

The Sweet Sound of Sewer Inspections

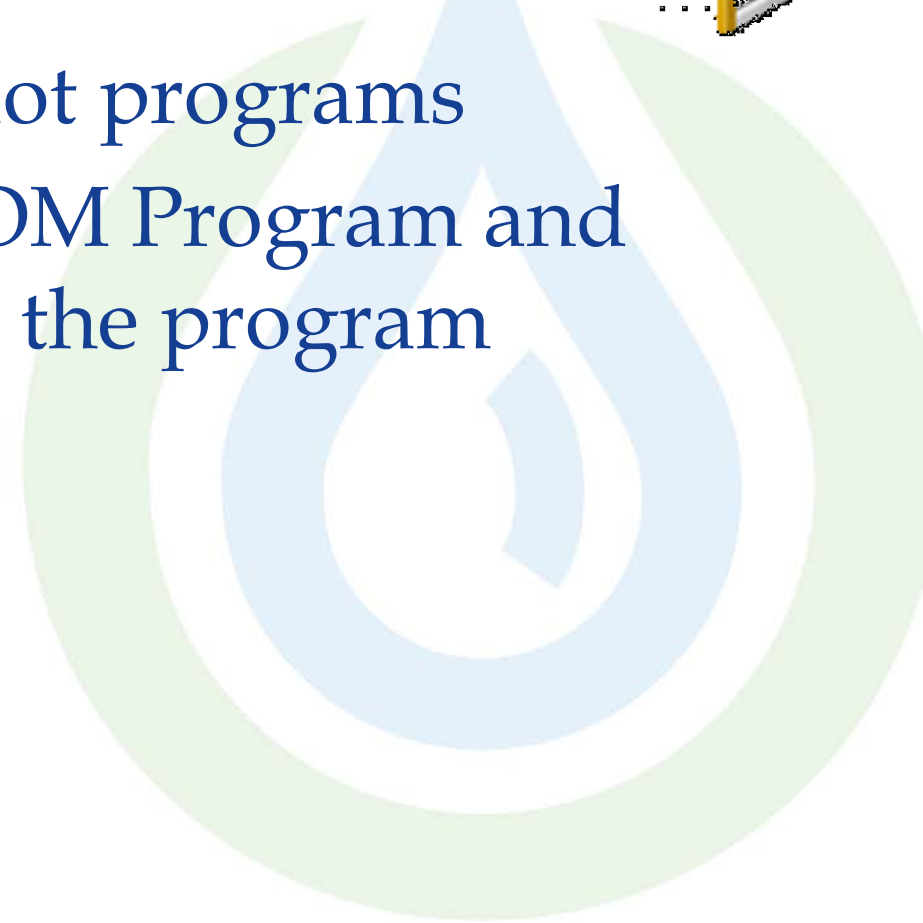
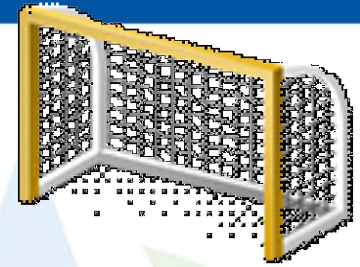


5 Cities Conference
August 17, 2017



Presentation Goals

- 🔹 Share results from pilot programs
- 🔹 Detail Impact to CMOM Program and steps taken to change the program



What is Acoustic Inspection?



What is Acoustic Inspection?



BUT FIRST....

💧 I'm required to "briefly" talk about MSD

St. Louis MSD Statistics



- 💧 Formed 1954 as Municipality of the State
- 💧 525 square miles
 - City of St. Louis & 80% St. Louis County
 - 88 Municipalities + City of St. Louis & St. Louis County
 - Serve - 1.3 million (419,000 accounts)
- 💧 Responsibilities:
 - Collection & Treatment of Wastewater
 - Stormwater Management



Operational Divisions

Collection System divided into 5 territories supported by 3 Yards

- 6550 miles of sanitary & combined sewer
- 3000 miles of storm sewer
- 193,000 manholes
- 153,000 inlets

Pump Stations divided into 3 territories supported by 3 divisions

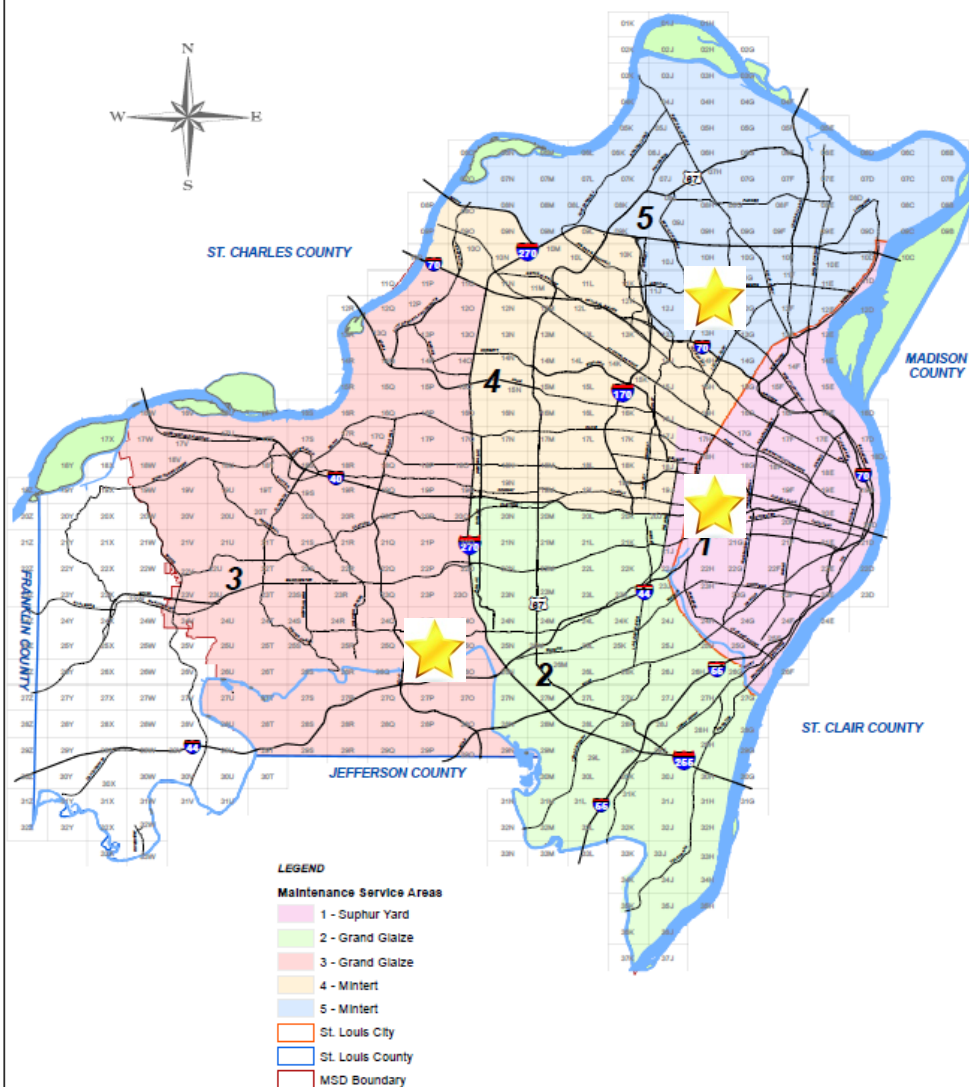
- 250 sanitary pump stations
- 26 Floodwall pump stations
- 130 miles of force mains

Treatment Plants

- 7 Plants
- 350 MGD average



The Metropolitan St. Louis Sewer District MAINTENANCE SERVICE AREAS





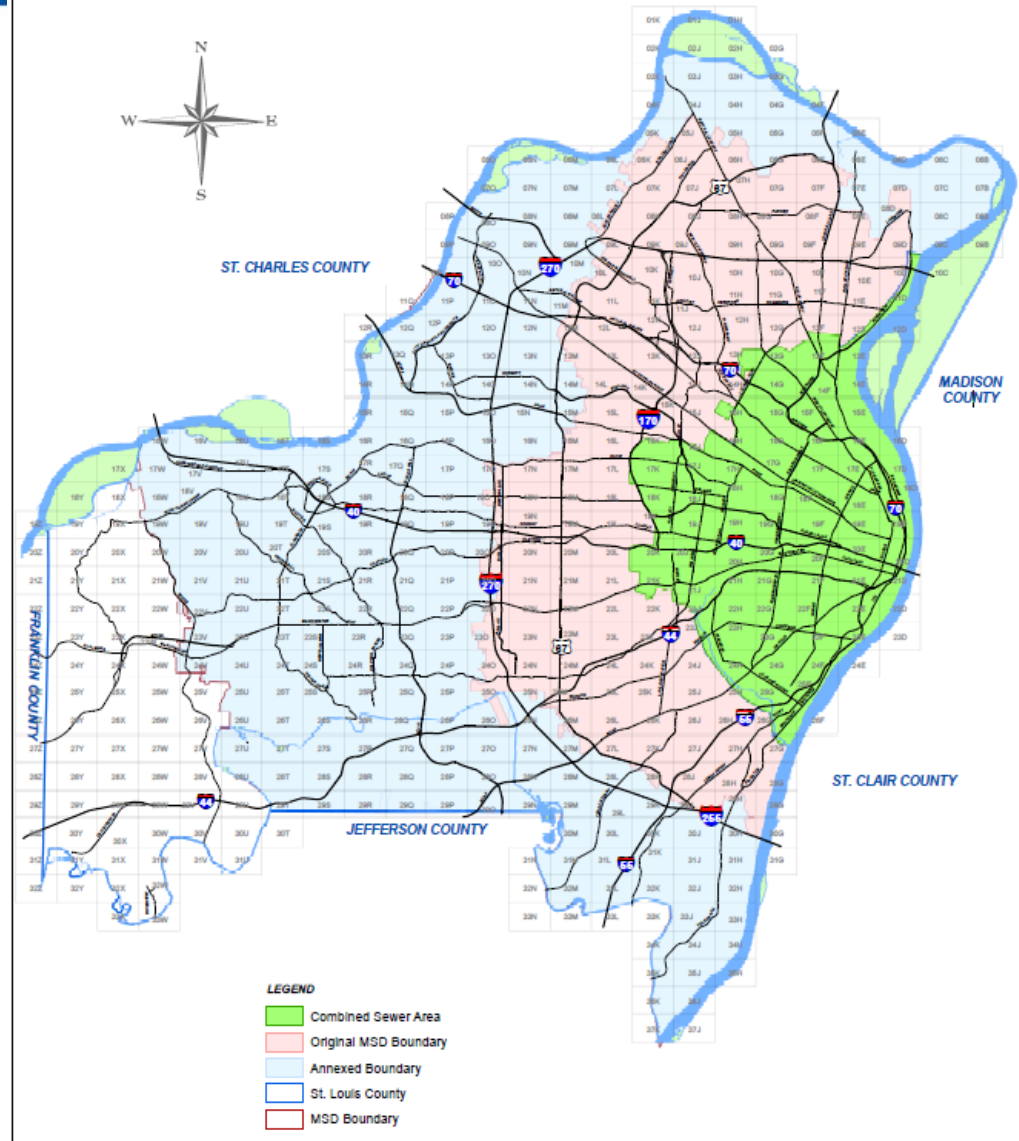
The Metropolitan St. Louis Sewer District

COMBINED SEWER AREA

Collection System Assets

Collection System:

- 6550 miles of sanitary sewer
 - 4750 miles Separate
 - 1800 miles Combined
- 162,000 sanitary manholes
 - 125,00 separate
 - 37,000 combined



Consent Decree – CMOM Program Dec. 2016

- 💧 Manhole Inspections (16,200/yr)
- 💧 Manhole Rehabilitation (Rehab ratings of 4 or 5)
- 💧 Sewer System Cleaning (1000 miles)
- 💧 CCTV Inspection (280 miles/yr)
- 💧 Sewer Rehabilitation (90 miles/yr)
- 💧 Force Main Inspections
- 💧 Pump Station Inspections
- 💧 Service Level based program



Sewer System Cleaning

- ④ $\leq 21''$ Non-pvc - 5 year cycle
- ④ $\leq 21''$ PVC - 10 year cycle
- ④ $> 21''$ Clean as necessary



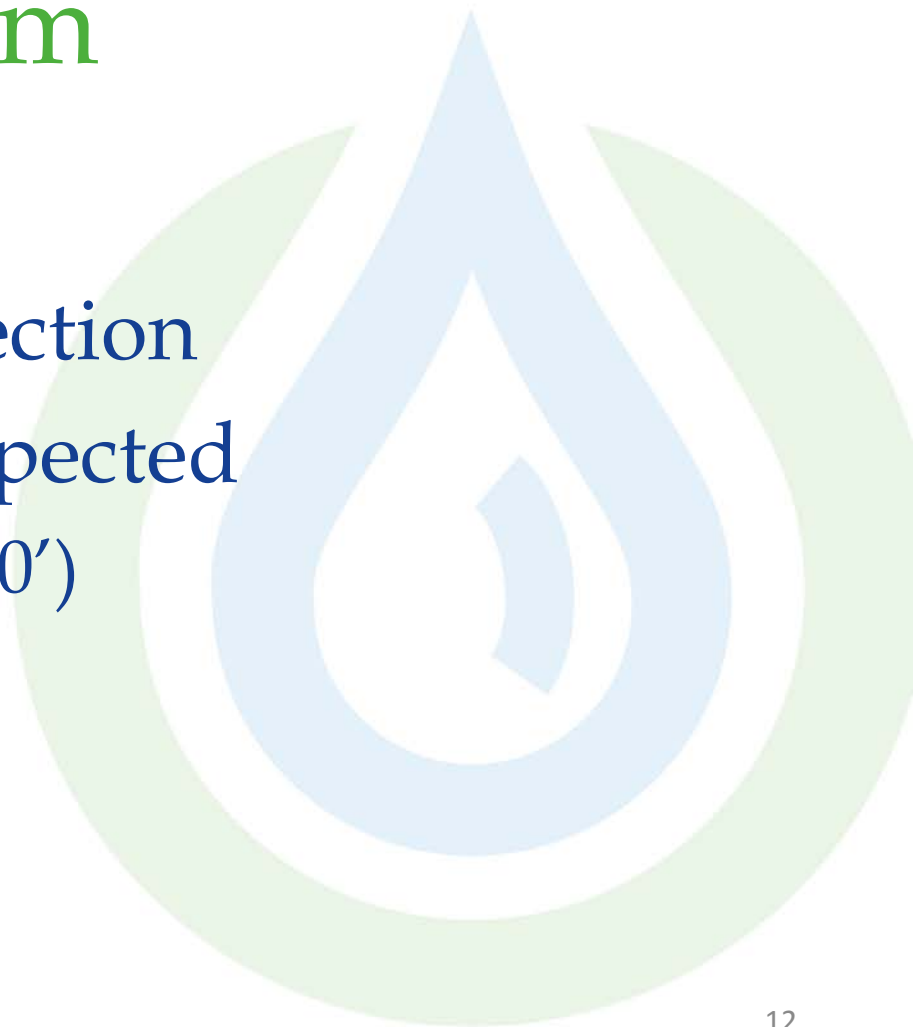
Changing CMOM Program

- 2014 - acoustic inspection technology introduced to District
 - How could be incorporate into our CMOM?
 - Started planning pilot program



2015 Pilot Program

- 🔍 Rented instrument
- 🔍 3 months of data collection
- 🔍 443 sewer reaches inspected
 - 15 miles of pipe (79,000')
- 🔍 Self performed



Inspection Process

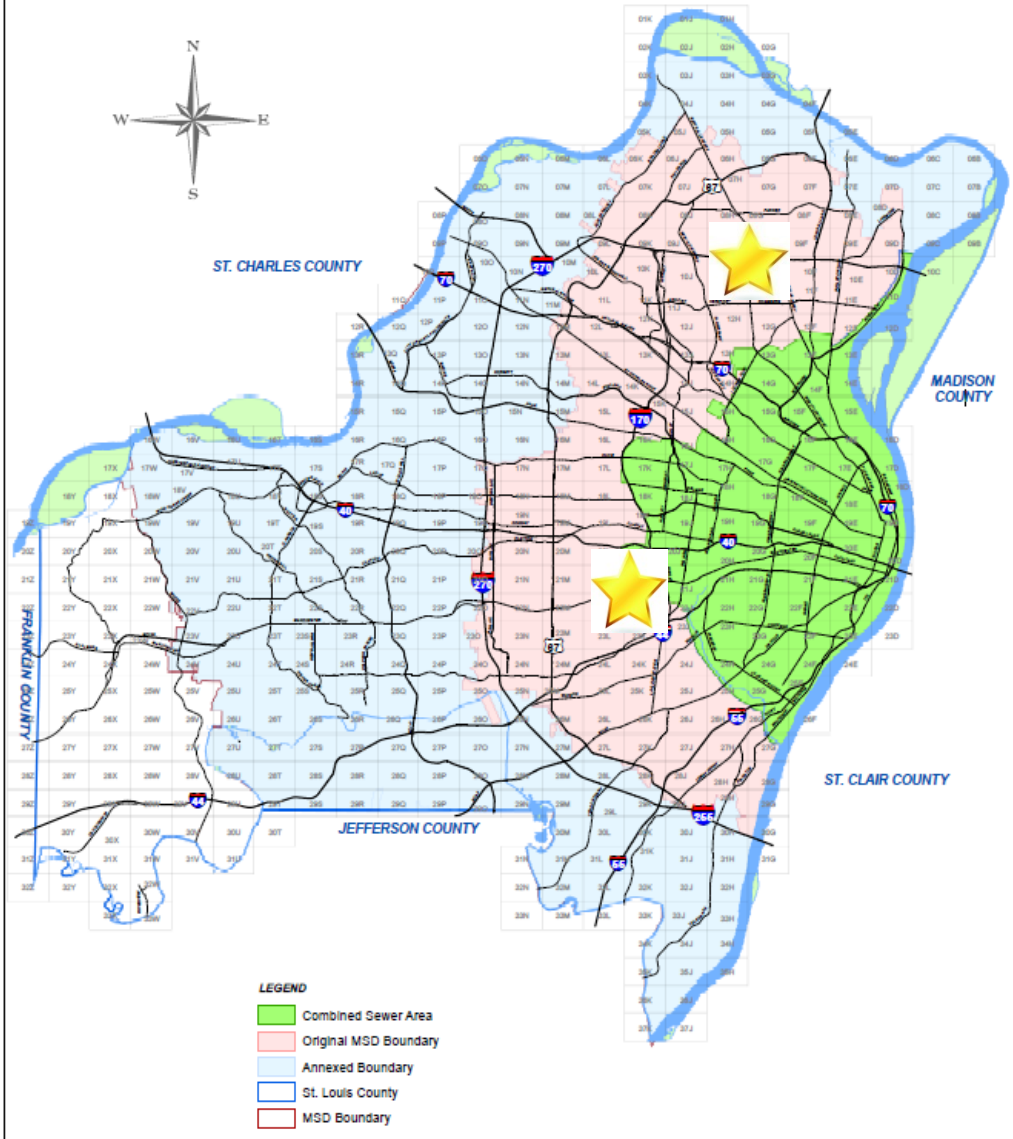
- ④ Acoustically Inspect pipe
- ④ CCTV pipe (approx. 20%)
- ④ Clean pipe (hydro-flush or cobra saw)
- ④ Acoustic Inspect again





The Metropolitan St. Louis Sewer District

COMBINED SEWER AREA



2015 Pilot Results

September 2015 semi-annual CD meeting

- Number of sewer reaches inspected – 443
- Length inspected – 79,239 feet



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Rating	# of Reaches	Feet
– Rating = 0	25	7,171
– Rating = 1	20	5,254
– Rating = 2	11	2,395
– Rating = 3	12	2,766
– Rating = 4	15	3,574
– Rating = 5	45	9,913
– Rating = 6	40	8,066
– Rating = 7	60	10,351
– Rating = 8	115	14,913
– Rating = 9	85	11,086
– Rating = 10	25	3,750

Rating 0-5

128 reaches

31,072'

39.2% of total

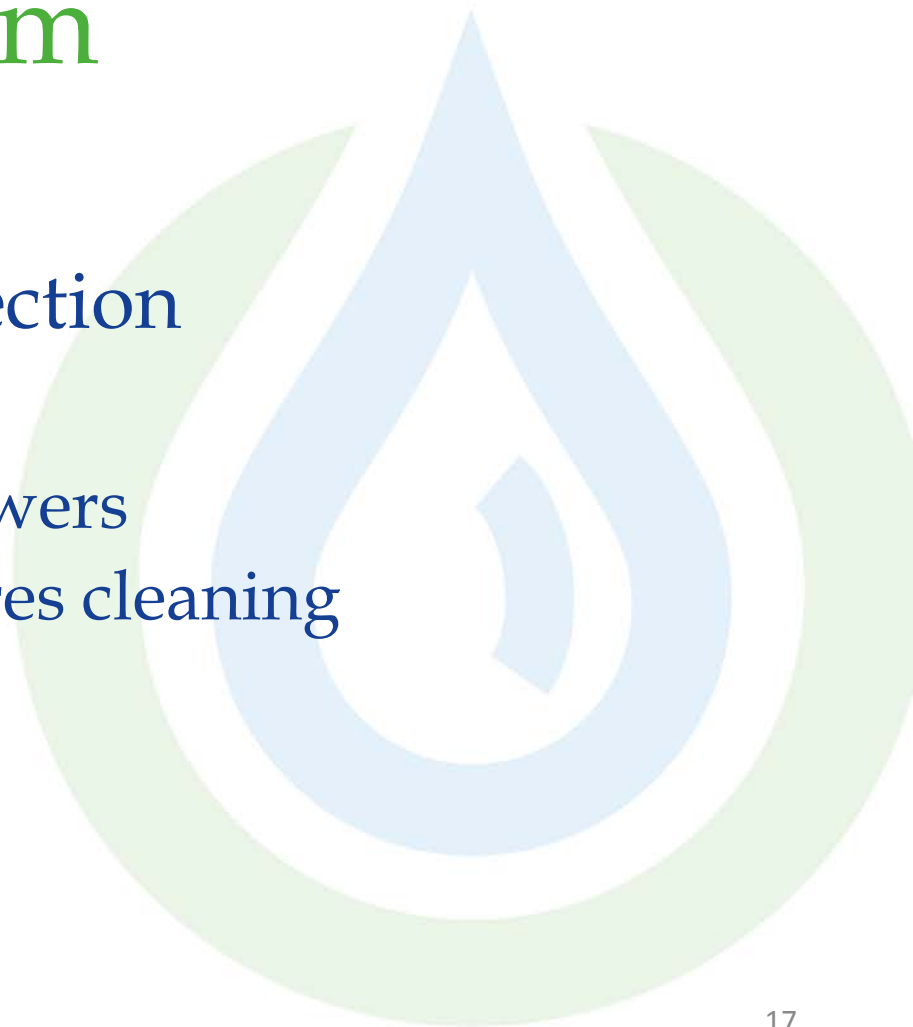
Next Steps

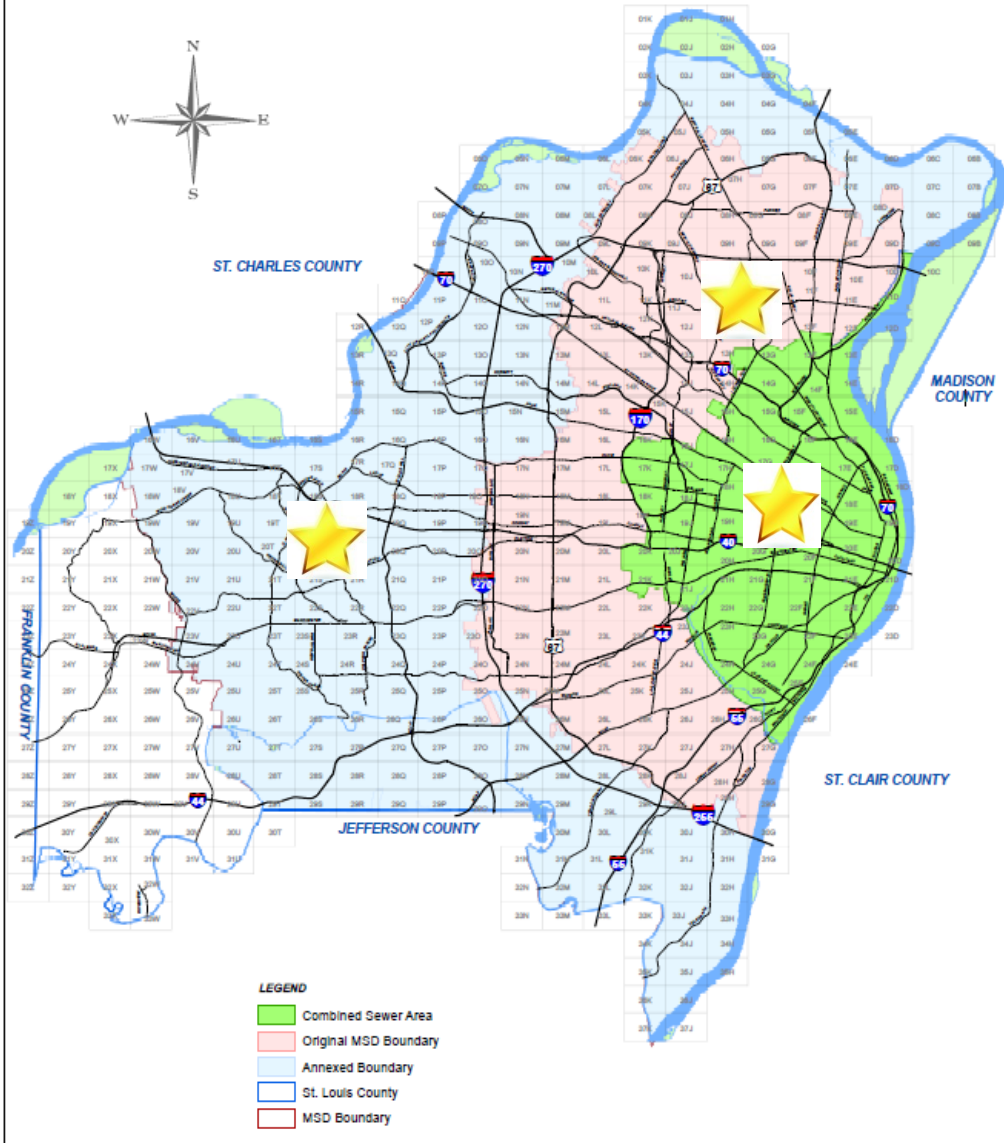
- 🔹 Agreed – Has Merit; More data needed
- 🔹 Round 2
 - Bigger and Better



2016 Pilot Program

- ④ Purchased instrument
- ④ 5+ months of data collection
- ④ 100 mile target goal
 - Combined/Separate Sewers
 - Verify rating that requires cleaning
 - Max pipe diameter
- ④ Self performed
 - 2800+ man-hour effort





2016 Pilot Results

September 2016 semi-annual CD meeting



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- Total Inspections – 2,224

- Fronts (1,735)
- Rears (489)

- Non PVC Pipe (1,718)
- PVC Pipe (506)

Sewer Rating	WO Count	Quantity (feet)	Miles	Percent WO	
0	42	12670	2.40	1.90%	
1	32	9780	1.85	1.44%	
2	59	16892	3.20	2.66%	
3	71	19823	3.75	3.21%	
4	79	22650	4.29	3.57%	
5	124	33502	6.35	5.60%	18.37%
6	169	42132	7.98	7.63%	
7	200	44923	8.51	9.03%	
8	593	108094	20.47	26.77%	
9	763	146162	27.68	34.45%	
10	83	19543	3.70	3.75%	
	2224	476171	90.18	100.00%	



2016 Pilot Results

September 2016 semi-annual CD meeting

	Acoustic Rating												
Pipe Dia.	0	1	2	3	4	5	6	7	8	9	10	total	
6				1								1	
8	25	21	28	36	42	81	124	136	516	679	58	1746	
10		1	1	4	4	6	6	7	13	17	3	62	
12	13	7	23	22	18	28	21	16	32	19	10	209	
15		2	7	8	14	8	17	10	23	33	7	129	
16	4	1					1	1	1	2		10	
18						1		3	6	10	4	24	
21									1	3	1	5	



2016 Pilot Results

September 2016 semi-annual CD meeting

- 🔹 High amounts of debris
- 🔹 High # of connections
- 🔹 Older

Combined Area	WO Count	Quantity (feet)	Miles	Percent WO	
0	23	7551	1.43	6.93%	
1	11	3699	0.70	3.31%	
2	33	8786	1.66	9.94%	
3	35	9412	1.78	10.54%	
4	41	11167	2.11	12.35%	
5	51	13299	2.52	15.36%	58.43%
6	50	11042	2.09	15.06%	
7	30	5829	1.10	9.04%	
8	34	2912	0.55	10.24%	
9	20	1909	0.36	6.02%	
10	4	277	0.05	1.20%	
	332	75883	14.37	100.00%	

	WO Count
Non Plastic	319
Plastic	13



2016 Pilot Results

September 2016 semi-annual CD meeting

New Separate					
Sewer Rating	WO Count	Quantity (feet)	Miles	Percent WO	
0	8	1767	0.33	0.76%	
1	5	724	0.14	0.48%	
2	3	508	0.10	0.29%	
3	5	965	0.18	0.48%	
4	6	977	0.19	0.57%	
5	9	1964	0.37	0.86%	3.44%
6	22	3763	0.71	2.10%	
7	59	11216	2.12	5.63%	
8	373	66270	12.55	35.59%	
9	506	98387	18.63	48.28%	
10	52	12200	2.31	4.96%	
	1048	198741	37.64	100.00%	

	WO Count
Non Plastic	604
Plastic	444

Old Separate					
Sewer Rating	WO Count	Quantity (feet)	Miles	Percent WO	
0	11	3352	0.63	1.36%	
1	16	5357	1.01	1.98%	
2	23	7598	1.44	2.85%	
3	30	9181	1.74	3.72%	
4	32	10506	1.99	3.97%	
5	61	17261	3.27	7.56%	21.44%
6	93	25865	4.90	11.52%	
7	108	27162	5.14	13.38%	
8	184	38416	7.28	22.80%	
9	222	43010	8.15	27.51%	
10	27	7066	1.34	3.35%	
	807	194774	36.89	100.00%	

	WO Count
Non Plastic	758
Plastic	49

Videos

– 9 Rating

- 8" VCP, 112 ft.

– 2 Rating

- 8" VCP, 330 ft.



2016 Pilot Results

September 2016 semi-annual CD meeting

- 🌊 Combined – 58.43%
- 🌊 New Separate – 3.44%
- 🌊 Old Separate – 21.44%
- 🌊 Total – 18.37%

- Investigations confirm that an inspection score of 6-10 indicates a clean sewer reach, and a score of 0-5 indicates a sewer reach that should be cleaned
- Not recommended for Combined Sewer System based on large percentage of inspections with a 5 or less rating
- Acoustic Inspection should only be used on 15” diameter pipe or less

2016 Pilot Results

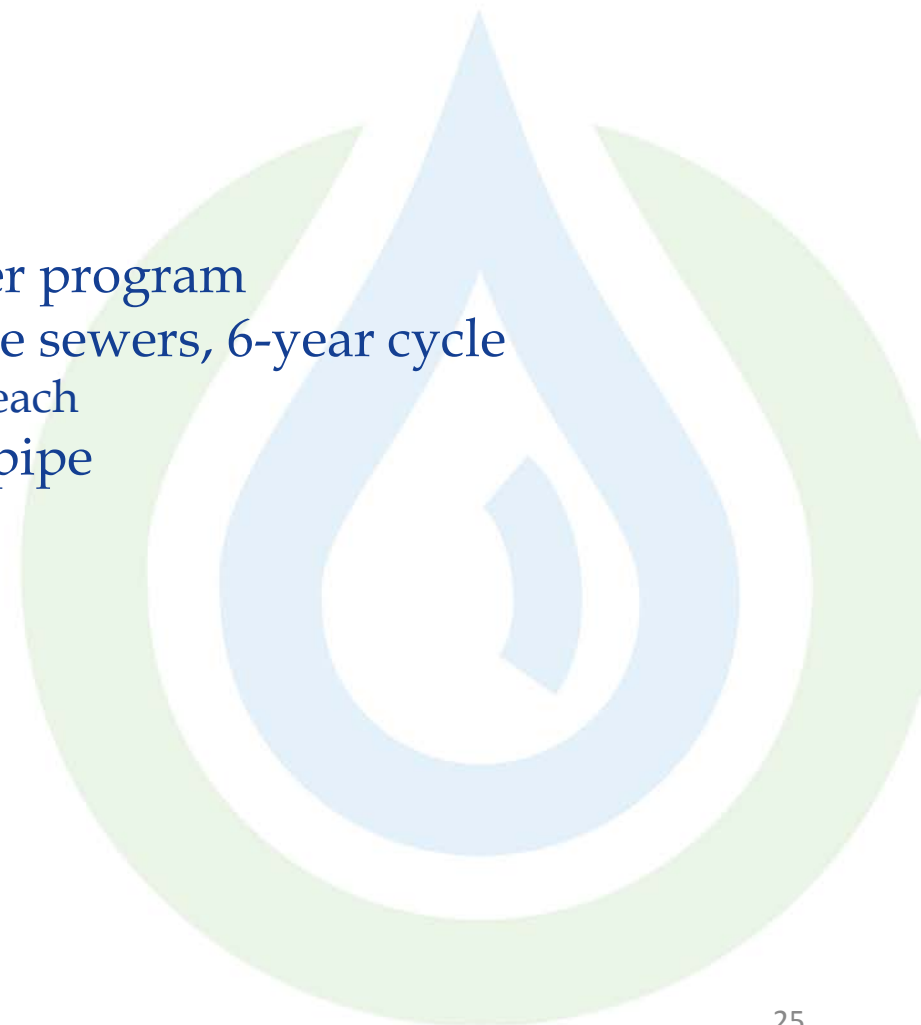
September 2016 semi-annual CD meeting

Recommendations

- No changes to combined sewer program
- Acoustic inspect $\leq 15''$ separate sewers, 6-year cycle
 - 0 thru 5 acoustic rating, clean reach
- No changes for $>15''$ or $\leq 21''$ pipe

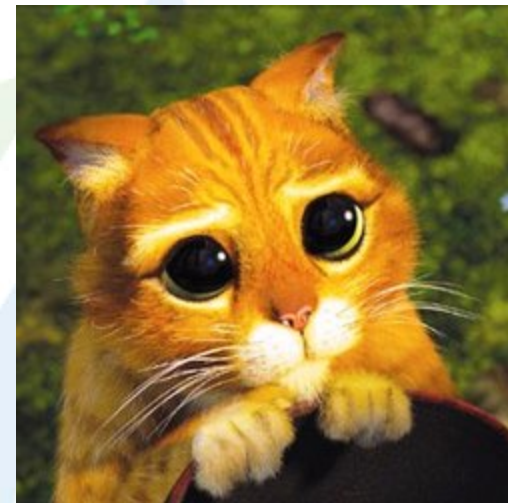
Next Steps

- Submit Formal Request



Final Submittal Request

- 💧 Combined System
 - Clean on 5-year cycle, $\leq 21''$ pipe
- 💧 Separate System, $\leq 15''$ pipe
 - Acoustic Inspect on 6-year cycle
 - Clean 0 thru 5 rated pipe
- 💧 Separate System, $>15''$ to $\leq 21''$
 - Clean on 6-year cycle
- 💧 $> 21''$ – Clean as necessary

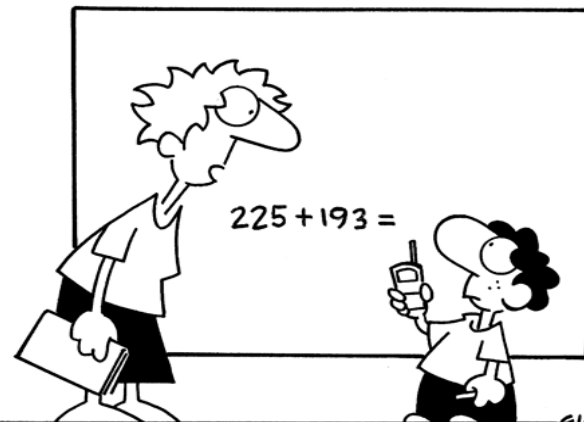


Math

Combined System $\leq 21''$ pipe

- 940 miles Non-pvc
- 55 miles PVC
- Old CMOM Cleaning
 - 188 miles Non-PVC
 - 5.5 miles PVC
 - Total: 193.5 miles
- New CMOM Cleaning
 - 199 miles

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"You have to solve this problem by yourself. You can't call tech support."

Math

🔍 Separate System $\leq 21''$ pipe

- 2,341 miles Non-pvc
- 2,035 miles PVC

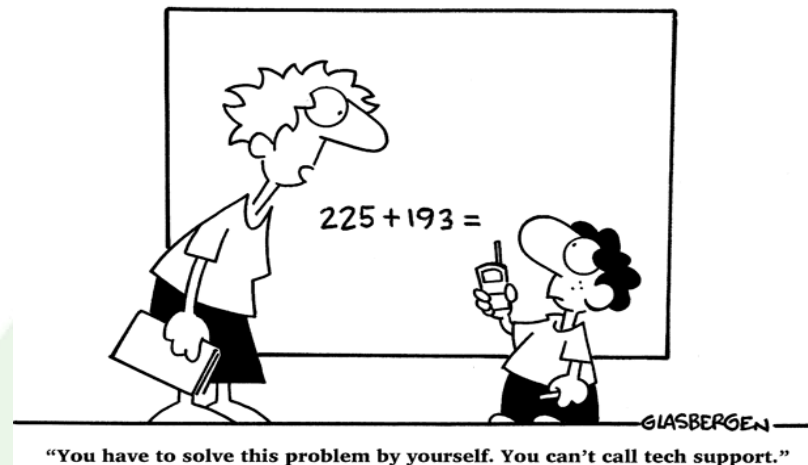
– Old CMOM Cleaning

- 468.2 miles Non-PVC
- 203.5 miles PVC
- Total: 671.7 miles

– New CMOM

- Acoustic $\leq 15''$ (97.2% of Separate System)
 - 709 miles (clean approx. 20% or 140 miles)
- Clean $> 15''$ to $\leq 21''$ (2.8% of Separate System)
 - 20.4 miles

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Approval

- 🔹 Approval – December 2016
- 🔹 Purchase Equipment
 - Acoustic units
 - Tablets
 - Repurpose fleet
- 🔹 Program CMMS
 - Acoustic Inspection
 - Auto escalation
- 🔹 Train Employees



New Program

- 💧 Acoustic Inspection
- 💧 If pipe rating = 0-5: Clean
- 💧 If cleaning generates > 1 bucket debris: CCTV
- 💧 If CCTV scores 4 or 5: repair as necessary

Expectations

- 🔹 Improved Safety
- 🔹 Reduced Cost
 - 40% of cleaning cost
- 🔹 Goals
 - 4,000' per day average
 - Reduced SSO's & WBU's



Year to Date Results

Select Year: 2017

Acoustic Inspections

MSD | Yards (by Crew) | Yards (by SA) | Cost Info | **Sewer Rating** | About

GY | MY | SY

Conditions- YTD

Rating	Inspections
0	69
1	50
2	41
3	48
4	67
5	122
6	618
7	1172
8	2931
9	3879
10	619

Conditions-ByMonth

JANUARY
 FEBRUARY
 MARCH
 APRIL
 MAY
 JUNE
 JULY
 AUGUST

Rating	Inspections
0	6
2	1
3	2
4	3
5	4
6	39
7	85
8	447
9	836
10	161

Rating Legend

Poor

0
 1
 2
 3
 4
 5
 6
 7
 8
 9
 10
 Excellent

Rating	CrewId	Inspection:
0	GYAC4	6
0	GYAC3	1
0	GYAC2	3
0	GYAC1	26

Questions?



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