

VILLAGE OF MANTUA
WATER & WASTEWATER SYSTEMS
SCHEMATIC ANALYSIS OF REVENUE REQUIREMENTS
FOR SYSTEM REPLACEMENT/REHABILITATION
November 2016

INTRODUCTION

This report was designed to review the Village of Mantua's water and wastewater utility. The objective of this analysis was to research and obtain information on operation, maintenance, repair and replacement costs as a standard typical in the public utility industry. The intent is to compare the current investment the Village makes in its utility with that normally incurred.

This analysis included a detailed financial review of the revenue and expenses currently in place for both the water and wastewater utility. This review was then supplemented by a conceptual engineering analysis of the expected staffing, operation, maintenance and capital replacement program for a utility system of this size. This review included the water treatment plant, the water distribution system, the wastewater treatment plant, and the wastewater collection system. This analysis is presented as a planning document and not intended to serve as a final recommendation for adjustment in utility rates. It should serve the Village as an integral piece of information for planning purposes.

I. WATER DISTRIBUTION SYSTEM

Water mains are generally known to have a 50-100 year life cycle depending on materials, installation techniques and soil conditions. The Village's distribution system includes approximately 35,000 lineal feet of water mains. In general, the mains 6-inches and smaller are approximately 90 years old, and the 8-inch and larger mains are 20 years old or newer. Given the age of the existing mains, the analysis below assumes the least conservative life span of 100 years. Further, this high-level analysis is intended to be schematic in nature and does not separately consider the booster station or the water storage tank.

In order to replace the water mains before they reach the end of their useful life (at which point their condition threatens public health and/or the cost of fixing breaks outstrips the cost to replace the mains), the small mains would have to be replaced in the next 10 years and the larger mains in the next 80. There are approximately 22,000 lineal feet of main 6-inch and smaller and 13,000 lineal feet of mains 8-inches or larger. Assuming a project cost of \$150/lineal foot for water main replacement (project costs include surveying, engineering, legal, permits, construction, testing, etc.) results the following annual investments:

<u>Pipe Sizes</u>	<u>6-inch or less</u>	<u>8-inch or greater</u>
Total length	20,000 lineal feet	13,000 lineal feet
Cost to replace	\$150 per lineal foot	\$150 per lineal foot
Total cost to replace	\$3,000,000	\$1,950,000
Time period for replacement	10 years	80 years
Required investment per year	\$300,000	\$25,000

Thus, the required investment in the water distribution system is approximately \$325,000 per year (in 2016 dollars).

II. WATER TREATMENT PLANT

The Water Treatment Plant has a capacity of 0.432 million gallons per day (MGD). It was constructed in 1996 at a cost of approximately \$1,600,000. Updating the 1996 construction cost to 2016 dollars results in a current replacement cost of \$3,000,000 (RS Means historical cost index values of 110.2 and 207.2). Of these costs, approximately 40% are items with a useful life of 20 to 30-years; these include process equipment, HVAC equipment, electronics, roofing, pavement, etc. The remaining 60% are items with a 50 year life span such as building structures, foundations, etc.

<u>Equipment Life</u>	<u>30 Years</u>	<u>50 Years</u>
Current Replacement Cost	\$1,200,000	1,800,000
Time period for replacement	10 years	30 years
Required investment per year	\$120,000	\$60,000

Thus the required investment in the water treatment plant is approximately \$180,000 per year (in 2016 dollars).

Some specific items that will need attention in the immediate future include the roof of the water treatment plant, the outdated telemetry and PLC system, and recommended improvements to the reservoir.

III. WASTEWATER COLLECTION SYSTEM

The total length of Mantua's collection system is approximately 25,000 lineal feet. The large majority of these sewers are 80-100 years old. It will not be possible to rehabilitate/replace these sewers within the industry expected life-span. It is therefore recommended that the Village undertake an aggressive rehabilitation/repair/replacement program. This analysis assumes a rehabilitation/replacement time period of 20 years in order to maintain a level of affordability. It is not possible to anticipate if 20 years is aggressive enough to rehabilitate/replace the collection system before the level of service or failure rate becomes unacceptable. This high-level analysis is intended to be schematic in nature and does not separately consider the two (2) sanitary lift stations. Further, this analysis does not consider lateral connections, which are a significant portion of the system, but are often privately owned.

This analysis will assume that 75% of the sewers can be rehabilitated and that 25% must be replaced. These are assumptions only, and are not based on any hard data. The assumed cost for rehabilitation is \$150 per lineal foot and the cost for replacement is assumed to be \$250 per lineal foot.

<u>Rehab or Replace</u>	<u>Rehabilitate</u>	<u>Replace</u>
Total length	18,750 lineal feet	6,250 lineal feet
Cost to replace	\$150 per lineal foot	\$250 per lineal foot
Total cost to replace	\$2,800,000	\$1,600,000
Time period for replacement	20 years	20 years
Required investment per year	\$140,000	\$80,000

Thus the investment in the wastewater collection system would be approximately \$220,000 per year (in 2016 dollars).

IV. WASTEWATER TREATMENT PLANT

The Water Treatment Plant has a capacity of 0.5 MGD. It was constructed in 2000 at a cost of approximately \$4,500,000. Updating the 1996 construction cost to 2016 dollars results in a current replacement cost of \$7,700,000 (RS Means historical cost index values of 120.9 and 207.2). Of these costs, approximately 50% are items with a useful life of 20 to 30 years; these include process equipment, HVAC equipment, electronics, roofing, pavement, etc. The remaining 50% are items with a 50 year life span such as building structures, foundations, etc.

<u>Equipment Life</u>	<u>30 Years</u>	<u>50 Years</u>
Current Replacement Cost	\$3,850,000	\$3,850,000
Time period for replacement	10 years	30 years
Required investment per year	\$385,000	\$130,000

Thus the required investment in the Wastewater Treatment Plant is approximately \$515,000 per year (in 2016 dollars).

V. OPERATION & MAINTENANCE

National statistics were researched and reviewed to help develop a reasonable estimate of labor, operation and maintenance costs for utility systems of the size comparable to the Village of Mantua. The cost estimates are broken down to include general administrative, operation and maintenance for the treatment plants, and operation and maintenance for the water distribution and sanitary systems.

**TOTAL ANNUAL OPERATION & MAINTENANCE COSTS
AND STAFFING ESTIMATES¹**

WATER SYSTEM

<u>ITEM</u>	<u>TOTAL O&M COSTS</u>	<u>STAFFING</u>
Administration	\$ 5,000	
Water Treatment Plant	40,000	1 1/2
Water Distribution System	15,000	3/4

WASTEWATER SYSTEM

<u>ITEM</u>	<u>TOTAL O&M COSTS</u>	<u>STAFFING</u>
Administration	\$ 7,500	
Wastewater Treatment Plant	75,000	2
Wastewater Collection System	15,000	3/4

VI. UTILITY RATE PROJECTIONS

As noted previously, both the water and sewer utility funds were reviewed in detail. Projections of the impacts of the overall cost implications presented are provided for three (3) scenarios following this section. The first utility rate increase, labeled as Alternative #1, is calculated and based upon raising the necessary revenue to meet the capital replacement program as presented in this report. Those results are unrealistic and not practical. A second scenario, Alternative #2, is provided that is based upon raising 50 percent of the needed revenue to meet the program identified for both utilities. Both of these projections cannot be achieved or implemented in a short time frame and present unrealistic increases. A third and final projection, Alternative #3, is made working backwards utilizing a maximum annual rate increase of 15% and spread out over time. The financial impact, over the long term, is also probably not desirable.

The final table is data provided by and relied upon by the Village that gives us consumption records related to billing.

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¹ USEPA 1981 Operation and Maintenance Costs for Municipal Wastewater Facilities

UTILITY RATE PROJECTIONS

Assume 400 Cubic Feet per month Residential Consumption

WATER

ALTERNATIVE #1

180% with a 15% decrease in 2024

<u>Usage (Cubic Feet)</u>	<u>Current Rate</u>	<u>Current Charge</u>	<u>Proposed Rate</u>	<u>Proposed Charge</u>	
0-235		\$15.00	\$42.00	\$42.00	
236-400	\$3.47	\$ 5.73	\$ 9.72	\$16.03	
		\$20.73		\$58.03	2017-2036

ALTERNATIVE #2

90% with a 30% decrease in 2023

<u>Usage (Cubic Feet)</u>	<u>Current Rate</u>	<u>Current Charge</u>	<u>Proposed Rate</u>	<u>Proposed Charge</u>	
0-235		\$15.00	\$28.50	\$28.50	
236-400	\$3.47	\$ 5.73	\$ 6.59	\$10.87	
		\$20.73		\$39.37	2017-2036

ALTERNATIVE #3

205% over 8 years

15% compounded for 8 years

<u>Usage (Cubic Feet)</u>	<u>Current Rate</u>	<u>Current Charge</u>	<u>Proposed Rate</u>	<u>Proposed Charge</u>	
0-235		\$15.00	\$45.89	\$45.89	
236-400	\$3.47	\$ 5.73	\$10.61	\$17.51	
		\$20.73		\$63.40	2024-2036

SEWER**ALTERNATIVE #1**

180% with a 20% decrease in 2017 and 10% in 2030

<u>Usage (Cubic Feet)</u>	<u>Current Rate</u>	<u>Current Charge</u>	<u>Proposed Rate</u>	<u>Proposed Charge</u>	
0-235	\$15.36	\$36.10	\$43.01	\$101.07	
236-400	\$10.88	\$17.95	\$30.46	\$ 50.27	
		\$54.05		\$151.33	2017-2036

ALTERNATIVE #2

95% with a 30% decrease in 2027

<u>Usage (Cubic Feet)</u>	<u>Current Rate</u>	<u>Current Charge</u>	<u>Proposed Rate</u>	<u>Proposed Charge</u>	
0-235	\$15.36	\$36.10	\$29.95	\$ 70.39	
236-400	\$10.88	\$17.95	\$21.22	\$ 35.01	
		\$54.05		\$105.39	2017-2036

ALTERNATIVE #3

166% over 7 years

15% Compounded for 7 years

<u>Usage (Cubic Feet)</u>	<u>Current Rate</u>	<u>Current Charge</u>	<u>Proposed Rate</u>	<u>Proposed Charge</u>	
0-235	\$15.36				
236-400	\$10.88	\$36.10	\$40.85	\$ 96.00	
		\$17.95	\$28.94	\$ 47.75	
		\$54.05		\$143.75	2023-2036

Projected Rates 2017 to 2024 for Water and Sewer for Alternative #3

<u>Water</u>			<u>Sewer</u>		
	0-235	236-400		0-235	236-400
2017	\$17.25	\$ 3.99	2017	\$17.64	\$12.51
2018	\$19.84	\$ 4.59	2018	\$20.31	\$14.39
2019	\$22.81	\$ 5.28	2019	\$23.36	\$16.55
2020	\$26.24	\$ 6.07	2020	\$26.86	\$19.03
2021	\$30.17	\$ 6.98	2021	\$30.89	\$21.88
2022	\$34.70	\$ 8.03	2022	\$35.53	\$25.17
2023	\$39.90	\$ 9.23	2023	\$40.86	\$28.94
2024	\$45.89	\$10.61	2024	\$40.86	\$28.94

BILLING CONSUMPTION RECORDS

WATER CONSUMPTION BILLED

	1998	1999	2000	2001	2002	2014	2015	2016
RESIDENTIAL	3,455,885	3,370,864	3,225,172	3,249,601	3,298,697			
COMMERCIAL	6,526,189	7,261,562	6,114,473	5,161,713	6,144,700			
TOTAL	9,982,074	10,632,426	9,339,645	8,411,314	9,443,397	6,543,600	6,198,700	
						-30.7%	-5.3%	

SEWER CONSUMPTION BILLED

	1998	1999	2000	2001	2002	2014	2015	2016
RESIDENTIAL	3,111,831	3,033,931	2,899,645	2,826,627	4,930,329			
COMMERCIAL	2,130,860	2,269,093	1,630,494	1,534,766	3,377,272			
TOTAL	5,242,691	5,303,024	4,530,139	4,361,393	8,307,601	74,000,142	70,880,329	Gallons
						9,891,745	9,474,713	Cubic Feet
						19.1%	-4.2%	

