



City of Toledo, Ohio
 Water System Revenue Bonds, Series 2020 - Operational Efficiency Improvement Cost Benefit Analysis
 Water System Benefits and Pro-Rata Costs

Performance Year	Measured Benefits				Non-Measured Benefits	Total Benefits			Debt Service ⁽¹⁾	Performance Period Costs			Total Costs		Net Benefit (Cost)	
	Increased Small Meter Accuracy: Water Benefit	Increased Large Meter Accuracy: Water Benefit	% of Total Meter Accuracy Benefit	Cumulative % of Total Meter Accuracy Benefit	Water Portion of O&M Cost Avoidance ⁽²⁾	Gross Water Benefit	PV ⁽³⁾	Water Portion of Net Debt Service	Measurement and Valuation ⁽²⁾	Other ⁽²⁾	Gross Water Cost	PV ⁽³⁾	Net Water Benefit (Cost)	PV ⁽³⁾		
2023	\$ 251,674	\$ 1,470,254	36.5%	36.5%	\$ 792,452	\$ 2,514,379	\$ 2,332,041	(2,288,631)	\$ (44,563)	\$ (176,405)	\$ (2,509,599)	\$ (2,327,607)	\$ 4,780	\$ 4,434		
2024	302,317	1,620,215	38.9%	37.7%	856,319	2,778,851	2,508,354	(2,542,988)	(48,866)	(185,214)	(2,777,068)	(2,506,745)	1,783	1,609		
2025	360,630	1,785,478	41.3%	38.9%	923,056	3,069,164	2,696,260	(2,744,163)	(86,323)	(235,011)	(3,065,496)	(2,693,039)	3,667	3,222		
2026	427,646	1,967,605	43.7%	40.1%	992,507	3,387,757	2,896,491	(3,048,875)	(58,325)	(277,876)	(3,385,075)	(2,894,198)	2,682	2,293		
2027	489,201	2,102,443	45.4%	41.1%	1,046,838	3,638,481	3,027,598	(3,229,100)	(100,813)	(304,202)	(3,634,116)	(3,023,966)	4,366	3,633		
2028	545,196	2,198,412	46.6%	42.1%	1,090,157	3,833,764	3,104,714	(3,443,000)	(65,970)	(321,472)	(3,830,442)	(3,102,024)	3,322	2,690		
2029	591,248	2,245,674	47.2%	42.8%	1,120,735	3,957,656	3,119,267	(3,549,475)	(68,823)	(335,609)	(3,953,907)	(3,116,312)	3,749	2,955		
2030	638,973	2,293,962	47.8%	43.4%	1,151,946	4,084,881	3,133,372	(3,661,275)	(71,785)	(349,807)	(4,082,867)	(3,131,828)	2,014	1,545		
2031	689,096	2,345,597	48.4%	44.0%	1,184,399	4,219,091	3,149,703	(3,778,125)	(74,898)	(364,977)	(4,218,000)	(3,148,889)	1,091	814		
2032	741,093	2,398,404	49.0%	44.5%	1,217,521	4,357,018	3,165,617	(3,369,750)	(126,175)	(858,549)	(4,354,474)	(3,163,768)	2,544	1,848		
2033	757,164	2,452,412	49.5%	44.9%	1,248,553	4,458,128	3,152,388	(3,980,450)	(81,305)	(396,202)	(4,457,958)	(3,152,268)	170	121		
2034	774,343	2,510,104	50.1%	45.4%	1,280,870	4,565,316	3,141,783	(4,067,450)	(84,642)	(412,464)	(4,564,557)	(3,141,260)	760	523		
2035	789,834	2,562,417	50.5%	45.8%	1,312,169	4,664,420	3,124,073	(4,144,638)	(87,992)	(429,040)	(4,661,671)	(3,122,231)	2,750	1,842		
2036	803,014	2,607,319	50.9%	46.1%	1,341,969	4,752,302	3,097,745	(4,212,150)	(91,320)	(445,007)	(4,748,477)	(3,095,252)	3,825	2,493		
2037	818,023	2,658,243	51.4%	46.5%	1,373,680	4,849,946	3,076,782	(4,230,125)	(153,193)	(462,254)	(4,845,572)	(3,074,007)	4,375	2,775		
2038	837,640	2,724,242	51.9%	46.8%	1,409,544	4,971,427	3,069,439	(4,389,800)	(98,776)	(481,592)	(4,970,168)	(3,068,662)	1,258	777		
2039	748,655	2,436,858	49.1%	47.0%	1,352,528	4,538,041	2,726,871	(3,972,188)	(96,181)	(468,688)	(4,537,057)	(2,726,279)	985	592		
2040	768,653	2,504,035	49.7%	47.1%	1,390,411	4,663,099	2,727,024	(2,912,963)	(100,336)	(488,936)	(3,502,235)	(2,048,140)	1,160,864	678,884		
2041	769,453	2,508,734	49.7%	47.2%	1,411,157	4,689,344	2,668,975	-	(103,338)	(503,813)	(607,151)	(345,565)	4,082,193	2,323,411		
2042	770,255	2,513,452	49.7%	47.4%	1,432,212	4,715,919	2,612,263	-	(171,875)	(518,631)	(690,506)	(382,488)	4,025,413	2,229,775		
Total	\$ 12,874,109	\$ 45,905,856			\$ 23,929,020	\$ 82,708,986	\$ 58,530,761	\$ (63,565,146)	\$ (1,815,499)	\$ (8,015,750)	\$ (73,396,395)	\$ (53,264,526)	\$ 9,312,590	\$ 5,266,235		

⁽¹⁾ Preliminary, subject to change.

⁽²⁾ Pro-rata allocations are made using the proportion of measured benefit derived from increased meter accuracy as estimated by JCI, "% of Total Meter Accuracy Benefit".

⁽³⁾ Discounted on an annual basis at a rate of 2.75% to October 22, 2020.



City of Toledo, Ohio
 Water System Revenue Bonds, Series 2020 - Operational Efficiency Improvement Cost Benefit Analysis
 Sewer System Benefits and Pro-Rata Costs

Performance Year	Measured Benefits				Non-Measured Benefits	Total Benefits			Debt Service ⁽¹⁾	Performance Period Costs			Total Costs		Net Benefit (Cost)	
	Increased Small Meter Accuracy: Sewer Benefit	Increased Large Meter Accuracy: Sewer Benefit	% of Total Meter Accuracy Benefit	Cumulative % of Total Meter Accuracy Benefit	Sewer Portion of O&M Cost Avoidance ⁽²⁾	Gross Sewer Benefit	PV ⁽³⁾	Sewer Portion of Net Debt Service	Measurement and Valuation ⁽²⁾	Other ⁽²⁾	Gross Sewer Cost	PV ⁽³⁾	Net Sewer Benefit (Cost)	PV ⁽³⁾		
2023	\$ 261,734	\$ 2,734,615	63.5%	63.5%	\$ 1,378,955	\$ 4,375,304	\$ 4,058,015	(3,988,563)	\$ (77,545)	\$ (306,964)	\$ (4,373,072)	\$ (4,055,945)	\$ 2,232	\$ 2,070		
2024	285,820	2,739,826	61.1%	62.3%	1,347,659	4,373,306	3,947,603	(4,001,100)	(76,905)	(291,487)	(4,369,492)	(3,944,160)	3,814	3,443		
2025	309,955	2,745,058	58.7%	61.1%	1,313,982	4,368,996	3,838,163	(3,910,888)	(122,882)	(334,541)	(4,368,310)	(3,837,561)	685	602		
2026	334,140	2,750,310	56.3%	59.9%	1,278,087	4,362,537	3,729,916	(3,926,088)	(75,107)	(357,830)	(4,359,025)	(3,726,914)	3,512	3,003		
2027	358,374	2,755,583	54.6%	58.9%	1,257,815	4,371,772	3,637,773	(3,883,813)	(121,131)	(365,511)	(4,370,455)	(3,636,677)	1,318	1,097		
2028	382,659	2,760,876	53.4%	57.9%	1,249,066	4,392,600	3,557,279	(3,945,575)	(75,586)	(368,332)	(4,389,493)	(3,554,763)	3,107	2,516		
2029	406,993	2,766,190	52.8%	57.2%	1,253,576	4,426,759	3,488,994	(3,973,488)	(76,980)	(375,389)	(4,425,857)	(3,488,284)	901	710		
2030	431,377	2,771,525	52.2%	56.6%	1,257,979	4,460,881	3,421,789	(3,998,375)	(78,392)	(382,006)	(4,458,773)	(3,420,172)	2,108	1,617		
2031	455,811	2,776,881	51.6%	56.0%	1,261,675	4,494,367	3,355,207	(4,025,238)	(79,784)	(388,790)	(4,493,813)	(3,354,793)	554	414		
2032	480,296	2,782,258	51.0%	55.5%	1,265,244	4,527,797	3,289,697	(3,503,938)	(131,120)	(892,201)	(4,527,260)	(3,289,307)	537	390		
2033	480,791	2,787,656	50.5%	55.1%	1,271,454	4,539,901	3,210,210	(4,049,463)	(82,797)	(403,470)	(4,535,729)	(3,207,261)	4,172	2,950		
2034	481,288	2,793,075	49.9%	54.6%	1,276,937	4,551,300	3,132,137	(4,052,800)	(84,383)	(411,198)	(4,548,381)	(3,130,128)	2,920	2,009		
2035	481,786	2,798,516	49.5%	54.2%	1,284,005	4,564,307	3,057,020	(4,053,388)	(86,104)	(419,832)	(4,559,323)	(3,053,682)	4,983	3,338		
2036	482,284	2,803,978	49.1%	53.9%	1,293,147	4,579,410	2,985,047	(4,061,225)	(87,998)	(428,817)	(4,578,040)	(2,984,154)	1,370	893		
2037	482,784	2,809,462	48.6%	53.5%	1,300,963	4,593,210	2,913,910	(4,006,038)	(145,083)	(437,784)	(4,588,905)	(2,911,179)	4,304	2,731		
2038	483,285	2,814,968	48.1%	53.2%	1,305,218	4,603,472	2,842,258	(914,475)	(91,465)	(445,947)	(1,451,888)	(896,419)	3,151,584	1,945,839		
2039	483,787	2,820,496	50.9%	53.0%	1,402,956	4,707,239	2,828,541	-	(99,767)	(486,163)	(585,930)	(352,080)	4,121,310	2,476,461		
2040	484,290	2,826,046	50.3%	52.9%	1,406,406	4,716,742	2,758,395	-	(101,490)	(494,560)	(596,051)	(348,576)	4,120,691	2,409,819		
2041	484,794	2,831,619	50.3%	52.8%	1,427,612	4,744,024	2,700,097	-	(104,543)	(509,688)	(614,231)	(349,594)	4,129,793	2,350,503		
2042	485,299	2,837,214	50.3%	52.6%	1,449,138	4,771,650	2,643,134	-	(173,906)	(524,760)	(698,666)	(387,008)	4,072,984	2,256,126		
Total	\$ 8,537,546	\$ 55,706,154			\$ 26,281,874	\$ 90,525,575	\$ 65,395,185	\$ (60,294,455)	\$ (1,972,969)	\$ (8,625,270)	\$ (70,892,694)	\$ (53,928,656)	\$ 19,632,881	\$ 11,466,530		

⁽¹⁾ Preliminary, subject to change.

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⁽³⁾ Discounted on an annual basis at a rate of 2.75% to October 22, 2020.



City of Toledo, Ohio
 Water System Revenue Bonds, Series 2020 - Operational Efficiency Improvement Cost Benefit Analysis
 Total Benefits and Costs

Performance Year	Measured Benefits		Non-Measured Benefits		Total Benefits		Debt Service ⁽¹⁾			Performance Period Costs		Total Costs		Net Benefit (Cost)	
	Increased Small Meter Accuracy Benefit	Increased Large Meter Accuracy Benefit	O&M Cost Avoidance	Gross Benefit	PV ⁽²⁾	Net Debt Service	Measurement and Valuation	Other	Gross Total Cost	PV ⁽²⁾	Net Benefit (Cost)	PV ⁽²⁾			
2023	\$ 513,408	\$ 4,204,869	\$ 2,171,407	\$ 6,889,684	\$ 6,390,056	\$ (6,277,194)	\$ (122,108)	(483,369)	\$ (6,882,671)	\$ (6,383,552)	\$ 7,013	\$ 6,504			
2024	588,137	4,360,041	2,203,978	7,152,157	6,455,957	(6,544,088)	(125,771)	(476,701)	(7,146,560)	(6,450,905)	5,597	5,052			
2025	670,586	4,530,536	2,237,038	7,438,160	6,534,423	(6,655,051)	(209,205)	(569,551)	(7,433,807)	(6,530,599)	4,353	3,824			
2026	761,786	4,717,915	2,270,593	7,750,294	6,626,407	(6,974,963)	(133,432)	(635,706)	(7,744,101)	(6,621,112)	6,194	5,296			
2027	847,575	4,858,026	2,304,652	8,010,254	6,665,372	(7,112,913)	(221,944)	(669,713)	(8,004,570)	(6,660,642)	5,684	4,729			
2028	927,854	4,959,288	2,339,222	8,226,364	6,661,994	(7,388,575)	(141,556)	(689,804)	(8,219,935)	(6,656,787)	6,429	5,207			
2029	998,241	5,011,864	2,374,310	8,384,415	6,608,261	(7,522,963)	(145,803)	(710,998)	(8,379,764)	(6,604,596)	4,651	3,666			
2030	1,070,350	5,065,487	2,409,925	8,545,762	6,555,161	(7,659,650)	(150,177)	(731,813)	(8,541,640)	(6,552,000)	4,121	3,161			
2031	1,144,907	5,122,477	2,446,074	8,713,458	6,504,910	(7,803,363)	(154,682)	(753,768)	(8,711,813)	(6,503,682)	1,645	1,228			
2032	1,221,388	5,180,662	2,482,765	8,884,815	6,455,314	(6,873,688)	(257,295)	(1,750,751)	(8,881,734)	(6,453,075)	3,081	2,239			
2033	1,237,955	5,240,067	2,520,007	8,998,029	6,362,599	(8,029,913)	(164,102)	(799,672)	(8,993,687)	(6,359,528)	4,342	3,070			
2034	1,255,631	5,303,179	2,557,807	9,116,617	6,273,920	(8,120,250)	(169,025)	(823,662)	(9,112,937)	(6,271,388)	3,679	2,532			
2035	1,271,620	5,360,933	2,596,174	9,228,727	6,181,093	(8,198,026)	(174,096)	(848,872)	(9,220,994)	(6,175,913)	7,733	5,179			
2036	1,285,299	5,411,297	2,635,116	9,331,712	6,082,792	(8,273,375)	(179,319)	(873,823)	(9,326,517)	(6,079,406)	5,195	3,386			
2037	1,300,808	5,467,705	2,674,643	9,443,156	5,990,692	(8,236,163)	(298,276)	(900,038)	(9,434,477)	(5,985,186)	8,679	5,506			
2038	1,320,925	5,539,210	2,714,763	9,574,898	5,911,697	(5,304,275)	(190,242)	(927,539)	(6,422,056)	(3,965,081)	3,152,842	1,946,616			
2039	1,232,442	5,257,355	2,755,484	9,245,281	5,555,412	(3,972,188)	(195,948)	(954,850)	(5,122,986)	(3,078,359)	4,122,295	2,477,052			
2040	1,252,943	5,330,081	2,796,816	9,379,841	5,485,418	(2,912,963)	(201,826)	(983,496)	(4,098,285)	(2,396,716)	5,281,555	3,088,703			
2041	1,254,247	5,340,353	2,838,769	9,433,368	5,369,073	-	(207,881)	(1,013,501)	(1,221,382)	(695,159)	8,211,987	4,673,914			
2042	1,255,553	5,350,665	2,881,350	9,487,569	5,255,398	-	(345,781)	(1,043,391)	(1,389,172)	(769,497)	8,098,397	4,485,901			
Total	\$ 21,411,655	\$ 101,612,011	\$ 50,210,895	\$ 173,234,561	\$ 123,925,947	\$ (123,859,601)	\$ (3,788,468)	\$ (16,641,020)	\$ (144,289,089)	\$ (107,193,182)	\$ 28,945,471	\$ 16,732,765			

⁽¹⁾ Preliminary, subject to change.

⁽²⁾ Discounted on an annual basis at a rate of 2.75% to October 22, 2020.