AGENDA
PUBLIC HEARING ON ENGINEER'S REPORT ON REPAIRS TO
MAIN TILE, DRAINAGE DISTRICT 67, HARDIN COUNTY

MONDAY, JULY 16, 2018 AT 9:00 A.M.
HARDIN COUNTY COURTHOUSE LOWER LEVEL CONFERENCE ROOM

1. Open Meeting
2. Approve Agenda
3. Introductions/Attendance
4. Open Public Hearing
5. Verify Publication
   Published in the Times Citizen on June 23, 2018
6. Explanation Of Project

   Documents:

   DD 67 ENGRS REPAIR REPORT 4-5-2018.PDF
7. Written Or Verbal Comments/Discussion
8. Close Public Hearing
9. Possible Action
   -Adopt Recommendation of Engineer's Report
   -Direct CGA to Prepare Plans and Specifications
10. Other Business
11. Adjourn Meeting

ENGINEER'S REPORT ON REPAIRS TO MAIN TILE, DRAINAGE DISTRICT NO. 67 HARDIN COUNTY

LICENSED PROFESSIONAL ENGINEER
LEE O. GALLENTINE
15745
IOWA

I HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF IOWA

April 4, 2018

LEE O. GALLENTINE, P.E. DATE

LICENSE NUMBER: 15745
MY LICENSE RENEWAL DATE IS DECEMBER 31, 2018
PAGES OR SHEETS COVERED BY THIS SEAL:
SHOWN ON TABLE OF CONTENTS

CGA
ENGINEERS • LAND SURVEYORS

OFFICE LOCATIONS

739 Park Avenue
Ackley, IA. 50601
Phone: 641-847-3273

511 Bank Street
Webster City, IA 50595
Phone: 515-832-1876
Fax: 515-832-1932

Engineer's Report on Repairs to Main Tile, Drainage District No. 67 Hardin County, Iowa

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Engineer's Report on Repairs to Main Tile, Drainage District No. 67 Hardin County, Iowa

1.0 INTRODUCTION

- SCOPE OF WORK – The District Trustees, requested Clapsaddle-Garber Associates to investigate and report concerning repairs to the Main tile of Drainage District No. 67. This report will summarize the history of improvements and repairs, investigate the necessity and feasibility of said repairs, and present opinions of probable construction costs associated with said repairs. As a result, on February 13, 2018 the District Trustees requested Clapsaddle-Garber Associates move ahead with an investigation and report concerning repairs to the Main tile.

- LOCATION – The area of investigation was limited to the lower portion of the Main tile that had CCTV inspection performed on it.

  The Main tile is located in Sections 28 and 33, Township 89 North (T89N), Range 21 West (R21W), Hardin County, Iowa. Specifically, the downstream limit of said Main tile is where it discharges into the Main of Drainage District No. 3. This point is a few hundred feet west of I Avenue and a few hundred feet north of the south line of said Section 28. Said Main tile then goes south across Section 28 and crosses into Section 33 at a few hundred feet west of I Avenue. It then continues south and crosses the former CRIP Railroad a few hundred feet west of I Avenue. After said crossing, it goes southwest across Section 33 to a point approximately ⅛ mile west of I Avenue and ⅛ mile north of 155th Street. From this point, it goes southeast and crosses 155th Street a few hundred feet west of I Avenue. It then terminates on the south side of 155th Street. For reference, copies of the Investigation Map showing the entire Main tile and the area of investigation is included in Appendix A.

2.0 DISTRICT HISTORY – The following is a summary of the pertinent history of Drainage District No. 67 as obtained from the Hardin County Auditor's drainage minutes and records.

1915, July 6th	Petition and Bond for establishment of Drainage District was filed. Said petition indicated that a district be established with laterals as properly needed. Drainage improvement was to commence in the SE¼ SE¼ Section 28, travel in a Southerly direction, and terminate in Section 33.
1915, Jul. 9	E.W. Edwards was appointed as Engineer.
1916, Feb. 5	Engineer's Report by E.W. Edwards called for the tile drain beginning at the main tile of Drainage District No. 3 at a point 250 feet upstream of the east line of Section 28 and running southerly across the SE¼ SE¼ of Section 28. From there, it went southerly across the E½ NE¼ of Section 33 and terminated in the NE¼ SE¼ of said Section 33 for a total distance of 3,800 feet. At the crossing with the CRIP Railroad, the reported recommended that 24 feet of 12 inch cast iron pipe be used immediately under the railroad tracks. The estimated total cost of construction for the Main and the Lateral 1 was $1,200.
1916, Feb. 25	Publication of Notice of hearing on establishment.
1916, Mar. 28	E.L. Chamberlain was appointed Construction Engineer.
1916, Mar. 30	Publication of Notice to Contractors for construction of drainage district facilities.
1916, Apr. 4	Tile Contract with Eldora Pipe and Tile Company for $533.82 for supplying tile was entered.
1916, Apr. 13	Construction contract with L.P. Debe for $652.78 for construction of drainage district facilities was entered.
1916, Apr. 27	Signed contract between the CRIP Railroad and Drainage District Trustees for construction of the railroad crossing. Said contract indicated that CRIP Railroad may supply 30 feet of cast iron pipe for installation directly under the railroad tracks and embankment. It also indicated that the drainage district would install said cast iron pipe, keep the district tile in "good repair", and assess the expense for repairs to "all parties" within the drainage district.
1916, May 29	E.L.Chamberlain resigned as Construction Engineer.
1916, July 27	Bond for J.H. Farrington as Construction Engineer.
1916, Oct. 7	Appointment of classification commission.
1917, Jan.15	Publication of Notice of Assessment of Benefits.
1953, Jan. 28	Bill for repair located in NE¼ Section 33.
1956, July 5	Bill for repair of intakes located in SE¼ NE¼ Section 33.
1956, July 24	Bill for repair of tile located in SE¼ NE¼ Section 33.
1957, Jan. 10	Bill for repair located in SE¼ NE¼ Section 33.
1974, May 23	Bill for repair of washed out intake in NE¼ NE¼ Section 33.
1979, Jun. 21	Bill for repair of broken tile located in Section 33.

3.0 INVESTIGATION – For the investigation portion of this report, field and office investigations were performed. The field portion was limited to visual observation (with excavation), GPS mapping of district facilities, and CCTV inspection of approximately 1125 feet of the Main tile (approximately 30%). For details see the pictures and coordinates contained in Appendix B, the CCTV inspection tabulation and reports in Appendix C, and exact locations of CCTV inspection contained in Investigation Map included in Appendix A.

For the office investigation, available copies of the above mentioned Engineer's Report, Plans and Profiles along with the district history were reviewed. Said review showed that relatively few repairs have been performed (only six from 1953 to 1979). The history did not contain any documented repairs since 1979. Even with the size of the district, this gap is probably not an indication of lack of repairs, but instead an indication of lack of documentation of repair work performed since 1979.

4.0 DISCUSSION AND CONCLUSIONS – Based on the above, it is obvious that the Main tile in the areas of investigation has exceeded its useful lifecycle. Much, it not all the existing VCP tile is cracked which is definitely an indication of nearing the end of lifecycle. More concerning are the many issues listed that restricted drainage and expose the district to potential liability from a tile collapse under the existing railroad tracks. These are an indication of the pipe exceeding its useful lifecycle. Said CCTV inspection and visual observations identified the following key issues:

- 1 full collapsed tile.
- 1 radially cracked tile.
- 10 partially collapsed tile.
- 30 offset joints with voids, rocks, or soil visible.
- 48' of previous repair with single wall HDPE. 5' of this is deformed.
- 609'± of soil and debris in flowline.
- Unable to CCTV inspect under railroad tracks due to debris. Said debris appears to be entering under said railroad tracks, which could indicate a tile collapse under said railroad tracks.

If repairs are not performed, the lower end of the Main tile will continue to deteriorate/collapse and will continue to allow soil to enter the Main tile. All of this will manifest itself as more sinkholes and soil infiltration. When all these issues are combined, it will lead to further reduced drainage and liability exposure by the drainage district.

5.0 REPAIR METHODS – To repair the lower end of the existing Main tile, either of the following options are the most straightforward ones available:

Spot Repairs

- For the lower end of the Main tile, remove and replace the existing tile only at the locations of the key issues identified above.
- The above repairs would be in the same location as the existing Main tile in order to preserve connections with private tile. The exception to this would be the railroad crossing, where the location of the Main tile would be dictated by railroad standards. For reference, the route and locations are shown on the map included in Appendix D.

Tile Replacement

- For the lower end of the Main tile, remove and replace the existing tile for the entire length of investigation.
- The above repairs would be in the same location as the existing Main tile in order to preserve connections with private tile. The exception to this would be the railroad crossing, where the location of the Main tile would be dictated by railroad standards. For reference, the route and locations are shown on the map included in Appendix E.

With the above-mentioned repair methods, the following should be noted:

- For both the above options, the current railroad crossing would not be removed, but would be abandoned and a new crossing will be installed at a location dictated by railroad standards.
- For both the above options trees within 50' of the locations of the repaired Main tile would be removed to stop infiltration of tree roots.
- The pipe sizes used are those that are currently manufactured that most closely meet the current Main tile size.
- The Tile Replacement option would allow for lower maintenance costs in the future as the entire length of investigation is new Main tile.
- The Tile Replacement option would remove all soil and debris in the existing tile for the entire the length of investigation.
- The above repairs are for the identified lower portion of the Main tile only. No repairs are proposed for the remainder of the existing Main tile.
- Repairs have historically been viewed as not having an impact on jurisdictional wetlands. As such, individual landowners should consult with applicable staff at the Hardin County NRCS offices to verify the existence of said jurisdictional wetlands and that there will be no impact on them

Per Iowa Code Chapter 468.126, any of the above actions that do not increase capacity would be considered a repair. As such, Subsection 1, paragraph c of Chapter 468.126 states "If the estimated cost of the repair does not exceed fifty thousand dollars, the board may order the work done without conducting a hearing on the matter. Otherwise, the board shall set a date for a hearing. . ." The opinion of probable construction cost contained in the next section of this report exceeds said $50,000 limit. Therefore, a hearing will be required. Per Iowa Code Chapter 468.126.1.g, the right of remonstrance does not apply to the proposed repairs.

6.0 OPINIONS OF PROBABLE CONSTRUCTION COSTS – Using the above methods of repair, an itemized list of project quantities and associated opinions of probable construction costs were compiled and are included in Appendices F and G of this report. A summary of said costs (to the nearest dollar) are as follows:

METHOD	TOTAL COST
Spot Repair	**$127,650**
Tile Replacement	**$142,140**

It should be noted that said costs include materials, labor, and equipment supplied by the contractor to complete the necessary repair and includes applicable engineering, construction observation, and project administration fees by Clapsaddle-Garber Associates. However, said costs do not include any interest, legal fees, county administrative fees, crop damages, other damages, previous repairs, engineering fees to date, wetland mitigation fees, right of way acquisition, or reclassification fees (if applicable). As always, all costs shown are opinions of Clapsaddle-Garber Associates based on previous lettings on other projects. Said costs are just a guideline and are not a guarantee of actual costs.

7.0 OWNERSHIP AND CLASSIFICATIONS – Any and all information concerning ownership of lands and classifications of said lands within Drainage District No. 67 can be obtained from the Hardin County Auditor's offices.

It should be noted that Iowa Code Chapter 468.65 states "When, after a drainage . . . district has been established . . ." and ". . . a repair . . . has become necessary, the board may consider whether the existing assessments are equitable as a basis for payment of the expense of . . . making the repair . . . " and "If they find the same to be inequitable in any particular . . . they shall . . . order a reclassification . . . " Based on this, it is our opinion that a reclassification may be required if the repair were to move forward.

8.0 RECOMMENDATIONS – There is a definite need to perform one of the above-mentioned repairs. The actions would remove the current restrictions to the Main tile, extend the lifespan of the same, and reduce the liability exposure by the drainage district. Therefore, it is recommended that the District Trustees, should take action to accomplish the following:

- Approve the Engineer's Report as prepared by Clapsaddle-Garber Associates.
- Hold the required hearing on the proposed repair.
- Adopt one of the recommendations of the Engineer's Report.
- Direct that the plans and specifications for the proposed repair be prepared by Clapsaddle-Garber Associates.
- Proceed with receiving bids from interested contractors by Clapsaddle-Garber Associates.
- Award contract to the lowest responsible contractor.
- If desired, proceed with reclassification proceedings.

DT TILE NOT LOCATED – (APPROX. FROM DISTRICT MAP)

DT TILE LOCATED AND INSPECTED (CCTV AND GPS)

DRAINAGE DISTRICT BOUNDARY

LATERAL 1 TILE

MAIN TILE

FORMER CRIP RAILROAD

CCTV INSERTION POINT #3380

COLLAPSED TILE SECTION

CCTV INSERTION POINT #3393, TILE BLOWOUT/SINKHOLE

160TH ST.

I AVE

155TH ST.

0 400

Scale: FEET

DRAWN BY: JVS	APPROVED BY: LOG	REVISIONS:	
DATE: 10-21-13	PROJ. NO.: 6862		
FIELD BK: -			
P:\6862\CADD\6862 - INVESTIGATION.DWG; 4/5/2018			

CGA
Clapsaddle-Garber Associates, Inc
Main Office: 16 East Main Street
Marshalltown, Iowa 50158
Ph 641-752-6701
www.cgaconsultants.com

ADDRESS:
739 PARK AVENUE
ACKLEY, IOWA 50601
PH 641-847-3273 FAX 641-847-2303

PROJECT:
DD 67 CCTV AND VISUAL OBSERVATION
HARDIN COUNTY, IOWA
2017

SHT. NAME:
DD67 MAIN TILE INVESTIGATION

SHT. NO.:
1 OF 1

9/22/17 CLAY TILE S. RR

9/22/17 TILE ROUTE, S. RR. TRACKS

9/22/17 DD67 Tile Route

9/22/17 UD67 TILE ROUTE S. OF RR

6862 DD67 9-21-17RB

3379,3637366.917,4985805.306,1107.015,CMP 12"X40' NEW 4/16
3380,3639675.137,4969274.473,1144.206,FL CLAYTILE
3381,3639675.694,4969274.406,1145.258,TOP CLAYTILE
3382,3639793.820,4969258.294,1150.818,GS TILELOCATE
3383,3639935.607,4969281.188,1151.324,GS TILELOCATE
3384,3639936.369,4969281.377,1151.360,FNL EW
3385,3639641.121,4969284.541,1150.951,GS TILELOCATE
3386,3639615.502,4969292.567,1153.122,EOG
3387,3639602.613,4969296.132,1154.644,CL RR
3388,3639590.210,4969299.436,1152.377,EOG
3389,3639589.055,4969299.737,1152.085,TOP RCP BURED
3390,3639581.876,4969292.866,1152.308,TOP RCP BURIED
3391,3639563.320,4969325.559,1149.703,FNL RR RW
3392,3639535.272,4969316.119,1144.456,FL CLAYTILE
3393,3639534.942,4969315.930,1145.492,TOP CLAYTILE
3394,3639475.438,4969283.404,1151.770,GS TILELOCATE
3395,3639398.714,4969221.275,1150.608,GS TILELOCATE
3396,3639361.847,4969190.479,1148.913,GS SINKAREA
3397,3639307.545,4969179.637,1139.639,SINK AREA
3398,3639270.615,4969173.269,1129.788,SINKAREA

Tabulated Defects

	Total	GPS #3393 Upstream	GPS #3393 Downstream	GPS #3380 Downstream	GPS #3380 Downstream
Total Length Televised (ft)	1125	336	67	690	32
Date:		9/21/2017	9/19/2017	9/21/2017	9/21/2017
Top crack (ft)	566	125	0	409	32
Side crack (ft)	50	0	0	50	0
Bottom crack (ft)	6	0	0	6	0
Partial or imminent collapse (#)	10	6	0	3	1
Full collapse (#)	1	1	0	0	0
Debris (ft)	609	0	37	540	32
Offset Joint (#)	74	5	4	64	1
Soil/voids visible in offset joint (#)	30	5	0	25	0
Single Wall HDPE (non-deformed) (ft)	43	43	0	0	0
Single Wall HDPE (deformed) (ft)	5	5	0	0	0
CMP (rusty) (ft)	0	0	0	0	0
Holes (non-fixed) (#)	0	0	0	0	0
Holes (fixed) (#)	0	0	0	0	0
Roots (ft)	195	128	37	30	0
Radial Cracks (# of tile)	1	0	0	1	0

Williams Excavation &
Directional Boring
102 Industrial Dr.
Ackley, IA
Phone: 641-485-3925

Main Inspections Small Photos

Mainline ID:	City:	Address:	Project name:
9/19/17 DD 67	**SOUTH SIDE OF TRACKS - GARY RILEY PROPERTY WEST OF I AVENUE**		**9/19/17 DD 67**
Start date/time:	Asset length:	Weather:	Operator:
9/19/2017 12:25 PM	0+67	**Dry**	**Paul**
Upstream node:	Depth US:	Downstream node:	Depth DS:
Pipe shape:	Pipe material:	Pipe height:	Pipe width:
Circular	**Clay**	**12.0 in.**	

Comments:
0+00 IS GPS #3393, WATER 1/2 FULL AND STAGNANT TRAVELING DOWNSTREAM
0+01 TOP CRACK (START), HEAVY ROOT INFILTRATION (START) - PIPE ROUND

Observations

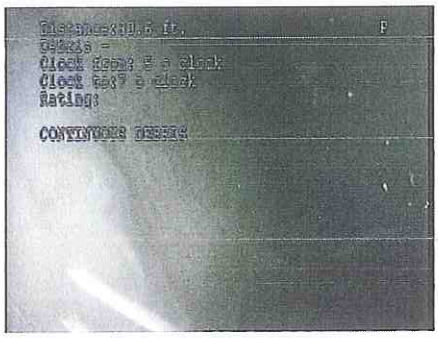
Distance	Dir.	Length	From/To	Code	Modifier/Severity	Rating	Comments
4.6 ft.	**U**	**10.6 ft.**	**11 / 1**	**Crack**	TILE SAGGING - PIPE EGG SHAPED.		**CONTINUOUS TOP CRACK**

Observations

Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
4.6 ft.	**U**	**10.6 ft.**	**/**	**Root**			**CONTINUOUS ROOTS IN PIPE**

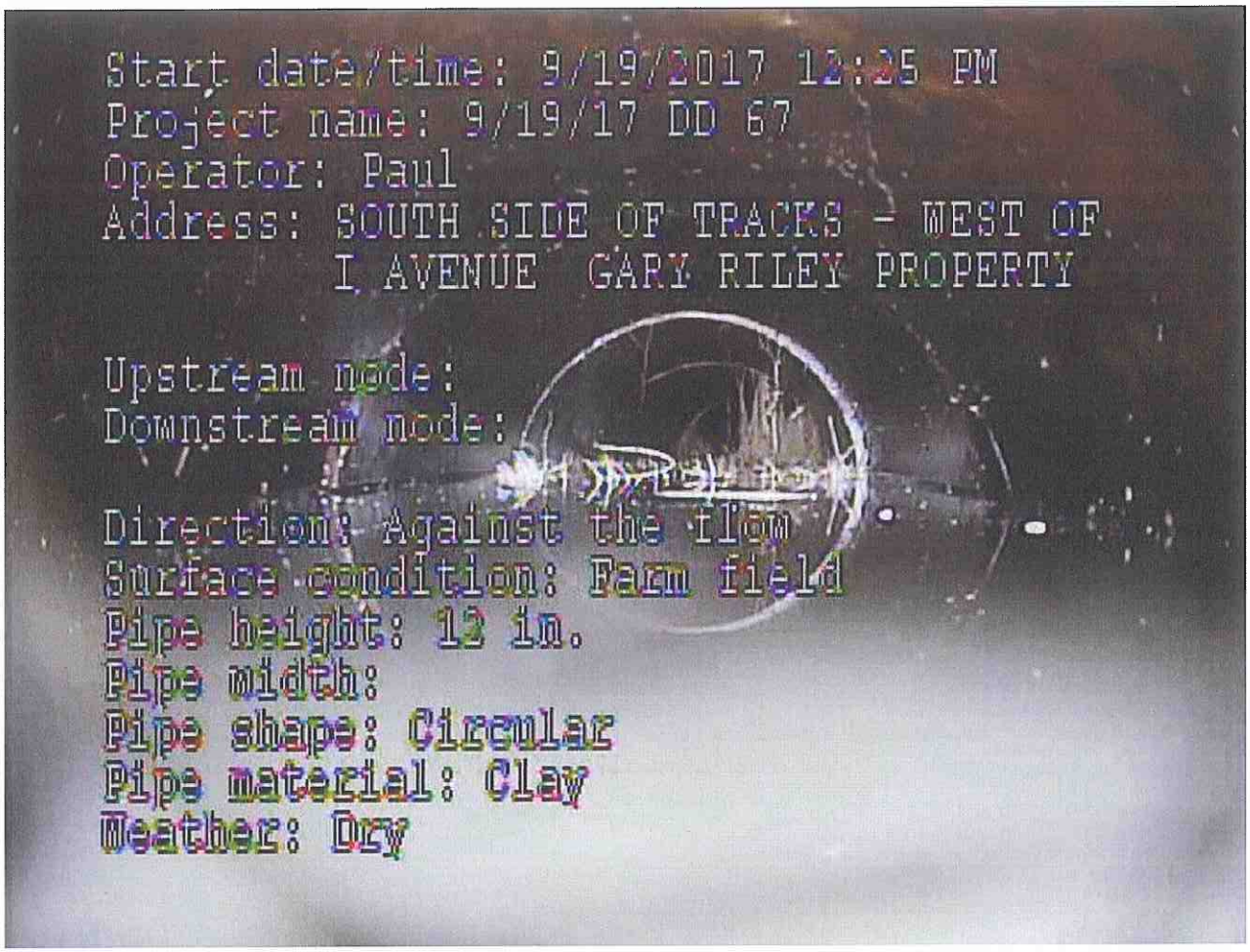
0+23 JOINT OFFSET (HORIZONTAL) - PIPE ROUND

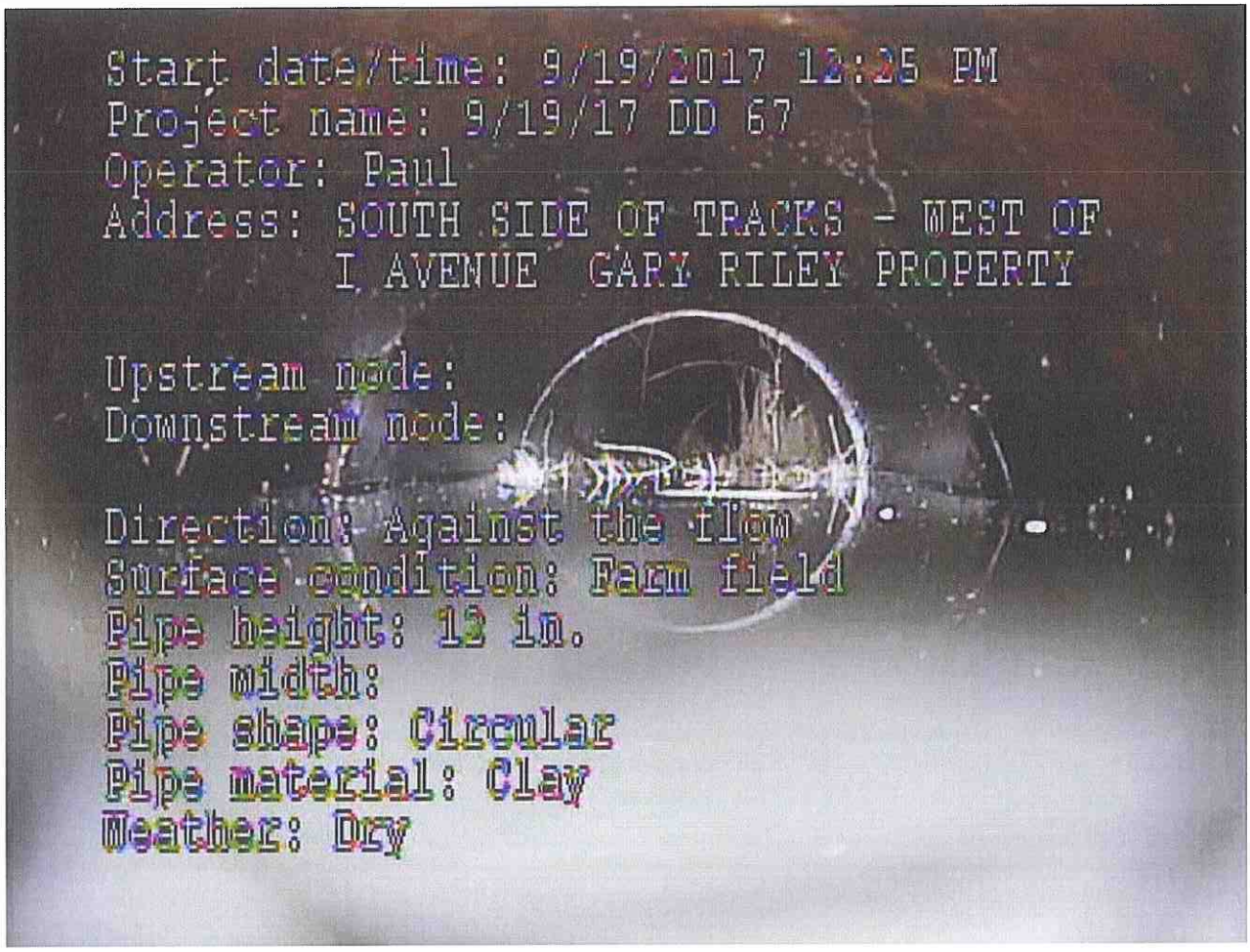
Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
30.6 ft.	**U**	**36.6 ft.**	**5 / 7**	**Debris**	(SILT) IN FLOWLINE, JOINT OFFSET (VERT), HEAVY ROOT INFILTRATION (END) - PIPE ROUND		**CONTINUOUS DEBRIS**

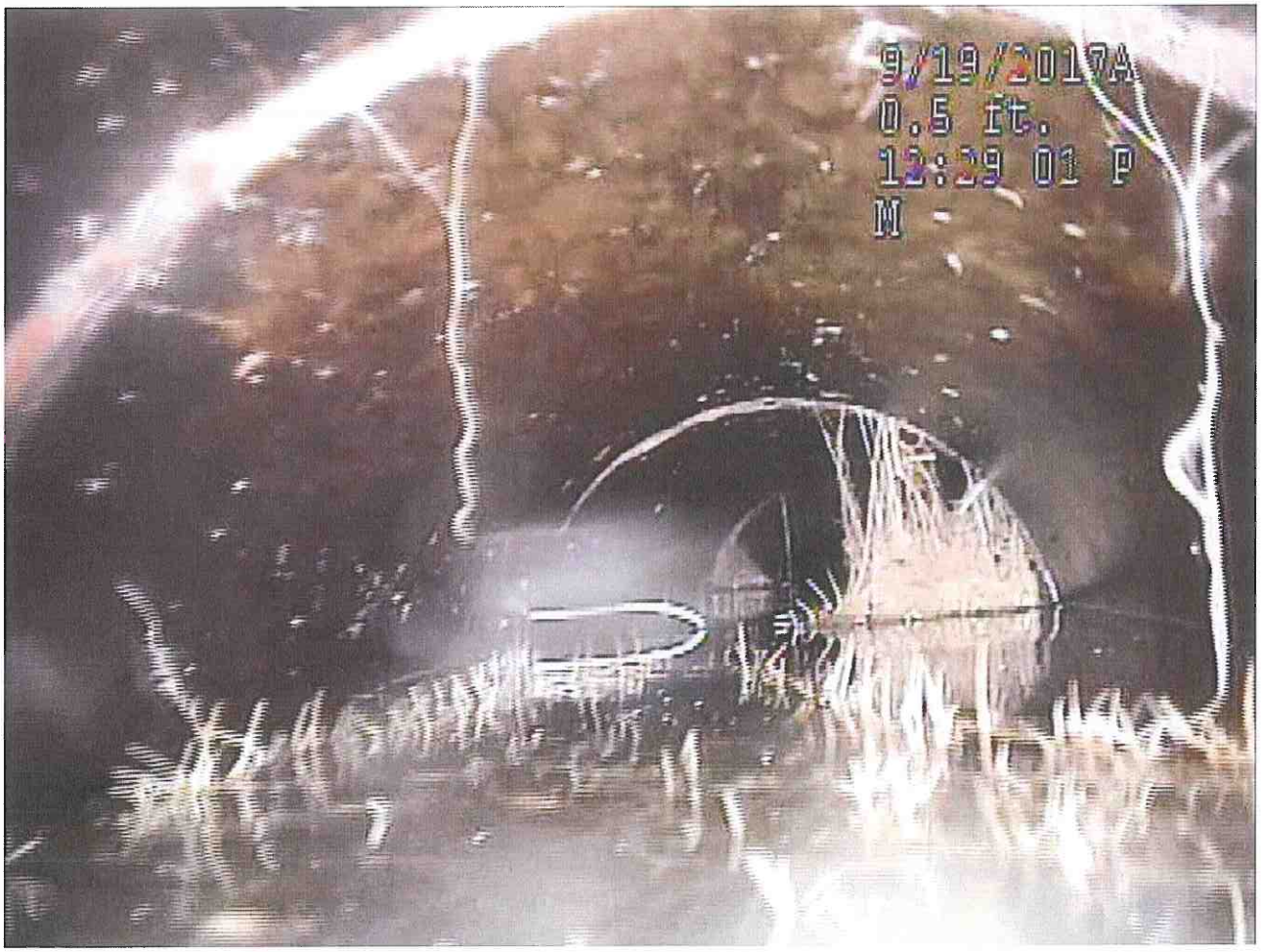


0+34 JOINT OFFSET (VERTICAL) - PIPE ROUND
0+40 SLIGHT ROOT INFILTRATION - PIPE ROUND
0+56 JOINT OFFSET - PIPE ROUND
0+60 SILT IN 1/3 OF FLOWLINE, JOINT OFFSET, ROOTBALL - PIPE ROUND
0+65 JOINT OFFSET (VERTICAL) - PIPE ROUND
0+67 END OF RUN, SILT TOO THICK - PIPE ROUND

Inspection's photos


Start date/time: 9/19/2017 12:25 PM
Project name: 9/19/17 DD 67
Operator: Paul
Address: SOUTH SIDE OF TRACKS - WEST OF
I AVENUE GARY RILEY PROPERTY
Upstream node:
Downstream node:
Direction: Against the flow
Surface condition: Farm field
Pipe height: 12 in.
Pipe width:
Pipe shape: Circular
Pipe material: Clay
Weather: Dry

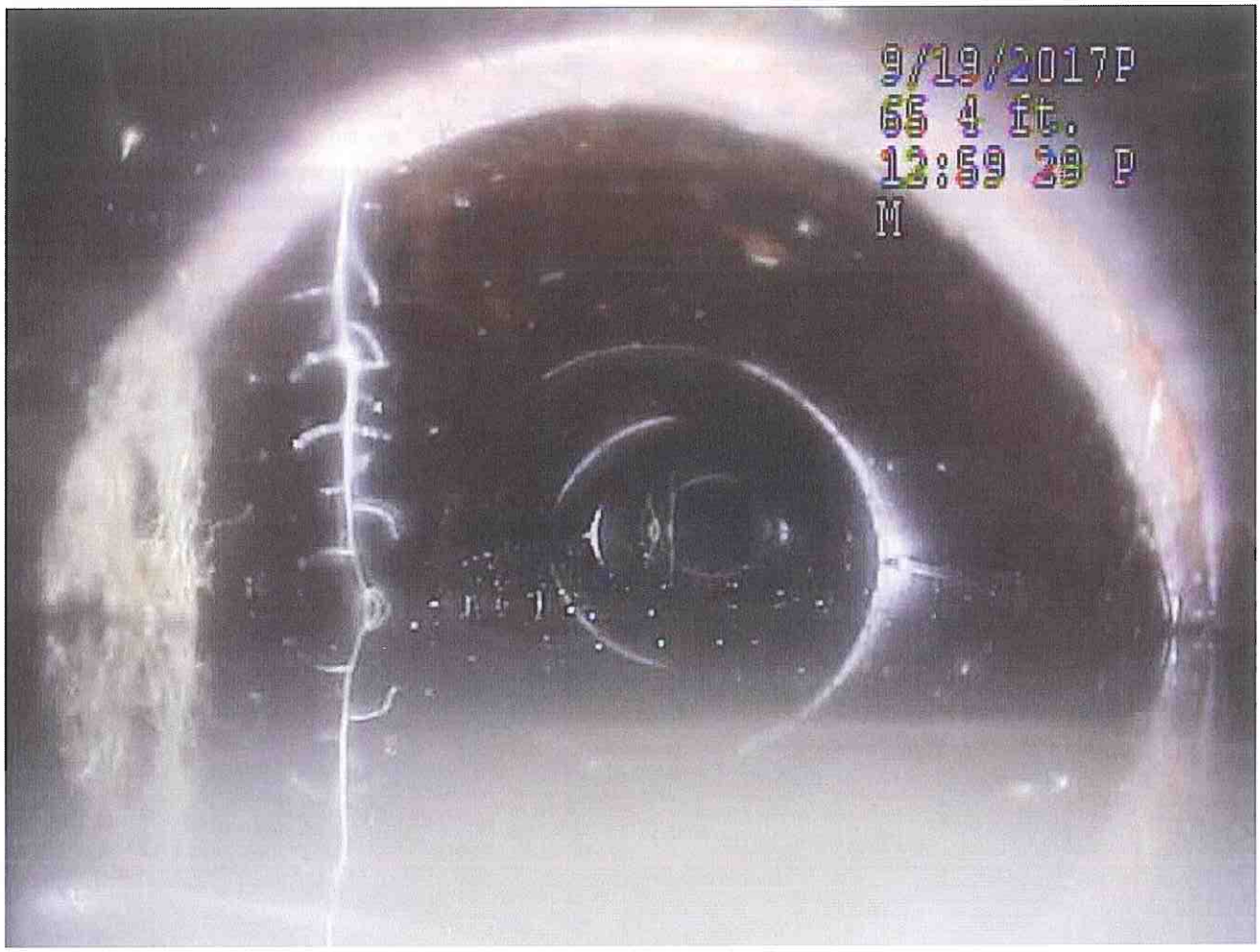

Start date/time: 9/19/2017 12:25 PM
Project name: 9/19/17 DD 67
Operator: Paul
Address: SOUTH SIDE OF TRACKS - WEST OF
I AVENUE GARY RILEY PROPERTY
Upstream node:
Downstream node:
Direction: Against the flow
Surface condition: Farm field
Pipe height: 12 in.
Pipe width:
Pipe shape: Circular
Pipe material: Clay
Weather: Dry


9/19/2017A
0.5 ft.
12:29 01 P
M


9/19/2017P
4.6 ft.
12:29 16 P
M


9/19/2017P
19 1 ft.
12:31 11 P
M


9/19/2017A
59 8 ft.
12:36 50 P
M


9/19/2017P
65 4 ft.
12:59 30 P
M

Main Inspections Small Photos

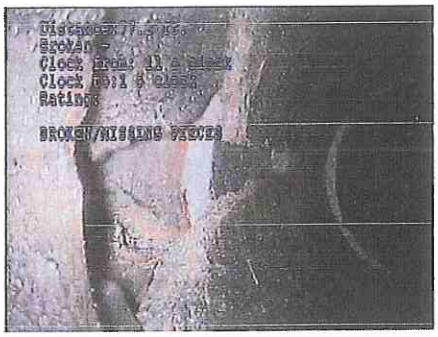
Mainline ID:	City:	Address:	Project name:
9/21/17 DD 67	**DD 67 UPSTREAM FROM WILLIAMS HOLE ON SOUTH SIDE OF TRACKS**		**9/21/17 DD 67**
Start date/time:	Asset length:	Weather:	Operator:
9/21/2017 12:06 PM	~~**1,500.0 ft.**~~ 3+36	**Dry**	**Paul**
Upstream node:	Depth US:	Downstream node:	Depth DS:
Pipe shape:	Pipe material:	Pipe height:	Pipe width:
Circular	**Clay**	**12.0 in.**	

Comments:

0+00 IS GPS 3393, VISIBILITY RESTRICTED, HIGH WATER LEVEL TRAVELING UPSTREAM
0+66 JOINT OFFSET, WATER 1/2 FULL - PIPE ROUND

Observations

Distance	Dir.	Length	From/To	Code	Modifier/Severity	Rating	Comments
77.2 ft.	**U**		**11 / 1**	**Broken**, MISSING PIECES OF TILE - PIPE ROUND			**BROKEN/MISSING PIECES**



1+00 UNDER WATER - PIPE ROUND
1+50 ROOTS IN FLOWLINE - PIPE ROUND

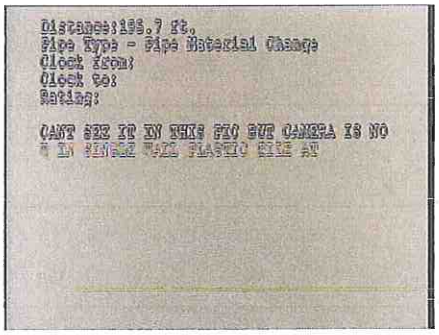
163.4 ft.	**U**		**11 / 1**	**Crack**, TOP (START) - PIPE EGG SHAPED			**CRACKED TOP**

Observations

Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
179.7 ft.	U		/	Root			ROOTS - WATER LEVEL IS HIGH. CANT SEE MUCH

1+82 COLLAPSE LIKELY - PIPE V SHAPED

Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
195.7 ft.	U		/	Pipe Type, VCP -> SW HDPE, TILE FULL WATER - ROUND			CANT SEE IT IN THIS PIC BUT CAMERA IS NOW IN SINGLE WALL PLASTIC TILE AT 196 FEET

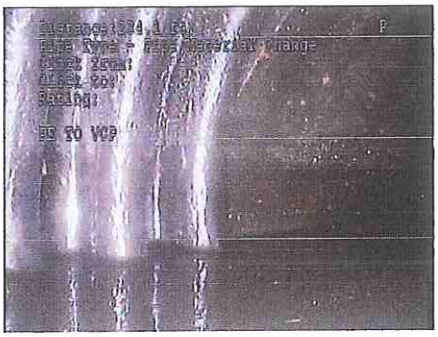


Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
226.7 ft.	U		/	Pipe Type, SW HDPE ->VCP, TOP CRACK (START) - PIPE V SHAPED			PE TO VCP

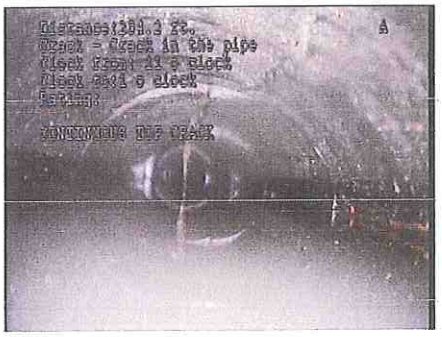
Observations

Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
229.3 ft.	U		/	Pipe Type, VCP -> SW HDPE - PIPE ROUND			VCP TO PE

Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
234.1 ft.	U		/	Pipe Type, SW HDPE -> VCP, COLLAPSE IMMINENT (TWO IN A ROW), SOIL VISIBLE IN JOINT GAPS - PIPE V SHAPED			PE TO VCP



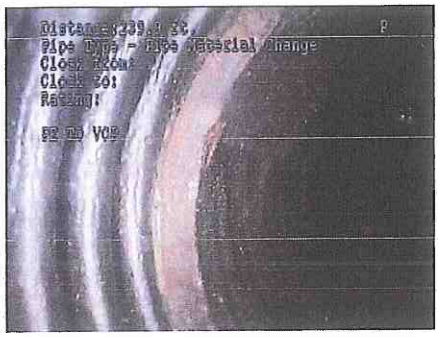
Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
234.2 ft.	U	2.5 ft.	11 / 1	Crack			CONTINUOUS TOP CRACK



Observations

Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
236.7 ft.	U		/	**Pipe Type**, VCP -> SW HDPE - PIPE ROUND			VCP TO PE

Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
239.9 ft.	U		/	**Pipe Type**, SW HDPE -> VCP, PARTIAL COLLAPSE (TWO IN A ROW), TOP CRACK (START), SOIL VISIBLE - PIPE V SHAPED			PE TO VCP

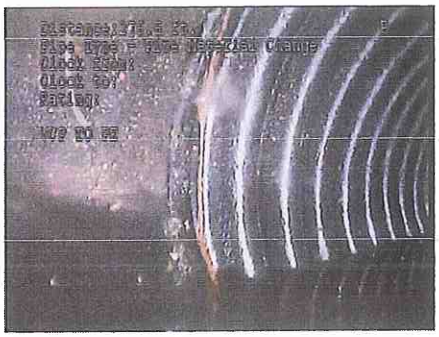


Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
242.8 ft.	U	12.1 ft.	11 / 1	**Crack**	2+57 JOINT OFFSET, SOIL VISIBLE IN GAP - PIPE ROUND		TOP CRACK

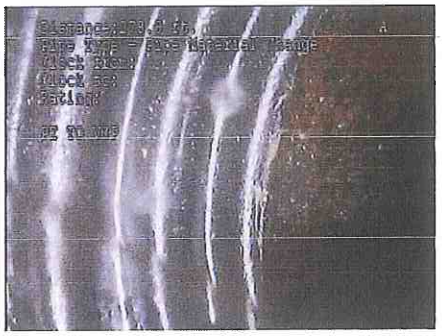
Observations

Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
262.4 ft.	U	73.2 ft.	11 / 1	Crack			TOP CRACK

276.6 ft.	U		/	Pipe Type, VCP -> SW HDPE - PIPE ROUND			VCP TO PE



278.8 ft.	U		/	Pipe Type, SW HDPE -> VCP - PIPE ROUND			PE TO VCP



Observations

Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
288.1 ft.	U		/	**Root**	INFILTRATION (START) - PIPE ROUND		**ROOTS**

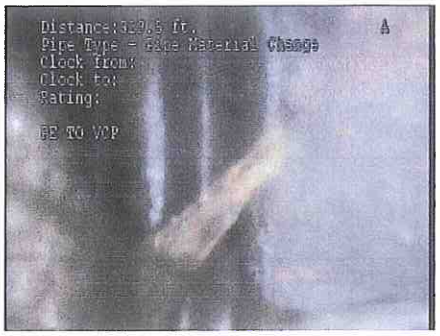
308.1 ft.	U		/	**Root**			**ROOTS**

3+19 PIPE SAGGING, SOIL VISIBLE IN JOINT - PIPE V SHAPED

324.9 ft.	U		/	**Pipe Type**, VCP -> SW HDPE - PIPE EGG SHAPED			**VCP TO PE**

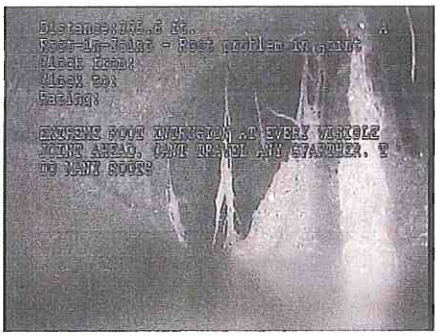
Observations

Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
329.5 ft.	U		/	**Pipe Type**, SW HDPE -> VCP, TOP CRACK (START) - PIPE EGG SHAPED			**PE TO VCP**

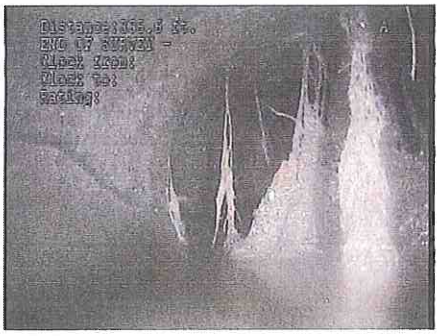


3+31 JOINT OFFSET, SOIL VISIBLE IN GAP - PIPE EGG SHAPED

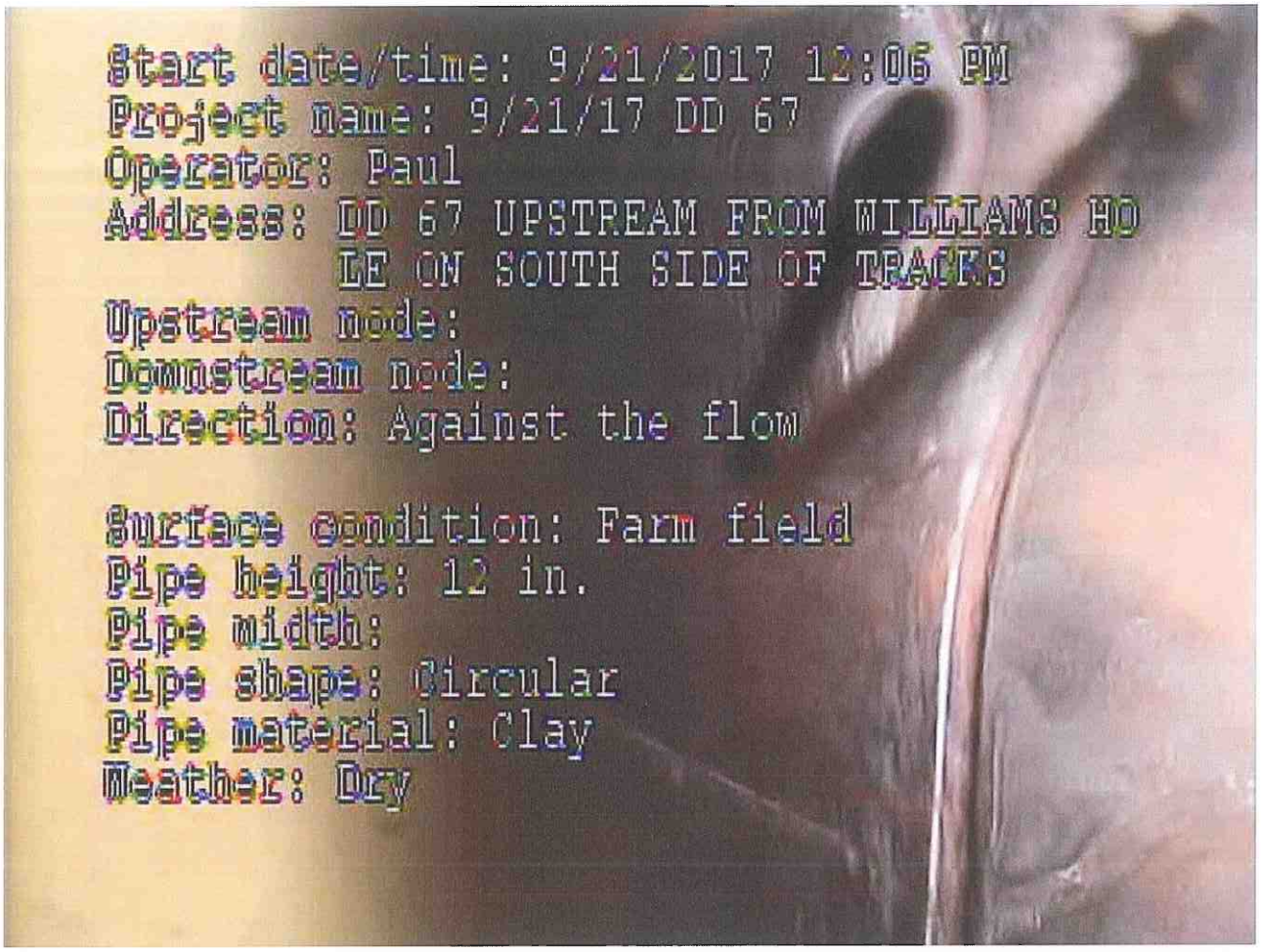
Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
335.6 ft.	U		/	**Root-in-Joint**, ROOTS TOO HEAVY TO TRAVERSE			**EXTREME ROOT INTRUSION AT EVERY VISIBLE JOINT AHEAD. CANT TRAVEL ANY GFARTHER. TOO MANY ROOTS**



Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
335.6 ft.	U		/	**END OF SURVEY**			



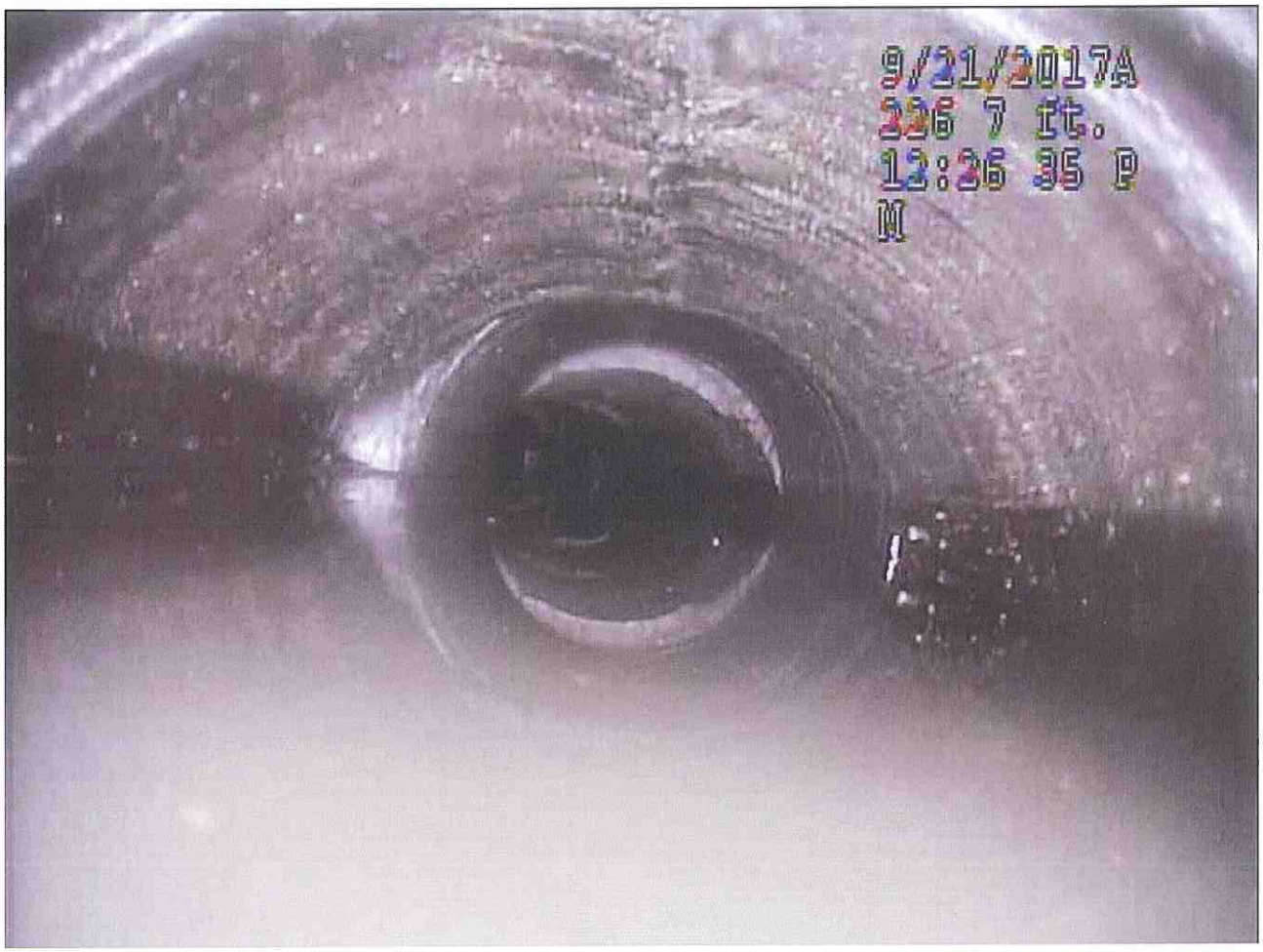
Inspection's photos


Start date/time: 9/21/2017 12:06 PM
Project name: 9/21/17 DD 67
Operator: Paul
Address: DD 67 UPSTREAM FROM WILLIAMS HO
LE ON SOUTH SIDE OF TRACKS
Upstream node:
Downstream node:
Direction: Against the flow
Surface condition: Farm field
Pipe height: 12 in.
Pipe width:
Pipe shape: Circular
Pipe material: Clay
Weather: Dry

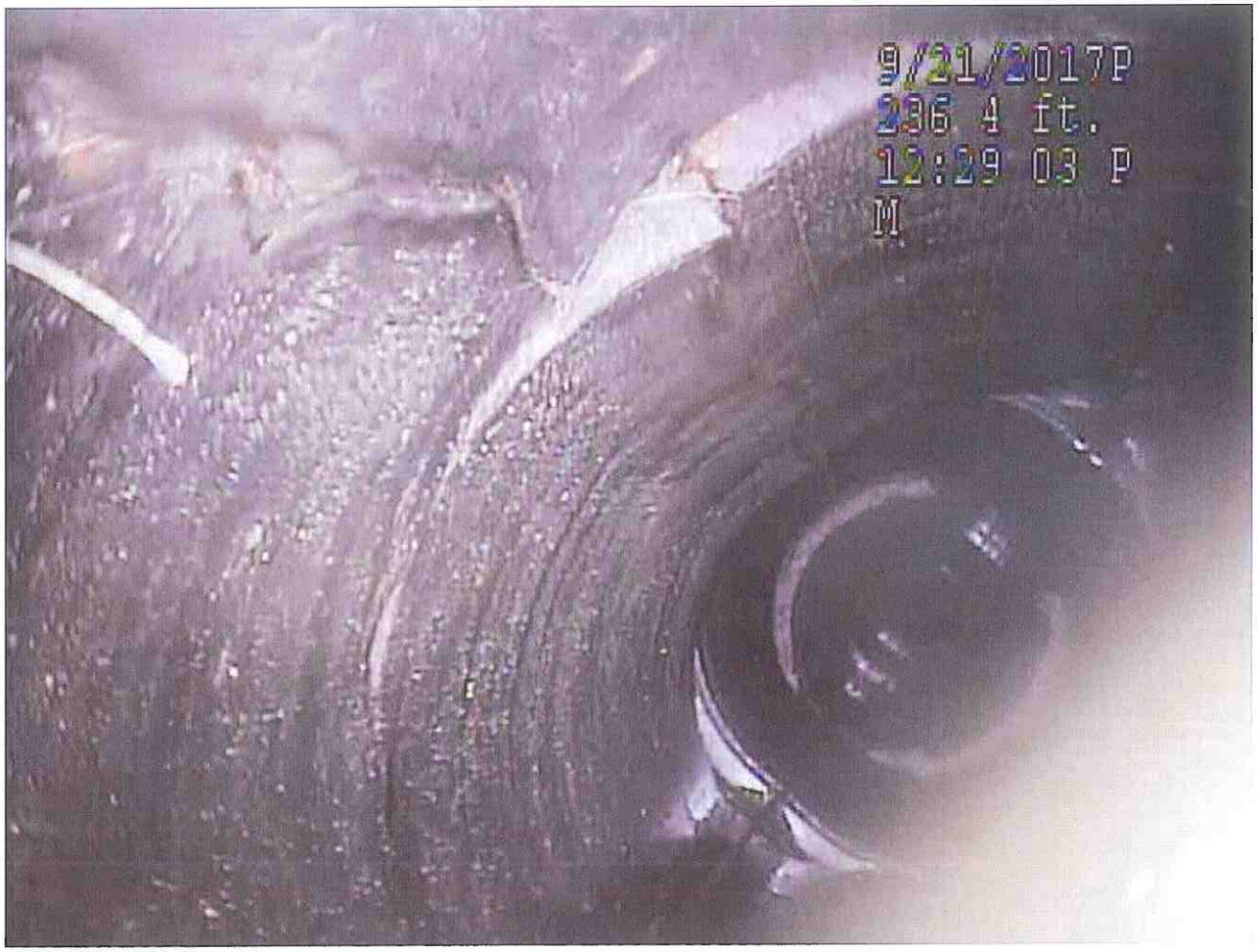

9/21/2017
77 2 ft.
12:11 36 P
M


9/21/2017
150 4 ft.
12:14 36 P
M
FLASHPOINT
Everything

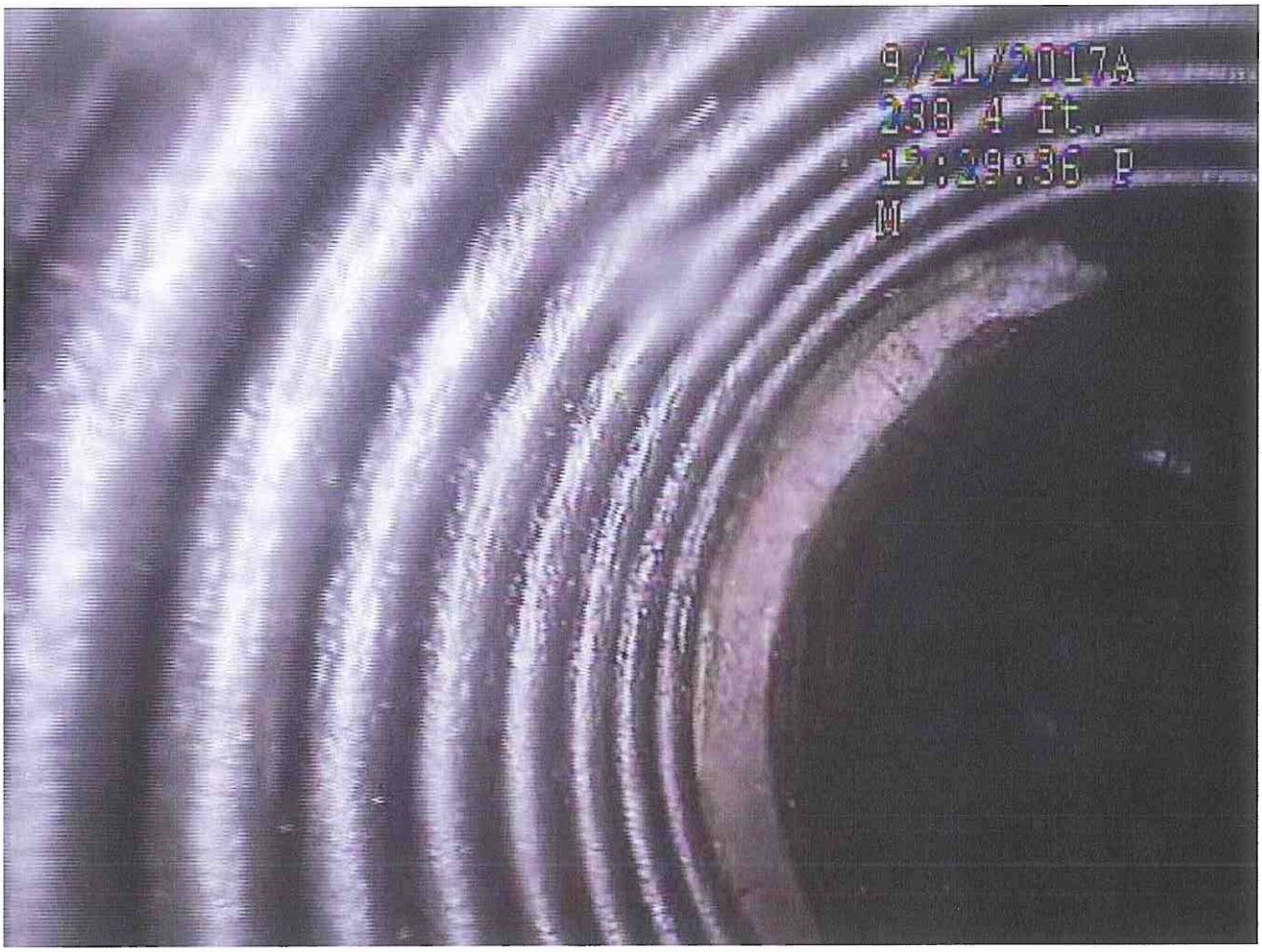

9/21/2017
182 3 ft.
12:17:15 P
M


9/21/2017A
226.7 ft.
12:26:35 P
M


9/21/2017A
229.6 ft.
12:27:54 P
M

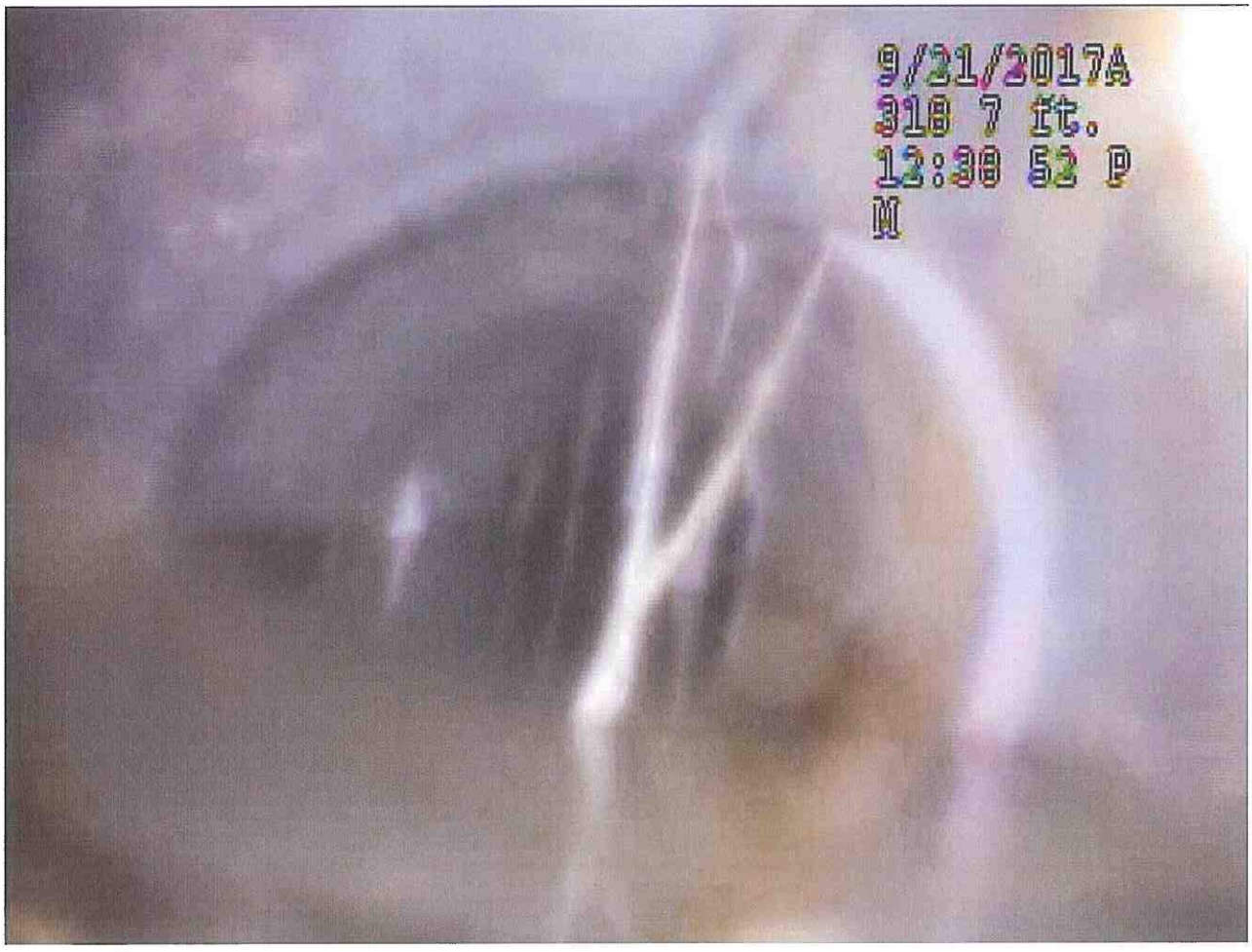

9/21/2017P
236.4 ft.
12:29:03 P
M


9/21/2017A
236.7 ft.
12:29:20 P
M

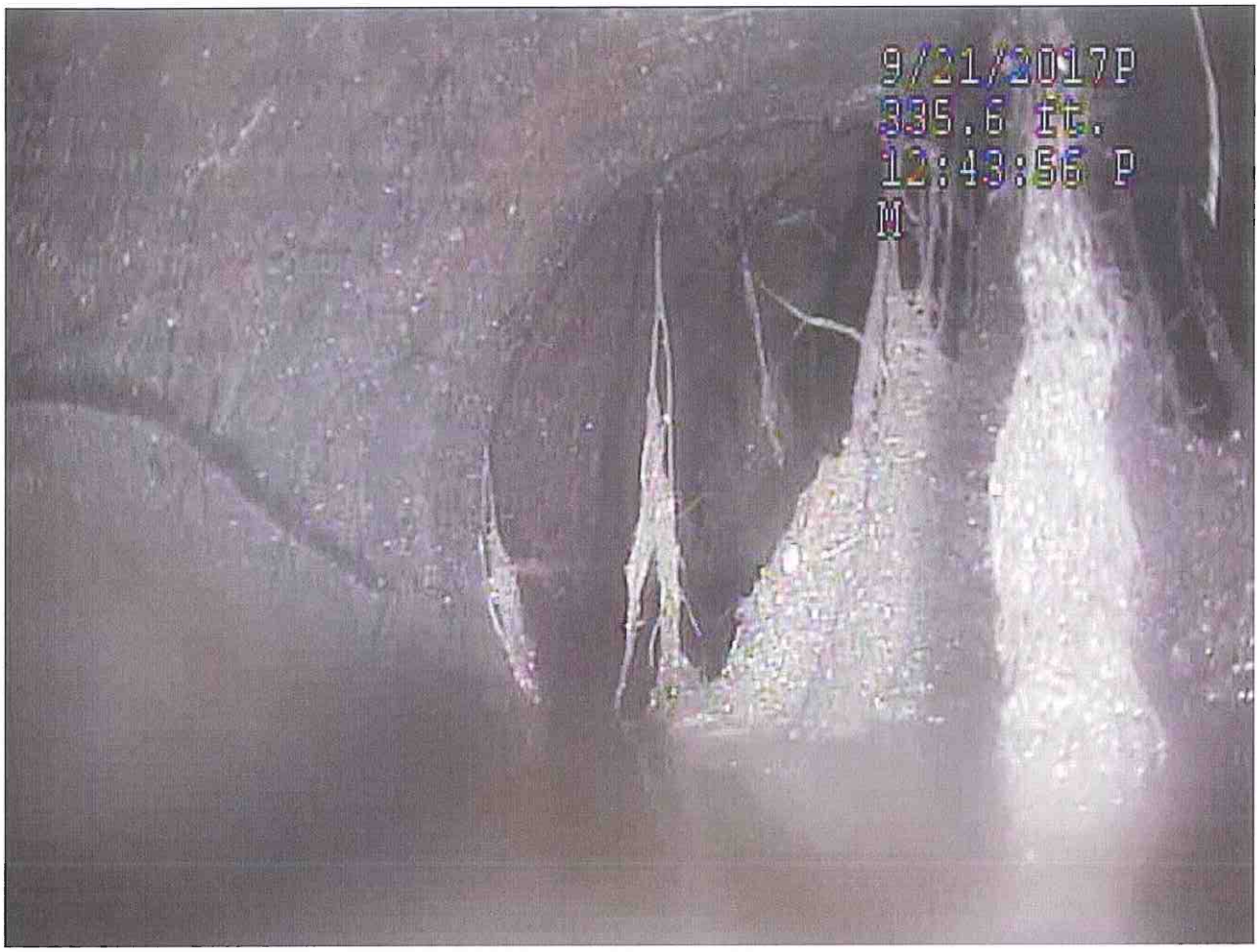

9/21/2017A
238.4 ft.
12:29:36 P
M


9/21/2017P
256.2 ft.
12:30:48 P
M


9/21/2017A
288 0 ft.
12:32:52 P
M


9/21/2017A
318 7 ft.
12:38 52 P
M


9/21/2017P
326 7 ft.
12:39:26 P
M


9/21/2017P
335.6 ft.
12:43:56 P
M

Main Inspections Small Photos

Mainline ID:	City:	Address:	Project name:
9/21/17 DD 67	**DD 67 DOWNSTREAM FRO MCDOWELL HOLE ON NORTH SIDE OF TRACKS**		**9/21/17 DD 67**
Start date/time:	Asset length:	Weather:	Operator:
9/21/2017 8:15 AM	**690.0 ft.**	**Dry**	**Paul**
Upstream node:	Depth US:	Downstream node:	Depth DS:
Pipe shape:	Pipe material:	Pipe height:	Pipe width:
Circular	**Clay**	15"	

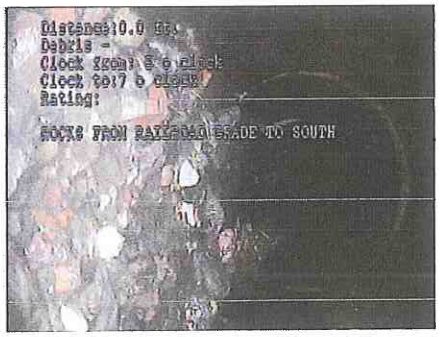
Comments:
0+00 IS GPS 3380

TRAVELING DOWNSTREAM

Observations

Distance	Dir.	Length	From/To	Code	Modifier/Severity	Rating	Comments
0.0 ft.	**D**	**279.5 ft.**	**11 / 1**	**Crack**	TOP AND SIDE (START), DEBRIS (SILT, RAILROAD GRADE, AND SHATTERED TILE) IN FLOWLINE. CONTINUED SILT IN FLOWLINE (START) - PIPE ROUND		**CONTINUOUS TOP CRACK**

Distance	Dir.	Length	From/To	Code	Modifier/Severity	Rating	Comments
0.0 ft.	**D**	**465.3 ft.**	**5 / 7**	**Debris**			**ROCKS FROM RAILROAD GRADE TO SOUTH**



Observations

Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
0.6 ft.	D		4 /	**Debris**, LARGE TILE PIECE - PIPE ROUND			**LARGE PIECE OF BROKEN TILE IN FLOWLINE**

0+04 MULTIPLE CRACKS, PIPE SAGGING - PIPE V SHAPED
0+18 JOINT OFFSET (VERT) - PIPE ROUND
0+20 JOINT OFFSET (VERT) - PIPE ROUND
0+33 TILE SAGGING, JOINT OFFSET - PIPE V SHAPED

Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
37.0 ft.	D		/	**Joint - Separated**, SOIL VISIBLE IN JOINT - PIPE ROUND			**WIDE JOINT**

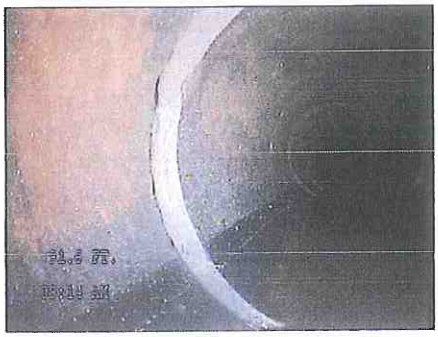
0+43 JOINT OFFSET, RADIAL CRACK - PIPE ROUND
0+46 CRACKS END - PIPE ROUND
0+58 TOP CRACK (START) - PIPE ROUND
0+63 TILE SAGGING (ONE) - PIPE V SHAPED

Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
71.5 ft.	D		7 / 11	**Joint - Separated**, SOIL VISIBLE, TILE SAGGING - PIPE EGG SHAPED			**WIDE JOINT - SOIL SHOWING**

0+74 TILE SAGGING, JOINT OFFSET W/ SOIL VISIBLE - PIPE EGG SHAPED
0+78 CRACKS (END) - PIPE ROUND
0+82 TOP CRACK (ONE) - PIPE ROUND

Observations

Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
91.6 ft.	D		7 / 1	Joint Offset	SOIL VISIBLE IN GAP - PIPE ROUND		SEVERE OFFSET



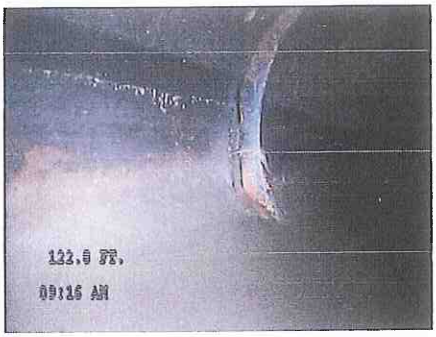
Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
97.8 ft.	D		2 / 4	Root-in-Joint			ROOTS

1+00 TOP CRACK (ONE) - PIPE ROUND

Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
110.0 ft.	D		3 / 10	Root	TOP CRACK (START) - PIPE ROUND		ROOTS

Observations

Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
122.8 ft.	D		7 / 10	Joint Offset	SOIL VISIBLE IN GAP (TWO IN A ROW), TOP CRACK (END) - PIPE ROUND		OFFSET



1+26 TOP CRACK (ONE TILE) - PIPE ROUND
1+30 JOINT OFFSET, TOP CRACK (START) - PIPE ROUND

Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
155.3 ft.	D		/	Root	SLIGHT INFILTRATION (20') - PIPE ROUND		ROOTS

1+80 JOINT OFFSET - PIPE ROUND
1+93 PIPE SAGGING, JOINT OFFSET - PIPE EGG SHAPED
2+16 JOINT OFFSET - PIPE ROUND
2+43 PIPE SAGGING, TOP & SIDE CRACKS (TWO IN A ROW), JOINT OFFSET - PIPE EGG SHAPED
2+60 JOINT OFFSET, SOIL VISIBLE IN GAP - PIPE ROUND
2+64 JOINT OFFSET - PIPE ROUND
2+70 TOP CRACK (END) - PIPE ROUND
2+88 JOINT OFFSET - PIPE ROUND
2+92 TOP CRACK (ONE TILE) - PIPE ROUND
2+95 JOINT OFFSET - PIPE ROUND
3+08 JOINT OFFSET - PIPE ROUND
3+20 JOINT OFFSET (THREE IN A ROW) - PIPE ROUND

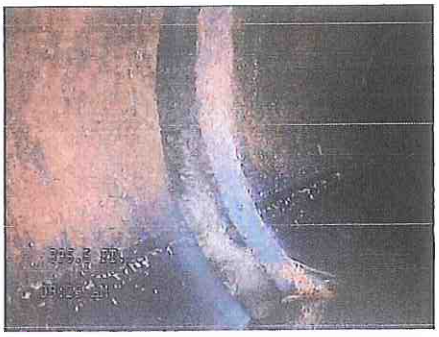
Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
370.9 ft.	D	108.0 ft.	12 / 6	Joint Offset			CONTINUOUS OFFSETS

3+77 JOINT OFFSET (THREE IN A ROW) - PIPE ROUND
3+84 JOINT OFFSET, SOIL VISIBLE IN GAP - PIPE ROUND
3+86 JOINT OFFSET, SOIL VISIBLE IN GAP (TWO IN A ROW) - PIPE ROUND

3+24 JOINT OFFSET, SOIL VISIBLE IN GAP - PIPE ROUND
3+30 JOINT OFFSET (SIX IN A ROW) - PIPE ROUND
3+36 JOINT OFFSET, SOIL VISIBLE IN GAP - PIPE ROUND
3+68 SILT IN FLOWLINE (END), VISIBLE ELEVATION WANDERING/CHANGE - PIPE ROUND

Observations

Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
396.5 ft.	D		/	Joint - Separated, SOIL VISIBLE - PIPE ROUND			WIDE / SOIL SHOWING



3+99 JOINT OFFSET, SOIL VISIBLE IN GAP - PIPE ROUND

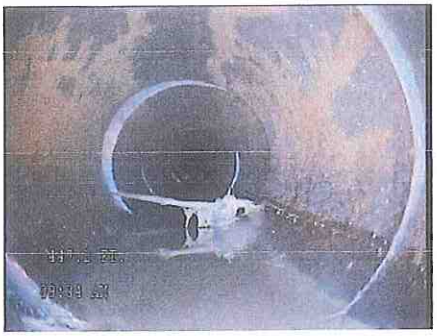
Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
408.5 ft.	D		/	Joint Offset, JOINT OFFSET, SOIL VISIBLE IN GAP (THREE IN A ROW) - PIPE ROUND			WIDE

Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
412.4 ft.	D		7 / 11	Joint - Separated			LARGE VOID

4+18 JOINT OFFSET, SILT IN FLOWLINE (START) - PIPE ROUND
4+24 JOINT OFFSET (FOUR IN A ROW), TOP CRACK (ONE TILE) - PIPE ROUND
4+29 JOINT OFFSET, SOIL VISIBLE IN GAP - PIPE ROUND
4+32 SILT (END), BOTTOM CRACK (TWO TILE) - PIPE ROUND
4+43 TOP CRACK (TWO TILE), JOINT OFFSET (TWO IN A ROW) - EGG SHAPED

Observations

Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
447.2 ft.	D		4 / 8	Root			ROOTS



4+56 TOP CRACK (START) - PIPE ROUND
4+88 JOINT OFFSET - PIPE ROUND

492.9 ft.	D		5 / 7	Root			ROOTS

5+10 JOINT OFFSET, TOP CRACK (END) - PIPE ROUND

532.5 ft.	D		5 / 8	Root	, TOP CRACK (ONE TILE), SILT IN FLOWLINE (START) - PIPE ROUND		ROOTS

5+49 JOINT OFFSET (THREE TILE) - PIPE ROUND

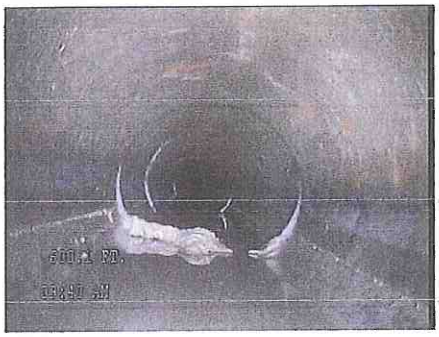
Observations

Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
563.2 ft.	D	62.8 ft.	/	Joint Offset	(SOIL VISIBLE), BOTTOM CRACK (ONE TILE) - PIPE ROUND		CONTINUOUS OFFSETS

5+70 TOP CRACK (START) - PIPE ROUND

Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
584.9 ft.	D	105.1 ft.	11 / 1	Crack			CONTINUOUS TOP CRACK

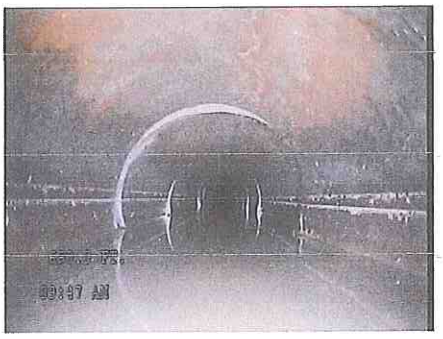
Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
600.1 ft.	D		5 / 8	Root	- PIPE ROUND		ROOTS



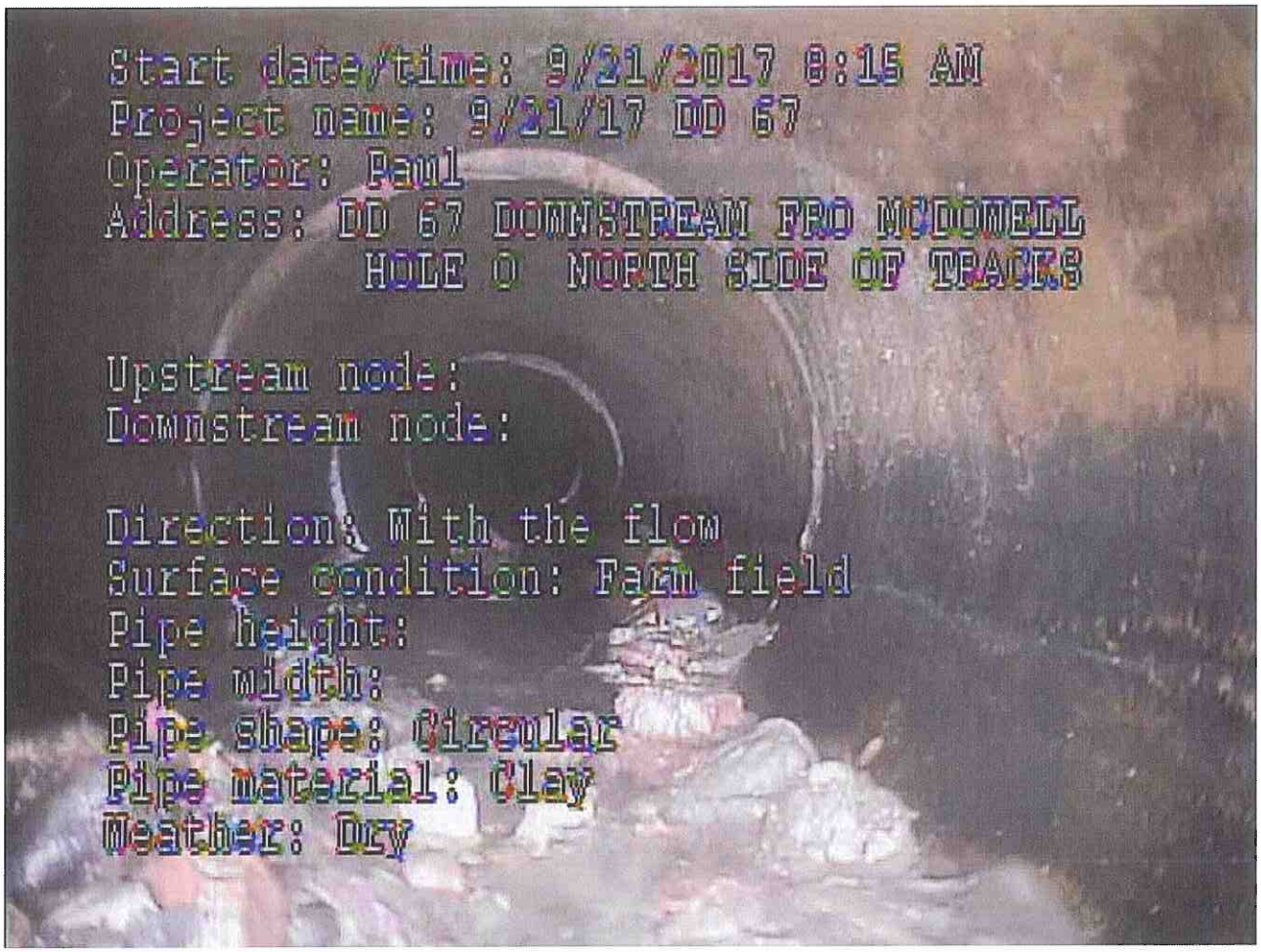
6+31 JOINT OFFSET - PIPE ROUND
6+76 JOINT OFFSET (TWO IN A ROW) - PIPE ROUND

Observations

Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
690.0 ft.	D		/	END OF SURVEY, LOSS OF TRACTION - PIPE ROUND			END OF SURVEY/INSPECTION. UNABLE TO GO ANY FARTHER. SOMETHING UNDER THE WATER/MUD IS STOPPING TRACTOR



Inspection's photos


Start date/time: 9/21/2017 8:15 AM
Project name: 9/21/17 DD 67
Operator: Paul
Address: DD 67 DOWNSTREAM FRO MCDOWELL
HOLE 0 NORTH SIDE OF TRACKS
Upstream node:
Downstream node:
Direction: With the flow
Surface condition: Farm field
Pipe height:
Pipe width:
Pipe shape: Circular
Pipe material: Clay
Weather: Dry


9/21/2017
0.0 ft.
8:16:56 AM

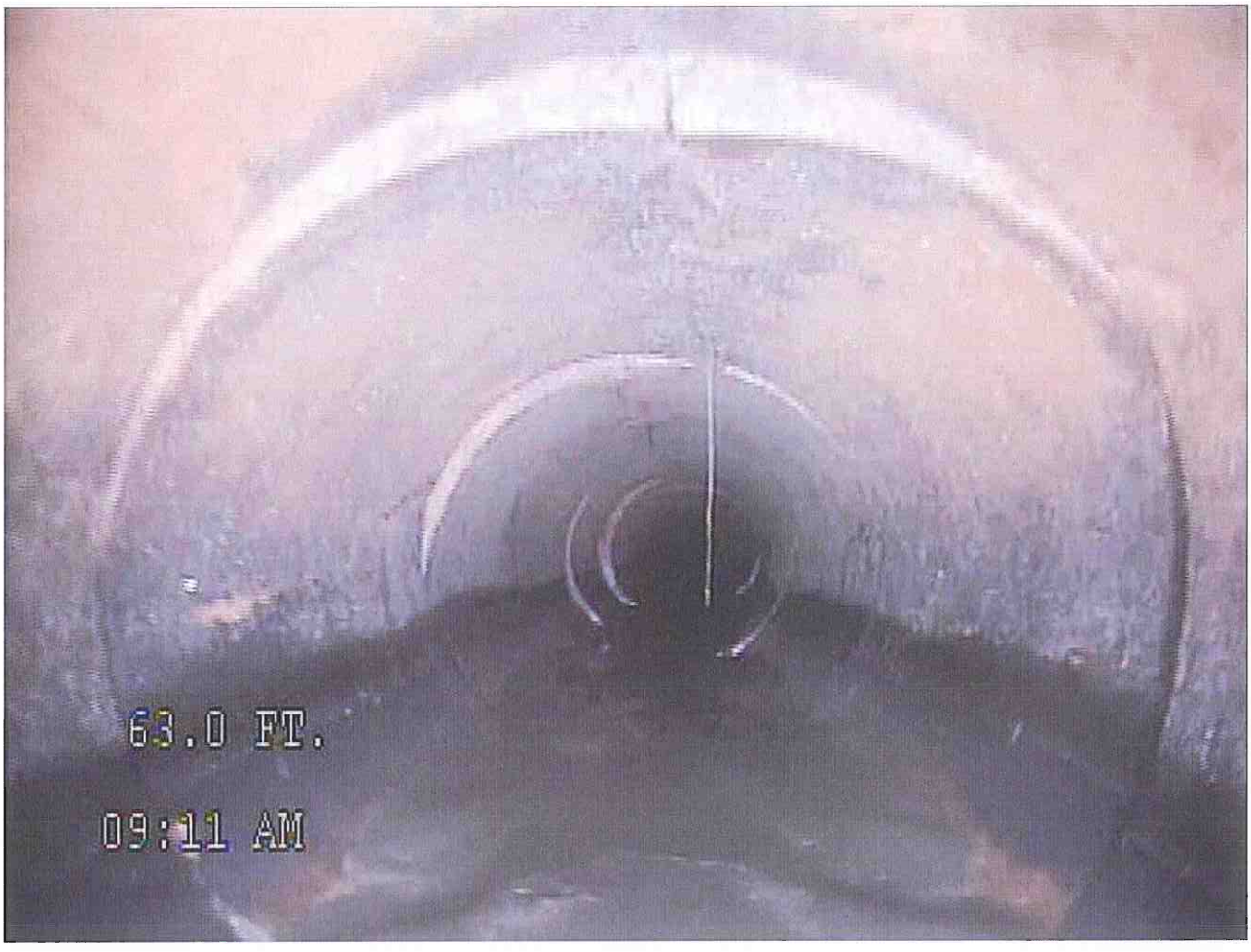

0.6 FT.
08:41 AM
09/21/17


3.7 FT.
08:54 AM
09/21/17


32.8 FT.
09:10 AM


35.5 FT.
09:10 AM


43.2 FT.
09:11 AM


63.0 FT.
09:11 AM

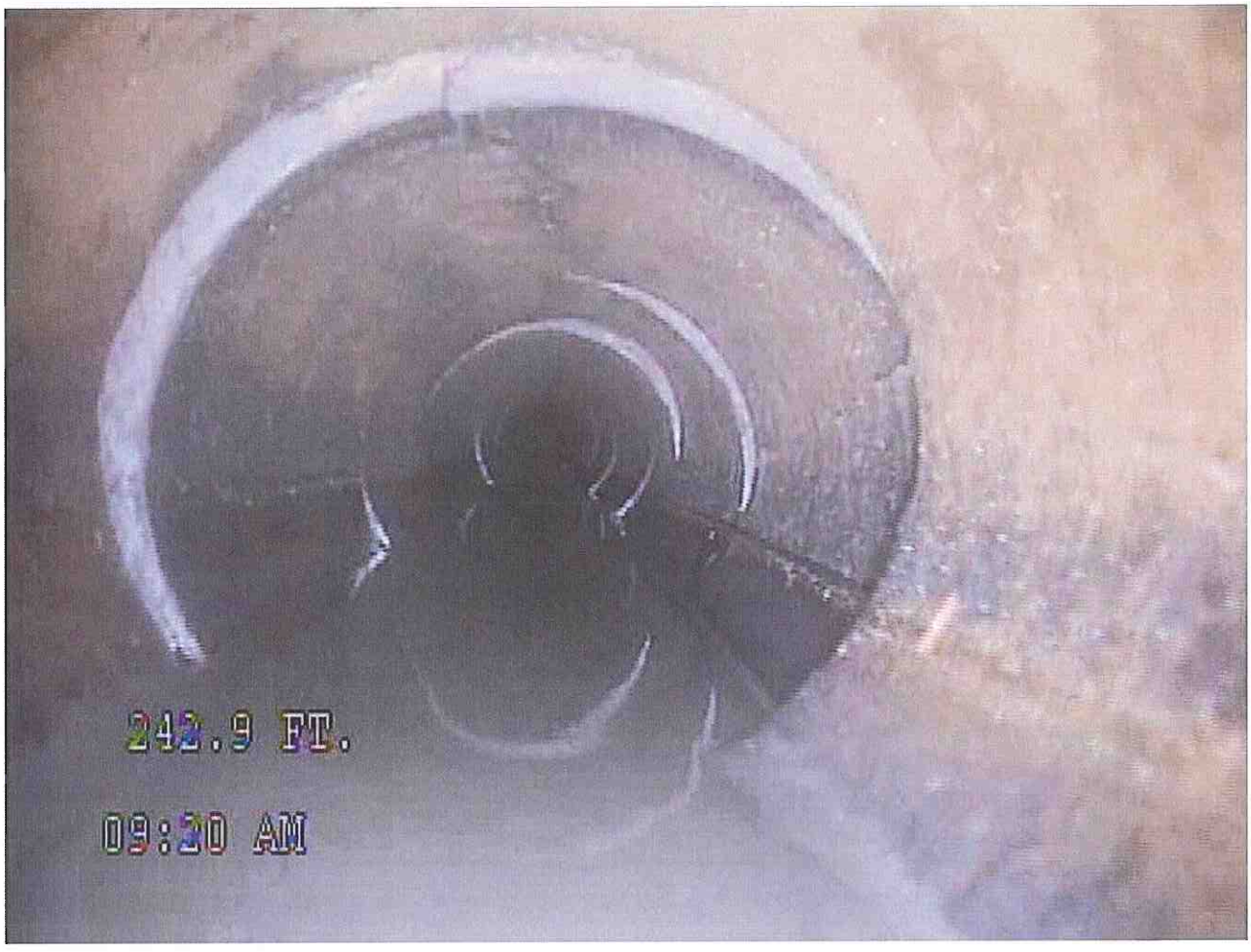

71.5 FT.
09:12 AM


91.6 FT.
09:13 AM


121.4 FT.
09:16 AM


122.8 FT.
09:16 AM


192.8 FT.
09:19 AM


242.9 FT.
09:20 AM


259.7 FT.
09:21 AM

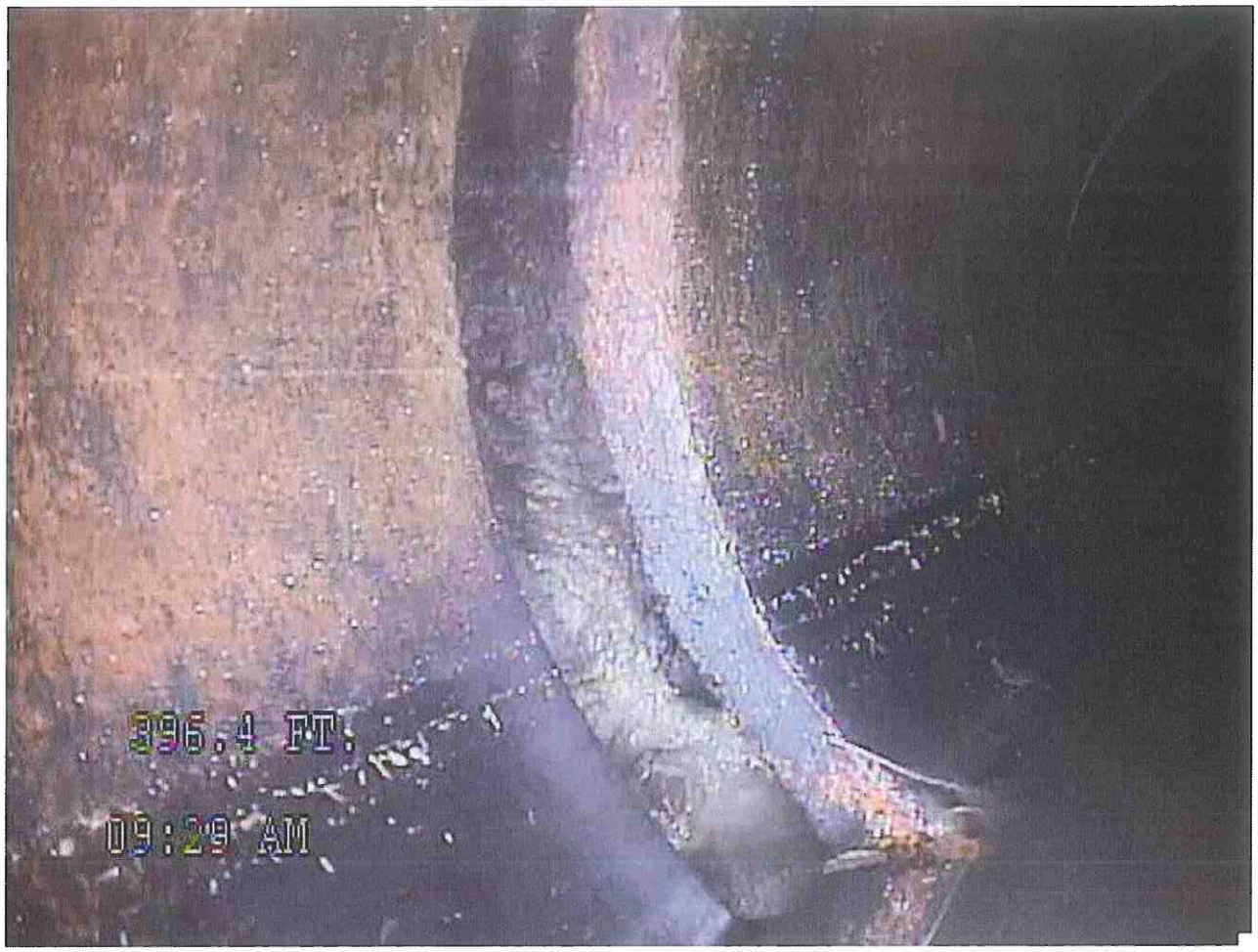

323.5 FT.
09:23 AM


335.8 FT.
09:28 AM


370.9 FT.
09:25 AM


383.9 FT.
09:26 AM


386.3 FT.
09:27 AM


396.4 FT.
09:29 AM


398.2 FT.
09:30 AM


407.7 FT.
09:30 AM


412.4 FT.
09:31 AM


412.5 FT.
09:31 AM


418.6 FT.
09:32 AM


423.7 FT.
09:32 AM


428.3 FT.
09:32 AM


563.9 FT.
09:38 AM

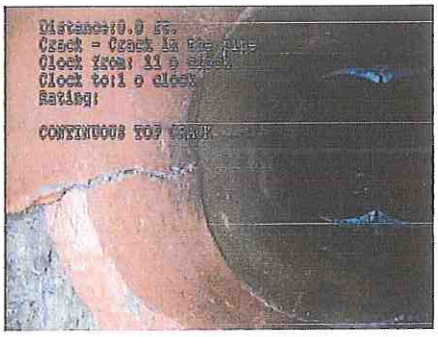
Main Inspections Small Photos

Mainline ID:	City:	Address:	Project name:
9/21/17 DD 67	**DD 67 UPSTREAM FROM MCDOWELL HOLE ON NORTH SIDE OF TRACKS**	**GOING UNDER RAILROAD**	**9/21/17 DD 67**
Start date/time:	Asset length:	Weather:	Operator:
9/21/2017 10:46 AM	~~1,500.0 ft.~~ 0+32	**Dry**	**Paul**
Upstream node:	Depth US:	Downstream node:	Depth DS:
Pipe shape:	Pipe material:	Pipe height:	Pipe width:
Circular	**Clay**	**15.0 in.**	

Comments:
0+00 IS GPS 3380 TRAVELING UPSTREAM

Observations

Distance	Dir.	Length	From/To	Code	Modifier/Severity	Rating	Comments
0.0 ft.	**U**	**31.9 ft.**	**11 / 1**	**Crack**	TOP (START), SILT IN FLOWLINE - PIPE ROUND		**CONTINUOUS TOP CRACK**



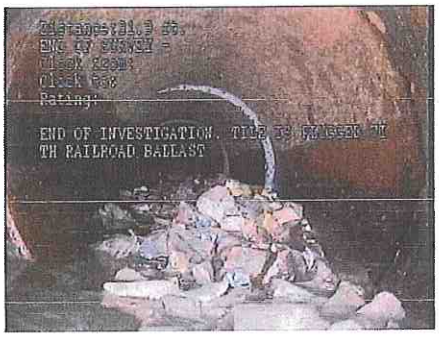
2.3 ft.	**U**	**29.6 ft.**	**5 / 7**	**Debris**			**CONTINUOUS DEBRIS IN FLOWLINE**

Observations

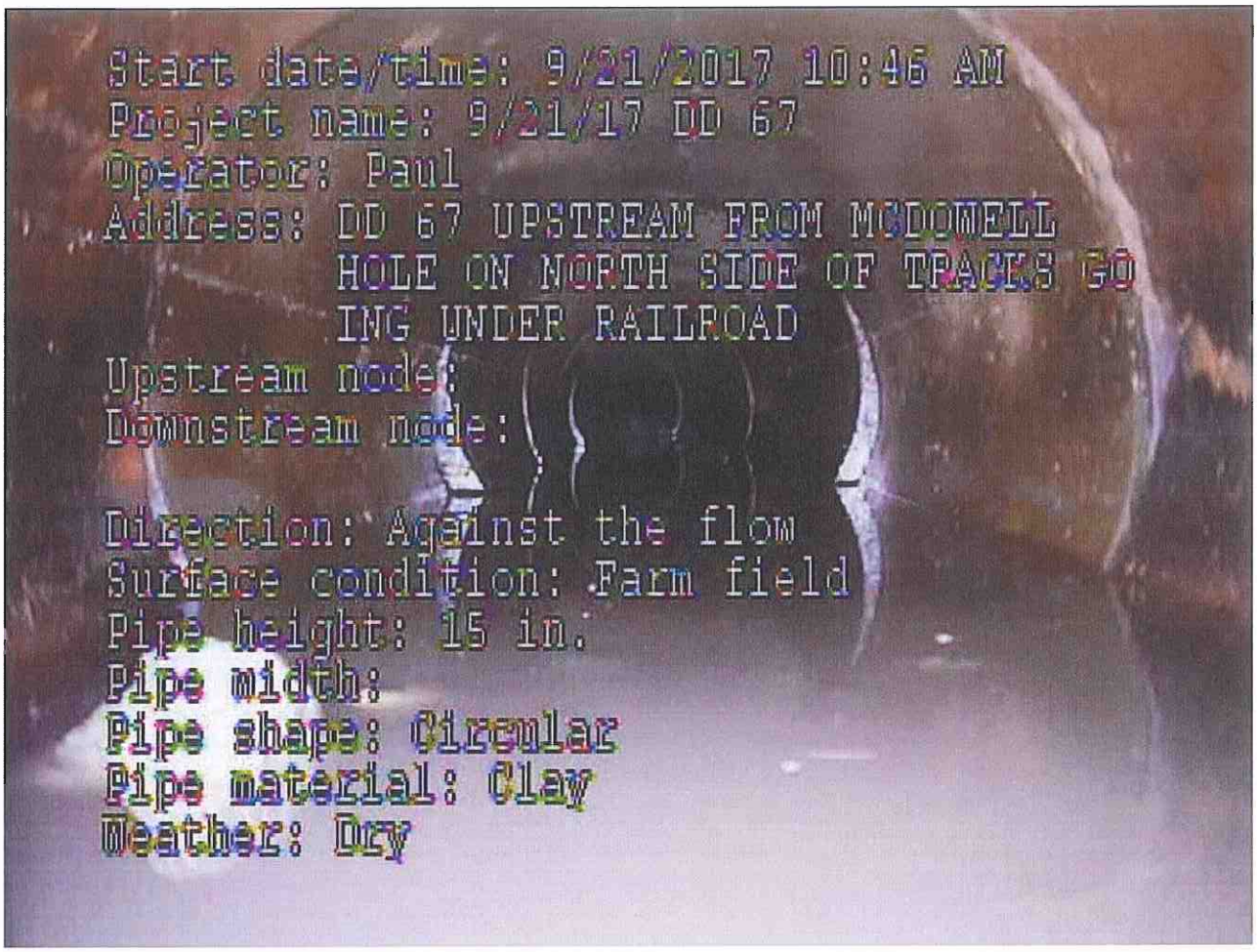
Distance	Dire	Length	From/To	Code	Modifier/Severity	Rating	Comments
12.2 ft.	U		5 / 7	Root, JOINT OFFSET - PIPE ROUND			ROOTS

27.9 ft.	U		5 / 7	Debris			LARGE AMOUNT OF RAILROAD BALLAST IN PIPE, WILL NOT BE ABLE TO GET PAST THIS.

31.9 ft.	U		/	END OF SURVEY, DEBRIS TOO DEEP.			END OF INVESTIGATION. TILE IS PLUGGED WITH RAILROAD BALLAST



Inspection's photos


Start date/time: 9/21/2017 10:46 AM
Project name: 9/21/17 DD 67
Operator: Paul
Address: DD 67 UPSTREAM FROM MCDOWELL
HOLE ON NORTH SIDE OF TRACKS GO
ING UNDER RAILROAD
Upstream node:
Downstream node:
Direction: Against the flow
Surface condition: Farm field
Pipe height: 15 in.
Pipe width:
Pipe shape: Circular
Pipe material: Clay
Weather: Dry


9/21/2017
13 2 ft.
10:51 17 A
M


9/21/2017
27 9 ft.
10:52 14 A
M


9/21/2017
29 9 ft.
10:54 56 A
M

PLAT
BULLIS DRAINAGE DISTRICT No 67
HARDIN COUNTY IOWA

T88 889N R21W
Containing 200 Acres
E L Chamberlain Engineer
Scale 1 inch = 400 ft

Allen Twp

F. STOWE

26" TILE

27

34

TILE

MAIN
Sta 0 To Sta 29 2900 ft 12 in Tile
Sta 29 To Sta 38 900 ft 10 in Tile
LATERAL 1
Sta 0 To Sta 11 1100 ft 10 in Tile

GEO. NOLTE.

MAIN

D. WHITE.

LAT 1

155TH ST.

33

INLET

INLET

C B I & P

IONE BULLIS

JOHN HEINZEROTH.

I AVE.

33

34

160TH ST

6

5

C. FOETYKE

A. P. HILLHOUSE

DRAINAGE DISTRICT BOUNDARY

SPOT REPAIRS

PLAT
BULLIS DRAINAGE DISTRICT No 67
HARDIN COUNTY IOWA

T88 889N R21W
Containing 200 Acres
E L Chamberlain Engineer
Scale 1 inch = 400 ft

Alden Twp

DRAINAGE DISTRICT BOUNDARY

TILE REPLACEMENT

F. STOWE

26" TILE

TILE

MAIN
Sta 0 To Sta 29 2900 ft 12 in Tile
Sta 29 To Sta 38 900 ft 10 in Tile
LATERAL 1
Sta 0 To Sta 11 1100 ft 10 in Tile

GEO. NOLTE

D. WHITE

MAIN

LAT 1

INLET

INLET

155TH ST.

33

I AVE.

IONE BULLIS

JOHN HEINZEROTH

33

34

160TH ST

6

5

C. FOETYKE

A. P. HILLHOUSE

CGA
ENGINEERS • LAND SURVEYORS

By: Z.J.S.
Date: 3/5/2018
Checked By: L.O.G.
Date: 3/24/2018

Engineer's Opinion of Probable Construction Cost

Project: Main tile Repair for D.D. #67

Location: Sections 28 and 33, T89N, R21W, Hardin County, Iowa

SPOT REPAIRS

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost
	CONSTRUCTION COSTS					
101	12" RCP OR DUAL WALL TILE	$ 30.00	LF	480	LF	$ 14,400.00
102	JACK AND BORE TILE (RAILROAD CROSSING)	$ 500.00	LF	110	LF	$ 55,000.00
103	CONCRETE COLLARS	$ 400.00	EA	16	EA	$ 6,400.00
104	TILE REMOVAL	$ 5.00	LF	480	LF	$ 2,400.00
105	TREE REMOVAL	$ 3,000.00	LS	1	LS	$ 3,000.00
106	ABANDON EXISTING TILE (RAILROAD CROSSING)	$ 60.00	LF	110	LF	$ 6,600.00
107	SEEDING	$ 1,000.00	LS	1	LS	$ 1,000.00
		CONSTRUCTION SUBTOTAL				$ 88,800.00
		Contingency (15%)				$ 13,320.00
		CONSTRUCTION TOTAL				**$ 102,120.00**
		Engr. & Const. Observation (25%)				$ 25,530.00
		TOTAL COST				**$ 127,650.00**

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TILE REPLACEMENT

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost
	CONSTRUCTION COSTS					
201	12" RCP OR DUAL WALL TILE	$ 27.00	LF	1015	LF	$ 27,405.00
202	24" JACK AND BORE TILE (RAILROAD CROSSING)	$ 500.00	LF	110	LF	$ 55,000.00
203	CONCRETE COLLARS	$ 400.00	EA	2	EA	$ 800.00
204	TILE REMOVAL	$ 5.00	LF	1015	LF	$ 5,075.00
205	TREE REMOVAL	$ 3,000.00	LS	1	LS	$ 3,000.00
206	ABANDON EXISTING TILE (RAILROAD CROSSING)	$ 60.00	LF	110	LF	$ 6,600.00
207	SEEDING	$ 1,000.00	LS	1	LS	$ 1,000.00
		CONSTRUCTION SUBTOTAL				$ 98,880.00
		Contingency (15%)				$ 14,832.00
		CONSTRUCTION TOTAL				**$ 113,712.00**
		Engr. & Const. Observation (25%)				$ 28,428.00
		TOTAL COST				**$ 142,140.00**