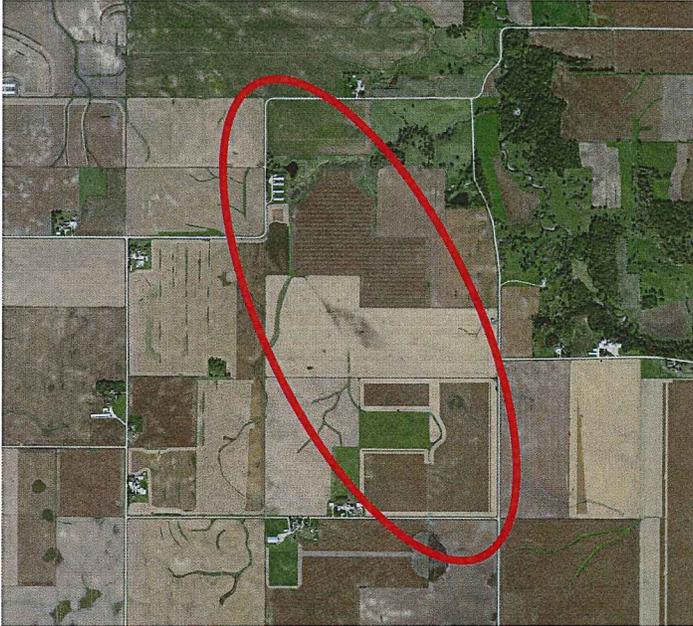


HARDIN COUNTY, IOWA

2016



**ENGINEER'S REPORT
ON REPAIR OR
IMPROVEMENTS TO
MAIN OF
DRAINAGE DISTRICT 102
HARDIN COUNTY**



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

LEE O. GALLETINE, P.E.

DATE

LICENSE NUMBER: 15745
MY LICENSE RENEWAL DATE IS DECEMBER 31, 2016
PAGES OR SHEETS COVERED BY THIS SEAL:
SHOWN ON TABLE OF CONTENTS

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Engineer's Report on Repair or Improvements to Main of Drainage District No. 102, Hardin County, Iowa

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Engineer's Report on Repair or Improvements to Main of Drainage District No. 102, Hardin County, Iowa

1.0 INTRODUCTION

- **SCOPE OF WORK** – The Hardin County Board of Supervisors, acting as District Trustees, requested Ryken Engineering to investigate and report concerning repairs or improvements to the main of Drainage District No. 102. This report will summarize the history of repairs and improvements to the main tile, investigate the necessity and feasibility of said repair or improvements, and present an opinion of probable construction costs associated with said repair or improvements. At the regular drainage meeting held on February 17, 2016, the recommended action shown in the Repair Summaries for Work Order Request #66 (copies included in Appendix A) were discussed and reviewed by the District Trustees. As a result, the District Trustees requested Ryken Engineering to move ahead with preparation of this report.

- **LOCATION** – The area of investigation included the entire main tile, which is located in Sections 18 and 19, Township 86 North, Range 20 West, Hardin County, Iowa. Specifically, the downstream limit was the main tile outlet in the Fractional Northwest Quarter of Section 18, approximately $\frac{3}{8}$ mile west of O Avenue and approximately $\frac{1}{4}$ mile south of 300th Street. The main tile then goes southerly and southeasterly across Section 18. It then skims into the Northeast Quarter of Section 19 approximately $\frac{1}{4}$ mile west of O Avenue. The upstream limit of said tile is just west of O Avenue at approximately $\frac{1}{4}$ mile north of 315th Street. For reference, a copy of the 1917 Drainage District No. 102 map, showing said limits and the district boundary is included in Appendix C.

2.0 **DISTRICT HISTORY** – The following is a summary of the pertinent history of the main tile of Drainage District No. 102 as obtained from the Hardin County Auditor’s drainage minutes and records.

- 1917, May 28 Petition for establishment of drainage district.
- 1917, Aug. 25 Preliminary Engineer’s Report by W.S. Porter was filed. It called for 6,700 feet main tile (28 inch diameter to 8 inch diameter), 3,260 feet of Lateral 1 tile (10 inch diameter to 7 inch diameter), 240 feet of Lateral 2 tile (6 inch diameter), 200 feet of Lateral 3 tile (6 inch diameter), 150 feet of Lateral 4 tile (6 inch diameter), 925 feet of Lateral 5 tile (6 inch diameter), 700 feet of Lateral 6 tile (6 inch diameter), 7,800 feet of Lateral 7 tile (18 inch diameter to 6 inch diameter), 390 feet of Lateral 8 tile (10 inch diameter), 650 feet of Lateral 9 tile (7 inch diameter), 800 feet of Lateral 10 tile (8 inch diameter to 6 inch diameter), 400 feet of Lateral 11 tile (6 inch diameter), 1,300 feet of Lateral 12 tile (6 inch diameter), 600 feet of Lateral 13 tile (8 inch diameter), and 900 feet of Lateral 14 tile (8 inch diameter).
Lateral 1 was to be connected at station 23+75 of the main tile.
Lateral 2 was to be connected at station 4+20 of the Lateral 1 tile.
Lateral 3 was to be connected at station 4+40 of the Lateral 1 tile.
Lateral 4 was to be connected at station 4+75 of the Lateral 1 tile.
Lateral 5 was to be connected at station 4+85 of the Lateral 1 tile.
Lateral 6 was to be connected at station 28+00 of the Lateral 1 tile.
Lateral 7 was to be connected at station 29+00 of the main tile.
Lateral 8 was to be connected at station 11+50 of the Lateral 7 tile.
Lateral 9 was to be connected to private tile that connected to Lateral 8 tile.
Lateral 10 was to be connected at station 55+00 of the Lateral 7 tile.
Lateral 11 was to be connected at station 67+00 of the Lateral 7 tile.
Lateral 12 was to be connected at station 70+50 of the Lateral 7 tile.
Lateral 13 was to be connected at station 42+50 of the main tile.
Lateral 14 was to be connected at station 49+00 of the main tile.
The outlet of the main tile was to be constructed at station 14+00 of the main due to ground topography. The estimated total cost of construction was \$12,305.30
- 1917, Sept. 6 Publication of Notice for hearing on establishment of drainage district.
- 1917, Oct. 10 Supplemental Engineer’s Report by W.S. Porter was filed. It called for the private tile located in the S½ of Section 13 and the E½ of Section 24 be made a part of the drainage district facilities.
- 1917, Oct. 11 Publication of Notice to Contractors for construction of drainage district facilities with a bid date of Oct. 22, 1917.
- 1917, Oct. 22 Bids were received on supplying tile and construction of drainage district facilities.
- 1917, Oct. 26 Construction contract with Jens A. Jensen for \$4,898.30 for construction of drainage district facilities was entered.
- 1917, Oct. 31 Tile contract with Eldora Pipe and Tile Co. for \$5,963.85 for supplying tile was entered.

1917, Nov. 12 Appointment of Commission to inspect and classify land in drainage district.

1918, Mar. 19 Petition by Ernest Hankemeier and A.J. DeWitt for the extension of Lateral No. 13.

1918, Jul. 1 Engineer's Report by W.S. Porter was filed. It recommended the extension of Lateral No. 13 to bring an outlet to the NE $\frac{1}{4}$ SE $\frac{1}{4}$ Section 18.

1918, Jul. 1 Engineer's Report by W.S. Porter was filed. It recommended that Lateral No. 7 not be constructed above Station 60.

1918, Jul. 1 Petition by J.W. Creson and Henry Pruessner to construct 750 feet of Lateral off Lateral No 7 at Station 70.

1918, Jul. 15 Engineer's Report by W.S. Porter recommending the construction of a lateral through J.W. Creson and Henry Pruessner land.

1918, Aug. 10 Final report on construction of drainage district facilities by W.S. Porter showing completion of contract was accepted with the deductions 'Lateral No. 7 600 feet 8" tile and 1,100 feet 6" tile. Lateral No. 11 400 feet 6" tile Lateral No. 12 1,300 feet 6" tile making a total cut off of 3,400 feet.' and with the additions 'The Pruesner & Creson Lateral 750 feet of 6" tile. For the Bales & DeWitt Lateral 715 feet 6" tile. For the Hankemier & DeWitt Lateral 500 feet 8" tile & 1,250 feet of 6" tile. For the Schnormeier & Hartwic Lateral 300 feet of 8" tile. Making a total added of 3,515 feet.'

1918, Sept. 4 Publication of Notice of Assessment of Benefits.

1922, Jan. 23 Letter from W.S. Porter recommending that "Lateral No. 8 be relaid at the point where they cross the first draw running west of Lateral No. 1 and that they be cemented in and extra filling be put on them."

1922, May 10 Engineer's Report by W.S. Porter on Lateral No. 8 was filed. It called for "...relaying of about 300 feet of the 16 inch tile relaying it in the west bank of the open ditch far enough away so that the overflow water will have no effect on it this will require us to purchase about 100 feet of new tile and to cement some of it also put in one intake 6 inch in size. I estimate will cost around two hundred dollars."

1922, May 22 Report by W.S. Porter was filed. It recommended "relaying at 300 feet of the 16 inch tile relaying in the west bank of the open ditch far enough away so that the over flow water will have no effect on it this will require us to purchase about 100 feet on new tile..." and "...estimate will cost around two hundred dollars"

1923, Feb. 19 District Trustees directed J.R. Maher to investigate and report the need for repairs on Drainage District No. 102.

1947, District Trustees met with landowners to discuss the possible construction of grass waterway in the SW $\frac{1}{4}$ NW $\frac{1}{4}$ and the NW $\frac{1}{4}$ SW $\frac{1}{4}$ of Section 18.

1948, Payment for right of way for waterway

- 1948, Jul. 12 Report from County Secondary Road Crew stating "Put in Culverts this spring but didn't level and didn't put on extensions N & S road on east side" located in Section 18.
- 1948, Sept. 1 Report from County Secondary Road Crew stating "culvert into pasture – put open ditch into field and needs extensions to cross with picker" located in Section 18.
- 1949, Feb. 9 Bill for construction of grassed waterway located in the SW¼ NW¼ and NW¼ SW¼ of Section 18.
- 1951, Oct. 5 Bill for installation of 30 feet of 48 inch culvert located in Section 18.
- 1954, Jun. 14 Request for 'Repair by placing 18" along present Main from sta 14+00 to 29+00' located in the W½ Section 18.
- 1954, Jul. 31 Engineer's Report by F.J. Reigles was filed. It stated that "the outlet is quite badly block and the outlet gully needs cleaning out". It also indicated that the currently installed "...tiling system would never be very satisfactory because of the steep grades of the laterals and sizes of that laterals as compared with the grade of the main tile". Therefore, there was a request to install a relief main from the outlet to a point past the lateral connections. The estimated cost for this repair was \$3,112.95.
- 1954, Aug. 12 Resolution by the County Board of Supervisors to set a hearing on the improvement per F.J. Reigles Engineer's Report.
- 1954, Sept. 10 Publication of Notice of Hearing on improvement to drainage district facilities.
- 1954, Oct. 9 Resolution by the County Board of Supervisors to direct Engineer F.J. Reigles "...to make a primary survey and report of the feasibility of the construction of the continuation of the grass wasterway from the Hankemeier property into the Bales property"
- 1955, May 14 Engineer's Report by F.J. Reigles was filed in the County Auditor's Office. It stated that "...that the expense and other difficulties involved in making such a deep waterway would come to more that the benefits received from such operation". It also recommended that a 6 inch intake be replaced with 12 inch intake with a 10 inch riser, install a 18 inch intake with 12 inch tile hookup to other lateral across Bales property, and dig a waterway to the east and south on a very flat grade as far across the Bales Pond. Estimated cost \$300.00.
- 1956, Aug. 7 Bill for repair to tile.
- 1957, May 8 Bill for repair to tile.
- 1957, Dec. 4 Bill for repair to tile.
- 1967, May 17 Engineer's Report by Hollis E. Ryken was filed. It recommended "that the intake at the north line of the Lehemier land in the south half of section 18 be closed to eliminate part of the load on the tile." and "That the land southeast of this intake which presently drains to this intake be provided with surface drainage into the existing surface drain..."
- 1975, Feb. 10 Application to secure drainage rights by L.F. Lehmeier through the property owned by Martin Schnormeier (described as FrW½ Section 18)

- for the purposes of installing a 12 inch tile parallel to the main tile starting at the outlet and terminating at the junction of the main tile with Lateral No. 7.
- 1975, Jun. 11 Order between L.F. Lehmeier and Martin Schnormeier for the benefit of L.F. Lehmeier to install a 12 inch tile parallel to the main tile, starting at the outlet of the main and terminating at the south line of the Schnormeier property as recorded in County Recorder's Book 486 Pages 539-541.
- 1979, Jan. Bill for repair of tile located in Section 18.
- 1980, Jan. 31 Bill for repair of tile.
- 1981, Mar. 21 Request for repairs to tile located in SW $\frac{1}{4}$ Section 18 to install 30' of 12" CMP in ditch.
- 1981, Apr. 9 Letter from Board of Supervisors informing landowners within drainage district of informal hearing regarding proposed improvements to the district.
- 1981, Apr. 23 Request for repairs to tile located in SW $\frac{1}{4}$ Section 18. It stated "Main line too shallow, needs to be replaced with 10' of 12" CMP"
- 1981, Apr. 27 Preliminary Hearing on proposed improvement to drainage district facilities. Discussion stated that "...the general opinion was that something needed to be done to protect the landowners at the bottom of the ditch as the people on the top are getting drainage, but the water is setting on the bottom for days at a time. L.F. Lehmeier expressed his need for surface drainage, and his request for repair were presented as follows: Install 12 inch steel tube 12 foot long in the main. Clean and repair open ditch". The Board of Supervisors ordered Hollis E. Ryken, to prepare a report on the feasibility and cost to repairs.
- 1981, May 19 Letter from Hollis E. Ryken responding to the requested repairs from the preliminary hearing. It stated that before the replacement of 30 feet of the tile with ridge pipe, it should be decided "...the responsibility for the existing condition be determined prior to proceeding with any additional survey work". Also, regarding the request to "clean and repair the open ditch", it stated "to date, we have been unable to verify the inclusion of this waterway as a legal improvement to the District. As a result, we could not recommend the repair of the waterway be considered unless it can be found to be legally established as part of the District."
- 1981, May 20 Letter from attorney John L. Butler stating that his opinion is that the repair and work done on the open waterway located in N $\frac{1}{2}$ SW $\frac{1}{4}$ Section 18 should be assessed to the drainage district.
- 1982, Jun. 17 Request for repair to "Use dragline & cast away N & S side of culvert crossing to allow pond to drain" located in the NE $\frac{1}{4}$ Section 18.
- 1982, Jan. 18 Authorization of Secondary Road Department to make necessary repairs and 'installed 30 feet of 12" CMP in ditch, main line is too shallow' located in Section 18.

1982, May 17 Authorization of Secondary Road Department to make necessary repairs of broken tile located in ditch on east side of road by intake located in Section 18.

1982, Aug. 9 Authorization of Secondary Road Department to make necessary repairs of broken tile located in field of Martin Schnormeier Section 18.

1982, Nov. 1 Authorization of Secondary Road Department to make necessary repairs to tile located in the Lehmeier property and finish cleaning open ditch located in Section 18.

1983, Feb. 14 Letter from Hollis E. Ryken, in regards to repairs to Martin Schnormeier property located in the FrW¹/₂ of Section 18 and Schnormeier's interest in doing an improvement to the lower end of Drainage District No. 102.

1983, Mar. 24 Request for improvement to drainage district facilities by Lehmeier to build an open ditch from the outlet and go southerly across the Lehmeier-Schnormeier property then go southeasterly.

1983, Mar. 30 Letter from Hollis E. Ryken, recommending authorization of a survey and study for the proposed improvements and possible alternatives to the open ditch, depending on the economics.

1983, Apr. 4 Letter from the Board of Supervisors directing Hollis E. Ryken to perform a survey and study for the requested improvements.

1983, Preliminary Engineer's Report on improvements to the lower end of Drainage District No. 102 by Hollis E. Ryken. It estimated the construction of an open ditch on a portion of the Main would cost \$68,293. The construction of an open ditch on Lateral No. 1 would cost \$2,969 and an open ditch on Lateral No. 7 would cost \$28,072.

1983, Nov. 28 Notice of hearing on Engineer's Report for the request improvements and for the feasibility of the proposed repairs.

1983, Dec. 29 Letter from engineer Wayne Gieselman, as privately hired for the Martin Schnormeier property. It indicated several issues with the requested improvements and offered alternatives to said improvements.

1984, Jan. 9 Board of Supervisors met in regards to the Engineer's Report on the requested improvements. Discussion was held and it was decided that the Board needed more time to look at alternatives concerning the project.

1984, Feb. 22 Letter from Ryken E. Hollis discussing the Engineer's Report and the alternatives submitted by Wayne Gieselman. It requested the Board of Supervisors discuss the following,

1. Determine if a remonstrance had been filed, or
2. Accept the plans and report as filed, or
3. Accept the minor amendments to the plans and report as filed, or
4. Order the Engineer to prepare a detailed estimate, report and plans for the alternative method.

1984, Feb. 28 Letter from Board of Supervisors stating the approximate cost of the improvement and reclassification was \$138,000.00.

1984, Mar. 5 Remonstrance was filed at the County Auditor's Office in regards to the requested improvement project.

1984, Mar. 12 Authorization of Secondary Road Department to investigate the need for a possible clean out of outlet on the main and install a pipe in Section 18.

1984, Mar. 20 Request for repair tile blow out, fix ditch, and level spoil bank located in Section 18.

1984, Nov. 13 Authorization of Secondary Road Department to make necessary repairs to broken tile in the ditch about 14' of 18" located in Section 13.

1984, Nov. 13 Authorization of Secondary Road Department to make necessary repairs on tile line where the Main is caved in and the tile cracked located in Section 13.

1984, Dec. 17 Authorization of Secondary Road Department to make necessary repairs 22' of Main tile located in Section 18.

1984, Dec. 28 Request for "Repair and Restore drainage from the outlet south across Marin Schormeier farm to N. fenceline of Lehmeier, Inc." located in Section 18.

1985, Mar. 13 Letter from Hollis E. Ryken in regards to the requested repair dated Dec. 28, 1984. Total estimated project cost \$9,338. It requested that the Board of Supervisors discuss the following options: Proceed with the requested repair or call a meeting to explore the possibility of an improvement project that would be agreeable to Schnormeier and Leheier.

1985, Apr. 9 Informal meeting in regards to the requested repair. It was decided to have formal hearing on the repair.

1985, Apr. 19 Publication of Notice for hearing on requested repairs.

1985, May 29 Remonstrance was filed at the County Auditor's Office in regards to the requested repair project.

1985, Jun. 5 Authorization of the Engineer to make necessary repairs where the outlet needs to be cleaned on the main located in Section 18.

1985, Oct. 30 Authorization of the Engineer to make necessary repairs to the 48 inch culvert which is separated and needs to be reset for surface water at the main located in Section 18.

1986, Apr. 28 Request for repair to clean and level banks and clean tile outlet located in Section 18.

1986, Apr. 30 Board of Supervisors decided that no action will be take on the requested repair dated Apr. 28, 1986 as the repairs go beyond the boundaries of drainage district.

1986, Oct. 15 Gehrke repaired a 10 inch tile with 12 inch plastic tile for approximately 20 feet and also two 6 inch tile lines. These repairs were necessary in order to complete the waterway described by the SCS. The question arose as to whether the county will pay for repairs.

1986, Nov. 6 Approval of request for repair of tile by Otto Schnormeier located in Section 24.

1986, Nov. 6 Approval of request for repair of broken tile by Otto Schnormeier located in Section 18.

1986, Nov. 10 Approval of request for repair of 2 broken tile by Otto Schnormeier located in Section 18.

1986, Nov. 19 The Board of Supervisors tabled the request for repairs by Martin Schnoreier until they had a chance to go out and look at the tile. Said request was located in Section 24 and Section 18.

1986, Dec. 1 Approval of request for repair by William Leheier for tile located in Section 18.

1987, Numerous letters and correspondences regarding the reshaping the land above Lateral No. 1 by Mr. Lehmeier. Board of Supervisors indicated as long as the tile is not damaged or the drain tile affected, Mr. Lehmeier can build terraces.

1987, Mar. 5 Approval of request for repair by Mr. Lehmeier located in Section 18.

1987, Mar. 21 Approval of request for repair to install 30 inch of 12" CMP in ditch by Mr. Lehmeier located in Section 18.

1987, May 13 Approval of request of repair of broken tile by Martin Schnormeier located in Section 18.

1988, Jan. 21 Engineer's Report by Hollis E. Ryken (as directed by the Board of Supervisors) to survey and reestablish the location and boundary of grass waterway located in SW $\frac{1}{4}$ NW $\frac{1}{4}$ and the NW $\frac{1}{4}$ SW $\frac{1}{4}$ of Section 18.

1988, Mar. 9 Resolution by the Board of Supervisors to reestablish the right of way of the grass waterway located within the SW $\frac{1}{4}$ NW $\frac{1}{4}$ and the NW $\frac{1}{4}$ SW $\frac{1}{4}$ of Section 18.

1988, Apr. 13 Engineer's Report by Hollis E. Ryken estimated the cost of construction for the clean out of grass waterway located within the SW $\frac{1}{4}$ NW $\frac{1}{4}$ and the NW $\frac{1}{4}$ SW $\frac{1}{4}$ of Section 18 would be \$9,338.

1989, Apr. 5 Approval of request for repair of tile blowout located in the NW $\frac{1}{4}$ NE $\frac{1}{4}$ Section 24.

1990, Apr. 4 Approval of request for repair of drainage district.

1990, Apr. 9 Approval of request for repair of tile blowout located in Section 18.

1990, Aug. 1 Approval of request for repair of tile blowout located in Section 13.

1990, Nov. 30 Approval of request for repairs of 2 tile blowouts located in Section 18.

1991, Apr. 3 Approval of request for repairs located in Section 24.

1991, Apr. 9 Approval of request for repair of tile blowout located in Section 24.

1991, Jun. 18 Proposal by Martin Schnormeier to give access to the open waterway in exchange for the District to maintain the open waterway, repair and maintain the crossing over the open ditch, straighten the open ditch north of the open waterway and provide a bulkhead on the open waterway on the north fenceline of Schnormeier's property.

1992, Mar. 4	<p>Petition for repairs to drainage district facilities.</p> <ol style="list-style-type: none"> 1. Repair the outlet of the main. 2. Replace the bulkhead at the outlet. 3. Established a berm along the waterway to prevent rilling. 4. New 96 inch pipe to be placed under the crossing. 5. A soil or earth berm should be installed at the top of the bank. 6. Clean out all waterways. 7. Reconstruct the intakes on both sides of the road located in the SE$\frac{1}{4}$ NE$\frac{1}{4}$ of Section 13 and SW$\frac{1}{4}$ NW$\frac{1}{4}$ of Section 18. 8. Cleanout the road ditches and fix the intakes located in the NE$\frac{1}{4}$ SW$\frac{1}{4}$ and NW$\frac{1}{4}$ SE$\frac{1}{4}$ Section 13. 9. Cleanout the road ditches and fix the intakes located in the SE$\frac{1}{4}$ SW$\frac{1}{4}$ and SW$\frac{1}{4}$ SE$\frac{1}{4}$ Section 13. 10. Tile blowout and tile holes located in Section 13 need to be repaired.
1992, Apr. 15	Request for repair of broken tile located in the NW $\frac{1}{4}$ SE $\frac{1}{4}$ Section 13.
1992, Apr. 18	Request for repair of tile blowout located in the NE $\frac{1}{4}$ Section 24.
1992, May 26	Letter from Hollis E. Ryken stating "I believe it would be in the best interests of all concerned to retain an engineer with no former affiliation with the District's problems..."
1993, Apr. 14	Bill for repairs to broken tile located in Section 18.
1993, Apr. 21	Request for repair to clean out at bulkhead at tile outlet located in NW $\frac{1}{4}$ Section 18.
1993, May 26	Bill for repair of 2 broken tile located in the SE $\frac{1}{4}$ Section 13.
1993, May 27	Request for repair of broken tile located in the NW $\frac{1}{4}$ Section 18.
1993, Aug. 6	Request for repair of blowout tile located in the SE $\frac{1}{4}$ Section 13.
1993, Oct. 19	Request for repairs of broken tile located in the NW $\frac{1}{4}$ Section 18.
1993, Oct. 19	Request for repairs of broken tile located in the NW $\frac{1}{4}$ and SE $\frac{1}{4}$ Section 13.
1993, Nov. 17	Request for repairs of 3 broken tile located in the NE $\frac{1}{4}$ Section 18.
1994, Feb. 15	Request for repair of blowout tile on Lateral 7 located in the SW $\frac{1}{4}$ Section 18.
1994, Jun. 2	Letter from Hollis E. Ryken in regards to Petition for Repairs dated Mar. 4, 1992. He declined to do the engineering work for this issue, but would recommend another engineer firm.
1994, Jun. 8	Board of Supervisors approved of rates from Brent W. Johnson of McClure Engineering Company.
1994, Sept.16	Engineer's Report on repairs to drainage district facilities by Brent W. Johnson was filed. It recommended open ditch clean out of 250', construction of a new wood bulkhead, filling gully between bulkhead and 48 inch culvert, repair 48 inch RCP farm crossing culvert and riprap

rill erosion. The total estimated construction cost is \$35,580.00 (This was in response to the petition for repairs dated Mar. 4, 1992)

1995, Jan. 10 Publication of Notice to Contractors for repairs with a bid date of Feb. 8, 1995.

1995, Feb. 6 Addendum No. 1 to Plans and Specification for repairs to Drainage District No. 102 by Brent W. Johnson, Engineer was filed.

1995, Feb. 8 Bids were received on construction of repairs to drainage district facilities.

1995, Feb. 15 Construction contract with Ingraham Construction, Inc. for \$18,885.00 for repairs to drainage district facilities was entered.

1995, Jun. 1 Statement of completion of construction of repairs to drainage district facilities by Ingraham Construction, Inc.

1995, Jun. 24 Publication of Notice of Completion of repairs to drainage district facilities.

1992 -1995 Numerous letters, legal statements, reports, objections and Equity Case No. 76-257-793 in regards to the petition for repairs, date Mar. 4, 1992

- A. Original Notice – Jul. 14, 1993
- B. Petition for Writ of Mandamus – Jul. 14, 1993
- C. Answer – Jul. 19, 1993
- D. Deposition of Martin Schnormeier – Aug. 27, 1993
- E. Answers to Interrogatories Propounded to Plaintiff – Oct. 15, 1993
- F. Scheduling Agreement – Nov. 10, 1993
- G. Motion to Continue – Mar. 14, 1994
- H. Stipulation – Jun. 10, 1994
- I. Order – Jun. 20, 1994
- J. Amendment to Answer – Nov. 29, 1994
- K. Answer to Application for Submission of Plaintiff to Mental Examination – Feb. 27, 1995
- L. Answer to Application – Feb. 27, 1995
- M. Affidavit for Attorney Fees – Feb. 27, 1995
- N. Defendants' Reply Brief – Apr. 10, 1995
- O. Plaintiff's Trial Brief – Mar. 31, 1995
- P. Finding, Conclusions and Order – May 30, 1995
- Q. Order – Jun. 12, 1995

1997, Jul. 10 Approval of request for repair located in Section 18.

1997, Jul. 16 Request for repairs to broken tile and intake located in the NW¼ Section 13.

1997, Jul. 16 Request for repairs to 2 tile blowouts located in NW¼ Section 18.

1997, Jul. 23 Request for repair tile blowout on Lateral No 7 located SW¼ SW¼ Section 18.

1998, Apr. 16 Letter to attorney John Whitesell in regards to Martin Schnormeier property. It indicated several issues with the drainage district and listed a few areas that were in need of repair.

1998, Nov. 5	Request for repair to have dirt removed and grassway cleaned out located in Section 18.
1999, Apr. 14	Approval of request of repair by Steve Perry located in Section 18.
1999, Apr. 15	Request for repairs to 2 tile blowouts located in the SE $\frac{1}{4}$ Section 18.
1999, May 12	Letter from Robert L. Haylock, Hardin County Engineer, indicating no work will be done at this time for the requested repair dated Nov. 5, 1998.
2000, Jul. 12	Request for repair of tile blowout on Lateral No. 7 located in SW $\frac{1}{4}$ Section 18.
2000, Dec. 14	Request for repair of tile blowout to main tile located in W $\frac{1}{2}$ Section 18.
2001, Apr. 24	Request for repair of broken tile on Lateral No. 7 located in SE $\frac{1}{4}$ Section 24.
2001, Aug. 30	Request for repair of broken tile located in SW $\frac{1}{4}$ Section 18.
2003, May 20	Request for repair of tile blowout on Lateral No. 7 located in NW $\frac{1}{4}$ Section 19.
2005, Apr. 4	Request for repair of tile blowout located in SW $\frac{1}{4}$ Section 18.
2005, Apr. 15	Request for repair of outlet of main tile located in NW $\frac{1}{4}$ Section 18.
2005, Jun. 20	Request for repair of hole in tile located in Section 18.
2006, Apr. 3	Request for repair of cleanout of outlet and bulkhead located in Section 18.
2006, Jun. 22	Request for repair of broken tile located in SW $\frac{1}{4}$ NE $\frac{1}{4}$ Section 18.
2007, May 1	Request for repair of tile blowout located in SW $\frac{1}{4}$ Section 24.
2008, May 21	Request for repair of plugged tile on Lateral No. 12 located in SE $\frac{1}{4}$ Section 24.
2009, Apr. 16	Request for repairs of 2 tile blowouts on Lateral No. 14 located in SW $\frac{1}{4}$ Section 18.
2009, Apr. 20	Request for repair of 2 tile blowouts located in NE $\frac{1}{4}$ Section 19.
2009, Jun. 26	Request for repair of 2 holes in tile located in NW $\frac{1}{4}$ Section 18.
2009, Aug. 24	Request for repairs of 2 holes in tile located in SW $\frac{1}{4}$ Section 18.
2010, Jun. 7	Request for repair of tile blowout located in SW $\frac{1}{4}$ Section 18.
2015, Apr. 9	Request for repair of hole in tile located in SW $\frac{1}{4}$ Section 18.

3.0 **INVESTIGATION** – Review of district history shows that repairs and modifications to the district tile (main and laterals) were first requested within 4 or 5 years of the original construction. In addition, landowners within the district have requested over 77 repairs for broken tiles, blowouts, and other repairs over the last 100 years. The majority of these repairs (75%) were located within Section 18. In addition to the history review, all the Engineer's Reports and corresponding plans and profile of the main tile were reviewed. Field investigation was performed along with televising of approximately 1300 feet of main tile and attempted televising of approximately 2100 feet of main tile (see Work Order Request #66 included in Appendix A). Said field investigation and televising showed that the lower end of the main tile has 5 tile blowouts visible, the middle segment of the main tile that was televised showed that the tile is in poor physical condition (cracked, egg shaped, and starting to collapse) and the upper end of the main tile is plugged or collapsed (making televising impossible). For locations of specific types of investigations, see Investigation Map included in Appendix B. All other investigations were limited to office and records research as mentioned. Based on the Engineer's Reports and resulting plans and profile, the current district main consists of the original 1917 tile with a private supplemental tile from Station 14+00 to Station 29+00. For our investigation, calculations were performed to see what the original drainage coefficient for the length of the district main tile is and it appears that the original main tile was designed to provide a drainage coefficient of 0.12 to 0.95 inches per acre per day.

4.0 **DISCUSSION AND CONCLUSIONS** – Based on the above, it is obvious that the installed 1917 main tile is undersized when compared to current agricultural demands for a drainage. In addition, this district has experienced an extremely high level of repairs on a regular basis (average of one every 10½ months over the last 62 years). This coupled with repairs requested within the first 4 to 5 years of the tile life cycle possibly indicate inferior material during the 1917 construction or improper construction methods. All told, the main tile provides a patchwork of 1917 pipe linked together by various previous repairs. This all is in a severe state of decay and restriction as seen by the large stretch of main tile that was either plugged or collapsed. Therefore, the main tile will only continue to collapse, which will lead to the creation of sinkholes and blowouts. As a result, siltation in the tile and further blockage of tile with tile pieces and soil will occur, restricting drainage in additional reaches of the main tile.

- 5.0 **REPAIR METHOD** – To repair the existing main tile, the following option is the most straightforward available:

Tile Replacement

- Remove and replace the existing main tile with new main tile of equal or comparable size. For reference, a chart with the required tile sizes and capacities is included in Appendix E.
- Typically, the replacement main tile would be in the same location as the existing main tile in order to locate and reconnect private tile and laterals. For reference, the route is shown on the map included in Appendix D.

With the above mentioned repair method, the following should be noted:

- The proposed and existing capacities shown in Appendix E are based on the assumption that the 1917 main tile is both installed per its respective design and that it is functioning at full capacity (i.e. not collapsed, broken, etc).
- The proposed repair will not increase the drainage capacity of the main tile beyond those shown in Appendix E.
- The proposed pipe sizes shown in Appendix E are those that are currently manufactured that most closely meet the current main tile size.
- 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 office to verify the existence of said jurisdictional wetlands and that there will be no impact on them.

Per Iowa Code Chapter 468.126, the above actions 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 Opinion of Probable Construction Costs 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 **IMPROVEMENT METHODS** – To improve drainage for the main tile, the following are some of the options available:

Dual Tile Installation

- Remove the existing main tile and install dual parallel main tiles in the location of the existing main tile. For reference, a chart with the required parallel tile sizes and capacities is included in Appendix F.
- Typically, the dual parallel main tiles would be in the same location as the existing main tile in order to locate and reconnect private and lateral tile. For reference, the route is shown on the map included in Appendix D.
- Disconnect all private and lateral tile encountered from the main tile.
- Reconnect all private and lateral tile to the new main tile.

- The dual parallel main tile would be connected at various locations along the route with manholes or buried interconnections to prevent one of them from overloading while the other one is empty.

Tile Replacement Upsizing

- Remove and replace the existing main tile with new main tile of a larger size. For reference, a chart with the required tile sizes and capacities is included in Appendix G.
- Typically, the replacement main tile would be in the same location as the existing main tile in order to locate and reconnect private and lateral tile. For reference, the route is shown on the map included in Appendix D.
- Disconnect all private and lateral tile encountered from the main tile.
- Reconnect all private and lateral tile to the new main tile.

Open Ditch Installation

- Remove and replace the existing main tile with an open ditch. For reference, a chart with the open ditch capacities is included in Appendix H.
- Typically, the open ditch would be in the same location as the existing main tile in order to locate and outlet private and lateral tile. For reference, the route is shown on the map included in Appendix D.
- Extend all private and lateral tile encountered to discharge into the open ditch.

With the above mentioned improvement methods, the following should be noted:

- The proposed and existing capacities shown in Appendices F, G, and H are based on the assumption that the 1917 main tile is both installed per its respective design and that it is functioning at full capacity (i.e. not collapsed, broken, etc).
- The dual tile installation method would allow for greater soil cover as the tile size is smaller.
- The open ditch installation method would involve the taking of right of way. However, some of this right of way is currently grassed waterway and some may already have been purchased in the past by the drainage district.
- The proposed pipe sizes shown in Appendices F and G are those that are currently manufactured that meet or exceed the ½" and 1" drainage coefficients.
- Improvements have historically been viewed as having an impact on jurisdictional wetlands. As such, individual landowners should consult with applicable staff at the Hardin County NRCS office to determine the existence of said jurisdictional wetlands and what said impact may be on them.

Per Iowa Code Chapter 468.126, the above actions would be considered an improvement. As such, Subsection 4, paragraph c of Chapter 468.126 states "If the estimated cost of the improvement 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 on whether to construct the proposed improvement and whether there shall be a reclassification of benefits for the cost of the proposed improvement." The opinion of probable construction cost contained in the Opinion of Probable Construction Costs section of this report exceeds said \$50,000 limit. Therefore, a hearing will be required. Per Iowa Code Chapter 468.126.4.e, the right of remonstrance may apply to the proposed improvements.

7.0 **OPINION OF PROBABLE CONSTRUCTION COSTS** – Using the above methods of repair and improvements, an itemized list of project quantities and associated opinions of probable construction cost for each option were compiled and are included in Appendices I, J, K and L of this report. A summary of said costs are as follows:

<u>METHOD</u>	<u>DRAINAGE COEFF.</u>	<u>TOTAL COST</u>
Tile Replacement (Repair)	Existing	\$ 568,260.00
Dual Tile Installation (Improvement)	½" 1"	\$ 985,155.60 \$ 1,183,578.00
Tile Replacement Upsizing (Improvement)	½" 1"	\$ 608,487.00 \$ 777,876.00
Open Ditch (Improvement)	Varies	\$ 753,918.00

It should be noted that said costs include materials, labor, and equipment supplied by the contractor to complete the necessary repair or improvement and includes applicable engineering, construction observation, and project administration fees by Ryken Engineering. It also includes right of way acquisition for the open ditch option only (assumed to require 16 acres at \$12,000 per acre). However, said costs do not include any interest, legal fees, county administrative fees, crop damages, other damages, previous repairs, engineering fees to date, or reclassification fees (if applicable). As always, all costs shown are opinions of Ryken Engineering based on previous lettings on other projects. Said costs are just a guideline and are not a guarantee of actual costs.

8.0 **OWNERSHIP AND CLASSIFICATIONS** – Any and all information concerning ownership of lands and classifications of said lands within Drainage District No. 102 can be obtained from the Hardin County Auditor’s office.

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.

It should also be noted that Iowa Code Chapter 468.131 states “When an assessment for improvements . . . exceeds twenty-five percent of the original assessment and the original or subsequent assessment . . . did not designate separately the amount each tract should pay for the main ditch and tile lateral drains then the board shall order a reclassification . . .” Based on this, it is our opinion that a reclassification separating all Laterals would be required if the improvement were to move forward.

- 9.0 **RECOMMENDATIONS** – There is a definite need to perform the repair or one of the improvements (mentioned above) to either restore the drainage capacity to the original design levels or to increase the capacity to more closely meet the needs of current agricultural drainage. Therefore, it is recommended that the Hardin County Board of Supervisors, acting as District Trustees, should take action to accomplish the following:
- Approve the Engineer’s Report as prepared by Ryken Engineering.
 - Hold the required hearing or hearings on the proposed repair or improvements.
 - Adopt one of the recommendations of the Engineer’s Report.
 - Direct Ryken Engineering to prepare plans and specifications for the proposed repair or improvements.
 - Direct Ryken Engineering to proceed with receiving bids from interested contractors.
 - Award contract to the lowest responsible contractor.
 - If desired or required by Iowa Code, proceed with reclassification proceedings.



Drainage Work Order Request For Repair

Hardin County

Date 4/9/2015 Work Order # 66
District # 102 Lateral _____
Township Providence Section 18 Twp 86 Rge 20 Qtr Sec SW1/4

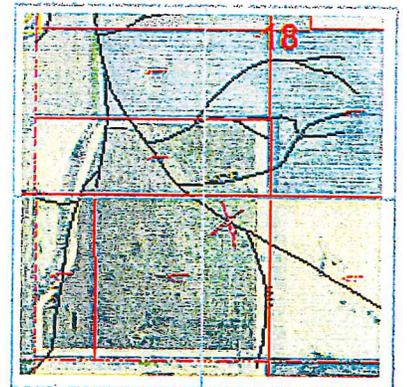
Repair Requested By Steve Perry
Address _____ Phone (641) 751-1553

Landowner Steve Perry
Address _____ Phone _____

Request Taken By Tina Schlemme

Available for Repair Now? Yes No Date Available _____

Problem Description Hole in fri SW1/4 on main tile between Lat 13 & Lat 4. It's about 3-4' wide and 3-4' deep. Possible 12" tile.



Repair labor, materials and equipment _____

Potential Wetlands? Yes-Repair existing tile only No-Repair and maintain tile

Repaired By: _____

Date: _____

Please send statement for services to:

Phone (641) 939-8111
Fax (641) 939-8245

Hardin County Auditor's Office
Attn: Tina Schlemme
1215 Edgington Ave, Suite 1
Eldora, IA 50627

For Office Use Only

Approved: _____ Date: _____

Drainage District:

#102

Repair Summary:

Landowner reported sinkhole in SW1/4 of Section 18, Township 86 North, Range 20 West. Excavated at sinkhole, 2 locations downstream (spread over 250±) and 2 locations upstream (spread over 600±) and found existing 15" VCP main tile is 2± deep and in poor condition. Was unable to televise at any location as main tile is collapsed and 1/4 to 3/4 full of dirt at all locations. Since landowner was anxious to plant field, temporarily repaired all locations with 15" Dual Wall HDPE tile and fabric wrapped joints as it is not possible to get existing VCP main flowing without major work.

Contractor Time and Materials (spent while Ryken was on-site):

9 hours of John Deere 410E Rubber Tire backhoe and Operator
9 hours of Workman
9.2' of 15" Dual Wall HDPE with fabric wrapped joints.
1.6' of Televising

Additional Actions Recommended:

In addition to the above, the following was noted while on site:

- Found remains of metal restrictor plate and handle on main tile at fence 1400± downstream of reported blowout.
- Found 3 sinkholes or blowouts on main tile within 500' of wood weir and outlet.

Based on the above, it is obvious that the main tile is in need of replacement for significant stretches, but the exact length cannot be determined without televising or potholing the tile at regular intervals. Therefore, It is recommended:

- Pothole main for its entire length every 200' to determine if it can be televised at any locations.
- Televise main for the stretches that are accessible.
- Determine plan of action (including removal of restrictor plate) after televising results are received.

It is up to the District Trustees as to when to do this (i.e. now with standing crops or after harvest) and whether to take bids or assign it to the lottery system.



Drainage Order Request For Repair

Hardin County

Date 4/9/2015 Work Order # 66

District # 102 Lateral _____
Township Providence Section 18 Twp 86 Rge 20 Qtr Sec SW1/4

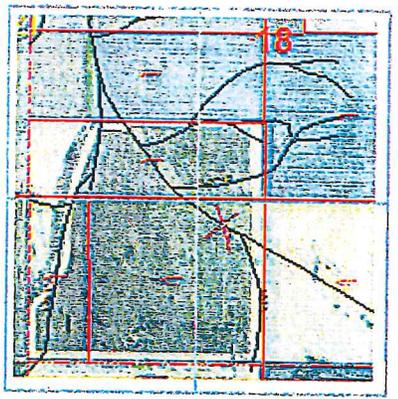
Repair Requested By Steve Perry
Address _____ Phone (641) 751-1553

Landowner Steve Perry
Address _____ Phone _____

Request Taken By Tina Schlemme

Available for Repair Now? Yes No Date Available _____

Problem Description Hole in fri SW1/4 on main tile between Lat 13 & Lat 4. It's about 3-4' wide and 3-4' deep. Possible 12" tile.



Repair labor, materials and equipment _____

Potential Wetlands? Yes-Repair existing tile only No-Repair and maintain tile

Repaired By: _____
Date: _____

Please send statement for services to:
Phone (641) 939-8111
Fax (641) 939-8245
Hardin County Auditor's Office
Attn: Tina Schlemme
1215 Edgington Ave, Suite 1
Eldora, IA 50627

For Office Use Only

Approved: _____ Date: _____

Drainage District:

#102

Repair Summary:

In follow-up to previous repair report, excavated the VCP main tile at 200' to 300' intervals through majority of S½ of Section 18, Township 86 North, Range 20 West to determine if CCTV inspection could be performed. Excavated at intervals upstream of area excavated in 2015 for 1100± and could not get CCTV equipment into main tile as it is either full of mud, collapsed, or both. Did not excavate into Section 19 as landowner had not been notified and last hole excavated is within ¼ mile of the end of the main anyway. Downstream of area excavated in 2015, excavated at remains of metal restrictor plate and handle and found main VCP tile was in poor physical condition, but was open enough to be televised. From this location, televised 869'± upstream and discovered that entire main VCP tile is cracked and egg shaped and majority is starting collapse with soil visible in several places. Also from this location, televised 488'± downstream and discovered that main VCP tile is in similar condition to that upstream. Had to abandon CCTV inspection downstream due to unknown obstruction in tile. Temporarily repaired main VCP tile with HDPE tile and fabric wrapped joints as it is not possible to properly repair main VCP tile without major work.

Contractor Time and Materials (spent while Ryken was on-site):

19.75 hours of Excavator and Operator
19.75 hours of Workman
1357.1' of Televising
5.5' of 18" diameter Dual Wall HDPE Tile
2.5' of 24" diameter Dual Wall HDPE Tile
1' of 8" HDPE Tile
Fabric Wrapped Joints

Additional Actions Recommended:

Based on this inspection and the inspection from 2015, it is obvious that the entire length of the main VCP tile is past the end of its life (in various states of collapse) and is not flowing (full of mud) for over 1800'. I would recommend total replacement of the entire length of the existing main tile. The cost would be well over \$50,000, which is high enough that a hearing and engineering report would be required for said repair.



USMH: South East

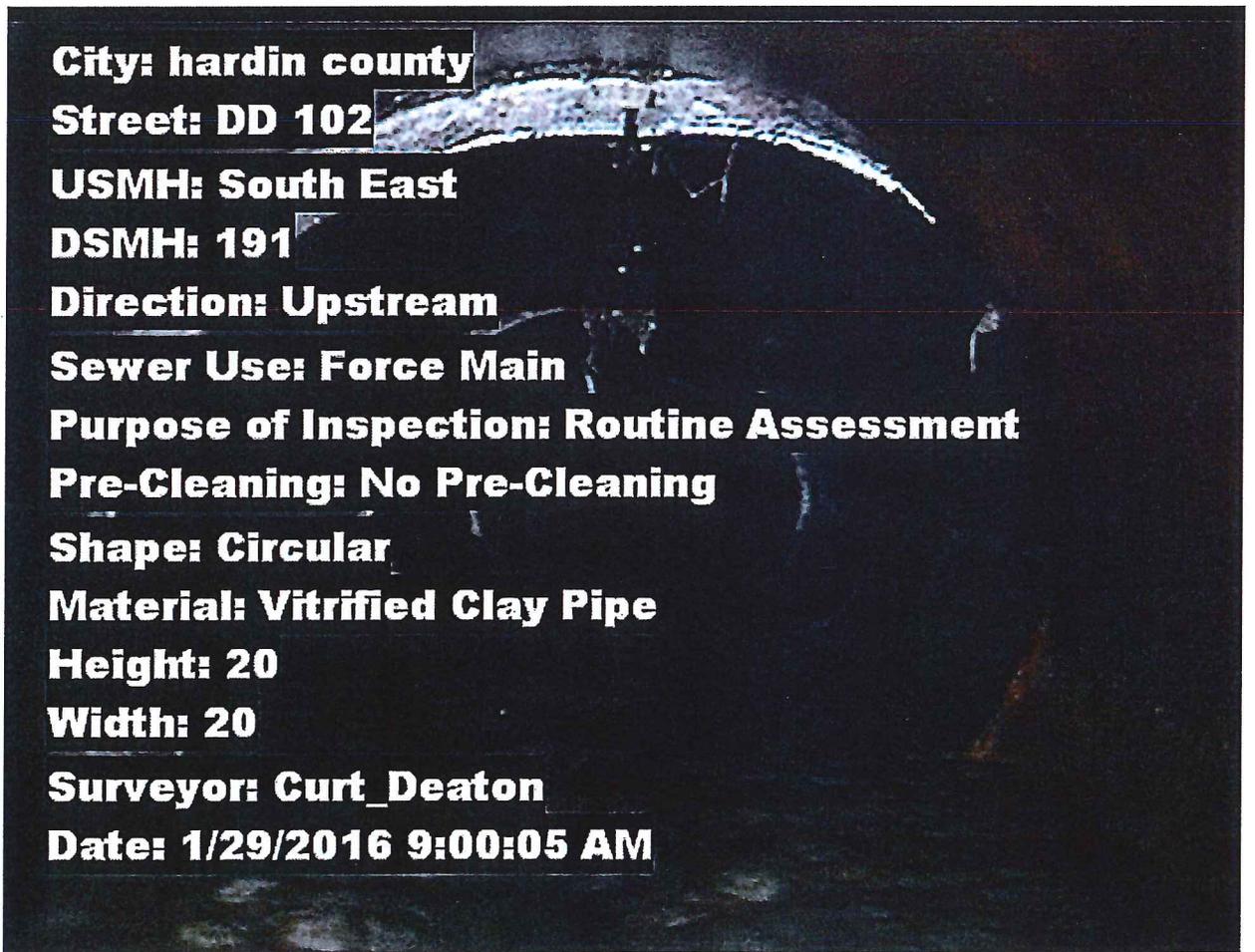
DSMH: 191

Upstream

Survey Abandoned

869 South East of hole 1

869Ft.



City: hardin county

Street: DD 102

USMH: South East

DSMH: 191

Direction: Upstream

Sewer Use: Force Main

Purpose of Inspection: Routine Assessment

Pre-Cleaning: No Pre-Cleaning

Shape: Circular

Material: Vitrified Clay Pipe

Height: 20

Width: 20

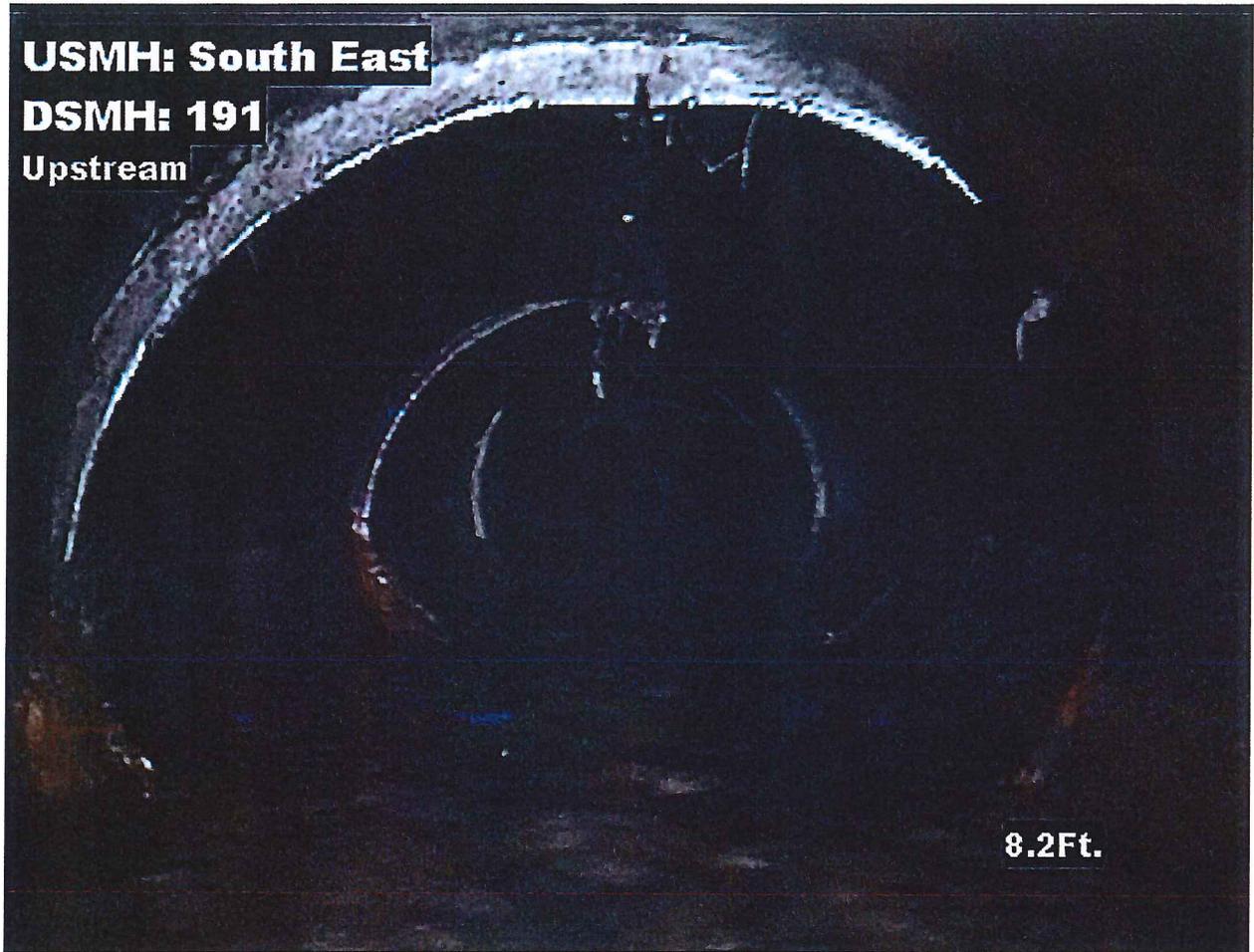
Surveyor: Curt Deaton

Date: 1/29/2016 9:00:05 AM

USMH: South East

DSMH: 191

Upstream

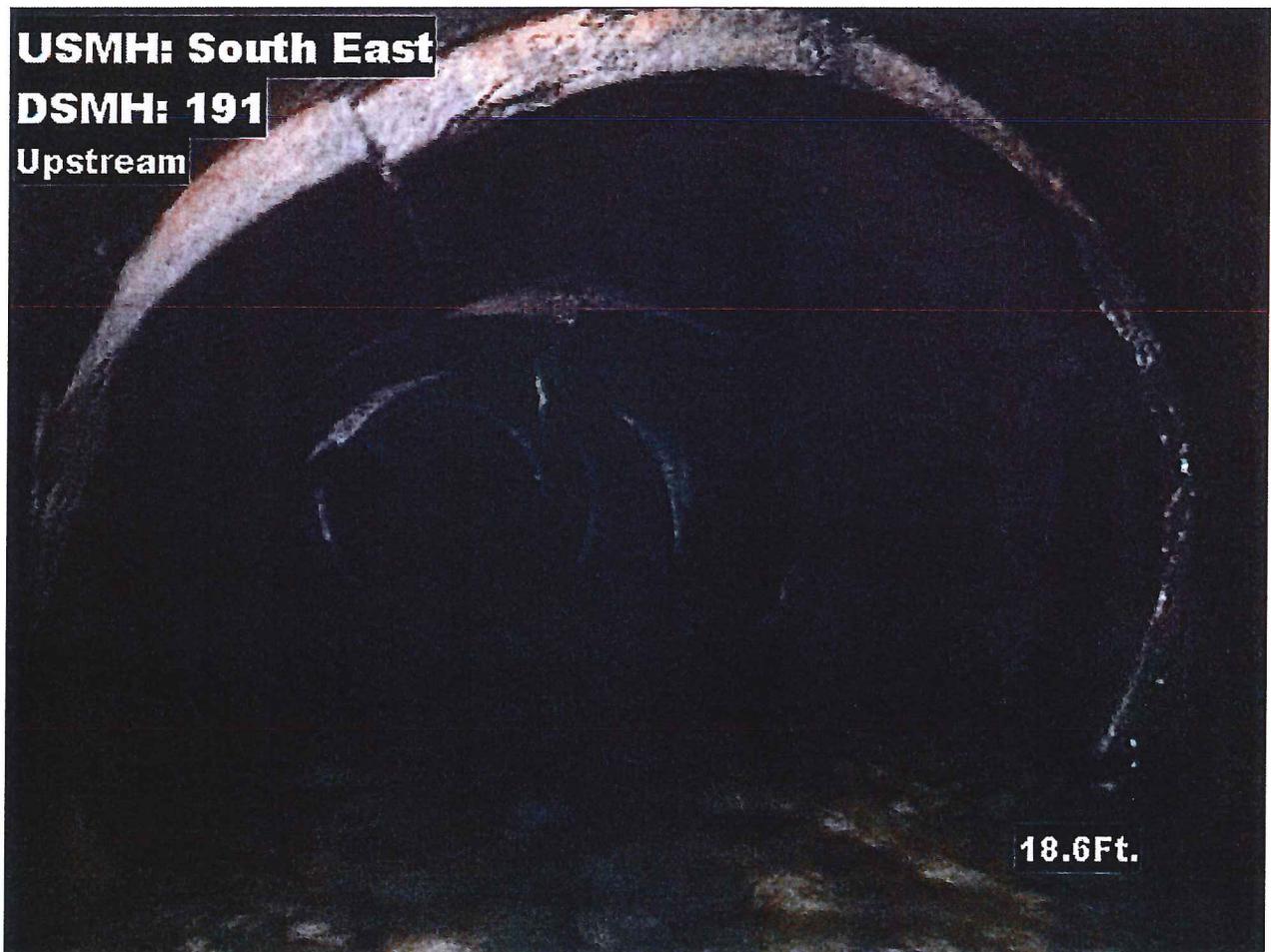


8.2Ft.

USMH: South East

DSMH: 191

Upstream

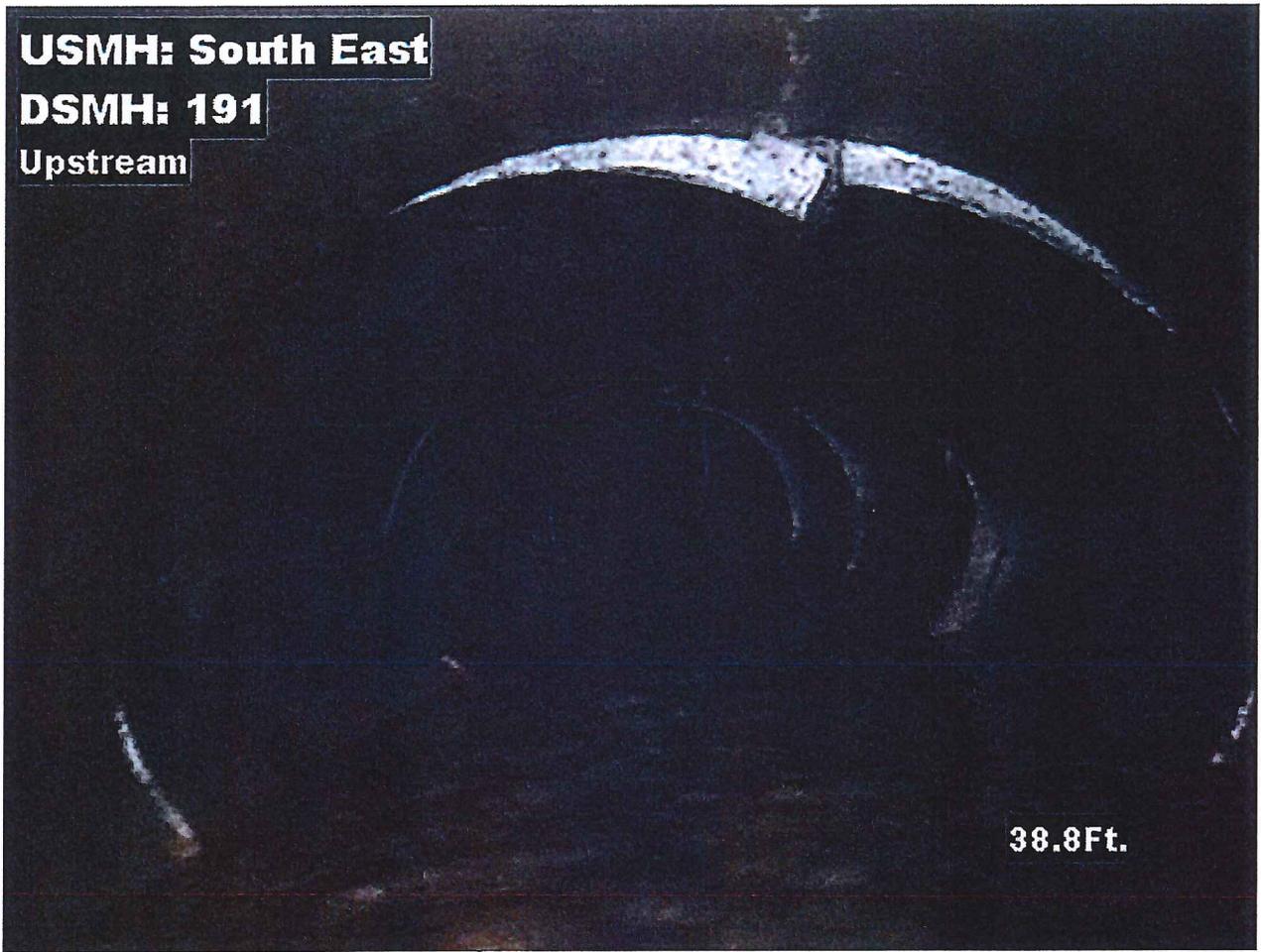


18.6Ft.

USMH: South East

DSMH: 191

Upstream

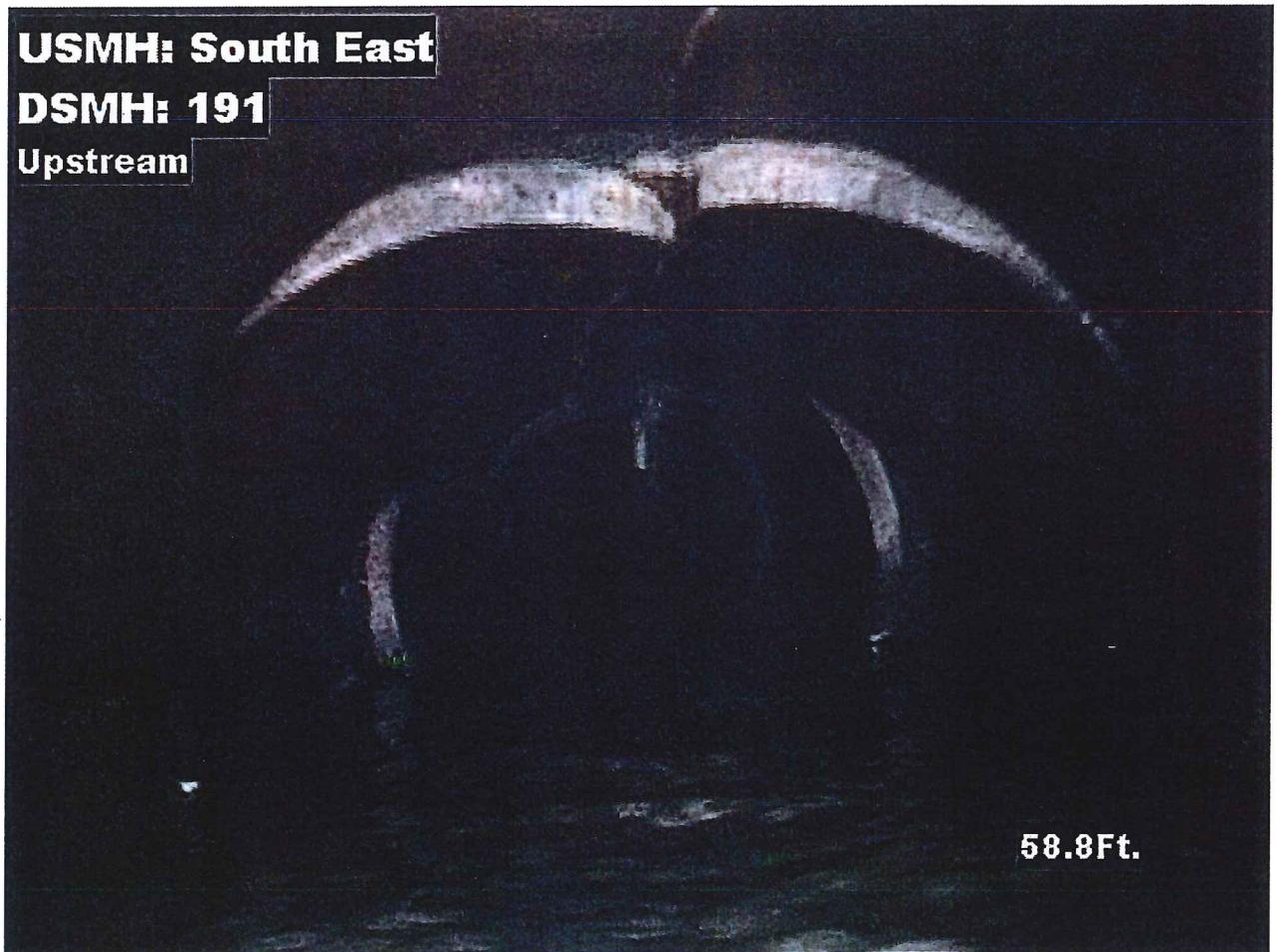


38.8Ft.

USMH: South East

DSMH: 191

Upstream



58.8Ft.

USMH: South East

DSMH: 191

Upstream

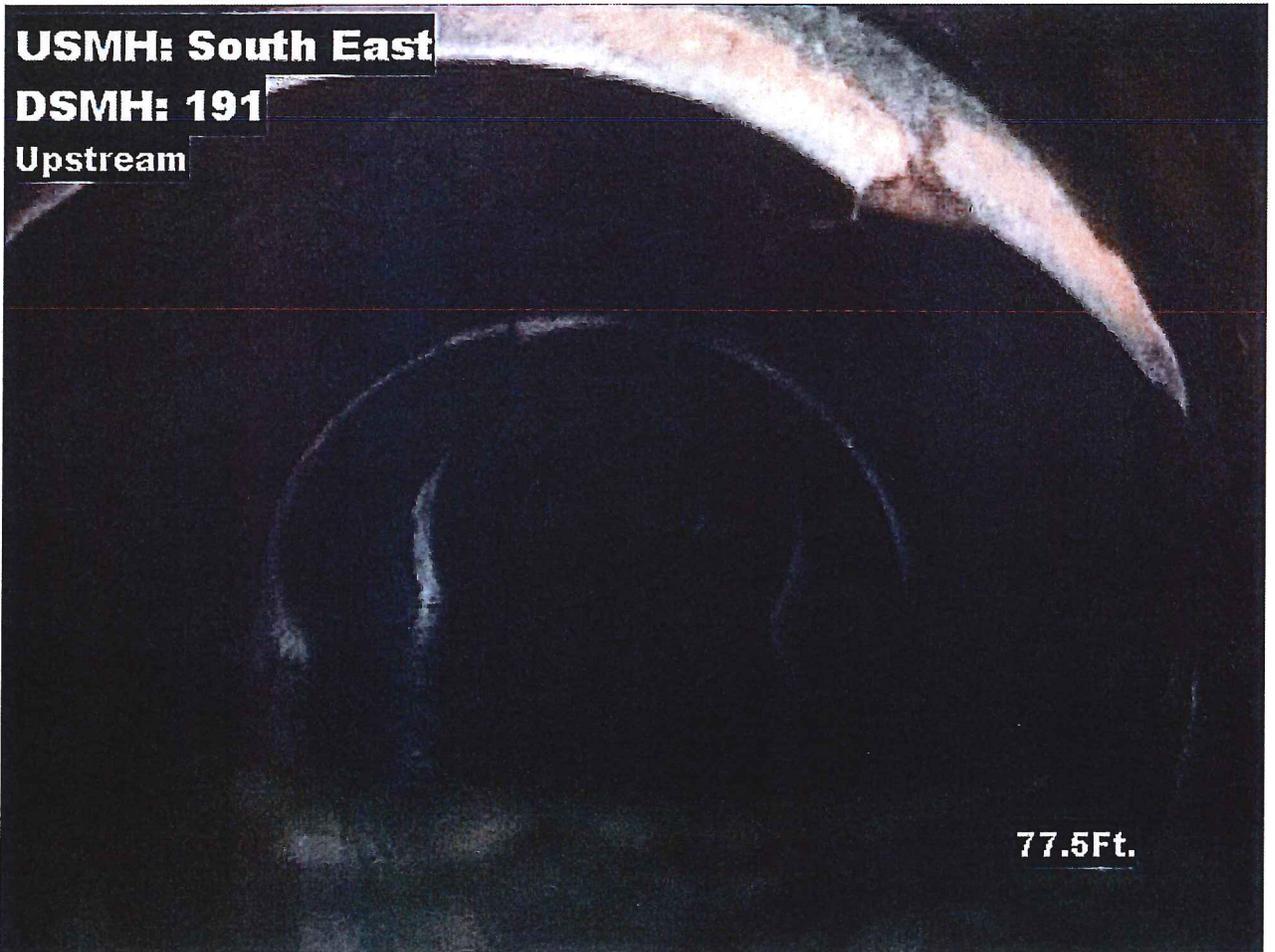


74.3Ft.

USMH: South East

DSMH: 191

Upstream

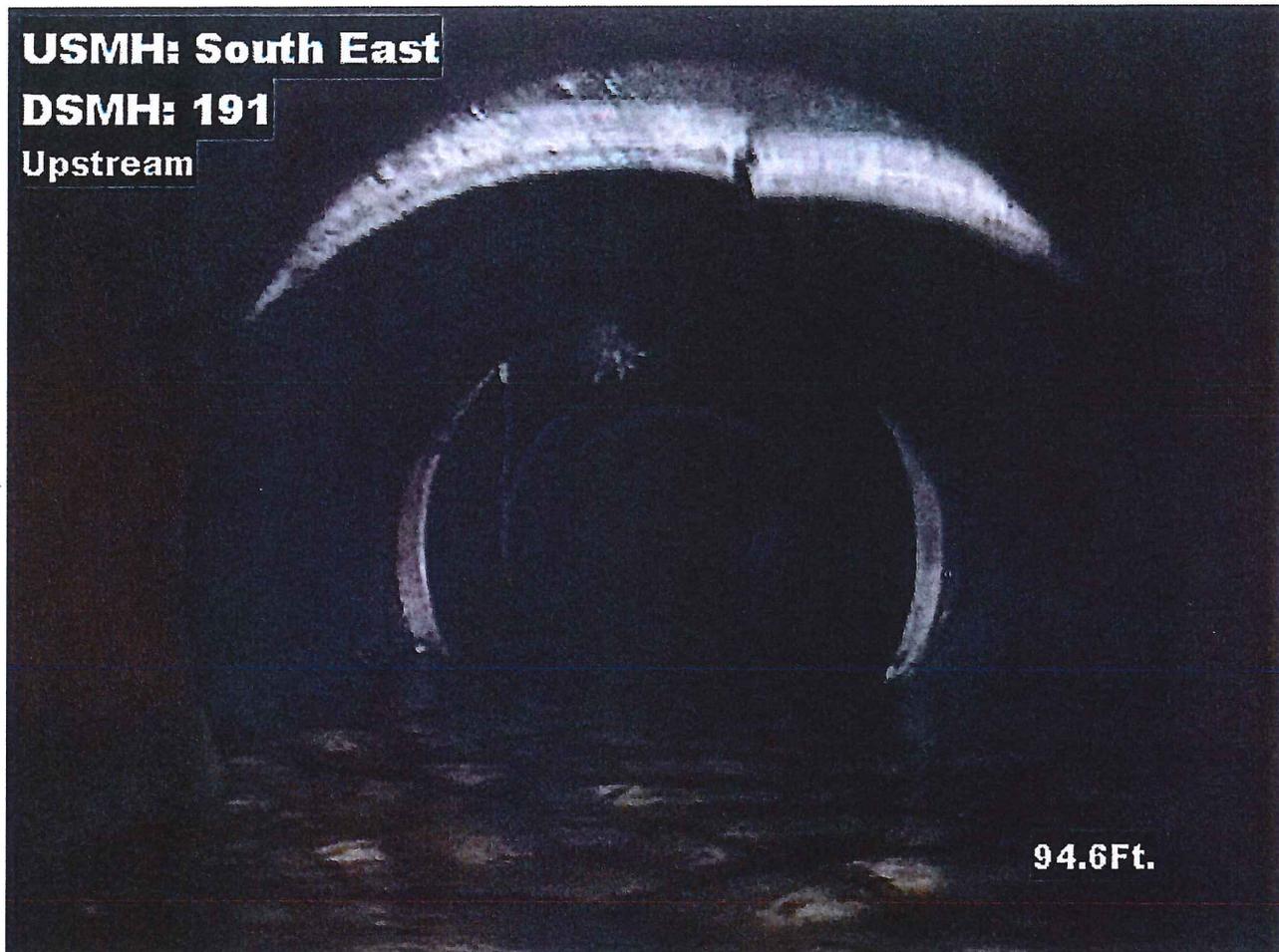


77.5Ft.

USMH: South East

DSMH: 191

Upstream

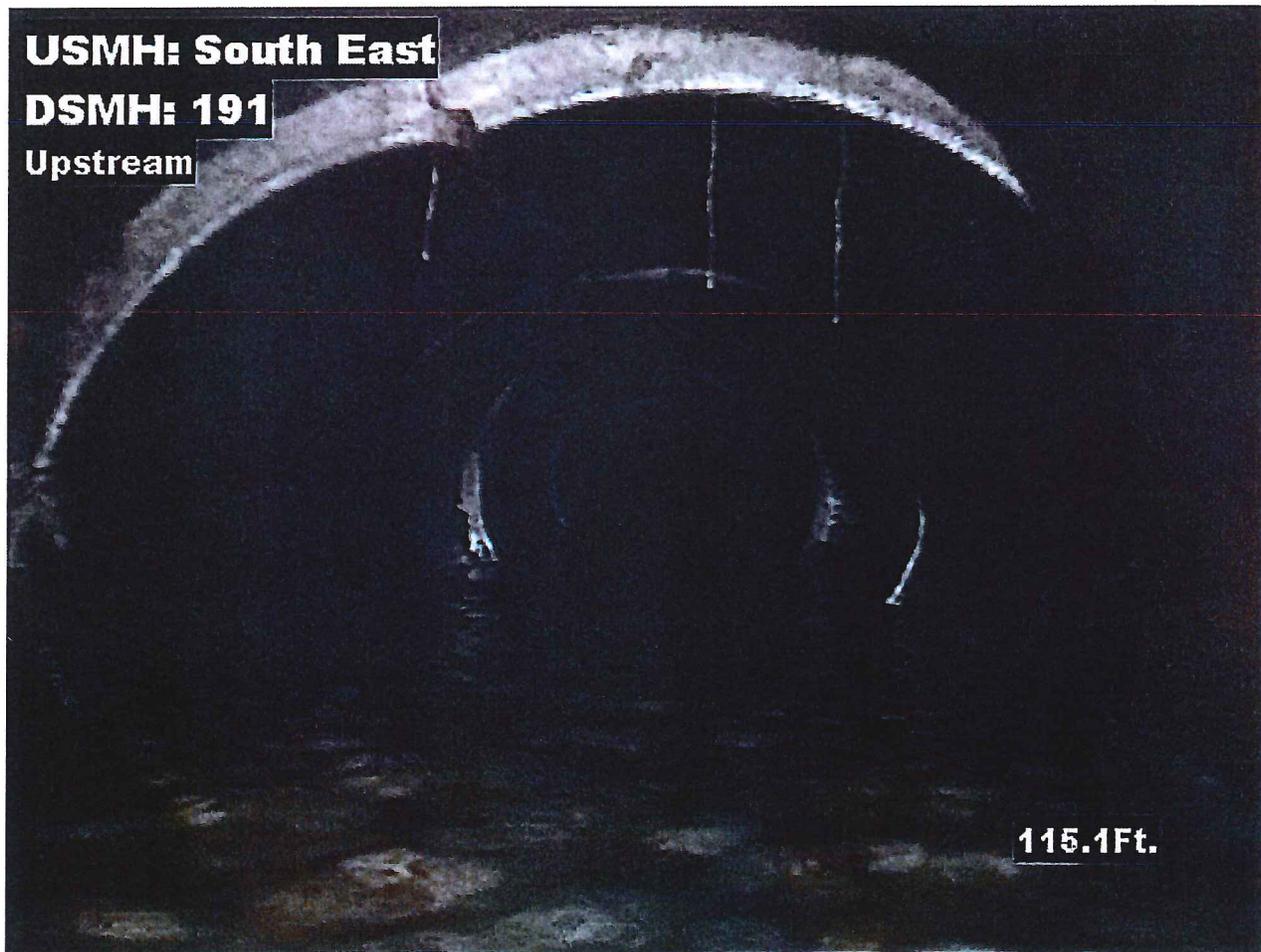


94.6Ft.

USMH: South East

DSMH: 191

Upstream

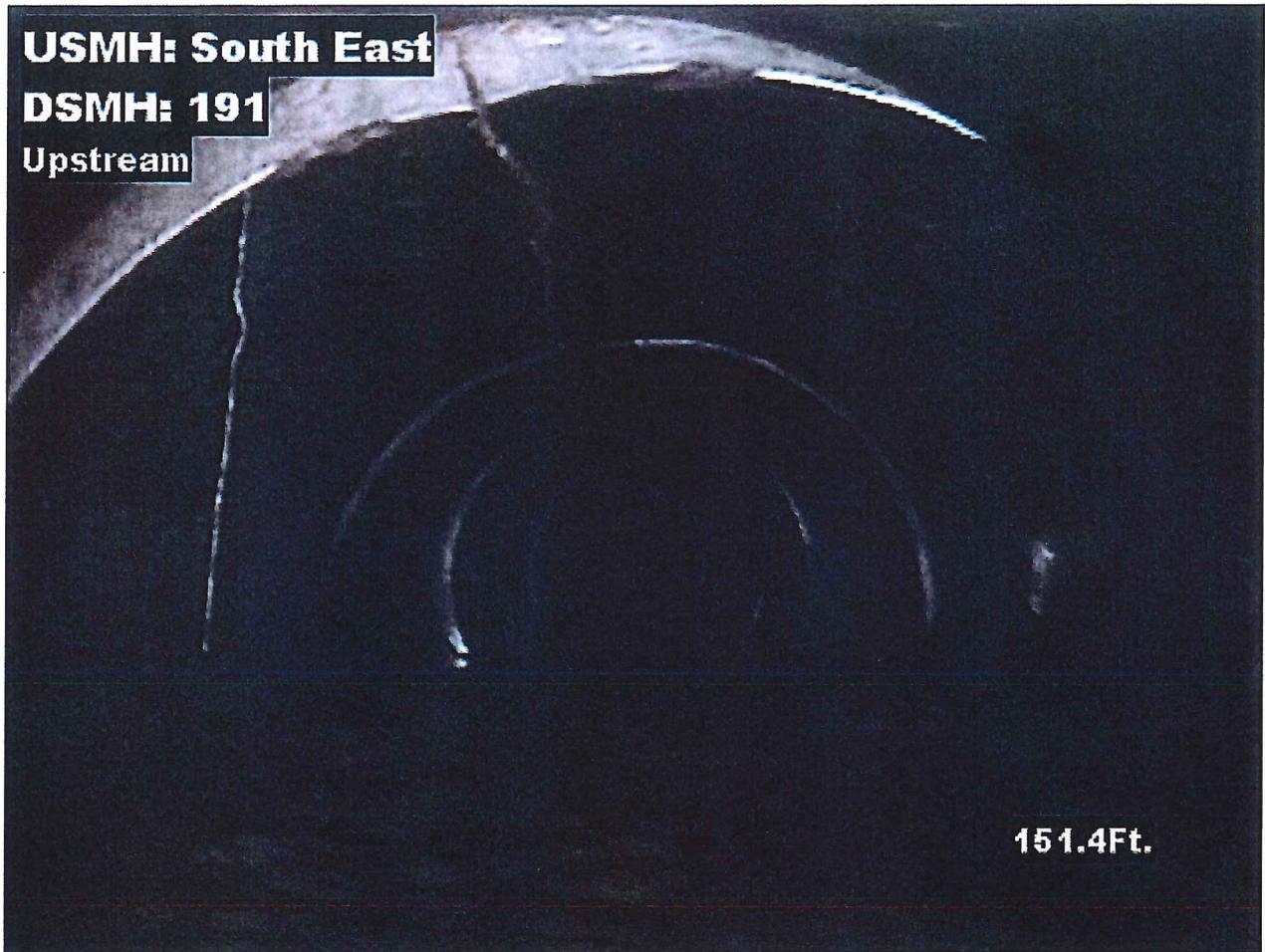


115.1Ft.

USMH: South East

DSMH: 191

Upstream

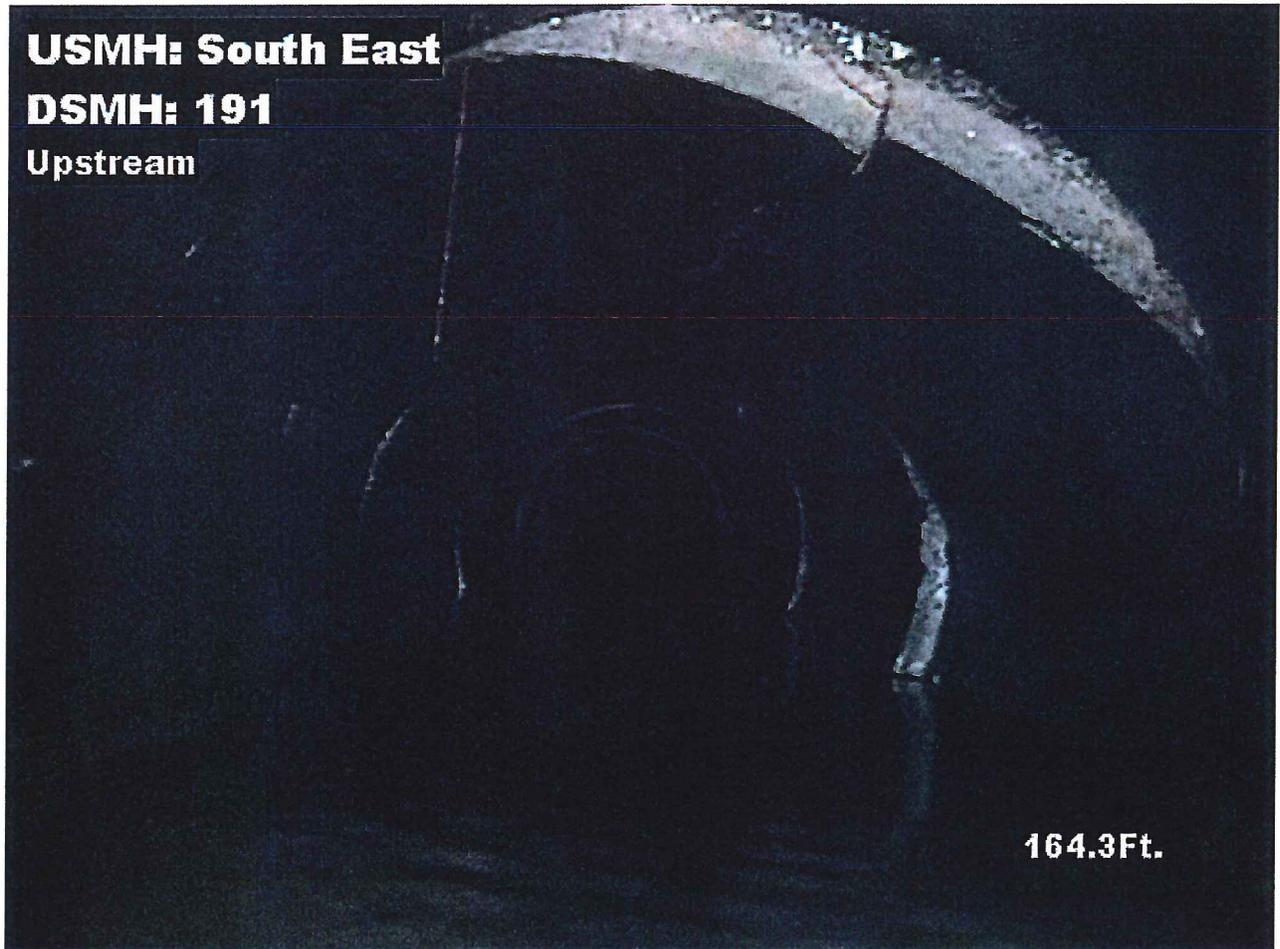


151.4Ft.

USMH: South East

DSMH: 191

Upstream

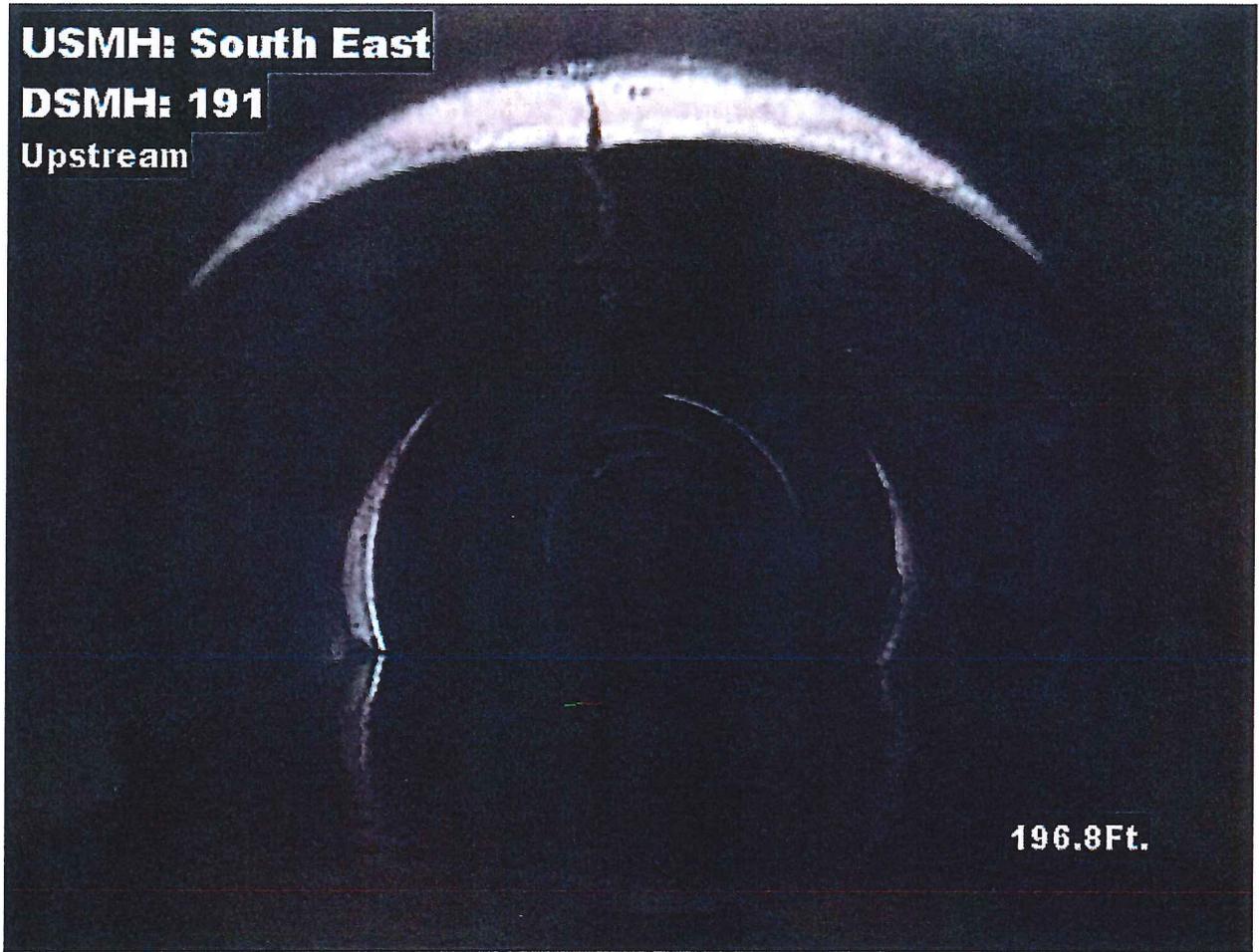


164.3Ft.

USMH: South East

DSMH: 191

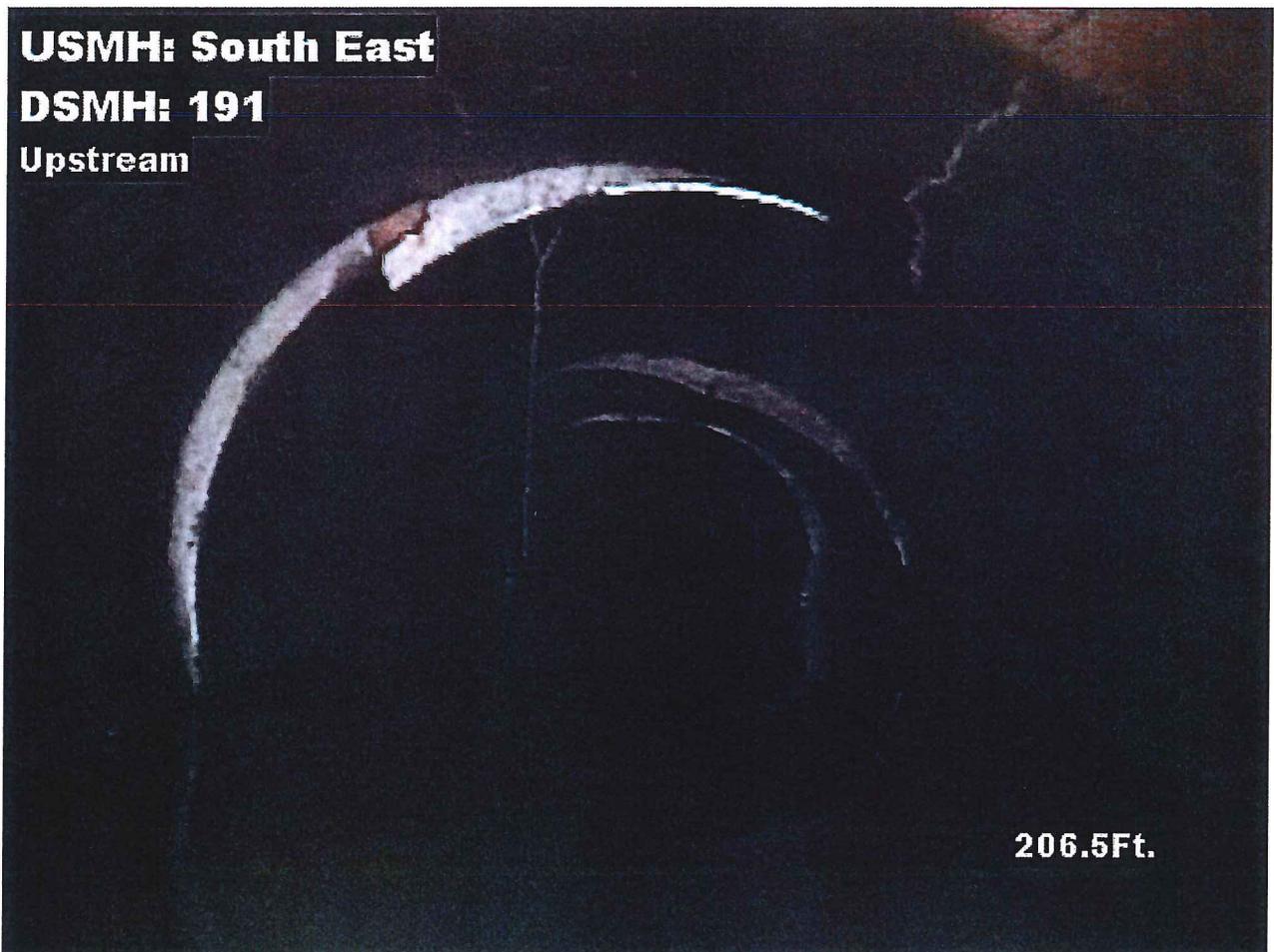
Upstream



USMH: South East

DSMH: 191

Upstream



USMH: South East

DSMH: 191

Upstream

Fracture Multiple

At 7 O'clock

To 5 O'clock

209.7Ft.

size

USMH: South East

DSMH: 191

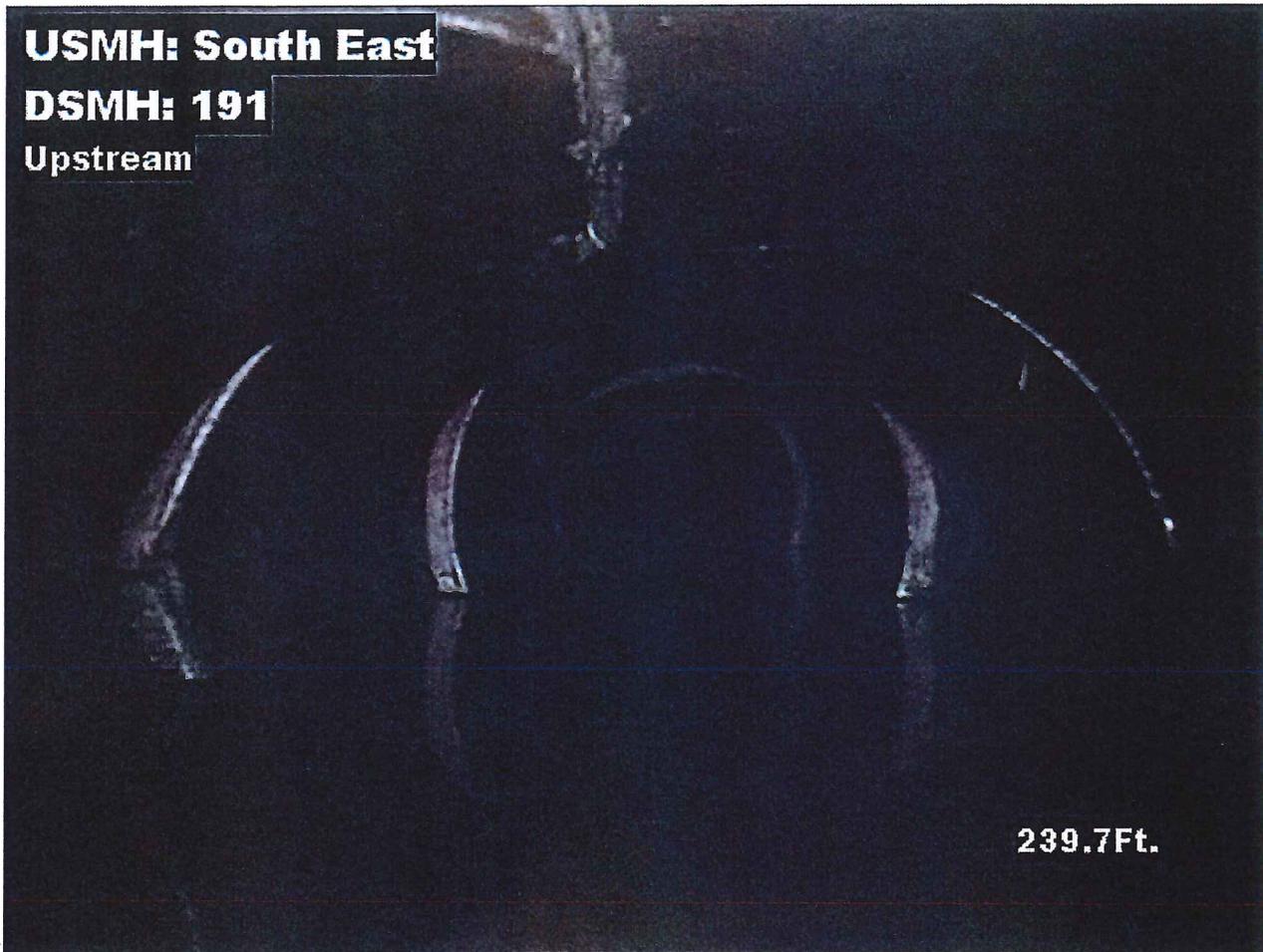
Upstream

235.3Ft.

USMH: South East

DSMH: 191

Upstream



239.7Ft.

USMH: South East

DSMH: 191

Upstream

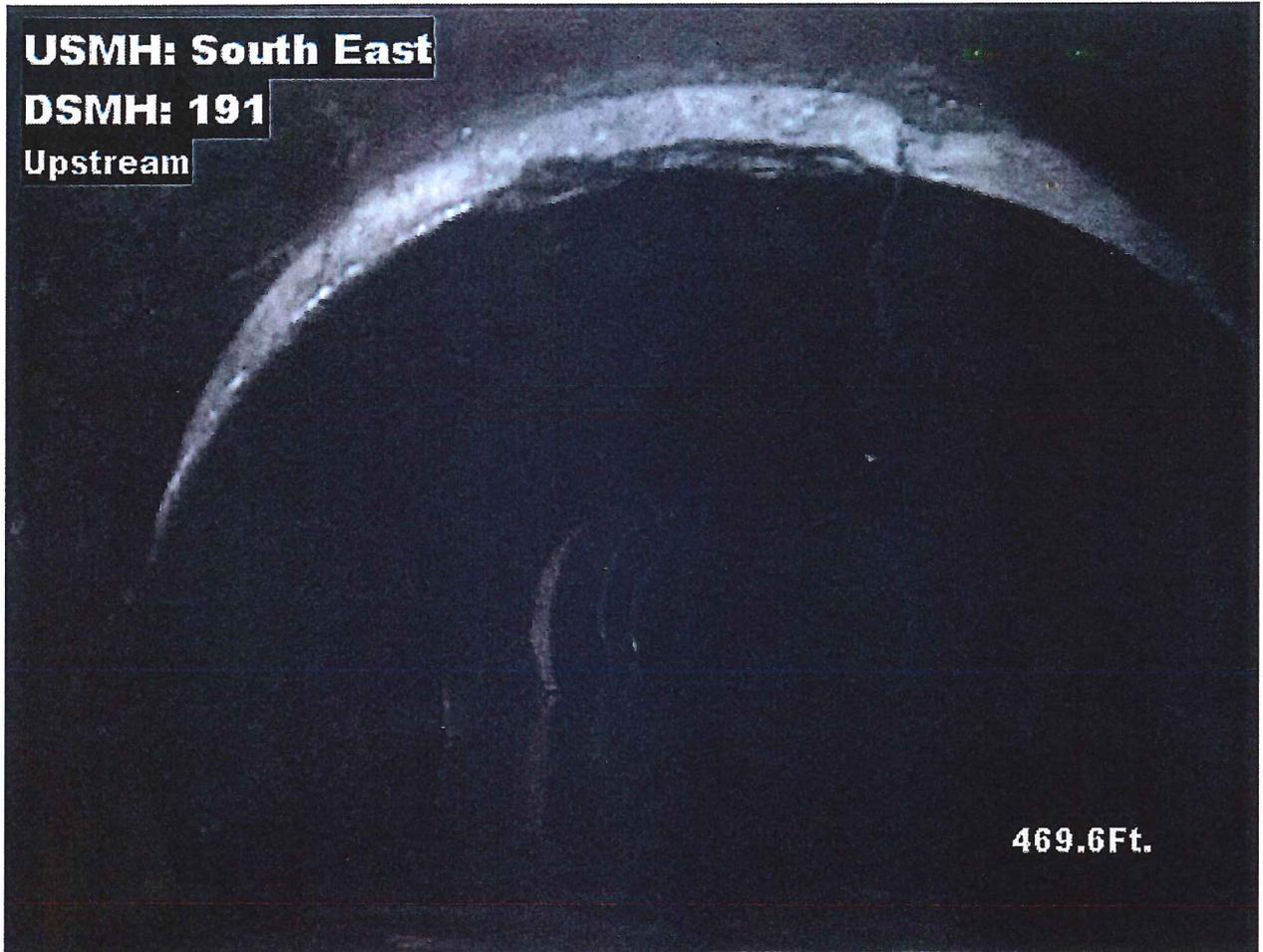


400.3Ft.

USMH: South East

DSMH: 191

Upstream



469.6Ft.

USMH: South East

DSMH: 191

Upstream

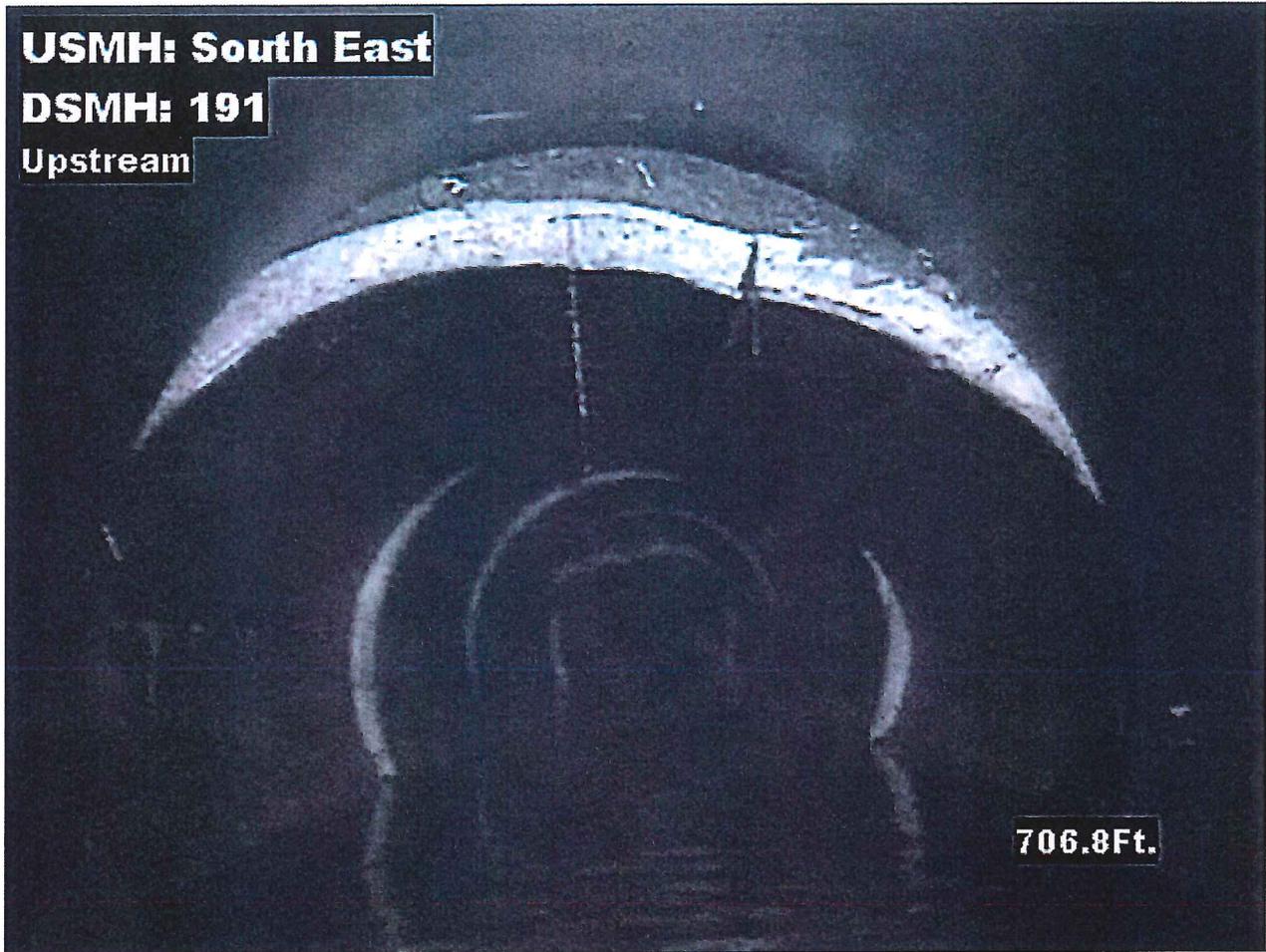


658.4Ft.

USMH: South East

DSMH: 191

Upstream



USMH: South East

DSMH: 191

Upstream



USMH: South East

DSMH: 191

Upstream



841.4Ft.

USMH: South East

DSMH: 191

Upstream

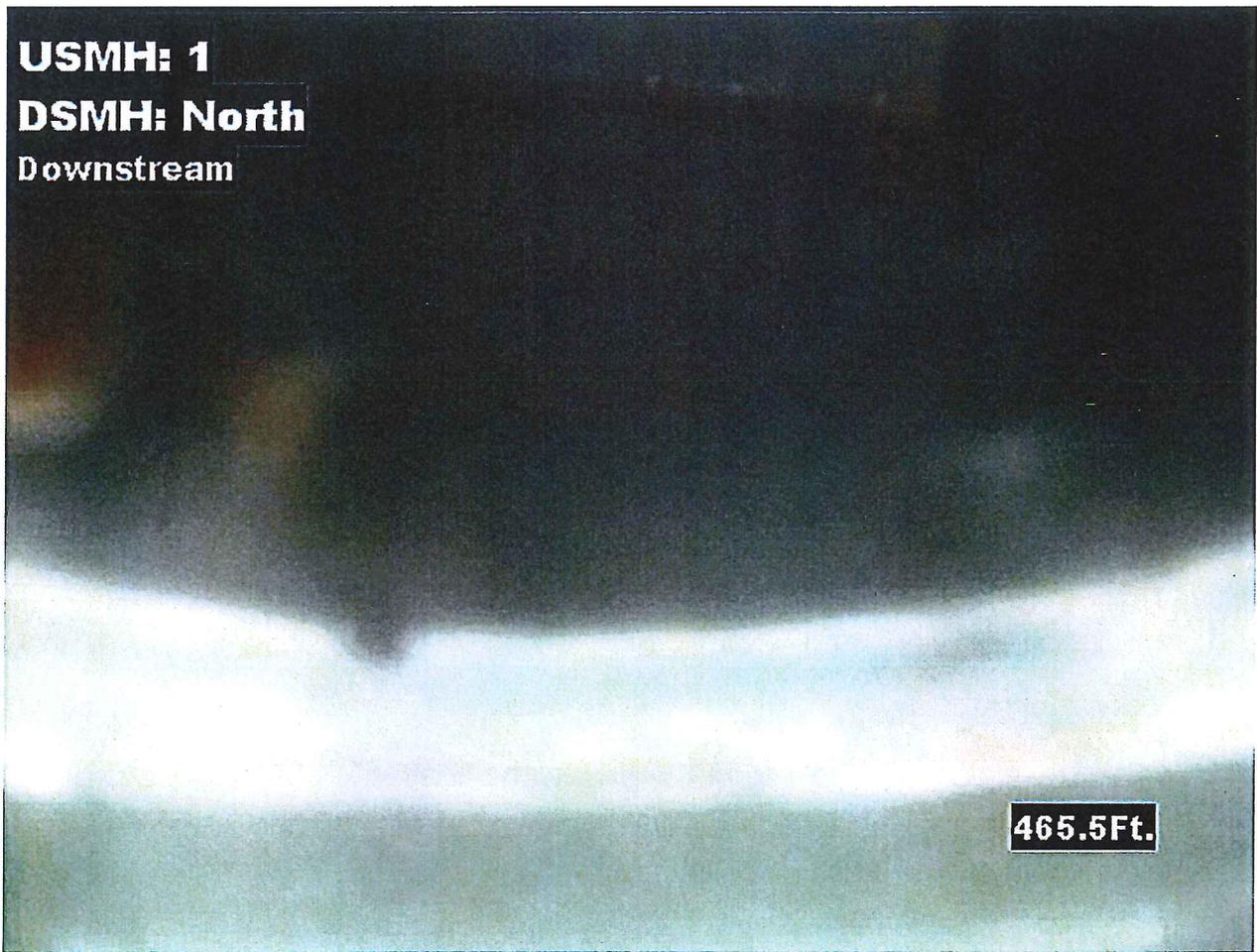


867.6Ft.

USMH: 1

DSMH: North

Downstream



465.5Ft.

City: hardin county

Street: DD 102

USMH: 1

DSMH: North

Direction: Downstream

Sewer Use: Stormwater

Purpose of Inspection: Routine Assessment

Pre-Cleaning: No Pre-Cleaning

Shape: Circular

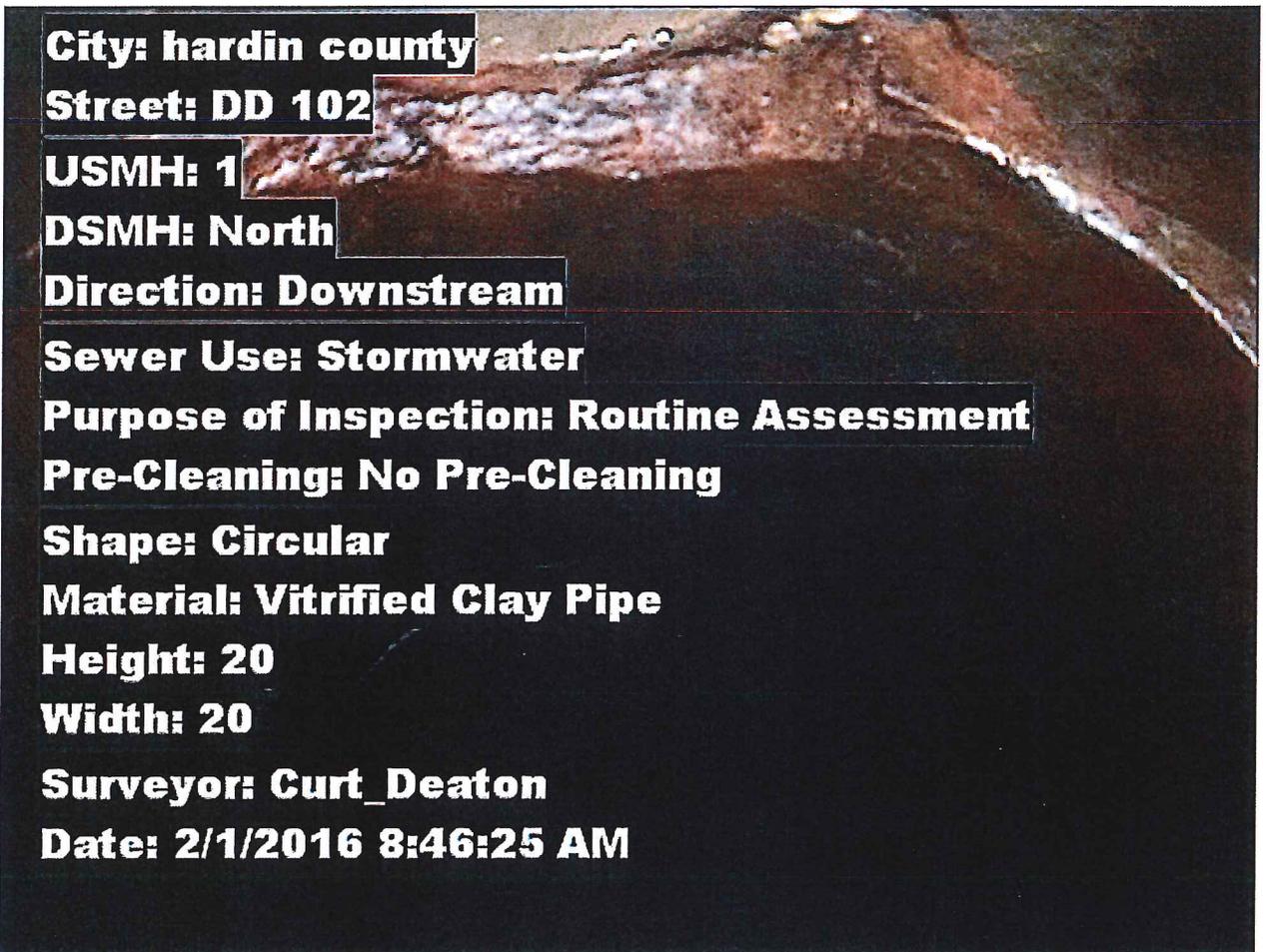
Material: Vitrified Clay Pipe

Height: 20

Width: 20

Surveyor: Curt_Deaton

Date: 2/1/2016 8:46:25 AM



USMH: 1

DSMH: North

Downstream

39.9Ft.

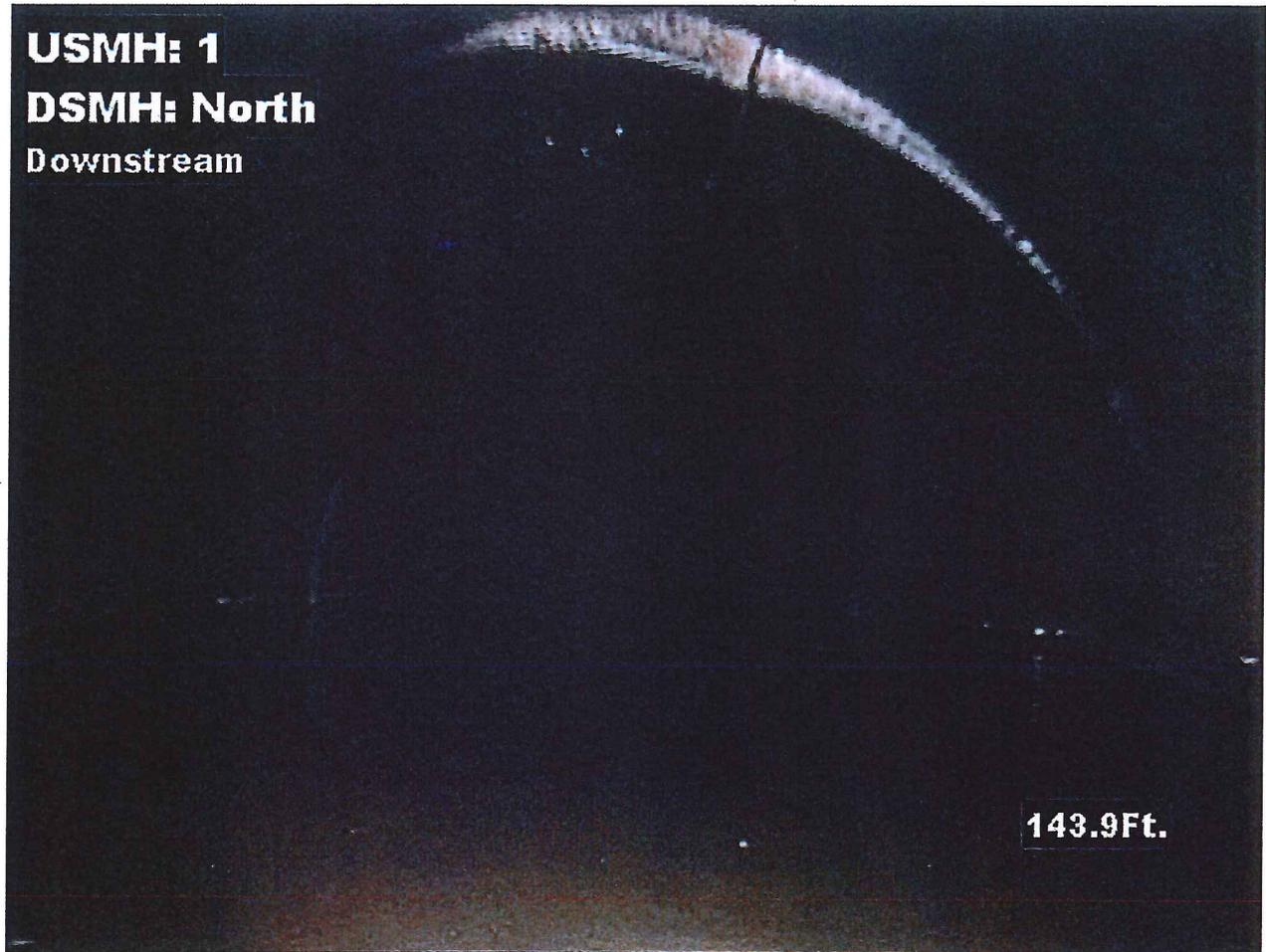
USMH: 1

DSMH: North

Downstream

62.5Ft.

USMH: 1
DSMH: North
Downstream



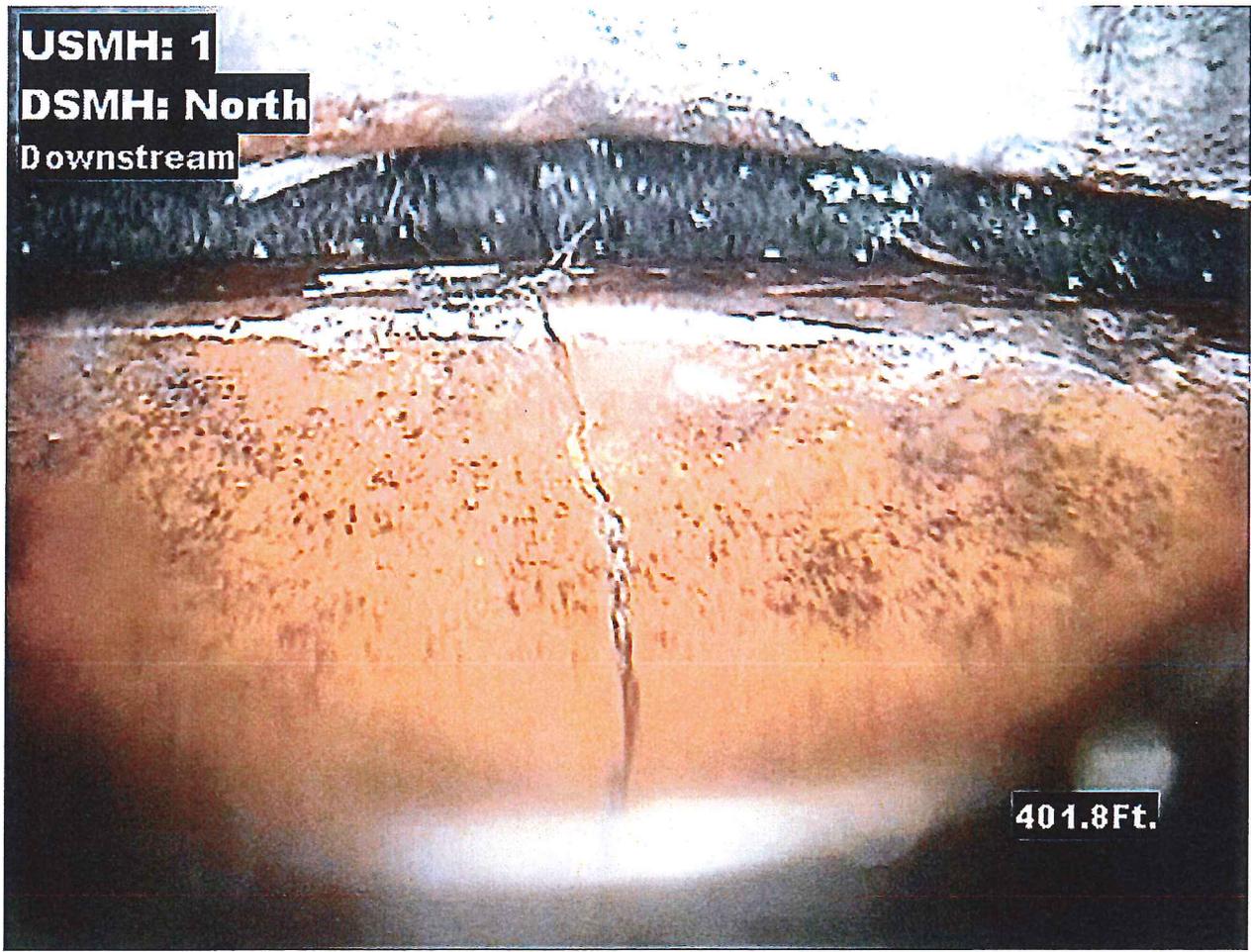
143.9Ft.

USMH: 1
DSMH: North
Downstream



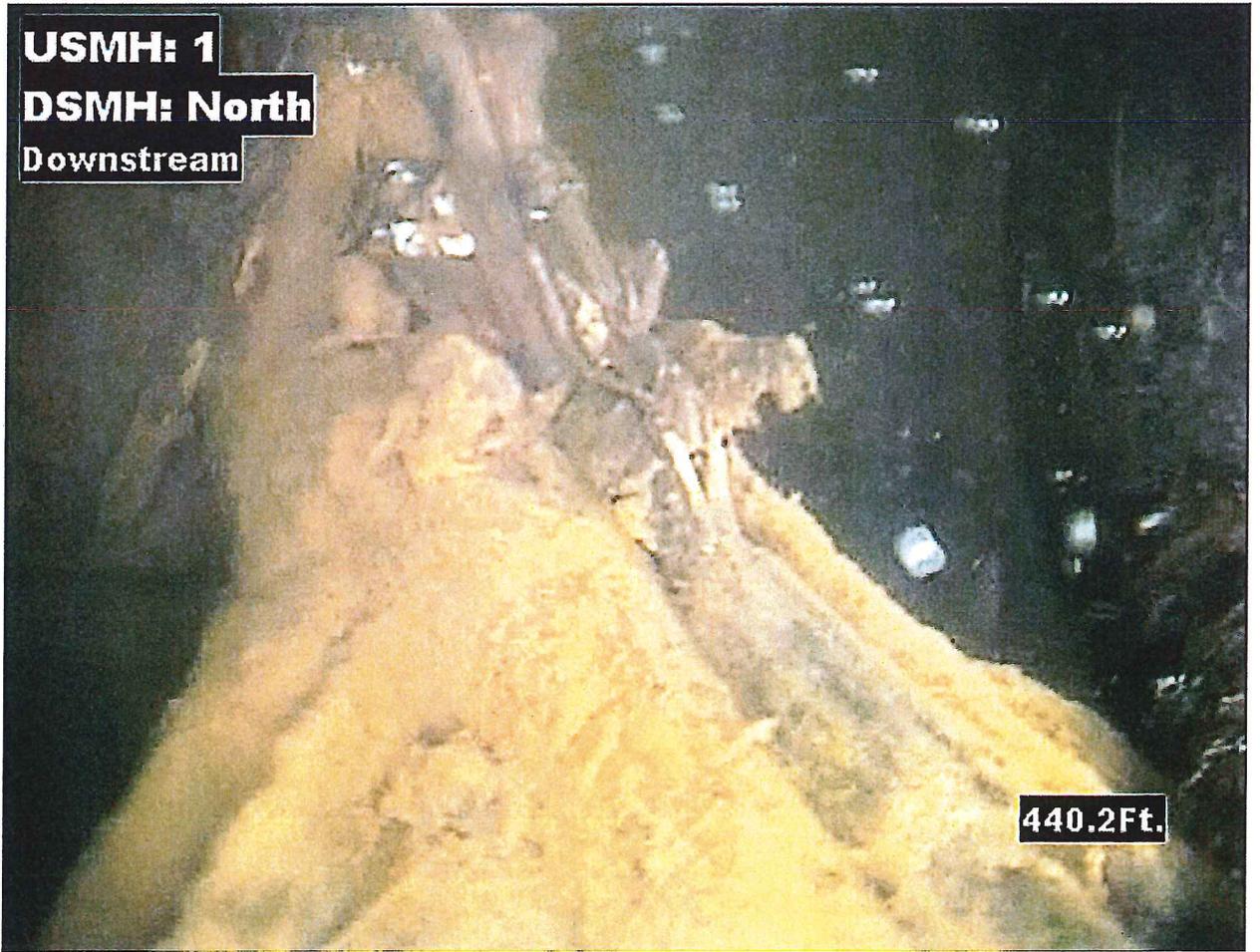
177.5Ft.

USMH: 1
DSMH: North
Downstream



401.8Ft.

USMH: 1
DSMH: North
Downstream



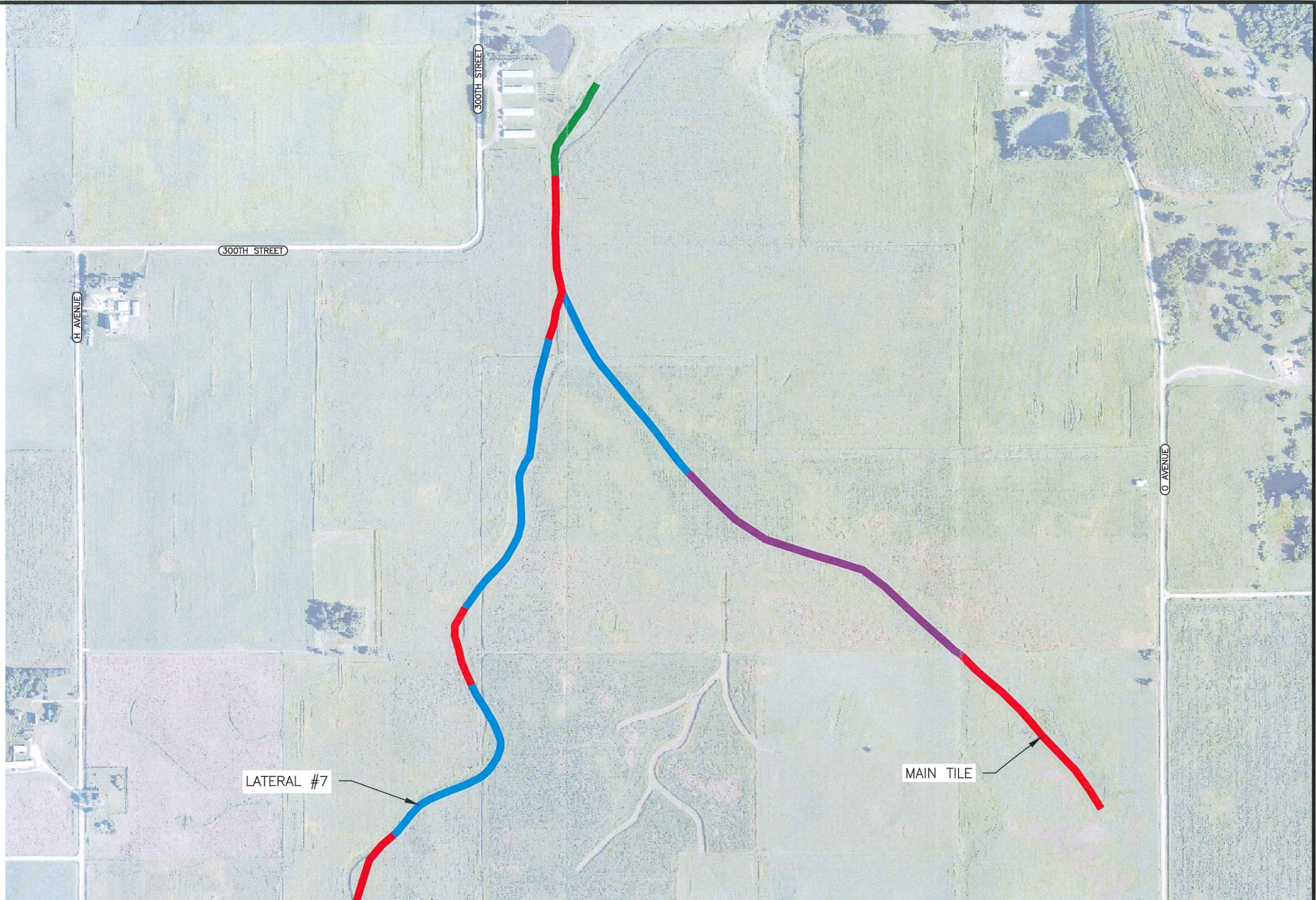
440.2Ft.

USMH: 1
DSMH: North
Downstream



443Ft.

- SINKHOLES IN SURFACE ABOVE TILE
- TELEVISED TILE IN POOR CONDITION
- UNTELEVISED TILE
- PLUGGED OR COLLAPSED TILE



DRAWN BY: MAH	APPROVED BY: LOG	REVISIONS:
DATE: 4/30/2015	PROJ. NO.: 6762	
FIELD BK: -		
P:\6762.3\CADD\CONCEPTS\6762 - EXCON - MERGED - REPORT.DWG; 5/27/2016		

RYKEN

ENGINEERING & LAND SURVEYING, INC.
ACKLEY, MASON CITY & WEBSTER CITY, IOWA

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

PROJECT:
DRAINAGE DISTRICT 102
HARDIN COUNTY, IOWA
2015

SHT. NAME:
INVESTIGATION MAP FOR WORK ORDER #66
DD 102

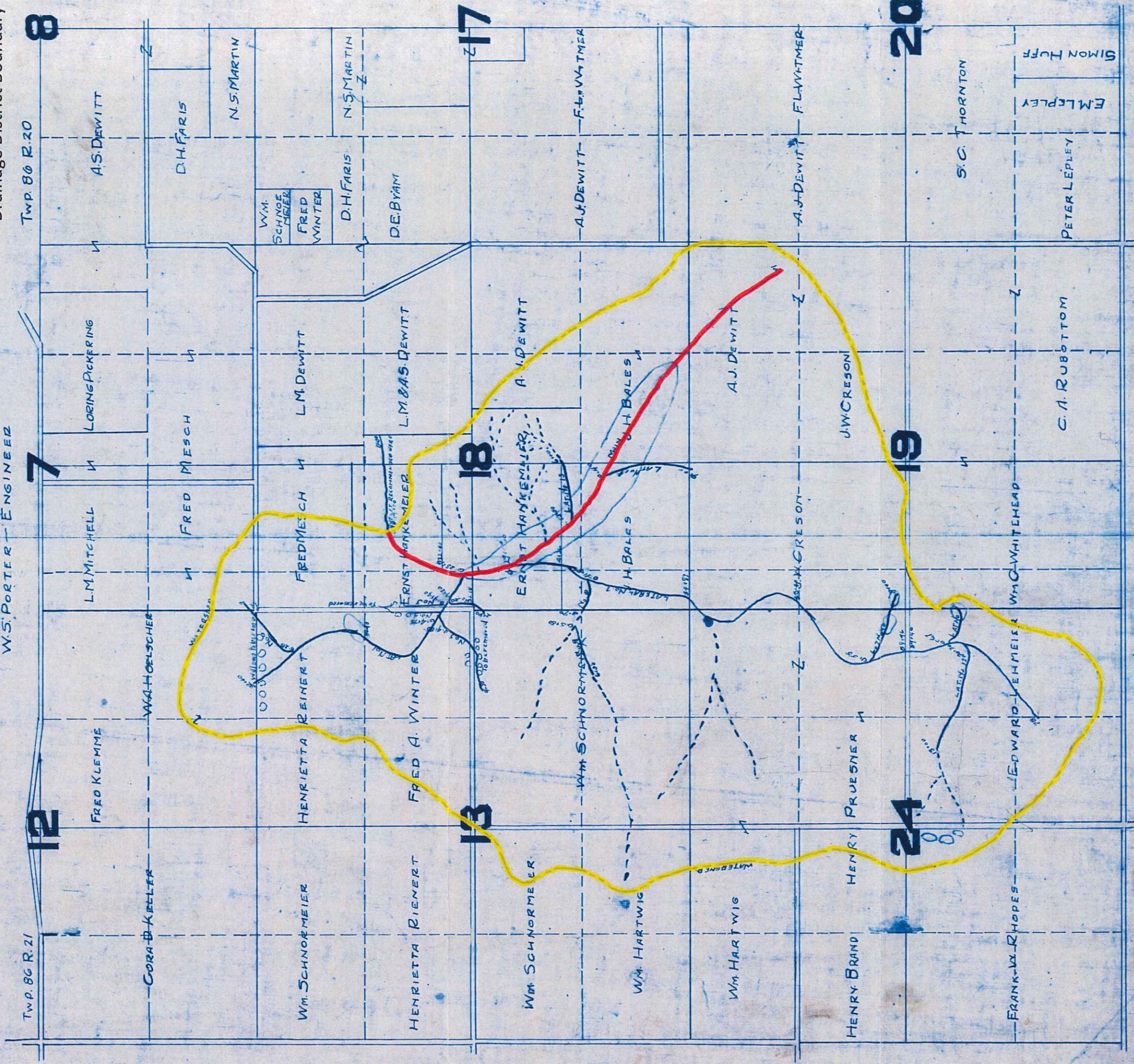
SHT. NO.:
1 OF 1

PLAT OF ERNEST HANKEMEIER DRAINAGE DISTRICT NO. 102 AUG. 1917

CONTAINING 1140 ACRES
SCALE 800' = 1"
W.S. PORTER ENGINEER

— Drainage District Main

— Drainage District Boundary



MAH	APPROVED BY:	LOG	REVISIONS:
3/30/2015	PROJ. NO.:	6762	
ADD\CONCEPTS\6762.3 - CONCEPTS.DWG; 5/25/2016			

RYKEN
ENGINEERING & LAND SURVEYING, INC.
ACKLEY, MASON CITY &, WEBSTER CITY, IOWA

ADDRESS:
739 PARK AVENUE
ACKLEY, IOWA 50601
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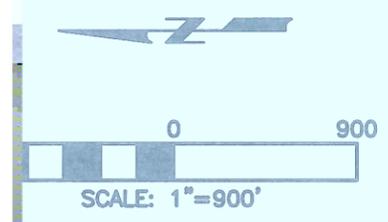
PROJECT:
DRAINAGE DISTRICT #102
HARDIN COUNTY, IOWA
2016

SHT. NAME:
LOCATION MAP OF REPAIRS OR IMPROVEMENTS

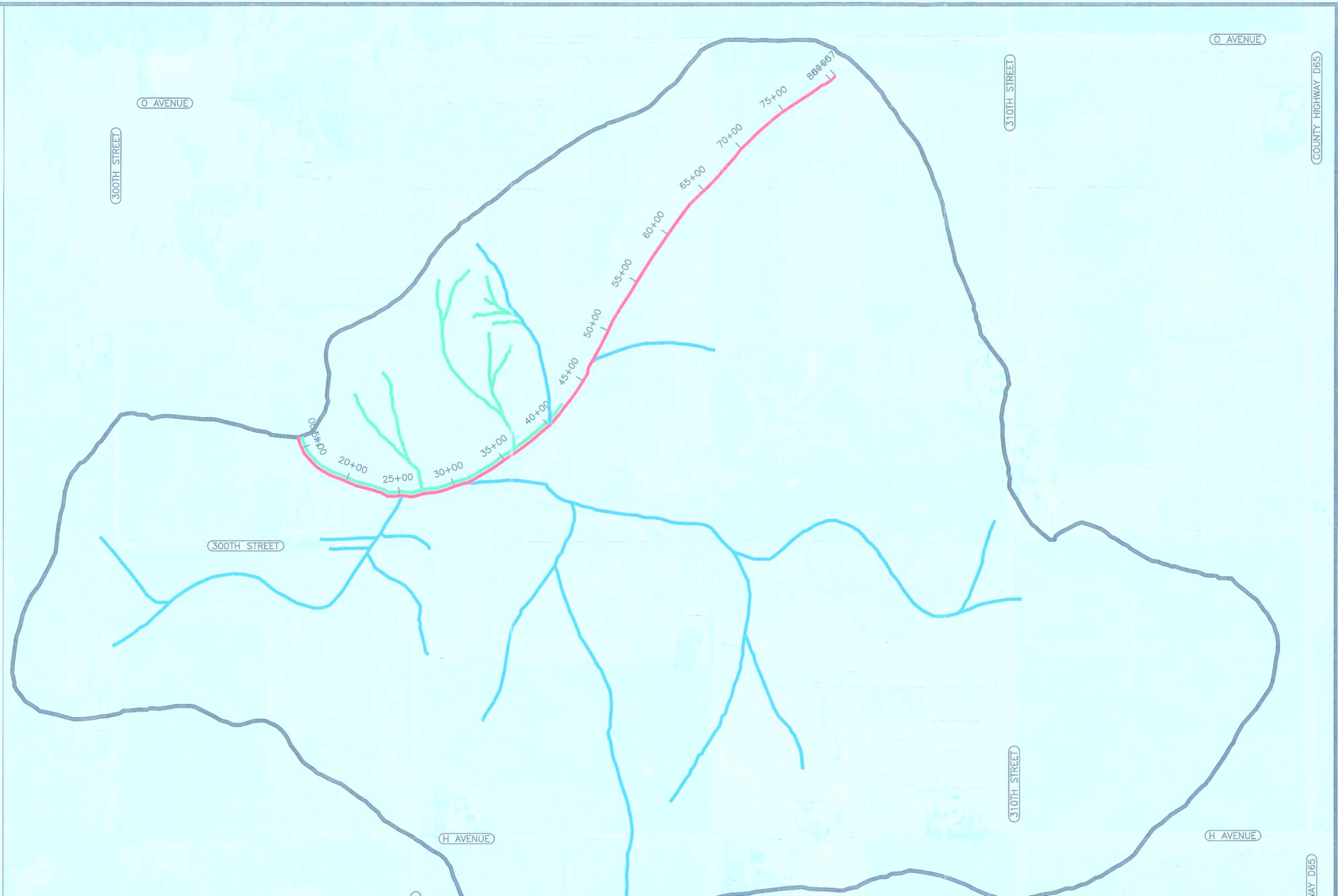
SHT. NO.:

1 OF 1

900



- EXISTING PRIVATE TILE
- EXISTING LATERAL TILE
- EXISTING MAIN TILE TO BE REPAIRED OR IMPROVED



DRAWN BY:
DATE: 4/
FIELD BK:
P:\6762.3\



Engineer's Opinion of Main Capacities

Project: Main Tile Repair for D.D. #102

Location: Sections 18 and 19, T86N, R20W, Hardin County, Iowa

By: Z.J.S.
 Date: 4/19/2016
 Checked By: L.O.G.
 Date: 6/22/2016

STA	DESCRIPTION	INSTALLED		REPAIR	
		ORIGINAL INSTALLED TILE SIZE (in)	ORIGINAL INSTALLED TILE CAPACITY (in*acres/day)	REPAIR TILE SIZE (in)	REPAIR CAPACITY (in*acres/day)
	Main				
14+00	Main Tile Outlet	28	0.30	30	0.36
23+75	Connection with Lateral 1 Pipe size change 28" - 26"	26	0.25	30	0.37
23+76	Upstream of Connection with Lateral 1	26	0.31	30	0.45
29+00	Connection with Lateral 7 Pipe size change 26" - 20" Grade Change 0.18% - 0.10%	20	0.12	24	0.19
29+01	Upstream of Connection with Lateral 7	20	0.30	24	0.49
42+50	Connection with Lateral 13 Pipe size change 20" - 18"	18	0.25	18	0.25
42+51	Upstream of Connection with Lateral 13	18	0.26	18	0.26
49+00	Connection with Lateral 14 Pipe size change 18" - 15"	15	0.18	15	0.18
49+01	Upstream of Connection with Lateral 14	15	0.31	15	0.31
57+20	Pipe size change 15" - 12"	12	0.27	12	0.27
63+00	Pipe size change 12" - 8" Grade Change 0.10% - 0.40%	8	0.20	8	0.20
70+00	Pipe size change 8" - 6" Grade Change 0.40% - 1.60%	6	0.40	6	0.40
77+00	Grade Change 1.60% - 0.70%	6	0.95	6	0.95
81+50	End Main Tile				

TILE REPLACEMENT - REPAIR



Engineer's Opinion of Main Capacities

Project: Main Tile Improvements for D.D. #102

Location: Sections 18 and 19, T86N, R20W, Hardin County, Iowa

By: Z.J.S.

Date: 4/19/2016

Checked By: L.O.G.

Date: 6/22/2016

DUAL TILE INSTALLATION - IMPROVEMENT

STA	DESCRIPTION	INSTALLED		IMPROVEMENT (DUAL TILE)					
		ORIGINAL INSTALLED TILE SIZE (in)	ORIGINAL INSTALLED TILE CAPACITY (in ² *acres/day)	1/2" DRAINAGE COEF.		COMBINED TILE CAPACITY (in ² *acres/day)			
				NEW DUAL PARALLEL TILE SIZE (in)	COMBINED TILE CAPACITY (in ² *acres/day)		NEW DUAL PARALLEL TILE SIZE (in)	COMBINED TILE CAPACITY (in ² *acres/day)	
	Main								
14+00	Main Tile Outlet	28	0.30	30	0.71	36	1.16		
23+75	Connection with Lateral 1 Pipe size change 28" - 26"	26	0.25	30	0.74	36	1.20		
23+76	Upstream of Connection with Lateral 1	26	0.31	24	0.50	30	0.90		
29+00	Connection with Lateral 7 Pipe size change 26" - 20" Grade Change 0.18% - 0.10%	20	0.12	24	0.50	30	0.90		
29+01	Upstream of Connection with Lateral 7	20	0.30	18	0.46	24	0.99		
42+50	Connection with Lateral 13 Pipe size change 20" - 18"	18	0.25	18	0.51	24	1.09		
42+51	Upstream of Connection with Lateral 13	18	0.26	18	0.53	24	1.14		
49+00	Connection with Lateral 14 Pipe size change 18" - 15"	15	0.18	18	0.57	24	1.23		
49+01	Upstream of Connection with Lateral 14	15	0.31	18	1.02	18	1.02		
57+20	Pipe size change 15" - 12"	12	0.27	12	0.53	18	1.57		
63+00	Pipe size change 12" - 8" Grade Change 0.10% - 0.40%	8	0.20	12	0.58	12	1.16		
70+00	Pipe size change 8" - 6" Grade Change 0.40% - 1.60%	6	0.40	8	0.87	8	1.74		
77+00	Grade Change 1.60% - 0.70%	6	0.95	8	2.05	8	2.05		
81+50	End Main Tile								

* Single pipe to be installed



Engineer's Opinion of Main Capacities

Project: Main Tile Improvements for D.D. #102

Location: Sections 18 and 19, T86N, R20W, Hardin County, Iowa

By: Z.J.S.

Date: 4/19/2016

Checked By: L.O.G.

Date: 6/22/2016

STA	DESCRIPTION	INSTALLED		IMPROVEMENT (UPSIZING)					
		ORIGINAL INSTALLED TILE SIZE (in)	ORIGINAL INSTALLED TILE CAPACITY (in ² *acres/day)	1/2" DRAINAGE COEF.		1" DRAINAGE COEF.			
				UPSIZING TILE SIZE (in)	IMPROVED TILE CAPACITY (in ² *acres/day)		UPSIZING TILE SIZE (in)	IMPROVED TILE CAPACITY (in ² *acres/day)	
	Main								
14+00	Main Tile Outlet	28	0.30	36	0.58	48	1.25		
23+75	Connection with Lateral 1 Pipe size change 28" - 26"	26	0.25	36	0.60	42	0.91		
23+76	Upstream of Connection with Lateral 1 Connection with Lateral 7	26	0.31	30	0.45	42	1.11		
29+00	Pipe size change 26" - 20" Grade Change 0.18% - 0.10%	20	0.12	30	0.57	42	0.86		
29+01	Upstream of Connection with Lateral 7	20	0.30	24	0.49	36	1.46		
42+50	Connection with Lateral 13 Pipe size change 20" - 18"	18	0.25	24	0.54	30	0.99		
42+51	Upstream of Connection with Lateral 13	18	0.26	24	0.57	30	1.03		
49+00	Connection with Lateral 14 Pipe size change 18" - 15"	15	0.18	24	0.62	30	1.12		
49+01	Upstream of Connection with Lateral 14	15	0.31	18	0.51	24	1.10		
57+20	Pipe size change 15" - 12"	12	0.27	12	0.78	24	1.69		
63+00	Pipe size change 12" - 8" Grade Change 0.10% - 0.40%	8	0.20	8	0.58	18	1.70		
70+00	Pipe size change 8" - 6" Grade Change 0.40% - 1.60%	6	0.40	8	0.87	12	2.56		
77+00	Grade Change 1.60% - 0.70%	6	0.95	8	2.05	8	2.05		
81+50	End Main Tile								

TILE REPLACEMENT UPSIZING - IMPROVEMENT



Engineer's Opinion of Main Capacities

Project: Main Improvements for D.D. #102

Location: Sections 18 and 19, T86N, R20W, Hardin County, Iowa

By: Z.J.S.

Date: 4/19/2016

Checked By: L.O.G.

Date: 6/22/2016

STA	DESCRIPTION	INSTALLED		IMPROVEMENT (OPEN DITCH)	
		ORIGINAL INSTALLED TILE SIZE (in)	ORIGINAL INSTALLED TILE CAPACITY (in ² acres/day)	MAIN	IMPROVED DITCH CAPACITY (in ² acres/day)
	Main				
14+00	Main Outlet	28	0.30	Open	8.84
23+75	Connection with Lateral 1 Pipe size change 28" - 26"	26	0.25	Open	9.16
23+76	Upstream of Connection with Lateral 1	26	0.31	Open	11.20
29+00	Connection with Lateral 7 Pipe size change 26" - 20" Grade Change 0.18% - 0.10%	20	0.12	Open	8.72
29+01	Upstream of Connection with Lateral 7	20	0.30	Open	22.24
42+50	Connection with Lateral 13 Pipe size change 20" - 18"	18	0.25	Open	24.48
42+51	Upstream of Connection with Lateral 13	18	0.26	Open	25.54
49+00	Connection with Lateral 14 Pipe size change 18" - 15"	15	0.18	Open	27.71
49+01	Upstream of Connection with Lateral 14	15	0.31	Open	49.41
57+20	Pipe size change 15" - 12"	12	0.27	Open	75.83
63+00	Pipe size change 12" - 8" Grade Change 0.10% - 0.40%	8	0.20	Open	165.07
70+00	Pipe size change 8" - 6" Grade Change 0.40% - 1.60%	6	0.40	Open	730.45
77+00	Grade Change 1.60% - 0.70%	6	0.95	Open	1722.37
81+50	End Main				

OPEN DITCH - IMPROVEMENT



ENGINEERING & LAND SURVEYING, INC.

By: Z.J.S.
 Date: 4/20/2016
 Checked By: L.O.G.
 Date: 6/22/2016

Engineer's Opinion of Probable Construction Cost
Project: Main Tile Repair for D.D. #102
 Location: Sections 18 and 19, T86N, R20W, Hardin County, Iowa

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost
CONSTRUCTION COSTS						
101	36" CMP OUTLET	\$ 125.00	LF	40	LF	\$ 5,000.00
102	30" DUAL WALL TILE	\$ 65.00	LF	1460	LF	\$ 94,900.00
103	24" DUAL WALL TILE	\$ 60.00	LF	1350	LF	\$ 81,000.00
104	18" DUAL WALL TILE	\$ 50.00	LF	650	LF	\$ 32,500.00
105	15" DUAL WALL TILE	\$ 45.00	LF	820	LF	\$ 36,900.00
106	12" DUAL WALL TILE	\$ 40.00	LF	580	LF	\$ 23,200.00
107	8" DUAL WALL TILE	\$ 30.00	LF	700	LF	\$ 21,000.00
108	6" DUAL WALL TILE	\$ 20.00	LF	1150	LF	\$ 23,000.00
109	30" X 24" DUAL WALL REDUCER	\$ 1,000.00	EA	1	EA	\$ 1,000.00
110	24" X 18" DUAL WALL REDUCER	\$ 750.00	EA	1	EA	\$ 750.00
111	18" X 15" DUAL WALL REDUCER	\$ 500.00	EA	1	EA	\$ 500.00
112	15" X 12" DUAL WALL REDUCER	\$ 500.00	EA	1	EA	\$ 500.00
113	12" X 8" DUAL WALL REDUCER	\$ 500.00	EA	1	EA	\$ 500.00
114	8" X 6" DUAL WALL REDUCER	\$ 500.00	EA	1	EA	\$ 500.00
115	30" X 30" X 10" DUAL WALL WYE (LATERAL 1 CONNECTION)	\$ 1,250.00	EA	1	EA	\$ 1,250.00
116	24" X 24" X 18" DUAL WALL WYE (LATERAL 7 CONNECTION)	\$ 1,000.00	EA	1	EA	\$ 1,000.00
117	18" X 18" X 8" DUAL WALL WYE (LATERAL 13 CONNECTION)	\$ 1,000.00	EA	1	EA	\$ 1,000.00
118	18" X 18" X 8" DUAL WALL WYE (LATERAL 14 CONNECTION)	\$ 1,000.00	EA	1	EA	\$ 1,000.00
119	HEADWALL	\$ 10,000.00	EA	1	EA	\$ 10,000.00
120	RIP-RAP	\$ 40.00	TN	50	TN	\$ 2,000.00
121	HICKENBOTTOM INTAKE	\$ 1,500.00	EA	4	EA	\$ 6,000.00
122	CONCRETE COLLAR	\$ 400.00	EA	5	EA	\$ 2,000.00
123	PRIVATE TILE CONNECTIONS	\$ 500.00	EA	35	EA	\$ 17,500.00
124	REMOVE EXISTING TILE	\$ 10.00	LF	6750	LF	\$ 67,500.00
CONSTRUCTION SUBTOTAL						\$ 430,500.00
Contingency (10%)						\$ 43,050.00
CONSTRUCTION TOTAL						\$ 473,550.00
Engr. & Const. Observation (20%)						\$ 94,710.00
TOTAL COST						\$ 568,260.00

TILE REPLACEMENT - REPAIR

Engineer's Opinion of Probable Construction Cost
Project: Main Tile Improvements for D.D. #102
 Location: Sections 18 and 19, T86N, R20W, Hardin County, Iowa

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost
CONSTRUCTION COSTS						
101	36" CMP OUTLET	\$ 125.00	LF	80	LF	\$ 10,000.00
102	30" DUAL WALL TILE	\$ 65.00	LF	1872	LF	\$ 121,680.00
103	24" DUAL WALL TILE	\$ 60.00	LF	1050	LF	\$ 63,000.00
104	18" DUAL WALL TILE	\$ 50.00	LF	5638	LF	\$ 281,900.00
105	12" DUAL WALL TILE	\$ 40.00	LF	1860	LF	\$ 74,400.00
106	8" DUAL WALL TILE	\$ 30.00	LF	1150	LF	\$ 34,500.00
107	30" X 24" DUAL WALL REDUCER	\$ 1,000.00	EA	2	EA	\$ 2,000.00
108	24" X 18" DUAL WALL REDUCER	\$ 750.00	EA	2	EA	\$ 1,500.00
109	18" X 12" DUAL WALL REDUCER	\$ 500.00	EA	2	EA	\$ 1,000.00
110	12" X 8" DUAL WALL REDUCER	\$ 500.00	EA	1	EA	\$ 500.00
111	30" X 30" X 10" DUAL WALL WYE (LATERAL 1 CONNECTION)	\$ 1,250.00	EA	1	EA	\$ 1,250.00
112	24" X 24" X 18" DUAL WALL WYE (LATERAL 7 CONNECTION)	\$ 1,000.00	EA	1	EA	\$ 1,000.00
113	18" X 18" X 8" DUAL WALL WYE (LATERAL 13 CONNECTION)	\$ 1,000.00	EA	1	EA	\$ 1,000.00
114	18" X 18" X 8" DUAL WALL WYE (LATERAL 14 CONNECTION)	\$ 1,000.00	EA	1	EA	\$ 1,000.00
115	HEADWALL	\$ 15,000.00	EA	1	EA	\$ 15,000.00
116	RIP-RAP	\$ 40.00	TN	80	TN	\$ 3,200.00
117	HICKENBOTTOM INTAKE	\$ 1,500.00	EA	4	EA	\$ 6,000.00
118	INTERCONNECTIONS	\$ 10,000.00	EA	4	EA	\$ 40,000.00
119	CONCRETE COLLAR	\$ 400.00	EA	6	EA	\$ 2,400.00
120	PRIVATE TILE CONNECTIONS	\$ 500.00	EA	35	EA	\$ 17,500.00
121	REMOVE EXISTING TILE	\$ 10.00	LF	6750	LF	\$ 67,500.00
CONSTRUCTION SUBTOTAL						\$ 746,330.00
Contingency (10%)						\$ 74,633.00
CONSTRUCTION TOTAL						\$ 820,963.00
Engr. & Const. Observation (20%)						\$ 164,192.60
TOTAL COST						\$ 985,155.60
CONSTRUCTION COSTS						
201	42" CMP OUTLET	\$ 150.00	LF	80	LF	\$ 12,000.00
202	36" DUAL WALL TILE	\$ 75.00	LF	1872	LF	\$ 140,400.00
203	30" DUAL WALL TILE	\$ 65.00	LF	1050	LF	\$ 68,250.00
204	24" DUAL WALL TILE	\$ 60.00	LF	4000	LF	\$ 240,000.00
205	18" DUAL WALL TILE	\$ 50.00	LF	2798	LF	\$ 139,900.00
206	12" DUAL WALL TILE	\$ 40.00	LF	1400	LF	\$ 56,000.00
207	8" DUAL WALL TILE	\$ 30.00	LF	2550	LF	\$ 76,500.00
208	36" X 30" DUAL WALL REDUCER	\$ 1,000.00	EA	2	EA	\$ 2,000.00
209	30" X 24" DUAL WALL REDUCER	\$ 1,000.00	EA	2	EA	\$ 2,000.00
210	24" X 18" DUAL WALL REDUCER	\$ 750.00	EA	2	EA	\$ 1,500.00
211	18" X 12" DUAL WALL REDUCER	\$ 500.00	EA	2	EA	\$ 1,000.00
212	12" X 8" DUAL WALL REDUCER	\$ 500.00	EA	2	EA	\$ 1,000.00
213	36" X 36" X 10" DUAL WALL WYE (LATERAL 1 CONNECTION)	\$ 1,250.00	EA	1	EA	\$ 1,250.00
214	30" X 30" X 18" DUAL WALL WYE (LATERAL 7 CONNECTION)	\$ 1,250.00	EA	1	EA	\$ 1,250.00
215	24" X 24" X 8" DUAL WALL WYE (LATERAL 13 CONNECTION)	\$ 1,000.00	EA	1	EA	\$ 1,000.00
216	24" X 24" X 8" DUAL WALL WYE (LATERAL 14 CONNECTION)	\$ 1,000.00	EA	1	EA	\$ 1,000.00
217	HEADWALL	\$ 15,000.00	EA	1	EA	\$ 15,000.00
218	RIP-RAP	\$ 40.00	TN	80	TN	\$ 3,200.00
219	HICKENBOTTOM INTAKE	\$ 1,500.00	EA	4	EA	\$ 6,000.00
220	CONCRETE COLLAR	\$ 400.00	EA	6	EA	\$ 2,400.00
221	INTERCONNECTIONS	\$ 10,000.00	EA	4	EA	\$ 40,000.00
222	PRIVATE TILE CONNECTIONS	\$ 500.00	EA	35	EA	\$ 17,500.00
223	REMOVE EXISTING TILE	\$ 10.00	LF	6750	LF	\$ 67,500.00
CONSTRUCTION SUBTOTAL						\$ 896,650.00
Contingency (10%)						\$ 89,665.00
CONSTRUCTION TOTAL						\$ 986,315.00
Engr. & Const. Observation (20%)						\$ 197,263.00
TOTAL COST						\$ 1,183,578.00



ENGINEERING & LAND SURVEYING, INC.

By: Z.J.S.

Date: 4/20/2016

Checked By: L.O.G.

Date: 6/22/2016

Engineer's Opinion of Probable Construction Cost
Project: Main Tile Improvements for D.D. #102

Location: Sections 18 and 19, T86N, R20W, Hardin County, Iowa

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost
CONSTRUCTION COSTS						
301	42" CMP OUTLET	\$ 150.00	LF	40	LF	\$ 6,000.00
302	36" DUAL WALL TILE	\$ 75.00	LF	896	LF	\$ 67,200.00
303	30" DUAL WALL TILE	\$ 65.00	LF	525	LF	\$ 34,125.00
304	24" DUAL WALL TILE	\$ 60.00	LF	2000	LF	\$ 120,000.00
305	18" DUAL WALL TILE	\$ 50.00	LF	819	LF	\$ 40,950.00
306	12" DUAL WALL TILE	\$ 40.00	LF	580	LF	\$ 23,200.00
307	8" DUAL WALL TILE	\$ 30.00	LF	1850	LF	\$ 55,500.00
308	36" X 30" DUAL WALL REDUCER	\$ 1,000.00	EA	1	EA	\$ 1,000.00
309	30" X 24" DUAL WALL REDUCER	\$ 1,000.00	EA	1	EA	\$ 1,000.00
310	24" X 18" DUAL WALL REDUCER	\$ 750.00	EA	1	EA	\$ 750.00
311	18" X 12" DUAL WALL REDUCER	\$ 500.00	EA	1	EA	\$ 500.00
312	12" X 8" DUAL WALL REDUCER	\$ 500.00	EA	1	EA	\$ 500.00
313	36" X 36" X 10" DUAL WALL WYE (LATERAL 1 CONNECTION)	\$ 1,500.00	EA	1	EA	\$ 1,500.00
314	30" X 30" X 18" DUAL WALL WYE (LATERAL 7 CONNECTION)	\$ 1,250.00	EA	1	EA	\$ 1,250.00
315	24" X 24" X 8" DUAL WALL WYE (LATERAL 13 CONNECTION)	\$ 1,250.00	EA	1	EA	\$ 1,250.00
316	24" X 24" X 8" DUAL WALL WYE (LATERAL 14 CONNECTION)	\$ 1,250.00	EA	1	EA	\$ 1,250.00
317	HEADWALL	\$ 10,000.00	EA	1	EA	\$ 10,000.00
318	RIP-RAP	\$ 40.00	TN	50	TN	\$ 2,000.00
319	HICKENBOTTOM INTAKE	\$ 1,500.00	EA	4	EA	\$ 6,000.00
320	CONCRETE COLLAR	\$ 400.00	EA	5	EA	\$ 2,000.00
321	REMOVE EXISTING TILE	\$ 10.00	LF	6750	LF	\$ 67,500.00
322	PRIVATE TILE CONNECTIONS	\$ 500.00	EA	35	EA	\$ 17,500.00
CONSTRUCTION SUBTOTAL						\$ 460,975.00
Contingency (10%)						\$ 46,097.50
CONSTRUCTION TOTAL						\$ 507,072.50
Engr. & Const. Observation (20%)						\$ 101,414.50
TOTAL COST						\$ 608,487.00
CONSTRUCTION COSTS						
401	54" CMP OUTLET	\$ 200.00	LF	40	LF	\$ 8,000.00
402	48" DUAL WALL TILE	\$ 115.00	LF	935	LF	\$ 107,525.00
403	42" DUAL WALL TILE	\$ 100.00	LF	526	LF	\$ 52,600.00
404	36" DUAL WALL TILE	\$ 75.00	LF	1349	LF	\$ 101,175.00
405	30" DUAL WALL TILE	\$ 65.00	LF	650	LF	\$ 42,250.00
406	24" DUAL WALL TILE	\$ 60.00	LF	1400	LF	\$ 84,000.00
407	18" DUAL WALL TILE	\$ 50.00	LF	700	LF	\$ 35,000.00
408	12" DUAL WALL TILE	\$ 40.00	LF	700	LF	\$ 28,000.00
409	8" DUAL WALL TILE	\$ 30.00	LF	450	LF	\$ 13,500.00
410	48" X 42" DUAL WALL REDUCER	\$ 1,500.00	EA	1	EA	\$ 1,500.00
411	42" X 36" DUAL WALL REDUCER	\$ 1,500.00	EA	1	EA	\$ 1,500.00
412	36" X 30" DUAL WALL REDUCER	\$ 1,000.00	EA	1	EA	\$ 1,000.00
413	30" X 24" DUAL WALL REDUCER	\$ 1,000.00	EA	1	EA	\$ 1,000.00
414	24" X 18" DUAL WALL REDUCER	\$ 750.00	EA	1	EA	\$ 750.00
415	18" X 12" DUAL WALL REDUCER	\$ 500.00	EA	1	EA	\$ 500.00
416	12" X 8" DUAL WALL REDUCER	\$ 500.00	EA	1	EA	\$ 500.00
417	48" X 48" X 10" DUAL WALL WYE (LATERAL 1 CONNECTION)	\$ 1,500.00	EA	1	EA	\$ 1,500.00
418	42" X 42" X 18" DUAL WALL WYE (LATERAL 7 CONNECTION)	\$ 1,500.00	EA	1	EA	\$ 1,500.00
419	30" X 30" X 8" DUAL WALL WYE (LATERAL 13 CONNECTION)	\$ 1,250.00	EA	1	EA	\$ 1,250.00
420	30" X 30" X 8" DUAL WALL WYE (LATERAL 14 CONNECTION)	\$ 1,250.00	EA	1	EA	\$ 1,250.00
421	HEADWALL	\$ 10,000.00	EA	1	EA	\$ 10,000.00
422	RIP-RAP	\$ 40.00	TN	50	TN	\$ 2,000.00
423	HICKENBOTTOM INTAKE	\$ 1,500.00	EA	4	EA	\$ 6,000.00
424	CONCRETE COLLAR	\$ 400.00	EA	5	EA	\$ 2,000.00
425	REMOVE EXISTING TILE	\$ 10.00	LF	6750	LF	\$ 67,500.00
426	PRIVATE TILE CONNECTIONS	\$ 500.00	EA	35	EA	\$ 17,500.00
CONSTRUCTION SUBTOTAL						\$ 589,300.00
Contingency (10%)						\$ 58,930.00
CONSTRUCTION TOTAL						\$ 648,230.00
Engr. & Const. Observation (20%)						\$ 129,646.00
TOTAL COST						\$ 777,876.00

TILE REPLACEMENT UPSIZING - IMPROVEMENT
(1/2" COEFFICIENT)

TILE REPLACEMENT UPSIZING - IMPROVEMENT
(1" COEFFICIENT)



ENGINEERING & LAND SURVEYING, INC.

By: Z.J.S.

Date: 4/20/2015

Checked By: L.O.G.

Date: 6/22/2016

Engineer's Opinion of Probable Construction Cost

Project: Main **Improvements** for D.D. #102

Location: Sections 18 and 19, T86N, R20W, Hardin County, Iowa

OPEN DITCH - IMPROVEMENT

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost
CONSTRUCTION COSTS						
501	OPEN DITCH CONSTRUCTION	\$ 2,500.00	STA	67.5	STA	\$ 168,750.00
502	CMP OUTLET (LATERAL 1)	\$ 55.00	LF	40	LF	\$ 2,200.00
503	CMP OUTLET (LATERAL 7)	\$ 55.00	LF	40	LF	\$ 2,200.00
504	CMP OUTLET (LATERAL 13)	\$ 55.00	LF	40	LF	\$ 2,200.00
504	CMP OUTLET (LATERAL 14)	\$ 55.00	LF	40	LF	\$ 2,200.00
506	RIP-RAP	\$ 40.00	TN	200	TN	\$ 8,000.00
507	CONCRETE COLLAR	\$ 400.00	EA	4	EA	\$ 1,600.00
513	SURFACE DRAINS	\$ 2,000.00	EA	36	EA	\$ 72,000.00
514	PRIVATE TILE OUTLETS	\$ 1,500.00	EA	35	EA	\$ 52,500.00
515	SEEDING (OPEN DITCH)	\$ 500.00	STA	67.5	STA	\$ 33,750.00
519	REMOVE EXISTING TILE	\$ 5.00	LF	6750	LF	\$ 33,750.00
520	RIGHT OF WAY	\$ 12,000.00	AC	16	AC	\$ 192,000.00
CONSTRUCTION SUBTOTAL						\$ 571,150.00
Contingency (10%)						\$ 57,115.00
CONSTRUCTION TOTAL						\$ 628,265.00
Engr. & Const. Observation (20%)						\$ 125,653.00
TOTAL COST						\$ 753,918.00