CITY OF HARRISONBURG, VIRGINIA

WATER RATES

&

COST OF SERVICES STUDY

FY2019

May 29, 2018

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I. Introduction

The City of Harrisonburg (City) conducted a comprehensive cost of service study (COSS) and a rate design study (RDS) for its water enterprise fund finances for the FY 2019 budget. As a prerequisite of the COSS, the justification for required revenue had been established in the Harrisonburg City budget process. The recommendations of the COSS and RDS as summarized in this document served to increase equity in the apportionment of costs by charging customers in proportion to causality.

A presentation of the City of Harrisonburg customer user profile is shown below. The grouping of customers as shown were synonymous with the nomenclature used in the Harrisonburg Public Utilities Billing Department; thus data was inherently prearranged for the cohort analysis that was performed herein.

CITY

- Residential
- Apartments
- Commercial
- Industrial
- Institutional

RURAL

- General
- VPGC

WHOLESALE

- Rockingham County

II. Cost of Services (COSS) Analysis

The COSS model was developed in house by staff at the Harrisonburg Public Utilities Department (HPU). The COSS study was performed in a series of eighteen spreadsheets that are provided in completed form in Appendix A.

COSS Protocol:

The cost of service model was the AWWA endorsed "Base-Extra Capacity Method". In this methodology the costs of services were separated into four primary cost components: (1) base costs, (2) extra capacity costs, (3) customer costs, and (4) direct fire protection costs. These costs by previously referenced components were then correlated to units of various services (average usage, max hour usage, max day usage, equivalent meters and fire flow demands) that each customer billing class was determined to place upon the Harrisonburg water system. Revenue targets were then derived for each customer class from the sum of all relevant apportioned cost components.

COSS methodology required collection and input of standard data that were specific to the Harrisonburg water system operations. In addition, the methodology also required the selection of some procedures by the analyst. Both data and procedures used in this analysis are summarized as follows.

Standard COSS Data:

Data specific input included:

- Average daily, maximum day and maximum hour system demands; (Appendix A, Table 1)
- Text book peaking factors for each customer class; (Appendix A, Table 2)
- Meter and equivalent meter inventories for each customer class; (Appendix A, Table 3)
- Sales volume and revenue for each customer class; (Appendix A, Table 5)
- Forecasted growth caps for average daily, maximum day and maximum hour demands; (Appendix A, Table 6)

- Replacement value, net book value and annual depreciation for water system assets; (Appendix A, Tables 7 & 8)

- Budget revenues and expenses;
  (Appendix A, Table 9)

- "Return on Investment" desired from "Outside City Customers" and "Wholesale Customers"; (Appendix A, Table 9)

COSS Analyst Decisions:

The decisions used by the analyst included:

- The required revenue was categorized using AWWA endorsed methodologies: The "Cash Needs Approach" was used to allocate costs for "Inside City Customers" versus the "Utility Basis Approach" that was used for "Outside City Customers". A comparison of the "Cash-Needs" and "Utility Basis" methods follow.

Cash-Needs Approach	Utility-Basis Approach
+ O & M Expenses	+ O & M Expenses
+ Taxes/Transfer Payments	+ Taxes/Transfer Payments
+ Debt Service	+ Depreciation Expense
+ Capital Improvements Funded From Rates	+ Return on Investment (Rate Base)
= Total Revenue Requirements	= Total Revenue Requirements

In the above methodologies a government-owned utility took the position that customers within the city were owner customers. They carried the risks and responsibilities of utility ownership. Inside-City customers could not "walk away" from the utility and the utility had a responsibility to develop the system to serve all customers within the jurisdictional boundaries. As such, owner revenue needs were determined by a "Cash Needs Approach".

In contrast, Outside-City and Wholesale customers were non-owner customers that had fewer risks than the owners. With this perspective, it was most appropriate to develop (or restate) the revenue requirements for the Outside-City and Wholesale customers on a Utility Basis. This provided an appropriate (fair) return on the value of the assets that were devoted to serving non-owner customer groups. When properly established, the rate of return under the utility basis for allocating cost of service would be fair to the owner customers, the Outside-City customers and the Wholesale customers. With purpose, the revenue generated from the return on investment (ROI) was then credited to the City customers and helped to retain lower in City rates.

- For data collection, a typical hybrid model approach was used. Specific demand and asset data were chosen from FY2017 test year which represented the most recent complete set of data that was available. In contrast, financial data was retrieved from the FY2019 proposed budget.

- The following costs were distributed to customers per usage and consumption patterns for the test year FY2017:
    - Operation & maintenance costs
    - Administrative costs
    - Transfer costs

- The following costs were distributed to customers per equivalent meter value:
    - Utility Billing costs

- The following costs were distributed per direct fire protection costs. They were passed on to the Fire Department as an internal transfer under non-rate revenue; thus, direct fire protection costs had no impact upon proposed water rates:
    - Itemized costs for hydrant maintenance, repair and replacement

- Capital, debt, depreciation and ROI costs were apportioned to assets as shown in the chart below:

Customer	Water Supply	Water Treatment	Distribution
Inside City	%u * total asset value	%u * total asset value	%u * City itemized asset value
Outside City	%u * total asset value	%u * total asset value	100%u * Outside City itemized asset value
Rockingham County	%u * total asset value	%u * total asset value	%u * City itemized asset value

Chart notes

- %u is based on ultimate demand forecasting per Table 6;
  data was retrieve from the HPU "Raw Water Supply Management Plan"
- Distribution assets were itemized between Inside and Outside City.
- The locations of Rockingham County wholesale connections did not readily allow for specific itemization of assets as used for Outside City customers; therefore, the City-County assets were apportioned based upon ultimate demand forecasting per Table 6. The City County Agreement maximum allocation for 1.0 MGD was used to determine the depreciation and ROI from Rockingham County as a wholesale customer.
- Depreciation was recognized as both a revenue and a cost in the Harrisonburg water budget and therefore had no impact to the COSS study.

- Non-rate revenue was credited against O&M costs using the same format used for distribution of O&M costs.

- The budget proposed $1,167,740 from fund balance which is a one-time expense not included in the revenue requirements for this study; this cost is credited against capital expenses and therefore had no impact upon COSS and RDS results.

III. Rate Design Study (RDS)

The rate design model software used in the RDS was a product and service of Water-worth, a software vendor from Victoria, British Columbia. Outputs from the model software has been provided in Appendix B and Appendix C.

The City HPU and the Water Worth vendor had previously work together to enter specific information for Harrisonburg into the model. City water rate structure and the billing account data for the most recent twelve months were used in an initial calibration exercise. With given known inputs, HPU tested the model's forecasted financial outputs against known financial outputs. The calibration was determined to be successful.

The next step was to insert the target values from the COSS analysis into the Water Worth rate model. Thereafter, various modifications to rates were tested to determine the best fit to meet the COSS targets. Section IV as follows shows the results of the best fit recommendation. It should be noted that the following opportunities and constraints were honored in the rate analysis:

- The analysis was a zero-growth model; therefore, expected sales volume (gallons) in FY2019 was forecasted to match sales volume (gallons) from FY2018.

- Revenue from seasonal rates was included as an adjustment.

- The ROI was set at 4.5% for rural customers (direct service by the City) and 0.0% for wholesale sales to Rockingham County.

- The rates to Rockingham County could only be adjusted per City County contract agreement

- The percentage of revenue from fixed rates (minimum bills) should be greater than 20%.

IV. COSS and Rate Study Results

The results of the best fit rate structure and schedule that were considered are shown below. The following is a summary of cost distribution to the customers that also allows a comparison to the COSS defined targets.

Customer	COSS Target	Rate Revenue	Difference	$ from minimum
Residential	$1,990,562	$1,956,109	($34,453)	$1,384,062
Apartments	$958,830	$1,049,269	$90,439	$783,023
Industrial	$1,579,394	$1,648,780	$69,386	$526,747
Institutional	$1,139,702	$1,123,423	($16,278)	$43,171
City Municipal	$906,434	$818,154	($88,280)	$153,165
Rural	$444,345	$468,362	$24,017	$265,090
VPGC	$1,020,540	$1,079,066	$58,527	$19,171
RoCo	$380,219	$290,206	($90,012)	$0
Total	**$8,466,660**	**$8,481,319**	**$14,659**	**$3,198,913**

Total revenue requirements were met with the selected structure and schedule of rates.

Whereas the City's current water rate structure is by user size groups rather than by customer type groups, an exact fit for each customer group was not feasible to obtain. A correction for one group would move another away from the target. With this constraint and the best fit recommendation as selected, City apartments, City industrial users and rural customers slightly overpay as revenues from others, including $90,000 from Rockingham County, fall short of the COSS targets.

The amount of revenue from minimum bills at $3,198,913 is 39% of total revenue and exceeds the minimum threshold of 20% for fixed revenue.

V. COSS and Rate Study Recommendations

The following changes to City, rural and wholesale rates achieve the cost distribution among customers as shown in the previous section. The City rates as shown below moved to a uniform rate as compared to the declining block rates as shown under current FY2018 rates. Rural rates remained declining block rate structure.

City Rates

Gallons per Month	Fy2018 Rates per 1000 gallons per month	Fy2019 Rates per 1000 gallons per month
<2,500	$ 3.11	$3.21
2,500 – 25,000	$3.11	$3.21
25,000-250,000	$3.11	$3.21
>250,000	$2.75	$3.21

Rural Rates

Gallons per Month	Fy208 Rates per 1000 gallons per month	Fy2019 Rates per 1000 gallons per month
<2,500	$5.07	$5.37
2,500 – 25,000	$5.07	$5.37
25,000-250,000	$5.07	$5.37
>250,000	$4.14	$4.43

The above rate schedule (plus seasonal charge of $0.25/1000 gallons and applicable minimum charges) will generate $8,481,319. The forecasted rate of return on 2,161,045,532 (5.92 MGD) gallons billed was $3.92 /1000 gallons.

Rockingham County rates were re-established in 2006 at equal to City resident rates at $2.15/1000 gallons. The FY2019 forecast for City customers was $3.74 / 1000 gallons ($6,643,684 @ 1,775,037,532 gallons). Rockingham County rates were increased to $3.74 / 1000 gallons to recognize the same 74% increase incurred since 2006.

VI.

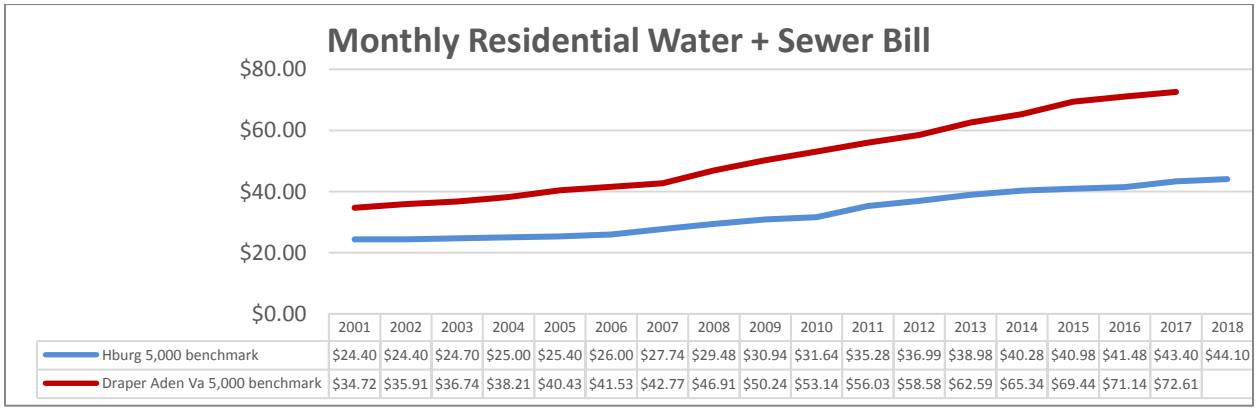
VI. Impact Analysis

The benchmark usage for residential customers is 5,000 gallons per month. As shown below, the Harrisonburg's residential benchmark for water will increase 3.15% to $16.05 per month. The residential benchmark for water plus sewer ($0.09 / 1000 gallons sewer increase) will increase 3.94% to $44.10 per month.

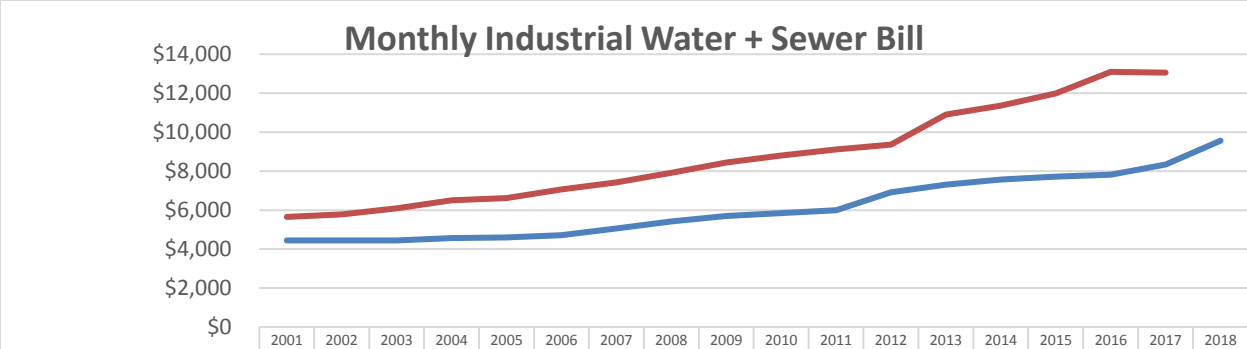
The benchmark usage for industrial customers is 1,000,000 gallons per month. As shown below, the Harrisonburg's industrial benchmark for water will increase 18.4% to $3,201.00 per month. The industrial benchmark for water plus sewer ($0.09 / 1000 gallons sewer increase) will increase 17.1% to $9,560.00 per month.

Monthly Bill: $ / month	Fy2018	FY2019
Residential Benchmark 5,000	$15.56 water $43.40 water + sewer	$16.05 water $44.10 water + sewer
Industrial Benchmark: 1M	$2,840.01 water $8,340.45 water + sewer	$3,210.00 water $9,560.00 water + sewer

Shown in the two trend graphs below are the Harrisonburg and Virginia statewide benchmarks for monthly bills based on 5,000 gallons that is typical for residential users and 1,000,000 gallons that is typical for an industrial user. The trends show that Harrisonburg will remain competitive and significantly lower with respect to average monthly charges.



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Hburg 5,000 benchmark	$24.40	$24.40	$24.70	$25.00	$25.40	$26.00	$27.74	$29.48	$30.94	$31.64	$35.28	$36.99	$38.98	$40.28	$40.98	$41.48	$43.40	$44.10
Draper Aden Va 5,000 benchmark	$34.72	$35.91	$36.74	$38.21	$40.43	$41.53	$42.77	$46.91	$50.24	$53.14	$56.03	$58.58	$62.59	$65.34	$69.44	$71.14	$72.61	



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
H'burg 1MG Benchmark	$4,442	$4,442	$4,442	$4,562	$4,592	$4,712	$5,062	$5,412	$5,702	$5,842	$5,987	$6,912	$7,312	$7,572	$7,712	$7,812	$8,340	$9,560
Draper Aden Va 1MG benchmark	$5,650	$5,778	$6,084	$6,499	$6,615	$7,067	$7,425	$7,916	$8,438	$8,808	$9,112	$9,363	$10,907	$11,366	$11,991	$13,095	$13,054	

VII. Alternative Rate Schedule

Due to the significant impact to the large water users, and a forth coming rate adjustment in FY2020 to accommodate additional debt in FY2020, Appendix C of this document provided the results of an alternative rate schedule. The alternative rate schedule has been prepared with purpose as a temporary lesser impact to the large users until the next COSS and RDS is performed. The alternative rate schedule is provided in Appendix C; it does not completely abort the existing declining block rate format, but in comparison to existing rates it moves closer to the future uniform rate.

The alternative rate schedule will be recommended and thereby would supersede the COSS recommendation for FY2019; but with understanding that fully meeting COSS recommendations will remain the staple of future rate schedule planning. This recommendation includes the following:

Proposed Rates

City Rates

Gallons per Month	Fy2018 Rates per 1000 gallons per month	Fy2019 Rates per 1000 gallons per month
<2,500	$ 3.11	$3.30
2,500 – 25,000	$3.11	$3.30
25,000-250,000	$3.11	$3.30
>250,000	$2.75	$3.00

Rural Rates

Gallons per Month	Fy208 Rates per 1000 gallons per month	Fy2019 Rates per 1000 gallons per month
<2,500	$5.07	$5.37
2,500 – 25,000	$5.07	$5.37
25,000-250,000	$5.07	$5.37
>250,000	$4.14	$4.43

Rockingham County rates will be $3.74 / 1000 gallons as determined previously.

COSS Analysis

Customer	COSS Target	Rate Revenue	Difference	$ from minimum
Residential	$1,990,562	$2,009,492	$18,900	$1,422,868
Apartments	$958,830	$1,054,134	$95,304	$759,993
Commercial	$1,579,394	$1,655,713	$76,319	$541,515
Industrial	$1,139,702	$1,064,608	($75,093)	$44,382
Institutional	$906,434	$798,562	($107,872)	$157,459
City Municipal	$46,635	$48,918	$2,283	$25,171
Rural	$444,345	$468,362	$24,017	$265,090
VPGC	$1,020,540	$1,079,066	$58,527	$19,171
RoCo	$380,219	$290,206	($90,012)	$0
Total	**$8,466,660**	**$8,469,032**	**$2,372**	**$3,235,649**

Revenue goals have been met and the fixed revenue remains strong at 39%.

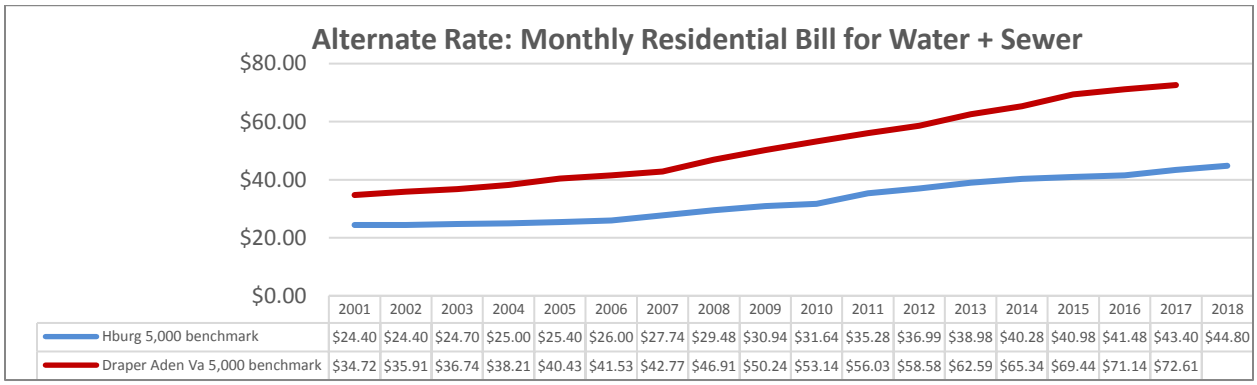
City Industrial and institutional users along with Rockingham County remain short of meeting COSS goals. The former is due to the alternative rate schedule and the latter is due to contract agreement terms.

Impact Analysis

The benchmark residential user increased 3.2 % overall from $43.40 per month to $44.80 per month (table); this remains below the 2017 statewide average of $72.61 per month (62% of D.A. Virginia Control Group). See trend figure below.

The benchmark industrial user increases 3.9 % overall from $8,544 per month to $8,878 per month (table); this remains below the 2017 statewide average of $13,054 per month (68%) of D.A. Virginia Control Group). See trend figure below.

Monthly Bill: $ / month	FY2018	FY2019	% Increase
Residential Benchmark 5,000	$15.56 water $43.40 water + sewer	$16.50 water $44.80 water + sewer	6.0% 3.2%
Industrial Benchmark: 1M	$2,840 water $8,340 water + sewer	$3,075 water $8,665 water + sewer	8.3% 3.9%



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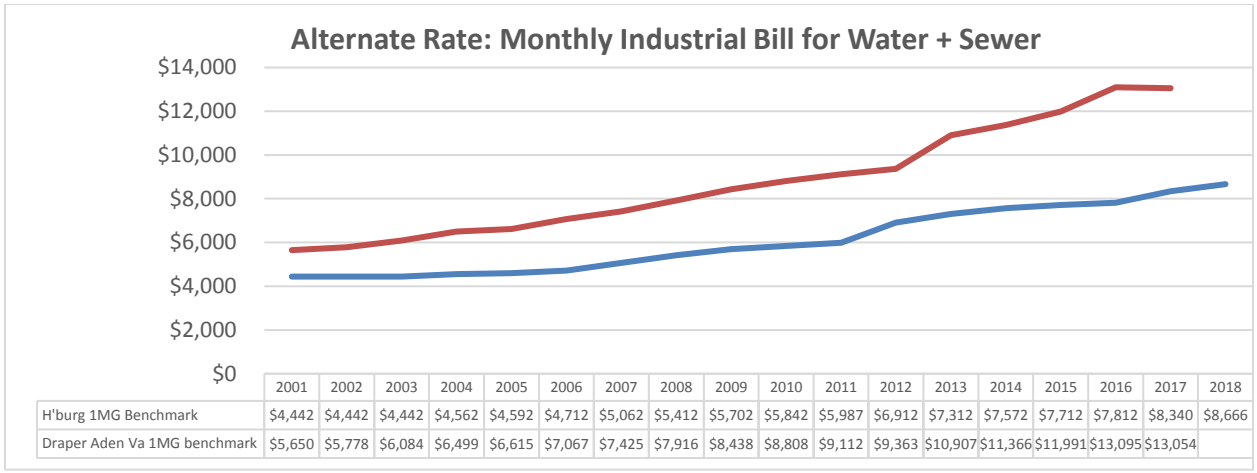

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