

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

VOLUME III

CLASS COST OF SERVICE STUDY

PITTSBURGH WATER & SEWER AUTHORITY
INITIAL TARIFF FILINGS AND RATE REQUESTS

DOCKET Nos. R-2018-3002645 and R-2018-3002647

JULY 2018

Pittsburgh Water and Sewer Authority

2018 Base Rate Case

DOCKET Nos. R-2018-3002645 and R-2018-3002647

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Pittsburgh Water and Sewer Authority

HJS-1W

FPPTY 2019 COS & Rate Design

FPPTY Water Revenue Requirements

Revenue Requirements**FPPTY
Revenue
Requirements**Operating Expenses*Direct Operating Expenses*

Administrative Division

Executive Director	\$ 2,401,277
Customer Service	3,468,914
Management Information Systems	2,267,765
Finance	2,718,330
Procurement	330,982
Human Resources	1,135,239
Legal	1,669,575
Public Affairs	717,283

Operations Division

Environmental Compliance	1,537,129
Ops Capital Assets	25,822
Warehouse	307,043
Water Treatment Plant	20,204,262
Water Quality (Lab)	3,847,559
Water Distribution	23,575,829
Sewer Operations	-

Engineering & Construction

Engineering & Construction	11,845,743
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Other Operating Expenses

Loss / (Gain) on ALCOSAN Billings	-
Co-Op Agreement Op. Expenses - Water	4,150,000
Co-Op Agreement Op. Expenses - Sewer	-
Non-City Water Subsidy	4,800,000

<i>Total Operating Expenses</i>	\$ 85,002,754
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Debt Service

Existing Debt	\$ 28,312,498
Future Debt	8,467,758

<i>Subtotal: Debt Service</i>	\$ 36,780,256
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Capital Expenditures & Transfers

Rate Funded Capital (PAYGO)	\$ 1,086,910
Other Transfers to Reserves	-
Reimbursements (Municipalities & Pennvest)	3,503,383
Remarketing & Liquidity Charges	-

<i>Subtotal: Capital Expenditures & Transfers</i>	\$ 4,590,293
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Total: Revenue Requirements**\$126,373,303**

			Water Functional Categories							
Water Operating Costs	FY 2019	Allocation	Supply	Treatment	Storage	Trans. & Distr.	Meters	Billing	Fire Protection	Admin Support
Operating Expenses	FPFTY									
<i>Direct Operating Expenses</i>										
Administrative Division										
Executive Director	\$ 2,401,277	W-H								100.0%
Customer Service	3,468,914	W-I					28.3%	71.7%		
Management Information Systems	2,267,765	W-H								100.0%
Finance	2,718,330	W-H								100.0%
Procurement	330,982	W-H								100.0%
Human Resources	1,135,239	W-H								100.0%
Legal	1,669,575	W-H								100.0%
Public Affairs	717,283	W-H								100.0%
Operations Division										
Environmental Compliance	1,537,129	W-H								100.0%
Ops Capital Assets	25,822	W-H								100.0%
Warehouse	307,043	W-H								100.0%
Water Treatment Plant	20,204,262	W-B		100.0%						
Water Quality (Lab)	3,847,559	W-B		100.0%						
Water Distribution	23,575,829	W-D				100.0%				
Sewer Operations	-	n/a								
Engineering & Construction Division										
Engineering & Construction	11,845,743	W-J		8.1%	20.6%	62.1%	4.3%			4.9%
Subtotal: Direct Operating Expenses	\$ 76,052,754									
<i>Other Operating Expenses</i>										
Loss / (Gain) on ALCOSAN Billings	-	n/a								100.0%
Co-Op Agreement Op. Expenses - Water	4,150,000	W-H								100.0%
Co-Op Agreement Op. Expenses - Sewer	-	n/a								100.0%
Non-City Water Subsidy	4,800,000	W-H								100.0%
Subtotal: Other Operating Expenses	\$ 8,950,000									
Total: Operating Expenses	\$ 85,002,754									

			Water Functional Categories									
Water Operating Expenses	FY 2019	Allocation	Supply	Treatment	Storage	Trans. & Distr.	Meters	Billing	Fire Protection	Admin Support		
Direct Operating Expenses	FPFTY											
Administrative Division												
Executive Director	\$ 2,401,277	W-H	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,401,277		
Customer Service	3,468,914	W-I	-	-	-	-	980,373	2,488,541	-	-		
Management Information Systems	2,267,765	W-H	-	-	-	-	-	-	-	2,267,765		
Finance	2,718,330	W-H	-	-	-	-	-	-	-	2,718,330		
Procurement	330,982	W-H	-	-	-	-	-	-	-	330,982		
Human Resources	1,135,239	W-H	-	-	-	-	-	-	-	1,135,239		
Legal	1,669,575	W-H	-	-	-	-	-	-	-	1,669,575		
Public Affairs	717,283	W-H	-	-	-	-	-	-	-	717,283		
Operations Division												
Environmental Compliance	1,537,129	W-H	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,537,129		
Ops Capital Assets	25,822	W-H	-	-	-	-	-	-	-	25,822		
Warehouse	307,043	W-H	-	-	-	-	-	-	-	307,043		
Water Treatment Plant	20,204,262	W-B	-	20,204,262	-	-	-	-	-	-		
Water Quality (Lab)	3,847,559	W-B	-	3,847,559	-	-	-	-	-	-		
Water Distribution	23,575,829	W-D	-	-	-	23,575,829	-	-	-	-		
Sewer Operations	-	n/a	-	-	-	-	-	-	-	-		
Engineering & Construction Division												
Engineering & Construction	11,845,743	W-J	-	964,983	2,441,323	7,356,369	505,114	-	-	577,953		
Subtotal: Direct Operating Expenses	\$ 76,052,754		\$ -	\$ 25,016,805	\$ 2,441,323	\$ 30,932,198	\$ 1,485,487	\$ 2,488,541	\$ -	\$ 13,688,399		
Other Operating Expenses												
Loss / (Gain) on ALCOSAN Billings	-	n/a	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
Co-Op Agreement Op. Expenses - Water	4,150,000	W-H	-	-	-	-	-	-	-	4,150,000		
Co-Op Agreement Op. Expenses - Sewer	-	n/a	-	-	-	-	-	-	-	-		
Non-City Water Subsidy	4,800,000	W-H	-	-	-	-	-	-	-	4,800,000		
Subtotal: Other Operating Expenses	\$ 8,950,000		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 8,950,000		
Allocated Water Operating Costs	\$ 85,002,754		\$ -	\$25,016,805	\$2,441,323	\$30,932,198	\$1,485,487	\$2,488,541	\$ -	\$22,638,399		
Allocation Percentage	-		0.00%	29.43%	2.87%	36.39%	1.75%	2.93%	0.00%	26.63%		

Allocated Water Assets					Water Functional Categories								
Row Labels	Acquisition Cost	Allocated to Water	Allocated Costs	Allocation	Supply	Treatment	Storage	Trans. & Distr.	Meters	Billing	Fire Protection	Admin Support	Readiness-to-Serve
Customer Service	2,790,042	44.25%	1,234,544	W-I					28.26%	71.74%			
Distribution	256,875,898	100.00%	256,875,898	W-D				100.00%					
Engineering	2,384,647	69.64%	1,660,725	W-D				100.00%					
Executive Director	969,720	71.73%	695,569	W-H								100.00%	
Finance	56,271	71.73%	40,362	W-H								100.00%	
Fire	11,366,803	100.00%	11,366,803	W-E					100.00%				
Membrane Plant	20,355,348	100.00%	20,355,348	W-B		100.00%							
Meters	29,354,311	100.00%	29,354,311	W-E					100.00%				
Mgt Info Systems	11,973,332	71.73%	8,588,325	W-H								100.00%	
Plant Operations	63,987,369	100.00%	63,987,369	W-B		100.00%							
Pumping	26,624,806	100.00%	26,624,806	W-D				100.00%					
Sewer Operations	397,298,184	0.00%	-	n/a									
Stormwater	4,897,811	0.00%	-	n/a									
Supply	920,461	100.00%	920,461	W-A	100.00%								
Warehouse	4,188,582	71.73%	3,004,419	W-B		100.00%							
Water Quality	1,429,105	100.00%	1,429,105	W-B		100.00%							
Water Storage	61,343,689	100.00%	61,343,689	W-C			100.00%						
Total	896,816,378		487,481,733		\$ 920,461	\$ 88,776,240	\$ 61,343,689	\$ 285,161,428	\$ 41,070,017	\$ 885,641	\$ -	\$ 9,324,256	\$ -

Allocation Factors for Capital Costs	0.19%	18.21%	12.58%	58.50%	8.42%	0.18%	0.00%	1.91%	0.00%
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Allocation of Capital Costs		Readiness-to-Serve																			
Debt Service	25.0%	\$	36,780,256	\$	52,086	\$	5,023,593	\$	3,471,263	\$	16,136,467	\$	2,324,034	\$	50,116	\$	-	\$	527,633	\$	9,195,064
Rate-Funded Capital	0.0%		1,086,910		2,052		197,939		136,774		635,808		91,571		1,975		-		20,790		-
DISC Deposit	0.0%		-		-		-		-		-		-		-		-		-		-
Other Transfers to Reserves	0.0%		3,503,383		6,615		638,008		440,858		2,049,368		295,158		6,365		-		67,011		-
Reimbursements from Municipalities	0.0%		-		-		-		-		-		-		-		-		-		-
Remarketing & Liquidity Charges	0.0%		-		-		-		-		-		-		-		-		-		-
Bad Debt Expense	0.0%		-		-		-		-		-		-		-		-		-		-
Total: Allocated Capital Costs		\$	41,370,549	\$	60,754	\$	5,859,540	\$	4,048,896	\$	18,821,643	\$	2,710,764	\$	58,455	\$	-	\$	615,433	\$	9,195,064

			Water Cost Drivers						
	<u>FY 2019</u>	<u>Allocation</u>	<i>Base</i>	<i>Max Day</i>	<i>Peak Hour</i>	<i>Meters</i>	<i>Bills</i>	<i>Readiness-to-Serve</i>	<i>Fire Protection</i>
	<i>FPFTY</i>								
Water Revenue Requirement									
Functional Categories									
Supply	\$ 60,754	W-AA	100.00%						
Treatment	30,876,344	W-BB	65.49%	34.26%					0.25%
Storage	6,490,219	W-CC	62.25%	21.41%	16.09%				0.25%
Trans. & Distr.	49,753,841	W-CC	62.25%	21.41%	16.09%				0.25%
Meters	4,196,251	W-DD				100.00%			
Billing	2,546,997	W-EE					100.00%		
Fire Protection	-	W-FF							100.00%
Admin Support	23,253,833	W-GG	52.98%	21.68%	8.67%	4.02%	2.44%	10.00%	0.21%
Readiness-to-Serve (Debt Service)	9,195,064	W-HH						100.00%	
Total: Water Revenue Requirements	\$ 126,373,303								

			Water Cost Drivers						
	<u>FY 2019</u>	<u>Allocation</u>	<i>Base</i>	<i>Max Day</i>	<i>Peak Hour</i>	<i>Meters</i>	<i>Bills</i>	<i>Readiness-to-Serve</i>	<i>Fire Protection</i>
	<i>FPFTY</i>								
Water Revenue Requirement									
Functional Categories									
Supply	\$ 60,754	W-AA	\$ 60,754	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Treatment	30,876,344	W-BB	20,220,449	10,578,704	-	-	-	-	77,191
Storage	6,490,219	W-CC	4,040,161	1,389,780	1,044,052	-	-	-	16,226
Trans. & Distr.	49,753,841	W-CC	30,971,766	10,654,014	8,003,677	-	-	-	124,385
Meters	4,196,251	W-DD	-	-	-	4,196,251	-	-	-
Billing	2,546,997	W-EE	-	-	-	-	2,546,997	-	-
Fire Protection	-	W-FF	-	-	-	-	-	-	-
Admin Support	23,253,833	W-GG	12,320,541	5,040,796	2,016,036	935,018	567,528	2,325,383	48,531
Readiness-to-Serve (Debt Service)	9,195,064	W-HH	-	-	-	-	-	9,195,064	-
Total: Water Revenue Requirements	\$ 126,373,303		\$ 67,613,671	\$ 27,663,294	\$ 11,063,765	\$ 5,131,269	\$ 3,114,524	\$ 11,520,447	\$ 266,332
Costs to Recover from Water Charges	\$ 126,373,303		\$ 67,613,671	\$ 27,663,294	\$ 11,063,765	\$ 5,131,269	\$ 3,114,524	\$ 11,520,447	\$ 266,332
			53.5%	21.9%	8.8%	4.1%	2.5%	9.1%	0.2%

Cost Functionalization: Water									
Code	Description	Supply	Treatment	Storage	Trans. & Distr.	Meters	Billing	Fire Protection	Admin Support
W-A	Supply Only	100.00%							
W-B	Treatment Only		100.00%						
W-C	Storage Only			100.00%					
W-D	Transmission & Distribution Only				100.00%				
W-E	Meters Only					100.00%			
W-F	Billing Only						100.00%		
W-G	Fire Protection Only							100.00%	
W-H	Admin Support Only								100.00%
W-I	Customer Service					28.26%	71.74%		
W-J	Engineering & Construction		8.15%	20.61%	62.10%	4.26%			4.88%

Allocation to Cost Drivers: Water								
Code	Description	Base	Max Day	Peak Hour	Meters	Bills	Readiness-to-Serve	Fire Protection
W-AA	Base	100.00%						
W-BB	Maximum Day	65.49%	34.26%					0.25%
W-CC	Peak Hour	62.25%	21.41%	16.09%				0.25%
W-DD	Customer - Meters				100.00%			
W-EE	Customer - Billing					100.00%		
W-FF	Fire Protection							100.00%
W-GG	Admin Support (Composite)	52.98%	21.68%	8.67%	4.02%	2.44%	10.00%	0.21%
W-HH	Readiness-to-Serve						100.00%	

Factor Derivations - Allocation to Functional Categories & Cost Components				
Code(s)	Description	Calculations		
W-I	Customer Service	2019 Customer Service Budget	FPFTY	Meter
WW-E	- This factor allocates the 2019 customer service budget between meter- and billing-related costs.	Salaries	\$ 2,868,714	22.88%
		Benefits	932,763	22.88%
		Temporary Help	15,000	100.00%
		Customer CC Fees	301,800	0.00%
		Postage	580,000	0.00%
		Billing Contract	588,240	0.00%
		Meter Services	1,326,992	100.00%
		Prof Service Other	581,520	0.00%
		Office Supplies	1,020	20.00%
		TE Airfare	2,000	50.00%
		TE Lodging	1,400	50.00%
		TE Meals	2,600	50.00%
		TE Seminars/Conferences	1,000	50.00%
		TE Training	500	50.00%
		Cellular Phone	6,120	0.00%
		Customer Refund AP	600,000	0.00%
		One Call	30,000	0.00%
		Total	\$ 7,839,668	\$ 2,215,621
		Allocation Factors		28.26%
				71.74%

W-J	Engineering & Construction	2019 Water CIP Costs	\$ \$ Amount	Allocation
	- This factor uses the 2019 Water CIP costs to allocate Engineering & Construction costs to the various functional categories.	Treatment	\$ 9,160,628	8.15%
		Storage	23,175,580	20.61%
		Trans. & Distr.	69,834,318	62.10%
		Meters	4,795,070	4.26%
		Admin	5,486,534	4.88%
		Total Water CIP	\$ 112,452,130	100.00%

W-BB Maximum Day

- Maximum day costs are allocated using a peak day determined using system daily production records. In addition, 0.25% is allocated to fire protection service.

Plant Production Data	
2017 Average Processed	69.67 mgd
Peak Day	93.54 mgd
Peak Hour Factor (1.6)	111.47 mgd
Base	65.49%
Maximum Day	34.26%
Fire Protection	0.25%

W-CC Peak Hour

- Peak hour costs are allocated using an estimated peak hour compared to system average and maximum day processed. In addition, 0.25% is allocated to fire protection service.

Plant Production Data	
2017 Average Processed	69.67 mgd
Peak Day	93.54 mgd
Peak Hour Factor (1.6)	111.47 mgd
Peak Hour / Avg	62.25%
Max Day (Plug)	21.41%
Peak Hr / Peak Day	16.09%
Fire Protection	0.25%

Equivalency Flow Ratios

- Used to escalate metering and readiness-to-serve costs, these ratios are industry standard and obtained from the American Waterworks Association

Equivalency Ratios			
	Flow		Fire
5/8"	1.00	1" or Less	1.00
3/4"	1.50	1 1/2"-3"	2.90
1"	2.50	4"	6.35
1.5"	5.00	6" or Greater	18.47
2"	8.00		
3"	16.00		
4"	25.00		
6"	50.00		
8"	80.00		
10"	115.00		

	Collection Factor	FY 2019 Consumption	Allocated Consumption	Average Day	Maximum Day			Peak Hour			Equivalent Meters	Total Bills	Fire Connections
					Cap. Factor	Total Cap.	Extra Cap.	Cap. Factor	Total Cap.	Extra Cap.			
Retail Units of Service													
Residential	95.6%	2,923,242	2,793,651	7,654	150.0%	11,481	3,827	250.0%	19,135	7,654	792,363	738,109	
Residential - CAP	95.6%	-	-	-	0.0%	-	-	0.0%	-	-	12,942	12,850	
Commercial	95.6%	3,761,388	3,594,641	9,848	155.0%	15,265	5,417	260.0%	25,606	10,341	359,887	78,913	
Industrial	95.6%	183,126	175,008	479	145.0%	695	216	190.0%	911	216	10,578	1,154	
Health or Education	95.6%	1,483,403	1,417,642	3,884	170.0%	6,603	2,719	280.0%	10,875	4,272	87,230	5,896	
Fire System	95.6%	4,051	3,871	11	195.0%	21	10	320.0%	34	13	18,694	13,933	18,694
Total: Water Units of Service		8,355,210	7,984,812	21,876		34,064	12,188		56,560	22,496	1,281,694	850,855	18,694

	Maximum Day			Peak Hour	
	Class MM/AD	System MD/MM	Weekly Use Adjustment	MD Peaking Factor (2)	Estimated MH/MD MH Peaking Factor (2)
Peaking Factors (1)					
Residential	1.13	1.34	1.00	1.50	1.66 2.50
Commercial	1.15	1.34	1.00	1.55	1.66 2.60
Industrial	1.09	1.34	1.00	1.45	1.33 1.90
Health or Education	1.25	1.34	1.00	1.70	1.66 2.80
Fire System	1.47	1.34	1.00	1.95	1.66 3.20

- (1) Peaking factors determined using customer billing information from normalized billing cycles.
(2) Maximum Day and Maximum Hour peaking factors are rounded.

Development of Unit Costs of Service		FY 2019
<u>Units of Service</u>		<i>FPFTY</i>
Total System Units		
Units		
<u>Allocated Revenue Requirement</u>		
Supply	\$ 60,754	
Treatment	30,876,344	
Storage	6,490,219	
Trans. & Distr.	49,753,841	
Meter Reading	4,196,251	
Billing	2,546,997	
Fire Protection	-	
Admin Support	23,253,833	
Readiness to Serve (Debt)	9,195,064	
Total: Revenue Requirements	\$ 126,373,303	
Revenue Requirement Unit Costs (\$/unit)		
<u>Revenue Offsets</u>		
Wholesale & Contract Revenue	\$ (4,933,489)	
Misc. Revenue	(2,947,706)	
Total: Revenue Offsets	\$ (7,881,195)	
Offset Unit Costs (\$/unit)		
Total Unit Costs (\$/unit)		
Total: Costs of Service		

Unit Costs							
<i>Base</i>	Extra Capacity		<i>Meters</i>	<i>Bills</i>	<i>Readiness-to-Serve</i>	<i>Fire Protection</i>	
	<i>Max Day</i>	<i>Peak Hour</i>					
7,984,812	12,188	22,496	1,281,694	850,855	1,281,694	18,694	
<i>kgal</i>	<i>kgal/day</i>	<i>kgal/day</i>	<i>Eq. Cost Meter</i>	<i>Total Bills</i>	<i>Eq. Flow Meter</i>	<i>Eq. Fire Cnx</i>	
\$ 60,754	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
20,220,449	10,578,704	-	-	-	-	77,191	
4,040,161	1,389,780	1,044,052	-	-	-	16,226	
30,971,766	10,654,014	8,003,677	-	-	-	124,385	
-	-	-	4,196,251	-	-	-	
-	-	-	-	2,546,997	-	-	
-	-	-	-	-	-	-	
12,320,541	5,040,796	2,016,036	935,018	567,528	2,325,383	48,531	
-	-	-	-	-	9,195,064	-	
\$ 67,613,671	\$ 27,663,294	\$ 11,063,765	\$ 5,131,269	\$ 3,114,524	\$ 11,520,447	\$ 266,332	
\$ 8.468	\$ 2,269.696	\$ 491.811	\$ 4.004	\$ 3.660	\$ 8.988	\$ 14.247	
\$ (2,823,824)	\$ (1,155,333)	\$ (462,068)	\$ -	\$ -	\$ (481,141)	\$ (11,123)	
(1,577,115)	(645,257)	(258,067)	(119,689)	(72,647)	(268,719)	(6,212)	
\$ (4,400,939)	\$ (1,800,590)	\$ (720,135)	\$ (119,689)	\$ (72,647)	\$ (749,860)	\$ (17,335)	
\$ (0.551)	\$ (147.733)	\$ (32.012)	\$ (0.093)	\$ (0.085)	\$ (0.585)	\$ (0.927)	
\$ 7.92	\$ 2,121.96	\$ 459.80	\$ 3.91	\$ 3.58	\$ 8.40	\$ 13.32	
\$ 63,212,732	\$ 25,862,704	\$ 10,343,630	\$ 5,011,580	\$ 3,041,877	\$ 10,770,587	\$ 248,997	

Customer Class Cost of Service

Residential

	Base	Unit Costs		Meters	Bills	Readiness-to-Serve	Fire Protection	Total
		Extra Capacity						
		Max Day	Peak Hour					
Unit Costs (\$/unit)	\$ 7.917	\$ 2,121.963	\$ 459.800	\$ 3.910	\$ 3.575	\$ 8.403	\$ 13.320	
Units of Service	2,793,651	3,827	7,654	792,363	738,109	792,363	-	
Cost of Service	\$ 22,116,275	\$ 8,120,580	\$ 3,519,232	\$ 3,098,237	\$ 2,638,801	\$ 6,658,545	\$ -	\$ 46,151,669

Residential - CAP

Unit Costs (\$/unit)	\$ 7.917	\$ 2,121.963	\$ 459.800	\$ 3.910	\$ 3.575	\$ 8.403	\$ 13.320	
Units of Service	-	-	-	12,942	12,850	12,942	-	
Cost of Service	\$ -	\$ -	\$ -	\$ 50,603	\$ 45,940	\$ 108,754	\$ -	\$ 205,297

Commercial

Unit Costs (\$/unit)	\$ 7.917	\$ 2,121.963	\$ 459.800	\$ 3.910	\$ 3.575	\$ 8.403	\$ 13.320	
Units of Service	3,594,641	5,417	10,341	359,887	78,913	359,887	-	
Cost of Service	\$ 28,457,409	\$ 11,493,786	\$ 4,754,672	\$ 1,407,203	\$ 282,122	\$ 3,024,276	\$ -	\$ 49,419,467

Industrial

Unit Costs (\$/unit)	\$ 7.917	\$ 2,121.963	\$ 459.800	\$ 3.910	\$ 3.575	\$ 8.403	\$ 13.320	
Units of Service	175,008	216	216	10,578	1,154	10,578	-	
Cost of Service	\$ 1,385,470	\$ 457,841	\$ 99,208	\$ 41,361	\$ 4,127	\$ 88,890	\$ -	\$ 2,076,897

Health or Education

Unit Costs (\$/unit)	\$ 7.917	\$ 2,121.963	\$ 459.800	\$ 3.910	\$ 3.575	\$ 8.403	\$ 13.320	
Units of Service	1,417,642	2,719	4,272	87,230	5,896	87,230	-	
Cost of Service	\$ 11,222,933	\$ 5,769,119	\$ 1,964,423	\$ 341,080	\$ 21,077	\$ 733,029	\$ -	\$ 20,051,661

Fire System

Unit Costs (\$/unit)	\$ 7.917	\$ 2,121.963	\$ 459.800	\$ 3.910	\$ 3.575	\$ 8.403	\$ 13.320	
Units of Service	3,871	10	13	18,694	13,933	18,694	18,694	
Cost of Service	\$ 30,645	\$ 21,379	\$ 6,095	\$ 73,096	\$ 49,811	\$ 157,094	\$ 248,997	\$ 587,116

Pittsburgh Water and Sewer Authority
FPFTY 2019 COS & Rate Design
 Minimum Charge Calculation

HJS-9W

Water	Min. Usage	FY 2018	COS Rate Build-Up - Test Year: 2019				
	<i>Existing</i>	<i>Existing Rates</i>	<i>Meter</i>	<i>Billing</i>	<i>R. T.S.</i>	<i>Usage</i>	<i>Total</i>
<u>Minimum Charge</u>							
5/8"	1	\$ 23.25	\$ 3.91	\$ 3.58	\$ 8.40	\$ 11.87	\$ 27.77
3/4"	2	37.83	5.87	3.58	12.61	23.74	45.79
1"	5	76.58	9.78	3.58	21.01	59.36	93.73
1 1/2"	10	149.47	19.55	3.58	42.02	118.72	183.87
2"	17	246.53	31.28	3.58	67.23	201.83	303.92
3"	40	546.96	62.56	3.58	134.45	474.89	675.49
4"	70	924.52	97.75	3.58	210.09	831.06	1,142.48
6"	175	2,181.24	195.51	3.58	420.17	2,077.65	2,696.91
8"	325	3,919.64	312.81	3.58	672.27	3,858.50	4,847.16
10" & Above	548	6,408.43	449.66	3.58	966.39	6,506.02	7,925.65

			<i>Meter</i>	<i>Billing</i>	<i>R. T.S.</i>	<i>Fire</i>	<i>Total</i>
<u>Fire Min. Charge</u>							
1" or Less	\$	26.94	\$ 3.91	\$ 3.58	\$ 8.40	\$ 13.32	\$ 29.21
1 1/2"-3"		71.02	11.33	3.58	24.34	38.58	77.82
4"		151.40	24.85	3.58	53.40	84.64	166.46
6" or Greater		433.13	72.24	3.58	155.25	246.07	477.13

	FY 2018	Fixed Charge	Net Volumetric	Billed	COS Rates	Policy Driven	Adj. Rate
	<i>Existing Rates</i>	<i>Revenue</i>	<i>Rev. Req</i>	<i>Volume</i>	<i>by Class</i>	<i>Adjustment</i>	<i>by Class</i>
<u>Volume Charge (per kgal)</u>							
Residential	\$ 9.41	\$22,765,756	\$ 23,230,925	2,007,586	\$ 11.57	(1,095,000)	\$ 11.03
Residential - CAP	9.41	360,285	(154,988)	-	11.57		11.03
Commercial	8.93	14,755,429	34,664,038	2,971,726	11.66	-	11.67
Industrial	7.51	517,608	1,559,289	155,336	10.04	-	10.04
Health or Education	12.21	4,050,004	16,001,657	1,230,542	13.00	1,095,000	13.90
Fire System	11.50	529,020	58,096	3,871	15.01	-	15.01
<i>Total: User Charge Revenue</i>		\$42,978,102	\$ 75,359,018	6,369,060	\$ 11.83	-	\$ 11.83

	Billed Vol.	Implied Vol.	Equivalent Vol.
<u>Unit Cost Calculations</u>			
Residential	2,007,586	872,933	2,880,518
Residential - CAP	-	26,090	26,090
Commercial	2,971,726	845,772	3,817,497
Industrial	155,336	32,279	187,614
Health or Education	1,230,542	248,880	1,479,422
Fire System	3,871	-	3,871
<i>Total: User Charge Revenue</i>	6,369,060	2,025,953	8,395,013

Total Volumetric Unit Cost \$ 11.87

	FTY Prior Tariff Rates	FPFTY Proposed Rates	Percent Difference	Dollar Difference
Retail Revenues				
<u>Minimum Charge</u>				
5/8"	\$ 23.25	\$ 27.77	19.4%	\$ 4.52
3/4"	37.83	45.79	21.0%	7.96
1"	76.58	93.73	22.4%	17.15
1 1/2"	149.47	183.87	23.0%	34.40
2"	246.53	303.92	23.3%	57.39
3"	546.96	675.49	23.5%	128.53
4"	924.52	1,142.48	23.6%	217.96
6"	2,181.24	2,696.91	23.6%	515.67
8"	3,919.64	4,847.16	23.7%	927.52
10" & Above	6,408.43	7,925.65	23.7%	1,517.22
<u>Minimum Charge - CAP</u>				
5/8"	\$ 11.63	\$ 13.89	19.4%	\$ 2.26
3/4"	18.92	22.90	21.0%	3.98
1"	38.29	46.87	22.4%	8.58
<u>Fire System Charge</u>				
1" or Less	\$ 26.94	\$ 29.21	8.4%	\$ 2.27
1 1/2"-3"	71.02	77.82	9.6%	6.80
4"	151.40	166.46	9.9%	15.06
6" or Greater	433.13	477.13	10.2%	44.00
<u>Volume Charge</u>				
Residential	\$ 9.41	\$ 11.03	17.2%	\$ 1.62
Commercial	8.93	11.67	30.7%	2.74
Industrial	7.51	10.04	33.7%	2.53
Health or Education	12.21	13.90	13.8%	1.69
Fire System	11.50	15.01	30.5%	3.51

	Fully Allocated CCOS		Revenue at Existing Rates		Revenue at Proposed Rates		Proposed Increase	
	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent
User Charge Revenue								
Residential (Includes CAP)	\$ 46,356,966	39.1%	\$ 38,188,376	39.3%	\$ 45,269,714	38.2%	\$ 7,081,338	18.5%
Commercial	49,419,467	41.7%	38,530,718	39.7%	49,435,468	41.7%	10,904,749	28.3%
Industrial	2,076,897	1.8%	1,585,983	1.6%	2,077,179	1.8%	491,196	31.0%
Health or Education	20,051,661	16.9%	18,304,127	18.8%	21,154,537	17.8%	2,850,410	15.6%
Fire System	587,116	0.5%	530,538	0.5%	587,123	0.5%	56,586	10.7%
Total: User Charge Revenue	\$ 118,492,107	100.0%	\$ 97,139,741	100.0%	\$ 118,524,020	100.0%	\$ 21,384,279	22.0%
Other Revenues								
Wholesale & Contract Revenues	\$ 4,933,489		\$ 4,543,675		\$ 4,933,489		\$ 389,814	8.6%
Other Revenues	2,947,706		2,897,388		2,947,706		50,318	1.7%
Total: Other Revenues	\$ 7,881,195		\$ 7,441,064		\$ 7,881,195		\$ 440,132	5.9%
Total: Water Revenues	\$ 126,373,303		\$ 104,580,805		\$ 126,405,216		\$ 21,824,411	20.9%

	FTY Revenue at Existing Rates	FPFTY Indicated COS by Customer Class	Percent Difference	Dollar Difference
User Charge Revenue				
Residential (Includes CAP)	\$ 38,188,376	\$ 46,356,966	21.4%	\$ 8,168,590
Commercial	38,530,718	49,419,467	28.3%	10,888,749
Industrial	1,585,983	2,076,897	31.0%	490,914
Health or Education	18,304,127	20,051,661	9.5%	1,747,534
Fire System	530,538	587,116	10.7%	56,579
Total: User Charge Revenue	\$ 97,139,741	\$118,492,107	22.0%	\$21,352,366

	FPFTY Indicated COS by Customer Class	FPFTY Revenue at Proposed Rates	Percent Difference	Dollar Difference
User Charge Revenue				
Residential (Includes CAP)	\$ 46,356,966	\$ 45,269,714	-2.3%	\$ (1,087,253)
Commercial	49,419,467	49,435,468	0.0%	16,001
Industrial	2,076,897	2,077,179	0.0%	282
Health or Education	20,051,661	21,154,537	5.5%	1,102,876
Fire System	587,116	587,123	0.0%	7
Total: User Charge Revenue	\$118,492,107	\$118,524,020	0.0%	\$ 31,913

	FPFTY Revenue at Existing Rates	FPFTY Revenue at Proposed Rates	Percent Difference	Dollar Difference
User Charge Revenue				
Residential (Includes CAP)	\$ 38,188,376	\$ 45,269,714	18.5%	\$ 7,081,338
Commercial	38,530,718	49,435,468	28.3%	10,904,749
Industrial	1,585,983	2,077,179	31.0%	491,196
Health or Education	18,304,127	21,154,537	15.6%	2,850,410
Fire System	530,538	587,123	10.7%	56,586
Total: User Charge Revenue	\$ 97,139,741	\$118,524,020	22.0%	\$21,384,279

	Customer Usage		FTY Existing Rates		FPFTY Proposed Rates	Percent Difference	Dollar Difference
Customer Impacts							
<u>Residential</u>							
5/8"	1 kgal	\$	23.25	\$	27.77	19.4%	\$ 4.52
5/8"	3 kgal		42.07		49.83	18.4%	7.76
5/8"	5 kgal		60.89		71.89	18.1%	11.00
5/8"	7 kgal		79.71		93.95	17.9%	14.24
5/8"	12 kgal		126.76		149.10	17.6%	22.34
1"	20 kgal		217.73		259.18	19.0%	41.45
<u>Commercial</u>							
5/8"	3 kgal	\$	41.11	\$	51.11	24.3%	\$ 10.00
5/8"	5 kgal		58.97		74.45	26.3%	15.48
5/8"	12 kgal		121.48		156.14	28.5%	34.66
1"	13 kgal		148.02		187.09	26.4%	39.07
2"	60 kgal		630.52		805.73	27.8%	175.21
3"	170 kgal		1,707.86		2,192.59	28.4%	484.73
<u>Industrial</u>							
1"	10 kgal	\$	114.13	\$	143.93	26.1%	\$ 29.80
1"	20 kgal		189.23		244.33	29.1%	55.10
2"	80 kgal		719.66		936.44	30.1%	216.78
4"	680 kgal		5,505.62		7,266.88	32.0%	1,761.26
6"	400 kgal		3,870.99		4,955.91	28.0%	1,084.92
8"	800 kgal		7,486.89		9,616.16	28.4%	2,129.27
<u>Health or Education</u>							
5/8"	5 kgal	\$	72.09	\$	83.37	15.6%	\$ 11.28
5/8"	10 kgal		133.14		152.87	14.8%	19.73
1"	15 kgal		198.68		232.73	17.1%	34.05
2"	50 kgal		649.46		762.62	17.4%	113.16
4"	400 kgal		4,953.82		5,729.48	15.7%	775.66
6"	1000 kgal		12,254.49		14,164.41	15.6%	1,909.92

Pittsburgh Water and Sewer Authority

HJS-14W

FPFTY 2019 COS & Rate Design

Revenue Proof

	FPFTY Units of Service	FPFTY Proposed Rates	FPFTY Proposed Revenue
Retail Revenues			
<u>Minimum Charge</u>			
5/8"	713,746	\$ 27.77	\$ 19,820,723
3/4"	37,643	45.79	1,723,665
1"	41,977	93.73	3,934,484
1 1/2"	10,789	183.87	1,983,865
2"	11,096	303.92	3,372,378
3"	3,984	675.49	2,691,275
4"	3,213	1,142.48	3,670,740
6"	1,425	2,696.91	3,842,832
8"	171	4,847.16	829,178
10" & Above	28	7,925.65	219,655
<i>Subtotal: Minimum Charge</i>			\$ 42,088,796
<u>Minimum Charge - CAP</u>			
5/8"	25,379	\$ 13.89	\$ 352,384
3/4"	298	22.90	6,827
1"	23	46.87	1,075
<i>Subtotal: Minimum Charge - CAP</i>			\$ 360,285
<u>Fire System Charge</u>			
1" or Less	12,958	\$ 29.21	\$ 378,501
1 1/2"-3"	739	77.82	57,488
4"	63	166.46	10,499
6" or Greater	173	477.13	82,532
<i>Subtotal: Fire System Charge</i>			\$ 529,020
<u>Volume Charge</u>			
Residential	2,007,586	\$ 11.03	\$ 22,143,673
Commercial	2,971,726	11.67	34,680,038
Industrial	155,336	10.04	1,559,571
Health or Education	1,230,542	13.90	17,104,533
Fire System	3,871	15.01	58,103
<i>Subtotal: Volume Charge</i>			\$ 75,545,919
Total: Retail Revenues			\$ 118,524,020
Other Revenues			
Wholesale and Contract Revenues			\$ 4,933,489
Other Revenues			2,947,706
<i>Total: Other Revenues</i>			\$ 7,881,195
Total: System Revenues			\$ 126,405,216
FPFTY Water System Revenue Requirements			\$ 126,373,303
Difference			\$ 31,913

Pittsburgh Water and Sewer Authority

FPFTY 2019 COS & Rate Design

Projected Units of Service

HJS-15W

	FY 2015	FY 2016	HTY	FTY	FPFTY
	<i>Actual</i>	<i>Actual</i>	<i>Actual</i>	<i>Estimated</i>	<i>Projected</i>
Units of Service					
<u>Number of Bills (1)</u>					
Residential	828,451	808,997	799,240	772,348	772,348
Residential - CAP	-	-	-	26,892	26,892
Commercial	87,043	85,647	82,574	82,574	82,574
Industrial	1,301	1,300	1,208	1,208	1,208
Health or Education	7,156	6,676	6,169	6,169	6,169
Fire System	14,281	14,536	14,579	14,579	14,579
Total	938,232	917,156	903,770	903,770	903,770
<u>Billable Consumption (kgal) (1)</u>					
Residential	2,657,264	2,351,579	2,100,713	2,100,713	2,100,713
Commercial	3,544,635	4,155,937	3,109,578	3,109,578	3,109,578
Industrial	173,245	293,330	162,541	162,541	162,541
Health or Education	1,493,318	1,483,044	1,287,624	1,287,624	1,287,624
Fire System	23,509	7,997	4,051	4,051	4,051
Total	7,891,970	8,291,888	6,664,507	6,664,507	6,664,507
<u>Total Consumption (kgal) (1) (2)</u>					
Residential	3,441,961	3,185,573	2,923,242	2,923,242	2,923,242
Commercial	4,076,178	4,836,929	3,761,388	3,761,388	3,761,388
Industrial	194,248	315,256	183,126	183,126	183,126
Health or Education	1,695,395	1,572,968	1,483,403	1,483,403	1,483,403
Fire System	24,743	8,877	5,055	5,055	5,055
Total	9,432,525	9,919,603	8,356,214	8,356,214	8,356,214
<u>Wholesale & Contract Consumption</u>					
Allegheny	5,964	7,386	6,978	6,463	6,464
Aspinwall	69,290	79,175	92,000	89,793	89,793
Bay Valley Foods / Riverbend	786,110	738,226	724,835	578,215	600,000
Fox Chapel	641,820	617,688	1,170,449	816,968	816,968
Hampton	3,874	28,400	-	9,915	9,916
PAWC	11,210	14,000	-	-	-
RSRV - 10"	112,950	114,141	81,076	100,453	100,454
RSRV - 6"	13,258	8,369	12,302	12,302	12,302
Sharpsburg	12,362	470	-	-	-
Westview	-	1,055	-	-	-
Total	1,656,838	1,608,910	2,087,640	1,614,109	1,635,897

(1) It is important to note that PWSA was experiencing billing system problems in 2015 and 2016. Customer counts and billed consumption produced by the billing system are unrealistically high.

(2) Total consumption represents actual customer usage included the usage captured in minimum allowance.

Pittsburgh Water and Sewer Authority
FPPTY 2019 COS & Rate Design
FPPTY Wastewater Conveyance Revenue Requirements

HJS-1WW

Revenue Requirements	FPPTY Revenue Requirements
<u>Operating Expenses</u>	
<i>Direct Operating Expenses</i>	
Administrative Division	
Executive Director	\$ 946,441
Customer Service	4,370,754
Management Information Systems	893,818
Finance	1,071,404
Procurement	130,454
Human Resources	447,444
Legal	658,047
Public Affairs	282,710
Operations Division	
Environmental Compliance	2,854,668
Ops Capital Assets	10,178
Warehouse	121,018
Water Treatment Plant	-
Water Quality (Lab)	-
Water Distribution	-
Sewer Operations	16,518,454
Engineering & Construction	
Engineering & Construction	5,163,643
<i>Other Operating Expenses</i>	
Loss / (Gain) on ALCOSAN Billings	3,699,738
Co-Op Agreement Op. Expenses - Water	-
Co-Op Agreement Op. Expenses - Sewer	3,000,000
Non-City Water Subsidy	-
<i>Total Operating Expenses</i>	<hr/> \$ 40,168,772
<u>Debt Service</u>	
Existing Debt	\$ 23,773,786
Future Debt	2,942,904
<i>Subtotal: Debt Service</i>	<hr/> \$ 26,716,690
<u>Capital Expenditures & Transfers</u>	
Rate Funded Capital (PAYGO)	\$ 413,090
Other Transfers to Reserves	2,196,617
Reimbursements (Municipalities & Pennvest)	-
Remarketing & Liquidity Charges	-
<i>Subtotal: Capital Expenditures & Transfers</i>	<hr/> \$ 2,609,707
Total: Revenue Requirements	<hr/> \$ 69,495,169

			Wastewater Conveyance Functional Categories			
			Conveyance & Collection	Meters	Billing	Admin Support
Wastewater Conveyance Operating Costs	FY 2019	Allocation				
Operating Expenses	FPFTY					
<i>Direct Operating Expenses</i>						
Administrative Division						
Executive Director	\$ 946,441	WW-D				100.0%
Customer Service	4,370,754	WW-E		28.3%	71.7%	
Management Information Systems	893,818	WW-D				100.0%
Finance	1,071,404	WW-D				100.0%
Procurement	130,454	WW-D				100.0%
Human Resources	447,444	WW-D				100.0%
Legal	658,047	WW-D				100.0%
Public Affairs	282,710	WW-D				100.0%
Operations Division						
Environmental Compliance	2,854,668	WW-D				100.0%
Warehouse	10,178	WW-D				100.0%
Ops Capital Assets	121,018	WW-D				100.0%
Water Treatment Plant	-	n/a				
Water Quality (Lab)	-	n/a				
Water Distribution	-	n/a				
Sewer Operations	16,518,454	WW-A	100.0%			
Engineering & Construction Division						
Engineering & Construction	5,163,643	WW-A	100.0%			
<i>Subtotal: Direct Operating Expenses</i>	\$ 33,469,034					
<i>Other Operating Expenses</i>						
Loss / (Gain) on ALCOSAN Billings	3,699,738	WW-D				100.0%
Co-Op Agreement Op. Expenses - Water	-	WW-D				100.0%
Co-Op Agreement Op. Expenses - Sewer	3,000,000	WW-D				100.0%
Non-City Water Subsidy	-	WW-D				100.0%
<i>Subtotal: Other Operating Expenses</i>	\$ 6,699,738					
Total: Operating Expenses	\$ 40,168,772					

Wastewater Conveyance Operating Costs	FY 2019 FPFTY	Allocation	Wastewater Conveyance Functional Categories			
			Conveyance & Collection	Meters	Billing	Admin Support
<u>Operating Expenses</u>						
<i>Direct Operating Expenses</i>						
Administrative Division						
Executive Director	\$ 946,441	WW-D	\$ -	\$ -	\$ -	\$ 946,441
Customer Service	4,370,754	WW-E	-	1,235,248	3,135,506	-
Management Information Systems	893,818	WW-D	-	-	-	893,818
Finance	1,071,404	WW-D	-	-	-	1,071,404
Procurement	130,454	WW-D	-	-	-	130,454
Human Resources	447,444	WW-D	-	-	-	447,444
Legal	658,047	WW-D	-	-	-	658,047
Public Affairs	282,710	WW-D	-	-	-	282,710
Operations Division						
Environmental Compliance	2,854,668	WW-D	-	-	-	2,854,668
Warehouse	10,178	WW-D	-	-	-	10,178
Ops Capital Assets	121,018	WW-D	-	-	-	121,018
Water Treatment Plant	-	n/a	-	-	-	-
Water Quality (Lab)	-	n/a	-	-	-	-
Water Distribution	-	n/a	-	-	-	-
Sewer Operations	16,518,454	WW-A	16,518,454	-	-	-
Engineering & Construction Division						
Engineering & Construction	5,163,643	WW-A	5,163,643	-	-	-
Subtotal: Direct Operating Expenses	\$ 33,469,034		\$ 16,518,454	\$ 1,235,248	\$ 3,135,506	\$ 7,416,183
<i>Other Operating Expenses</i>						
Loss / (Gain) on ALCOSAN Billings	3,699,738	WW-D	-	-	-	3,699,738
Co-Op Agreement Op. Expenses - Water	-	WW-D	-	-	-	-
Co-Op Agreement Op. Expenses - Sewer	3,000,000	WW-D	-	-	-	3,000,000
Non-City Water Subsidy	-	WW-D	-	-	-	-
Subtotal: Other Operating Expenses	\$ 6,699,738		\$ 21,682,097	\$ -	\$ -	\$ 9,685,602
Total: Wastewater Conveyance Operating Costs	\$ 40,168,772		\$ 21,682,097	\$ 1,235,248	\$ 3,135,506	\$ 14,115,921
Allocation Percentage			53.98%	3.08%	7.81%	35.14%

Allocated Wastewater Conveyance Assets				
System Fixed Assets	Acquisition Cost	Allocated to Wastewater	Allocated Costs	Allocation
Customer Service	2,790,042	55.75%	1,555,498	WW-E
Distribution	256,875,898	0.00%	-	n/a
Engineering	2,384,647	30.36%	723,922	WW-A
Executive Director	969,720	28.27%	274,152	WW-D
Finance	56,271	28.27%	15,909	WW-D
Fire	11,366,803	0.00%	-	n/a
Membrane Plant	20,355,348	0.00%	-	n/a
Meters	29,354,311	0.00%	-	n/a
Mgt Info Systems	11,973,332	28.27%	3,385,008	WW-D
Plant Operations	63,987,369	0.00%	-	n/a
Pumping	26,624,806	0.00%	-	n/a
Sewer Operations	397,298,184	100.00%	397,298,184	WW-A
Stormwater	4,897,811	100.00%	4,897,811	WW-A
Supply	920,461	0.00%	-	n/a
Warehouse	4,188,582	28.27%	1,184,163	WW-D
Water Quality	1,429,105	0.00%	-	n/a
Water Storage	61,343,689	0.00%	-	n/a
Total	896,816,378		409,334,646	

Wastewater Conveyance Functional Categories				
Conveyance & Collection	Meters	Billing	Admin Support	Readiness-to-Serve
	28.26%	71.74%		
			100.00%	
100.00%				
			100.00%	
			100.00%	
			100.00%	
100.00%				
100.00%				
			100.00%	
			100.00%	
\$ 402,919,916	\$ 439,610	\$ 1,115,888	\$ 4,859,231	\$ -

Allocation Factors for Capital Costs	98.43%	0.11%	0.27%	1.19%	0.00%
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Allocation of Capital Costs	Readiness-to-Serve													
Debt Service	0.0%	\$	26,716,690		\$	26,298,009	\$	28,693	\$	72,832	\$	317,155	\$	-
Rate-Funded Capital	0.0%		413,090			406,617		444		1,126		4,904		-
Other Transfers to Reserves	0.0%		2,196,617			2,162,194		2,359		5,988		26,076		-
Reimbursements from Municipalities	0.0%		-			-		-		-		-		-
Remarketing & Liquidity Charges	0.0%		-			-		-		-		-		-
Total: Allocated Capital Costs		\$	29,326,397		\$	28,866,820	\$	31,495	\$	79,947	\$	348,135	\$	-

			Wastewater Conveyance Cost Drivers			
	FY 2019	Allocation	<i>Volume</i>	<i>Meter</i>	<i>Billing</i>	<i>Readiness-to-Serve</i>
	<i>FPFTY</i>					
Wastewater Conveyance Revenue Requirements						
<u>Functional Categories</u>						
Collection & Transmission	\$ 50,548,917	WW-AA	100.00%			
Meters	1,266,743	WW-BB		100.00%		
Billing	3,215,453	WW-CC			100.00%	
Admin Support	14,464,056	WW-DD	91.86%	2.30%	5.84%	
Readiness-to-Serve (Debt)	-	WW-EE				100.00%
Total: Wastewater Conveyance Revenue Requirements	\$ 69,495,169					
	FY 2019	Allocation	<i>Volume</i>	<i>Meter</i>	<i>Billing</i>	<i>Readiness-to-Serve</i>
	<i>FPFTY</i>					
Wastewater Conveyance Revenue Requirements						
<u>Functional Categories</u>						
Collection & Transmission	\$ 50,548,917	WW-AA	\$ 50,548,917	\$ -	\$ -	\$ -
Meters	1,266,743	WW-BB	-	1,266,743	-	-
Billing	3,215,453	WW-CC	-	-	3,215,453	-
Admin Support	14,464,056	WW-DD	13,285,982	332,943	845,131	-
Readiness-to-Serve (Debt)	-	WW-EE	-	-	-	-
Total: Wastewater Conveyance Revenue Requirements	\$ 69,495,169		\$ 63,834,899	\$ 1,599,687	\$ 4,060,584	\$ -
Costs to Recover from Wastewater Conveyance Charges	\$ 69,495,169		\$ 63,834,899	\$ 1,599,687	\$ 4,060,584	\$ -
			91.9%	2.3%	5.8%	0.0%

Cost Functionalization: Wastewater Conveyance					
Code	Description	Coll. & Trans	Meters	Billing	Admin Support
WW-A	Collection & Transmission Only	100.00%			
WW-B	Meters Only		100.00%		
WW-C	Billing Only			100.00%	
WW-D	Admin Support Only				100.00%
WW-E	Customer Service		28.26%	71.74%	

Allocation to Cost Drivers: Wastewater Conveyance					
Code	Description	Volume	Meter	Billing	Readiness-to-Serve
WW-AA	Volume	100.00%			
WW-BB	Customer - Meters		100.00%		
WW-CC	Customer - Billing			100.00%	
WW-DD	Admin Support (Composite)	91.86%	2.30%	5.84%	
WW-EE	Readiness-to-Serve				100.00%

Factor Derivations - Allocation to Functional Categories & Cost Components					
<i>Code(s)</i>	<i>Description</i>	<i>Calculations</i>			
W-I	Customer Service	2019 Customer Service Budget	FPPTY	Meter	Billing
WW-E	- This factor allocates the 2019 customer service budget between meter- and billing-related costs.	Salaries	\$ 2,868,714	22.88%	77.12%
		Benefits	932,763	22.88%	77.12%
		Temporary Help	15,000	100.00%	0.00%
		Customer CC Fees	301,800	0.00%	100.00%
		Postage	580,000	0.00%	100.00%
		Billing Contract	588,240	0.00%	100.00%
		Meter Services	1,326,992	100.00%	0.00%
		Prof Service Other	581,520	0.00%	100.00%
		Office Supplies	1,020	20.00%	80.00%
		TE Airfare	2,000	50.00%	50.00%
		TE Lodging	1,400	50.00%	50.00%
		TE Meals	2,600	50.00%	50.00%
		TE Seminars/Conferences	1,000	50.00%	50.00%
		TE Training	500	50.00%	50.00%
		Cellular Phone	6,120	0.00%	100.00%
		Customer Refund AP	600,000	0.00%	100.00%
		One Call	30,000	0.00%	100.00%
		Total	\$ 7,839,668	\$2,215,621	\$ 5,624,048
		Allocation Factors		28.26%	71.74%

W-J	Engineering & Construction	2019 Water CIP Costs	\$\$ Amount	Allocation
	- This factor uses the 2019 Water CIP costs to allocate Engineering & Construction costs to the various functional categories.	Treatment	\$ 9,160,628	8.15%
		Storage	23,175,580	20.61%
		Trans. & Distr.	69,834,318	62.10%
		Meters	4,795,070	4.26%
		Admin	5,486,534	4.88%
		Total Water CIP	\$ 112,452,130	100.00%

W-BB	Maximum Day	Plant Production Data	
	- Maximum day costs are allocated using a peak day determined using system daily production records. In addition, 0.25% is allocated to fire protection service.	2017 Average Processed	69.67 mgd
		Peak Day	93.54 mgd
		Peak Hour Factor (1.6)	111.47 mgd
		Base	65.49%
		Maximum Day	34.26%
		Fire Protection	0.25%

W-CC	Peak Hour	Plant Production Data	
	- Peak hour costs are allocated using an estimated peak hour compared to system average and maximum day processed. In addition, 0.25% is allocated to fire protection service.	2017 Average Processed	69.67 mgd
		Peak Day	93.54 mgd
		Peak Hour Factor (1.6)	111.47 mgd
		Peak Hour / Avg	62.25%
		Max Day (Plug)	21.41%
		Peak Hr / Peak Day	16.09%
		Fire Protection	0.25%

Equivalency Flow Ratios	Equivalency Ratios			
- Used to escalate metering and readiness-to-serve costs, these ratios are industry standard and obtained from the American Waterworks Association	Flow		Fire	
	5/8"	1.00	1" or Less	1.00
	3/4"	1.50	1 1/2"-3"	2.90
	1"	2.50	4"	6.35
	1.5"	5.00	6" or Greater	18.47
	2"	8.00		
	3"	16.00		
	4"	25.00		
	6"	50.00		
	8"	80.00		
	10"	115.00		

Pittsburgh Water and Sewer Authority

FPFTY 2019 COS & Rate Design

Wastewater Conveyance Units of Service

HJS-6WW

	<u>Collection Factor</u>	FY 2019 Consumption	Allocated Consumption	Average Day	Equivalent Meters	Total Bills
Retail Units of Service						
Residential	96%	2,968,558	2,836,958	7,772	1,072,988	1,018,263.97
Residential - CAP	96%	-	-	-	12,942	12,850
Commercial	96%	3,847,537	3,676,970	10,074	409,133	96,176.58
Industrial	96%	183,941	175,787	482	10,964	1,161.14
Health or Education	96%	1,481,894	1,416,200	3,880	86,793	5,885.01
Total: Wastewater Conveyance Units of Service		8,481,930	8,105,914	22,208	1,592,820	1,134,337

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Pittsburgh Water and Sewer Authority
FPFTY 2019 COS & Rate Design
Cost Distribution to Customer Classes

HJS-8WW

Customer Class Cost of Service

Residential

Unit Costs (\$/unit)	\$ 7.538	\$ 0.961	\$ 3.426	\$ -	
Units of Service	2,836,958	1,072,988	1,018,264	1,072,988	
Cost of Service	\$ 21,383,645	\$ 1,031,421	\$ 3,488,829	\$ -	\$ 25,903,895

Residential - CAP

Unit Costs (\$/unit)	\$ 7.538	\$ 0.961	\$ 3.426	\$ -	
Units of Service	-	12,942	12,850	12,942	
Cost of Service	\$ -	\$ 12,440	\$ 44,027	\$ -	\$ 56,467

Commercial

Unit Costs (\$/unit)	\$ 7.538	\$ 0.961	\$ 3.426	\$ -	
Units of Service	3,676,970	409,133	96,177	409,133	
Cost of Service	\$ 27,715,263	\$ 393,283	\$ 329,525	\$ -	\$ 28,438,071

Industrial

Unit Costs (\$/unit)	\$ 7.538	\$ 0.961	\$ 3.426	\$ -	
Units of Service	175,787	10,964	1,161	10,964	
Cost of Service	\$ 1,324,999	\$ 10,539	\$ 3,978	\$ -	\$ 1,339,516

Health or Education

Unit Costs (\$/unit)	\$ 7.538	\$ 0.961	\$ 3.426	\$ -	
Units of Service	1,416,200	86,793	5,885	86,793	
Cost of Service	\$ 10,674,643	\$ 83,431	\$ 20,164	\$ -	\$ 10,778,237

Unit Costs				Total
Volume	Meter	Billing	Readiness-to-Serve	

Pittsburgh Water and Sewer Authority
FPFTY 2019 COS & Rate Design
 Minimum Charge Calculation

HJS-9WW

Wastewater Conveyance	Min. Usage	FY 2018	COS Rate Build-Up - Test Year: 2019				
	<i>Existing</i>	<i>Existing Rates</i>	<i>Meter</i>	<i>Billing</i>	<i>R.T.S.</i>	<i>Usage</i>	<i>Total</i>
<u>Minimum Charge</u>							
5/8"	1	\$ 7.71	\$ 0.96	\$ 3.43	\$ -	\$ 6.89	\$ 11.28
3/4"	2	15.62	1.44	3.43	-	13.78	18.65
1"	5	37.10	2.40	3.43	-	34.44	40.27
1 1/2"	10	76.62	4.81	3.43	-	68.88	77.12
2"	17	129.72	7.69	3.43	-	117.09	128.21
3"	40	295.88	15.38	3.43	-	275.51	294.32
4"	70	506.20	24.03	3.43	-	482.14	509.61
6"	175	1,213.27	48.06	3.43	-	1,205.36	1,256.86
8"	325	2,197.82	76.90	3.43	-	2,238.53	2,318.86
10" & Above	548	3,618.63	110.54	3.43	-	3,774.51	3,888.48

	FY 2018						
	<i>Existing Rates</i>	Fixed Charge Revenue	Net Volumetric Rev. Req	Billed Volume	COS Rates by Class	Policy Driven Adjustment	Adj. Rate by Class
<u>Volume Charge (per kgal)</u>							
Residential	\$ 6.92	\$12,475,204	\$ 13,338,779	2,036,074	\$ 6.55	-	\$ 6.56
Residential - CAP	6.92	146,378	(89,911)	-	6.55	-	6.56
Commercial	6.11	7,319,893	21,118,179	3,030,056	6.97	-	6.97
Industrial	5.57	243,808	1,095,708	155,997	7.02	-	7.03
Health or Education	7.64	1,807,649	8,970,589	1,229,683	7.30	-	7.30
		\$21,992,932	\$ 44,433,344	6,451,811		-	\$ 6.89

	Billed Vol.	Implied Vol.	Equivalent Vol.
<u>Unit Cost Calculations</u>			
Residential	2,036,074	1,154,246	3,190,320
Residential - CAP	-	26,090	26,090
Commercial	3,030,056	957,732	3,987,788
Industrial	155,997	33,289	189,286
Health or Education	1,229,683	247,399	1,477,082
Total: User Charge Revenue	6,451,811	2,418,755	8,870,566
Total Volumetric Unit Cost \$ 6.89			

	FTY Prior Tariff Rates	FPFTY Proposed Rates	Percent Difference	Dollar Difference
Retail Revenues				
<u>Minimum Charge</u>				
5/8"	\$ 7.71	\$ 11.28	46.3%	\$ 3.57
3/4"	15.62	18.65	19.4%	3.03
1"	37.10	40.27	8.5%	3.17
1 1/2"	76.62	77.12	0.7%	0.50
2"	129.72	128.21	-1.2%	(1.51)
3"	295.88	294.32	-0.5%	(1.56)
4"	506.20	509.61	0.7%	3.41
6"	1,213.27	1,256.86	3.6%	43.59
8"	2,197.82	2,318.86	5.5%	121.04
10" & Above	3,618.63	3,888.48	7.5%	269.85
<u>Minimum Charge - CAP</u>				
5/8"	\$ 3.86	\$ 5.64	46.3%	\$ 1.79
3/4"	7.81	9.33	19.4%	1.52
1"	18.55	20.14	8.5%	1.59
<u>Volume Charge</u>				
Residential	\$ 6.92	\$ 6.56	-5.2%	\$ (0.36)
Commercial	6.11	6.97	14.1%	0.86
Industrial	5.57	7.03	26.2%	1.46
Health or Education	7.64	7.30	-4.5%	(0.34)
Fire System	9.17	-	-100.0%	(9.17)

	Fully Allocated CCOS		Revenue at Existing Rates		Revenue at Proposed Rates		Proposed Increase	
	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent
User Charge Revenue								
Residential (Includes CAP)	\$ 25,960,362	39.0%	\$ 23,056,956	37.9%	\$ 25,978,229	39.0%	\$ 2,921,273	12.7%
Commercial	28,438,071	42.8%	25,539,083	41.9%	28,439,384	42.7%	2,900,301	11.4%
Industrial	1,339,516	2.0%	1,103,834	1.8%	1,340,469	2.0%	236,635	21.4%
Health or Education	10,778,237	16.2%	11,171,143	18.3%	10,784,338	16.2%	(386,805)	-3.5%
Fire System	-	0.0%	35,497	0.1%	-	0.0%	(35,497)	-100.0%
Total: User Charge Revenue	\$ 66,516,187	100.0%	\$ 60,906,513	100.0%	\$ 66,542,420	100.0%	\$ 5,635,907	9.3%
Other Revenues								
Wholesale & Contract Revenues	\$ 466,380		\$ 466,380		\$ 466,380		\$ -	0.0%
Other Revenues	2,512,602		2,445,815		2,512,602		66,787	2.7%
Total: Other Revenues	\$ 2,978,982		\$ 2,912,195		\$ 2,978,982		\$ 66,787	2.3%
Total: Wastewater Conveyance Revenues	\$ 69,495,169		\$ 63,818,708		\$ 69,521,403		\$ 5,702,694	8.9%

	FTY Revenue at Existing Rates	FPFTY Indicated COS by Customer Class	Percent Difference	Dollar Difference
User Charge Revenue				
Residential (Includes CAP)	\$ 23,056,956	\$ 25,960,362	12.6%	\$ 2,903,406
Commercial	25,539,083	28,438,071	11.4%	2,898,988
Industrial	1,103,834	1,339,516	21.4%	235,682
Health or Education	11,171,143	10,778,237	-3.5%	(392,905)
Fire System	35,497	-	-100.0%	(35,497)
Total: User Charge Revenue	\$ 60,906,513	\$ 66,516,187	9.2%	\$5,609,674

	FPFTY Indicated COS by Customer Class	FPFTY Revenue at Proposed Rates	Percent Difference	Dollar Difference
User Charge Revenue				
Residential (Includes CAP)	\$ 25,960,362	\$ 25,978,229	0.1%	\$ 17,867
Commercial	28,438,071	28,439,384	0.0%	1,312
Industrial	1,339,516	1,340,469	0.1%	953
Health or Education	10,778,237	10,784,338	0.1%	6,100
Fire System	-	-	0.0%	-
Total: User Charge Revenue	\$ 66,516,187	\$ 66,542,420	0.0%	\$ 26,233

	FTY Revenue at Existing Rates	FPFTY Revenue at Proposed Rates	Percent Difference	Dollar Difference
User Charge Revenue				
Residential (Includes CAP)	\$ 23,056,956	\$ 25,978,229	12.7%	\$ 2,921,273
Commercial	25,539,083	28,439,384	11.4%	2,900,301
Industrial	1,103,834	1,340,469	21.4%	236,635
Health or Education	11,171,143	10,784,338	-3.5%	(386,805)
Fire System	35,497	-	-100.0%	(35,497)
Total: User Charge Revenue	\$ 60,906,513	\$ 66,542,420	9.3%	\$5,635,907

	Customer Usage		FTY Existing Rates		FPFTY Proposed Rates	Percent Difference	Dollar Difference
Customer Impacts							
<u>Residential</u>							
5/8"	1 kgal	\$	7.71	\$	11.28	46.3%	\$ 3.57
5/8"	3 kgal		21.55		24.40	13.2%	2.85
5/8"	5 kgal		35.39		37.52	6.0%	2.13
5/8"	7 kgal		49.23		50.64	2.9%	1.41
5/8"	12 kgal		83.83		83.44	-0.5%	(0.39)
1"	20 kgal		140.90		138.67	-1.6%	(2.23)
<u>Commercial</u>							
5/8"	3 kgal	\$	19.93	\$	25.22	26.5%	\$ 5.29
5/8"	5 kgal		32.15		39.16	21.8%	7.01
5/8"	12 kgal		74.92		87.95	17.4%	13.03
1"	13 kgal		85.98		96.03	11.7%	10.05
2"	60 kgal		392.45		427.92	9.0%	35.47
3"	170 kgal		1,090.18		1,200.42	10.1%	110.24
<u>Industrial</u>							
1"	10 kgal	\$	64.95	\$	75.42	16.1%	\$ 10.47
1"	20 kgal		120.65		145.72	20.8%	25.07
2"	80 kgal		480.63		571.10	18.8%	90.47
4"	680 kgal		3,903.90		4,797.91	22.9%	894.01
6"	400 kgal		2,466.52		2,838.61	15.1%	372.09
8"	800 kgal		4,843.57		5,658.11	16.8%	814.54
<u>Health or Education</u>							
5/8"	5 kgal	\$	38.27	\$	40.48	5.8%	\$ 2.21
5/8"	10 kgal		76.47		76.98	0.7%	0.51
1"	15 kgal		113.50		113.27	-0.2%	(0.23)
2"	50 kgal		381.84		369.11	-3.3%	(12.73)
4"	400 kgal		3,027.40		2,918.61	-3.6%	(108.79)
6"	1000 kgal		7,516.27		7,279.36	-3.2%	(236.91)

Pittsburgh Water and Sewer Authority

HJS-14WW

FPFTY 2019 COS & Rate Design

Revenue Proof

	FPFTY Units of Service	FPFTY Proposed Rates	FPFTY Proposed Revenue
Retail Revenues			
<u>Minimum Charge</u>			
5/8"	1,004,554	\$ 11.28	\$ 11,331,368
3/4"	39,286	18.65	732,677
1"	44,956	40.27	1,810,362
1 1/2"	11,222	77.12	865,473
2"	12,209	128.21	1,565,273
3"	3,955	294.32	1,163,905
4"	3,433	509.61	1,749,370
6"	1,656	1,256.86	2,081,579
8"	189	2,318.86	438,780
10" & Above	28	3,888.48	107,767
<i>Subtotal: Minimum Charge</i>			\$ 21,846,554
<u>Minimum Charge - CAP</u>			
5/8"	25,379	\$ 5.64	\$ 143,136
3/4"	298	9.33	2,780
1"	23	20.14	462
<i>Subtotal: Minimum Charge - CAP</i>			\$ 146,378
<u>Volume Charge</u>			
Residential	2,036,074	\$ 6.56	\$ 13,356,647
Commercial	3,030,056	6.97	21,119,491
Industrial	155,997	7.03	1,096,661
Health or Education	1,229,683	7.30	8,976,689
Fire System	3,871	-	-
<i>Subtotal: Volume Charge</i>			\$ 44,549,488
<i>Total: Retail Revenues</i>			\$ 66,542,420
Other Revenues			
Wholesale and Contract Revenues			\$ 466,380
Other Revenues			2,512,602
<i>Total: Other Revenues</i>			\$ 2,978,982
<i>Total: System Revenues</i>			\$ 69,521,403
FPFTY Wastewater Conveyance Revenue Requirements			\$ 69,495,169
<i>Difference</i>			\$ 26,233

	FY 2015	FY 2016	HTY	FTY	FPFTY
	<i>Actual</i>	<i>Actual</i>	<i>Actual</i>	<i>Estimated</i>	<i>Projected</i>
Units of Service					
<u>Number of Bills (1)</u>					
Residential	812,852	796,377	1,092,391	1,065,499	1,065,499
Residential - CAP	-	-	-	26,892	26,892
Commercial	85,058	84,024	100,638	100,638	100,638
Industrial	1,296	1,316	1,215	1,215	1,215
Health or Education	7,077	6,601	6,158	6,158	6,158
Fire System	4,724	2,701	2,600	-	-
<i>Total</i>	<u>911,007</u>	<u>891,019</u>	<u>1,203,002</u>	<u>1,200,402</u>	<u>1,200,402</u>
<u>Billable Consumption (kgal) (1)</u>					
Residential	2,574,683	2,301,322	2,130,523	2,130,523	2,130,523
Commercial	3,573,074	4,320,306	3,170,614	3,170,614	3,170,614
Industrial	173,305	293,331	163,234	163,234	163,234
Health or Education	1,340,876	1,305,727	1,286,726	1,286,726	1,286,726
Fire System	23,519	7,999	4,051	4,051	4,051
<i>Total</i>	<u>7,685,457</u>	<u>8,228,685</u>	<u>6,755,147</u>	<u>6,755,147</u>	<u>6,755,147</u>
<u>Total Consumption (kgal) (1) (2)</u>					
Residential	3,348,247	3,123,680	2,968,558	2,968,558	2,968,558
Commercial	4,115,291	5,011,388	3,847,537	3,847,537	3,847,537
Industrial	194,338	315,285	183,941	183,941	183,941
Health or Education	1,531,181	1,386,474	1,481,894	1,481,894	1,481,894
Fire System	41,549	15,471	9,130	9,130	9,130
<i>Total</i>	<u>9,230,606</u>	<u>9,852,298</u>	<u>8,491,060</u>	<u>8,491,060</u>	<u>8,491,060</u>
<u>Wholesale & Contract Consumption</u>					
Bay Valley Foods / Riverbend	180,000	180,000	180,000	180,000	180,000

(1) It is important to note that PWSA was experiencing billing system problems in 2015 and 2016. Customer counts and billed consumption produced by the billing system are unrealistically high.

(2) Total consumption represents actual customer usage included the usage captured in minimum allowance.