Public Works Department

Sewer Acoustical Inspection Report

April 27, 2020

Acoustical Testing Technology

Ivins City is piloting a new system of sewer inspection and cleaning based on a new technology that employs soundwaves to assess the openness of a sewer pipeline. The product used is called the Sewer Line Rapid Assessment Tool (SL-RAT) made by InfoSense, Inc. The technology comes with a transmitting device and a receiving device as shown in the pictures below.



Each device is set in manholes connected by the segment of pipeline that is desired to be inspected. After 1 to 2 minutes of acoustic measurements, the devices produce a score from 0 to 10 which indicates a level of blockage with 0 being totally blocked and 10 meaning totally open. The manufacturer indicates the following qualitative descriptions for a indication of the meaning of the score:

Acoustical Assessment Score	Qualitative Description
0	Blocked
1-3	Poor
4-6	Fair
7-10	Good

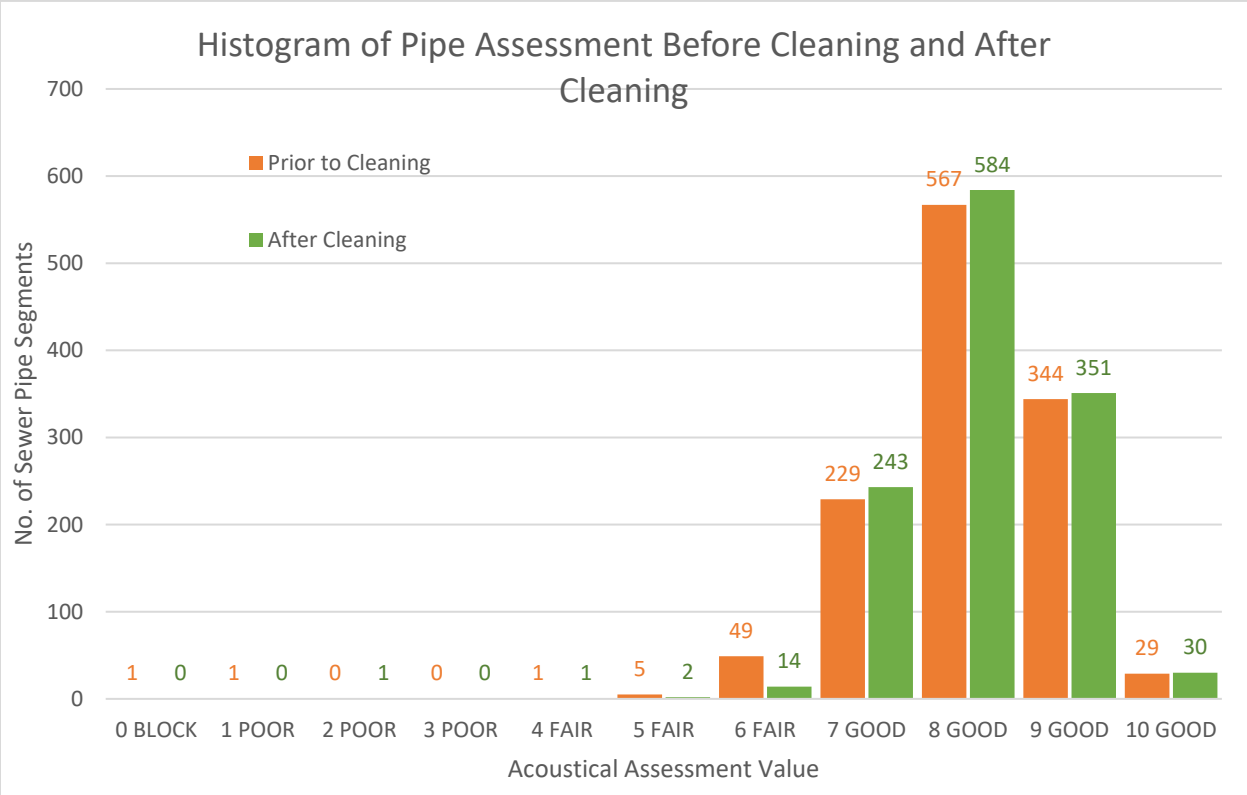
Procedures

- The testing began on March 19, 2020 and the entire system had been tested on April 13, 2020.
- Any results that scored 6 or were cleaned and jetted by the crew with the vacuum-jet trucks.
- After the cleaning, the manholes were retested with the acoustical equipment. The system was cleaned and tested on April 20, 2020

Results:

The following results are reported below:

Openness Assessment Value	No. of Segments Tested Prior to Cleaning	Total System After Cleaning Pipes with Scores of 6 or less
0 BLOCK	1	0
1 POOR	1	0
2 POOR	0	1
3 POOR	0	0
4 FAIR	1	1
5 FAIR	5	2
6 FAIR	49	14
7 GOOD	229	243
8 GOOD	567	584
9 GOOD	344	351
10 GOOD	29	30

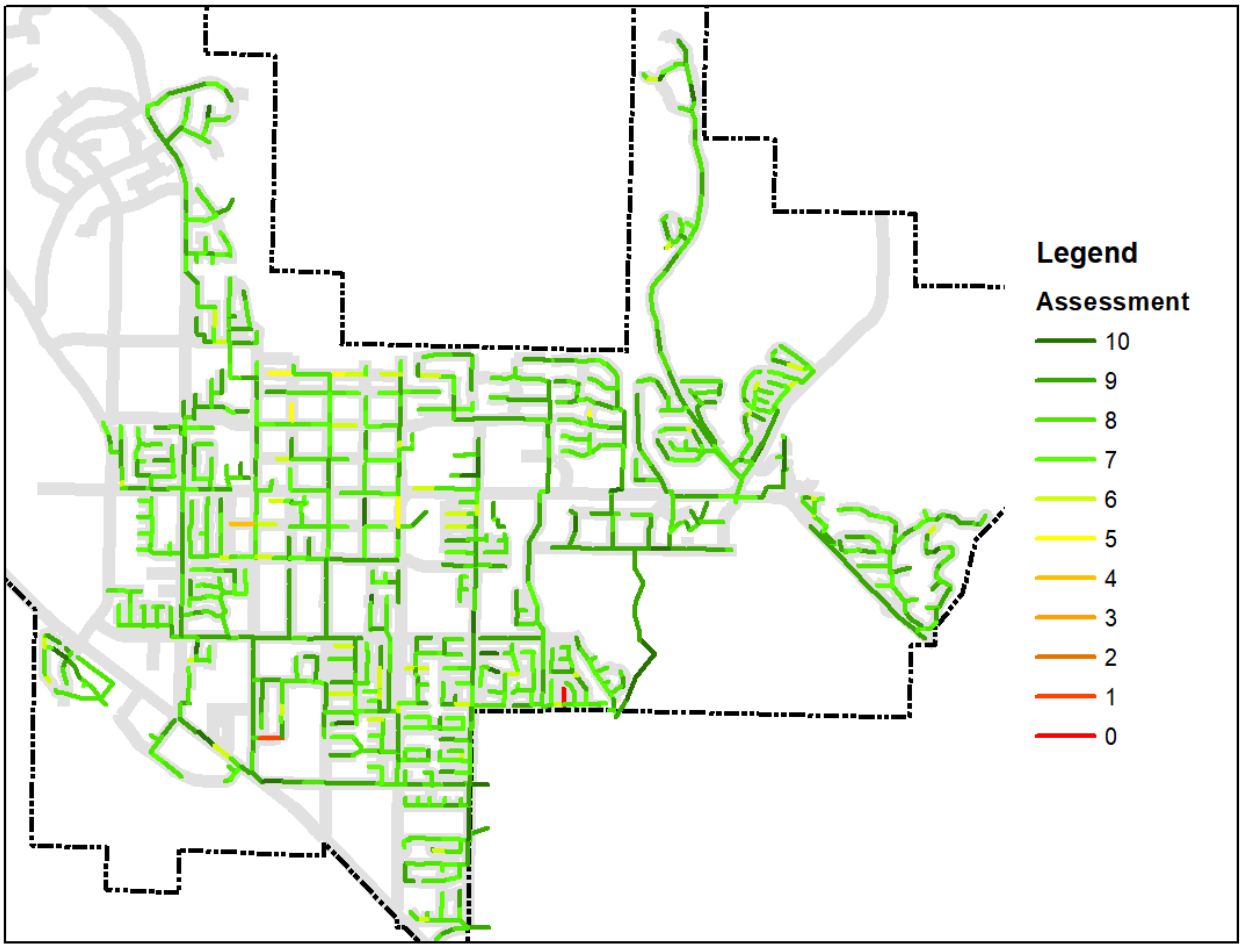


Condition	Prior to Cleaning		After Cleaning	
BLOCK	1	0.08%	0	0.00%
POOR	1	0.08%	1	0.08%
FAIR	55	4.5%	17	1.4%
GOOD	1169	95.4%	1208	98.5%
Total	1226		1226	

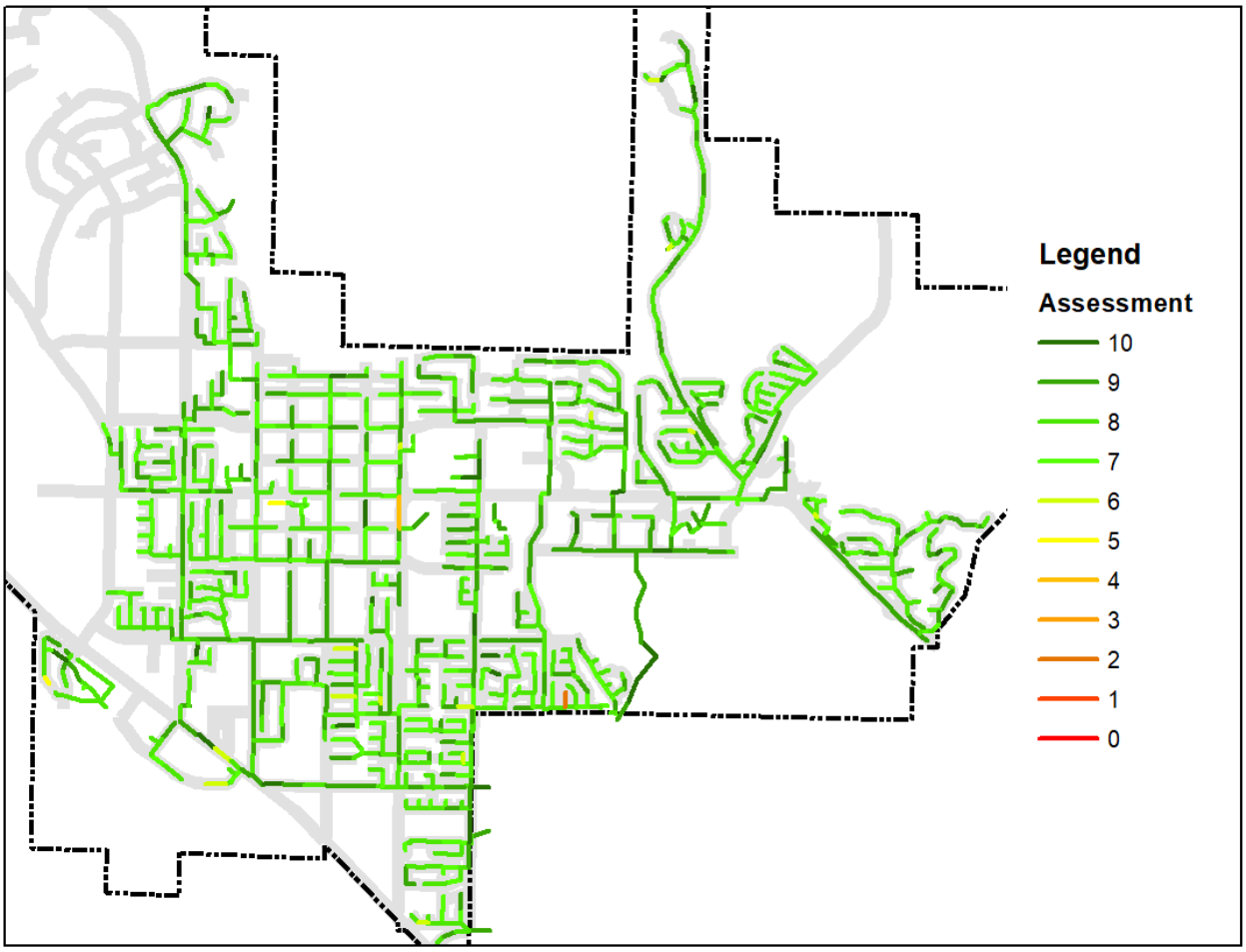
As presented above, it was determined to clean and jet 57 pipe segments that were in FAIR, POOR or BLOCK condition (received acoustical scores of 6 or less). These 57 segments represent 4.6% of the entire system.

Appendix A shows a list of all of the pipes cleaned and retested. A map of the scores for the pipe before testing and after testing is shown below:

Map 1, Initial Testing Before Cleaning



Map 2, Final Testing After Cleaning



After the cleaning and retesting the following observation are made:

- 1208 of 1226 pipe segments, 98.5% are in “GOOD” condition. 17 pipe segments or 1.4% are in in “FAIR” condition. Only 1 pipe segment remains in “POOR” condition.
- The blocked pipe at 680 E from 540 S to 580 S improved to a “POOR” condition, score 2. This is the only pipe that remained in “POOR” condition. There is likely to be a deep pipe belly, significant root or other similar blockage on this segment.
- 9 of the 57 pipe segments had no change in score. This may be due to a structural problem such as belly in the pipe or a blockage that could not be cleared with jetting such as a tree root.
- 3 of the 57 pipe segments that were cleaned scored a lower acoustical score after cleaning.
- 17 pipes improved the score by 1 point.
- 16 pipes improved the score by 2 points.
- 12 pipe segments improved in the score by 3 or more, up to 7 points.

Conclusions and Recommendations

- All pipes that remain in “POOR” and “FAIR” condition should be inspected with a video camera to identify the reasons for the continued obstruction.
- It is anticipated that the segment on 680 East in Red Rock Subdivision will need a repair.

- This new technology does appear to be valuable in reducing the City's labor costs by reducing the regular practice of cleaning pipes that may not need to be cleaned.
    - Prior to this technology being introduced the City policy was to set a goal to clean all sewer pipes once every two years, basically cleaning somewhere between 33 to 50% of the system each year. It is now recommended that we conduct the acoustical testing every year and only clean the pipes that fall in the FAIR, POOR, and BLOCK category. (As the system ages, it may be possible to allow some of the FAIR segments to go uncleaned.) So far this means a reduction of cleaning responsibilities by 10X!
- The City has been trying to survey by video camera 15% of the system each year with the intent of getting the entire system surveyed every 7 years. The City has forgone the camera contract this year and used this budget instead to pay for the rental of the acoustic device. It may be still necessary to obtain video footage of the entire system periodically since there are some problems that would remain undetected by the acoustical survey such as broken pipe, groundwater infiltration, root obstructions, pipe sags, and other defects. The Public Works Department needs to determine what is the appropriate level of video survey needed while using this technology.

Appendix A: Pipe Segments Cleaned and Retested.

Pipe ID	Location	1st Test	2nd Test After Cleaning	Score Improvement	Size (in)	Slope	Video Needed?	Notes
6821	680 E from 540 S to 580 S	0	2	2	8	2.15%	Yes	Belly likely, needs video, possibly replacement
7048	200 E fr Center to 100 S	5	4	-1	8		Yes	Pipe may have a belly, need to camera pipe
	Tuscano West	6	5	-1	8		Yes	
7109	Wild Indigo Wy from 531 S to 510 S	6	5	-1	8		Yes	Still Dirty?
7334	Desert Ln fr 250 N to Palisades Dr	5	6	1	8		Maybe	Dirty Pipe, Low Flows
6411	Copper Canyon Dr fr #21 to #5	6	6	0	8	2.12%	Maybe	Dirty Pipe, Low Flows
7162	Encanto fr #2 to #1	6	6	0	8	1.20%	Yes	Pipe may have a belly
6693	420 S fr 20 E to 75 E	6	6	0	8	2.27%	Maybe	Low Flows, Belly?
6601	550 S fr 15 E to 75E	6	6	0	8	1.54%	Maybe	Low Flows, Belly?
6580	150 E fr 550 S to 580 S	6	6	0	8	1.25%	Maybe	Low Flows, Dirty Pipe, Belly?
6535	580 S fr 380 E to 400 E	6	6	0	8	1.13%	Maybe	Belly?
6824	1175 S from 260 E to 290 E	6	6	0	8	0.51%	Maybe	Low Flow, Flat, Belly?
7005	Fitness Wy from 350 W to 270 W		6		8	0.50%	Yes	Flat, Belly?
6738	350 N fr 160 W to 100 W	5	7	2	8	0.40%		Dirty Pipe, Flat
6032	325 W fr 550 N to 490 N	6	7	1	8	1.70%		Dirty Pipe, Low Flows
6016	450 N 325 W to 300 W	6	7	1	8	0.70%		Dirty Pipe, Flat, Smells common, needs annual cleaning
6694	350 N fr 150 E to 200 E	6	7	1	8	0.92%		Dirty Pipe, Low Flows
6662	Vermillion Cliffs Dr fr #6 to #2	6	7	1	8	0.58%		Dirty Pipe Low Flows
6657	Scottsdale Dr from #46 to Prescott Ln	6	7	1	8	2.50%		Dirty Pipe, Low Flows
7166	Encanto fr #12 to #14	6	7	1	8	2.67%		Dirty Pipe, Low Flows
6928	Tuscan Gr Lane fr 25 N to Center	6	7	1	8	2.04%		Dirty Pipe
6935	200 S from 285 W to 265 W	6	7	1	8	0.68%		Dirty Pipe, Flat
6482	400 E fr 30 S to 60 S	6	7	1	8	3.46%		Dirty Pipe
6752	120 W fr 600 S to 580 S	6	7	1	8	0.12%		Dirty Pipe, Flat
6807	150 E fr 490 S to 540 S	6	7	1	8	1.71%		Dirty Pipe
6746	200 E fr 560 S to 600 S	6	7	1	8	0.08%		Flat, Dirty
6570	625 S from 120 E to 160 E	6	7	1	8	1.18%		Dirty
6890	710 S from 100 E to 100 E (backyards)	6	7	1	8	1.07%		Dirty
7187	Talon Wy fr 270 W to Quail Pl	7	7	0	8	0.52%		Dirty Pipe, Low Flows, Flat
	Tuscano East	7	7	0	8			
6755	685 S fr 170 W to 120 W	1	8	7	8	0.58%	Yes	Belly possible, needs video
6723	100 S fr 260 W to 200 W	4	8	4	8	0.50%	Maybe	Dirty Pipe, Flat, Low Flows
6556	Eagle Rock Dr from 320 N to Scotsdale Dr	6	8	2	8	1.84%		Dirty Pipe
6308	The Springs from fr #25 to #24	6	8	2	8	0.59%		Dirty Pipe, Low Flows, Flat
6939	The Reserve fr #126 to #125	6	8	2	8	2.03%		Dirty Pipe, Low Flows
7359	Center ST fr 225 E to 290 E	6	8	2	8			Dirty Pipe, Low Flows
6888	200 S from 200 W to 150 W	6	8	2	8	0%		Dirty Pipe, Flat
6721	100 S from 160 W to 200 W	6	8	2	8	2.63%		Dirty Pipe, Low Flows
7106	Wild Indigo Wy from 408 S to 430 S	6	8	2	8			Dirty Pipe, Low Flows
	Haven	6	8	2	8			Dirty Pipe, Low Flows
6557	500 S fr 220 E to 250 E	6	8	2	8	0.86%		Dirty, Low Flow
6558	500 S fr 275 E to 250 E	6	8	2	8	0.54%		Dirty, Low Flow
6372	Padre Lakes Dr fr Coyote Wy to Sage Dr	6	8	2	8	0.49%		Dirty, Flat
6342	490 S fr 670 E to 690 E	6	8	2	8	2.35%		Dirty
6336	580 S from 680 E to 625 E	6	8	2	8	1.78%		Dirty
7056	Desert Gardens Ln from 307 E to 337 E	6	8	2	8	0.50%		Dirty, Low Flow
6564	755 S from 125 E to 160 E	7	8	1	8	0.65%		Dirty
6716	100 W fr 260 N to 200 N	5	9	4	8	4.04%		Dirty Pipe, Low Flows
6695	350 N fr 100 E to 50 E	6	9	3	8	2.44%		Dirty Pipe, Low Flows
7243	350 N fr 250 E to 300 E	6	9	3	8			Dirty Pipe, Low Flows
6730	100 N fr 140 W to 100 W	6	9	3	8	0.61%		Dirty Pipe, Low Flows, Flat
6703	200N from 75 E to Main	6	9	3	8	1.29%		Dirty Pipe, Low Flows
6479	60 S from 320 E to 375 E	6	9	3	8	3.33%		Dirty Pipe, Low Flows
6478	100 S from 320 E to 375 E	6	9	3	8	2.34%		Dirty Pipe, Low Flows
6508	380 E from 700 S to 740 S	6	9	3	8	1.52%		Dirty
6477	100 S from 375 E to 400 E	8	9	1	8	1.19%		Not Dirty
6711	350 N fr 50 E to Main	5	10	5	8	1.08%		Dirty Pipe