

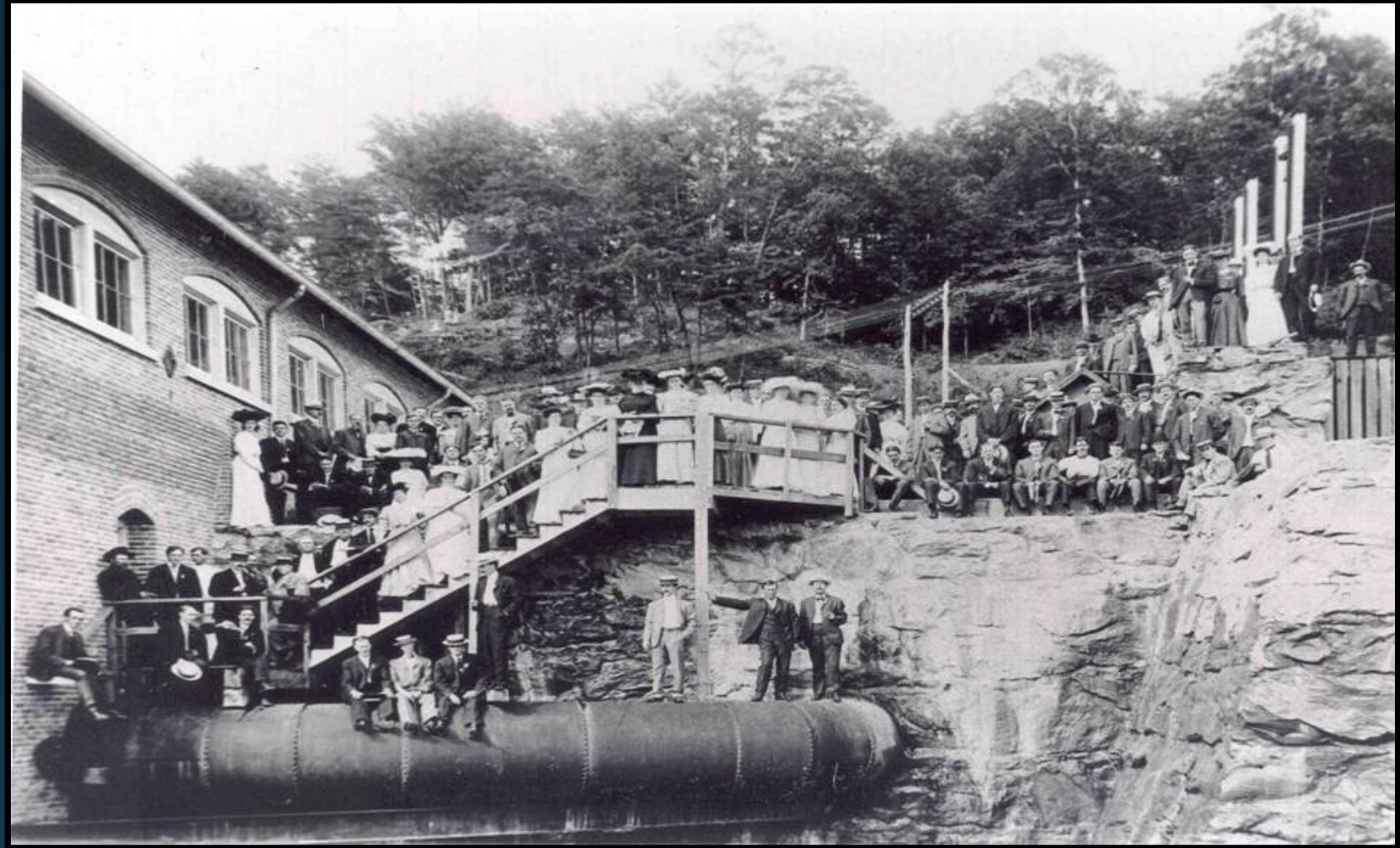
Public Information  
Presentation  
December, 2022

# MSD History, Operation, & Capital Reinvestment



# MSD History

- **1962** –MSD created by State Statute as a Special District to eliminate direct discharges and to replace ailing sewer infrastructure.
- **1967** – *New Regional Treatment Plant*
- **1984** – New Hydroelectric Facility 2880 KW.
- **1991** – Consolidation of collection system lines from Cities, Towns and Sanitary Districts.



*Above: Hydro Dedication ceremony, 1904*



# Consolidation of Fifteen Separate Sewer Systems in 1991

## Five Municipalities

- City of Asheville
- Town of Biltmore Forest
- Town of Black Mountain
- Town of Montreat
- Town Of Weaverville



Over 170,000 people

## Ten Special Districts

- Beaverdam Water and Sewer District
- Busbee Sanitary Sewer District
- Caney Valley Sanitary Sewer District
- Crescent Hill Sanitary Sewer District
- Enka-Candler Water and Sewer District
- Fairview Sanitary Sewer District
- Venable Sanitary District
- Skyland Sanitary Sewer District
- Swannanoa Water and Sewer District
- Woodfin Sanitary Water and Sewer District



# MSD Board of Directors

- Governed by a fourteen-member Board appointed by the following entities:

City of Asheville (3)

Buncombe County(3)

Henderson County (2)

Biltmore Forest

Black Mountain

Montreat

Weaverville

Woodfin Sanitary Water and Sewer District

Town of Woodfin

- Board solely responsible for setting rates and fees for service.
- Chairman, Vice-chairman and Secretary-Treasurer are elected annually by the Board.
- Members serve staggered three-year terms and may be re-appointed.

- Active subcommittees:

Capital Improvement Program

Planning

Right of Way

Personnel

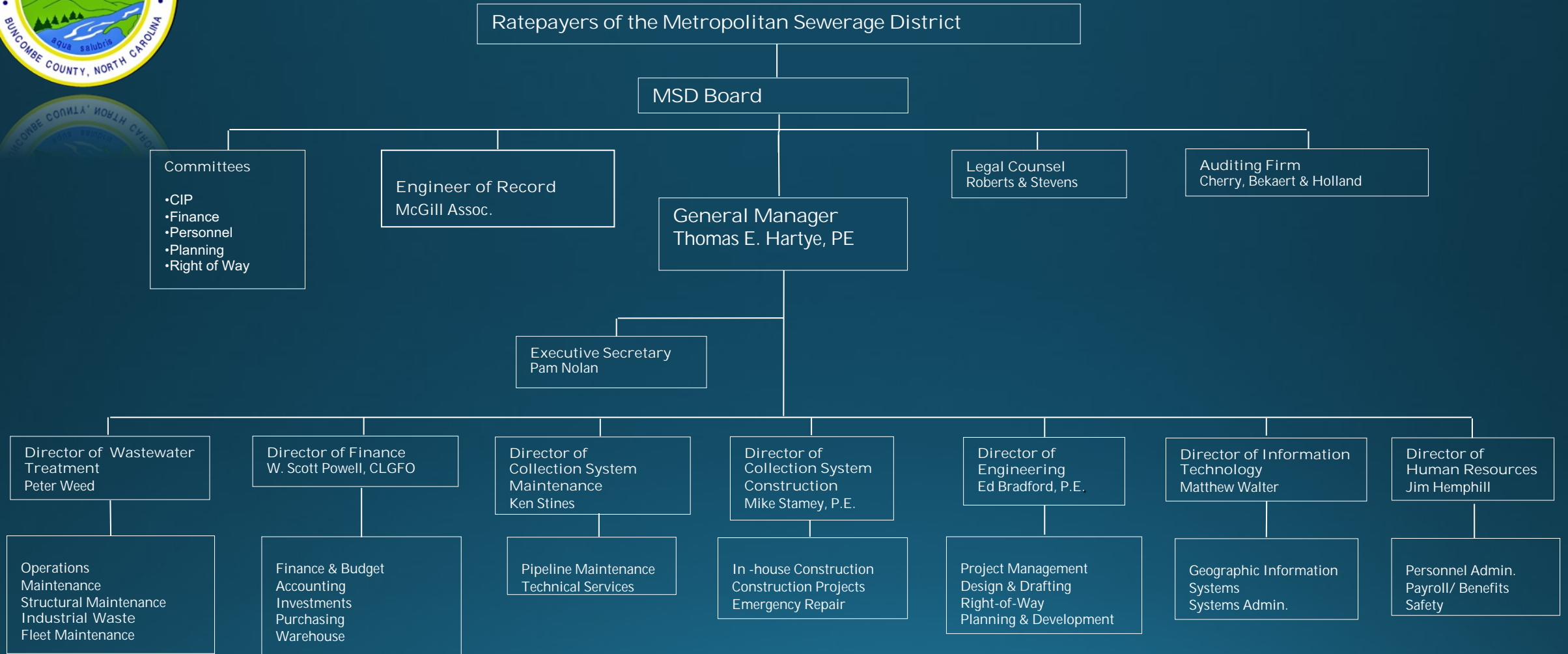
Finance

- The Board employs a General Manager, P.E., who is responsible for managing all District operations.

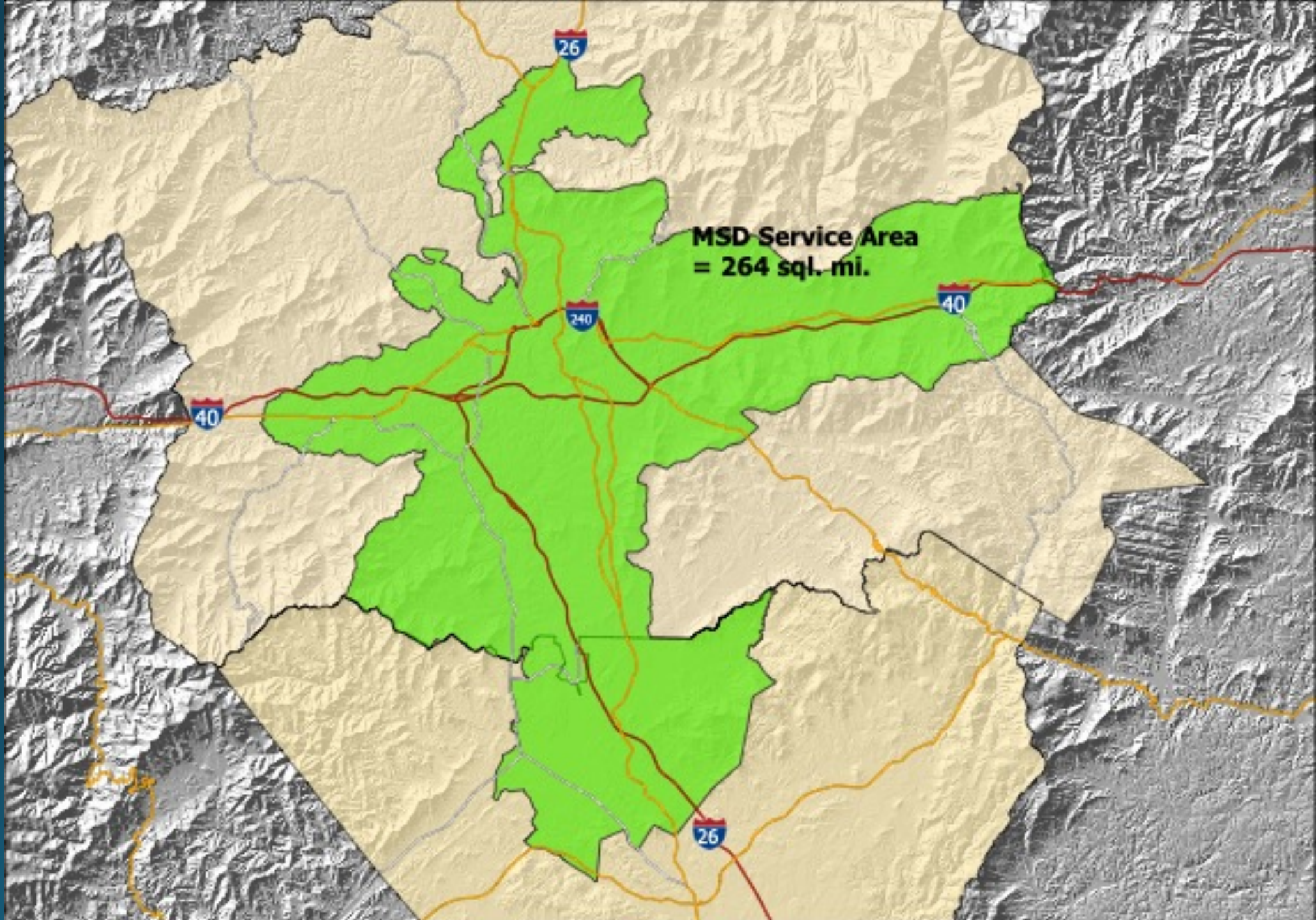
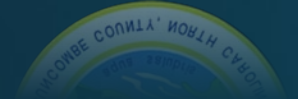




# Management Structure



Employees FY 2001 -- 167  
Employees FY 2022 -- 150







# MSD System

- MSD serves ~201,000 people via 57,000 customer accounts
- 40 MGD Treatment Plant (currently at 20 MGD)
- Hydroelectric Facility (2880 KW)
- 1,133 miles of sewer lines
- 33,581 manholes
- 40 pump stations





# MSD Mission

- MSD is publicly owned regional utility with a mission to eliminate direct discharges and to replace ailing sewer infrastructure.
- MSD uses equal shares of revenue and Bond funds to fund an aggressive Construction Program to replace and upgrade the Treatment Plant and sewer system.
- MSD has spent \$ 405 Million since Consolidation in 1991 – replacing 28% of the original system.



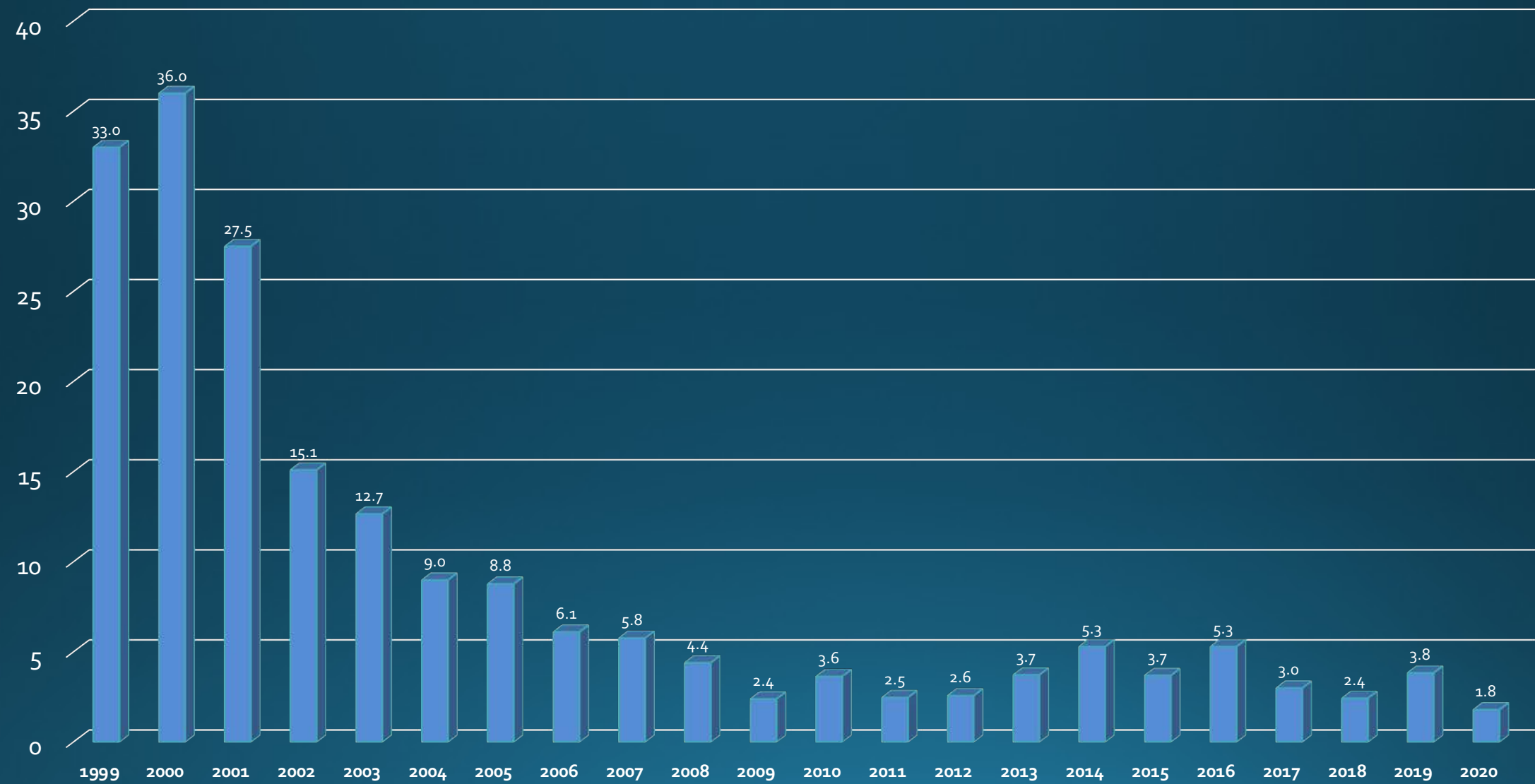


# Customer Service Response

The MSD service area is over 264 square miles.

- MSD created a First Response Team to cut down in response time to customer calls and system emergencies.
- MSD tracks both response times and the time spent on each job.
- In FY 2022 the average response time of 31 minutes to customer service requests during regular working hours.
- During this same time period the average response time was 51 minutes to service after hours with for the On-Call Night Crew.

# SSO's/100 Miles of Sewer per year







# MSD Treatment Plant







# Treatment Plant

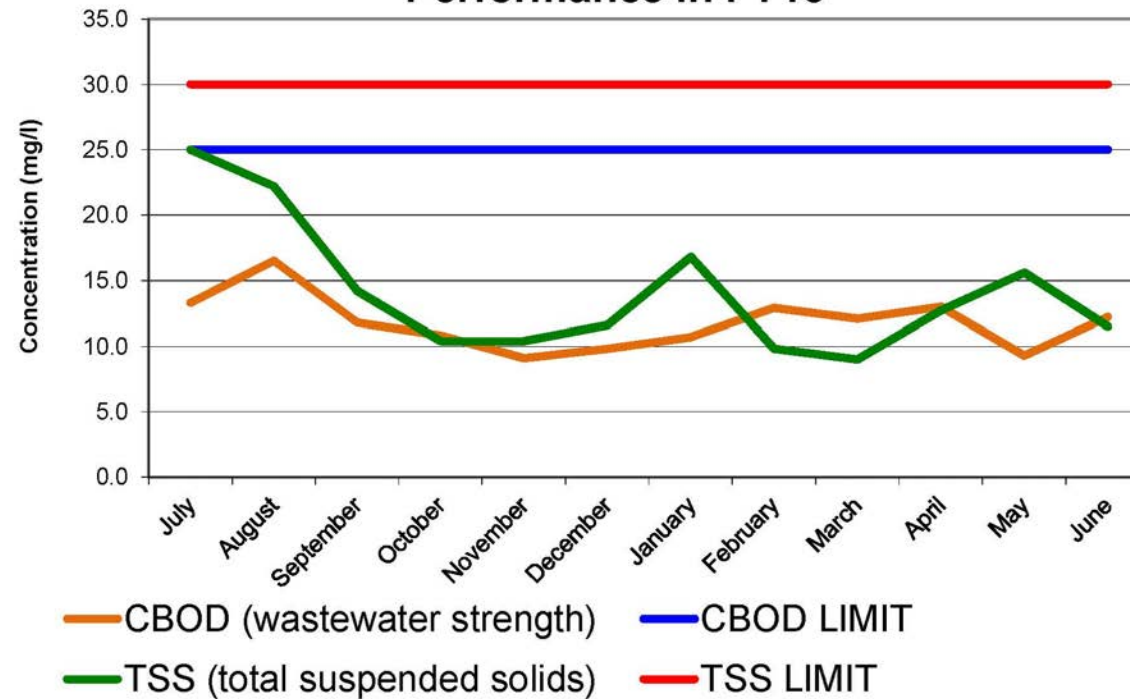
- 1987 Plant expansion to 40 MGD completed (65 MGD Peak)
- Current Average Daily Flow 21.7 MGD
- 152 Rotating Biological Contactors (RBC)—largest in world
- 2880 KW Hydroelectric Generation Facility
- 4 MW Diesel Generator Back-up
- New \$10 million Aqua Disk Polishing Filters
- \$ 7.4 Million Upgrade to incinerator and air emissions system
- \$17 Million High-Rate Primary Treatment Facility





# Regulatory Compliance at the Treatment Plant

**Wastewater Reclamation Facility  
Performance in FY13**





# Current Hydroelectric Production



- Can Generate 2880 KW
- FY 2015 Avoided Power Cost \$435,000





# Existing Powerhouse and Flume





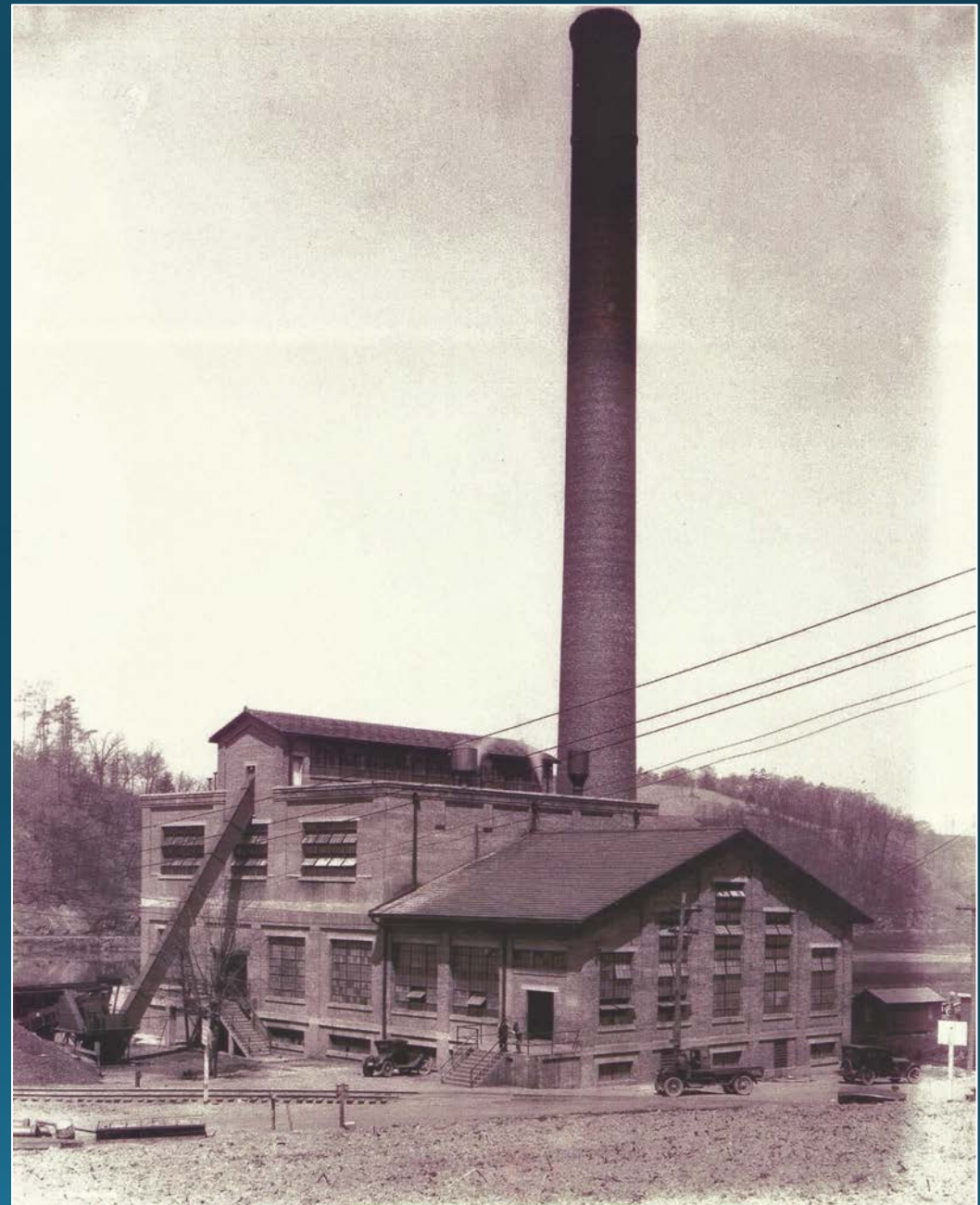


One of three turbine blades - variable pitch.





MSD Administration Bldg. *ca 1923*  
*Power Generation Facility*

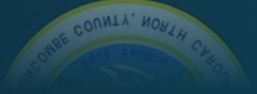




## Interior of Facility – Showing Coal-fired Steam Generators

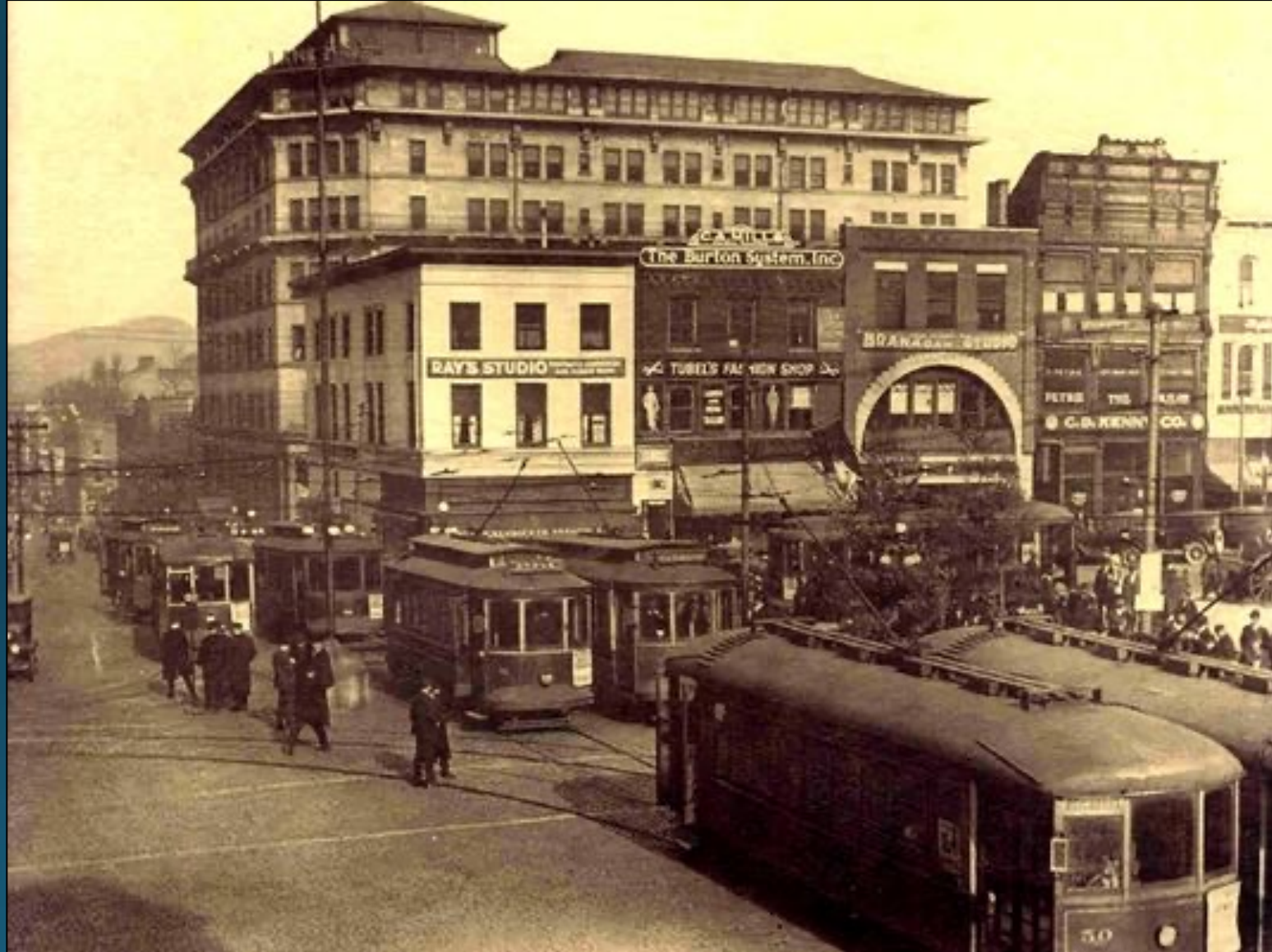






## Downtown Asheville *ca* 1923

*The current  
MSD Admin  
Building once  
housed the  
power  
generation  
facility for the  
trolley system  
in Asheville.*





# Capital Improvement Program

## Background

- A Capital Improvement Program Committee comprised of representatives of all of our member agencies makes annual recommendations to the Board regarding program priorities.
- The District has replaced or rehabbed nearly 25% of the entire system and has implemented a long-term asset management plan to rehab or replace a little over 1% of the system per year which translates to a little over 50,000 feet each year.
- Since Consolidation in 1990 the District has reinvested over \$400 Million on Capital Improvements for the system. This includes \$350 million for replacing and rehabbing sewer lines and \$50 million on rehabilitation of the Treatment Plant and general infrastructure.



# Ten Year Capital Improvement Program

FY23 - FY32

- Total Estimated Expenditures over 10-yr CIP

**\$389.3M**

- Consolidation thru end of FY21 Capital Expenditures total **\$461.1 million.**

Description	Proposed Expenditures
Interceptors/Wet Weather Rehab	\$86.8M
Collection System Rehabilitation	\$110.9M
Treatment Plant & PS	\$153.7M
Reimbursement Projects	\$1.5M
Design/ROW/Const. Mgmt. Expenses	\$35.4M



# Future Growth Potential System Capacity

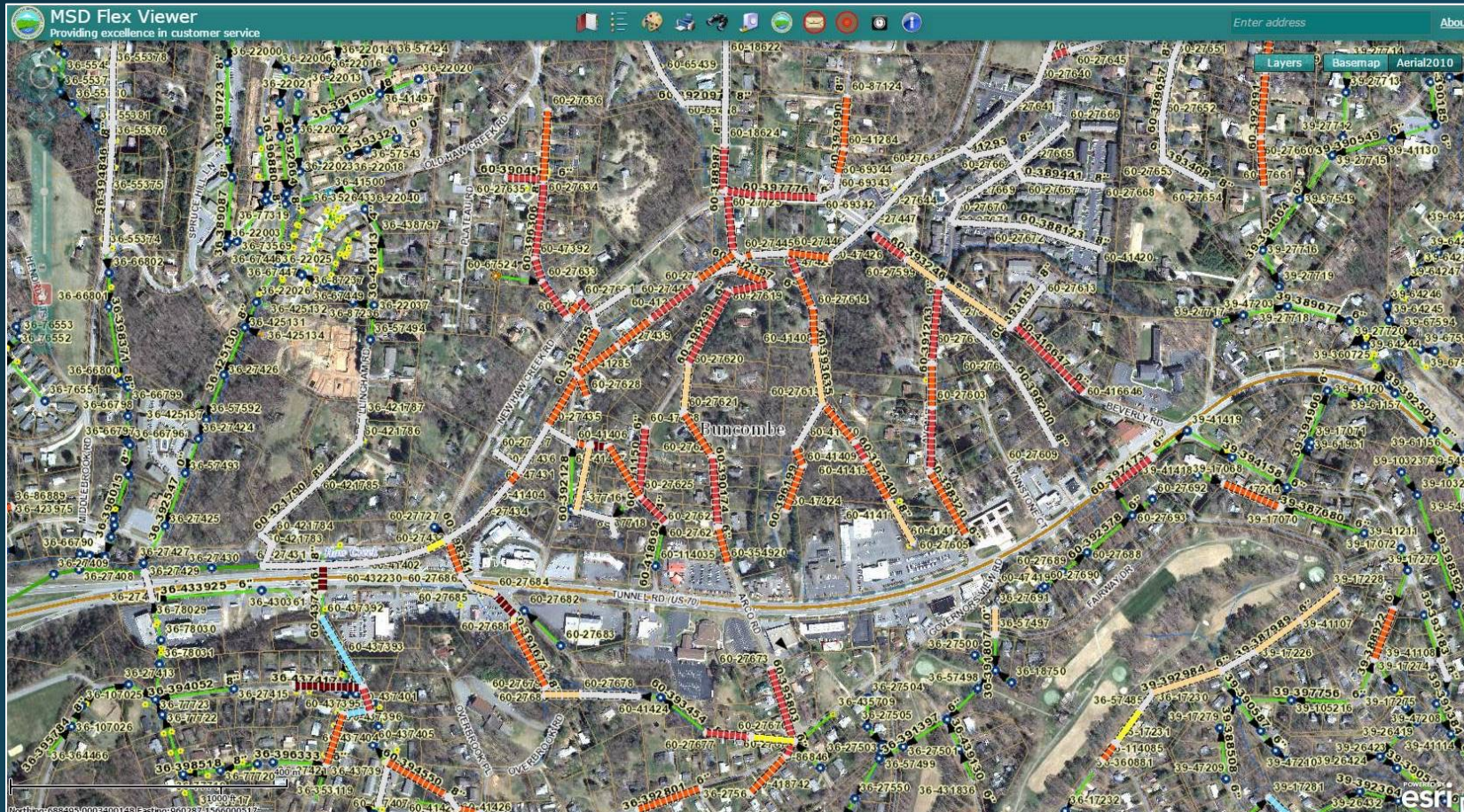
- Currently using about 22 MGD of 40 MGD capacity at the Treatment Plant.
- MSD's aggressive program of rehabilitation and replacement of existing lines include upgrades of lines sizes to provide for future growth.
- The MSD Collection System Master Plan has mapped out all the lines necessary to serve areas that are identified by our Member Agencies for future growth.







# Pipe Rating Program



- Proactive program to focus rehabilitation dollars where most needed
- Featured in February 2004 issue of “Water Environment & Technology” magazine
- Developed by interdepartmental team using off-the-shelf software





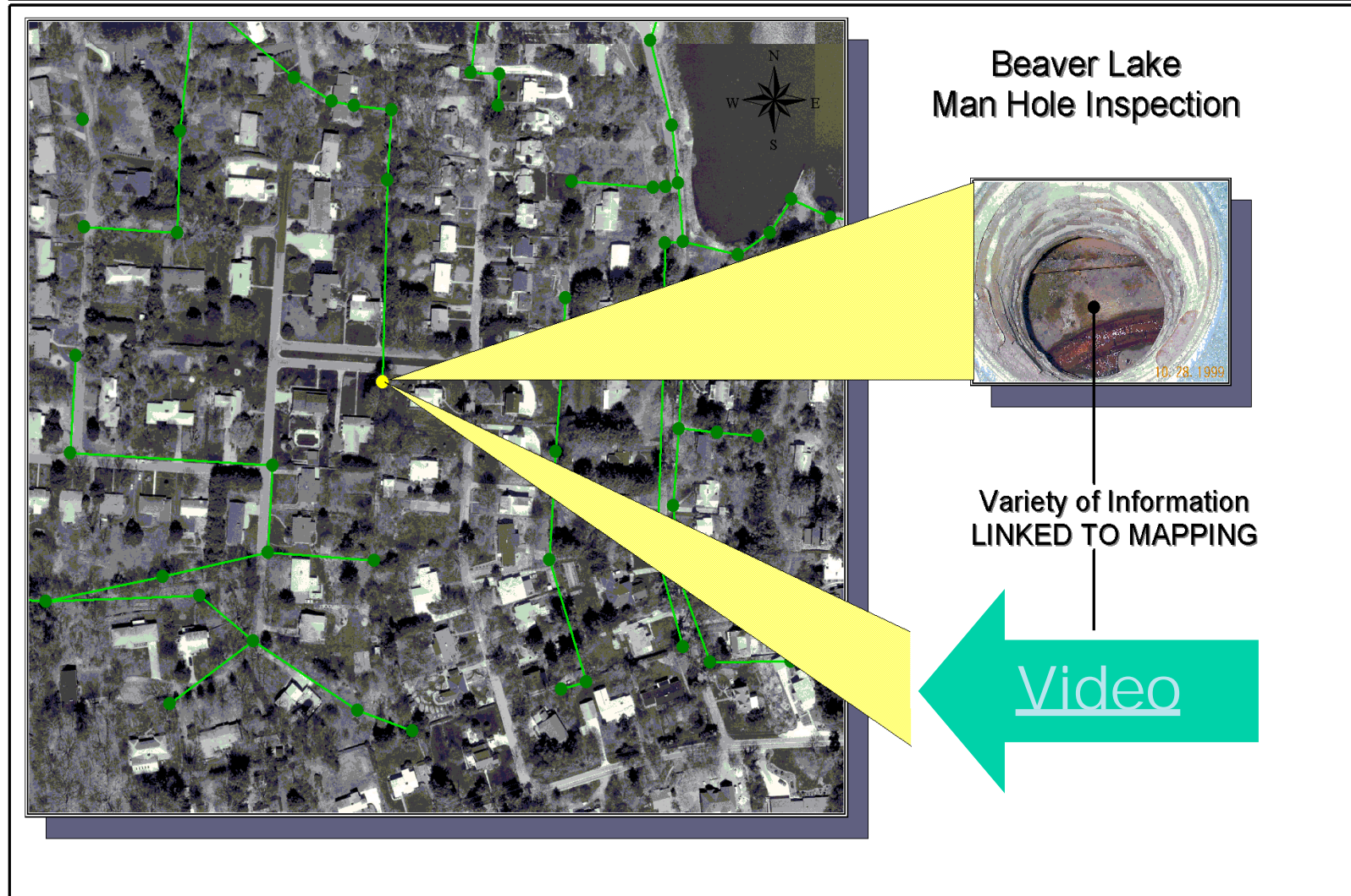
# Line cleaning and CCTV & Defect Coding







# GIS Capabilities





# CCTV, Defects, SSO's, Work Orders

Microsoft Access

File Edit View Insert Format Records Tools Window Help

pipe score 4in 97 format : Database

Tables Queries Forms Reports Macros Modules

select form view of pipe scoring

Open Design New

select form view of pipe scoring

PipeID	Mean Pipeline score	Mean Defect score	Peak Defect
24800	9.2647		45

Length	Slope	UPMHNO	DSMHNO
34	0.076516	26507	26506

Pipe Video hyperlink  
\\Video\_server\Video\Basin47\26507 to 26506.mpg

Drain\_B Royal Pines

Basin #: 47

Record: 1 of 788

UPS. 33.7 Ft>  
16426>16425

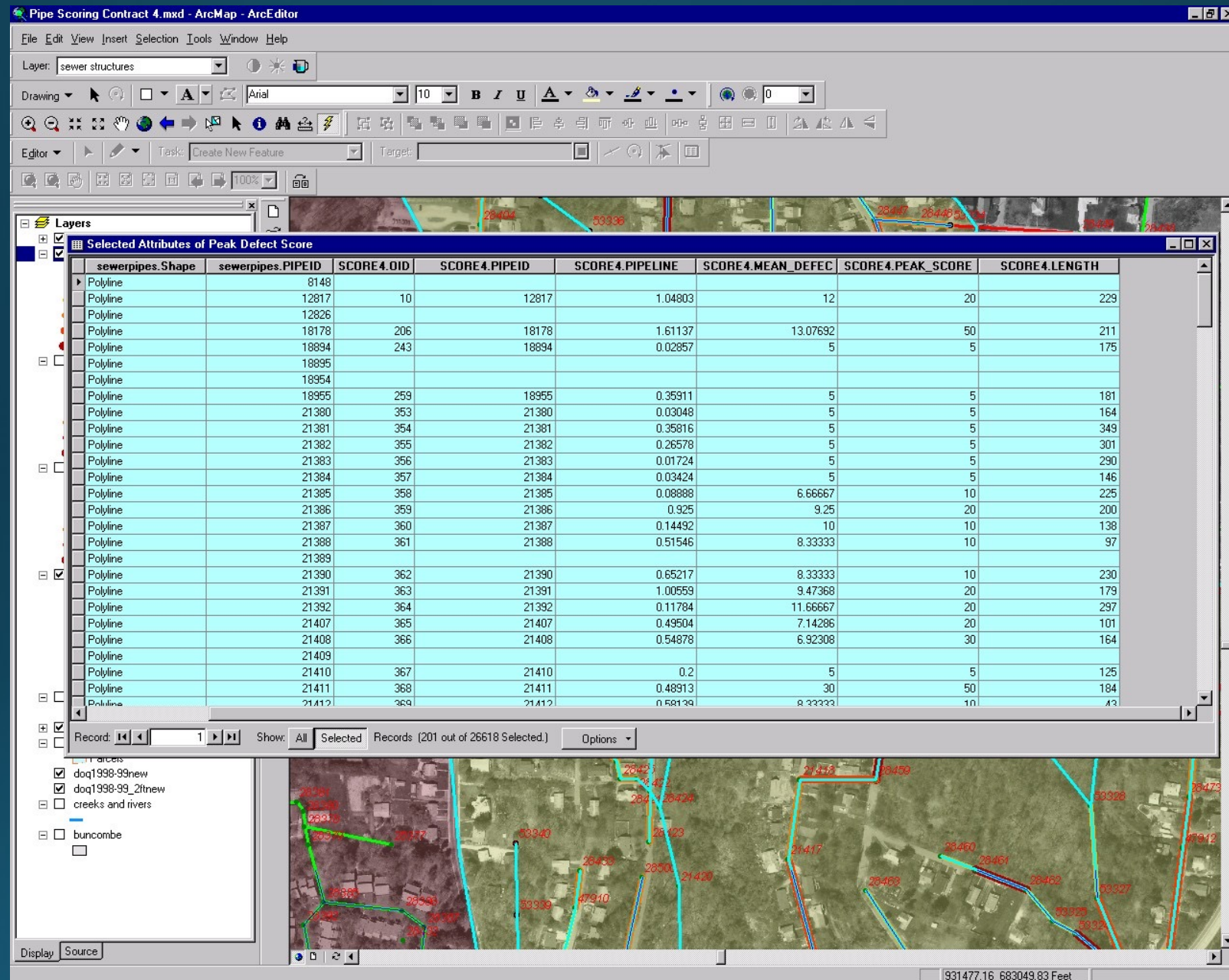
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NUM





# Integrated Data







# Pipe Rating Program



Proactive program to focus rehabilitation dollars where most needed





# AMSA Award for Pipe Rating Project



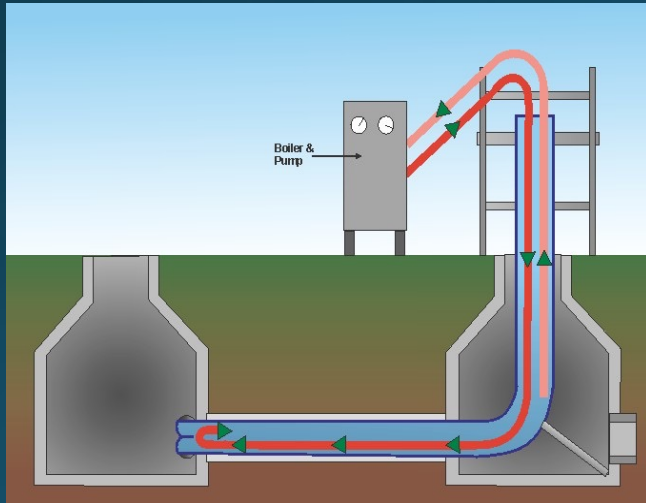
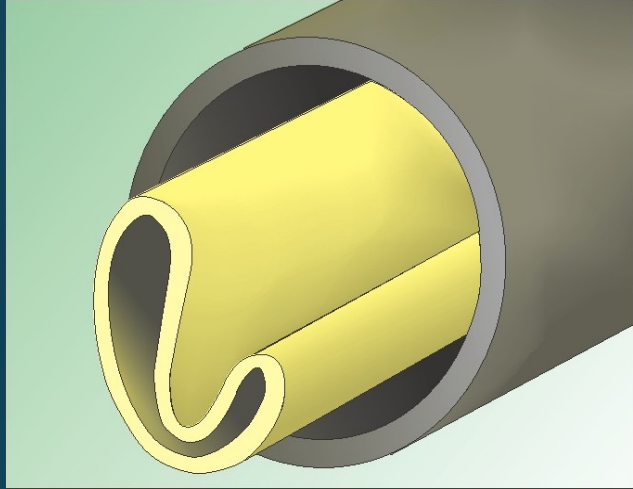
- In May of 2003, MSD received an AMSA National Environmental Achievement Award for the Pipe Rating Program
- Developed in-house with a vertical team using off-the-shelf software
- MSD and Los Angeles only two US utilities to receive this award





# Trenchless Technologies

## Pipe Lining

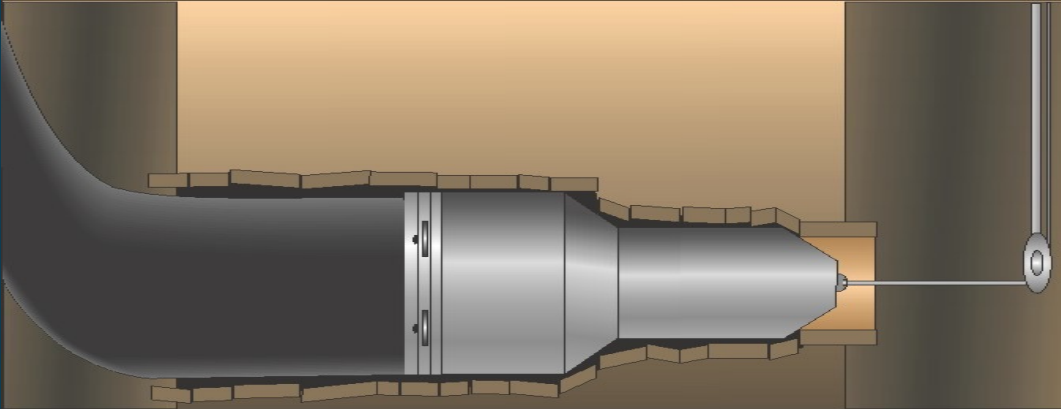






# Trenchless Technologies

## Pipe Bursting





# Recently Completed Plant Projects





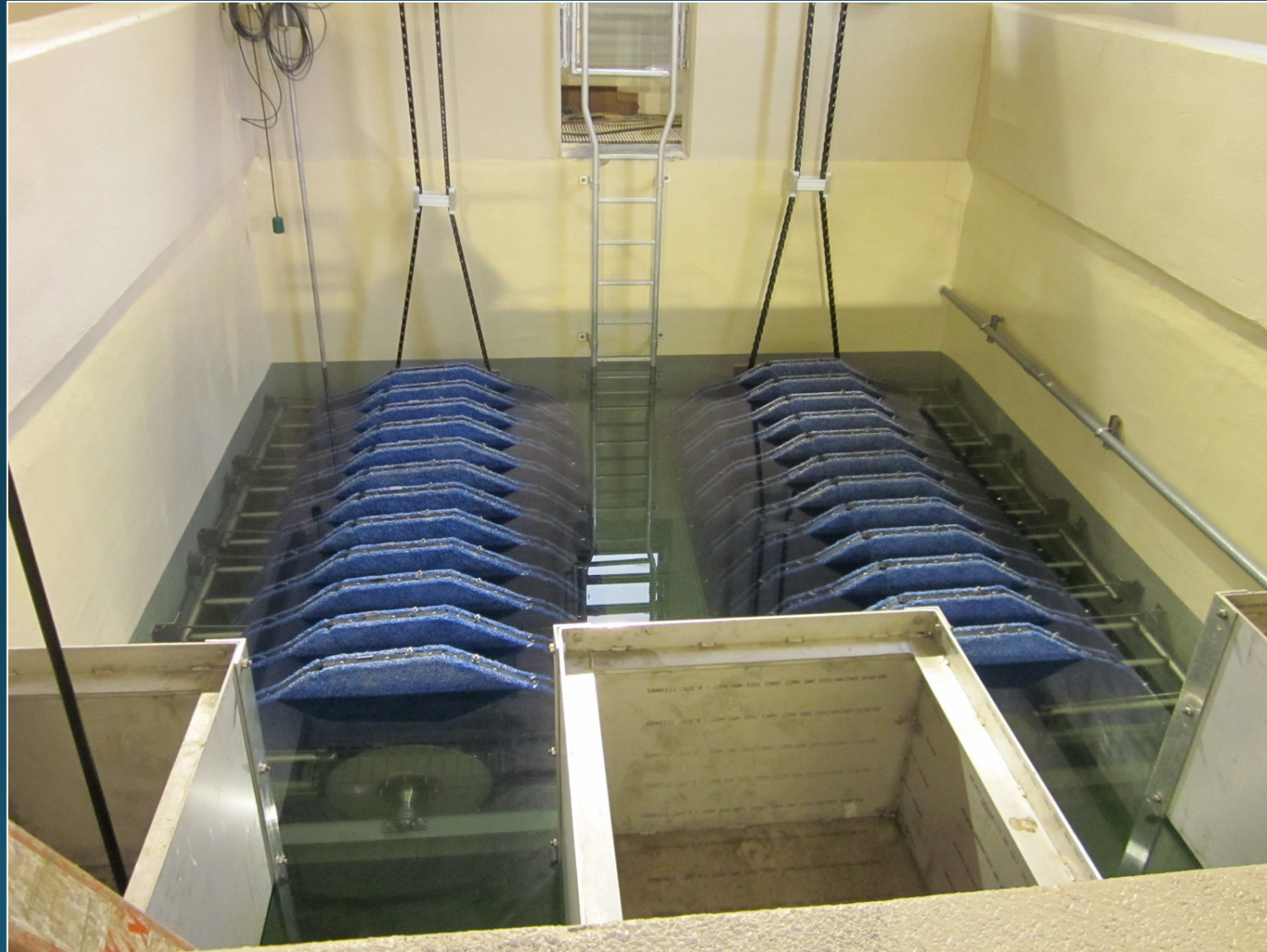
## New \$10 Million Aqua Disk Filters







# Initial Testing of New Filters







# Filter Installation Project

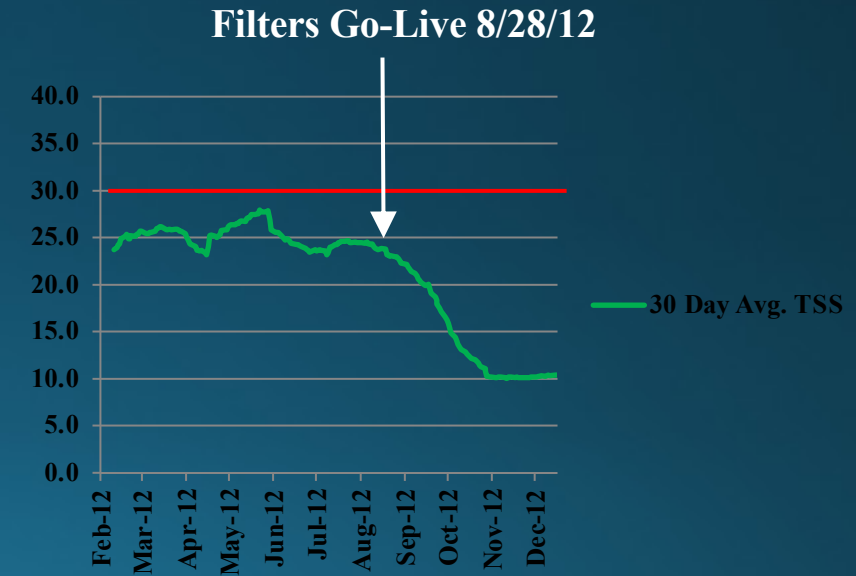
## Old System

- *18 existing "Microscreens" – all problematic.*
- *Performance failure – very little suspended solids removal*

## New System

- *Board awarded construction contract in October 2010.*
- *\$9.2M construction cost, over three fiscal years.*
- *Facility startup August 2012.*

## Excellent Results







## Incinerator System Emissions Upgrades







# Incinerator Emissions Upgrade Project

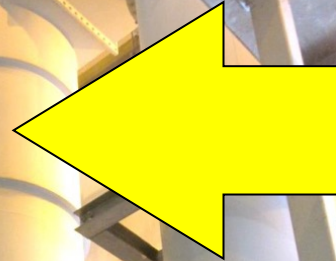
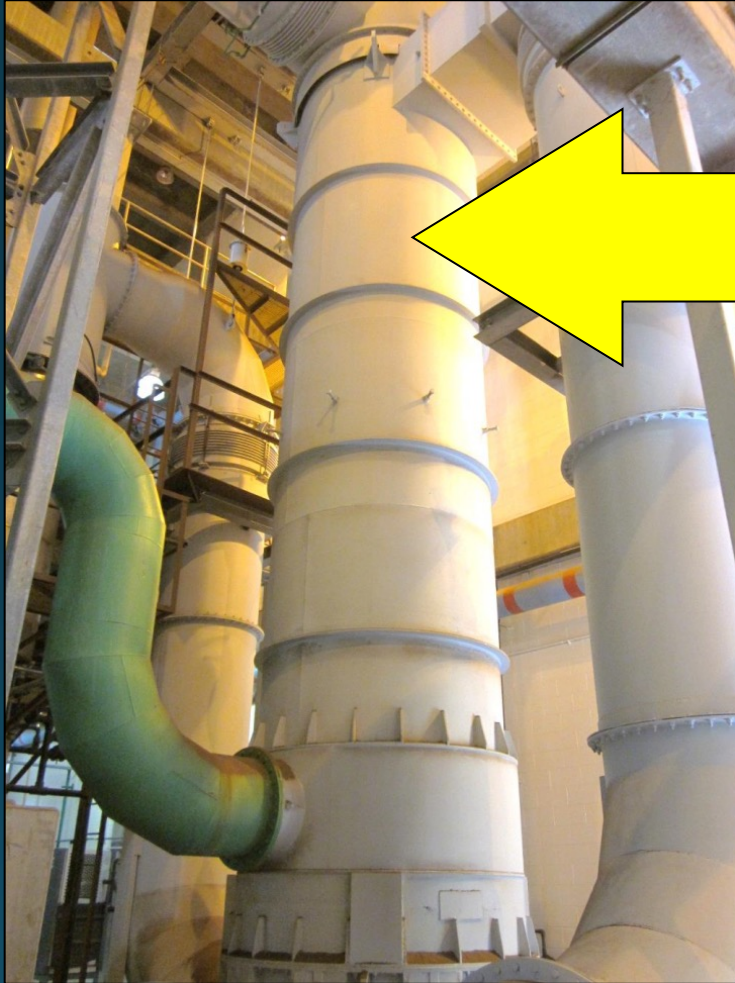
- EPA imposed aggressive schedule upon MSD, so MSD staff managed an accelerated design timeframe with consultant (CDM Smith) and pre-purchased critical equipment.
- MSD pilot tested a new membrane technology used in other applications.
- This new technology reduced capital costs by \$5M and annual costs by over \$100K.
- Was operational December 2015, ahead of schedule.
- Passed final compliance testing in 2016, staff continues to fine-tune operational parameters to maximize mercury removal rates.
- Project won 2017 NACWA Environmental Achievement Award.





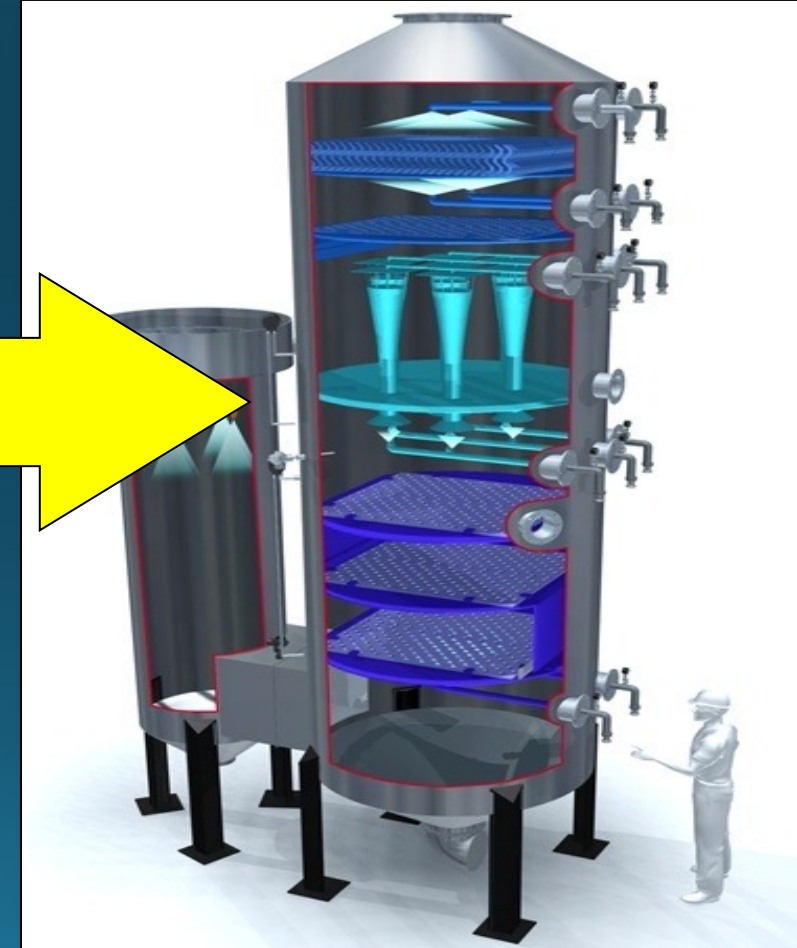
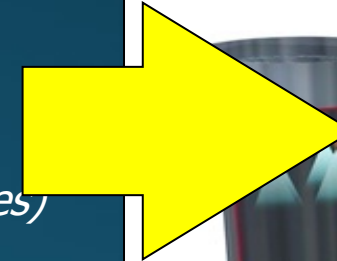
# Incinerator Emissions Upgrade Project

*High-wear components have been replaced*



Heat Exchanger  
*(Recovers Heat)*

Venturi  
*(Removes Particulates)*



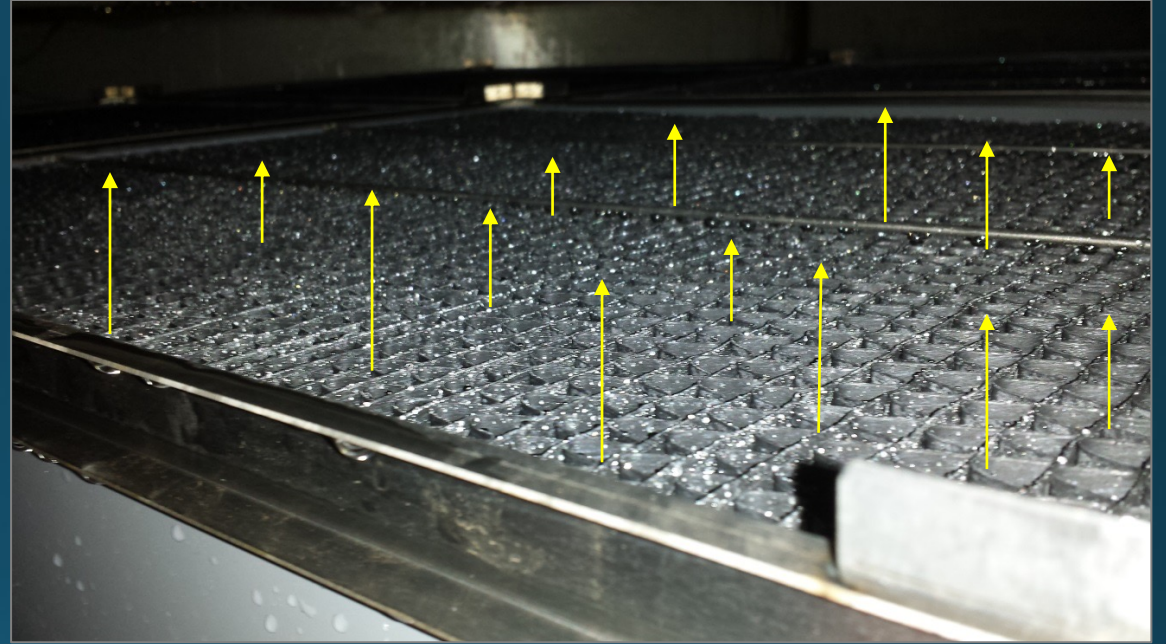




# New Mercury Removal System

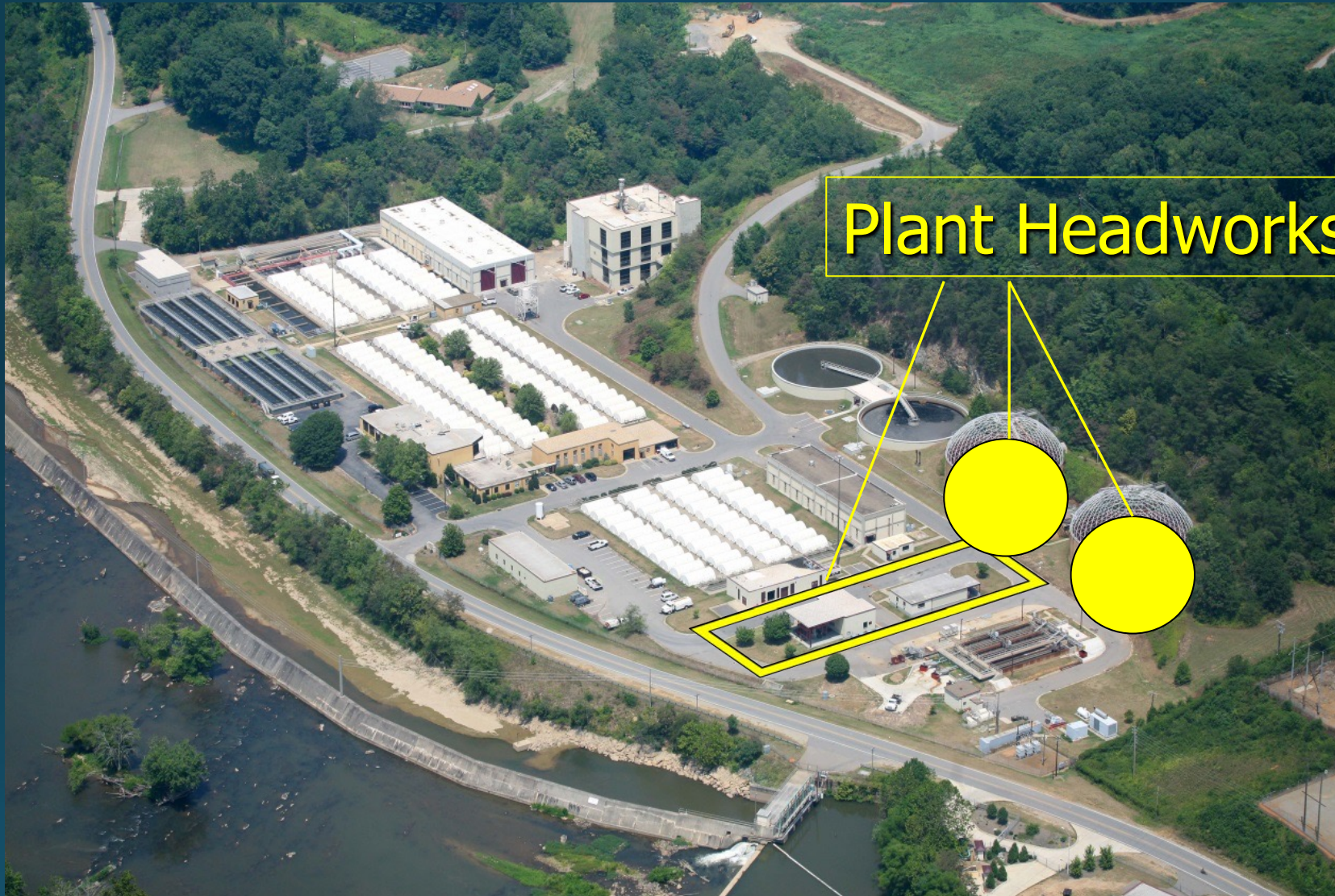


*Three stories up - sorbent panel layers.*



*Up close - the exhaust flows up through the baffles. Impregnated with activated carbon, they remove mercury. These are manufactured by Gore Industries (aka Gore-Tex)*





## Plant Headworks Project

- New Bar Screens
- Improved Fine Screens
- Grit Removal
- Surge System for Peak Flows
- Construction complete
- Total Project cost approx. \$9.6 Million





Influent bar screens - 1/2"

Fine Screens - 1/4"

Vortex grit  
removal units



Surge Pump Station

A 3D CAD model of a surge pump station. It features two large, grey cylindrical storage tanks on either side. A network of blue pipes connects these tanks to a central pump unit. The pump unit consists of two vertical pump columns with multiple pumps. Below the pumps is a control building with a black roof and a glass-enclosed area. The entire system is set against a light blue background.





# Influent Bar Screens

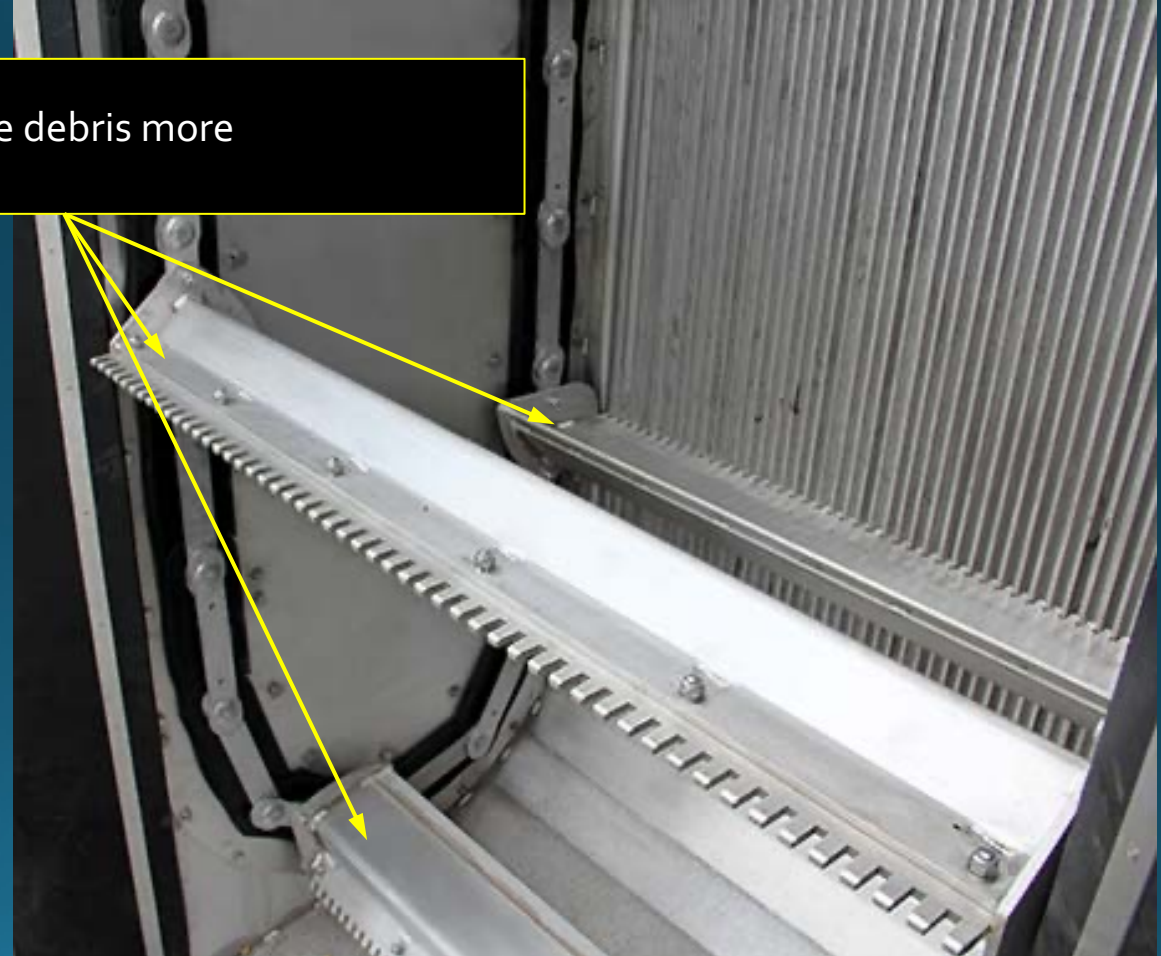
Bar Screens capture large debris upstream of Influent Pumps



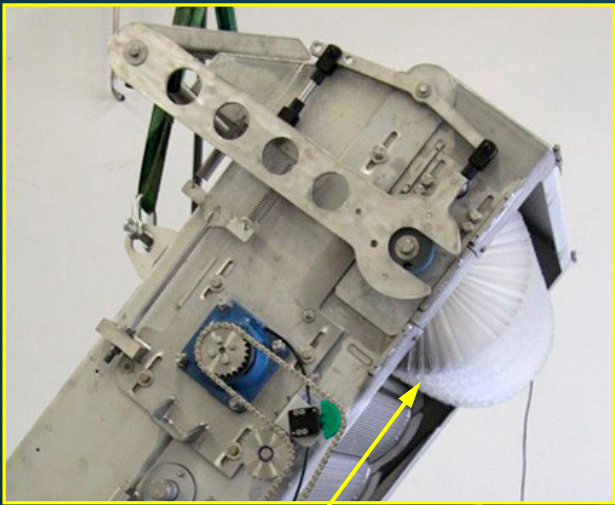
29'-0"

$\frac{1}{2}$ " bar separation

Multiple rakes remove debris more quickly







Mechanical brush  
removes debris



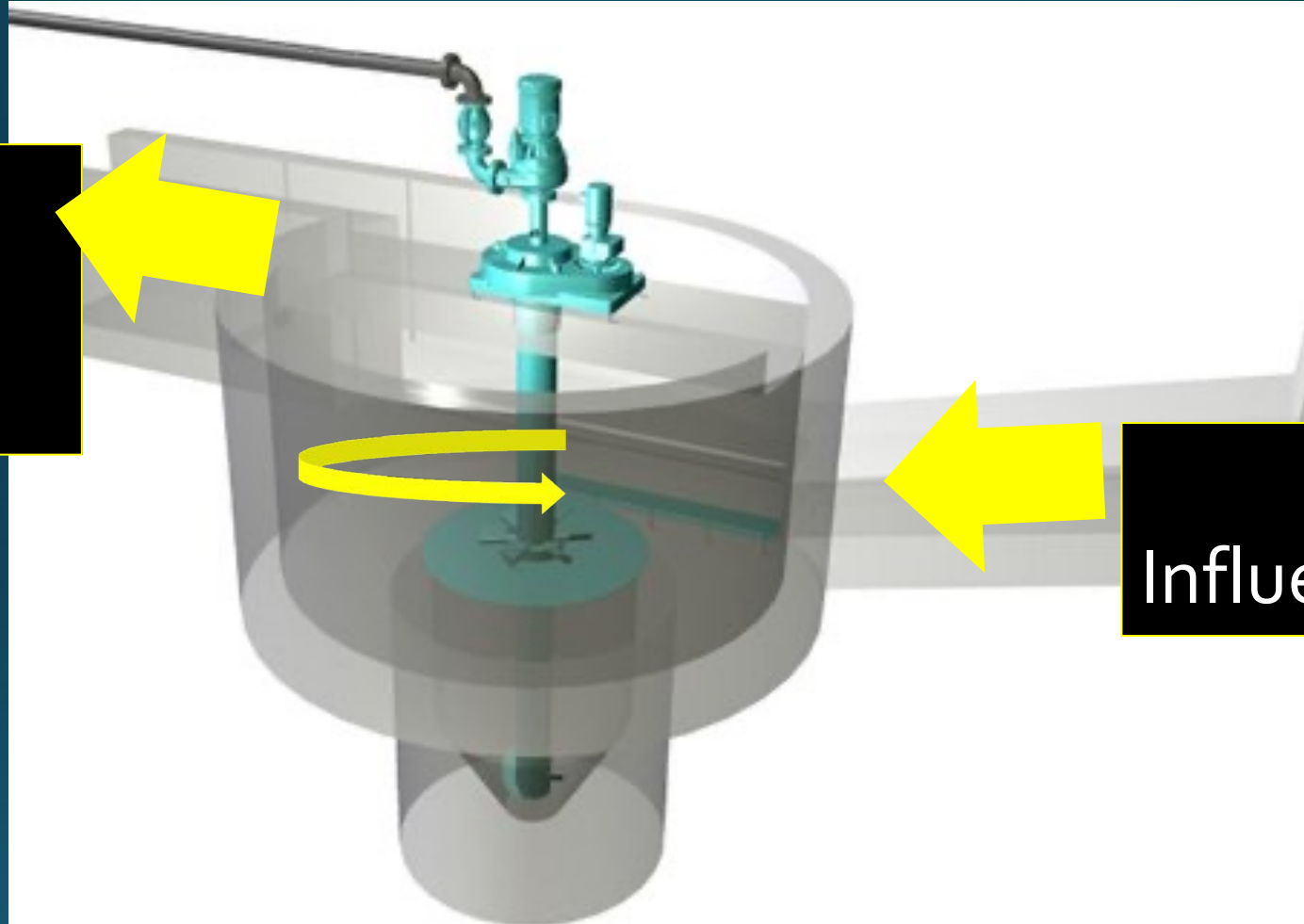
$\frac{1}{4}$ " perforated  
plate





# Vortex Grit Removal basins

Effluent  
flow



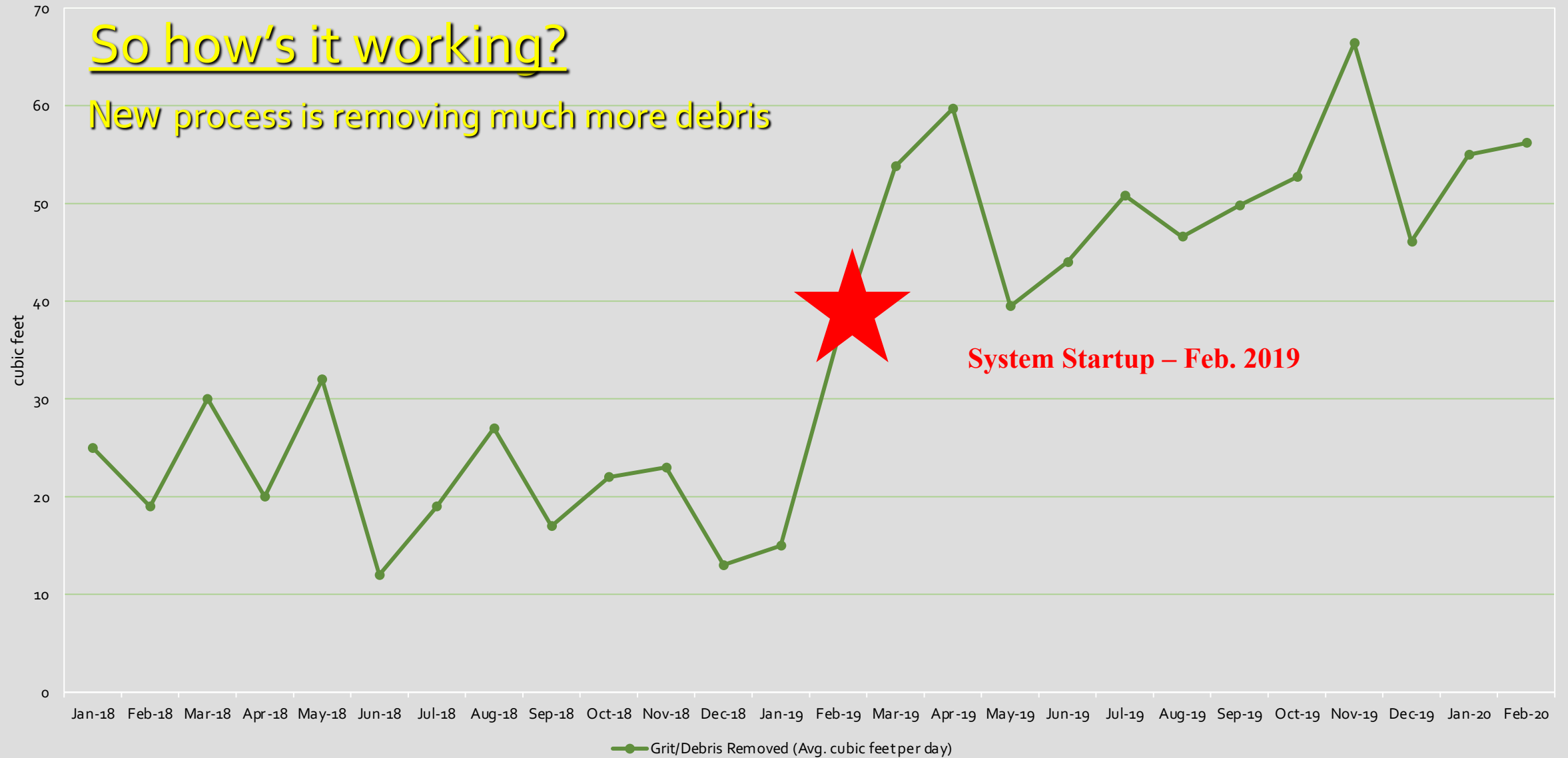
Influent flow



Headworks Grit/Debris Removal per day

So how's it working?

New process is removing much more debris





# Current Plant Improvement Projects



# \$17 Million High-Rate Primary Treatment Process





# \$17 Million High-Rate Primary Treatment Process

ACTIFLO®

Sand Recovery

Add Polymer &  
Coagulant – Rapid  
Mix

Add Sand Ballast  
Slower mix

Coagulation basin

Maturation basin

Settling basin





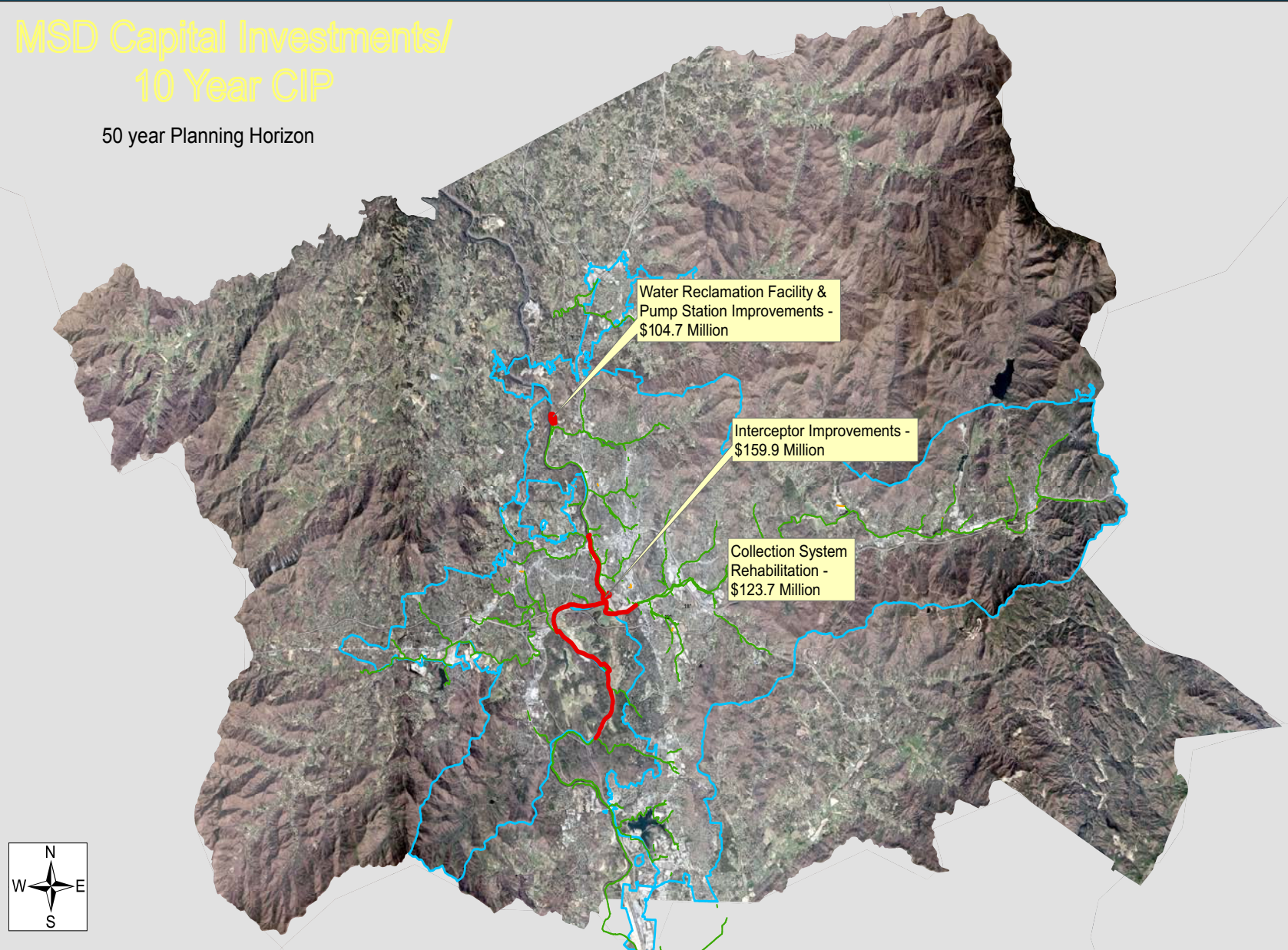


# Capital Reinvestment of \$389 Million over **next 10 years** for Growth and Future Regulations

*\$105 Million – Upgrade Treatment  
Plant and Major Pump Stations*

*\$160 Million– Interceptor  
Improvements*

*\$ 124 Million – Collection System  
replacement/Upgrades Treatment*







## Carrier Bridge pump station replacement

- MSD's largest pump station, constructed in 1966
- Serves large portions of South & West Buncombe, North Henderson
- Capacity increase from 22mgd to 40mgd (2070 flow projection)

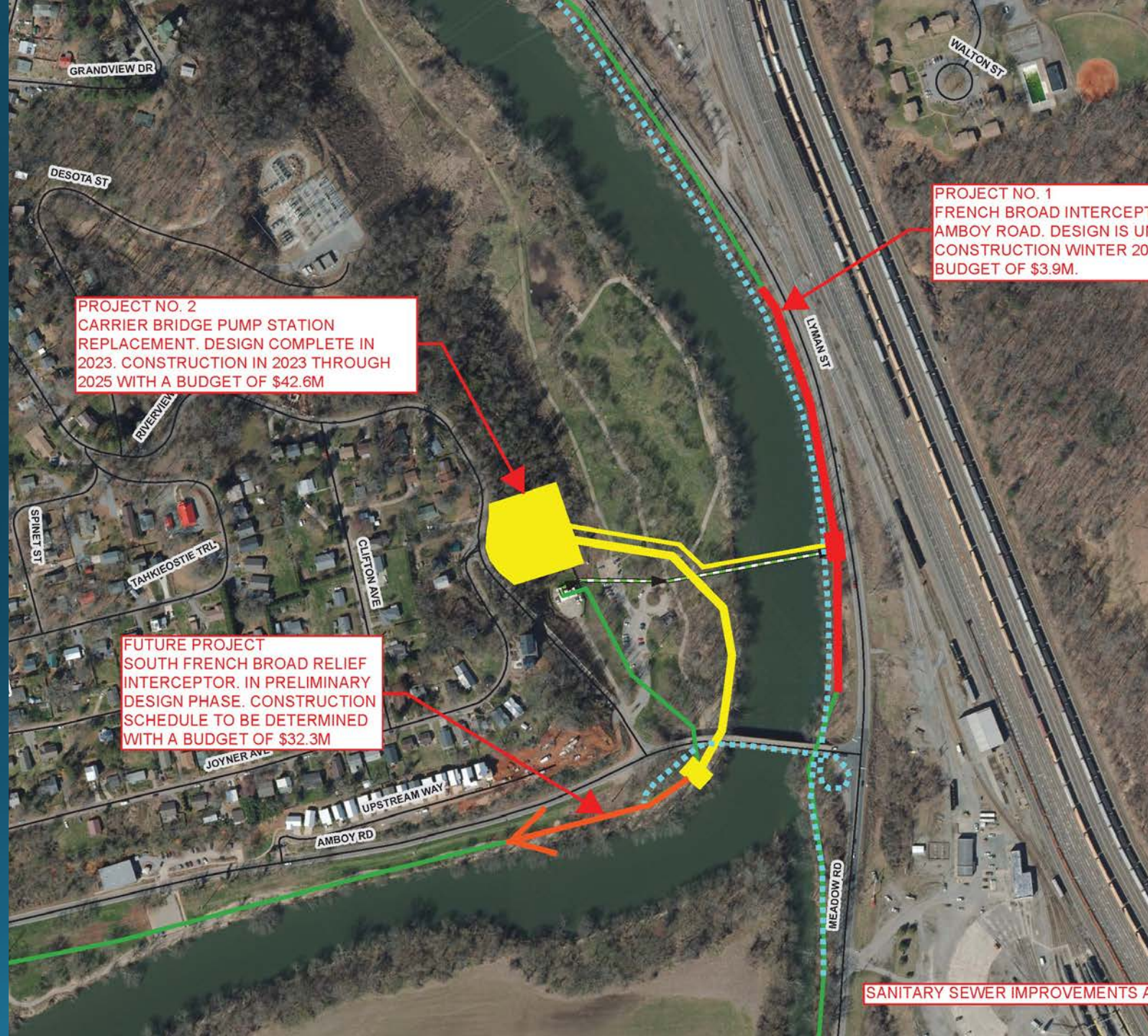






## Project details

- Located next to existing PS
- 800 LF of new 60-inch inlet piping
- Two (2) 36-inch discharge force mains
  - Exploring “open-cut” option
- Enclosed PS with odor control



PROJECT NO. 2  
CARRIER BRIDGE PUMP STATION  
REPLACEMENT. DESIGN COMPLETE IN  
2023. CONSTRUCTION IN 2023 THROUGH  
2025 WITH A BUDGET OF \$42.6M

FUTURE PROJECT  
SOUTH FRENCH BROAD RELIEF  
INTERCEPTOR. IN PRELIMINARY  
DESIGN PHASE. CONSTRUCTION  
SCHEDULE TO BE DETERMINED  
WITH A BUDGET OF \$32.3M

PROJECT NO. 1  
FRENCH BROAD INTERCEPTOR  
ON AMBOY ROAD. DESIGN IS UNDER  
CONSTRUCTION WINTER 2023  
BUDGET OF \$3.9M.

SANITARY SEWER IMPROVEMENTS





# Financial Overview of District

# FY23 Budget Revenues

## \$59,852,098

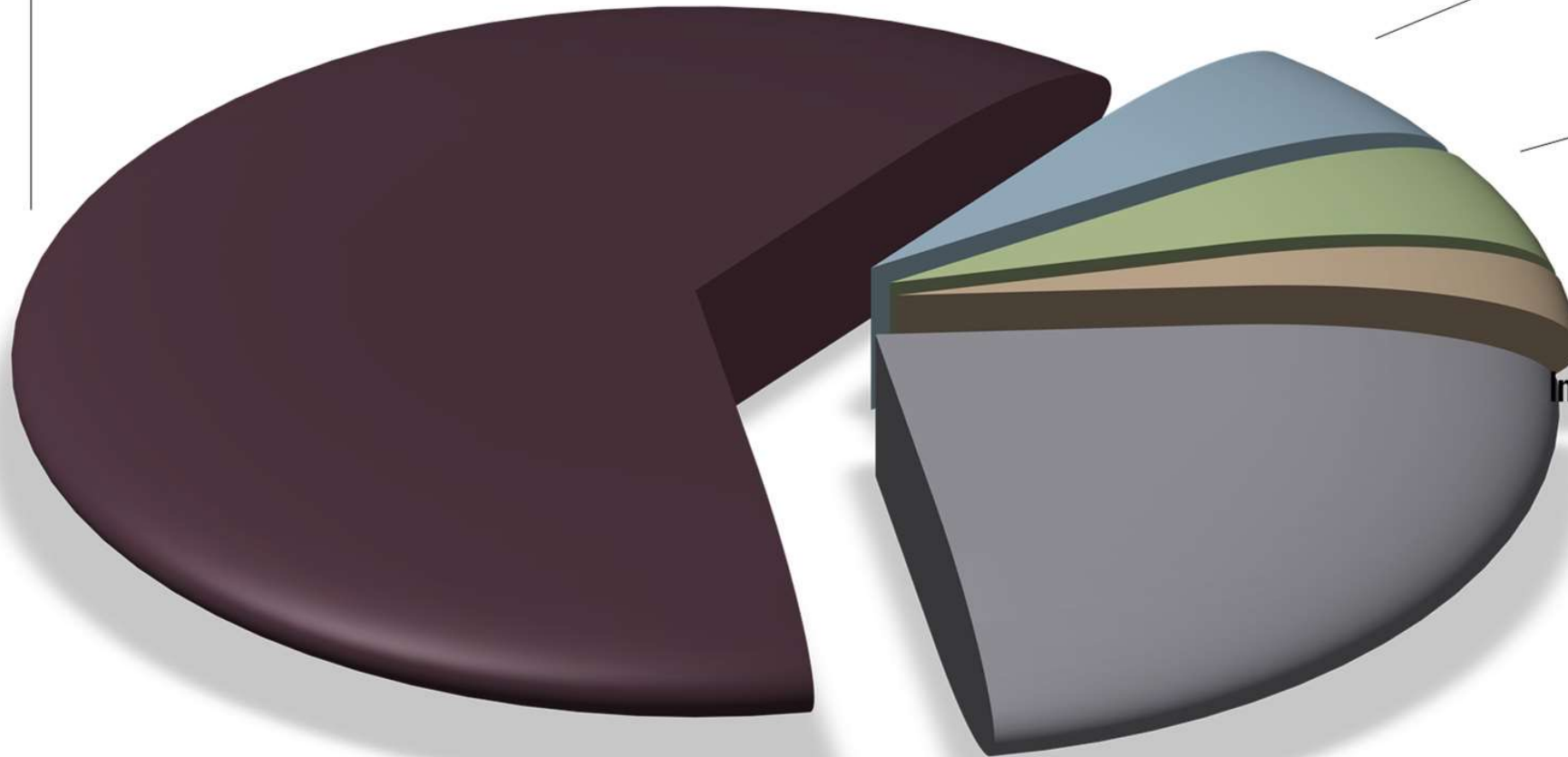
Domestic User Fees,  
\$37,820,971 , 63.2%

Industrial User Fees,  
\$3,370,488 , 5.6%

Facility & Tap Fees,  
\$3,175,000 , 5.3%

Interest & Misc. Income,  
\$1,656,205 , 2.8%

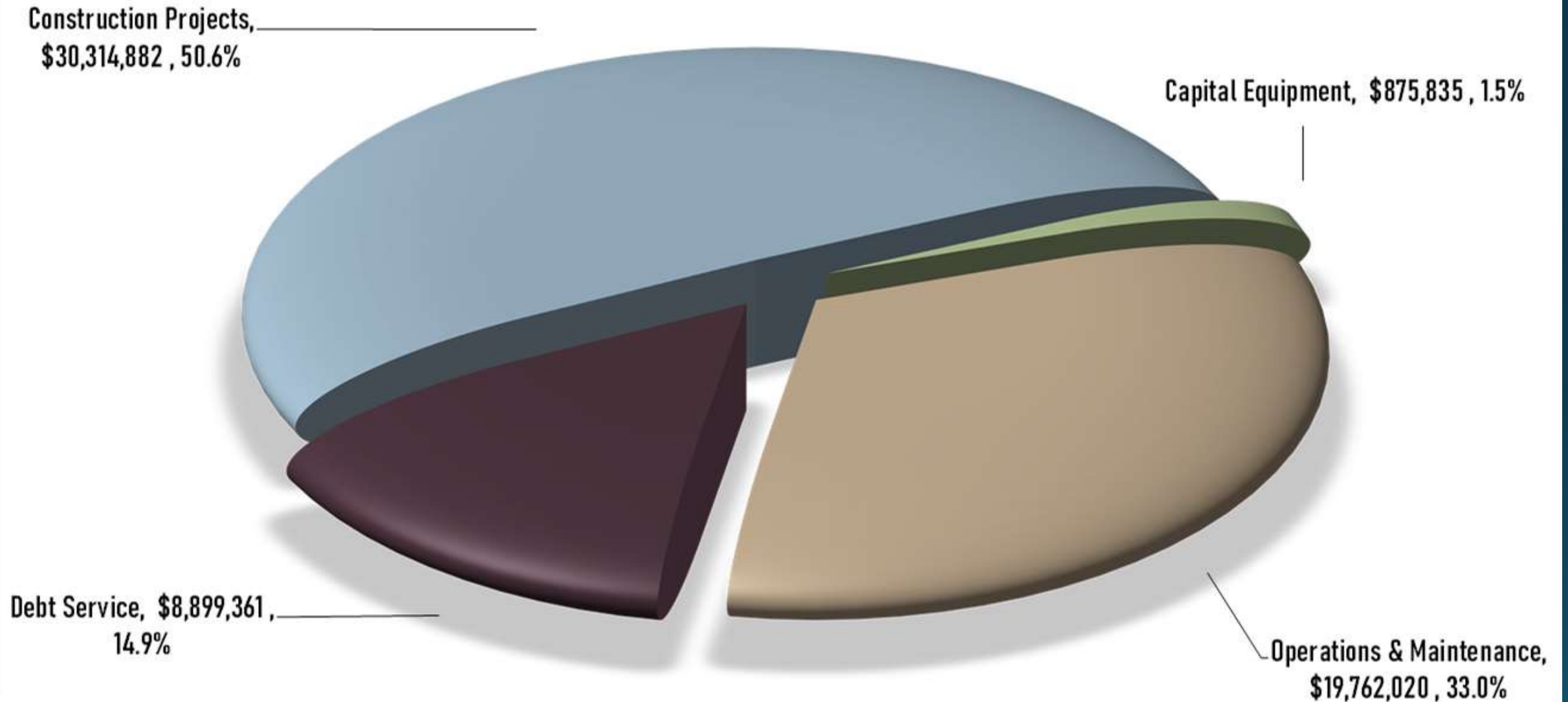
Other Sources & Uses,  
\$13,829,434 , 23.1%





# FY23 Budget Expenditures

## \$59,852,098

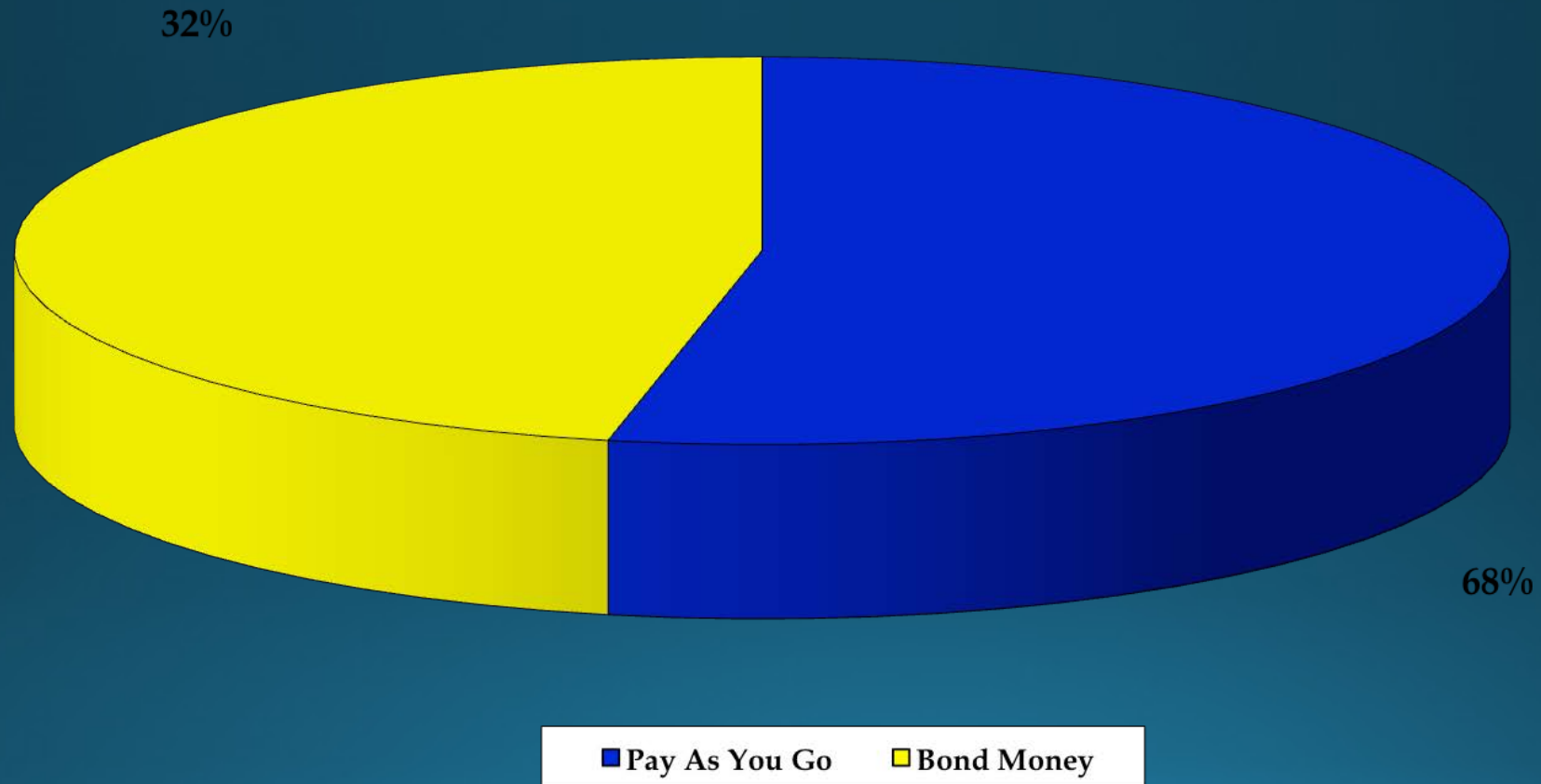




# Capital Improvements and Sources of Funding

FY 2012 to FY 2021

\$148.6 Million

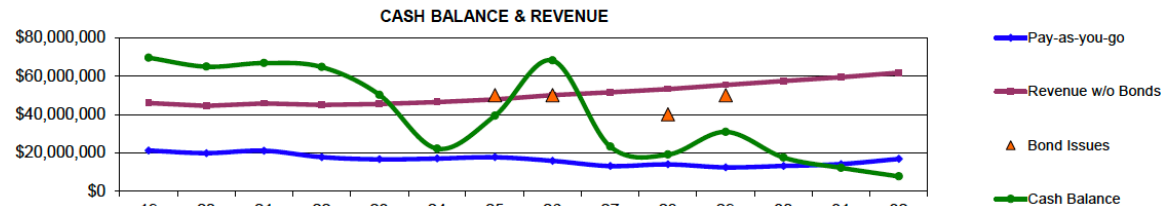
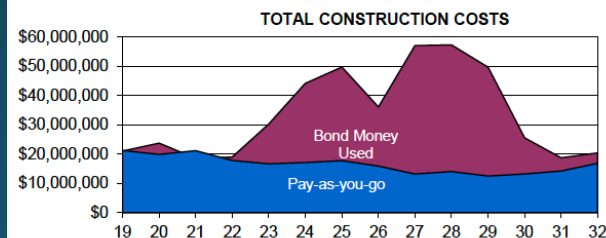




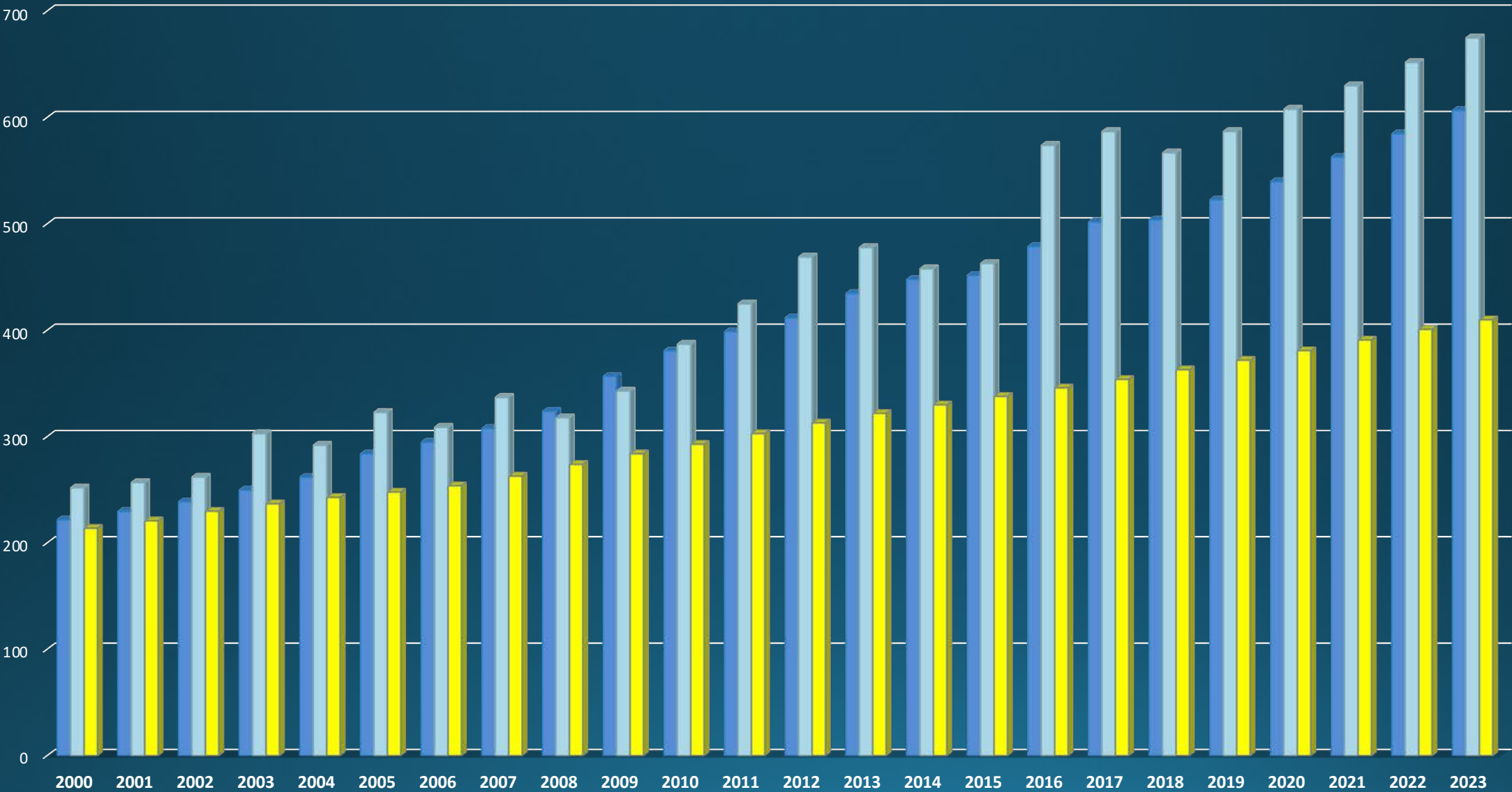


# MSD Business Plan Future Projection

Business Plan - FY23	2.5%	2.5%	0.0%	2.75%	3.00%	3.00%	3.00%	3.00%	3.00%	3.50%	3.50%	3.50%	3.50%	3.50%	Sewer Rate Increase	
	\$31.36	\$32.17	\$32.17	\$33.04	\$34.10	\$35.12	\$36.16	\$37.25	\$38.34	\$39.69	\$41.04	\$42.47	\$43.96	\$45.50	Average Monthly Bill	
	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032	Assumptions	
July 1- Available for Construction	70,079,187	69,570,373	64,919,355	66,789,880	64,750,548	50,266,064	22,234,277	39,348,652	68,143,170	23,307,286	19,134,094	30,961,674	17,615,596	12,208,633	Minimum of 365 Days Cash on Hands	
REVENUE:																
Domestic Users	32,884,881	33,092,478	34,081,773	35,439,096	36,801,493	38,187,998	39,599,108	41,097,323	42,622,114	44,463,304	46,338,992	48,313,857	50,390,174	51,870,149	Consumption and Account Growth	
Industrial Users (No growth)	3,771,616	3,426,103	3,497,070	3,509,420	3,370,488	3,288,760	3,359,081	3,431,510	3,506,113	3,595,760	3,688,545	3,784,578	3,883,972	3,883,972		
Billing and Collections (User Fee)	821,024	852,981	983,058	952,783	1,019,478	1,050,062	1,081,564	1,114,011	1,147,431	1,181,854	1,217,310	1,253,829	1,291,444	1,330,187		
Tap Fees	648,068	632,174	740,513	600,000	175,000	175,000	175,000	175,000	175,000	175,000	175,000	175,000	175,000	175,000		
Facility Fees	5,695,771	5,105,437	4,351,547	4,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000		
Interest & Non-operating Revenues	1,715,479	1,121,638	217,271	263,773	862,625	543,753	461,872	1,074,918	914,505	636,621	751,437	728,659	447,363	399,763		
City of Asheville (annex.-Enka)	32,210	31,898	30,586	30,586	35,000	35,000	0	0	0	0	0	0	0	0		
Rental Income	74,915	76,982	79,445	71,641	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	96,000	960,000		
Transfer from Reserves (to / from)	159,485	(76,752)	0	0	0	0	0	0	0	0	0	0	0	0		
Miscellaneous	175,401	218,441	1,884,732	140,000	140,000	140,000	140,000	140,000	140,000	140,000	140,000	140,000	140,000	140,000		
Total Revenues	45,978,851	44,481,380	45,865,995	45,007,299	45,500,084	46,516,573	47,912,624	50,128,762	51,601,162	53,288,539	55,407,284	57,491,923	59,423,953	61,759,070	0.75% Increase	
State and Federal (EPA) Grants																
Revenue Bonds/Stimulus						50,000,000		50,000,000	40,000,000		50,000,000					
Total Funds Available	116,058,038	114,051,752	110,785,350	111,797,179	110,250,632	96,782,637	120,146,901	139,477,415	119,744,333	116,595,825	124,541,378	88,453,597	77,039,549	73,967,703	Bond Issues figured at: 4.5% yield FY25 4.5% yield FY26 5.0% yield FY28 5.0% yield FY29	
EXPENSES:																
Operations & Maintenance	15,312,654	14,772,938	14,923,174	17,372,689	19,920,325	20,609,732	21,335,936	22,092,390	22,880,535	23,701,961	24,558,345	25,451,442	26,382,787	27,367,383		
Replacement Funds (WRF & Fleet)	730,000	750,000	750,000	850,000	850,000	905,000	905,000	905,000	905,000	905,000	905,000	905,000	905,000	905,000	3% inflation in O & M, Replacement Funds and Engineering Force Account	
Debt Service	9,412,540	9,826,547	9,811,696	9,823,943	8,899,361	8,833,835	8,805,928	12,177,032	15,542,940	15,541,681	18,371,503	18,857,215	18,843,113	17,517,748		
CIP (including Bond Projects)	21,032,471	23,782,912	18,510,600	19,000,000	30,314,882	44,199,793	49,751,385	36,159,823	57,108,571	57,313,089	49,744,856	25,624,344	18,700,016	20,398,070	ENR 10-year Construction Index @ 2.96%	
Total Expenses	46,487,665	49,132,397	43,995,470	47,046,632	59,984,568	74,548,360	80,798,249	71,334,245	96,437,046	97,461,731	93,579,704	70,838,001	64,830,916	66,188,201	General Sewer Rehab to cover approx. 45,000 lineal ft / year	
Pay-as-you-go (Current Revenue only)	21,253,657	19,881,895	21,131,125	17,810,668	16,680,398	17,073,006	17,770,761	15,859,341	13,177,687	14,044,897	12,477,436	13,183,266	14,198,053	16,873,939		
Debt Coverage (User Fees only)	2.4	2.3	2.4	2.3	2.4	2.5	2.6	1.9	1.6	1.7	1.5	1.5	1.6	1.7		
Debt Coverage with Total Revenue	3.2	3.0	3.1	2.8	2.9	2.9	3.0	2.3	1.8	1.9	1.7	1.7	1.8	2.0	Target Debt Coverage 1.5	
April 21, 2022																
10-Year Capital Improvement Program																
Active Plan CIP	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032	No growth in Industries - Rate Parity for Flow in 2020	
Interceptor/Wet Weather Rehabilitation	1,366,293	4,090,464	123,500	5,232,420	9,380,715	1,247,875	1,301,774	13,462,872	26,351,083	13,595,041	9,393,186	9,773,026	22,542	2,303,340		
General Sewer Rehabilitation	10,377,703	7,547,700	8,719,182	9,366,088	9,889,001	8,433,351	9,202,097	11,544,886	9,165,777	9,269,041	11,175,091	11,621,475	14,346,286	13,659,330		
Private Sewer Rehabilitation	0	6,500	14,400	221,500	210,250	93,333	28,622	2,240,756	0	0	0	0	0	0		
Treatment Plant / Pump Stations	6,480,693	9,006,250	6,346,317	1,179,021	6,148,362	31,119,928	35,828,984	5,434,352	18,025,134	30,725,951	25,366,962	331,164	340,967	351,059		
Engineering Force Account	2,667,819	2,795,998	2,870,201	2,900,971	3,096,554	3,205,306	3,289,908	3,376,957	3,466,577	3,623,056	3,709,617	3,798,679	3,890,221	3,984,341		
Reimbursements	139,963	336,000	437,000	100,000	590,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000		
Contingency	0	0	0	0	1,000,000											
Capital Improvement Program Totals	21,032,471	23,782,912	18,510,600	19,000,000	30,314,882	44,199,793	49,751,385	36,159,823	57,108,571	57,313,089	49,744,856	25,624,344	18,700,016	20,398,070	District 10yr CIP \$389.3 Million	
District total 10yr Budget \$776 Million																



# Average Annual Service Charge

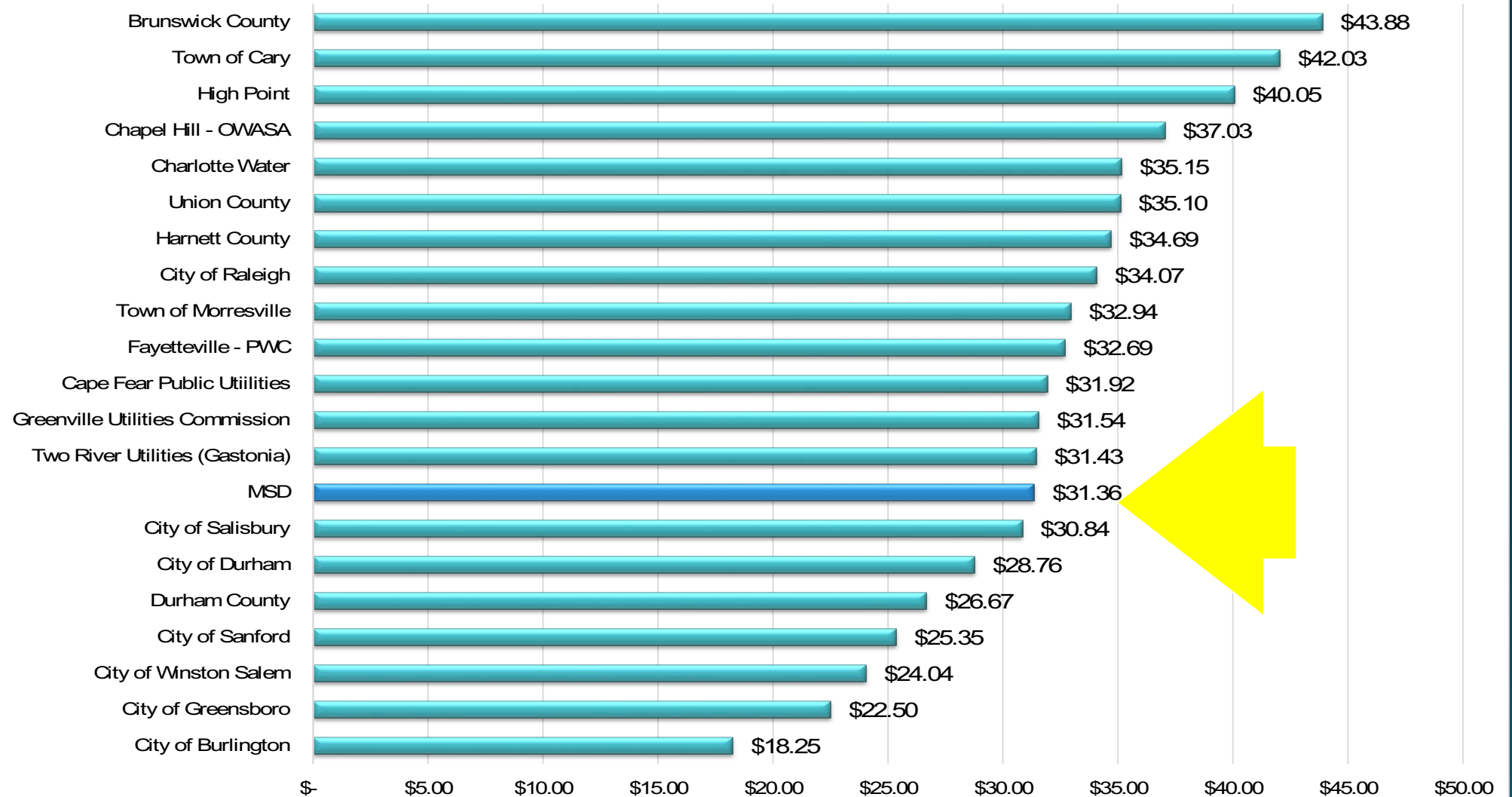






# Comparative Monthly Residential Bills

5 CCF Customer Bill Comparison to AA& AAA NC Units of Government



Source: UNC Environmental Resource Center



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#### MAIN CONTACTS

Emergency Call #: **828-255-0061**

Administrative Offices Main #: **828-254-9646**

Monday-Friday, 7:30 am to 4:30 pm

#### VIRTUAL PLANT TOUR



MSDBC.ORG



# Operational Questions ?



Our End Product