

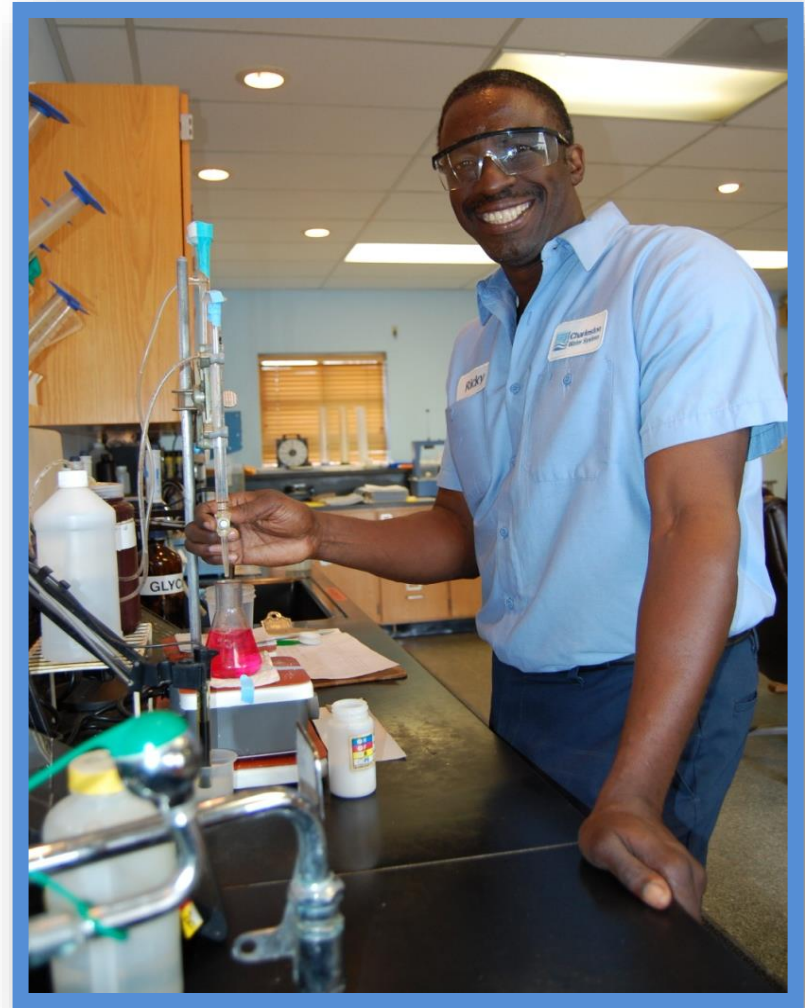
Charleston's Aging Infrastructure



Mark Cline, P.E.
Capital Projects Officer
www.charlestonwater.com

Our Mission

is to protect public health and enhance the environment of our service community by providing clean water services of exceptional quality and value.



Water Service



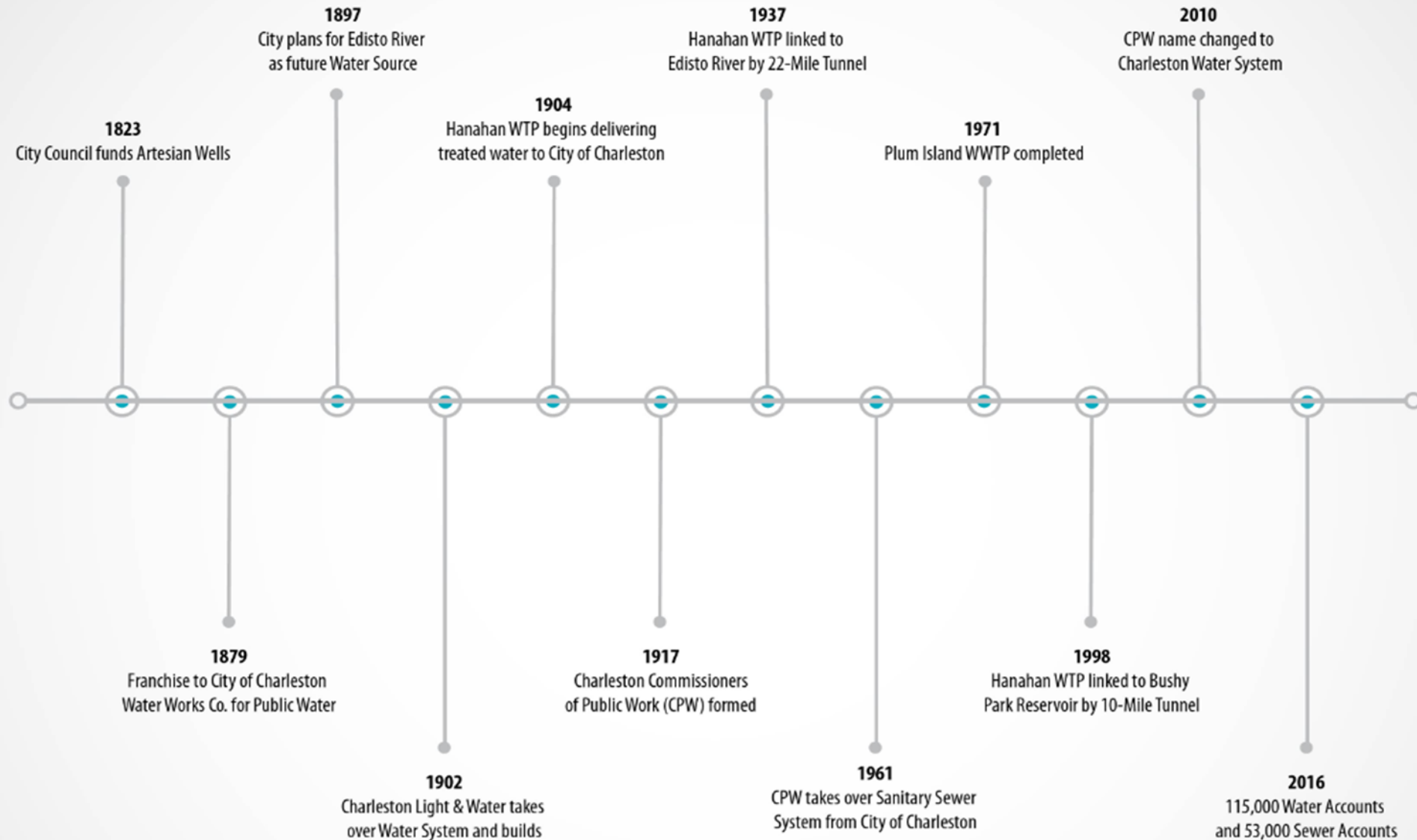
**Public health
Fire protection**

Sewer Service



**Public health
Environmental protection**

CWS History



Artesian well at Meeting and
Wentworth Streets.



Artesian well at Rutledge Ave. and
Calhoun St.



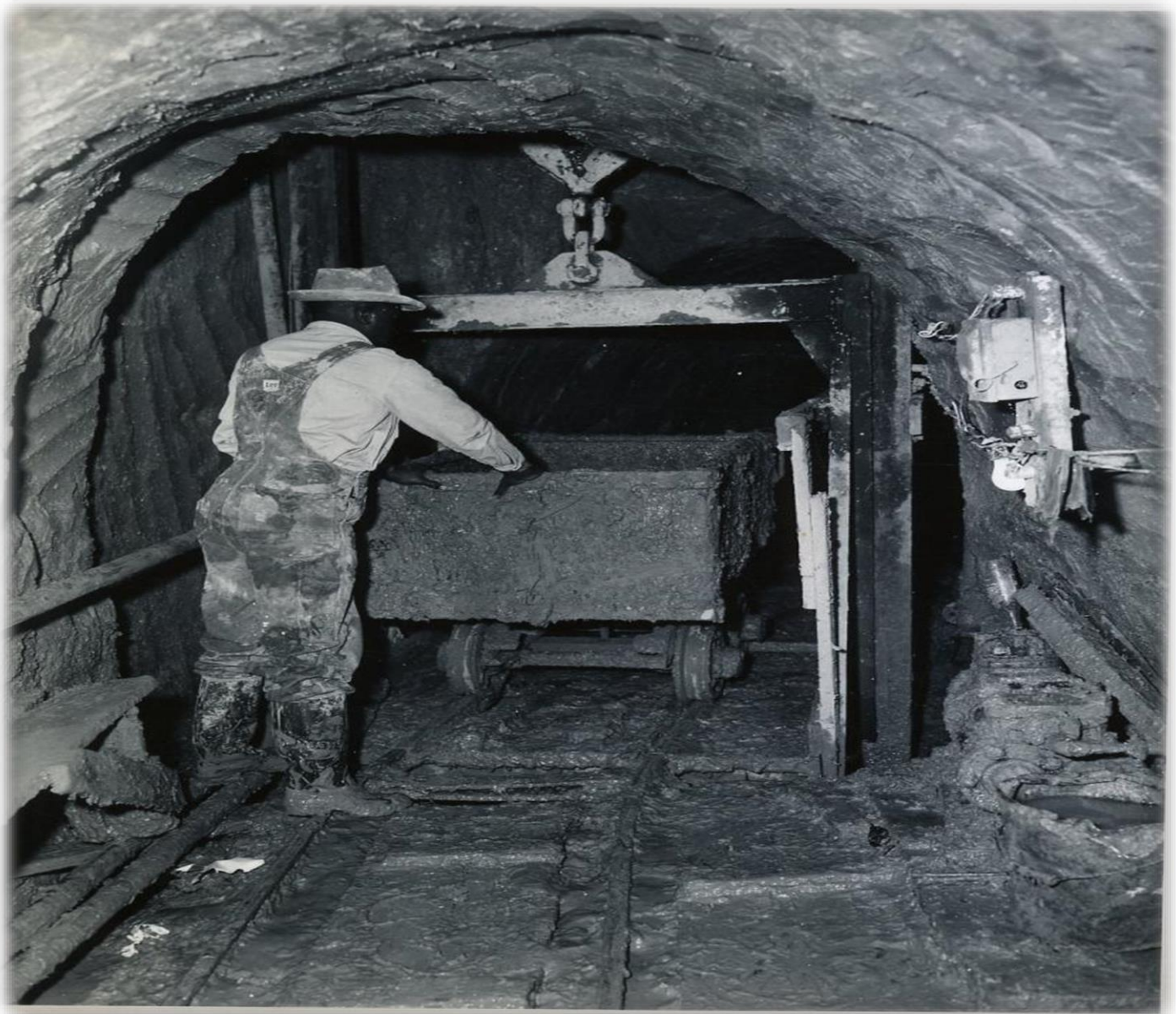
Goose Cr. Dam

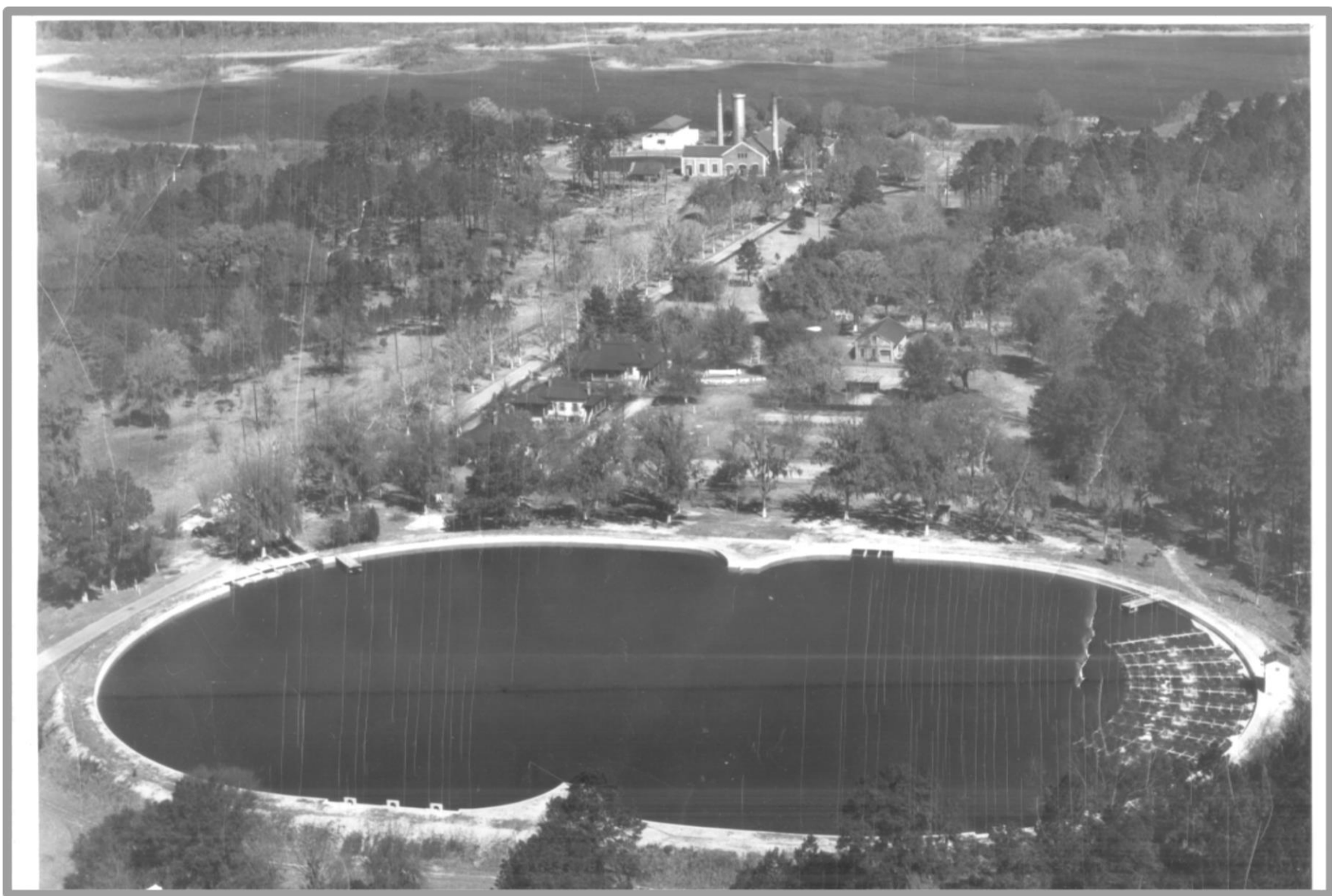
Charleston Light & Water Co.

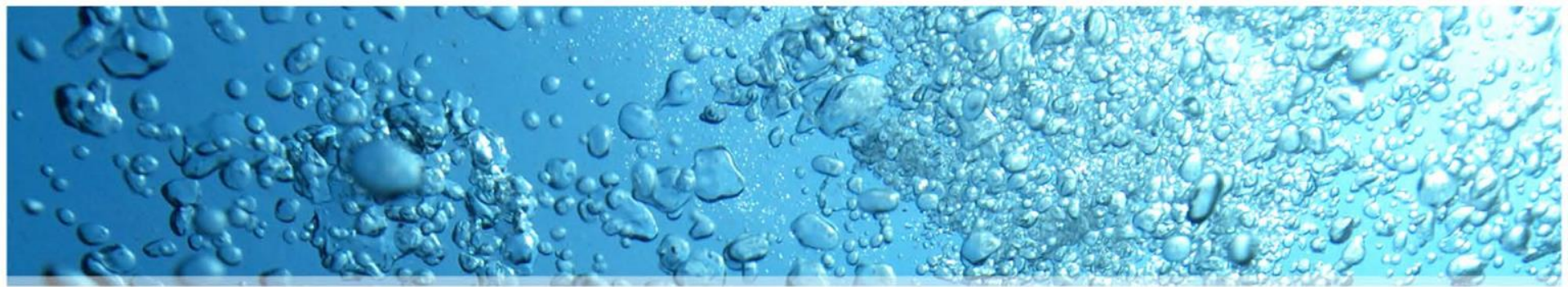




In 1937, a 23-mile tunnel connecting the Edisto River to the Hanahan Plant was completed. The hand-excavated tunnel took nine years to build and cost \$1.36 million.







System Statistics

Service Area Water



Covers nearly 500 square miles. Provide retail and wholesale water service for the greater Charleston area, which includes multiple municipalities as well as areas of unincorporated Charleston County, the DoD, and portions of lower Berkeley and Dorchester Counties.

Water System Stats

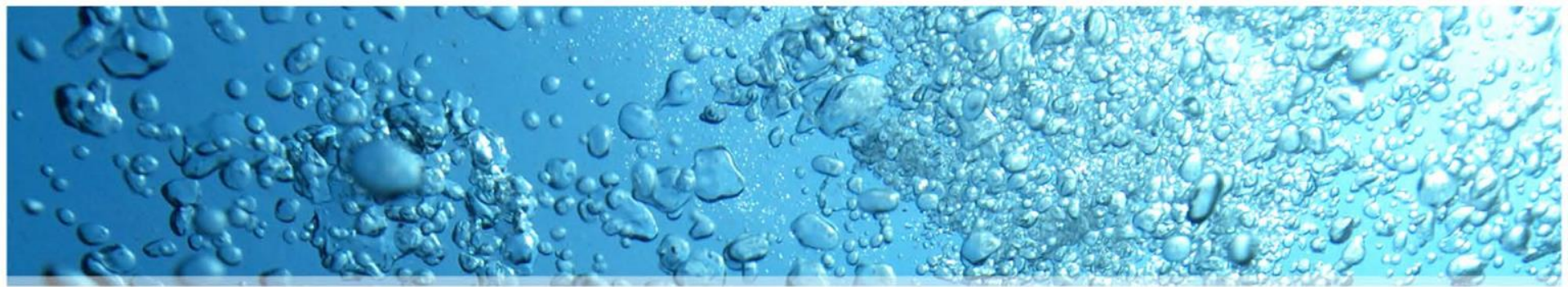
- **1800 miles of mains**
- **9,000 fire hydrants**
- **6 storage tanks**
- **8 booster pump stations**
- **30 miles of raw water tunnels**
- **2 raw water sources**
- **1 treatment plant**

Water System Stats

- **115,000 retail accounts**
- **7 wholesale accounts**
- **2015 treated water sales \$66.0 M**
- **2015 water impact fees \$4.6 M**
- **2015 avg. treated water pumpage 58.8 MGD**
- **2015 max. day treated water pumpage 79.9 MG**

1,800 miles of water pipe





Water System Master Planning and Capital Improvements Program

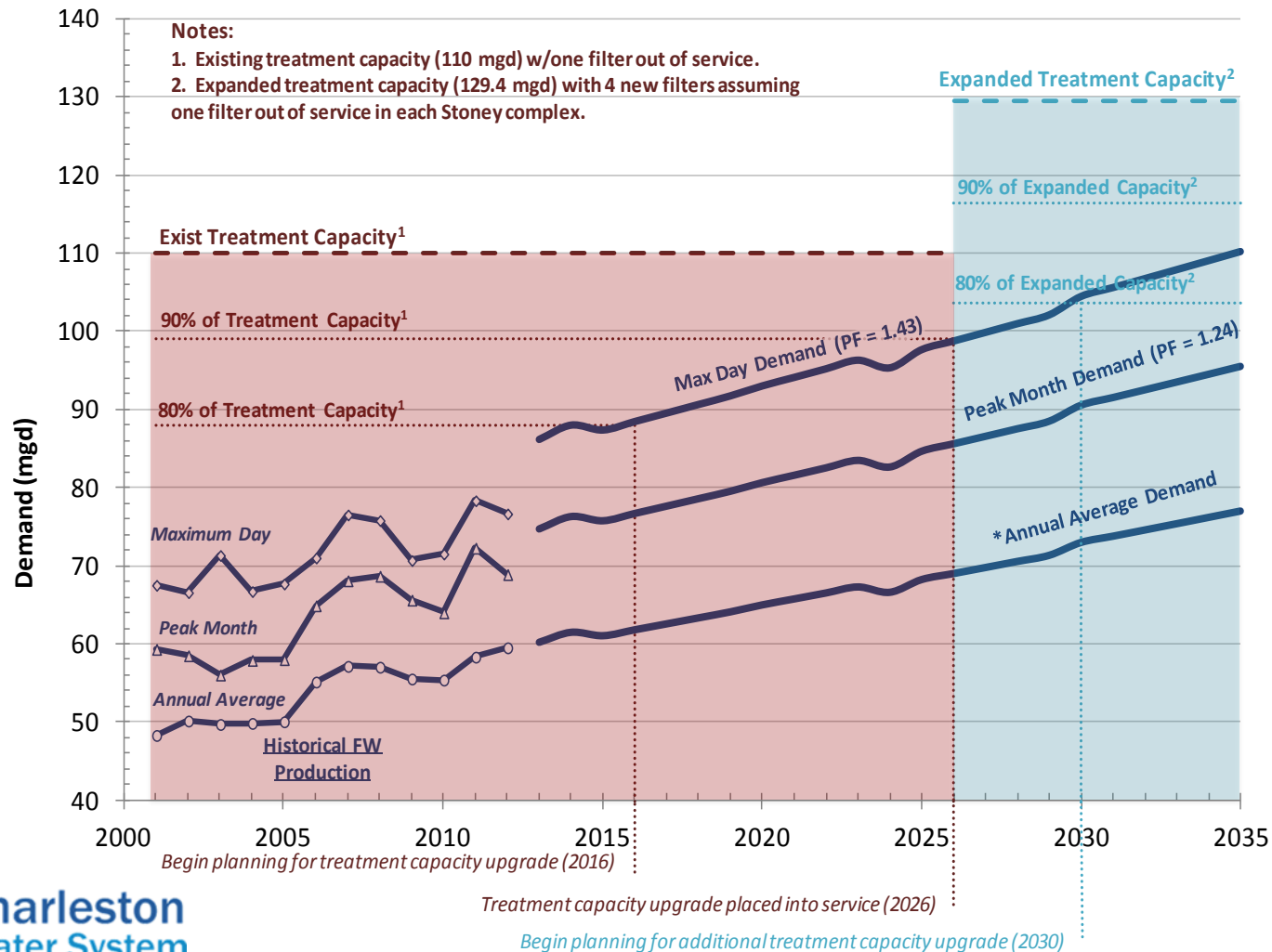
Water System Master Plans

- **Cover Treatment Plant and Distribution System**
- **Address infrastructure needs for growth, continued regulatory compliance, and rehabilitation**
- **25-year planning period**
- **Phased needs implementation using cycles of approximately 5 years each**
- **Needs prioritized by staff and consultants**

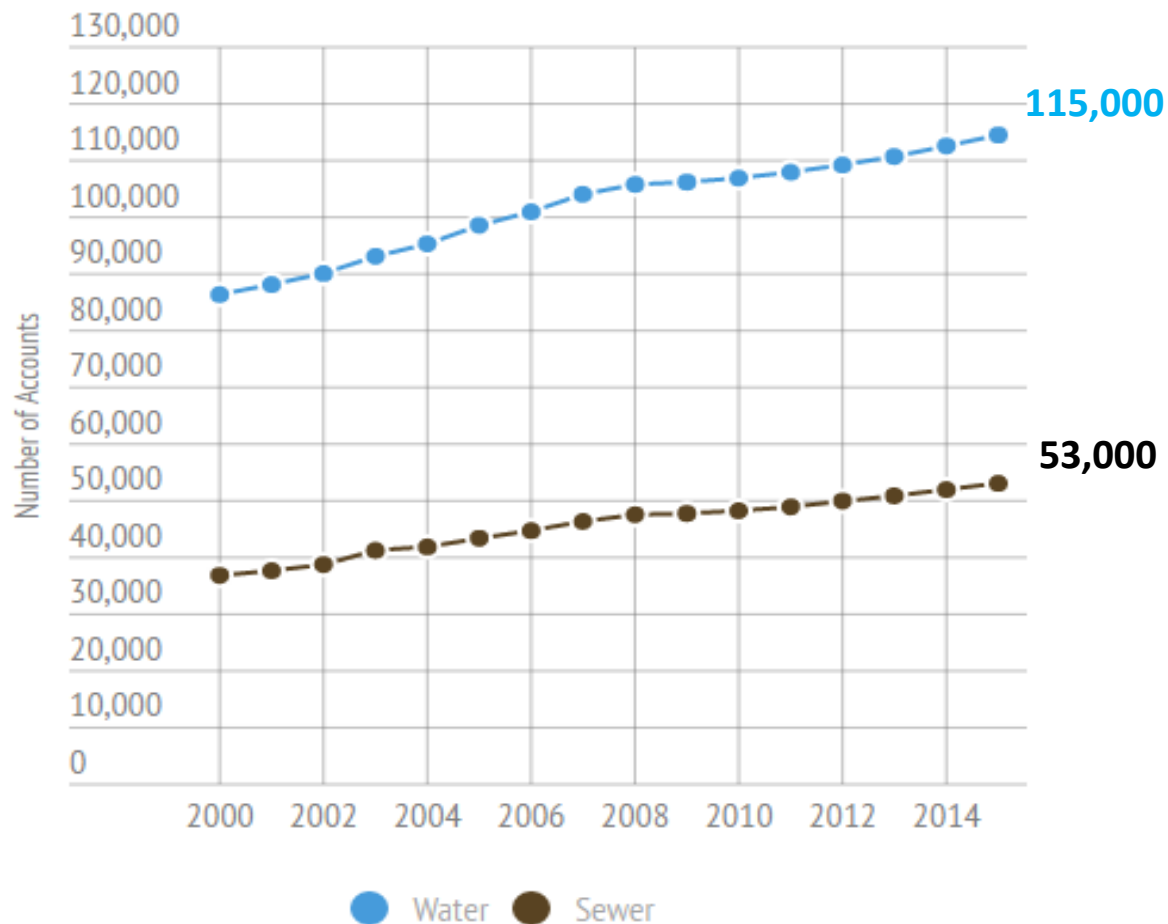
Water System Master Plans

- **Estimate of service area water demands based on historical data and area planning information (recently adjusted for recession period)**
- **Calibrated hydraulic model simulates system pressures at current and projected demands**
- **Master Plans updated periodically**

Water Demand Projections



Number of Water and Sewer Accounts, 2000 - 2015



Capital Improvements Program

Support of Elected Officials —————> CIP and Water Rates
Financing —————> Muni Bonds, Cash Reserves
GO Bonds, SRF, WIFIA, etc.
Bond Ratings —————> S&P, Moodys, Fitch, others
CWS ratings AAA, AA+
Public —————> Inform and Educate



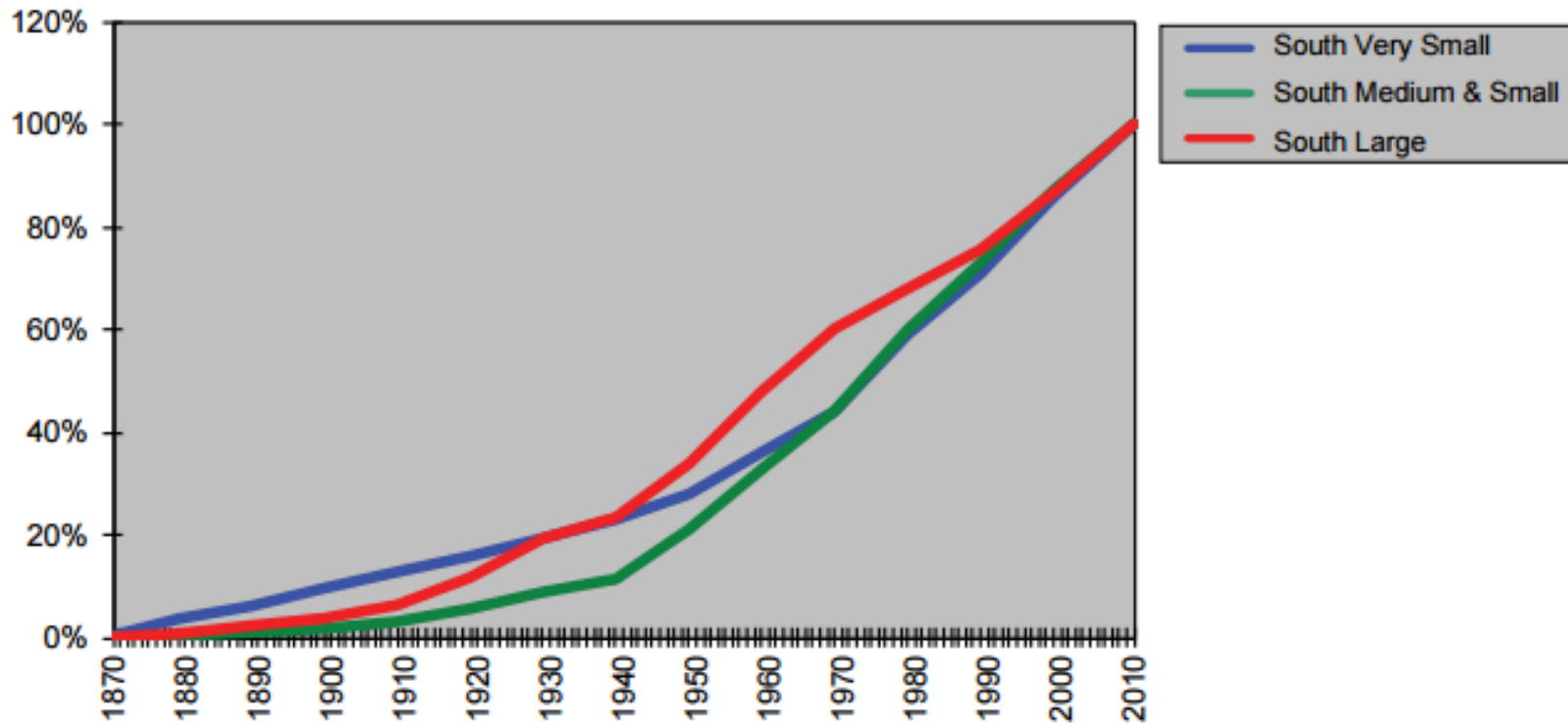
Capital Improvements Program

“...Restoring existing water systems as they reach the end of their useful lives and expanding them to serve a growing population will cost at least **\$1 trillion** over the next 25 years, if we are to maintain current levels of water service.”

— American Water Works Association, *Buried No Longer: Confronting America's Water Infrastructure Challenge* (2011), p. 3.

Capital Improvements Program

Proportion of Water Systems Built by Decade: South



Buried No Longer: Confronting America's Water Infrastructure Challenge

Capital Improvements Program

2006-2015 Water Utility CIP

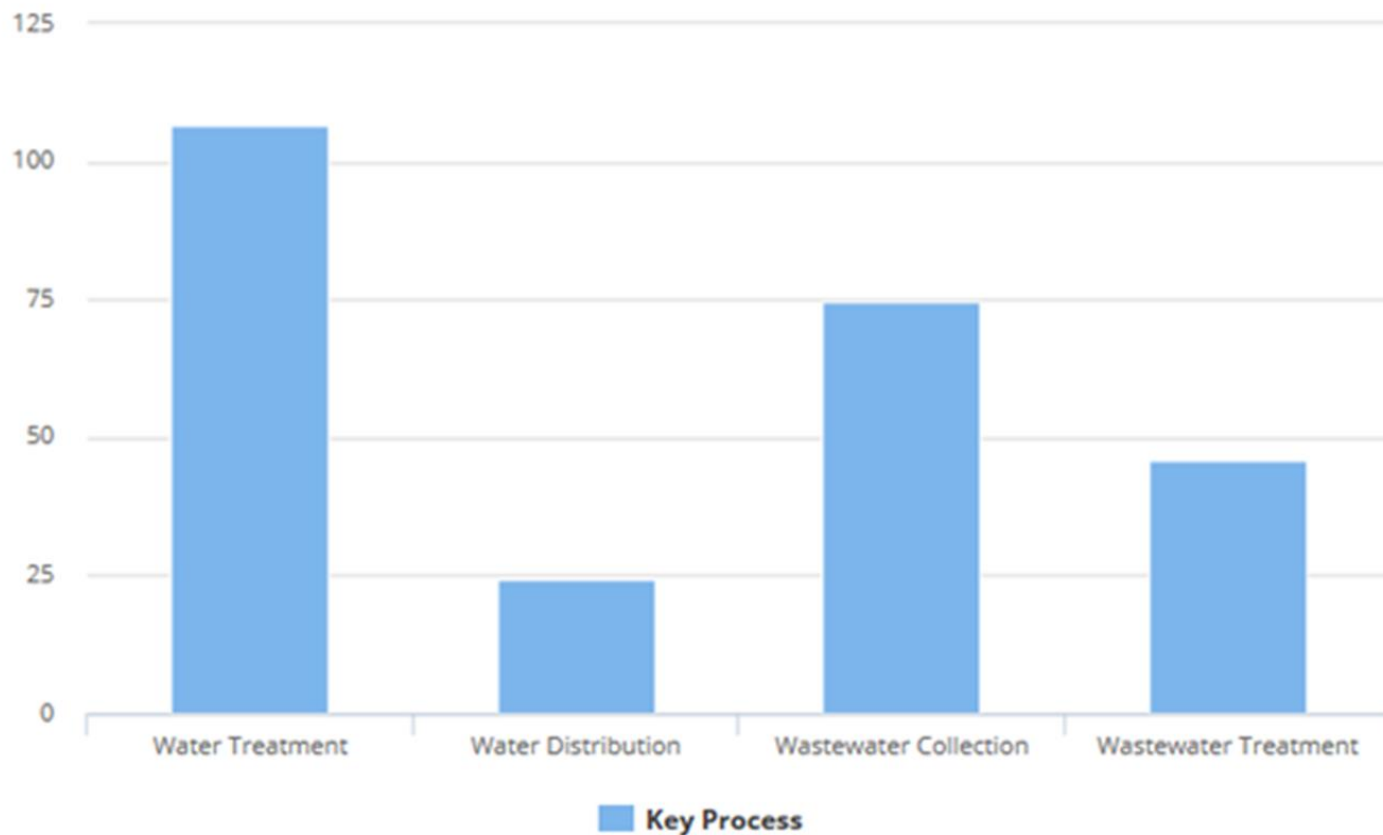
Total Amount:	\$246,145,800	
Infrastructure R&R Allocation:	\$145,494,800	(59%)
Distribution System R&R Allocation:	\$49,145,800	(20%)
Plant R&R Allocation:	\$96,349,000	(39%)

Capital Improvements Program

2015 System Renewal Worksheet								
	System Information ¹			Target Needs		Actual (Current Year)		
	Assets	Total System Replacement Cost	Lifecycle (yrs.)	Annual Renewal Target Rate ² (%)	Annual Budget \$ Needed/Yr. Based on Renewal Target Rate	Department	Budget \$ Expenditures	Renewal Rate ³ (%)
Water System	Mains	\$830,379,000	100	1.00%	\$8,303,790	E&C Budget	\$1,548,142	24.48%
	Valves					WDD Budget	\$484,775	
	Hydrants					Grand Total	\$2,032,917	
	Services							
	System Information ¹			Target Needs		Actual (Current Year)		
	Assets	Total System Replacement Cost	Lifecycle (yrs.)	Renewal Target Rate ² (%)	Annual Budget \$ Needed/Yr. Based on Renewal Target Rate	Department	Budget \$ Expenditures	Renewal Rate ³ (%)
Water Plant	Plant	\$307,119,084	33	3.00%	\$9,213,573	E&C	\$9,420,813	106.46%
	Tunnels					HWTP Budget	\$388,130	
	Storage Tanks					Grand Total	\$9,808,943	
	Reservoirs							

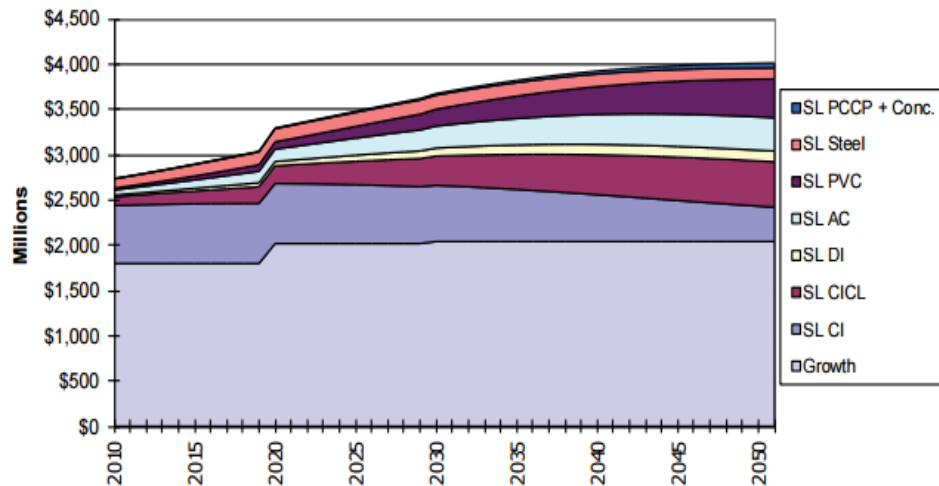
Capital Improvements Program

2015 Rehab and Renewal Rate



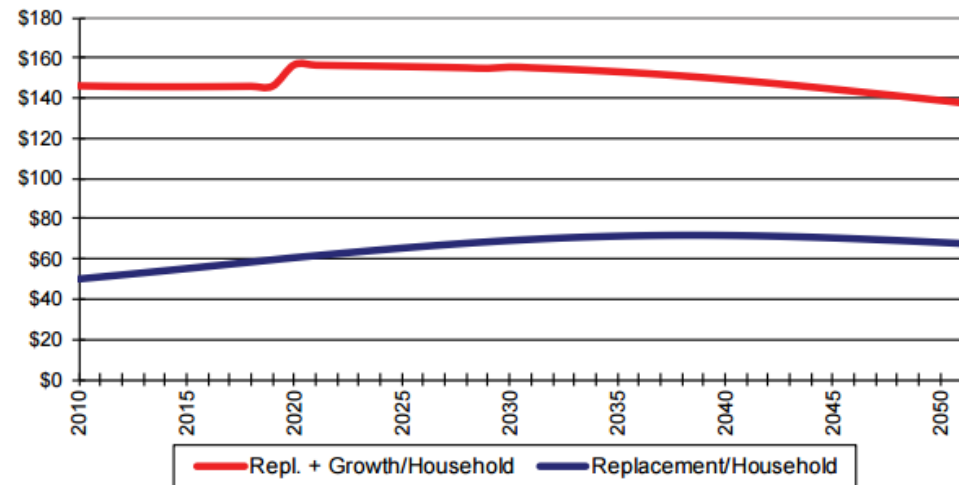
Capital Improvements Program

**Investment for Replacement & Growth
South Large**



CI: cast iron; CICL: cast iron cement lined; DI: ductile iron; AC: asbestos cement; PV: polyvinyl chloride;
PCCP: prestressed concrete cylinder pipe

**Household Cost of Needed Investment
for Replacement Plus Growth*
South Large**

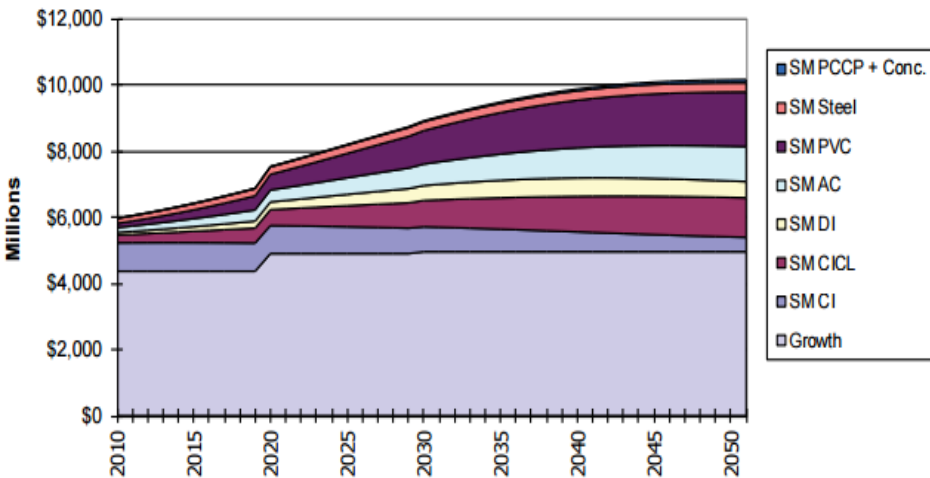


*This assumes costs are spread evenly across households of 2.6 persons each, based on data from the US Census.

Buried No Longer: Confronting America's Water Infrastructure Challenge

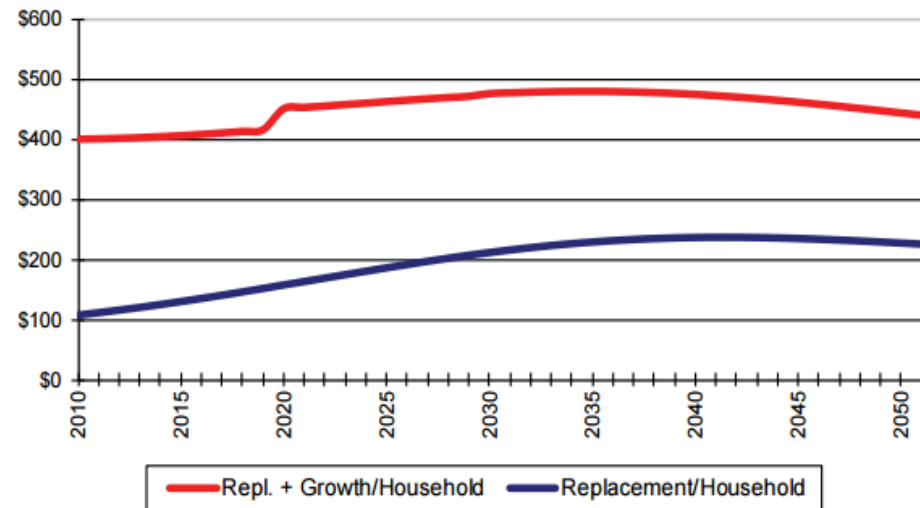
Capital Improvements Program

**Investment for Replacement & Growth
South Medium**



CI: cast iron; CICL: cast iron cement lined; DI: ductile iron; AC: asbestos cement; PV: polyvinyl chloride;
PCCP: prestressed concrete cylinder pipe

**Household Cost of Needed Investment
for Replacement Plus Growth*
South Medium**

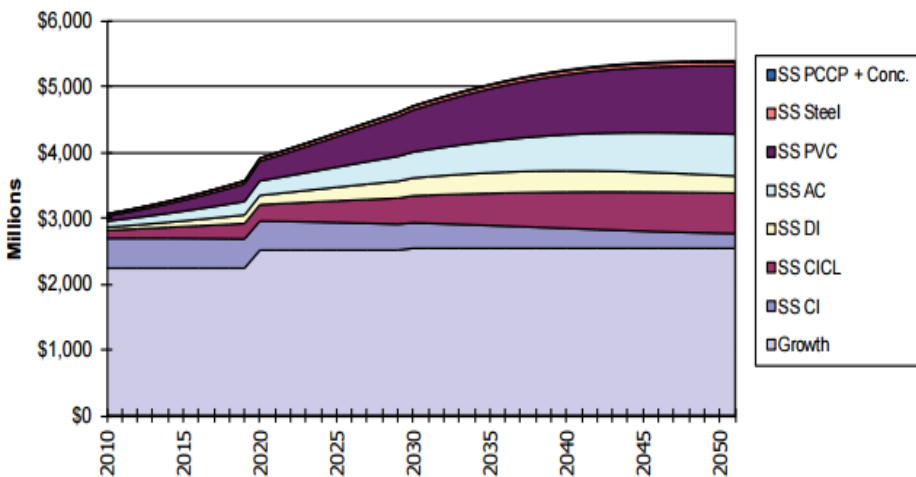


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Buried No Longer: Confronting America's Water Infrastructure Challenge

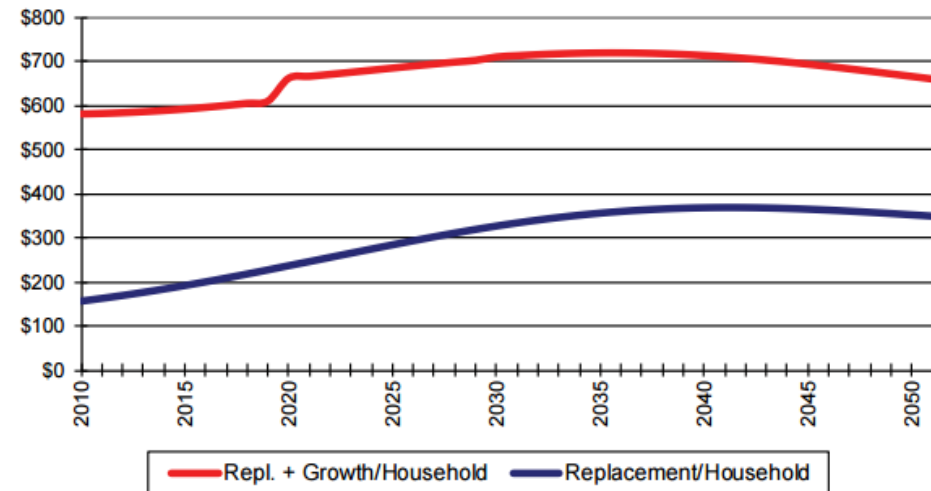
Capital Improvements Program

**Investment for Replacement & Growth
South Small**



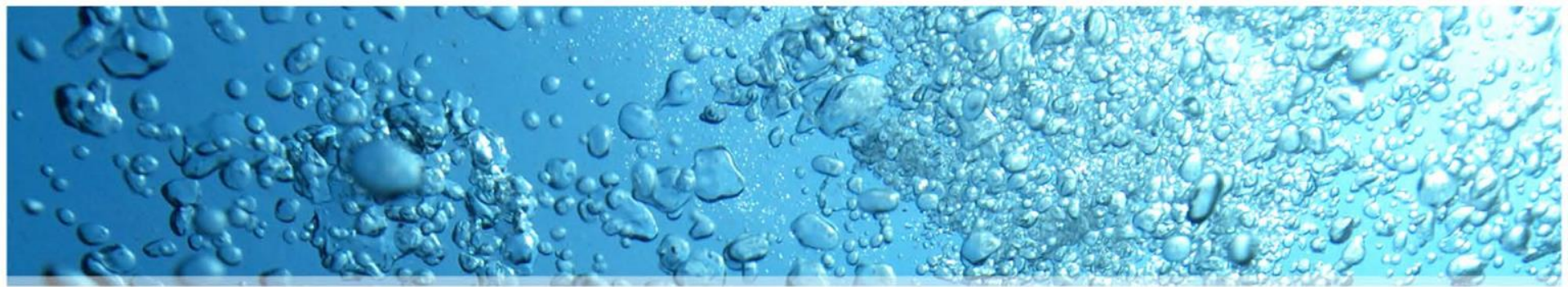
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**Household Cost of Needed Investment
for Replacement Plus Growth*
South Small**



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Buried No Longer: Confronting America's Water Infrastructure Challenge



Water System Rehabilitation/Renewal











1.5 MG Elevated Storage Tank Pressure Equalization and Filter Wash Water

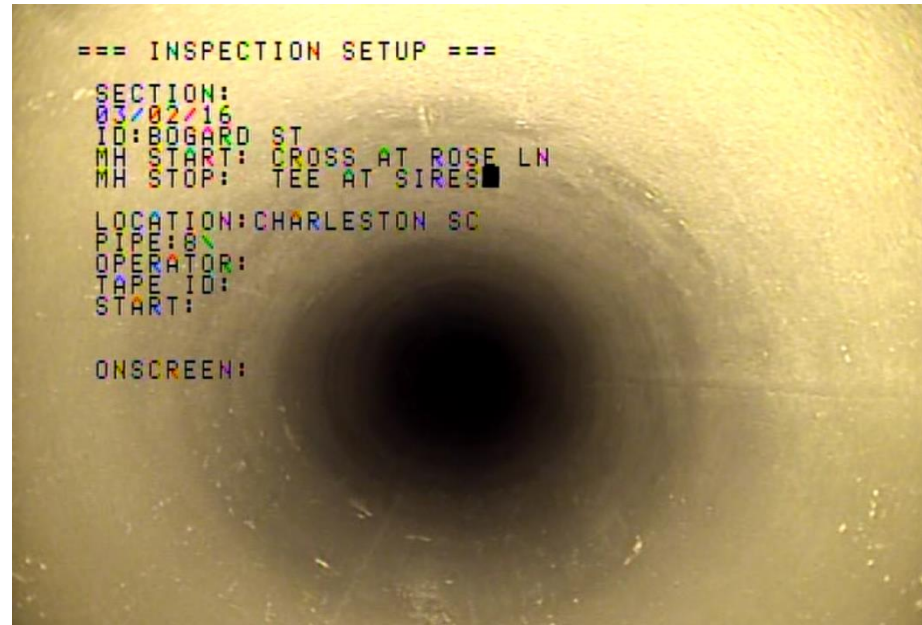












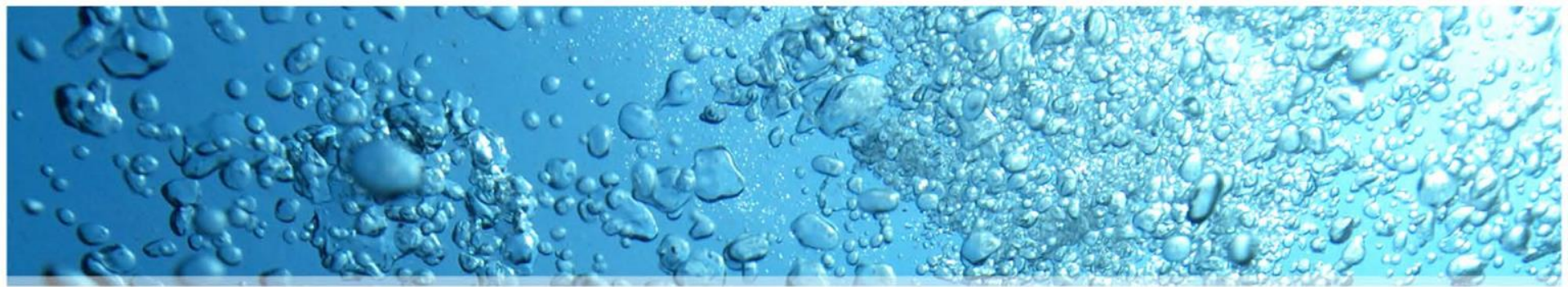
Lead Service Line Replacement



Water System Rehab & Renewal

Numerous Competing Issues / Challenges:

- **Growth**
- **New Water Regulations**
- **DOT / County / City Road Improvements**



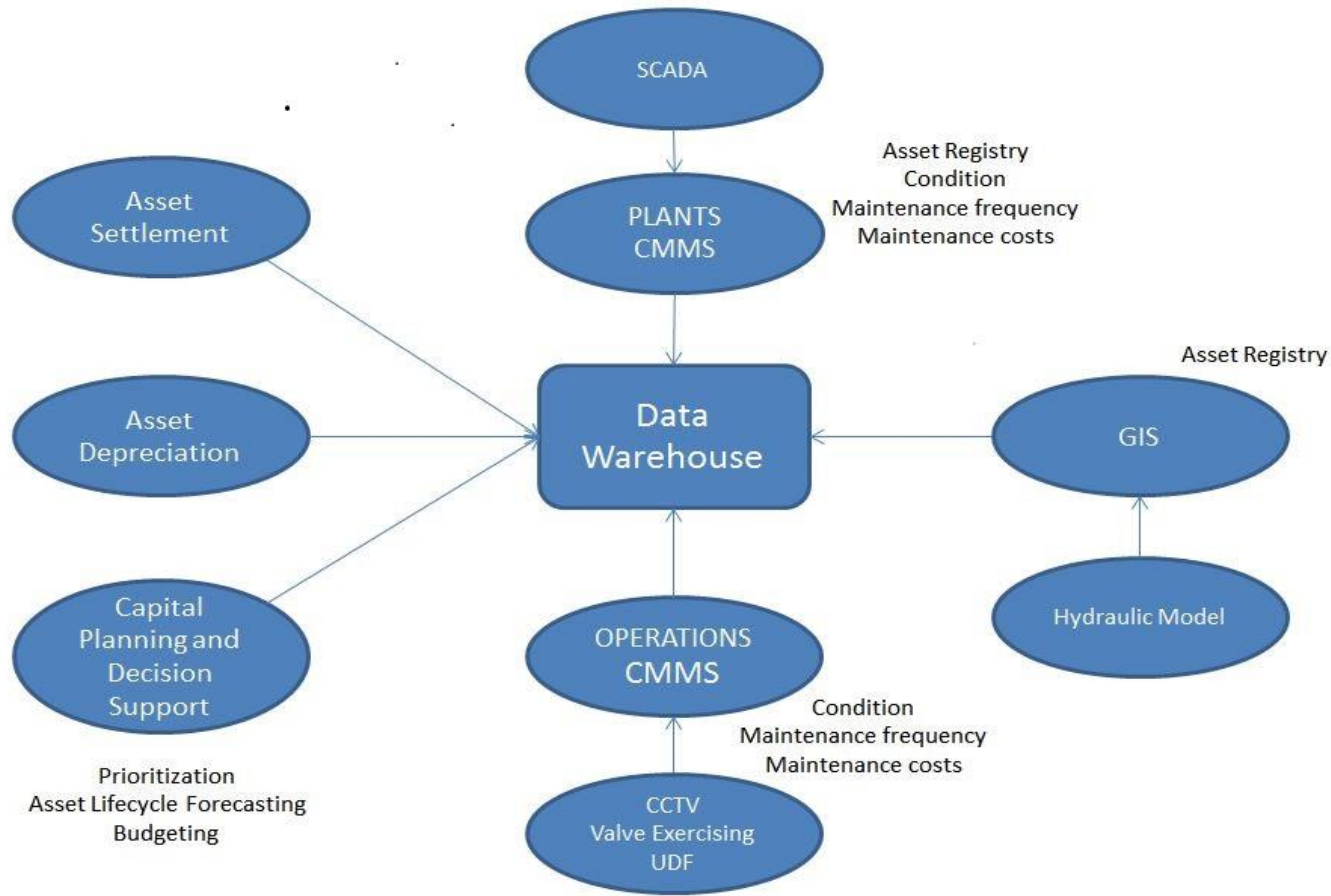
Future Planning

Asset Management Program



- Comprehensive (Operations, IT, Accounting, Finance, Engineering)
- Enterprise asset inventory registry (EI) connects financial and various operational databases
- Asset accounting and depreciation (AD)
- Asset settlement (AS) bridges EI and AD
- Decision support (DS) incorporates tools for long-range planning for risk management and budget forecasting
- Capital planning (CP) incorporates tools for CIP development

Asset Management Program



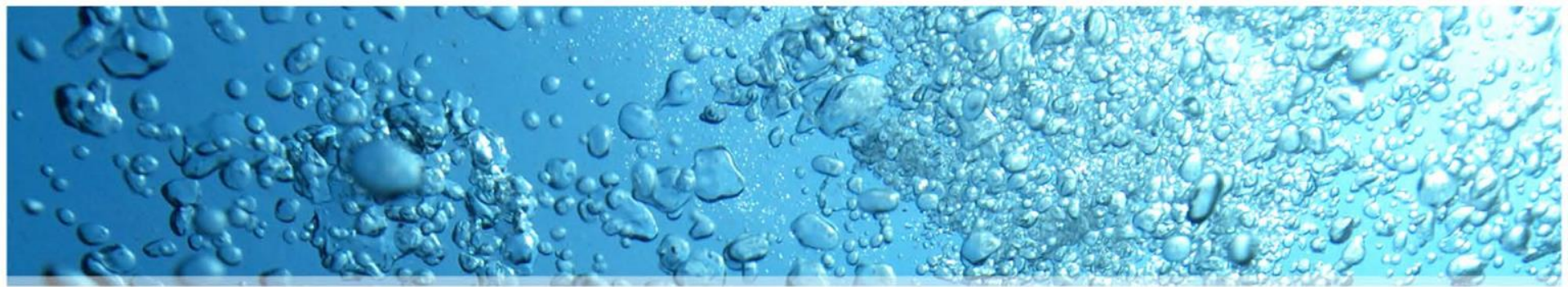


Asset Management Program

Integration of data sources enables data-driven decisions

- Installation of Assets (new and rehabilitation)
- Operations – O&M Costs, Optimization
- Rehabilitation and Replacement Strategy
- Capacity Management
- Resource Management
- Risk Management - Criticality
- Capital Planning
- Rate Planning
- Financial Forecasting – Management
- Analysis and Decision Making





“When the well is dry, we
learn the worth of water.”

-Benjamin Franklin