Overview of FY2019 – FY2028 CIP

Environmental Quality and Operations Committee

October 17, 2019

Adam Ortiz, Committee Chair

District of Columbia Water and Sewer Authority

Leonard Benson, Senior Vice President and Chief Engineer

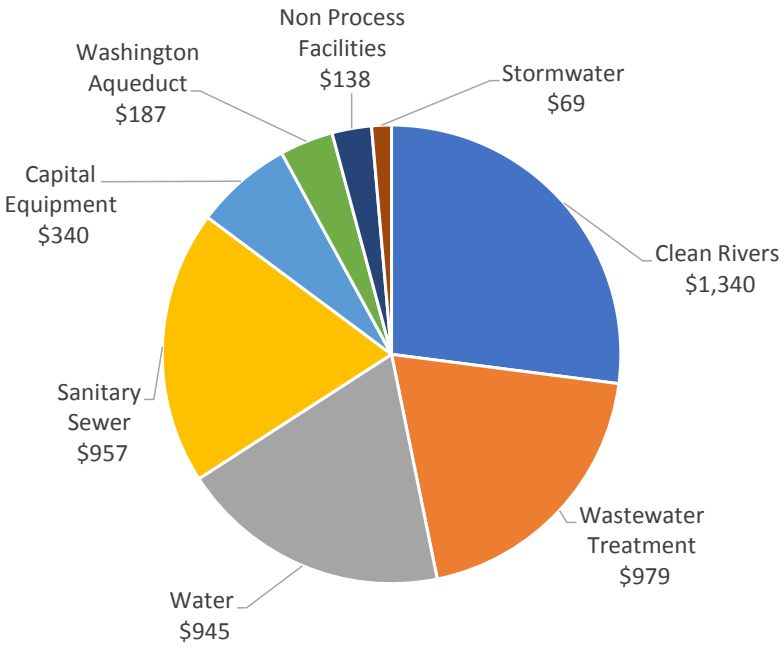
Small Diameter Water Main unlined Cast Iron pipe

10th St at Otis St, NE (10" VCP, deformed, broken

Budget Theme: Stewardship, Accountability & Sustainability

FY19-28 CIP Overview

Capital = $4,956 Million



- Build remaining tunnels to continue to dramatically improve the health of the District waterways, meet the consent decree requirements and reduce the flooding risk in Northeast DC
- Rehabilitate wastewater treatment facilities to ensure we continue to meet our permit requirements and protect the Potomac River and Chesapeake Bay.
- Achieve 1% replacement of water lines per year, to improve water quality, maintain fire protection and help reduce the number of water main breaks
- Ramp up to 1% rehabilitation of sewer pipes per year, and upgrade pump stations to prevent failures and service disruptions
- Maintain equipment reliability for operational facilities, large vehicles, renovations, and technology software/hardware projects to ensure delivery of critical water and sewer services
- Address critical infrastructure needs at the Washington Aqueduct to continue to meet EPA safe drinking water requirements
- Replace HVACs & Roofs, and upgrades to Main & O Seawall, historic restoration work and other non-process facilities
- Rehabilitate the stormwater pump stations that protect low lying roadway from flooding.

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FY19-28 CIP Overview

Modified Baseline CIP

1) FY19 & FY20 Total spending for each year has been kept at FY18-27 board approved baseline levels to remain congruent with previously approved 5% rate increases
2) Ramp-up to modified Baseline CIP beginning in FY21

Service Area ($000's)	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	10-Yr Total	Last Year's CIP	(Increase) /Decrease
Non-Process Facilities	15,309	36,002	26,793	20,665	6,831	11,058	10,396	3,901	3,553	3,560	138,067	108,032	(30,036)
Wastewater Treatment	69,979	66,620	76,510	97,635	110,047	82,434	81,249	133,338	137,575	123,351	978,738	855,948	(122,790)
Clean Rivers	187,859	147,208	139,786	191,573	151,411	64,415	55,689	144,295	97,067	83,286	1,262,589	1,313,196	50,607
Combined Sewer	7,491	4,219	9,444	8,015	8,646	13,520	8,852	5,800	5,593	7,598	79,178	119,151	39,973
Stormwater	4,220	8,571	8,118	8,586	3,725	4,987	7,564	7,494	5,239	10,102	68,608	24,452	(44,156)
Sanitary Sewer	44,927	43,646	57,249	85,588	97,220	98,194	115,011	140,020	134,664	140,615	957,135	532,490	(424,645)
Water	61,884	71,720	96,300	101,039	84,395	96,491	103,325	106,145	105,338	118,378	945,015	730,672	(214,343)
CAPITAL PROJECTS	**391,669**	**377,987**	**414,200**	**513,102**	**462,275**	**371,098**	**382,087**	**540,993**	**489,029**	**486,890**	**4,429,330**	**3,683,941**	**(745,389)**
Capital Equipment	34,518	26,823	36,907	33,086	32,725	36,680	35,540	35,426	34,339	34,279	340,324	198,133	(142,191)
Washington Aqueduct	12,930	15,532	15,909	15,536	35,006	14,830	32,731	9,034	12,298	23,321	187,127	120,052	(67,075)
ADDITIONAL CAPITAL PROGRAMS	**47,448**	**42,355**	**52,816**	**48,622**	**67,731**	**51,509**	**68,272**	**44,461**	**46,637**	**57,600**	**527,450**	**318,185**	**(209,265)**
TOTAL CIP	**439,117**	**420,342**	**467,016**	**561,724**	**530,006**	**422,608**	**450,358**	**585,454**	**535,665**	**544,490**	**4,956,780**	**4,002,126**	**(954,655)**
Last Years CIP	439,118	420,342	402,681	445,647	385,312	326,284	318,360	439,427	375,004		4,002,126		
(Increase)/Decrease	1	(0)	(64,335)	(116,077)	(144,694)	(96,324)	(131,998)	(146,027)	(160,661)	(544,490)	(954,655)		

FY19-28 CIP Overview

Asset Management Based Investment Needs

Service Area	Replacement Value ($M) [1]	Min. Annual Investment (%)	Min. Annual Investment ($M)	Average Annual Asset Management Based Investment ($M) [2]	Average Annual BOD Approved Modified AM Investment ($M) [3]
Wastewater	$4,786	2.0%	$96	$120	$107
Water	$5,599	1.5%	$84	$134	$83
Sewer	$9,967	1.5%	$149	$180	$98
Facilities	$229	2.0%	$5	$7	$7

Does not include all CIP programs such as DC Clean Rivers

1 – 2019 dollars
2 – Includes Minimum Investment as well as asset management recommended investment required due to age of the system
3 – Approved by DC Water BOD on April 4, 2019

FY19-28 CIP Overview

Service Area	Current Baseline $3.8B	Modified Baseline $4.4B	Asset Management $5.4B
Clean Rivers	**Fully funded** to meet Consent Decree	**Fully funded** to meet Consent Decree	**Fully funded** to meet Consent Decree
Wastewater	**Generally funded** to meet NPDES Permit and established levels of service	**Fully funded** to meet NPDES Permit and established levels of service	**Fully funded** to meet NPDES Permit and established levels of service
Stormwater	**Underfunded**	**Fully funded**	**Fully funded**
Water			
Pump Stations & Storage Facilities	**Generally funded** to current service levels	**Generally funded**	**Fully funded**
Small Diameter WMs	**Underfunded; (Funded to meet 1%** replacement/rehab goal **[11 mi/year]),** but only 0.7% a year at full replacement	**Underfunded; (Funded to meet 1%** per year replacement level - increased cost is due to switch to full replacement **[11 mi/year]**)	**Fully funded to ramp up to 2%** replacement level **[22 mi/year]**
Large Diameter WMs	**Generally funded**	**Generally funded**	**Generally funded**
Sewer			
Pump Stations	**Underfunded**	**Fully funded**	**Fully funded**
Sewer Lines < 60" dia.	**Substantially underfunded [0.35%; 6.2 mi/year]**	**Underfunded (Funded to ramp up to 1.0%** per year rehabilitation level **[17.5 mi/year]** by FY23	**Fully funded to ramp up to 2.3%** rehabilitation level **[40 mi/year]**
Sewer Lines ≥ 60"	**Generally Funded**	**Generally Funded**	**Generally Funded**
Non Process	**Fully funded** for HQ, Fleet and Sewer Operations Facilities, Otherwise **Underfunded**	**Fully funded**	**Fully funded**

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'Generally Funded' = What we know or expect to find can be rehabilitated
'Underfunded' = What we know or expect to find is not all funded 'Fully Funded' = All needs known or expected are met

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What we achieve with the Modified Baseline Plan in FY21 and beyond? *Striking a Balance*

- The Modified Baseline CIP balances financial and affordability concerns with additional investment in our assets that begin to address aging water and sewer infrastructure during this 10 year period

  - Non Process Facilities - $58 million increase
    - Additional facilities needs including HVAC and roof rehabilitation
  - Wastewater - $95 million increase
    - Upgrades to Effluent Filters, Secondary and Nitrification treatment processes
  - Stormwater - $35 million increase
    - Upgrading of storm water pump stations, increasing from $1M/year to an average of $5M/year from FY20 onwards

What we achieve with the Modified Baseline Plan in FY21 and beyond? *Striking a Balance (cont.)*

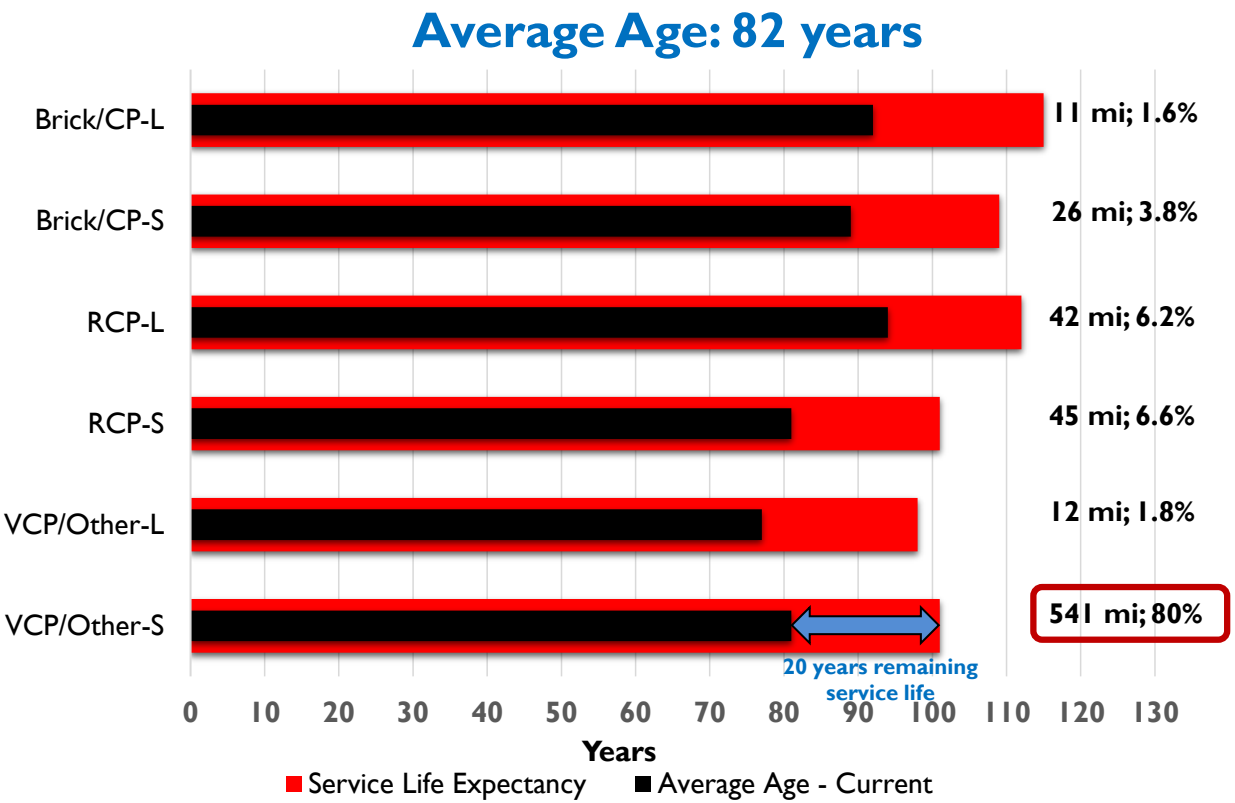
- Sanitary Sewers - $314 million increase
  - Condition Assessment:
    - Local Sewers (<60-in), from 35 mi/year to 69 mi/year (50-year cycle to 25-year cycle)
    - Major Sewers (≥60-in), from 7 mi/year to 11 mi/year (25-year cycle to 15-year cycle)
  - Rehabilitation:
    - Local Sewers (<60-in), 6 mi/year to 17.5 mi/year
    - Major Sewers (≥60-in), funds address what we know or expect to find
    - Sewer On-going (funding for emergency repairs), increased by 32% (from $11M/year to $14.5M/year)
- Water - $154 million increase
  - Rehabilitation:
    - Small Dia. Water Mains (<16-in), from 8 mi/year to 11 mi/year
    - Lead Service Lines Replacement, from 150 to 1,000 in public space
    - Water On-going (funding for emergency repairs), increased by 45% (from $11M/year to $16M/year)

Risk Based Approach

- Vertical assets (pump stations and treatment processes)
  - Use a Reliability Centered Maintenance to extend asset life
  - Focus dollars on critical assets using analytical techniques
- Water Distribution system (pipes) Inspections and replacements
  - Based on calculated Consequence and Likelihood of Failure
  - Small diameter water mains based on water quality complaints and break history
  - Large dimeter water mains based on condition assessment results
- Sewer Collection system (pipes) Inspections and rehabilitation
  - Based on calculated Consequence and Likelihood of Failure
  - Based on condition assessment results
- Facilities rehabilitation based on condition assessment results

Sewer Collection System Age

Sewer Linear - Sanitary Average Age and Service Life Expectancies by Sanitary Sewer Material Type - FY2018



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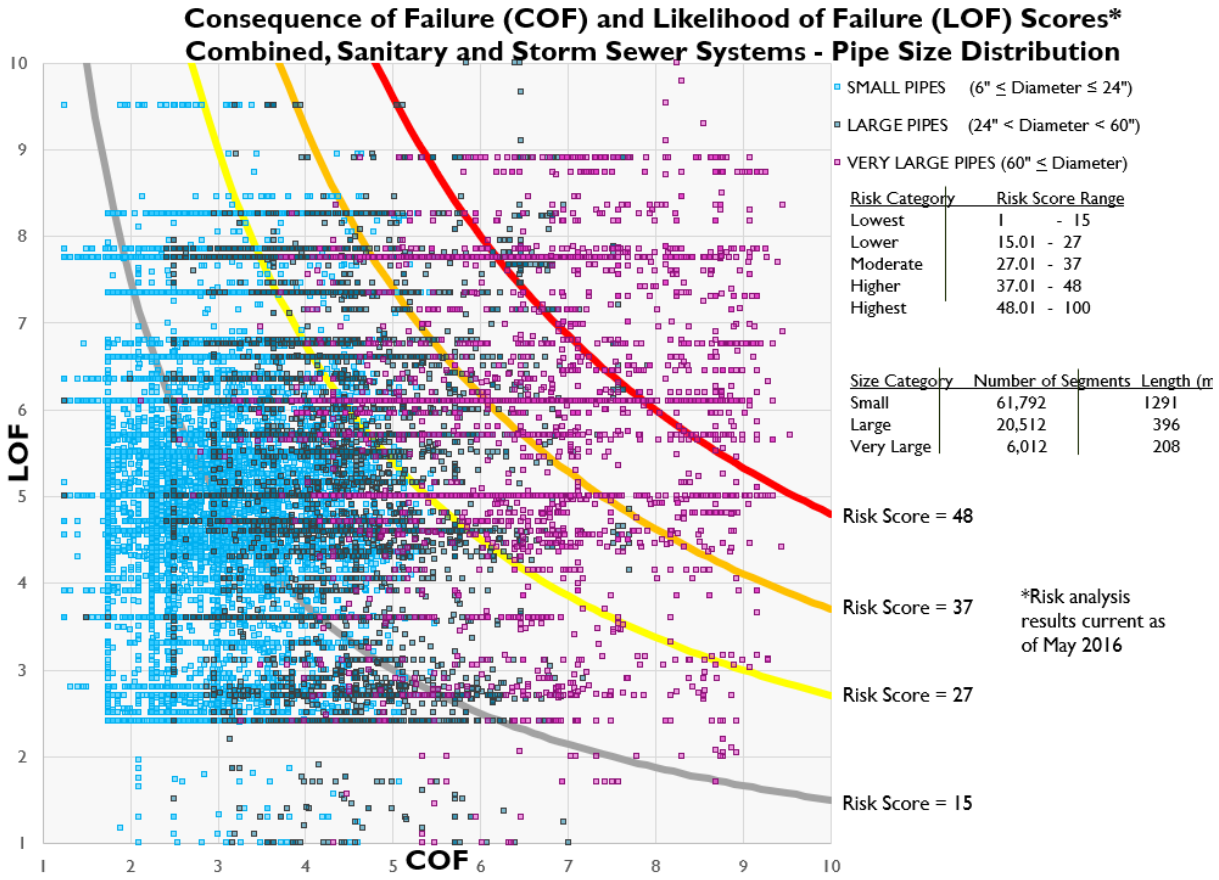
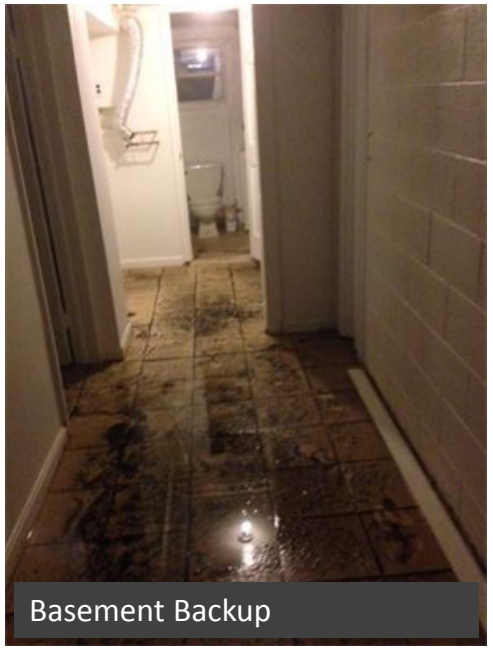
Sewer Collection System Analysis



Sewer Collection System Failures


Watergate Center


Overflow


Basement Backup


Basement Backup


MH 36870 Firth Stirling

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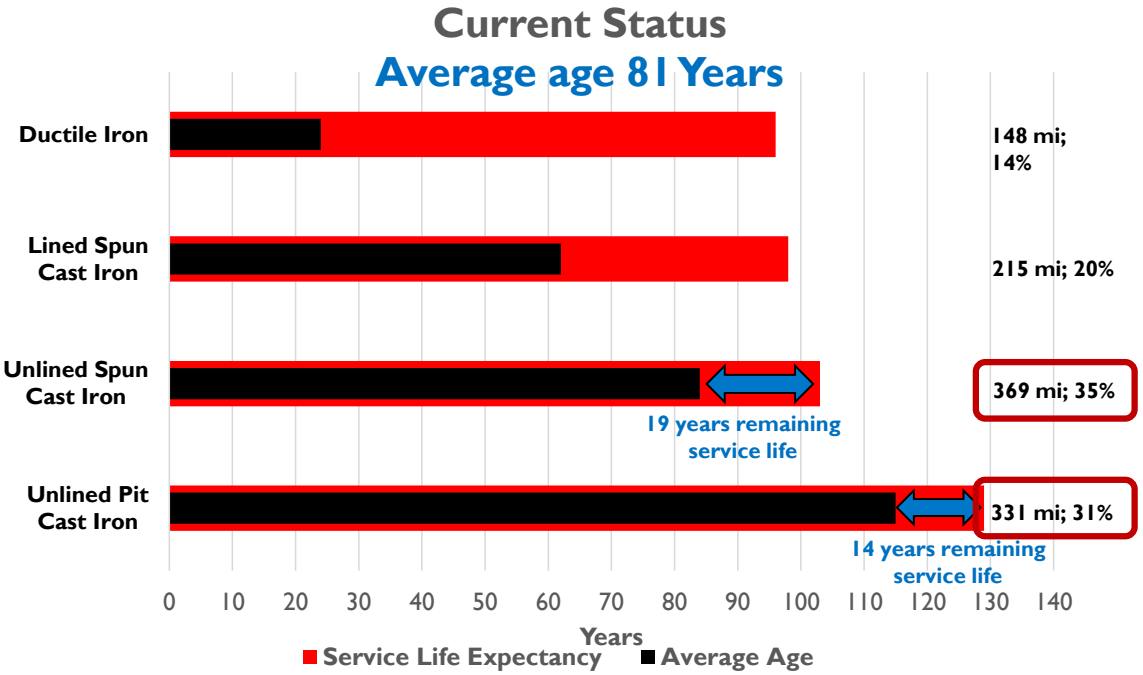
Water Distribution System Age

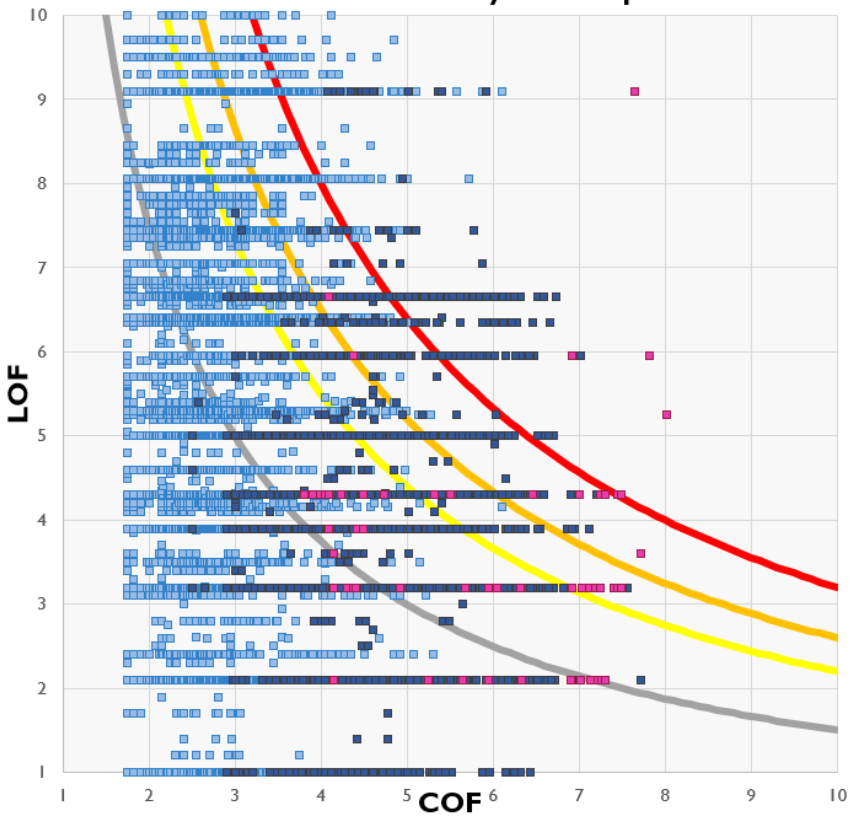
Small Diameter Water Mains

Average Age and Service Life Expectancies by SDWM Cohort type - FY2018



Water Distribution System Analysis

Consequence of Failure (COF) and Likelihood of Failure (LOF) Scores*
Water System - Pipe Size Distribution



- SMALL PIPES (Diameter ≤ 12")
- LARGE PIPES (12" < Diameter ≤ 48")
- VERY LARGE PIPES (48" < Diameter)

Risk Category	Risk Score Range
Lowest	1 - 14.99
Lower	15 - 21.99
Moderate	22 - 25.99
Higher	26 - 31.99
Highest	32 - 100

Size Category	Number of Segments	Length (i
Small	55,349	982
Large	10,207	206
Very Large	73	9

Risk Score = 32

Risk Score = 26

Risk Score = 22

Risk Score = 15

*Risk Analysis Results Current as of September 2016

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Water Distribution System Failures


Q St. NW


Q St. NW

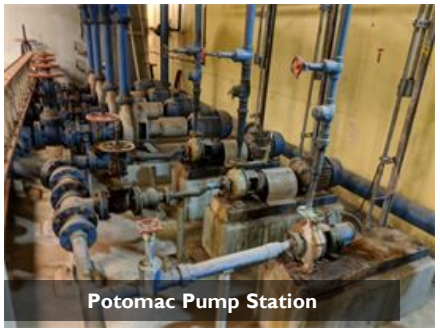

Q St. NW


6th St SW


6th St SW

Infrastructure Repairs Before and After


Potomac Pump Station


Potomac Pump Station


1st and Canal Stormwater Pump Station

Low Area Trunk Sewer


Potomac Pump Station


Potomac Pump Station


1st and Canal Stormwater Pump Station

Low Area Trunk Sewer

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Benefits of Proactive Investment

- Proactive investment strategy minimizes direct (DC Water) cost and social & environmental (community impact) costs:
  - Reactive approach has about a 1.5-fold to over 15-fold increase in direct costs to DC Water when compared to a proactive (planned) approach
  - Reactive approach has about a 5-fold to 19-fold increase in socioeconomic costs to the community, when compared to a proactive (planned) approach
- Emergency repairs on linear assets do not extend the service life of the repaired asset
  - Generally does not address the root problem or cause
  - Is wasted money when more comprehensive proactive project is done
- Repeated emergency repairs and associated impacts can negatively impact DC Water's reputation and customer confidence

CIP Risks/Sensitivities (Unfunded)

- Washington Aqueduct –
  - FY2019-2030 Proposed CIP ($291M, DC Water share = $218M)
  - Federally Owned Water Main Repairs ($86M, all DC Water)
  - Travilah Quarry Acquisition & Outfitting ($284M, cost sharing unknown)
  - Advanced Treatment Facilities ($540M, DC Water share = $405M
- Blue Plains Process Optimization & Revenue Opportunities
  - Full Plant Deammonification (>$60M)
  - Resource Recovery (Hot Water Heating Loop; Sludge Drying)
- Water and Sewer
  - Lead Service Replacement Program
  - Second Water Source
  - Pepco DC Power Line Undergrounding (DC PLUG) – ($57M, DC Water Share is 50% = $28M)
  - Condition assessment of large sewers could lead to additional CIP needs

CIP Risks/Sensitivities (Unfunded)

- Regulatory/Consent Decree/Permitting:
  - E. Coli Total Maximum Daily Load (TMDL) – lawsuit by environmental groups seeking more restrictive TMDL
  - MS4 permit - repair of Stormwater Outfalls, total scope and cost unknown (currently $5M approved)
  - National Parks Service permitting requirements for sewer projects
  - Anacostia River Sediment Clean-up
  - Chesapeake Bay TMDL – Phase 3 Watershed Implementation Plans being prepared, possible TMDL reassessment in the future
  - Green Infrastructure (GI) Practicability Assessment - Clean Rivers practicability assessment of GI to be performed in 2020. Currently, construction of GI in the District is more expensive than originally estimated
  - SSOs – risk of SSO Consent Decree
  - Blue Plains Odor Control