

Revised Final

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

B&V PROJECT NO. 189413

PREPARED FOR

Metropolitan Sewer District of Greater Cincinnati

16 NOVEMBER 2015

16 November 2015

Mr. Gérald Checco  
Executive Director  
Metropolitan Sewer District of Greater Cincinnati  
1600 Gest Street  
Cincinnati, OH 45204

Subject: 2015 Comprehensive Cost of Service & Rate Design Study – Revised Final Report

Dear Mr. Checco:

Attached please find our revised final report, summarizing a comprehensive review and analysis of the District's wastewater rate structure. This revised final report reflects the revised District's capital improvement program (CIP) dated Friday, November 13, 2016.

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](mailto:lemoinepr@bv.com).

Very truly yours,  
BLACK & VEATCH CORPORATION



Pamela Lemoine  
Principal Consultant  
Management Consulting

## Table of Contents

<b>Table of Contents</b> .....	<b>i</b>
<b>1 Introduction</b> .....	<b>1</b>
1.1 General Background.....	1
1.2 Purpose.....	2
1.3 Scope.....	2
<b>2 Summary of Findings</b> .....	<b>3</b>
<b>3 Revenue</b> .....	<b>8</b>
3.1 Customer Growth .....	8
3.2 Wastewater Revenue under Existing Rates .....	12
<b>4 Revenue Requirements</b> .....	<b>16</b>
4.1 Operation and Maintenance Expense .....	16
4.2 Capital Improvement Program.....	17
4.3 Revenue Requirement Levels.....	20
<b>5 Cost of Service Allocation</b> .....	<b>24</b>
5.1 Functional Cost Components.....	25
5.2 Allocation to Cost Components .....	26
5.3 Allocation of Operation and Maintenance Expense .....	28
5.4 Summary of Allocation to Functional Cost Components .....	28
5.5 Distribution of Costs to Customer Classes.....	30
5.6 Cost of Service Allocations .....	32
5.7 Adequacy of Existing Rates to Meet Cost of Service .....	32
<b>6 Proposed Wastewater Rate Adjustments</b> .....	<b>35</b>
6.1 Existing Rates.....	35
6.2 Proposed Wastewater Rate Adjustments .....	35
<b>7 Conclusion</b> .....	<b>56</b>

**LIST OF TABLES**

Table 2-1 Cost of Service Requirements – Test Year 2016 ..... 6

Table 2-2 Summary of Functional Cost Components - 2016 Test Year ..... 6

Table 2-3 Summary of Functional Cost Components – 2015 Test Year ..... 7

Table 3-1 Historical and Projected Accounts..... 9

Table 3-2 Historical and Projected Billable Volumes ..... 11

Table 3-3 Existing Rates ..... 13

Table 3-4 Projected User Charge Revenues Under Existing Rates ..... 14

Table 3-5 Operating and Non-Operating Revenue ..... 15

Table 4-1 Projected Operation and Maintenance Expense ..... 17

Table 4-2 Capital Improvement Program <sup>(a)</sup> ..... 18

Table 4-3 Capital Improvement Financing Plan ..... 18

Table 4-4 Surplus Fund..... 19

Table 4-5 Existing and Projected Long-Term Debt Service ..... 20

Table 4-6 Estimated Revenues and Revenue Requirements under Increased Rates <sup>(a)</sup> ..... 22

Table 5-1 Cost of Service to be Recovered from Rates - Test Year 2016 ..... 25

Table 5-2 Allocation of Plant Investment to Functional Cost Components – Test Year 2016..... 27

Table 5-3 Allocation of Operation and Maintenance Expense to Functional Cost Components - Test Year 2016 ..... 29

Table 5-4 Summary of Allocation to Functional Cost Components – Text Year 2016..... 30

Table 5-5 Estimated Units of Service – Test Year 2016..... 31

Table 5-6 Unit Costs of Service and Customer Class Allocation – Test Year 2016..... 33

Table 5-7 Comparison of Allocated Cost of Service with Revenues under Existing Rates - Test Year 2016 ..... 34

Table 6-1 Sewerage Service Charges – Option 1 - Test Year 2016 ..... 37

Table 6-2 Sewerage Surcharges – Option 1 - Test Year 2016 ..... 38

Table 6-3 Comparison of Allocated Cost of Service with Revenue under Option #1 Rates ..... 39

Table 6-4 Typical Customer Sewer Bills under Existing and Option #1 Rates. 40

Table 6-5 Sewerage Service Charges – Option 2 - Test Year 2016 ..... 42

Table 6-6 Sewerage Surcharges – Option 2 - Test Year 2016 ..... 43

Table 6-7 Comparison of Allocated Cost of Service with Revenue under Option #2 Rates ..... 44

Table 6-8 Typical Customer Sewer Bills under Existing and Option #2 Rates. 45

Table 6-9 Sewerage Service Charges – Option 3 - Test Year 2016 ..... 47

Table 6-10 Sewerage Surcharges – Option 3 - Test Year 2016 .....48

Table 6-11 Comparison of Allocated Cost of Service with Revenue under Option #3 Rates.....49

Table 6-12 Typical Customer Sewer Bills under Existing and Option #3 Rates50

Table 6-13 Sewerage Service Charges – Option 4 - Test Year 2016.....52

Table 6-14 Sewerage Surcharges – Option 4 - Test Year 2016 .....53

Table 6-15 Comparison of Allocated Cost of Service with Revenue under Option #4 Rates.....54

Table 6-16 Typical Customer Sewer Bills under Existing and Option #4 Rates55

**LIST OF FIGURES**

Figure 2-1 Breakdown of Annual Revenue Requirements..... 5

Figure 4-1 Breakdown of Annual Revenue Requirements.....23

Figure 4-2 Summary of Annual Revenue Requirements.....23

# 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).

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 2015 reflects the previously approved rate increase effective January 9, 2015. Revenue needs, including required system-wide revenue increases, are projected for years 2016-2018 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 of the Long Term Control Plan. The needs for annual revenue adjustments subsequent to 2015 have also been identified.

## 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 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.

## 2 Summary of Findings

The findings of the report are summarized in this section. During the course of Black & Veatch's study, various assumptions were made regarding the forecast of inflation and bond interest rates affecting the projection of future operation and maintenance expenses and debt service payments on proposed bond sales to finance the District's major capital improvement program. The following summarizes the principal findings from Black & Veatch's studies and the overall indicated rate 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 2014 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 volume per account as follows:
  - Single Family Residential:
    - 2015 = 2.5% decline over prior year
    - 2016 = 2.0% decline over prior year
    - 2017 = 1.5% decline over prior year
    - 2018 = 1.0% decline over prior year
  - Multi-family:
    - 2015 = 1.0% decline over prior year
    - 2016 = 0.5% decline over prior year
    - 2017 = 0.5% decline over prior year
    - 2018 = 0.25% decline over prior year
  - Commercial:
    - 2015 = 2.0% decline over prior year
    - 2016 = 1.0% decline over prior year
    - 2017 = 0.5% decline over prior year
    - 2018 = 0.5% decline over prior year
  - Industrial:
    - 2015 = 3.0% decline over prior year
    - 2016 = 2.0% decline over prior year
    - 2017 = 1.0% decline over prior year
    - 2018 = 1.0% decline over prior year
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, and industrial pretreatment 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 \$288,969,000 in 2015 under present rates.

4. The District has developed a proposed capital improvement program totaling \$783.2 million for the period 2015 to 2018. These capital costs do not include any significant costs for Phase 2 of the Long Term Control Plan. The District is budgeting for project contingency of \$43 million over the 2015-2018 projection period. 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 \$360 million in proposed revenue bonds and \$99 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 \$101,704,000 to \$117,579,000 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 \$107,465,000 to \$116,631,000 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 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 78 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 38 percent of total revenue requirements in 2015 to approximately 40 percent of total revenue requirements in 2017. Debt Service then declines in 2018 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 62 percent.

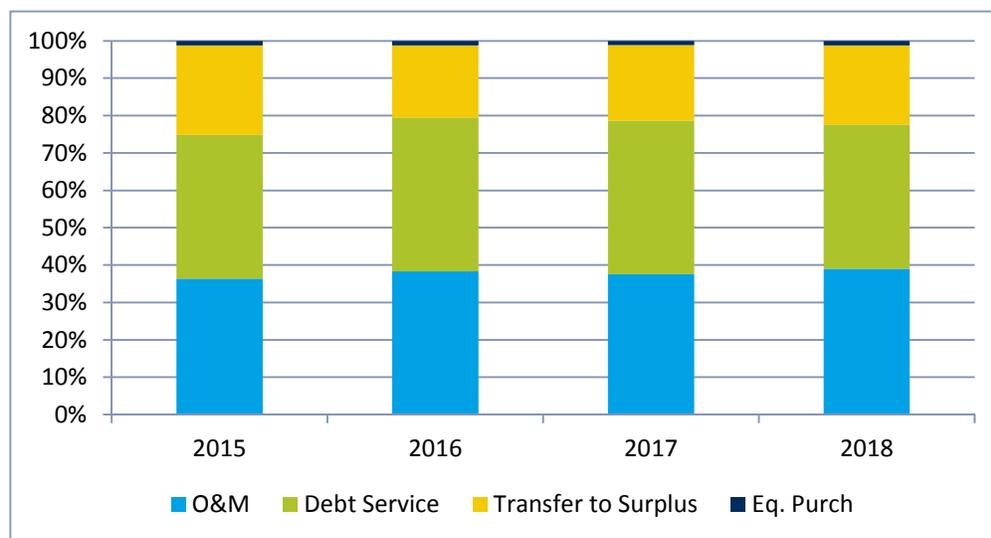


Figure 2-1 Breakdown of Annual Revenue Requirements

7. A 5.5 percent revenue increase effective in January 9, 2015, was approved by the Hamilton County Commissioners, and reflects 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 rates were based on a 2014 analysis of system-wide revenue requirements, and incorporated in calculating projected wastewater revenues under existing rates. While such rates are projected to be sufficient for 2015, they are indicated to be insufficient to recover the District’s future revenue requirements during the proposed study period. As such, a series of subsequent annual revenue adjustments are indicated to be required, as follows:

- 2016 = 4.87 percent
- 2017 = 4.50 percent
- 2018 = 4.50 percent

As indicated, the projected system-wide revenue increase for 2016 is estimated to be 4.87 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. It is important to note that the projected adjustments reflect only the impact of on-going asset management (e.g., renewals and replacements) and Phase 1 of the Long Term Control Plan only. **It is important to note, that once Phase 2 costs are finalized, required increases for 2017 and beyond could be 1.0% to 3.5% higher 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 \$283,948,600 for the 2016 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 2016

Line No.	Description	Test Year 2016
1	Operation and Maintenance Expense	\$102,437,000
2	User Charge Replacements	0
3	Capital Costs	181,511,600
4	Total Cost of Service to be Met from Rates	\$283,948,600

9. Detailed cost of service studies were made for the 2016 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 - 2016 Test Year

Line No.	Cost Component	Total Cost of Service
		\$
1	<b>Volume Related Cost</b>	32,387,545
2	<b>Capacity Related Cost</b>	161,873,696
3	<b>Strength Related Cost</b>	
4	Suspended Solids	29,029,578
5	BOD	34,402,743
6	TKN	3,396,513
7	<b>Customer Cost</b>	5,313,430
	<b>Industrial Monitoring &amp; Surveillance</b>	
8	Surcharge	980,345
9	Pretreatment	1,516,471
10	<b>Sewer In Basement</b>	15,048,280
11	<b>Total Cost of Service</b>	<b>283,948,600</b>

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 – 2016 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	117,800,909	125,836,324	134,706,172	16,905,263	14.35%
2	Commercial	51,302,673	50,008,430	52,749,918	1,447,245	2.82%
3	Industrial	30,782,371	28,837,962	29,532,028	(1,250,343)	-4.06%
4	Multifamily	51,748,612	50,141,834	52,884,713	1,136,102	2.20%
5	Surcharge	19,127,954	14,075,769	14,075,769	(5,052,186)	-26.41%
6	Sewer In Basement (a)	0	15,048,280	0		
7	Total	270,762,519	283,948,600	283,948,600	13,186,081	4.87%

(a)

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

11. Based upon results from the detailed cost of service study for the 2016 test year, four (4) alternative rate schedules have been developed in such a manner as to achieve a system-wide revenue increase of 4.87 percent. Based upon review and discussion, it is anticipated that additional alternatives may be evaluated prior to adoption of a final 2016 rate schedule.

## 3 Revenue

The revenue for the District to meet costs of wastewater service is derived principally from sewerage service charges and excess strength surcharges. 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			
		2013	2014	2015	2016	2017	2018
<b>CWW</b>							
Bi-Monthly Customers							
1	Residential	59	59	59	59	59	59
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	59	59	59	59	59	59
Monthly							
6	Residential	18	18	18	18	18	18
7	Commercial	388	381	381	381	381	381
8	Industrial	283	283	283	283	283	283
9	Multi-Family	304	295	295	295	295	295
10	Resid-Pmt Plan	8,346	7,008	7,008	7,008	7,008	7,008
11	Subtotal	9,338	7,985	7,985	7,985	7,985	7,985
Quarterly							
12	Residential	159,257	160,809	160,809	160,809	160,809	160,809
13	Commercial	12,294	12,302	12,302	12,302	12,302	12,302
14	Industrial	132	130	130	130	130	130
15	Multi-Family	21,096	21,114	21,114	21,114	21,114	21,114
16	Subtotal	192,779	194,354	194,354	194,354	194,354	194,354
17	Total CWW	202,176	202,398	202,398	202,398	202,398	202,398
<b>Political Bodies</b>							
18	Residential	21,741	21,733	21,733	21,733	21,733	21,733
19	Commercial	2,378	2,377	2,377	2,377	2,377	2,377
20	Industrial	38	38	38	38	38	38
21	Warren Co.	1	1	1	1	1	1
22	Subtotal	24,158	24,149	24,149	24,149	24,149	24,149
23	<b>Total</b>	<b>226,333</b>	<b>226,547</b>	<b>226,547</b>	<b>226,547</b>	<b>226,547</b>	<b>226,547</b>

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:
  - 2015 = 2.5% decline over prior year
  - 2016 = 2.0% decline over prior year
  - 2017 = 1.5% decline over prior year
  - 2018 = 1.0% decline over prior year
- Multi-family:
  - 2015 = 1.0% decline over prior year
  - 2016 = 0.5% decline over prior year
  - 2017 = 0.5% decline over prior year
  - 2018 = 0.25% decline over prior year
- Commercial:
  - 2015 = 2.0% decline over prior year
  - 2016 = 1.0% decline over prior year
  - 2017 = 0.5% decline over prior year
  - 2018 = 0.5% decline over prior year
- Industrial:
  - 2015 = 3.0% decline over prior year
  - 2016 = 2.0% decline over prior year
  - 2017 = 1.0% decline over prior year
  - 2018 = 1.0% decline over prior year

As shown in Table 3-2, total water usage or billable wastewater volume is projected at 30,250,400 hundred cubic feet (Ccf) for 2016. 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			
		2013 ccf	2014 ccf	2015 ccf	2016 ccf	2017 ccf	2018 ccf
<b>CWW</b>							
Bi-Monthly Customers							
1	Residential	4,278	3,864	3,767	3,692	3,636	3,600
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	4,278	3,864	3,767	3,692	3,636	3,600
Monthly							
6	Residential	130,124	142,748	139,179	136,396	134,350	133,006
7	Commercial	1,619,390	1,620,327	1,587,921	1,572,041	1,564,181	1,556,360
8	Industrial	5,195,970	5,248,856	5,091,390	4,989,562	4,939,666	4,890,270
9	Multi-Family	1,868,908	1,880,142	1,861,340	1,852,033	1,842,773	1,838,166
10	Resid-Pmt Plan	688,435	581,934	567,386	556,038	547,697	542,220
10	Subtotal	9,502,828	9,474,006	9,247,216	9,106,071	9,028,668	8,960,023
Quarterly							
11	Residential	9,521,105	9,754,215	9,510,359	9,320,152	9,180,350	9,088,546
12	Commercial	3,947,583	4,076,080	3,994,558	3,954,612	3,934,839	3,915,165
13	Industrial	488,609	514,434	499,001	489,021	484,131	479,290
14	Multi-Family	4,751,484	4,856,213	4,807,651	4,783,612	4,759,694	4,747,795
15	Subtotal	18,708,781	19,200,941	18,811,569	18,547,398	18,359,014	18,230,796
16	Total CWW	28,215,887	28,678,811	28,062,552	27,657,160	27,391,319	27,194,419
<b>Political Bodies</b>							
17	Residential	1,272,497	1,169,004	1,139,779	1,116,983	1,100,228	1,089,226
18	Commercial	1,250,003	1,148,339	1,125,372	1,114,119	1,108,548	1,103,005
19	Industrial	145,099	133,298	129,299	126,713	125,446	124,192
20	Warren Co.	240,740	242,658	237,805	235,427	234,250	233,078
21	Subtotal	2,908,339	2,693,299	2,632,255	2,593,242	2,568,472	2,549,501
22	<b>Total</b>	<b>31,124,226</b>	<b>31,372,110</b>	<b>30,694,807</b>	<b>30,250,402</b>	<b>29,959,791</b>	<b>29,743,920</b>

### 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, and an extra strength surcharge for excess pollutant customers. Charges are applied either monthly or quarterly according to customer distinction. A schedule of current rates is shown in Table 3-3.

The minimum charge per quarter includes the first 900 (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.

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 such increased rates are reflected in the 2015 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 \$251,345,500 for the 2015 to 2018 projection period.

Revenues from extra strength and industrial wastes are projected to contribute an additional \$19,128,000 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, tap permits, and septic tank disposal. As shown on Table 3-5, other operating revenue is projected to remain constant at \$5,308,000 per year throughout the study period, connection charges and tap fees is projected to remain constant at \$2,182,000 per year throughout the study period, and revenue from interest earnings on all funds is projected to average approximately \$4 million during the study period.

Table 3-3 Existing Rates

<b>Minimum Monthly Charge - \$/Bill - 2015</b>						
<b>Line No.</b>	<b>Meter Size</b>	<b>Number of Family Units</b>	<b>Quarterly Usage</b>	<b>Quarterly Charge</b>	<b>Monthly Usage</b>	<b>Monthly Charge</b>
	Inches		Cf	\$	Cf	\$
1	5/8"	1	900	\$ 117.35	500	\$ 57.11
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
<b>Volume Charge - \$/ccf - 2015</b>						
			<b>Quarterly</b>	<b>Monthly</b>	<b>Rate</b>	
			Cf	Cf	\$	
12	First (cf)		900	500	\$	0
13	To (cf)		15,000	5,000	\$	5.879
14	Over (cf)		15,000	5,000	\$	4.701
<b>Extra Strength Charges - \$ per mg/l per 1,000 cubic feet - 2015</b>						
					<b>Rate</b>	
					\$	
15	Suspended Solids (TSS)				\$	0.002756
16	Biochemical Oxygen Demand (BOD)				\$	0.004707
17	Nitrogen Oxygen Demand (TKN)				\$	0.004122

Table 3-4 Projected User Charge Revenues Under Existing Rates

Line No.	Description	Projected			
		2015	2016	2017	2018
		\$	\$	\$	\$
<b>CWW</b>					
Bi-Monthly Customers					
1	Residential	44,815	44,711	44,634	44,584
2	Commercial	0	0	0	0
3	Industrial	0	0	0	0
4	Multi-Family	0	0	0	0
5	Subtotal	44,815	44,711	44,634	44,584
Monthly					
6	Residential	819,769	806,972	797,567	791,390
7	Commercial	8,663,578	8,589,964	8,553,526	8,517,269
8	Industrial	26,982,020	26,512,608	26,282,596	26,054,885
9	Multi-Family	11,082,157	11,038,992	10,996,043	10,974,676
10	Resid-Pmt Plan	4,513,050	4,488,212	4,469,956	4,457,968
11	Subtotal	52,060,574	51,436,749	51,099,688	50,796,188
Quarterly					
12	Residential	100,938,203	100,421,100	100,041,029	99,791,449
13	Commercial	31,835,573	31,646,722	31,553,240	31,460,227
14	Industrial	3,636,066	3,589,127	3,566,127	3,543,357
15	Multi-Family	40,819,637	40,709,620	40,600,152	40,545,692
16	Subtotal	177,229,479	176,366,568	175,760,548	175,340,725
17	Total CWW	229,334,869	227,848,028	226,904,871	226,181,496
<b>Political Bodies</b>					
18	Residential	10,958,674	10,958,674	10,958,674	10,958,674
19	Commercial	11,117,759	11,065,987	11,040,360	11,014,861
20	Industrial	687,266	680,635	677,387	674,170
21	Warren Co.	1,092,161	1,081,240	1,075,834	1,070,455
22	Subtotal	23,855,860	23,786,536	23,752,254	23,718,160
23	<b>Total</b>	<b>253,190,729</b>	<b>251,634,565</b>	<b>250,657,125</b>	<b>249,899,656</b>

Table 3-5 Operating and Non-Operating Revenue

Line No.	Description	Projected			
		2015	2016	2017	2018
		\$1,000	\$1,000	\$1,000	\$1,000
1	Sewerage Service Charge	253,191	251,635	250,657	249,900
2	Sewerage Surcharges	19,128	19,128	19,128	19,128
3	Pretreatment Monitoring	771	771	771	771
4	Subtotal	273,090	271,534	270,556	269,799
5	Other Operating Revenue				
6	Rental Income	132	132	132	132
7	Septic Tank Disposal	1,555	1,555	1,555	1,555
8	Tap Permits-Licenses	32	32	32	32
9	Inspection-Plan Review	239	239	239	239
10	Other (a)	3,350	3,350	3,350	3,350
11	Total Other Operating Revenue	5,308	5,308	5,308	5,308
12	Connection Fee Revenue (b)	2,182	2,182	2,182	2,182
13	Build American Bond Discount	4,125	4,125	4,125	4,125
14	Interest-Trust Accounts (c)	4,265	4,333	3,681	3,889
15	<b>Total Revenue</b>	<b>288,969</b>	<b>287,482</b>	<b>285,852</b>	<b>285,303</b>

- (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 2015 through 2018 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 2015 are based on the 2015 approved budget and expenditures for 2016 are based on the proposed 2016 budget submitted to the County in August 2015. Years 2017-2018 operation and maintenance expenditures are projected to increase based on annual price escalations over the 2016 proposed budget. Benefits are forecasted to increase at a rate of 5 percent per year during the study period. Chemical, gas/oil/fuel, and power costs are projected to increase 3.91 percent per year. All other operation and maintenance expense elements are assumed to increase at a rate of 2.64 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 \$101,704,000 in 2015 to \$117,579,000 in 2018.

Table 4-1 Projected Operation and Maintenance Expense

Line No.	Description	Projected			
		2015 \$1,000	2016 \$1,000	2017 \$1,000	2018 \$1,000
1	<b>Office of the Director</b>	8,057	7,783	7,999	8,222
2	<b>Wastewater Administration</b>				
3	Billing & Collecting	5,628	5,000	5,132	5,267
4	All Other	3,779	4,598	4,742	4,891
5	Total	9,406	9,598	9,874	10,159
6	<b>Information Technology</b>	5,499	6,371	6,556	6,748
7	<b>Project/Business Development</b>	2,511	2,804	2,897	2,994
8	<b>Project Delivery</b>	2,764	5,824	6,002	6,186
9	<b>Wastewater Collection</b>	22,647	20,708	21,323	21,958
10	<b>Wastewater Treatment</b>				
11	Superintendent	901	1,203	1,238	1,275
12	Mill Creek	19,968	21,110	21,760	22,432
13	Little Miami	5,962	6,314	6,505	6,702
14	Muddy Creek	3,421	3,560	3,668	3,779
15	Sycamore	1,977	2,178	2,244	2,312
16	Taylor Creek	1,957	1,766	1,819	1,874
17	Polk Run	1,615	1,702	1,752	1,803
18	MSD Pump Stations	0	1,601	1,646	1,691
19	Equipment Maintenance	9,264	7,680	7,919	8,166
20	Total Wastewater Treatment	45,064	47,115	48,551	50,033
21	<b>Industrial Waste Management</b>	5,293	6,984	7,202	7,428
22	<b>Sewer in Basement</b>	9,405	11,814	12,132	12,458
23	<b>Total O&amp;M</b>	110,646	119,000	122,536	126,185
24	Incremental Expenditures	0	0	200	1,300
25	Office Equipment & Motorized Vehicles	(3,410)	(3,414)	(3,504)	(3,597)
26	Projected Encumbrance Cancellation	(5,532)	(5,950)	(6,127)	(6,309)
27	<b>Total Net O&amp;M Expense</b>	101,704	109,636	113,105	117,579

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 2015 through 2018. These capital costs do not include any significant costs for Phase 2 of the Long Term Control Plan. A summary of the capital improvement program, totaling \$783,171,000 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 2015, annual expenditures are based on the approved 2015 CIP budget. For years 2016-

2018, annual expenditures are based on the proposed CIP budget submitted to the County in August 2015.

Table 4-2 Capital Improvement Program <sup>(a)</sup>

Line No.	Description	Projected				Total Cost
		2015	2016	2017	2018	
		\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
<b>Capital Projects</b>						
1	WWIP Projects	56,323	216,349	62,306	45,639	380,617
2	Asset Management Projects	59,982	70,761	129,085	142,726	402,554
3	<b>Total Approved Capital Program</b>	<b>116,305</b>	<b>287,110</b>	<b>191,391</b>	<b>188,365</b>	<b>783,171</b>

(a)

Reflects proposed annual certification of projects as developed by Metropolitan Sewer District staff. Annual project expenditures will deviate from scheduled certifications and do not include 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 2015 levels throughout the study period, at \$2,182,000 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			
		2015	2016	2017	2018
		\$1,000	\$1,000	\$1,000	\$1,000
<b>Source of Funds</b>					
1	Beginning of Year Balance	6,295	26,244	26,581	29,542
2	Connection Fees	2,182	2,182	2,182	2,182
3	Transfer from / (to) Surplus Account	125,000	160,000	215,000	165,000
4	Interest Income	162	263	279	306
5	<b>Total Source of Funds</b>	<b>133,639</b>	<b>188,689</b>	<b>244,042</b>	<b>197,029</b>
<b>Application of Funds</b>					
6	Major Capital Improvements	107,395	162,108	214,501	165,128
7	<b>Total Use of Funds</b>	<b>107,395</b>	<b>162,108</b>	<b>214,501</b>	<b>165,128</b>
8	<b>End of Year Balance</b>	<b>26,244</b>	<b>26,581</b>	<b>29,542</b>	<b>31,901</b>

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.

In addition to the major capital improvements shown on Line 6 of Table 4-3, and OWDA/WPCLF projects, the District also plans for Project Contingency spending as shown on Line 2 of Table 4-2, which is anticipated to be separately funded from the Surplus Fund.

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 and the timing of revenue bond issuances. As such, a minimum beginning of year balance of \$215-220 million has been targeted, reflecting recent practice that has allowed for some flexibility in timing revenue bond issuances to ensure adequate funding for the CIP.

Table 4-4 Surplus Fund

Line No.	Description	Projected			
		2015	2016	2017	2018
		\$1,000	\$1,000	\$1,000	\$1,000
<b>Sources and Uses of Funds</b>					
1	Beginning of Year Balance	339,430	274,814	221,808	221,511
2	Revenue Bond Proceeds	0	59,738	160,833	110,286
3	Interest Income	2,783	2,829	2,080	2,129
4	Transfer from / (to) Bond Reserve Account	2,101	812	898	1,003
5	Transfer from / (to) Operating Account	67,000	55,115	60,892	63,763
6	Transfer to Contingency Fund	(11,500)	(11,500)	(10,000)	(10,000)
7	Transfer to Construction Account	(125,000)	(160,000)	(215,000)	(165,000)
8	End of Year Balance	274,814	221,808	221,511	223,691

#### 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 2005B, 2006A, 2007A, 2009A, 2009B, 2010A and 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<sup>1</sup>, and pension liability.

<sup>1</sup> The analysis presented herein was completed prior to the issuance of Hamilton County’s 2014A and 2015A Refunding Bonds issuance.

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 5.4 percent. Bonds are assumed to be issued on July 1 of each year 2016 through 2018.

As shown in Table 4-5, \$360 million in revenue bonds and \$99 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			
			2015 \$1,000	2016 \$1,000	2017 \$1,000	2018 \$1,000
1	<b>Existing Revenue Bonds</b>		76,111	77,952	78,500	60,734
	<b>Proposed Revenue Bonds</b>					
2	2015 Series	0	0	0	0	0
3	2016 Series	65,000		3,459	4,612	4,612
4	2017 Series	175,000			5,174	12,417
5	2018 Series	120,000				3,548
6	Total Revenue Bonds	360,000	76,111	81,410	88,285	81,311
7	<b>Existing Other Debt (a)</b>		31,354	36,363	35,573	35,096
	<b>Proposed Other Debt (a)</b>					
8	2015 Series	9,000	0	0	0	0
9	2016 Series	40,000		0	0	224
10	2017 Series	25,000			0	0
11	2018 Series	25,000				0
12	Total Other Debt	99,000	31,354	36,363	35,573	35,320
13	<b>Total Debt Service</b>		107,465	117,774	123,858	116,631

(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 2015 through 2018. 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 4 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 the level of revenues to be received.

Total revenue requirements are summarized on Line 21 of Table 4-7. The ending balance/deficit available shown on Line 22 is the projected Operating Reserve end-of-year cash balance from the annual operation of the Utility. Operating reserve requirements are listed on Line 24 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 20.

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 only. Once Phase 2 costs have been finalized and incorporated into a future analysis, future revenue needs could be impacted.

Table 4-6 Estimated Revenues and Revenue Requirements under Increased Rates <sup>(a)</sup>

Line No.	Description	Projected			
		2015 \$1,000	2016 \$1,000	2017 \$1,000	2018 \$1,000
<b>Revenues:</b>					
1	Revenue from Rates:				
2	Revenue from Existing Rates	272,319	270,763	269,785	269,028
	Increased Revenue				
3	1/1/16 - 4.87%		11,362	13,139	13,102
4	1/1/17 - 4.50%			10,970	12,696
5	1/1/18 - 4.50%				11,432
6	Total Revenue from Rates	272,319	282,124	293,894	306,257
7	Other Operating Revenues	5,308	5,308	5,308	5,308
8	Pretreatment Monitoring	771	771	771	771
9	Non Operating Revenues	4,805	4,817	4,828	4,882
10	Total Operating Revenues	283,202	293,020	304,801	317,218
<b>Revenue Requirements:</b>					
11	O&M Expenses	101,704	109,636	113,105	117,579
12	Debt Service Requirements				
13	Existing Revenue Bonds	76,111	77,952	78,500	60,734
14	Proposed Revenue Bonds	0	3,459	9,786	20,576
15	Total Revenue Bonds	76,111	81,410	88,285	81,311
16	Other Existing Debt Obligations	31,354	36,363	35,573	35,096
17	Other New Debt Obligations	0	0	0	224
18	Total Debt Service	107,465	117,774	123,858	116,631
19	Annual Equipment Purchases	3,410	3,414	3,504	3,597
20	Transfer to Surplus Account	67,000	55,115	60,892	63,763
21	Total Revenue Requirements	279,579	285,939	301,360	301,569
22	Annual Net Balance	3,623	7,081	3,441	15,649
23	Cumulative Annual Balance	71,833	78,915	82,355	98,004
24	Minimum Required Operating Balance	16,718	18,022	18,593	19,328
<b>Debt Service Coverage:</b>					
25	Net Revenue from Operations	181,498	183,384	191,696	199,639
26	Transfer to Surplus Account (b)	0	0	0	0
27	Connection Fee Revenue	2,182	2,182	2,182	2,182
28	Other Interest Income (c)	3,585	3,642	2,977	3,132
29	Revenue Available for Coverage	187,265	189,208	196,855	204,953
<b>Debt Service Coverage for:</b>					
30	Revenue Bonds	246%	232%	223%	252%
31	Minimum Required	125%	125%	125%	125%
32	MSD Policy	150%	150%	150%	150%
33	Total Debt Service	174%	161%	159%	176%
34	Minimum Required	110%	110%	110%	110%
35	MSD Policy	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 78 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.

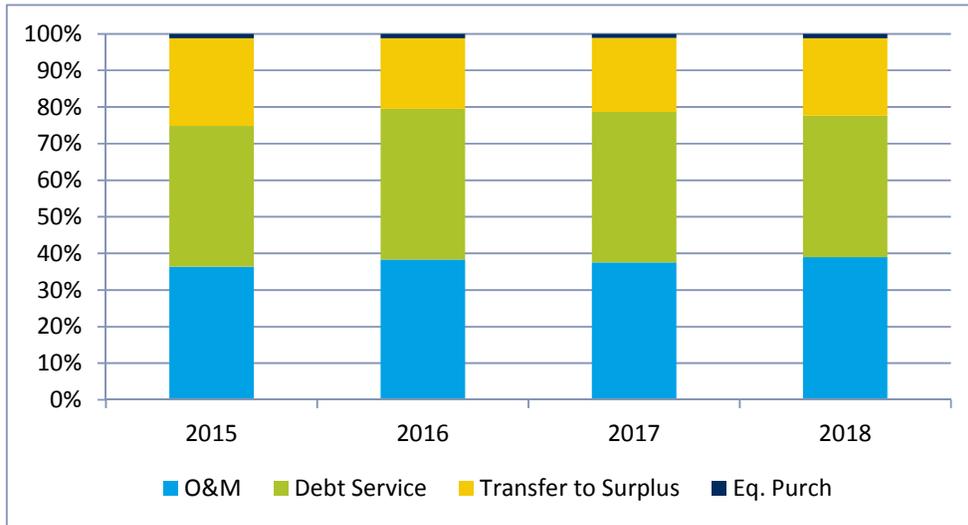


Figure 4-1 Breakdown of Annual Revenue Requirements

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.

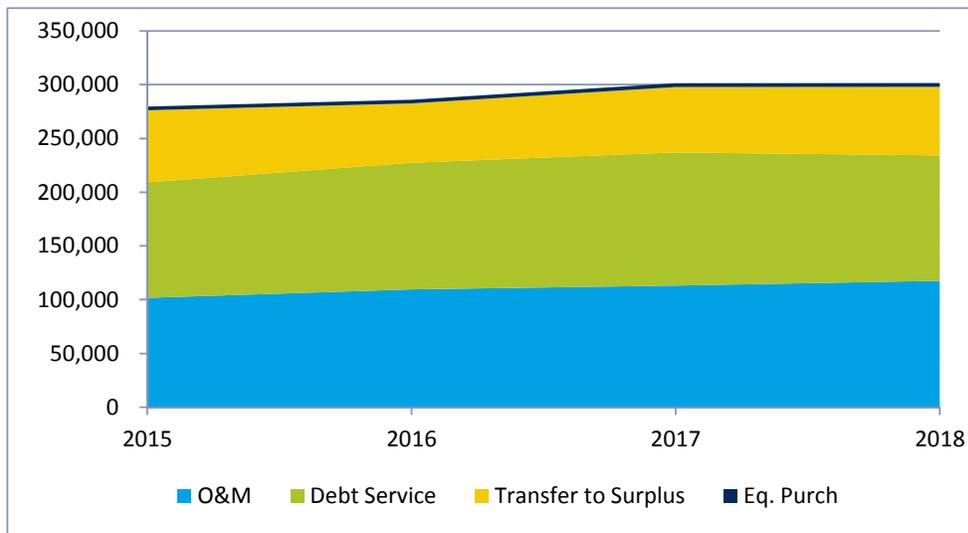


Figure 4-2 Summary of Annual Revenue Requirements

## 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 \$102,437,000 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 \$181,512,000.

The total cost of service to be met from wastewater charges is estimated to be \$283,949,000 as shown on Line 10, Column 3 of Table 5-1.

Table 5-1 Cost of Service to be Recovered from Rates - Test Year 2016

Line No.	Description	O&M Expense \$1,000	Capital Costs \$1,000	Total \$1,000
<b>Revenue Requirements:</b>				
1	Operation and Maintenance Expense	109,636		109,636
2	User Charge Replacements			0
3	Debt Service Requirements		117,774	117,774
4	Capital Outlay (a)		3,414	3,414
4	Total	109,636	121,188	230,824
<b>Less Other Revenue Sources:</b>				
5	Surplus Fund Transfer and Change in Operating Balance		62,196	62,196
6	Other Operating Revenue	(5,308)		(5,308)
7	Pretreatment Monitoring	(771)		(771)
8	Nonoperating Revenue	(1,802)	(3,015)	(4,817)
9	Annualized Revenue Adjustments (b)	683	1,142	1,824
10	Total	(7,199)	60,323	53,125
11	Total Cost of Service	102,437	181,512	283,949

- (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, 2014, 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 2016

Line No.	Description	Total	Volume	Capacity	Wastewater Strength			Sewer in Basement
					SS	BOD	TKN	
		\$	\$	\$	\$	\$	\$	\$
<b>Plant in Service:</b>								
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	<b>Total Major Plant</b>	<b>306,899,435</b>	<b>63,082,439</b>	<b>36,784,673</b>	<b>96,855,069</b>	<b>103,280,405</b>	<b>6,896,849</b>	<b>0</b>
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	644,586,519	0	644,586,519	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	5,669,512	53,681,448	8,793,400	9,326,610	555,352	1,332,600
20	Sewer in Basement	16,583,034	0	0	0	0	0	16,583,034
21	<b>Total Plant in Service</b>	<b>1,122,556,384</b>	<b>77,458,331</b>	<b>773,519,942</b>	<b>119,152,045</b>	<b>126,929,414</b>	<b>7,581,018</b>	<b>17,915,634</b>
<b>Less</b>								
22	Grants	(5,318,953)	(1,238,178)	(1,487,327)	(934,765)	(1,543,736)	(114,946)	(334)
23	Sewer in Basement	(16,583,034)	0	(50,346,491)	0	0	0	0
25	<b>Total Net Investment</b>	<b>1,100,654,398</b>	<b>76,220,153</b>	<b>721,686,123</b>	<b>118,217,280</b>	<b>125,385,678</b>	<b>7,466,072</b>	<b>17,915,300</b>
26	<b>CWIP (Work in Progress)</b>	<b>321,659,465</b>	<b>62,583,827</b>	<b>229,607,382</b>	<b>12,133,834</b>	<b>15,849,348</b>	<b>1,207,495</b>	<b>277,578</b>
27	<b>Net Investment Plus CWIP</b>	<b>1,388,550,071</b>	<b>138,803,980</b>	<b>951,293,506</b>	<b>130,351,114</b>	<b>141,235,026</b>	<b>8,673,568</b>	<b>18,192,878</b>

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 25 of Table 5-2 is the basis for recovery of the test year 2016 capital cost of \$181,512,000.

### 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, and pretreatment monitoring and surveillance 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 2016 O&M expense is projected to be \$109,635,700, 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 2016

Line No.	Description	Total	Volume	Capacity	Wastewater Strength					Sewer In Basement	
					SS	BOD	TKN	Cust/Bill.	Surcharge		Pretreatment
		\$	\$	\$	\$	\$	\$	\$	\$	\$	
<b>Wastewater Treatment:</b>											
1	Office of the Director - 410	7,783,078	877,919	2,957,944	851,257	1,013,132	159,959	482,438	89,011	207,693	1,143,724
2	Wastewater Engineering - 420	2,803,776	202,809	1,905,652	308,519	327,100	19,836	0	0	0	39,859
3	Project Delivery- 421	5,824,242	454,810	3,934,024	636,907	675,265	40,950	0	0	0	82,285
4	Wastewater Administration - 430	9,597,560	518,597	1,747,294	502,848	598,470	94,489	5,284,982	52,580	122,687	675,612
5	Information Technology - 431	6,370,580	718,591	2,421,127	696,768	829,266	130,929	394,884	72,857	170,001	936,158
6	Wastewater Treatment - 441	1,202,674	300,898	286,649	271,353	313,320	30,453	0	0	0	0
7	Wastewater Treatment - 442 (Mill Creek)	21,109,933	5,184,531	2,389,613	5,642,364	6,992,206	901,220	0	0	0	0
8	Wastewater Treatment - 443 (Little Miami)	6,314,451	1,687,961	923,532	1,453,526	1,984,958	264,474	0	0	0	0
9	Wastewater Treatment - 444 (Muddy Creek)	3,560,382	1,370,626	1,071,196	372,813	745,747	0	0	0	0	0
10	Wastewater Treatment - 445 (Sycamore)	2,177,860	710,690	633,831	270,000	563,340	0	0	0	0	0
11	Wastewater Treatment - 446 (Colerain/Taylor Creek)	1,766,384	510,460	514,995	150,799	590,130	0	0	0	0	0
12	Wastewater Treatment - 447 (Polk Run)	1,701,501	557,207	543,682	154,322	446,291	0	0	0	0	0
13	MSD Pump Stations - 448	1,601,230	0	1,601,230	0	0	0	0	0	0	0
14	Wastewater Treatment - 449 (Equipment Main.)	7,680,362	1,960,369	1,818,225	1,721,204	1,987,400	193,165	0	0	0	0
15	Wastewater Collection - 450	20,708,339	139,550	20,568,789	0	0	0	0	0	0	0
16	Industrial Waste - 460	6,983,930	1,141,328	0	768,763	1,230,021	768,763	0	922,516	2,152,537	0
17	Sewer in Basement - 470 & 480	11,813,718	0	0	0	0	0	0	0	0	11,813,718
18	<b>Total O&amp;M Expense</b>	<b>119,000,000</b>	<b>16,336,348</b>	<b>43,317,784</b>	<b>13,801,443</b>	<b>18,296,645</b>	<b>2,604,238</b>	<b>6,162,305</b>	<b>1,136,965</b>	<b>2,652,918</b>	<b>14,691,356</b>
19	Plus: Incremental O&M Expenses	0	0	0	0	0	0	0	0	0	0
20	Less: Office Equipment & Motorized Vehicles	(3,414,292)	(385,127)	(1,297,595)	(373,431)	(444,442)	(70,171)	(211,637)	(39,048)	(91,111)	(501,731)
21	Less: Force Accounts	0	0	0	0	0	0	0	0	0	0
22	Less: Projected Encumbrance Cancellation	(5,950,000)	(821,120)	(2,163,071)	(691,233)	(918,977)	(130,446)	(306,322)	(56,517)	(131,874)	(730,439)
23	<b>Total Net O&amp;M Expenditures</b>	<b>109,635,708</b>	<b>15,130,101</b>	<b>39,857,117</b>	<b>12,736,779</b>	<b>16,933,226</b>	<b>2,403,621</b>	<b>5,644,346</b>	<b>1,041,400</b>	<b>2,429,933</b>	<b>13,459,186</b>

Table 5-4 Summary of Allocation to Functional Cost Components – Text Year 2016

Line No.	Cost Component	Operating Expense \$	Capital Costs \$	Total Cost of Service \$
1	<b>Volume Related Cost</b>	14,243,055	18,144,490	32,387,545
2	<b>Capacity Related Cost</b>	37,520,379	124,353,316	161,873,696
3	<b>Strength Related Cost</b>			
4	Suspended Solids	11,990,049	17,039,529	29,029,578
5	BOD	15,940,467	18,462,277	34,402,743
6	TKN	2,262,702	1,133,811	3,396,513
7	<b>Customer Cost</b>	5,313,430	0	5,313,430
	<b>Industrial Monitoring &amp; Surveillance</b>			
8	Surcharge	980,345	0	980,345
9	Pretreatment	1,516,471	0	1,516,471
10	<b>Sewer In Basement</b>	12,670,103	2,378,177	15,048,280
11	<b>Total Cost of Service</b>	<b>102,437,000</b>	<b>181,511,600</b>	<b>283,948,600</b>

## 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 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.

### 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 2016

Line No.	Description	Residential	Commercial	Industrial	Multi Family	Surcharge	Sewer in Basement	Total
<b>1</b>	<b>Wastewater Volume - 1,000 Ccf</b>							
2	Contributed Wastewater Volume	11,369	6,641	5,605	6,636			30,250
3	Infiltration/Inflow	30,064	10,444	4,441	10,446			55,395
4	Total	41,433	17,085	10,046	17,081			85,645
<b>5</b>	<b>Wastewater Capacity Flow Rate - Ccf/day</b>							
6	Contributed Wastewater Volume	46,721	27,291	23,036	27,270			124,318
7	Infiltration/Inflow	247,102	85,843	36,498	85,854			455,297
8	Total	293,823	113,134	59,534	113,124			579,615
	<b>Wastewater Strength - 1,000 pounds</b>							
9	Suspended Solids	39,803	18,766	13,083	18,757	5,168		95,577
10	BOD	23,237	12,018	9,191	12,012	20,807		77,265
11	TKN	2,985	1,256	760	1,255	1,741		7,997
	<b>Customer Billing Units</b>							
12	Equivalent Bills	759,090	63,290	4,070	88,000	928		915,378
13	<b>Surcharge</b>							
14	<b>Sewer In Basement</b>						331,790	331,790

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 294 mg/l, 235 mg/l, and 13 mg/l, respectively. An average I/I strength allowance of 101 mg/l, 35 mg/l and 11 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 \$13,186,000, or 4.87 percent, overall increase in the level of wastewater service revenues is considered necessary to meet the projected revenue requirements for the 2016 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 2016

Line No.	Description	Total	Volume	Capacity	Wastewater Strength			Billing	Industrial Monitoring & Surveillance	Sewer In Basement
					SS	BOD	TKN			
		\$	\$	\$	\$	\$	\$	\$	\$	
<b>Cost of Service:</b>										
1	Operation & Maintenance Expense	102,437,000	14,243,055	37,520,379	11,990,049	15,940,467	2,262,702	5,313,430	2,496,816	12,670,103
2	Replacement Costs	0	0	0	0	0	0	0	0	0
3	Subtotal	102,437,000	14,243,055	37,520,379	11,990,049	15,940,467	2,262,702	5,313,430	2,496,816	12,670,103
3	Other Capital Costs	181,511,600	18,144,490	124,353,316	17,039,529	18,462,277	1,133,811	0	0	2,378,177
4	Total Cost of Service	283,948,600	32,387,545	161,873,696	29,029,578	34,402,743	3,396,513	5,313,430	2,496,816	15,048,280
<b>Units of Service:</b>										
5	Total Units		85,644,958 Ccf	579,615 Ccf/day	95,577 1,000 lbs.	77,265 1,000 lbs.	7,997 1,000 lbs.	915,378 Eq. Bills		331,790 Connections
<b>Unit Cost of Service:</b>										
6	Operation & Maintenance Expense		0.1663	64.7333	125.4496	206.3081	282.9444	5.8046		38.19
7	Replacement Costs		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.00
8	Subtotal		0.1663	64.7333	125.4496	206.3081	282.9444	5.8046		38.19
9	Other Capital Costs		0.2119	214.5447	178.2814	238.9464	141.7798	0.0000		7.17
10	Total Unit Cost of Service		0.3782	279.2780	303.7310	445.2545	424.7242	5.8046		45.35
<b>Allocation to Customer Classes:</b>										
<b>Residential</b>										
11	Units of Service		41,432,706	293,823	39,803	23,237	2,985	759,090		
12	OM&R Costs	40,948,607	6,890,403	19,020,126	4,993,270	4,793,982	844,589	4,406,236		
13	Other Capital Costs	84,887,718	8,777,812	63,038,162	7,096,133	5,552,398	423,213	0		
14	Total	125,836,324	15,668,215	82,058,288	12,089,403	10,346,380	1,267,802	4,406,236		
<b>Commercial</b>										
15	Units of Service		17,085,030	113,134	18,766	12,018	1,256	63,290		
16	OM&R Costs	15,721,186	2,841,300	7,323,535	2,354,187	2,479,411	355,378	367,375		
17	Other Capital Costs	34,287,244	3,619,584	24,272,298	3,345,628	2,871,658	178,075	0		
18	Total	50,008,430	6,460,885	31,595,833	5,699,815	5,351,069	533,454	367,375		
<b>Industrial</b>										
19	Units of Service		10,045,909	59,534	13,083	9,191	760	4,070		
20	OM&R Costs	9,300,598	1,670,670	3,853,831	1,641,257	1,896,178	215,038	23,625		
21	Other Capital Costs	19,537,364	2,128,297	12,772,703	2,332,455	2,196,157	107,753	0		
22	Total	28,837,962	3,798,966	16,626,534	3,973,712	4,092,335	322,790	23,625		
<b>Multifamily</b>										
23	Units of Service		17,081,313	113,124	18,757	12,012	1,255	88,000		
24	OM&R Costs	15,860,703	2,840,682	7,322,887	2,353,058	2,478,173	355,095	510,807		
25	Other Capital Costs	34,281,131	3,618,797	24,270,153	3,344,023	2,870,225	177,934	0		
26	Total	50,141,834	6,459,479	31,593,040	5,697,081	5,348,398	533,029	510,807		
<b>Surcharge</b>										
27	Units of Service				5,168	20,807	1,741	928		
28	OM&R Costs	6,419,332			648,276	4,292,723	492,602	5,387	980,345	
29	Other Capital Costs	6,139,966			921,290	4,971,839	246,836	0		
30	Total	12,559,297			1,569,566	9,264,562	739,438	5,387	980,345	
<b>Industrial Pretreatment (a)</b>										
31	Units of Service									
32	OM&R Costs	1,516,471							1,516,471	
33	Other Capital Costs	0								
34	Total	1,516,471							1,516,471	
<b>Sewer In Basement</b>										
35	Units of Service									331,790
36	OM&R Costs	12,670,103								12,670,103
37	Other Capital Costs	2,378,177								2,378,177
38	Total	15,048,280								15,048,280
39	<b>Total Cost of Service</b>	283,948,600	32,387,545	161,873,696	29,029,578	34,402,743	3,396,513	5,313,430	2,496,816	15,048,280

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 3).

Table 5-7 Comparison of Allocated Cost of Service with Revenues under Existing Rates - Test Year 2016

Line No.	Cost Component	Revenue Under Existing Rates	Total Cost of Service	Adjusted Cost of Service	Indicated Revenue Increase Required	Indicated Revenue Adjustment
		\$	\$	\$	\$	%
1	<b>Residential</b>	117,800,909	125,836,324	134,706,172	\$ 16,905,263	14.35%
2	<b>Commercial</b>	51,302,673	50,008,430	52,749,918	\$ 1,447,245	2.82%
3	<b>Industrial</b>	30,782,371	28,837,962	29,532,028	\$ (1,250,343)	-4.06%
4	<b>Multifamily</b>	51,748,612	50,141,834	52,884,713	\$ 1,136,102	2.20%
5	<b>Surcharge</b>	19,127,954	14,075,769	14,075,769	\$ (5,052,186)	-26.41%
6	<b>Sewer In Basement</b>	0	15,048,280	0	0	
7	<b>Total</b>	<b>270,762,519</b>	<b>283,948,600</b>	<b>283,948,600</b>	<b>13,186,081</b>	4.87%

## 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 4-3 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.

### 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. Three alternative rate schedules were developed for consideration, as discussed below.

### 6.2.1 Option 1: Cost of Service

Table 6-1 presents a schedule of sewerage service charges, designed using based on the existing rate structure, and reflect rates necessary to recover cost of service by customer class. Table 6-2 presents the schedule of sewerage surcharges, based on cost of service.

Table 6-1 Sewerage Service Charges – Option 1 - Test Year 2016

**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, as determined by the number of units therein, whichever results in the larger minimum charge.

The minimum charge shall include the allowance for the first 500 cubic feet of water used in the case of monthly bills; and the first 900 cubic feet of water used, in the case of quarterly bills.

The minimum charge rates shall be as follows:

Meter Size	Number of Family Units	Quarterly Bills		Monthly Bills	
		OM&R	Total	OM&R	Total
Inches					
5/8"	1	\$ 45.40	\$ 121.88	\$ 21.87	\$ 52.95
3/4"	2-3	\$ 58.89	\$ 161.05	\$ 26.36	\$ 66.00
1"	4-5	\$ 77.77	\$ 215.87	\$ 32.66	\$ 84.28
1 ½"	6-12	\$ 131.73	\$ 372.53	\$ 50.64	\$ 136.50
2"	13-20	\$ 185.68	\$ 529.18	\$ 68.63	\$ 188.71
3"	21-50	\$ 423.08	\$ 1,218.44	\$ 147.76	\$ 418.47
4"	51-115	\$ 692.86	\$ 2,001.70	\$ 237.69	\$ 679.55
6"	116-250	\$ 1,367.30	\$ 3,959.84	\$ 462.50	\$ 1,332.27
8"	Over 250	\$ 2,041.74	\$ 5,917.99	\$ 687.31	\$ 1,984.98
10"		\$ 2,716.18	\$ 7,876.13	\$ 912.13	\$ 2,637.70
12"		\$ 3,120.84	\$ 9,051.02	\$ 1,047.01	\$ 3,029.33

**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 500 cubic feet per month; or 900 cubic feet per quarter -		
Next 4,500 cubic feet per month; or 14,100 cubic feet per quarter -	\$ 1.387	\$ 7.826 /Ccf
Over 5,000 cubic feet per month; or 15,000 cubic feet per quarter -	\$ 1.387	\$ 4.180 /Ccf

**Basis of Charge**

For residential water service accounts (one and two family residences) a quarterly minimum and commodity charge shall be based upon water used during a winter quarterly billing period. Said winter period being the quarterly 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 – Option 1 - Test Year 2016

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)	\$ 0.002256	per 100 cubic feet for each mg/l of SS strength above 300 mg/l
Biochemical Oxygen Demand (BOD)	\$ 0.003371	per 100 cubic feet for each mg/l of BOD strength above 240 mg/l
Nitrogen Oxygen Demand (TKN)	\$ 0.003463	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)	\$ 0.3615	per pound of excess strength
Biochemical Oxygen Demand (BOD)	\$ 0.5402	per pound of excess strength
Nitrogen Oxygen Demand (TKN)	\$ 0.5550	per pound of excess strength

**6.2.1.1 Revenue Recovery under Option 1 Rates**

As previously discussed, the Option #1 rate schedule would recover the necessary 4.87 percent increase in revenue required by the utility, while achieving cost of service based on the existing rate structure, as shown in Table 6-3. As shown, 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	134,706,172	117,800,909	129,802,271	96.36%
2	Commercial	52,749,918	51,302,673	55,710,615	105.61%
3	Industrial	29,532,028	30,782,371	28,140,203	95.29%
4	Multifamily	52,884,713	51,748,612	56,216,537	106.30%
5	Surcharge	14,075,769	19,127,954	14,075,114	100.00%
6	Total	283,948,600	270,762,519	283,944,741	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 2016		
		Bill \$	Bill \$	Increase \$	Increase %
<b>Quarterly</b>					
5/8"	0	117.35	121.88	4.53	3.86%
5/8"	3	117.35	121.88	4.53	3.86%
5/8"	6	117.35	121.88	4.53	3.86%
5/8"	9	117.35	121.88	4.53	3.86%
5/8"	12	134.99	145.36	10.37	7.68%
5/8"	15	152.62	168.84	16.21	10.62%
5/8"	20	182.02	207.97	25.95	14.26%
5/8"	25	211.41	247.10	35.69	16.88%
3/4"	30	274.78	325.40	50.62	18.42%
3/4"	50	392.36	481.93	89.57	22.83%
1"	75	595.45	732.41	136.95	23.00%
1"	100	742.43	928.06	185.63	25.00%
1 1/2"	150	1,181.45	1,476.04	294.59	24.93%
2"	200	1,563.32	1,841.67	278.35	17.81%
2"	300	2,033.42	2,259.63	226.21	11.12%
3"	500	3,755.78	3,784.81	29.03	0.77%
3"	1,000	6,106.28	5,874.61	(231.67)	-3.79%
4"	5,000	25,751.09	23,376.27	(2,374.82)	-9.22%
6"	10,000	51,272.96	46,232.41	(5,040.55)	-9.83%
8"	20,000	100,400.57	89,986.56	(10,414.01)	-10.37%
10"	20,000	102,504.54	91,944.70	(10,559.84)	-10.30%
12"	20,000	103,797.03	93,119.59	(10,677.44)	-10.29%
<b>Monthly</b>					
5/8"	0	57.11	52.95	(4.16)	-7.28%
5/8"	3	57.11	52.95	(4.16)	-7.28%
5/8"	6	62.99	60.78	(2.21)	-3.51%
5/8"	9	80.63	84.26	3.63	4.50%
5/8"	12	98.26	107.73	9.47	9.64%
5/8"	15	115.90	131.21	15.31	13.21%
5/8"	20	145.30	170.34	25.05	17.24%
5/8"	25	174.69	209.48	34.79	19.91%
3/4"	30	215.47	261.66	46.19	21.44%
3/4"	50	333.05	418.18	85.14	25.56%
1"	75	470.22	540.95	70.73	15.04%
1"	100	587.75	645.44	57.70	9.82%
1 1/2"	150	870.56	906.64	36.09	4.15%
2"	200	1,157.00	1,167.83	10.84	0.94%
2"	300	1,627.10	1,585.79	(41.30)	-2.54%
3"	500	2,839.04	2,651.47	(187.56)	-6.61%
3"	1,000	5,189.54	4,741.27	(448.26)	-8.64%
4"	5,000	24,294.59	21,720.75	(2,573.83)	-10.59%
6"	10,000	48,526.61	43,271.47	(5,255.13)	-10.83%
8"	20,000	96,259.98	85,720.18	(10,539.79)	-10.95%
10"	20,000	97,020.01	86,372.90	(10,647.10)	-10.97%
12"	20,000	97,508.34	86,764.53	(10,743.80)	-11.02%

### 6.2.2 Option 2: “Across-the-Board” Increase Except Sewerage Surcharge

Table 6-5 presents a schedule of sewerage service charges that is designed using the existing rate structure and reflects an increase of 5.25 percent for all rates, except sewerage surcharges, which are held constant at current rates. This results in an overall system increase of 4.87 percent. Table 6-6 presents the schedule of sewerage surcharges which reflect no change over those implemented in January 2015.

Table 6-5 Sewerage Service Charges – Option 2 - Test Year 2016

**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, as determined by the number of units therein, whichever results in the larger minimum charge.

The minimum charge shall include the allowance for the first 500 cubic feet of water used in the case of monthly bills; and the first 900 cubic feet of water used, in the case of quarterly bills.

The minimum charge rates shall be as follows:

Meter Size Inches	Number of Family Units	Quarterly Bills		Monthly Bills	
		OM&R	Total	OM&R	Total
5/8"	1	\$ 68.87	\$ 123.51	\$ 35.66	\$ 60.11
3/4"	2-3	\$ 86.60	\$ 159.26	\$ 41.56	\$ 72.09
1"	4-5	\$ 121.85	\$ 218.33	\$ 52.81	\$ 92.77
1 ½"	6-12	\$ 202.35	\$ 371.02	\$ 79.28	\$ 143.03
2"	13-20	\$ 285.29	\$ 525.54	\$ 108.20	\$ 197.12
3"	21-50	\$ 640.18	\$ 1,348.77	\$ 225.32	\$ 483.13
4"	51-115	\$ 1,060.92	\$ 2,233.72	\$ 375.87	\$ 799.98
6"	116-250	\$ 2,088.39	\$ 4,356.48	\$ 727.86	\$ 1,565.17
8"	Over 250	\$ 3,115.93	\$ 6,585.26	\$ 1,079.91	\$ 2,326.52
10"		\$ 4,167.77	\$ 8,799.69	\$ 1,456.30	\$ 3,126.45
12"		\$ 4,823.29	\$ 10,160.04	\$ 1,706.50	\$ 3,640.42

**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 500 cubic feet per month; or 900 cubic feet per quarter -		
Next 4,500 cubic feet per month; or 14,100 cubic feet per quarter -	\$ 2.591	\$ 6.188 /Ccf
Over 5,000 cubic feet per month; or 15,000 cubic feet per quarter -	\$ 2.591	\$ 4.948 /Ccf

**Basis of Charge**

For residential water service accounts (one and two family residences) a quarterly minimum and commodity charge shall be based upon water used during a winter quarterly billing period. Said winter period being the quarterly 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 – Option 2 - Test Year 2016

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

**6.2.2.1 Revenue Recovery under Option 2 Rates**

As previously discussed, the Option #2 rate schedule would increase all rates 5.25 percent, except sewerage surcharge rates, over those implemented in January 2015. This results in an overall system increase of 4.87 percent. The percent and maintain current cost recovery by customer class, as 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	134,706,172	117,800,909	123,984,549	92.04%
2	Commercial	52,749,918	51,302,673	53,995,835	102.36%
3	Industrial	29,532,028	30,782,371	32,398,408	109.71%
4	Multifamily	52,884,713	51,748,612	54,465,057	102.99%
5	Surcharge	14,075,769	19,127,954	19,127,954	135.89%
6	Total	283,948,600	270,762,519	283,971,804	100.01%

### 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. As shown, all rates would increase at 5.25 percent for all rates, except sewerage surcharge, over those implemented in January 2015. This results in an overall system increase of 4.87 percent.

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

Meter Size Inches	Usage Ccf	Existing	Proposed 2016		
		Bill \$	Bill \$	Increase \$	Increase %
<b>Quarterly</b>					
5/8"	0	117.35	123.51	6.16	5.25%
5/8"	3	117.35	123.51	6.16	5.25%
5/8"	6	117.35	123.51	6.16	5.25%
5/8"	9	117.35	123.51	6.16	5.25%
5/8"	12	134.99	142.07	7.09	5.25%
5/8"	15	152.62	160.64	8.01	5.25%
5/8"	20	182.02	191.57	9.55	5.25%
5/8"	25	211.41	222.51	11.10	5.25%
3/4"	30	274.78	289.20	14.42	5.25%
3/4"	50	392.36	412.95	20.59	5.25%
1"	75	595.45	626.71	31.26	5.25%
1"	100	742.43	781.40	38.97	5.25%
1 ½"	150	1,181.45	1,243.47	62.02	5.25%
2"	200	1,563.32	1,645.38	82.06	5.25%
2"	300	2,033.42	2,140.16	106.74	5.25%
3"	500	3,755.78	3,952.95	197.17	5.25%
3"	1,000	6,106.28	6,426.85	320.57	5.25%
4"	5,000	25,751.09	27,103.00	1,351.91	5.25%
6"	10,000	51,272.96	53,964.76	2,691.80	5.25%
8"	20,000	100,400.57	105,671.54	5,270.97	5.25%
10"	20,000	102,504.54	107,885.97	5,381.43	5.25%
12"	20,000	103,797.03	109,246.32	5,449.29	5.25%
<b>Monthly</b>					
5/8"	0	57.11	60.11	3.00	5.25%
5/8"	3	57.11	60.11	3.00	5.25%
5/8"	6	62.99	66.30	3.31	5.25%
5/8"	9	80.63	84.86	4.23	5.25%
5/8"	12	98.26	103.42	5.16	5.25%
5/8"	15	115.90	121.99	6.09	5.25%
5/8"	20	145.30	152.92	7.63	5.25%
5/8"	25	174.69	183.86	9.17	5.25%
3/4"	30	215.47	226.78	11.32	5.25%
3/4"	50	333.05	350.53	17.49	5.25%
1"	75	470.22	494.91	24.69	5.25%
1"	100	587.75	618.60	30.86	5.25%
1 ½"	150	870.56	916.25	45.70	5.25%
2"	200	1,157.00	1,217.73	60.74	5.25%
2"	300	1,627.10	1,712.51	85.42	5.25%
3"	500	2,839.04	2,988.08	149.05	5.25%
3"	1,000	5,189.54	5,461.98	272.45	5.25%
4"	5,000	24,294.59	25,570.03	1,275.45	5.25%
6"	10,000	48,526.61	51,074.22	2,547.62	5.25%
8"	20,000	96,259.98	101,313.57	5,053.60	5.25%
10"	20,000	97,020.01	102,113.50	5,093.50	5.25%
12"	20,000	97,508.34	102,627.47	5,119.14	5.25%

### 6.2.3 Option 3: “Across-the-Board” Increase Except Surcharge and No Minimum Volume

Table 6-9 presents a schedule of sewerage service charges, designed using the same rate structure as Option 2, but with no minimum volume component. Under this rate structure, customers would pay a service charge plus a volume charge for all volume. Table 6-10 presents the schedule of sewerage surcharges, which reflect no change over those implemented in January 2015.

Table 6-9 Sewerage Service Charges – Option 3 - Test Year 2016

**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, as determined by the number of units therein, whichever results in the larger minimum charge.

The minimum charge does not include an allowance for usage as customers are billed based on actual usage.

The minimum charge rates shall be as follows:

Meter Size	Number of Family Units	Quarterly Bills		Monthly Bills	
		OM&R	Total	OM&R	Total
Inches					
5/8"	1	\$ 45.55	\$ 78.98	\$ 22.70	\$ 29.17
3/4"	2-3	\$ 63.28	\$ 114.73	\$ 28.60	\$ 41.15
1"	4-5	\$ 98.53	\$ 173.80	\$ 39.85	\$ 61.83
1 1/2"	6-12	\$ 179.03	\$ 326.49	\$ 66.32	\$ 112.09
2"	13-20	\$ 261.97	\$ 481.01	\$ 95.24	\$ 166.18
3"	21-50	\$ 616.86	\$ 1,304.24	\$ 212.36	\$ 452.19
4"	51-115	\$ 1,037.60	\$ 2,189.19	\$ 362.91	\$ 769.04
6"	116-250	\$ 2,065.07	\$ 4,311.95	\$ 714.90	\$ 1,534.23
8"	Over 250	\$ 3,092.61	\$ 6,540.73	\$ 1,066.95	\$ 2,295.58
10"		\$ 4,144.45	\$ 8,755.16	\$ 1,443.34	\$ 3,095.51
12"		\$ 4,799.97	\$ 10,115.51	\$ 1,693.54	\$ 3,609.48

**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:

	OM&R	Total
First 500 cubic feet per month; or 900 cubic feet per quarter -	\$ 2.519	\$ 6.016 /Ccf
Next 4,500 cubic feet per month; or 14,100 cubic feet per quarter -	\$ 2.519	\$ 6.016 /Ccf
Over 5,000 cubic feet per month; or 15,000 cubic feet per quarter -	\$ 2.591	\$ 4.948 /Ccf

**Basis of Charge**

For residential water service accounts (one and two family residences) a quarterly minimum and commodity charge shall be based upon water used during a winter quarterly billing period. Said winter period being the quarterly 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 – Option 3 - Test Year 2016

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

**6.2.3.1 Revenue Recovery under Option 3 Rates**

As previously discussed, the Option #3 rate schedule would recover the necessary 4.87 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	134,706,172	117,800,909	127,579,204	94.71%
2	Commercial	52,749,918	51,302,673	54,289,963	102.92%
3	Industrial	29,532,028	30,782,371	32,754,512	110.91%
4	Multifamily	52,884,713	51,748,612	50,199,526	94.92%
5	Surcharge	14,075,769	19,127,954	19,127,954	135.89%
6	Total	283,948,600	270,762,519	283,951,159	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 2016		
		Bill \$	Bill \$	Increase \$	Increase %
<b>Quarterly</b>					
5/8"	0	117.35	78.98	(38.37)	-32.70%
5/8"	3	117.35	97.03	(20.32)	-17.32%
5/8"	6	117.35	115.07	(2.28)	-1.94%
5/8"	9	117.35	133.12	15.77	13.44%
5/8"	12	134.99	151.17	16.18	11.99%
5/8"	15	152.62	169.21	16.59	10.87%
5/8"	20	182.02	199.29	17.27	9.49%
5/8"	25	211.41	229.37	17.96	8.49%
3/4"	30	274.78	295.20	20.42	7.43%
3/4"	50	392.36	415.51	23.15	5.90%
1"	75	595.45	624.97	29.52	4.96%
1"	100	742.43	775.36	32.93	4.44%
1 1/2"	150	1,181.45	1,228.83	47.38	4.01%
2"	200	1,563.32	1,630.74	67.42	4.31%
2"	300	2,033.42	2,125.52	92.10	4.53%
3"	500	3,755.78	3,938.31	182.53	4.86%
3"	1,000	6,106.28	6,412.21	305.93	5.01%
4"	5,000	25,751.09	27,088.36	1,337.27	5.19%
6"	10,000	51,272.96	53,950.12	2,677.16	5.22%
8"	20,000	100,400.57	105,656.90	5,256.33	5.24%
10"	20,000	102,504.54	107,871.33	5,366.79	5.24%
12"	20,000	103,797.03	109,231.68	5,434.65	5.24%
<b>Monthly</b>					
5/8"	0	57.11	29.17	(27.94)	-48.92%
5/8"	3	57.11	47.22	(9.89)	-17.32%
5/8"	6	62.99	65.27	2.28	3.61%
5/8"	9	80.63	83.31	2.69	3.33%
5/8"	12	98.26	101.36	3.10	3.15%
5/8"	15	115.90	119.41	3.51	3.03%
5/8"	20	145.30	149.48	4.19	2.88%
5/8"	25	174.69	179.56	4.87	2.79%
3/4"	30	215.47	221.62	6.16	2.86%
3/4"	50	333.05	341.93	8.89	2.67%
1"	75	470.22	486.31	16.09	3.42%
1"	100	587.75	610.00	22.26	3.79%
1 1/2"	150	870.56	907.65	37.10	4.26%
2"	200	1,157.00	1,209.13	52.14	4.51%
2"	300	1,627.10	1,703.91	76.82	4.72%
3"	500	2,839.04	2,979.48	140.45	4.95%
3"	1,000	5,189.54	5,453.38	263.85	5.08%
4"	5,000	24,294.59	25,561.43	1,266.85	5.21%
6"	10,000	48,526.61	51,065.62	2,539.02	5.23%
8"	20,000	96,259.98	101,304.97	5,045.00	5.24%
10"	20,000	97,020.01	102,104.90	5,084.90	5.24%
12"	20,000	97,508.34	102,618.87	5,110.54	5.24%

#### 6.2.4 Option 4: Change in Multi-Family Billing

Table 6-13 presents a schedule of sewerage service charges, designed using the same form of rate structure as the existing service charges with the exception of Multi-family billing. Under Option #4, Multi-family customers would be billed based only on meter size, not “the greater of meter size or number of units.” The rate structure is designed to generate the system-wide revenue increase of 4.87 percent. Table 6-14 presents the schedule of sewerage surcharges, which reflect no change over those implemented in January 2015.

Table 6-13 Sewerage Service Charges – Option 4 - Test Year 2016

**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, as determined by the number of units therein, whichever results in the larger minimum charge.

The minimum charge shall include the allowance for the first 500 cubic feet of water used in the case of monthly bills; and the first 900 cubic feet of water used, in the case of quarterly bills.

The minimum charge rates shall be as follows:

Meter Size Inches	Number of Family Units	Quarterly Bills		Monthly Bills	
		OM&R	Total	OM&R	Total
5/8"	1	\$ 70.81	\$ 126.98	\$ 36.66	\$ 61.80
3/4"	2-3	\$ 89.03	\$ 163.74	\$ 42.73	\$ 74.12
1"	4-5	\$ 125.27	\$ 224.47	\$ 54.29	\$ 95.38
1 ½"	6-12	\$ 208.04	\$ 381.45	\$ 81.51	\$ 147.05
2"	13-20	\$ 293.31	\$ 540.31	\$ 111.24	\$ 202.66
3"	21-50	\$ 658.17	\$ 1,386.67	\$ 231.65	\$ 496.71
4"	51-115	\$ 1,090.73	\$ 2,296.49	\$ 386.43	\$ 822.46
6"	116-250	\$ 2,147.07	\$ 4,478.90	\$ 748.31	\$ 1,609.15
8"	Over 250	\$ 3,203.49	\$ 6,770.31	\$ 1,110.26	\$ 2,391.90
10"		\$ 4,284.88	\$ 9,046.96	\$ 1,497.22	\$ 3,214.30
12"		\$ 4,958.82	\$ 10,445.54	\$ 1,754.45	\$ 3,742.72

**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 500 cubic feet per month; or 900 cubic feet per quarter -		
Next 4,500 cubic feet per month; or 14,100 cubic feet per quarter -	\$ 2.591	\$ 6.188 /Ccf
Over 5,000 cubic feet per month; or 15,000 cubic feet per quarter -	\$ 2.591	\$ 4.948 /Ccf

**Basis of Charge**

For residential water service accounts (one and two family residences) a quarterly minimum and commodity charge shall be based upon water used during a winter quarterly billing period. Said winter period being the quarterly 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 6-14 Sewerage Surcharges – Option 4 - Test Year 2016

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

**6.2.4.1 Revenue Recovery under Option #4 Rates**

As previously discussed, the Option #4 rate schedule would recover the necessary 4.87 percent increase in revenue required by the utility, while changing Multi-family billing to reflect only meter size, not “the greater of meter size or number of units.” The cost recovery by customer class is shown in Table 6-15.

Table 6-15 Comparison of Allocated Cost of Service with Revenue under Option #4 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	134,706,172	117,800,909	126,632,182	94.01%
2	Commercial	52,749,918	51,302,673	54,593,194	103.49%
3	Industrial	29,532,028	30,782,371	32,550,909	110.22%
4	Multifamily	52,884,713	51,748,612	51,045,292	96.52%
5	Surcharge	14,075,769	19,127,954	19,127,954	135.89%
6	Total	283,948,600	270,762,519	283,949,531	100.00%

#### 6.2.4.2 Typical Bills under Option #4 Rates

A comparison of typical bills under the Option #4 schedule of sewerage service charge rates with those under existing rates is shown in Table 6-16.

Table 6-16 Typical Customer Sewer Bills under Existing and Option #4 Rates

Meter Size Inches	Usage Ccf	Existing	Proposed 2016		
		Bill \$	Bill \$	Increase \$	Increase %
<b>Quarterly</b>					
5/8"	0	117.35	126.98	9.63	8.21%
5/8"	3	117.35	126.98	9.63	8.21%
5/8"	6	117.35	126.98	9.63	8.21%
5/8"	9	117.35	126.98	9.63	8.21%
5/8"	12	134.99	145.54	10.56	7.82%
5/8"	15	152.62	164.11	11.48	7.52%
5/8"	20	182.02	195.04	13.02	7.16%
5/8"	25	211.41	225.98	14.57	6.89%
3/4"	30	274.78	293.68	18.90	6.88%
3/4"	50	392.36	417.43	25.07	6.39%
1"	75	595.45	632.85	37.40	6.28%
1"	100	742.43	787.54	45.11	6.08%
1 ½"	150	1,181.45	1,253.90	72.45	6.13%
2"	200	1,563.32	1,660.15	96.83	6.19%
2"	300	2,033.42	2,154.93	121.51	5.98%
3"	500	3,755.78	3,990.85	235.07	6.26%
3"	1,000	6,106.28	6,464.75	358.47	5.87%
4"	5,000	25,751.09	27,165.77	1,414.68	5.49%
6"	10,000	51,272.96	54,087.18	2,814.22	5.49%
8"	20,000	100,400.57	105,856.59	5,456.02	5.43%
10"	20,000	102,504.54	108,133.24	5,628.70	5.49%
12"	20,000	103,797.03	109,531.82	5,734.79	5.53%
<b>Monthly</b>					
5/8"	0	57.11	61.80	4.69	8.21%
5/8"	3	57.11	61.80	4.69	8.21%
5/8"	6	62.99	67.99	5.00	7.94%
5/8"	9	80.63	86.55	5.92	7.35%
5/8"	12	98.26	105.11	6.85	6.97%
5/8"	15	115.90	123.68	7.78	6.71%
5/8"	20	145.30	154.61	9.32	6.41%
5/8"	25	174.69	185.55	10.86	6.22%
3/4"	30	215.47	228.81	13.35	6.19%
3/4"	50	333.05	352.56	19.52	5.86%
1"	75	470.22	497.52	27.30	5.81%
1"	100	587.75	621.21	33.47	5.69%
1 ½"	150	870.56	920.27	49.72	5.71%
2"	200	1,157.00	1,223.27	66.28	5.73%
2"	300	1,627.10	1,718.05	90.96	5.59%
3"	500	2,839.04	3,001.66	162.63	5.73%
3"	1,000	5,189.54	5,475.56	286.03	5.51%
4"	5,000	24,294.59	25,592.51	1,297.93	5.34%
6"	10,000	48,526.61	51,118.20	2,591.60	5.34%
8"	20,000	96,259.98	101,378.95	5,118.98	5.32%
10"	20,000	97,020.01	102,201.35	5,181.35	5.34%
12"	20,000	97,508.34	102,729.77	5,221.44	5.35%

## 7 Conclusion

The results of this analysis indicate that a series of revenue increases are expected to be required from 2016-2018 to help provide proper funding of all District programs. 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 of the Long Term Control Plan only, and once Phase 2 costs are finalized, required increases for 2017 and beyond could be 1.0% to 3.5% higher 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 four alternative rate designs presented herein are designed to recover the anticipated revenue needs of the District in 2016 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.