

## 2017 CCTV Inspection Analysis

#### Inspection Results

The CCTV inspection covered 27 segments and a total of 5,567 feet of vitrified clay pipe (VCP) sanitary sewer pipeline during the 2017 inspection program.

In the field, wastewater collection system CCTV observation information was collected in the form of video recordings and an electronic data log by Flowline LLC. These electronic logs were reviewed and compiled. The inspectors in the field used the NASSCO Pipeline Assessment & Certification Program (PACP) coding system to record observations.

Typical defects found within the Minerva Park collection system during the 2017 inspections are detailed below.

#### Structural Issues

**Broken Pipe** – One type of structural problem observed was broken pipe segments with visible voids behind the break. A broken pipe section seen during CCTV inspection is shown in Figure 1. Breaks may be the result of excessive loading, improper installation, or pipe deterioration. These defects may allow leakage of raw sewage into the ground and significant inflow of groundwater which may cause sinkholes.



**Figure 1** Broken Pipe in Segment MH 033 to MH 032

**Fractured Pipe** – Figure 2 shows a fractured pipe section. Fractures are defects where there is a clear separation between the fragments, but no hole has yet been formed. Like breaks, fractures may be the result of excessive loading, improper installation, or pipe deterioration. Left unabated, fractures can worsen over time to cause pipe deflection and collapse.







Figure 2 Fractured Pipe in Segment MH 018 to MH 005



Figure 3 Cracked Pipe in Segment MH 021 to MH 019

Separated Joints – Offset joints between pipe segments can allow groundwater infiltration to occur, will contribute to uneven stresses on the pipe, and can cause further cracks and damage. This defect is considered structural and is evaluated accordingly. Figure 4 shows an example of a separated joint.



Figure 4 Offset Joint in Segment MH 072 to MH 071

Vertical Alignment Defects – Several vertical alignment defects were recorded during the inspection process. This type of defect creates hydraulic bottlenecks which reduce the system's hydraulic carrying capacity and causes elevated water levels within the pipe segment. Figure 5 shows flow conditions of a vertical alignment defect.



Figure 5 Sag in Pipe Segment MH 030 to MH 029

Attached Encrustation – Most pipe segments had light to moderate attached encrustation (DEA) along the pipe walls. The buildup can restrict the flow and reduce hydraulic performance. An example of encrustation buildup along the mainline is shown in Figure 6.



**Figure 6** Deposits Attached in Pipe Segment MH 002 to MH 001

**Roots** – Another observed problem was light to heavy root intrusion. In some cases, heavy roots impeded the travel of the CCTV camera. Roots are a maintenance problem and must be removed through cleaning and cutting activities or chemical treatment. Roots may also cause structural damage to pipe joints and walls by growing and forcing cracks to open, requiring pipe replacement. Intrusion of roots at joints is shown in Figure 7.



**Figure 7** *Root Intrusion in Segment MH 034 to MH 032* 

The majority of the pipe segments inspected in 2017 were in poor condition. Evaluation, analysis, and recommendations for the defects that were observed are described below.

#### Data Analysis

The goal of the Minerva Park condition assessment was to provide data necessary to make decisions on sewer repairs and improvements for the inspected pipe segments by quantifying the presence of defects in a pipe segment. The CCTV inspection process described previously was the first step in determining the need for improvements. The CCTV observations of pipe defects were subsequently translated into a pipe condition grade which in turn permitted prioritization and recommendations for each asset. Table 1 below summarizes the pipe condition grades used.

Table 1
Pipe Condition Grades

Condition Grade	Description
А	Pipe in sound condition. Perform routine inspection.
В	Pipe in generally good condition. Perform maintenance activities (e.g., routine inspection and cleaning) on infrequent basis.
С	Point repairs should be carried out to extend pipe life and reduce likelihood of problems. Perform routine maintenance activities.
D	Major repairs necessary to maintain service in structurally-damaged pipes. Pipe replacement or relining should be considered. Proactive maintenance required until repairs are made.
F	Imminent Failure. Replace or rehabilitate pipe as soon as possible in order to maintain service. Proactive maintenance required until repairs are made.

## Source: National Association of Sewer Service Companies (NASSCO) Pipeline Assessment & Certification Program (PACP) defect coding system

The percentages of pipe segments in each of the condition grades for the pipes inspected in 2017 are listed below. Figure 8 shows the graphical representation of the distribution of the pipe segments based on overall condition grade.

#### **Inspected Pipe Segments in 2017**

- 0 percent of pipes are in Grade A condition
- 0 percent of pipes are in Grade B condition
- 4 percent of pipes are in Grade C condition
- 96 percent of pipes are in Grade D condition

The calculated pipe grades and defect information for all the inspected pipe segments in 2017 are provided in the summary table in Appendix B.





### Pipeline Recommendations

The plan to address the issues present in the sewer collection system is based on the prioritization criteria listed in Table 2.

#### Table 2

Prioritization Criteria

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Priority	Description
1	Address safety issues that may be present as a result of the poor condition of the sewer system.
2	Restore the original hydraulic carrying capacity of the sewer system.
3	Reinspect the pipe segments whose inspection was abandoned due to maintenance, structural issues or CCTV camera limitations in the field.
4	Address minor pipe maintenance issues as resources are available.
0	No direct action required until next regular inspection cycle.

Based on the number and degree of defects in each pipe segment, a priority rating was assigned. Table 3 below summarizes the pipe counts for each grade and corresponding prioritization, and Figure 9 displays the results graphically.

#### Table 3

Grade and Priority Summary Pipe Counts

			Priority		
Pipe Grade	0	4	3	2	1
А	0	0	0	0	0
В	0	0	0	0	0
С	0	0	0	1	0
D	0	0	0	26	0
F	0	0	0	0	0
TOTAL	0	0	0	27	0





Recommendations for each pipe segment were based on the number and severity of defects observed during each inspection. Recommendations can be summarized into the following groups:

- Removal of attached encrustation and Root-Cutting Removal of attached encrustation and roots ٠ before lining of the pipe.
- Line or Replace Rehabilitation lining is the restoration or improvement of the functional service of ٠ an existing pipeline system. Rehabilitation methods include cured in place pipe, sliplining, and plastic lining. Replacement refers to the construction of a new sewer, on or off the line of an existing sewer. The function of the new sewer will incorporate that of the old, but may also include other improvements or development work. This can be carried out by open cut or trenchless methods.
- Point Repair Rectify damage to the structural fabric of the sewer, but reconstruction of a whole ٠ pipeline is not necessary. Robotics or mechanical methods are used to perform localized point repairs.

Table 4 and Figure 10 summarize the recommendations for all of the pipe segments inspected in 2017. A complete listing of each pipe segment and its associated grade, priority, and recommendation may be found in Appendix A.

Recommendation Summary Table										
Recommendation	Footage	% Total								
Point repair	98	2%								
Encrustation removal and Line	3,097	56%								
Line	1,193	21%								
Root Cut/Encrustation removal and Line	1,180	21%								
TOTAL	5,567	100%								

# Table 4



#### Figure 10

**Recommendation Summary** 

It is recommended that the Village of Minerva Park implement a pipe line rehabilitation program to repair deficiencies found during CCTV inspection. Improvements have been categorized as Priority 2 or 3. No defects were identified as Priority 1 requiring immediate repair. All pipe line point repairs were identified as Priority 2 and should be scheduled for repair within 1-2 years. Pipe line rehabilitation should include two (2) point repairs on one (1) pipe lines at an estimated cost of \$20,000, fourteen (14) lines need removal of encrustation and lining at an estimated cost of \$205,700, eight (8) lines need to be lined at an estimated cost of \$53,700, and four (4) lines need root cut with removal of encrustation and lining at estimated cost of \$83,600. Total planning level cost to implement the recommended improvement program is \$526,400. A summary of pipe line improvement cost is shown in Table 5. Detailed recommendations are provided in Appendix A.

#### Table 5

Recommended Pipe Line Improvement Summary

Recommendation	Quantity	Cost (\$)
Priority 2		
Point Repairs	2	\$20,000
Line	1,193 (LF)	\$53,700
Encrustation removal and Line	3,097 (LF)	\$205,700
Root Cut/Encrustation removal and Line	1,180 (LF)	\$83,600
Sub-Total		\$363,000
20% Legal, Administration, and Design		\$72,600
25% Contingency		\$90,800
Sub-Total		\$136,300
TOTAL		\$526,400

# Appendix A – Pipe Segment CCTV Inspections Summary

Control         Control <t< th=""><th colspan="12">APPENDIX A</th></t<>	APPENDIX A																		
Content         Content <t< td=""><td></td><td>Туре</td><td></td><td></td><td></td><td>1</td><td></td><td>Priority</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>		Туре				1		Priority											
i         i		No defects						1	Immediate	a action: Safety issues may be present due to	poor condition								
D         Distance intervent weiser weis	B	B Maintenance defects (clean and inspect regularly)				2	First phas	e project: Restore hydraulic capacity											
Description         Description <thdescription< th=""> <thdescription< th=""></thdescription<></thdescription<>	С	C Defects noted (Line or point repairs)					3	Second pl	hase project: Clean/re-CCTV incomplete inspe	ections or repair,									
Control         Control <t< td=""><td>D</td><td>Pipe failed or obst</td><td>efects (repai</td><td>r, line or rep</td><td>place)</td><td></td><td></td><td>4</td><td>Address a</td><td>as resources are available</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	D	Pipe failed or obst	efects (repai	r, line or rep	place)			4	Address a	as resources are available									
Description         Description <thdescription< th=""> <thdescription< th=""></thdescription<></thdescription<>	Condition Access	Pipe failed of obst			») • 2017	-													
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State         State <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>																			
Image					Incontent										-				
UBBA					Pipe	ссту	ссту	Condition			Reviewed Point					Root Cut and/or		Unit	Total
yz         yz<	US Node	DS Node	Diam(in)	Material	Length	Length	Date CCTV Comments	Grade	Priority	Recommendation	By Repairs Unit	s Unit Price	Lining (ft)	Units	Unit Price	Encrustation removal (ft)	Units	Price	Cost
aby         abs         bb         bb<         b							Multiple cracks and fractures. Multiple Roots at												
And by the second sec	002	001	8	VCP	172	172	8/16/2017 joints. Attached deposits throughout.	D	2	Encrustation removal and Line	RC		172	LF	\$45	172	LF	2.50	\$8,170
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	003	002	8	VCP	258	258	8/16/2017 deposits throughout	D	2	Encrustation removal and Line	RC		258	LE	\$45	258	LE	2 50	\$12 255
Image         Image <th< td=""><td>000</td><td>002</td><td>Ŭ</td><td>101</td><td>200</td><td>200</td><td>Survey abandoned 181' from MH 003 and 91'</td><td>D</td><td></td><td>Enordotation removal and Elife</td><td></td><td></td><td>200</td><td></td><td>φισ</td><td>200</td><td></td><td>2.00</td><td>ψ12,200</td></th<>	000	002	Ŭ	101	200	200	Survey abandoned 181' from MH 003 and 91'	D		Enordotation removal and Elife			200		φισ	200		2.00	ψ12,200
Ability         Ability <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>from MH 004 due to attached deposits. Multiple</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>							from MH 004 due to attached deposits. Multiple												
Obs         Obs <td>004</td> <td>003</td> <td>0</td> <td>VCD</td> <td></td> <td>272</td> <td>cracks and fractures. Attached deposits</td> <td>D</td> <td>2</td> <td>Energy station removel and Line</td> <td>PC .</td> <td></td> <td>272</td> <td>1.5</td> <td>¢ 4E</td> <td>070</td> <td>15</td> <td>2 50</td> <td>¢10.000</td>	004	003	0	VCD		272	cracks and fractures. Attached deposits	D	2	Energy station removel and Line	PC .		272	1.5	¢ 4E	070	15	2 50	¢10.000
bit         bi	004	003	0	VCF		212	Longitudinal cracks at 18.5' and 61' and 71'	D	2		RC		212	LF		212	LF	2.50	<b>Φ12,920</b>
665       0.50       16       0.70       26       1.20							from MH 005. Multiple Roots at joints. Attached												
O       O	005	001	18	VCP	245	245	8/10/2017 deposits throughout	D	2	Encrustation removal and Line	RC		245	LF	\$95	245	LF	2.50	\$23,888
Image: Discreption of the constraint of the	018	005	15	VCP	405	405	8/10/2017 deposits throughout	D	2	Encrustation removal and Line	RC		405	LE	\$75	405	IF	2 50	\$31 388
101       102       1.5       1/02       1.6       1/10 <t< td=""><td>010</td><td>000</td><td>10</td><td>101</td><td>400</td><td>400</td><td>Multiple cracks and fractures. Attached</td><td>D</td><td></td><td>Enordotation removal and Elife</td><td></td><td></td><td>400</td><td></td><td>ψισ</td><td>400</td><td></td><td>2.00</td><td>φ01,000</td></t<>	010	000	10	101	400	400	Multiple cracks and fractures. Attached	D		Enordotation removal and Elife			400		ψισ	400		2.00	φ01,000
000       000       1       Vop       000       1       Vop       000       Vop       000      Vop       000       Vop </td <td>019</td> <td>018</td> <td>15</td> <td>VCP</td> <td>314</td> <td>314</td> <td>8/10/2017 deposits throughout.</td> <td>D</td> <td>2</td> <td>Encrustation removal and Line</td> <td>RC</td> <td></td> <td>314</td> <td>LF</td> <td>\$75</td> <td>314</td> <td>LF</td> <td>2.50</td> <td>\$24,335</td>	019	018	15	VCP	314	314	8/10/2017 deposits throughout.	D	2	Encrustation removal and Line	RC		314	LF	\$75	314	LF	2.50	\$24,335
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	020	010	0	VCP	160	160	Multiple cracks and fractures. Attached	D	2	Encrustation removal and Line	PC		160	15	¢45	160	15	2.50	¢0 020
69       615       VCP       134       13	020	019	0	VCF	109	109	90% of the pipe have cracks and fractures.	D	2		KC		109		φ <del>4</del> 5	109	LI	2.30	φ0,020
Sol         Optical is vold with the state of forward and a forward an	021	019	15	VCP	134	134	11/8/2016 Attached deposits throughout.	D	2	Encrustation removal and Line	RC		134	LF	\$75	134	LF	2.50	\$10,385
bp:         (D7         (D7 <td></td> <td></td> <td></td> <td></td> <td>150</td> <td></td> <td>90% of the pipe have cracks and fractures.</td> <td></td> <td></td> <td></td> <td>50</td> <td></td> <td>450</td> <td></td> <td>075</td> <td>450</td> <td></td> <td>0.50</td> <td><b></b></td>					150		90% of the pipe have cracks and fractures.				50		450		075	450		0.50	<b></b>
ONC         ONC <td>022</td> <td>021</td> <td>15</td> <td>VCP</td> <td>150</td> <td>150</td> <td>8/10/2017 Attached deposits throughout. Multiple cracks and fractures, broken pipe at 85'</td> <td>D</td> <td>2</td> <td>Encrustation removal and Line</td> <td>RC</td> <td></td> <td>150</td> <td>LF</td> <td>\$75</td> <td>150</td> <td>LF</td> <td>2.50</td> <td>\$11,625</td>	022	021	15	VCP	150	150	8/10/2017 Attached deposits throughout. Multiple cracks and fractures, broken pipe at 85'	D	2	Encrustation removal and Line	RC		150	LF	\$75	150	LF	2.50	\$11,625
OPC       OPC       VCP	023	022	8	VCP	89	89	8/10/2017 from MH 023.	D	2	Line	RC		89	LF	\$45				\$4,005
COD         Odd         6         VCP         2/2         2/2         2/2         1/2         2/3         1/2         2/3         1/2         2/3         1/2         2/3         1/2         2/3         1/2         2/3         1/2         2/3         1/2         2/3         1/2         1/3         2/3         1/2         1/3         2/3         1/2         1/3         2/3         1/2         1/3         2/3         1/2         1/3         2/3         1/2         1/3         2/3         1/2         1/3         2/3         1/2         1/3         2/3         1/2         1/3         2/3         1/3         2/3         1/3         2/3         1/3         2/3         1/3         2/3         1/3         2/3         1/3         2/3         1/3         2/3         1/3         2/3         1/3         2/3         1/3         2/3         1/3         2/3         1/3         2/3         1/3         2/3         1/3         2/3         1/3         2/3         1/3         2/3         2/3         2/3         2/3         2/3         2/3         2/3         2/3         2/3         2/3         2/3         2/3         2/3         2/3         2/3         2/3	024	023	8	VCP	143	143	8/10/2017 Multiple cracks and fractures.	D	2	Line	RC		143	LF	\$45				\$6,413
abs         bbs         bbs <td>025</td> <td>024</td> <td>8</td> <td>VCP</td> <td>247</td> <td>247</td> <td>8/10/2017 Multiple cracks and fractures.</td> <td>D</td> <td>2</td> <td>Line</td> <td>RC</td> <td></td> <td>247</td> <td>LF</td> <td>\$45</td> <td></td> <td></td> <td></td> <td>\$11,115</td>	025	024	8	VCP	247	247	8/10/2017 Multiple cracks and fractures.	D	2	Line	RC		247	LF	\$45				\$11,115
03         027         8         VCP         152         2         2         100         102         1         122         17         64         1         15         1	026	025	8	VCP	87	87	8/10/2017 Multiple cracks and fractures.	D	2	Line	RC RC		87		\$45 \$45				\$3,893
000       027       8       VCP       158       190       10	027	024	8	VCP	122	122	8/10/2017 Multiple cracks and fractures.	D	2		RC RC		122	LI	\$45				\$5 468
cost         cost <t< td=""><td>029</td><td>027</td><td>8</td><td>VCP</td><td>156</td><td>156</td><td>8/10/2017 Multiple cracks and fractures.</td><td>C</td><td>2</td><td>Line</td><td>RC</td><td></td><td>156</td><td>LF</td><td>\$45</td><td></td><td></td><td></td><td>\$7.020</td></t<>	029	027	8	VCP	156	156	8/10/2017 Multiple cracks and fractures.	C	2	Line	RC		156	LF	\$45				\$7.020
100         0.00         8         VCP         98         08         0100/11         0100/11         0							Longitudinal cracks at 31' and 93' and 71' from												
(3)         (30)	030	029	8	VCP	98	98	8/10/2017 MH 030.	C	2	Point repair	RC 2 EA	\$10,000	00	15	<b>6</b> 45				\$20,000
Multiple cacks and fractures. Roots are at 24 and 54 in the cacks and fractures. Roots are at 10 <sup>4</sup> mm M4020. (It heavy cleaning and mark at 10 <sup>4</sup> mm M4020. (It heavy cleaning and mark at 10 <sup>4</sup> mm M4020. (It heavy cleaning and mark at 10 <sup>4</sup> mm M4020. (It heavy cleaning and mark at 10 <sup>4</sup> mm M4020. (It heavy cleaning and mark at 10 <sup>4</sup> mm M4020. (It heavy cleaning and mark at 10 <sup>4</sup> mm M4020. (It heavy cleaning and mark at 10 <sup>4</sup> mm M4020. (It heavy cleaning and mark at 10 <sup>4</sup> mm M4020. (It heavy cleaning and mark at 10 <sup>4</sup> mm M4020. (It heavy cleaning and mark at 10 <sup>4</sup> mm M4020. (It heavy cleaning and mark at 10 <sup>4</sup> mm M4020. (It heavy cleaning and mark at 10 <sup>4</sup> mm M4020. (It heavy cleaning and mark at 10 <sup>4</sup> mm M4020. (It heavy cleaning and mark at 10 <sup>4</sup> mm M4020. (It heavy cleaning and mark at 10 <sup>4</sup> mm M4020. (It heavy cleaning and mark at 10 <sup>4</sup> mm M4020. (It heavy cleaning and mark at 10 <sup>4</sup> mm M4020. (It heavy cleaning and mark at 10 <sup>4</sup> mm M4020. (It heavy cleaning and mark at 10 <sup>4</sup> mm M4020. (It heavy cleaning and mark at 10 <sup>4</sup> mm M4020. (It heavy cleaning and mark at 10 <sup>4</sup> mm M4020. (It heavy cleaning at 10 <sup>4</sup> mark at 10 <sup>4</sup> mm M4020. (It heavy cleaning at 10 <sup>4</sup> mm	031	030	8	VCP	96	96	8/10/2017 Multiple cracks and fractures.	D	2	Line	RC		96	LF	\$45				\$4,320
org       o							Multiple cracks and fractures. Roots at pipe												
cost         cost <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>joints throughout. Attached deposits starts at 24'</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>							joints throughout. Attached deposits starts at 24'												
0.02       15       VCP       345       345       8.0201       form M 0028       D       2       Rock Dutternutation emoval and Line       RC       I       I       S75       345       LF       2.0       388.78         0.03       Malple codes and fractures. Roos at 100 month.       D       2       Rock Dutternutation emoval and Line       RC       I <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>ends at 110' from MH 032. (if heavy cleaning</td> <td></td>							ends at 110' from MH 032. (if heavy cleaning												
Obs         Obs <td>022</td> <td>022</td> <td>15</td> <td>VCP</td> <td>245</td> <td>245</td> <td>can not cou through the attached en crustation,</td> <td>D</td> <td>2</td> <td>Root Cut/Encrustation removal and Line</td> <td>PC</td> <td></td> <td>245</td> <td>15</td> <td>¢75</td> <td>245</td> <td>15</td> <td>2.50</td> <td>¢26 729</td>	022	022	15	VCP	245	245	can not cou through the attached en crustation,	D	2	Root Cut/Encrustation removal and Line	PC		245	15	¢75	245	15	2.50	¢26 729
033         032         8         VCP         262         89/207         Multiple cracks and fractures. Roots at pipe         D         2         Root Cu/Encrustation removal and Line         RC         -         262         -         5         262         1/2         5         262         1/2         5         262         1/2         5         262         1/2         5         262         1/2         5         262         1/2         5         262         1/2         5         262         1/2         5         262         262         1/2         5         262         262         1/2         5         262         262         1/2         5         262 <td>032</td> <td>022</td> <td>10</td> <td>VCP</td> <td>345</td> <td>345</td> <td>Hole with soil visible at 44' and 205' from MH</td> <td>D</td> <td>2</td> <td>Root Cul/Encrustation removal and Line</td> <td>RC</td> <td></td> <td>340</td> <td>LF</td> <td>\$15</td> <td>340</td> <td>LF</td> <td>2.50</td> <td>\$20,738</td>	032	022	10	VCP	345	345	Hole with soil visible at 44' and 205' from MH	D	2	Root Cul/Encrustation removal and Line	RC		340	LF	\$15	340	LF	2.50	\$20,738
033       032       8       VCP       282       282       282       282       282       4F       253       252       4F       250       252							033. Multiple cracks and fractures. Roots at												
0.03       0.15       VCP       297       99/2017       obstatives. Roots at pipe obst stroughout.       D       2.0       Root Cu/Encrustation removal and Line       RC       Image: Constraint of the straint of th	033	032	8	VCP	262	262	8/9/2017 pipe joints throughout.	D	2	Root Cut/Encrustation removal and Line	RC		262	LF	\$45	262	LF	2.50	\$12,445
Och         Ock         10         L0         L	034	032	15	VCP	207	207	Multiple cracks and fractures. Roots at pipe 8/9/2017 joints throughout	D	2	Root Cut/Encrustation removal and Line	RC		207	LE	\$75	207	IE	2 50	\$23.018
048       034       15       VCP       95       95       88/2077       deposits hroughout.       D       2       Encustation removal and Line       RC       95       LF       \$75       95       LF       2.0       \$7333         0070       048       15       VCP       276       88/2077       deposits hroughout.       D       2       Root Out/Encustation removal and Line       RC       L <td< td=""><td>0.04</td><td>002</td><td>15</td><td>VOF</td><td>231</td><td>231</td><td>Multiple cracks and fractures. Attached</td><td></td><td><u> </u></td><td></td><td></td><td></td><td>231</td><td></td><td>ψιJ</td><td>231</td><td></td><td>2.30</td><td>Ψ<b>2</b>3,010</td></td<>	0.04	002	15	VOF	231	231	Multiple cracks and fractures. Attached		<u> </u>				231		ψιJ	231		2.30	Ψ <b>2</b> 3,010
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	048	034	15	VCP	95	95	8/8/2017 deposits throughout.	D	2	Encrustation removal and Line	RC		95	LF	\$75	95	LF	2.50	\$7,363
070       048       15       VCP       276       276       848/2017       Multiple cracks and fractures. Broken pipe at 12°, 234 and 261 from MH 07. Attached deposits at 3 and 24.       D       2       Root Cut/Encrustation removal and Line       RC       LF       276       LF       575       276       LF       2.0       \$21.351         071       070       12       VCP       389       88/2017       deposits from MH 07. Attached deposits       D       2       Encrustation removal and Line       RC       LF       389       LF       \$55       389       LF       2.0       \$22.351         071       070       12       VCP       389       88/2017       deposits from MH 07. Attached deposits       D       2       Encrustation removal and Line       RC       LF       389       LF       \$55       389       LF       2.0       \$25.351         072       071       8       VCP       212       212       212       212       212       14       14       88/2017       from MH 07. Attached deposits from Upout.       D       2       Encrustation removal and Line       RC       LF       14       LF       \$25       110.70         073       071       12       VCP       148       148							Multiple cracks and fractures. Roots at pipe		1					1					
OPI         OPI <td>070</td> <td>048</td> <td>15</td> <td>VCP</td> <td>276</td> <td>276</td> <td>8/8/2017 60' from MH 070.</td> <td>D</td> <td>2</td> <td>Root Cut/Encrustation removal and Line</td> <td>RC</td> <td></td> <td>276</td> <td>LF</td> <td>\$75</td> <td>276</td> <td>LF</td> <td>2,50</td> <td>\$21.351</td>	070	048	15	VCP	276	276	8/8/2017 60' from MH 070.	D	2	Root Cut/Encrustation removal and Line	RC		276	LF	\$75	276	LF	2,50	\$21.351
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $							Multiple cracks and fractures. Broken pipe at								<b>*</b> . •				4= 1,000
O71       O70       12       VCP       389       389       389       389       389       389       389       389       389       12       2.50       \$2.50 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>162' ,234' and 261' from MH 071. Attached</td> <td>_</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>. –</td> <td></td> <td></td>							162' ,234' and 261' from MH 071. Attached	_									. –		
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	071	070	12	VCP	389	389	8/8/2017 deposits throughout.	D	2	Encrustation removal and Line	RC		389	LF	\$65	389	LF	2.50	\$26,258
072       071       8       VCP       212       212       8/8/2017       Incomposition of the optical strates and fractures. Broken pipe at 37       D       2       Encrustation removal and Line       RC       I       212       LF       \$45       212       LF       \$45       212       LF       \$20       \$1000         073       071       12       VCP       148       148       8/8/2017       from MH 073. Attached deposits throughout.       D       2       Encrustation removal and Line       RC       LF       S45       148       LF       \$20       \$148       LF       \$20       \$10070         073       071       12       VCP       148       8/8/2017       from MH 073. Attached deposits throughout.       D       2       Encrustation removal and Line       RC       148       LF       \$565       148       LF       \$20       \$10070         074       073       12       VCP       134       8/8/2017       instation sector and fractures. Roots and fractures. Root and fractures. Roots and fractures. Root and fractures. Root and fractu							113' from MH 072 . Attached deposits												
073       071       12       VCP       148       148       3/8/207       Multiple cracks and fractures. Broken pipe at 37       D       2       Encustation removal and Line       RC       1       148       LF       \$65       148       LF       2.50       \$10.077         074       073       12       VCP       148       148       8/8/207       multiple cracks and fractures. Roots at pipe joints throughout.       D       2       Encrustation removal and Line       RC       1       148       LF       \$65       148       LF       2.50       \$10.077         074       073       12       VCP       134       14       Multiple cracks and fractures. Roots at pipe joints throughout.       D       2       Encrustation removal and Line       RC       1       148       LF       \$65       148       LF       2.50       \$10.077         1	072	071	8	VCP	212	212	8/8/2017 throughout.	D	2	Encrustation removal and Line	RC		212	LF	\$45	212	LF	2.50	\$10,070
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$							Multiple englis and factures. Decline give at 001												
$\frac{1}{1}$	073	071	12	VCP	148	148	8/8/2017 from MH 073. Attached deposits throughout	D	2	Encrustation removal and Line	RC		148	LE	\$65	148	LE	2 50	\$10 017
074       073       12       VCP       134       134       134       8/8/207       joints throughout.       D       2       Encrustation removal and Line       RC       I       134       LF       \$65       134       LF       2.0       \$9,011         Image: Construction removal and Line       Image: Construction removal and Line <td< td=""><td>0.0</td><td>011</td><td></td><td></td><td>110</td><td>1.10</td><td>Multiple cracks and fractures. Roots at pipe</td><td>5</td><td>-</td><td></td><td></td><td></td><td>1.0</td><td></td><td>çcc</td><td>110</td><td><u> </u></td><td>2.00</td><td>φ10,011</td></td<>	0.0	011			110	1.10	Multiple cracks and fractures. Roots at pipe	5	-				1.0		çcc	110	<u> </u>	2.00	φ10,011
Image: state of the state	074	073	12	VCP	134	134	8/8/2017 joints throughout.	D	2	Encrustation removal and Line	RC		134	LF	\$65	134	LF	2.50	\$9,011
And the second secon											Sub Total 2		5 /60	2		A 976			\$362 947
Image: Constraint of the system of the sy			1			1							5,405			4,270			4002, <b>3</b> 41
Image: Constraint of the constrated of the constraint of the constraint of the constraint of the											ADMINISTRATION ITEMS		1	1					
Image: Construint of the state of											20% Legal, Administration, an	d Design							\$72,589
Image: Second			-	1					1		Administration Subtotal								\$163.326
											Total Cost								\$526,273