	2,674	2,674	2,674	2,674	2,674
3	Transfer from / (to) Surplus Account	120,000	195,000	135,000	115,000	140,000	165,000
4	Interest Income	94	249	261	275	304	299
5	Total Source of Funds	117,933	221,681	164,319	144,039	172,232	199,922
Application of Funds							
6	Major Capital Improvements	94,175	195,297	138,230	114,785	140,284	171,761
7	Total Use of Funds	94,175	195,297	138,230	114,785	140,284	171,761
8	End of Year Balance	23,758	26,384	26,090	29,254	31,949	28,161

The application of funds summarized in Line 6 of Table 4-3 indicates the estimated total annual encumbrances, not including projects funded by OWDA/WPCLF loans, and represents the total amount required to be funded from revenue bonds and other cash sources. Because the cost of projects funded by low interest loans are reimbursed directly by loan programs at the time expenses

are incurred, both the loan proceeds and associated capital costs are excluded from the determination of capital funding needs.

As previously discussed, Surplus Fund revenues are comprised of revenue bond proceeds, interest income, transfers from the Bond Reserve Account as allowed by the Bond Indenture, and transfers from the Operating Fund, as outlines in the Bond Indenture. Table 4-4 summarizes the sources of funding within the Surplus Fund, as well as the indicated transfer to the Construction Account (Fund 704). The actual Surplus Fund balance will vary substantially throughout the year based upon the need for transfers to the Construction Account. In addition, the County has historically cash financed the capital program, and issued debt on a recurring basis based on eligible projects completed in the preceding 18 month period (“Reimbursement financing”). In order to continue utilizing “Reimbursement Financing” and provide for flexibility concerning the timing of revenue bond issuances, the District has historically targeted a minimum beginning of year balance of \$215-220 million for the Surplus Fund to ensure adequate funding for the CIP. As a result of project and funding timing, 2016 balance reflects a \$215.3 million balance followed by a \$206.7 million in 2017(unencumbered). The fluctuation in the balance throughout the year and from year to year are both examples of the need to maintain a large beginning balance each year.

Table 4-4 Surplus Fund

Line No.	Description	Projected					
		2016	2017	2018	2019	2020	2021
		\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
Sources and Uses of Funds							
1	Beginning of Year Balance	269,438	215,306	206,690	223,072	232,010	231,559
2	Revenue Bond Proceeds	0	137,857	91,905	27,571	68,929	91,905
3	Interest Income	2,371	2,569	2,023	2,173	2,203	2,213
4	Transfer from / (to) Bond Reserve Account	(16,161)	842	932	18,743	837	1,321
5	Transfer from / (to) Operating Account	79,658	45,116	56,522	75,451	67,581	77,658
6	Transfer to Contingency Fund	0	0	0	0	0	0
7	Transfer to Construction Account	(120,000)	(195,000)	(135,000)	(115,000)	(140,000)	(165,000)
8	End of Year Balance	215,306	206,690	223,072	232,010	231,559	239,656

4.2.2 Debt Service Requirements

A summary of the District’s existing and proposed debt service requirements is shown in Table 4-5. Existing debt service requirements are related to the 2006A, 2007A, 2009A, 2009B, 2010A, 2010B, 2013A, 2013B, 2014A, and 2015A Series revenue bonds; separate Ohio Water Development Authority (OWDA) contract loans, a capital lease for the Wastewater Engineering Building, and pension liability.

Debt service requirements on the proposed revenue bond issues required during the study period are based upon equal annual principal and interest payments over a period of 25 years at an estimated net effective interest rate of 5.0 percent. Bonds are assumed to be issued on July 1 of each year 2017 through 2021.

As shown in Table 4-5, \$455 million in revenue bonds and \$345 million in low interest loans are projected over the planning period. Debt service payments on low interest loans are assumed to begin two years after issuance.

Table 4-5 Existing and Projected Long-Term Debt Service

Line No.	Description	Issue Amount \$1,000	Projected					
			2016	2017	2018	2019	2020	2021
1	Existing Revenue Bonds		77,952	78,500	60,734	60,735	60,274	60,313
	Proposed Revenue Bonds							
2	2016 Series	0	0	0	0	0	0	0
3	2017 Series	150,000		7,982	10,643	10,643	10,643	10,643
4	2018 Series	100,000			2,956	7,095	7,095	7,095
5	2019 Series	30,000				887	2,129	2,129
6	2020 Series	75,000					2,217	5,321
7	2021 Series	100,000						2,956
8	Total Revenue Bonds	455,000	77,952	86,482	74,334	79,360	82,358	88,458
9	Existing Other Debt (a)		30,918	31,665	31,532	30,446	23,434	23,371
	Proposed Other Debt (a)							
10	2016 Series	195,208	0	0	1,007	12,085	12,085	12,085
11	2017 Series	50,000		0	0	280	3,361	3,361
12	2018 Series	25,000			0	0	140	1,680
13	2019 Series	25,000				0	0	140
14	2020 Series	25,000					0	0
15	2021 Series	25,000						0
16	Total Other Debt	345,208	30,918	31,665	32,539	42,812	39,020	40,638
17	Total Debt Service		108,869	118,147	106,873	122,172	121,378	129,095

(a) Includes OWDA, OPWC, WPCLF bonds, and Note Proceeds.

4.3 REVENUE REQUIREMENT LEVELS

There are three approaches to establishing utility revenue requirements. The first approach identifies the cash requirements of utilities – operation and maintenance expense, principal and interest to satisfy debt service requirements of bonds or loan programs, capital improvements funded from revenues, and deposits to reserve funds. The second addresses the utilities’ financial statements. Operation and maintenance expenses and bond or loan generated debt service interest are the same as in the cash approach. However, the financial statements recognize depreciation of existing assets instead of actual cash spent on capital related items. The third approach addresses covenants that the utilities have made to bond holders, financing agents, or mandated policies in regards to minimum reserve balances. The financial plan presented herein was developed to satisfy annual revenue requirements based on the cash needs of the utility and to sustain appropriate fund balances and coverage requirements.

The pro forma operation statement or cash flow analysis presented in Table 4-6 provides a basis for evaluation of the adequacy of revenues under existing rates to meet the projected revenue requirements of the District for the period 2016 through 2021. Revenue under existing rates, as shown in Line 2, reflect calculated revenue under rates effective January 9, 2015. The indicated increased revenue levels shown on Lines 3 through 7 of Table 4-6 are based on the effective dates and magnitude of required revenue adjustments considered necessary to meet the revenue requirement obligations of the District as well as required revenue bond coverage provisions. The effective amount of increased revenues shown during the first year of each annual rate adjustment includes an allowance for the effect of bill proration and billing lag on revenues to be received.

Total revenue requirements are summarized on Line 22 of Table 4-6. The ending balance/deficit available shown on Line 23 is the projected Operating Reserve end-of-year cash balance from the annual operation of the Utility. Operating reserve requirements are listed on Line 25 and are needed to maintain the mandated two month's expenditures requirement in the Operating Fund. Funds in excess of this requirement are assumed to be transferred to the Surplus Fund, as shown in Line 21.

Presented at the bottom of Table 4-6 is an analysis of the District's ability to provide adequate debt service coverage on revenue bonds and total debt service obligations. The District's current revenue bond rate covenant requires that system net revenues (total revenue less operation and maintenance expense) be sufficient to provide at least 125 percent coverage of the annual revenue bond debt service requirements due each year, and 110 percent coverage of total debt service obligations. The revenue increases projected in this study reflect the level of funding necessary to recover all annual expenditures and maintain revenue bond debt coverage at the District's stated policy level of 150 percent or higher. While the existing revenue bond rate covenant requires a minimum of 125 percent for revenue bond debt coverage, the current District policy is for bond debt coverage to be equal to or greater than 150 percent, and is established to help maintain stability of the District's financial condition while implementing the anticipated size of the final Wet Weather Improvement Program. It is important to note that the projected adjustments include the District's projected capital needs to address on-going system replacement and completion of Phase 1 of the Long Term Control Plan. It also includes assumptions related to annual capital expenditures for Phase 2 of the Long Term Control Plan beginning in 2019. As the District and County continue to develop the requirements, and associated costs, of the Long-Term Control Plan, the evaluation of revenue needs should continue to be evaluated to understand the impact of changes on future revenue.

As shown in Table 4-6, debt service coverage remains above District policy in all years of the study period. While it may appear that projected revenue increases could be reduced and still meet policy levels for debt service coverage, it should be noted that the District continues to plan for how to best complete the Long Term Control Plan, with significant capital obligations (estimated at \$2.015 billion in 2006\$ for years 2019 and beyond). This will require future revenue increases and increased debt. At the same time, annual debt service paid through District rates is currently approximately 40 percent of total revenues. As new debt is issued to fund the capital program, it is expected that the District's debt obligation will grow, and depending on the total length of the WWIP schedule, it could grow substantially. It is important, therefore, for the District's financial condition to remain strong to avoid significant future revenue increases and a potentially untenable debt load.

Table 4-6 Estimated Revenues and Revenue Requirements under Increased Rates ^(a)

Line No.	Description	Projected					
		2016	2017	2018	2019	2020	2021
		\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
Revenues:							
1	Revenue from Rates:						
2	Revenue from Existing Rates	273,220	272,368	271,738	271,323	271,117	271,117
	Increased Revenue						
3	4/1/17 - 4.25%		10,341	11,549	11,531	11,522	11,522
4	1/1/18 - 4.25%			11,076	12,021	12,012	12,012
5	1/1/19 - 4.25%				11,529	12,523	12,523
6	1/1/20 - 4.25%					12,010	13,055
7	1/1/21 - 4.25%						12,521
6	Total Revenue from Rates	273,220	282,709	294,363	306,405	319,185	332,750
8	Other Operating Revenues	4,783	4,783	4,783	4,783	4,783	4,783
9	Pretreatment Monitoring	401	401	401	401	401	401
10	Non Operating Revenues	4,827	4,755	4,872	4,893	4,869	4,894
11	Total Operating Revenues	283,231	292,647	304,419	316,482	329,238	342,829
Revenue Requirements:							
12	O&M Expenses	109,545	113,654	117,697	122,174	125,714	129,452
13	Debt Service Requirements						
14	Existing Revenue Bonds	77,952	78,500	60,734	60,735	60,274	60,313
15	Proposed Revenue Bonds	0	7,982	13,599	18,625	22,084	28,144
16	Total Revenue Bonds	77,952	86,482	74,334	79,360	82,358	88,458
17	Other Existing Debt Obligations	30,918	31,665	31,532	30,446	23,434	23,371
18	Other New Debt Obligations	0	0	1,007	12,365	15,586	17,267
19	Total Debt Service	108,869	118,147	106,873	122,172	121,378	129,095
20	Annual Equipment Purchases	3,414	3,649	3,733	3,819	3,907	3,996
21	Transfer to Surplus Account	79,658	45,116	56,522	75,451	67,581	77,658
22	Total Revenue Requirements	301,487	280,566	284,825	323,616	318,579	340,202
23	Annual Net Balance	(18,256)	12,081	19,594	(7,134)	10,659	2,627
24	Cumulative Annual Balance	63,124	75,205	94,799	87,664	98,323	100,950
25	Minimum Required Operating Balance	18,007	18,683	19,347	20,083	20,665	21,280
Debt Service Coverage:							
26	Net Revenue from Operations	173,685	178,993	186,722	194,307	203,525	213,377
27	Transfer to Surplus Account (b)	0	0	0	0	0	0
28	Connection Fee Revenue	2,674	2,674	2,674	2,674	2,674	2,674
29	Other Interest Income (c)	2,991	3,411	2,955	3,151	3,039	3,112
30	Revenue Available for Coverage	179,350	185,078	192,351	200,132	209,238	219,162
Debt Service Coverage for:							
31	Revenue Bonds	230%	214%	259%	252%	254%	248%
32	Minimum Required	125%	125%	125%	125%	125%	125%
33	MSD Policy	150%	150%	150%	150%	150%	150%
34	Total Debt Service	165%	157%	180%	164%	172%	170%
35	Minimum Required	110%	110%	110%	110%	110%	110%
36	MSD Policy	130%	130%	130%	130%	130%	130%

- (a) Beginning of year account balances at December 2014 represent unencumbered funds available to meet ongoing obligations of the sewer system.
- (b) Equal to one-half of calculated transfer to Surplus Fund, based on current year revenues and expenses. Assumes approval of change to Trust Indenture to eliminate the inclusion of one-half of the calculated transfer to the Surplus Fund in the calculation of debt service coverage.
- (c) Includes interest earnings on cash invested in the Bond Reserve and Surplus Fund accounts.

As shown in Figure 4-1, operation and maintenance expenses and debt service requirements average approximately 77 percent of the District’s total revenue requirements over the planning period. Other requirements include annual equipment purchases and generation of sufficient amounts of net revenues to meet required revenue bond coverage provisions, which is used to provide cash financing of capital improvements.

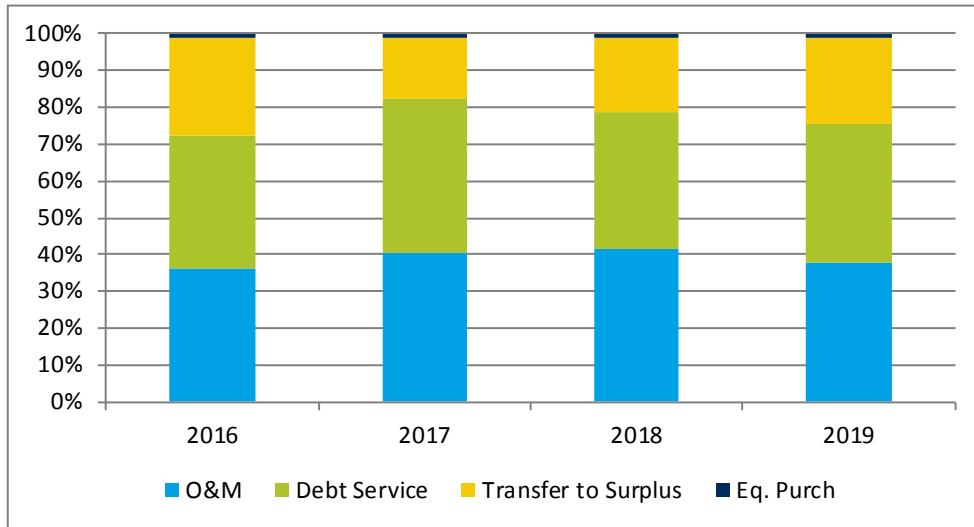


Figure 4-1 Breakdown of Annual Revenue Requirements

Over the planning period, the total revenue requirements of the District are expected to increase, primarily due to the implementation of the capital program. As shown in Figure 4-2, operation and maintenance expenses are projected to increase due to inflation and the impact of the capital program on operations, and debt service costs and funds transferred to the Surplus Fund (to be used for capital funding) are expected to also increase over the study period.

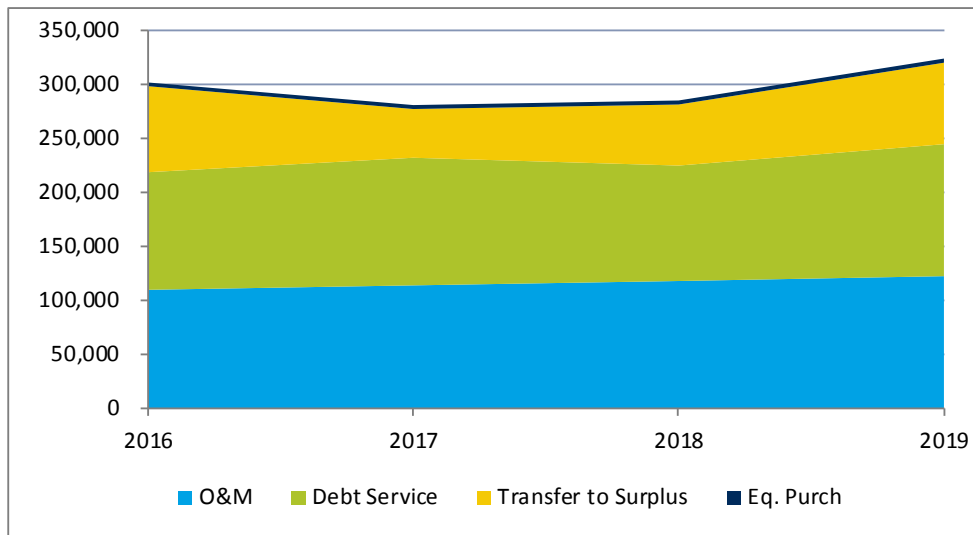


Figure 4-2 Summary of Annual Revenue Requirements

5 Cost of Service Allocation

The revenue requirements to be derived from rates and charges for wastewater service are synonymous with the definition of the cost of service. In developing equitable rate structures, revenue requirements are allocable to the various customer classifications according to the service rendered. Allocations of these requirements to customer classes should take into account the quantity of wastewater contributed, peak rates of wastewater flow, strength of wastewater, number of customers, and other relevant factors. Cost of service considerations must also recognize EPA rules and regulations required under the Federal Clean Water Act, as amended, relating to “user charges” as subsequently discussed.

EPA user charge requirements mandated under the Federal Clean Water Act, which the District must comply with, cover only the O&M expense portion, including replacements, of the total costs. These costs are often referred to as OM&R. The O&M expenses, shown on Line 10, Column 1 of Table 5-1, represent the net expense of the District to be met from user charges and include a portion of the cost burden associated with equipment replacements needed to maintain the expected service life of individual property units as defined by EPA. While the District has established accounting procedures to separately identify equipment replacements once incurred, the District’s budgetary system for forecasting expenditures does not specifically identify equipment replacement costs separately. The total of the net O&M expense amount of \$107,103,000 comprise the total OM&R cost element considered subject to EPA user charge requirements as used in these cost analyses and shown in subsequent tables.

Capital costs consist of debt service on existing and proposed bonds, and additional funding related to capital improvement program requirements. The total annual capital costs for 2016, to be recovered through wastewater charges as shown in column 2 of Table 5-1, is estimated to be \$176,840,000.

The total cost of service to be met from wastewater charges is estimated to be \$283,944,000 as shown on Line 11, Column 3 of Table 5-1.

Table 5-1 Cost of Service to be Recovered from Rates - Test Year 2017

Line No.	Description	O&M Expense \$1,000	Capital Costs \$1,000	Total \$1,000
Revenue Requirements:				
1	Operation and Maintenance Expense	113,654		113,654
2	User Charge Replacements			0
3	Debt Service Requirements		118,147	118,147
4	Capital Outlay (a)		3,649	3,649
4	Total	113,654	121,796	235,450
Less Other Revenue Sources:				
5	Surplus Fund Transfer and Change in Operating Balance		57,197	57,197
6	Other Operating Revenue	(4,783)		(4,783)
7	Pretreatment Monitoring	(401)		(401)
8	Nonoperating Revenue	(1,847)	(2,908)	(4,755)
9	Annualized Revenue Adjustments (b)	480	755	1,235
10	Total	(6,551)	55,045	48,494
11	Total Cost of Service	107,103	176,840	283,944

- (a) Revenue financed capital outlay has been reduced by an amount necessary to fund indicated user charge replacements as required under federal rules and regulations of the Clean Water Act.
- (b) Represents effect of partial year rate adjustment and billing lag following an increase in revenues.

5.1 FUNCTIONAL COST COMPONENTS

In developing an equitable rate structure, revenue requirements are allocated to the various customer classifications according to the cost of service rendered. Customers are classified to reflect groups of customers with similar service requirements who can be served at similar cost. Each class represents a particular type of service requirement or load on the System in terms of customer related infiltration/inflow (I/I), volume related I/I, flow, BOD strength, SS strength, TKN strength, and number of customers served.

As a basis for allocating costs of service among customer classes, costs are first allocated to functional cost components, then allocated to cost categories, and subsequently distributed to customer classes. In this study there are five primary cost components: (1) flow, or volume costs, (2) capacity costs, (3) wastewater strength costs, (4) customer costs, and (5) directly assigned costs.

Volume costs are those which vary directly with the quantity of wastewater contributed and include capital costs related to investment in system facilities which are sized on the basis of wastewater volume, O&M expense related to those facilities, and the expense of volume related treatment chemicals and electric power associated with the volume of wastewater treated.

Capacity related costs include capital costs related to investment in system facilities which are sized on the basis of maximum rates of wastewater flow and the operation and maintenance expense related to those facilities.

Wastewater strength costs consist of the operation and maintenance expense and capital costs related to system facilities which are designed principally on the basis of the quantity of pollutants in the wastewater. Strength costs are further separated into components varying with SS, BOD, and TKN loadings.

Customer costs are those costs which tend to vary in proportion to the number of customers served. These include customer related billing and collection expense.

Pretreatment costs are those costs required for the administration, monitoring, and enforcement of the District's industrial waste monitoring and pretreatment program. These costs vary in proportion to the number of businesses and industries subject to categorical pretreatment standards, and to the degree in which these businesses must be monitored to insure compliance with wastewater discharge requirements. These costs are directly assigned to those customers that incur the cost.

5.2 ALLOCATION TO COST COMPONENTS

Each element of cost is allocated to functional cost components on the basis of the parameter or parameters having the most significant influence on the magnitude of that element of cost. O&M expense items are allocated directly to appropriate cost components, while the allocation of capital and replacement costs is based upon a detailed allocation of related capital investment. The separation of costs into functional components provides a means for distributing such costs to the various classes of customers on the basis of their respective responsibilities for each particular type of service.

In the allocation of O&M expense and investment, costs are allocated directly to cost components to the extent possible. General and administrative cost elements are then allocated on the basis of the allocation of other costs to which they are most nearly related.

5.2.1 Plant Investment, Replacement, and Capital Costs

The estimated test year plant investment in wastewater facilities consists of plant in service as of December 31, 2015, construction work in progress, and the estimated cost of capital improvements through 2015. Allocation of the existing and planned investment in wastewater facilities to functional cost components is shown in Table 5-2.

Table 5-2 Allocation of Plant Investment to Functional Cost Components – Test Year 2017

Line No.	Description	Total	Volume	Capacity	Wastewater Strength			Sewer in Basement
					SS	BOD	TKN	
		\$	\$	\$	\$	\$	\$	\$
Plant in Service:								
1	Major Treatment							
2	Preliminary Treatment	16,843,166	0	16,843,166	0	0	0	0
3	Primary Sedimentation	7,201,304	7,201,304	0	0	0	0	0
4	Pumping	7,117,213	0	7,117,213	0	0	0	0
5	Power	1,141,017	1,141,017	0	0	0	0	0
6	Aeration Basins	9,898,654	4,949,327	0	0	4,652,367	296,960	0
7	Aeration Equipment	5,765,563	0	0	0	5,189,007	576,556	0
8	Secondary Sedimentation	18,232,515	18,232,515	0	0	0	0	0
9	Chlorination/Disinfection	18,756,790	18,756,790	0	0	0	0	0
10	Sludge Handling/Treatment	37,118,913	0	0	18,559,457	17,445,889	1,113,567	0
11	Sludge Dewatering/Disposal	116,881,076	0	0	58,440,538	54,934,106	3,506,432	0
12	Outfall	5,349,422	0	5,349,422	0	0	0	0
13	General Treatment	62,593,802	12,801,486	7,474,871	19,855,075	21,059,037	1,403,334	0
14	Total Major Plant	306,899,435	63,082,439	36,784,673	96,855,069	103,280,405	6,896,849	0
15	Minor Treatment Plants	35,999,161	7,531,283	4,397,565	11,681,003	12,389,310	0	0
16	Laboratory	5,745,723	1,175,097	686,147	1,822,573	1,933,089	128,817	0
17	Collection System	642,479,546	0	642,479,546	0	0	0	0
18	Pumping & Lift Stations	33,383,590	0	33,383,590	0	0	0	0
19	General & Administrative	79,358,922	5,681,634	53,626,547	8,812,201	9,346,551	556,539	1,335,450
20	Sewer in Basement	16,583,034	0	0	0	0	0	16,583,034
21	Total Plant in Service	1,120,449,411	77,470,453	771,358,068	119,170,846	126,949,355	7,582,205	17,918,483
Less								
22	Grants	(5,318,952)	(1,238,181)	(1,487,313)	(934,770)	(1,543,741)	(114,946)	(335)
23	Sewer in Basement	(16,583,034)	0	(50,346,491)	0	0	0	0
25	Total Net Investment	1,098,547,425	76,232,272	719,524,263	118,236,076	125,405,614	7,467,259	17,918,149
26	CWIP (Work in Progress)	321,659,465	62,583,827	229,607,382	12,133,834	15,849,348	1,207,495	277,578
27	Net Investment Plus CWIP	1,386,443,098	138,816,099	949,131,645	130,369,910	141,254,962	8,674,755	18,195,727

The investment in existing plant and capital additions is allocated to cost components on a design or cost causative basis recognizing the principal function governing the design of the facility. For example, raw wastewater pumping and preliminary treatment facilities are basically designed to meet peak hydraulic flow requirements and are allocated to the capacity cost function. Primary and secondary clarifiers, aeration and chlorination basins, are designed in relation to the volume of wastewater flow and detention time and are allocated to the volume cost component. Equipment for aeration facilities are generally designed in accordance with the BOD and TKN strength loadings. Since the sludge which is removed from the wastewater in the treatment process results from the reduction of suspended solids, BOD, and TKN concentrations, the costs associated with sludge handling and disposal facilities are allocated proportionately between the strength cost components.

The investment for general elements of the treatment plant, such as garage and shop facilities, is included in treatment general plant and is allocated in relation to total treatment plant investment in other facilities. The allocation of major treatment plant investment to functional cost components, as shown on Line 14 of Table 5-2 is the sum of the respective allocations of the investment for each individual major treatment plant facility using the methods discussed above.

The investment in other treatment facilities, representing several package and smaller treatment plants, is allocated to cost components based upon estimated functional requirements of the major plants. Collection system facilities including pump and lift stations are basically designed to meet peak hydraulic flow requirements; therefore, the investment in these facilities is allocated entirely to the capacity related cost component. The investment in general plant facilities, including vehicles, furniture, and miscellaneous equipment not directly allocable to a specific cost function, is allocated in relation to the total investment in other system facilities.

The resulting allocation of total net investment shown on Line 27 of Table 5-2 is the basis for recovery of the test year 2017 capital cost of \$176,840,000.

5.3 ALLOCATION OF OPERATION AND MAINTENANCE EXPENSE

Projected operation and maintenance expense for the test year is allocated to cost components in generally the same manner as plant investment. The results of the allocation are shown in Table 5-3.

Treatment plant O&M expenses; excluding electric power, natural gas, and chemical costs, are allocated to the volume, capacity, SS, BOD, TKN, surcharge, and pretreatment related cost components based upon the estimated operating expense associated with each function. Electric power expense for raw wastewater pumping and preliminary treatment, and the cost of chemicals are allocated to the volume component. Costs for sludge handling and disposal are allocated to SS, BOD, and TKN components reflecting the functions for which these costs were incurred. Operation supervision, equipment maintenance, and laboratory expense are allocated on the basis of other allocated treatment operation and maintenance expense less power and chemical costs.

Expenses for the maintenance and repair of the wastewater collection system are allocated to the capacity cost function. Capital projects and engineering related expenses are allocated on the basis of the projected investment in total capital additions. Expenses associated with the industrial waste activities for the laboratory, extra strength surcharge, pretreatment monitoring and surveillance, and septic tank disposal are allocated to cost components in direct proportion to the estimated expense associated with each. Billing and collection expense is allocated to the customer related cost function. General expenses related to Administration and the Director's Office are allocated among cost components in proportion to the total of all other expense, less power, natural gas, and chemical costs.

The total 2017 O&M expense is projected to be \$113,654,200, as shown on Line 23 of Table 5-3.

5.4 SUMMARY OF ALLOCATION TO FUNCTIONAL COST COMPONENTS

Table 5-4 presents a summary of the test year cost of service consisting of the previous allocation of operating expense, replacement, and capital costs to functional cost components.

Table 5-3 Allocation of Operation and Maintenance Expense to Functional Cost Components - Test Year 2017

Line No.	Description	Total	Wastewater Strength							TKN	Cust./Bill.	Surcharge	Pretreatment	Sewer In Basement
			Volume	Capacity	SS	BOD	TKN	TKN	TKN					
Wastewater Treatment:														
1	Office of the Director - 410	8,362,913	964,184	3,179,475	916,565	1,097,156	176,993	493,794	102,361	238,842	1,193,542			
2	Wastewater Engineering - 420	3,716,731	298,176	2,504,675	405,500	42,071	26,071	0	0	0	52,388			
3	Project Delivery - 421	5,941,253	424,367	4,042,060	654,398	693,809	42,074	0	0	0	84,545			
4	Wastewater Administration - 430	9,522,314	521,390	1,719,327	495,640	593,296	95,711	5,267,023	55,352	129,156	645,418			
5	Information Technology - 431	6,643,577	765,957	2,525,805	728,128	871,591	140,605	392,275	81,316	189,738	948,161			
6	Wastewater Treatment - 441	1,309,359	332,210	313,718	291,856	338,702	32,873	0	0	0	0			
7	Wastewater Treatment - 442 (Mill Creek)	20,238,711	4,894,957	2,357,794	5,349,678	6,759,029	877,252	0	0	0	0			
8	Wastewater Treatment - 443 (Little Miami)	7,587,517	1,945,843	1,133,442	1,753,269	2,429,658	325,305	0	0	0	0			
9	Wastewater Treatment - 444 (Muddy Creek)	3,976,254	1,538,782	1,159,623	432,812	845,037	0	0	0	0	0			
10	Wastewater Treatment - 445 (Sycamore)	2,381,669	785,601	695,016	288,044	613,008	0	0	0	0	0			
11	Wastewater Treatment - 446 (Colerain/Taylor Creek)	1,816,707	522,886	515,805	151,274	626,743	0	0	0	0	0			
12	Wastewater Treatment - 447 (Polk Run)	1,777,992	588,750	556,929	156,650	475,663	0	0	0	0	0			
13	MSD Pump Stations - 448	1,482,855	0	1,482,855	0	0	0	0	0	0	0			
14	Wastewater Treatment - 449 (Equipment Main)	7,971,858	2,117,986	1,879,414	1,748,442	2,029,084	196,934	0	0	0	0			
15	Wastewater Collection - 450	21,220,251	142,341	21,077,910	0	863,727	1,381,963	863,727	1,036,473	2,418,436	0			
16	Industrial Waste - 460	7,493,962	929,636	0	0	0	0	0	0	0	0			
17	Sewer in Basement - 470 & 480	12,033,039	0	0	0	0	0	0	0	0	12,033,039			
18	Total O&M Expense	123,476,960	16,773,064	45,143,847	14,235,983	19,184,660	2,777,546	6,153,092	1,275,502	2,976,172	14,957,094			
19	Plus: Incremental O&M Expenses	0	0	0	0	0	0	0	0	0	0			
20	Less: Office Equipment & Motorized Vehicles	(3,648,936)	(420,696)	(1,387,280)	(399,919)	(478,715)	(77,226)	(215,454)	(44,662)	(104,212)	(520,771)			
21	Less: Force Accounts	0	0	0	0	0	0	0	0	0	0			
22	Less: Projected Encumbrance Cancellation	(6,173,848)	(842,516)	(2,254,451)	(712,870)	(963,778)	(139,127)	(305,922)	(63,416)	(147,971)	(743,796)			
23	Total Net O&M Expenditures	113,654,176	15,509,852	41,502,116	13,123,195	17,742,166	2,561,192	5,631,716	1,167,424	2,723,989	13,692,526			

Table 5-4 Summary of Allocation to Functional Cost Components – Test Year 2017

Line No.	Cost Component	Operating Expense	Capital Costs	Total Cost of Service
		\$	\$	\$
1	Volume Related Cost	14,670,607	17,705,942	32,376,549
2	Capacity Related Cost	39,256,419	121,061,387	160,317,807
3	Strength Related Cost			
4	Suspended Solids	12,413,093	16,628,633	29,041,726
5	BOD	16,782,130	18,017,018	34,799,148
6	TKN	2,422,605	1,106,462	3,529,067
7	Customer Cost	5,326,981	0	5,326,981
	Industrial Monitoring & Surveillance			
8	Surcharge	1,104,254	0	1,104,254
9	Pretreatment	2,175,592	0	2,175,592
10	Sewer In Basement	12,951,618	2,320,858	15,272,476
11	Total Cost of Service	107,103,300	176,840,300	283,943,600

5.5 DISTRIBUTION OF COSTS TO CUSTOMER CLASSES

The total cost responsibility of each class of service may be established by developing unit costs of service for each cost function and assigning those costs to the customer classes based on the respective service requirements of each class.

5.5.1 Customer Classifications

Wastewater customers have been separated into several principal categories including residential, commercial, industrial, multifamily, surcharge, septic tank disposal, and sewer-in-basement. Each class represents a particular type of service requirement or load on the system in terms of wastewater volume, capacity, strength, number of customers served, and direct cost responsibility. The individual customers are billed on either a quarterly or monthly billing period.

As previously discussed, residential, multi-family, commercial and industrial customer classification is based upon information provided in GCWW billing data. The surcharge category represents customers billed for excess strength waste discharges to the wastewater system. The septic tank disposal category represents customers billed per thousand gallons for excess strength waste related to septic haulers that dispose of waste at a receiving station at the wastewater treatment plant.

5.5.2 Units of Service

The determination of customer class responsibility for costs of service requires that each general customer class be allocated a portion of the volume, capacity, strength, and customer costs of service according to its respective service requirements, and that all costs directly associated with a specific customer class be allocated to that class.

Volume related costs vary with and are allocated on the basis of the volume of wastewater conveyed and treated by the wastewater system. Capacity related costs are those associated with providing maximum capacity for the conveyance of wastewater, and are distributed to customer classes on the

basis of estimated maximum rates of wastewater flow. Strength costs are related to the function of reducing wastewater SS, BOD, and TKN concentrations and are allocated to customer classes in proportion to respective strength loadings. Customer costs, which consist of billing and collection costs, are allocated on the basis of the number of customer equivalent bills.

The estimated test year service requirements or units of service for the various customer classes are shown in Table 5-5. Estimates of annual wastewater volume and number of bills are based on projections of the number of wastewater customers and their corresponding water use, adjusted to exclude exempted water used but not discharged to the wastewater system. Historical data and information regarding wastewater customers and water use were provided from utility records. An analysis of wastewater bills rendered during a recent period was used as a basis for estimating the wastewater volume of each customer class during the test year.

Wastewater collected and treated by the District consists of two elements: (1) contributed sanitary wastewater flow, and (2) infiltration/ inflow (I/I) of ground water and stormwater runoff into the sewers. Contributed wastewater flow is that portion of the annual water use or other discharge of each customer class which enters the sanitary wastewater system. Estimates of the contributed volume of each class is generally based upon wastewater billing records that exclude estimated water use not reaching the wastewater system, such as that used for lawn sprinkling and car washing or included in manufactured products.

Table 5-5 Estimated Units of Service – Test Year 2017

Line No.	Description	Residential	Commercial	Industrial	Multi Family	Surcharge	Septic Tank Disposal	Sewer in Basement	Total
1	Wastewater Volume - 1,000 Ccf								
2	Contributed Wastewater Volume	11,578	7,180	5,870	6,672				31,301
3	Infiltration/Inflow	31,109	10,921	4,560	9,047				55,638
4	Total	42,688	18,102	10,430	15,719				86,939
5	Wastewater Capacity Flow Rate - Ccf/day								
6	Contributed Wastewater Volume	47,582	29,508	24,123	27,420				128,633
7	Infiltration/Inflow	255,692	89,763	37,477	74,360				457,292
8	Total	303,274	119,271	61,600	101,780				585,925
	Wastewater Strength - 1,000 pounds								
9	Suspended Solids	38,993	18,957	12,772	16,927	4,106	6,171		97,926
10	BOD	21,246	11,347	8,322	10,301	23,405	4,187		78,808
11	TKN	3,024	1,353	833	1,189	1,096	383		7,878
	Customer Billing Units								
12	Equivalent Bills	2,278,310	180,480	5,460	259,260	1,104			2,724,614
13	Sewer In Basement							319,500	319,500

Ccf - Hundred cubic feet
Ccf/day - Hundred cubic feet per day

Based on an evaluation of historical plant loading data, it is estimated that the amount of flow entering the sewers through I/I will average 65 percent of the total wastewater flow reaching the treatment plants. Each customer class should bear its proportionate share of the costs associated with I/I as the wastewater system must be adequate to convey and process the total flow. Recognizing that the major cost responsibility for I/I is allocable on an individual connection basis, three-fourths of the I/I volume is allocated to customer classes based on estimated customer equivalent connections with the remaining one-fourth allocated on the basis of contributed volume.

The responsibility for collection system capacity cost varies with the estimated peak flow rates of contributed wastewater and infiltration attributable to each customer class. Infiltration/inflow is estimated to comprise 75 percent of the total peak flow.

The SS, BOD, and TKN responsibility of each customer class is based on estimated average domestic strength concentrations and contributed wastewater volume for each class. Average SS, BOD, and TKN concentrations of contributed domestic sewage are estimated to be 271 mg/l, 200 mg/l, and 15 mg/l, respectively. Average SS, BOD, and TKN concentrations of septic tank disposal are estimated to be 20,913 mg/l, 14,190 mg/l, and 1,296 mg/l, respectively. An average I/I strength allowance of 100 mg/l, 35 mg/l and 10 mg/l for SS, BOD and TKN respectively was also used to balance total wastewater loadings contributed by normal and excess strength users with the total wastewater loadings received at the treatment plants.

Suspended solids, BOD, and TKN strengths in excess of normal domestic limits are assigned to a surcharge classification, and are shown separately in Table 5-5. The estimates of excess strength quantities for surcharge customers are based on extra strength data provided by historical surcharge billings of the District.

The annual number of equivalent bills applicable to each class of wastewater service is based upon the respective number of bills rendered and estimated ratios of average billing and collection costs of various sized meters to that of a 5/8 inch meter.

5.6 COST OF SERVICE ALLOCATIONS

The costs of service are distributed to the various customer classes by applying the unit costs of service to respective service requirements. The test year unit cost of service for each functional cost component is based on the total cost divided by the applicable units of service as shown in Table 5-6. The total unit costs of service applied to the respective requirements for each customer class results in the total cost of service for each customer class.

5.7 ADEQUACY OF EXISTING RATES TO MEET COST OF SERVICE

Presented in Table 5-7 is a comparison of the allocated cost of service and revenue under existing rates by individual customer class and for the system in total.

The indicated revenue increase required over existing rates for each domestic user class (residential, commercial, industrial and multifamily) indicates where emphasis should be directed in the subsequent rate design of sewer service charges. Pretreatment related fees will need to be modified to recover the total costs of the District's industrial pretreatment program.

The \$11,576,000, or 4.25 percent, overall increase in the level of wastewater service revenues is considered necessary to meet the projected revenue requirements for the 2017 test year (includes necessary adjustment to reflect delays in billing due to quarterly billing cycle). This overall level of revenue needs to be produced by the proposed rates developed and presented in subsequent sections of this report.

Table 5-6 Unit Costs of Service and Customer Class Allocation – Test Year 2017

Line No.	Description	Total \$	Volume \$	Capacity \$	Wastewater Strength			Billing \$	Industrial Monitoring & Surveillance \$	Sewer In Basement \$
					SS \$	BOD \$	TKN \$			
Cost of Service:										
1	Operation & Maintenance Expense	107,103,300	14,670,607	39,256,419	12,413,093	16,782,130	2,422,605	5,326,981	3,279,846	12,951,618
2	Replacement Costs	0	0	0	0	0	0	0	0	0
3	Subtotal	107,103,300	14,670,607	39,256,419	12,413,093	16,782,130	2,422,605	5,326,981	3,279,846	12,951,618
3	Other Capital Costs	176,840,300	17,705,942	121,061,387	16,628,633	18,017,018	1,106,462	0	0	2,320,858
4	Total Cost of Service	283,943,600	32,376,549	160,317,807	29,041,726	34,799,148	3,529,067	5,326,981	3,279,846	15,272,476
Units of Service:										
5	Total Units		86,938,503 Ccf	585,925 Ccf/day	97,926 1,000 lbs.	78,808 1,000 lbs.	7,878 1,000 lbs.	2,724,614 Eq. Bills		319,500 Connections
Unit Cost of Service:										
6	Operation & Maintenance Expense		0.1687	66.9991	126.7597	212.9494	307.5334	1.9551		40.54
7	Replacement Costs		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.00
8	Subtotal		0.1687	66.9991	126.7597	212.9494	307.5334	1.9551		40.54
9	Other Capital Costs		0.2037	206.6158	169.8078	228.6190	140.4579	0.0000		7.26
10	Total Unit Cost of Service		0.3724	273.6149	296.5675	441.5684	447.9913	1.9551		47.80
Allocation to Customer Classes:										
Residential										
11	Units of Service		42,687,715	303,274	38,993	21,246	3,024	2,278,310		
12	OM&R Costs	42,373,934	7,203,422	20,319,070	4,942,740	4,524,323	929,981	4,454,398		
13	Other Capital Costs	83,258,314	8,693,803	62,661,213	6,621,316	4,857,238	424,745	0		
14	Total	125,632,248	15,897,224	82,980,283	11,564,056	9,381,561	1,354,726	4,454,398		
Commercial										
15	Units of Service		18,101,568	119,271	18,957	11,347	1,353	180,480		
16	OM&R Costs	16,633,903	3,054,584	7,991,044	2,402,983	2,416,337	416,093	352,862		
17	Other Capital Costs	34,333,078	3,686,575	24,643,278	3,219,047	2,594,139	190,040	0		
18	Total	50,966,982	6,741,159	32,634,322	5,622,030	5,010,476	606,132	352,862		
Industrial										
19	Units of Service		10,429,955	61,600	12,772	8,322	833	5,460		
20	OM&R Costs	9,545,154	1,760,023	4,127,142	1,618,974	1,772,165	256,175	10,675		
21	Other Capital Costs	19,040,060	2,124,170	12,727,536	2,168,785	1,902,567	117,001	0		
22	Total	28,585,214	3,884,193	16,854,677	3,787,760	3,674,732	373,177	10,675		
Multifamily										
23	Units of Service		15,719,266	101,780	16,927	10,301	1,189	259,260		
24	OM&R Costs	14,683,539	2,652,578	6,819,163	2,145,661	2,193,592	365,657	506,888		
25	Other Capital Costs	29,627,099	3,201,394	21,029,360	2,874,337	2,355,004	167,004	0		
26	Total	44,310,639	5,853,972	27,848,524	5,019,998	4,548,596	532,662	506,888		
Surcharge										
27	Units of Service				4,106	23,405	1,096	1,104		
28	OM&R Costs	6,947,975			520,475	4,984,023	337,065	2,158	1,104,254	
29	Other Capital Costs	6,201,941			697,231	5,350,764	153,946	0		
30	Total	13,149,916			1,217,706	10,334,787	491,011	2,158	1,104,254	
Industrial Pretreatment (a)										
31	Units of Service									
32	OM&R Costs	2,175,592							2,175,592	
33	Other Capital Costs	0								
34	Total	2,175,592							2,175,592	
Septic Tank Disposal										
35	Units of Service				6,171	4,187	383			
36	OM&R Costs	1,791,584			782,259	891,691	117,633			
37	Other Capital Costs	2,058,949			1,047,918	957,305	53,726			
38	Total	3,850,533			1,830,178	1,848,996	171,359			
Sewer In Basement										
39	Units of Service									319,500
40	OM&R Costs	12,951,618								12,951,618
41	Other Capital Costs	2,320,858								2,320,858
42	Total	15,272,476								15,272,476
43	Total Cost of Service	283,943,600	32,376,549	160,317,807	29,041,726	34,799,148	3,529,067	5,326,981	3,279,846	15,272,476

Ccf - 100 cubic feet
Ccf/day - Hundred cubic feet per day

(a) Industrial Pretreatment is net revenue received for Pretreatment Monitoring (Table 3-5 Line 4).

Table 5-7 Comparison of Allocated Cost of Service with Revenues under Existing Rates - Test Year 2017

Line No.	Cost Component	Revenue Under Existing Rates	Total Cost of Service	Adjusted Cost of Service	Indicated Revenue Increase Required	Indicated Revenue Adjustment
		\$	\$	\$	\$	%
1	Residential	117,223,451	125,632,248	135,073,986	\$ 17,850,535	15.23%
2	Commercial	48,835,753	50,966,982	53,826,314	\$ 4,990,561	10.22%
3	Industrial	31,944,824	28,585,214	29,306,931	\$ (2,637,893)	-8.26%
4	Multifamily	52,379,645	44,310,639	46,560,328	\$ (5,819,317)	-11.11%
5	Surcharge	20,192,310	15,325,509	15,325,509	\$ (4,866,801)	-24.10%
6	Septic Tank Disposal	1,792,000	3,850,533	3,850,533	\$ 2,058,533	114.87%
7	Sewer In Basement	0	15,272,476	0	0	
8	Total	272,367,983	283,943,600	283,943,600	11,575,617	4.25%

6 Proposed Wastewater Rate Adjustments

The initial consideration in the derivation of rate schedules for utility service is the establishment of equitable charges to the customers commensurate with the cost of providing that service. While the cost of service allocations to customer classes should not be construed as literal or exact determinations, they offer a guide to the necessity for, and the extent of, rate adjustments. Practical considerations sometimes modify rate adjustments by taking into account additional factors such as the extent of change from previous rate levels, existing contracts, and past local policies and practices.

6.1 EXISTING RATES

A summary of the existing sewer rates was presented earlier in Table 3-3 of the Revenue Requirements chapter. The existing schedule of sewerage service charges provides for a monthly or quarterly minimum charge depending on a customer's meter size or number of family unit equivalents and a commodity charge. The minimum charge includes a corresponding usage allowance of either 500 cubic feet per month or 900 cubic feet per quarter. For usage above the minimum allowance a commodity charge is assessed.

For residential customers consisting of one and two family units, the quarterly service charges are applicable to metered water use during the current billing period or a winter quarter billing period, whichever is less. The winter period represents the quarterly billing period most closely corresponding to usage during the months of October through April. All non-residential customers are billed on the basis of actual water used throughout the year with consideration given to either water used but not discharged to the wastewater system, or wastewater contributed from other sources such as wells or other water suppliers.

A sewerage surcharge is levied on customers contributing quantities of high strength wastes to the wastewater system. The existing surcharge is attributable to a customer's strength concentrations of suspended solids, BOD, and TKN in excess of the range of normal strength wastewater. Strength wastewater limits are presently defined by the District Cost of Service Rates as not exceeding 300 mg/l of suspended solids, 240 mg/l of BOD, and 25 mg/l of TKN. The existing sewerage surcharge rates, as shown in Table 4-3, are expressed as unit charges per hundred cubic feet (Ccf) for each mg/l of strength above the normal limits. To the extent that the strength of any pollutant parameter is less than 80 percent of the corresponding value for normal strength wastewater limits contributed by customers and described in the units of service section, a credit is allowed as an offset against surcharges otherwise due.

The existing fee for septic tank haulers is based on the size of the tank charged per thousand gallons and is intended to represent the cost of treating high concentrations of suspended solids, BOD, and TKN found in each tank hauled to a receiving station at the wastewater treatment plant.

6.2 PROPOSED WASTEWATER RATE ADJUSTMENTS

The overall level of revenue requirements and cost of service allocations described in this report provide information for adjusting wastewater rates. The preceding cost of service allocation sections of the report illustrates the changes needed to recover costs of service from customer classes served and provide the total level of revenue required. Each alternative rate structure has been developed

assuming all customers move to monthly billing. In addition, all scenarios assume that multi-family customers will be billed solely based on meter size (elimination of “the greater of either the meter size or number of units). Two alternative rate schedules were developed for consideration, Each option is discussed below.

6.2.1 Option 1: Cost of Service

Table 6-1 presents a schedule of sewerage service charges, designed based on:

- all customers being billed monthly
- the service charge for multifamily customers is now based on actual meter size only
- the minimum charge per month includes the first 300 cubic feet of contributed wastewater volume per month (versus existing rate structure of 900 cubic feet per quarter or 500 cubic feet per month).

The calculated rates reflect those necessary to recover cost of service by customer class. Table 6-2 presents the schedule of sewerage surcharges and septic tank disposal charges, based on cost of service.

Table 6-1 Sewerage Service Charges – Option 1 - Test Year 2017

Minimum Charge

The minimum charge shall be based on the size of the water meter used to serve the premises, or the size of the premise served.

The minimum charge shall include the allowance for the first 300 cubic feet of water used for monthly bills.

The minimum charge rates shall be as follows:

Meter Size Inches	Monthly Bills	
	OM&R	Total
5/8"	\$ 15.50	\$ 40.31
3/4"	\$ 20.27	\$ 53.68
1"	\$ 26.95	\$ 72.40
1 1/2"	\$ 46.03	\$ 125.89
2"	\$ 65.11	\$ 179.37
3"	\$ 149.06	\$ 414.72
4"	\$ 244.47	\$ 682.15
6"	\$ 482.97	\$ 1,350.75
8"	\$ 721.48	\$ 2,019.34
10"	\$ 959.99	\$ 2,687.93
12"	\$ 1,103.09	\$ 3,089.08

Commodity Charge

The commodity charge shall be based on the quantity of water used on the premises served as same is measured by a water meter or meters therein used, which meters must be acceptable to the Municipality that collects such charge.

The commodity charges for each 100 cubic feet (Ccf) consumed are as follows:

	Minimum	
	OM&R	Total
First 300 cubic feet per month -		
Next 4,700 cubic feet per month -	\$ 1.325	\$ 7.242 /Ccf
Over 5,000 cubic feet per month -	\$ 1.325	\$ 3.860 /Ccf

Basis of Charge

For residential water service accounts (one and two family residences) a monthly minimum and commodity charge shall be based upon water used during a winter quarterly billing period. Said winter period being the monthly billing period most closely corresponding to usage during the months of October through April. Said charges shall be payable with each bill rendered throughout the year.

All non-residential customers shall be charged based upon the water used during a billing period that is subject to a sewerage charge. The District will consider applications, fully supported, for adjustment due to nonsewered water use. All well water and water reaching the system from other sources will be considered in the basis for charge.

Table 6-2 Sewerage Surcharges and Septic Tank Disposal Charges – Option 1 - Test Year 2017

Proposed Sewerage Surcharges - Test Year 2017

For customers having high strength waste discharge, the surcharge, which is in addition to other sewerage service charges, shall be computed on the following basis:

Suspended Solids (TSS)	\$ 0.002295	per 100 cubic feet for each mg/l of SS strength above 300 mg/l
Biochemical Oxygen Demand (BOD)	\$ 0.003502	per 100 cubic feet for each mg/l of BOD strength above 240 mg/l
Nitrogen Oxygen Demand (TKN)	\$ 0.003874	per 100 cubic feet for each mg/l of Total Kjeldahl Nitrogen (TKN) strength above 25 mg/l.

Provision

Provided, however, that to the extent the strength of a pollutant is less than eighty percent (80%) of the corresponding value for normal strength sewage, a credit shall be allowed as an offset against surcharge otherwise due, the credit shall be calculated by multiplying the above specified surcharge rate for the pollutant in question times the difference between actual pollutant concentration in mg/l and eighty percent (80%) of the corresponding value for normal sewage. No credit shall be allowed in excess of surcharge otherwise due.

Suspended Solids (TSS)	\$ 0.3678	per pound of excess strength
Biochemical Oxygen Demand (BOD)	\$ 0.5612	per pound of excess strength
Nitrogen Oxygen Demand (TKN)	\$ 0.6208	per pound of excess strength

Proposed Septic Tank Disposal Charge - Test Year 2017

The fee for septic tank haulers is based on the size of the tank charged per thousand gallons and is intended to represent the cost of treating high concentrations of suspended solids, BOD, and TKN found in each tank hauled to a receiving station at the wastewater treatment plant. Each septic hauler shall pay the following cost per thousand gallons per load.

All Haulers	\$ 108.86	per 1,000 gallons
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6.2.1.1 Revenue Recovery under Option 1 Rates

As previously discussed, the Option 1 rate schedule would recover the necessary 4.25 percent increase in revenue required by the utility, while achieving cost of service for each customer class, based on the rate structure changes outlined above. , as shown in Table 6-3. It is important to note that because the existing rate schedule is the same for all customer classes, it is not possible to achieve 100 percent cost recovery by customer class.

Table 6-3 Comparison of Allocated Cost of Service with Revenue under Option 1 Rates

Line No.	Customer Class	Total Adjusted Cost of Service \$	Revenue Under Existing Rates \$	Revenue Under Proposed Rates \$	Cost of Service Recovery Under Proposed Rates %
1	Residential	135,073,986	117,223,451	130,666,389	96.74%
2	Commercial	53,826,314	48,835,753	55,863,752	103.79%
3	Industrial	29,306,931	31,944,824	27,905,310	95.22%
4	Multifamily	46,560,328	52,379,645	50,331,873	108.10%
5	Surcharge	15,325,509	20,192,310	15,325,743	100.00%
6	Septic Tank Disposal	3,850,533	1,792,000	3,850,533	100.00%
7	Total	283,943,600	272,367,983	283,943,600	100.00%

6.2.1.2 Typical Bills under Option 1

A comparison of typical bills under the proposed schedule of sewerage service charge rates with those under existing rates is shown in Table 6-4.

Table 6-4 Typical Customer Sewer Bills under Existing and Option 1 Rates

Meter Size Inches	Usage Ccf	Existing	Proposed 2017		
		Bill \$	Bill \$	Increase \$	Increase %
Former Quarterly Shown Monthly for Comparison Only					
5/8"	0	39.12	40.31	1.19	3.05%
5/8"	1	39.12	40.31	1.19	3.05%
5/8"	2	39.12	40.31	1.19	3.05%
5/8"	3	39.12	40.31	1.19	3.05%
5/8"	4	45.00	47.55	2.56	5.68%
5/8"	6	56.75	62.04	5.28	9.31%
5/8"	7	62.63	69.28	6.64	10.61%
5/8"	8	68.51	76.52	8.01	11.69%
3/4"	10	91.59	104.37	12.78	13.95%
3/4"	15	120.99	140.58	19.59	16.19%
1"	25	198.48	231.72	33.23	16.74%
1"	30	227.88	267.93	40.05	17.57%
1 1/2"	50	393.82	466.25	72.43	18.39%
2"	60	489.77	558.33	68.56	14.00%
2"	100	677.81	712.71	34.90	5.15%
3"	150	1,173.58	1,141.04	(32.54)	-2.77%
3"	300	1,878.73	1,719.98	(158.75)	-8.45%
4"	1,600	8,270.30	7,004.89	(1,265.41)	-15.30%
6"	3,300	16,934.29	14,234.81	(2,699.48)	-15.94%
8"	6,600	33,153.46	27,640.08	(5,513.38)	-16.63%
10"	6,600	33,854.78	28,308.67	(5,546.11)	-16.38%
12"	6,600	34,285.61	28,709.82	(5,575.79)	-16.26%
Former Monthly for Comparison Only					
5/8"	0	59.54	40.31	(19.23)	-32.29%
5/8"	3	59.54	40.31	(19.23)	-32.29%
5/8"	6	65.42	62.04	(3.38)	-5.17%
5/8"	9	83.05	83.76	0.71	0.85%
5/8"	12	100.69	105.49	4.80	4.76%
5/8"	18	135.96	148.94	12.97	9.54%
5/8"	20	147.72	163.42	15.70	10.63%
5/8"	25	177.12	199.63	22.51	12.71%
3/4"	30	215.47	249.21	33.74	15.66%
3/4"	50	333.05	394.04	61.00	18.31%
1"	75	470.22	509.25	39.03	8.30%
1"	100	587.75	605.74	18.00	3.06%
1 1/2"	150	870.56	852.21	(18.34)	-2.11%
2"	200	1,157.00	1,098.67	(58.32)	-5.04%
2"	300	1,627.10	1,484.63	(142.46)	-8.76%
3"	500	2,839.04	2,491.90	(347.13)	-12.23%
3"	1,000	5,189.54	4,421.70	(767.83)	-14.80%
4"	5,000	24,294.59	20,127.53	(4,167.05)	-17.15%
6"	10,000	48,526.61	40,094.13	(8,432.47)	-17.38%
8"	20,000	96,259.98	79,358.72	(16,901.25)	-17.56%
10"	20,000	97,020.01	80,027.31	(16,992.69)	-17.51%
12"	20,000	97,508.34	80,428.46	(17,079.87)	-17.52%

6.2.2 Option 2: “Average Residential Bill Impact = System-wide Revenue Increase” with Septic Hauler Rate Increased at System-wide Revenue Increase and No Change to Sewerage Surcharges

Table 6-5 presents a schedule of sewerage service charges that is designed based on:

- All customers billed monthly
- The service charge for multi-family customers based on actual meter size only
- The minimum charge per month includes the first 300 cubic feet of contributed wastewater volume per month

The minimum charge rates were designed to move to monthly billing while keeping the increase in the bill for the average residential customer (based on calculated average quarterly volume of 17 Ccf) near the system revenue increase of 4.25 percent. It is important to note that this results in a reduction in minimum charge revenue from 54% to 47% as shown on Table 7-1. Service Septic tank disposal rates were increased by 4.25 percent. Surcharge rates were held constant, allowing surcharge rates to continue to move toward cost of service. The volume charge was then adjusted to recover 100% of costs. This results in an overall system increase of 4.25 percent. Table 6-6 presents the schedule of sewerage surcharges and septic tank disposal rates.

Table 6-5 Sewerage Service Charges – Option 2 - Test Year 2017

Minimum Charge

The minimum charge shall be based on the size of the water meter used to serve the premises, or the size of the premise served.

The minimum charge shall include the allowance for the first 300 cubic feet of water used for monthly bills.

The minimum charge rates shall be as follows:

Meter Size Inches	Monthly Bills	
	OM&R	Total
5/8"	\$ 23.17	\$ 39.06
3/4"	\$ 25.91	\$ 44.93
1"	\$ 32.92	\$ 57.82
1 1/2"	\$ 49.42	\$ 89.15
2"	\$ 67.44	\$ 122.86
3"	\$ 140.44	\$ 301.12
4"	\$ 234.27	\$ 498.61
6"	\$ 453.66	\$ 975.54
8"	\$ 673.08	\$ 1,450.07
10"	\$ 907.68	\$ 1,948.65
12"	\$ 1,063.63	\$ 2,268.99

Commodity Charge

The commodity charge shall be based on the quantity of water used on the premises served as same is measured by a water meter or meters therein used, which meters must be acceptable to the Municipality that collects such charge.

The commodity charges for each 100 cubic feet (Ccf) consumed are as follows:

	Minimum	
	OM&R	Total
First 300 cubic feet per month -		
Next 4,700 cubic feet per month -	\$ 2.806	\$ 6.701 /Ccf
Over 5,000 cubic feet per month -	\$ 2.806	\$ 5.359 /Ccf

Basis of Charge

For residential water service accounts (one and two family residences) a monthly minimum and commodity charge shall be based upon water used during a winter quarterly billing period. Said winter period being the monthly billing period most closely corresponding to usage during the months of October through April. Said charges shall be payable with each bill rendered throughout the year.

All non-residential customers shall be charged based upon the water used during a billing period that is subject to a sewerage charge. The District will consider applications, fully supported, for adjustment due to nonsewered water use. All well water and water reaching the system from other sources will be considered in the basis for charge.

Table 6-6 Sewerage Surcharges and Septic Tank Disposal Charges – Option 2 - Test Year 2017

Proposed Sewerage Surcharges - Test Year 2017

For customers having high strength waste discharge, the surcharge, which is in addition to other sewerage service charges, shall be computed on the following basis:

Suspended Solids (TSS)	\$ 0.002756	per 100 cubic feet for each mg/l of SS strength above 300 mg/l
Biochemical Oxygen Demand (BOD)	\$ 0.004707	per 100 cubic feet for each mg/l of BOD strength above 240 mg/l
Nitrogen Oxygen Demand (TKN)	\$ 0.004122	per 100 cubic feet for each mg/l of Total Kjeldahl Nitrogen (TKN) strength above 25 mg/l.

Provision

Provided, however, that to the extent the strength of a pollutant is less than eighty percent (80%) of the corresponding value for normal strength sewage, a credit shall be allowed as an offset against surcharge otherwise due, the credit shall be calculated by multiplying the above specified surcharge rate for the pollutant in question times the difference between actual pollutant concentration in mg/l and eighty percent (80%) of the corresponding value for normal sewage. No credit shall be allowed in excess of surcharge otherwise due.

Suspended Solids (TSS)	\$ 0.4417	per pound of excess strength
Biochemical Oxygen Demand (BOD)	\$ 0.7543	per pound of excess strength
Nitrogen Oxygen Demand (TKN)	\$ 0.6606	per pound of excess strength

Proposed Septic Tank Disposal Charge - Test Year 2017

The fee for septic tank haulers is based on the size of the tank charged per thousand gallons and is intended to represent the cost of treating high concentrations of suspended solids, BOD, and TKN found in each tank hauled to a receiving station at the wastewater treatment plant. Each septic hauler shall pay the following cost per thousand gallons per load.

All Haulers	\$ 52.13	per 1,000 gallons
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6.2.2.1 Revenue Recovery under Option 2 Rates

As previously discussed, the Option 2 rates for the minimum charge rates were designed to move to monthly billing while keeping the average residential customer’s bill increase at approximately the system revenue increase of 4.25 percent.. The volume charge was then adjusted to recover 100% of costs. The sewerage surcharge rates were held flat and the septic tank disposal rates were increased by 4.25%. This results in an overall system increase of 4.25 percent. The comparison of adjusted cost of service and revenue under proposed rates by customer class, is indicated in Table 6-7.

Table 6-7 Comparison of Allocated Cost of Service with Revenue under Option 2 Rates

Line No.	Customer Class	Total Adjusted Cost of Service	Revenue Under Existing Rates	Revenue Under Proposed Rates	Cost of Service Recovery Under Proposed Rates
		\$	\$	\$	%
1	Residential	135,053,884	117,223,451	123,445,189	91.40%
2	Commercial	53,795,420	48,835,753	53,709,544	99.84%
3	Industrial	29,272,589	31,944,824	34,658,787	118.40%
4	Multifamily	46,529,920	52,379,645	50,093,969	107.66%
5	Surcharge	15,412,709	20,192,310	20,192,310	131.01%
6	Septic Tank Disposal	3,879,080	1,792,000	1,843,802	47.53%
7	Total	283,943,600	272,367,983	283,943,600	100.00%

6.2.2.2 Typical Bills under Option 2

A comparison of typical bills under the proposed schedule of sewerage service charge rates with those under existing rates is shown in Table 6-8.

Table 6-8 Typical Customer Sewer Bills under Existing and Option 2 Rates

Meter Size Inches	Usage Ccf	Existing	Proposed 2017		
		Bill \$	Bill \$	Increase \$	Increase %
Former Quarterly Shown Monthly for Comparison Only					
5/8"	0	39.12	39.06	(0.06)	-0.14%
5/8"	1	39.12	39.06	(0.06)	-0.14%
5/8"	2	39.12	39.06	(0.06)	-0.14%
5/8"	3	39.12	39.06	(0.06)	-0.14%
5/8"	4	45.00	45.76	0.77	1.70%
5/8"	6	56.75	59.16	2.41	4.24%
5/8"	7	62.63	65.86	3.23	5.16%
5/8"	8	68.51	72.56	4.05	5.91%
3/4"	10	91.59	91.83	0.24	0.26%
3/4"	15	120.99	125.34	4.35	3.60%
1"	25	198.48	205.24	6.75	3.40%
1"	30	227.88	238.74	10.86	4.77%
1 1/2"	50	393.82	404.08	10.27	2.61%
2"	60	489.77	491.38	1.61	0.33%
2"	100	677.81	705.73	27.92	4.12%
3"	150	1,173.58	1,151.92	(21.65)	-1.85%
3"	300	1,878.73	1,955.73	77.00	4.10%
4"	1,600	8,270.30	9,119.53	849.23	10.27%
6"	3,300	16,934.29	18,706.25	1,771.96	10.46%
8"	6,600	33,153.46	36,864.49	3,711.03	11.19%
10"	6,600	33,854.78	37,363.07	3,508.29	10.36%
12"	6,600	34,285.61	37,683.41	3,397.80	9.91%
Former Monthly for Comparison Only					
5/8"	0	59.54	39.06	(20.48)	-34.39%
5/8"	3	59.54	39.06	(20.48)	-34.39%
5/8"	6	65.42	59.16	(6.25)	-9.56%
5/8"	9	83.05	79.26	(3.79)	-4.56%
5/8"	12	100.69	99.37	(1.32)	-1.31%
5/8"	18	135.96	139.57	3.61	2.65%
5/8"	20	147.72	152.97	5.25	3.55%
5/8"	25	177.12	186.48	9.36	5.28%
3/4"	30	215.47	225.85	10.38	4.82%
3/4"	50	333.05	359.86	26.82	8.05%
1"	75	470.22	506.72	36.50	7.76%
1"	100	587.75	640.69	52.94	9.01%
1 1/2"	150	870.56	939.95	69.40	7.97%
2"	200	1,157.00	1,241.60	84.60	7.31%
2"	300	1,627.10	1,777.47	150.37	9.24%
3"	500	2,839.04	3,027.47	188.43	6.64%
3"	1,000	5,189.54	5,706.82	517.28	9.97%
4"	5,000	24,294.59	27,339.11	3,044.52	12.53%
6"	10,000	48,526.61	54,609.54	6,082.93	12.54%
8"	20,000	96,259.98	108,671.07	12,411.09	12.89%
10"	20,000	97,020.01	109,169.65	12,149.64	12.52%
12"	20,000	97,508.34	109,489.99	11,981.65	12.29%

6.2.3 Option 3: Option 2 Adjusted to Eliminate Minimum Allowance

Table 6-9 presents a schedule of sewerage service charges, designed using the same rate structure as Option 2, but with no minimum volume allowance component.

Under this rate structure, customers would pay a service charge plus a volume charge for all billed volume, and is based on:

- All customers being billed monthly
- The service charge for multi-family customers based on actual meter size only
- No minimum charge allowance included in the base fee.

In developing this scenario, the service charge is reduced from that calculated for Option 2 by an amount equal to the final volume block rate times 3 Ccf. Customer bills are calculated based on assessing a volume charge to all billed volume. Under this rate structure, customers with billed volume less than the minimum allowance will experience a decrease in their bill (as shown in Table 6-12). Under this scenario, the average residential bill, based on 17 Ccf/quarter or just under 6 Ccf/month, would increase more than the system-wide increase of 4.25% (at 6 Ccf/month, bill impact equals 10.73%).

Table 6-10 presents the schedule of sewerage surcharges and septic tank disposal charges.

Table 6-9 Sewerage Service Charges – Option 3 - Test Year 2017

Minimum Charge

The minimum charge shall be based on the size of the water meter used to serve the premises, or the size of the premise served.

The minimum charge shall include the allowance for the first 300 cubic feet of water used for monthly bills.

The minimum charge rates shall be as follows:

Meter Size Inches	Monthly Bills	
	OM&R	Total
5/8"	\$ 14.75	\$ 22.98
3/4"	\$ 17.49	\$ 28.85
1"	\$ 24.50	\$ 41.74
1 1/2"	\$ 41.00	\$ 73.07
2"	\$ 59.02	\$ 106.78
3"	\$ 132.02	\$ 285.04
4"	\$ 225.85	\$ 482.53
6"	\$ 445.24	\$ 959.46
8"	\$ 664.66	\$ 1,433.99
10"	\$ 899.26	\$ 1,932.57
12"	\$ 1,055.21	\$ 2,252.91

Commodity Charge

The commodity charge shall be based on the quantity of water used on the premises served as same is measured by a water meter or meters therein used, which meters must be acceptable to the Municipality that collects such charge.

The commodity charges for each 100 cubic feet (Ccf) consumed are as follows:

	Minimum	
	OM&R	Total
First 4,700 cubic feet per month -	\$ 2.782	\$ 6.643 /Ccf
Over 5,000 cubic feet per month -	\$ 2.806	\$ 5.359 /Ccf

Basis of Charge

For residential water service accounts (one and two family residences) a monthly minimum and commodity charge shall be based upon water used during a winter quarterly billing period. Said winter period being the monthly billing period most closely corresponding to usage during the months of October through April. Said charges shall be payable with each bill rendered throughout the year.

All non-residential customers shall be charged based upon the water used during a billing period that is subject to a sewerage charge. The District will consider applications, fully supported, for adjustment due to nonsewered water use. All well water and water reaching the system from other sources will be considered in the basis for charge.

Table 6-10 Sewerage Surcharges and Septic Tank Disposal Charges – Option 3 - Test Year 2017

Proposed Sewerage Surcharges - Test Year 2017

For customers having high strength waste discharge, the surcharge, which is in addition to other sewerage service charges, shall be computed on the following basis:

Suspended Solids (TSS)	\$ 0.002756	per 100 cubic feet for each mg/l of SS strength above 300 mg/l
Biochemical Oxygen Demand (BOD)	\$ 0.004707	per 100 cubic feet for each mg/l of BOD strength above 240 mg/l
Nitrogen Oxygen Demand (TKN)	\$ 0.004122	per 100 cubic feet for each mg/l of Total Kjeldahl Nitrogen (TKN) strength above 25 mg/l.

Provision

Provided, however, that to the extent the strength of a pollutant is less than eighty percent (80%) of the corresponding value for normal strength sewage, a credit shall be allowed as an offset against surcharge otherwise due, the credit shall be calculated by multiplying the above specified surcharge rate for the pollutant in question times the difference between actual pollutant concentration in mg/l and eighty percent (80%) of the corresponding value for normal sewage. No credit shall be allowed in excess of surcharge otherwise due.

Suspended Solids (TSS)	\$ 0.4417	per pound of excess strength
Biochemical Oxygen Demand (BOD)	\$ 0.7543	per pound of excess strength
Nitrogen Oxygen Demand (TKN)	\$ 0.6606	per pound of excess strength

Proposed Septic Tank Disposal Charge - Test Year 2017

The fee for septic tank haulers is based on the size of the tank charged per thousand gallons and is intended to represent the cost of treating high concentrations of suspended solids, BOD, and TKN found in each tank hauled to a receiving station at the wastewater treatment plant. Each septic hauler shall pay the following cost per thousand gallons per load.

All Haulers	\$ 52.13	per 1,000 gallons
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6.2.3.1 Revenue Recovery under Option 3 Rates

As previously discussed, the Option 3 rate schedule would recover the necessary 4.25 percent increase in revenue required by the utility, while removing the minimum volume component. The resulting revenue recovery by customer class is indicated in Table 6-11.

Table 6-11 Comparison of Allocated Cost of Service with Revenue under Option 3 Rates

Line No.	Customer Class	Total Adjusted Cost of Service	Revenue Under Existing Rates	Revenue Under Proposed Rates	Cost of Service Recovery Under Proposed Rates
		\$	\$	\$	%
1	Residential	135,053,884	117,223,451	127,313,003	94.27%
2	Commercial	53,795,420	48,835,753	54,104,351	100.57%
3	Industrial	29,272,589	31,944,824	34,668,642	118.43%
4	Multifamily	46,529,920	52,379,645	45,821,492	98.48%
5	Surcharge	15,412,709	20,192,310	20,192,310	131.01%
6	Septic Tank Disposal	3,879,080	1,792,000	1,843,802	47.53%
7	Total	283,943,600	272,367,983	283,943,600	100.00%

6.2.3.2 Typical Bills under Option 3

A comparison of typical bills under the Option 3 schedule of sewerage service charge rates with those under existing rates is shown in Table 6-12.

Table 6-12 Typical Customer Sewer Bills under Existing and Option 3 Rates

Meter Size Inches	Usage Ccf	Existing	Proposed 2017		
		Bill \$	Bill \$	Increase \$	Increase %
Former Quarterly Shown Monthly for Comparison Only					
5/8"	0	39.12	22.98	(16.13)	-41.24%
5/8"	1	39.12	29.63	(9.49)	-24.26%
5/8"	2	39.12	36.27	(2.85)	-7.28%
5/8"	3	39.12	42.91	3.80	9.71%
5/8"	4	45.00	49.56	4.56	10.14%
5/8"	6	56.75	62.84	6.09	10.73%
5/8"	7	62.63	69.49	6.85	10.94%
5/8"	8	68.51	76.13	7.62	11.12%
3/4"	10	91.59	95.29	3.69	4.03%
3/4"	15	120.99	128.50	7.51	6.21%
1"	25	198.48	207.82	9.34	4.70%
1"	30	227.88	241.04	13.16	5.77%
1 1/2"	50	393.82	405.23	11.42	2.90%
2"	60	489.77	492.53	2.76	0.56%
2"	100	677.81	706.88	29.07	4.29%
3"	150	1,173.58	1,153.07	(20.50)	-1.75%
3"	300	1,878.73	1,956.88	78.15	4.16%
4"	1,600	8,270.30	9,120.68	850.38	10.28%
6"	3,300	16,934.29	18,707.40	1,773.11	10.47%
8"	6,600	33,153.46	36,865.64	3,712.18	11.20%
10"	6,600	33,854.78	37,364.22	3,509.44	10.37%
12"	6,600	34,285.61	37,684.56	3,398.95	9.91%
Former Monthly for Comparison Only					
5/8"	0	59.54	22.98	(36.55)	-61.40%
5/8"	3	59.54	42.91	(16.62)	-27.92%
5/8"	6	65.42	62.84	(2.57)	-3.93%
5/8"	9	83.05	82.77	(0.28)	-0.34%
5/8"	12	100.69	102.70	2.01	2.00%
5/8"	18	135.96	142.56	6.60	4.85%
5/8"	20	147.72	155.85	8.13	5.50%
5/8"	25	177.12	189.06	11.95	6.74%
3/4"	30	215.47	228.15	12.68	5.89%
3/4"	50	333.05	361.01	27.97	8.40%
1"	75	470.22	507.87	37.65	8.01%
1"	100	587.75	641.84	54.09	9.20%
1 1/2"	150	870.56	941.10	70.55	8.10%
2"	200	1,157.00	1,242.75	85.75	7.41%
2"	300	1,627.10	1,778.62	151.52	9.31%
3"	500	2,839.04	3,028.62	189.58	6.68%
3"	1,000	5,189.54	5,707.97	518.43	9.99%
4"	5,000	24,294.59	27,340.26	3,045.67	12.54%
6"	10,000	48,526.61	54,610.69	6,084.08	12.54%
8"	20,000	96,259.98	108,672.22	12,412.24	12.89%
10"	20,000	97,020.01	109,170.80	12,150.79	12.52%
12"	20,000	97,508.34	109,491.14	11,982.80	12.29%

7 Conclusion

The results of this analysis indicate that a series of revenue increases are expected to be required from 2017-2021 to help provide proper funding of all District programs and maintain strong key financial indicators. It is important to note that the projected adjustments reflect capital expenditures projected to provide for on-going renewals and replacements and completion of Phase 1 and estimated Phase 2 costs beginning in 2019 of the Long Term Control Plan. Once Phase 2 costs are finalized, required increases for 2018 and beyond could vary from those projected within this report, depending on the size and timing of Phase 2 related projects. As discussed in this report, the alternative rate schedules summarized in Section 6 are designed to recover the total system-wide revenue needs of the District. The three alternative rate designs presented herein are designed to recover the anticipated revenue needs of the District in 2017 while addressing certain policy considerations, as previously discussed.

Because of the magnitude of the capital program moving forward, and the potential impact in individual years that could occur due to changes in the timing of projects, it is recommended that the revenue requirement analysis be conducted annually to ensure that revenues remain sufficient to provide adequate funding for the capital improvement program without unanticipated, large increases in rates in a single year. It is further recommended that a detailed cost allocation and rate design study be completed at a minimum of every two years, as it is expected that due to the nature of the WWIP, shifts in allocated costs by customer class could result in rate increases for each class that are different from the average revenue increase, and the shift could be significant over time.

Table 7-1 compares the three (3) alternative rate structures with existing rates, including a summary of the resulting mix of revenue generated from the minimum/service charges and commodity charges. For comparison purposes, the existing minimum charge rate is shown as the existing quarterly rate divided by three in order to provide an easy, and comparable, comparison with proposed monthly bills. All three alternative rate structures reflect monthly billing only. Option 1 (COS) and Option 2 both reflect a 3 Ccf minimum allowance included in the minimum/service charge. Option 3 reflects the elimination of the 3 Ccf minimum allowance.

All alternative 2017 rate structures result in a reduction in fixed charge revenue from the minimum/service charge. However, Option 3, which eliminates the minimum allowance, results in substantial reduction in fixed revenue generated from the minimum/service charge (30% revenue from fixed charges compared to 47% for Option 2 and 54% under the current rate structure. Decisions regarding a final rate structure should take into consideration both customer impact and impact on fixed charge revenues, as revenue stability is a key consideration in determining the financial strength of a utility.

Table 7-1 Comparison of Existing Rates with 3 Alternative 2017 Rate Structures

Minimum Charge					
Meter Size	Current Quarterly as Monthly	Option 1: COS Monthly Rate	Option 2 Monthly Rate	Option 3 Monthly Rate	
Inches					
5/8"	\$ 39.12	\$ 40.31	\$ 39.06	\$ 22.98	
3/4"	\$ 50.44	\$ 53.68	\$ 44.93	\$ 28.85	
1"	\$ 69.15	\$ 72.40	\$ 57.82	\$ 41.74	
1 ½"	\$ 117.50	\$ 125.89	\$ 89.15	\$ 73.07	
2"	\$ 166.44	\$ 179.37	\$ 122.86	\$ 106.78	
3"	\$ 427.16	\$ 414.72	\$ 301.12	\$ 285.04	
4"	\$ 707.43	\$ 682.15	\$ 498.61	\$ 482.53	
6"	\$ 1,379.72	\$ 1,350.75	\$ 975.54	\$ 959.46	
8"	\$ 2,085.59	\$ 2,019.34	\$ 1,450.07	\$ 1,433.99	
10"	\$ 2,786.92	\$ 2,687.93	\$ 1,948.65	\$ 1,932.57	
12"	\$ 3,217.75	\$ 3,089.08	\$ 2,268.99	\$ 2,252.91	
Commodity Charge					
First (cf)	300	\$ 0	\$ 0	\$ 0	\$ 6.643
To (cf)	5,000	\$ 5.879	\$ 7.242	\$ 6.701	\$ 6.643
Over (cf)	5,000	\$ 4.701	\$ 3.860	\$ 5.359	\$ 5.359
Revenue Under Proposed Rates (\$1,000s)					
Minimum Charge		\$ 136,381	\$ 137,519	\$ 122,390	\$ 79,545
Commodity Charge		\$ 116,168	\$ 127,248	\$ 139,517	\$ 182,362
Total		\$ 252,549	\$ 264,767	\$ 261,907	\$ 261,907
Minimum Charge		54%	52%	47%	30%
Commodity Charge		46%	48%	53%	70%