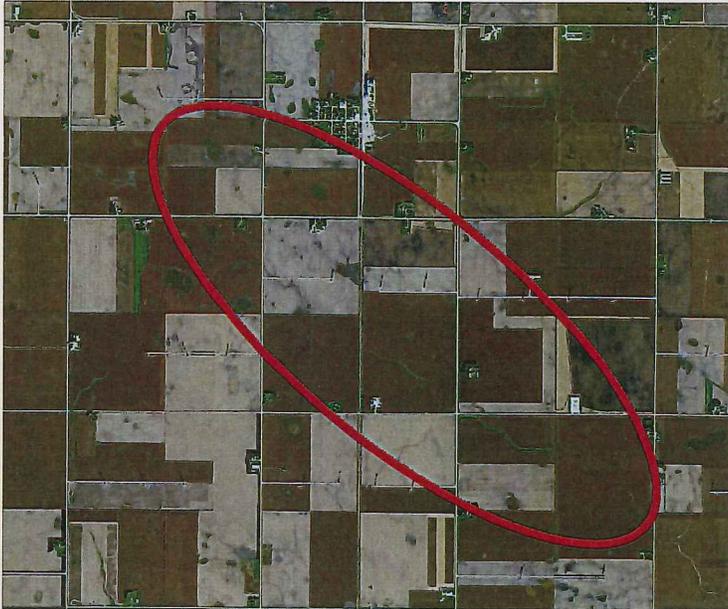


**HARDIN COUNTY, IOWA**

**2016**



**ENGINEER'S REPORT  
ON IMPROVEMENTS TO  
MAIN TILE OF  
DRAINAGE DISTRICT 25  
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. Gallentine* PE April 12, 2016  
LEE O. GALLENTINE, 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 Improvements to Main Tile of Drainage District No. 25, Hardin County, Iowa

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# Engineer's Report on Improvements to Main Tile of Drainage District No. 25, 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 improvements to the main tile of Drainage District No. 25. This report will summarize the history of repairs and improvements to the main tile, investigate the necessity and feasibility of said improvement, and present an opinion of probable construction costs associated with said improvement. At the Drainage District 25 public hearing held on June 17, 2015, much discussion was held about not performing any work on the Lateral 3 tile until the main tile had been improved. For reference, a copy of the minutes from said meeting are included in Appendix A. As a result, the District Trustees requested Ryken Engineering to investigate and report concerning improvements to said main tile and Work Order Request #90 was generated (copy included in Appendix B).
- LOCATION – The area of investigation included the entire main tile, which is located in Sections 21, 27, 28, 34 and 35, Township 86 North, Range 22 West, Hardin County, Iowa. Specifically, the downstream limit was the main tile outlet on the east side of Section 35, just west of G Avenue at approximately ½ mile south of 330th Street. The main tile then goes northwesterly across Section 35 and crosses F Avenue just south of the intersection of F Avenue and 330th Street. It then skims through the Northeast Quarter of Section 34 and crosses 330th Street just west of its intersection with F Avenue. Said main tile then continues northwest across Section 27 crossing the Union Pacific Railroad at approximately ¾ mile north of 330<sup>th</sup> Street and crossing E Avenue at approximately ¼ mile south of County Highway D65. It then continues northwest across Section 28 and crosses County Highway D65 approximately ½ mile west of E Avenue, where the upstream limit of said tile is (just into Section 21 on the north side of County Highway D65). For reference, a copy of the 1912 Drainage District No. 25 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. 25 as obtained from the Hardin County Auditor’s drainage minutes and records and those of Ryken Engineering and Land Surveying.

- 1911, May 4                      Petition for establishment of drainage district was filed in the County Auditor's Office.
- 1911, Oct. 2                     Preliminary Engineer's Report by S.B. Gardner was filed in the County Auditor's Office. It called for 17,300 feet of main tile (28 inch diameter to 12 inch diameter), 1,200 feet of Lateral 1 tile (10 inch diameter), 200 feet of Lateral 2 tile (10 inch diameter), and 7,300 feet of Lateral 3 tile (12 inch diameter to 8 inch diameter). Lateral 1 was to be connected at station 35+00 of the main tile. Lateral 2 was to be connected at station 55+00 of the main tile. Lateral 3 was to be connected at station 95+00 of the main tile. The estimated total cost of construction was \$16,133.00
- 1911, Oct. 12 and 19         Publication of Notice for hearing on establishment, Drainage District No. 25.
- 1912, Jan. 5                     Bids were received on supplying tile and construction of Drainage District No. 25.
- 1912, Jan. 5                     Tile contract with Eldora Pipe and Tile Co. for \$1,985.80 for supplying tile was entered.
- 1912, Jan. 12                  Construction contract with Gade Excavating for \$3,974.00 for construction of drainage district facilities was entered.
- 1912, Feb. 5                     Contract with St. Paul & Kansas City Short Line Railroad Company for construction of main tile and Lateral 3 tile in and across railroad right of way was entered.
- 1913, Oct. 6                     Appointment of Commission to inspect and classify land in Drainage District.
- 1914, Jan. 22 and 29         Publication of Notice of Assessment of Benefits, Drainage District No. 25.
- 1915, Apr. 26                  Final report on Drainage District No. 25 by S.B. Gardner showing completion of contract was accepted.
- 1919, May 15                    Letter from W.S. Porter, Engineer indicating repairs to be made to tile.
- 1924, Mar. 22                  Request for repair of tile blowout.
- 1956, Jan. 19                  Bill for repairs to main tile located in SW¼ Section 27, T86N, R22W.
- 1957, Apr. 10                  Bill for repairs to main tile located in NE¼ Section 35, T86N, R22W.
- 1957, Apr. 30                  Bill for repairs to tile located in NW¼ - NE¼ Section 35, T86N, R22W.
- 1961, Jun. 8                     Bill for repairs to tile located in Section 35, T86N, R22W.
- 1961, Aug. 22                  Bill for repairs to tile located in Section 35, T86N, R22W.
- 1961, Nov. 17                  Bill for repairs to tile located in Section 27, T86N, R22W.
- 1965, Apr. 30                  Bill for repairs to tile located in Section 27, T86N, R22W.
- 1968, Oct. 15                  Bill for repairs to tile located in Section 27, T86N, R22W.

1971, Jun. 22	Bill for repairs to main tile located in NE $\frac{1}{4}$ SE $\frac{1}{4}$ Section 35, T86N, R22W.
1971, Jun. 22	Bill for repairs to main tile located in SW $\frac{1}{4}$ SE $\frac{1}{4}$ Section 27, T86N, R22W.
1971, Oct. 18	Bill for repairs to main tile located in SW $\frac{1}{4}$ SE $\frac{1}{4}$ Section 27, T86N, R22W.
1979, Oct. 25	Bill for repairs to tile located in NW $\frac{1}{4}$ Section 27, T86N, R22W.
1980, Jun. 10	Bill for repairs to tile located in Section 35, T86N, R22W.
1980, Oct. 27	Bill for repairs to tile located in Section 27, T86N, R22W.
1982, May, 19	Bill for repairs to tile located in Section 27, T86N, R22W.
1983, Sept. 26	Request for repair of broken tile in Section 35, T86N, R22W.
1984, Sept. 17	Request for repair of broken tile on main tile in Section 35, T86N, R22W.
1985, Apr. 24	Bill for repairs to main tile located in SE $\frac{1}{4}$ Section 35, T86N, R22W.
1988, Apr. 13	Request for repair of 2 intakes in Section 28, T86N, R22W.
1988, Apr. 28	Bill for repairs to main tile blowout located in SE $\frac{1}{4}$ Section 35, T86N, R22W.
1990, Apr. 18	Request for repair of broken tile in NE $\frac{1}{4}$ NW $\frac{1}{4}$ Section 35, T86N, R22W.
1991, Apr. 17	Request for repair of blowout tile in Section 27, T86N, R22W.
1991, May 22	Request for repair of broken tile in NW $\frac{1}{4}$ Section 27, T86N, R22W.
1991, Oct. 30	Request for repair of broken tile in NW $\frac{1}{4}$ Section 27, T86N, R22W.
1993, Jun. 16	Request for repair of broken tile in Section 35, T86N, R22W.
1993, Aug. 3	Request for repair of broken main tile in NW $\frac{1}{4}$ Section 35, T86N, R22W.
1994, Apr. 27	Bill for repair of broken tile located in NE $\frac{1}{4}$ Section 35, T86N, R22W.
1994, Oct. 25	Request for repair of tile in NW $\frac{1}{4}$ Section 35, T86N, R22W.
1995, May 17	Request for repair of broken tile in NW $\frac{1}{4}$ Section 35, T86N, R22W.
1995, Jun. 14	Request for repair of broken tile in Section 35, T86N, R22W.
1995, Aug. 7	Bill for repair to tile located in NW $\frac{1}{4}$ Section 35, T86N, R22W.
1996, Jun. 28	Request for repair of blowout main tile in NW $\frac{1}{4}$ Section 35, T86N, R22W.
2000, May 4	Request for repair of broken main tile in NE $\frac{1}{4}$ NE $\frac{1}{4}$ Section 28, T86N, R22W.
2001, Jun. 18	Request for repair of broken main tile in NW $\frac{1}{4}$ Section 35, T86N, R22W.
2002, Jun. 5	Request for repair of broken main tile in NW $\frac{1}{4}$ Section 35, T86N, R22W.

2003, Jun. 12	Request for repair of broken main tile in NW¼ Section 35, T86N, R22W.
2005, Mar. 30	Request for repair of broken main tile in NW¼ Section 35, T86N, R22W.
2005, Oct. 18	Request for repair of 2 broken main tile in NW¼ Section 35, T86N, R22W.
2007, May 21	Request for repair of broken main tile in NW¼ Section 35, T86N, R22W.
2009, Apr. 24	Request for repair of blowout on main or Lateral 1 tile in NE¼ NW¼ Section 35, T86N, R22W.
2010, Oct. 4	Request for repair of blowout on main tile in NE¼ NW¼ Section 35, T86N, R22W.
2011, Aug. 16	Request for repair of 2 blowouts on main tile in NW¼ Section 35, T86N, R22W.
2013, Sept. 9	Request for repair of blowout on main tile in NW¼ Section 35, T86N, R22W.

3.0 **INVESTIGATION** – Review of district history shows that repairs to the main tile were first requested within 10 years of the original construction. In addition, landowners along the length of the main tile have requested 45 repairs of broken tile, blowouts and other repairs over the last 60 years. The majority of these repairs were located within Sections 27 and 35. An additional review of the original Engineer's Report and corresponding profile of the main tile was done. No additional field investigation was performed, but it should be noted that televising in Sections 27 and 35 of approximately 1900 feet of main tile was performed under Work Order Request #48. Said televising showed evidence of 5 previous repairs that showed signs of failure and 9 locations showing partial collapse of the original tile. All other investigations were limited to office and records research only. Based on said Engineer's Report and resulting profile, the current district main consists of the original 1912 tile with no supplemental drainage district tile. For our investigation, calculations were performed to see what the original drainage coefficient for the length of the main tile is and it appears that the main tile was designed to provide a drainage coefficient of 0.08 to 0.27 inches per acre per day.

4.0 **DISCUSSION AND CONCLUSIONS** – Based on the above, it is obvious that the installed 1912 main tile is undersized when compared to current agricultural demands for a drainage. In addition, this area has experienced a high level of repairs on a regular basis (average of one every 16 months over the last 60 years). This coupled with repairs requested within the first 10 years of the main tile life cycle possibly indicate inferior material during the 1912 construction. All told, the main tile provides a patchwork of 1912 pipe linked together by various previous repairs all of which is decaying. 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 blockage of tile with tile pieces and soil will occur, further restricting drainage.

- 5.0 **IMPROVEMENT METHODS** – To improve drainage for the main tile, the following are some the options available:

Parallel Tile Installation

- Install a parallel main tile adjacent to and parallel with the existing main tile. For reference, a chart with the required parallel tile sizes and capacities is included in Appendix E and the route is shown on the map included in Appendix D.
- Disconnect all private tile encountered and lateral tile from the main tile from the side the parallel tile is to be installed.
- Reconnect all private and lateral tile to the new main tile.
- The existing main tile and the 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 of Tile)

- 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 F.
- 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.

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 G.
- Typically, the open ditch would be in the same location as the existing main tile in order to locate and reconnect private tile. For reference, the route is shown on the map included in Appendix D.

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

- The parallel tile installation would require higher maintenance costs in the future as the majority of the existing main tile is over 100 years old and no repairs on the existing main tile is proposed in this report.
- For some pipe sizes required for the first two of the above options, the top of the pipe at the beginning of the main would either be at the existing ground surface or buried less than 2 feet from the existing ground surface. To protect the new main tile, farming operations should not be allowed over it at these locations. This could possibly be avoided if the route of the new main tile is shifted from that of either existing tile. However, this may create difficulties locating and reconnecting existing private tile. This is based on the assumption that the existing ground elevations shown in 1912 profile are still correct and in place.
- The proposed and existing, capacities shown in Appendices E, F, and G are based on the assumptions that the 1912 main tile is both installed per its respective design and that it is functioning at full capacity (i.e. are not collapsed, broken, etc).
- The tile replacement (upsizing) method would allow for lower maintenance costs in the future as the entire main tile is new.
- The open ditch installation method would involve the taking of right of way. However, some of this right of way is currently grassed waterway.
- The pipe sizes shown in Appendices E and F 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.

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

<b><u>METHOD</u></b>	<b><u>DRAINAGE COEFF.</u></b>	<b><u>TOTAL COST</u></b>	<b><u>ROAD CROSSING COST</u></b>
Parallel Tile Installation	½"	\$ 2,528,703	\$ 104,750
	1"	\$ 3,574,985	\$ 115,250
Tile Replacement - Upsizing	½"	\$ 2,893,782	\$ 108,250
	1"	\$ 4,097,272	\$ 129,750
Open Ditch	N/A	\$ 3,167,939	\$ 813,000

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 59 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.

- 7.0 **OWNERSHIP AND CLASSIFICATIONS** – Any and all information concerning ownership of lands and classifications of said lands within Drainage District No. 25 can be obtained from the Hardin County Auditor’s office.

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.

- 8.0 **RECOMMENDATIONS** – There is a definite need to perform one of the above mentioned improvements to increase the capacity to more closely meet the needs of current agricultural drainage. If any of the recommend improvements are selected, it would also be recommended to improve to the main tile of Drainage District No. 1-35 to insure continuity of capacity throughout the entire drainage system as Drainage District No. 1-35 it is downstream of Drainage District No. 25. 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 improvement.
- Adopt one of the recommendations of the Engineer’s Report.
- Direct Ryken Engineering to prepare plans and specifications for the proposed improvement.
- 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.

**MINUTES**  
**DD 25 PUBLIC HEARING ON**  
**ENGINEER'S REPORT ON REPAIR**  
**AND IMPROVEMENT TO LATERAL 3 TILE**  
**JUNE 17, 2015**  
**11:00 A.M.**

Hardin County Board of Supervisor Chairman, Lance Granzow, opened the meeting. Also present were Hardin County Supervisors, Ronn Rickels and Renee McClellan; Landowners, Ray Guard, David Fincham, Alvin Clark, Gary Thompson, Dennis Friest, Michael Terry Nessa, Matthew Schwartz, Dan Johnson, Lee and Karen Coburn, Kevin Nessa, K P Mort, John Everly, Adam Hill and Gerald Nelson; Lee Gallentine with Ryken Engineering; Hardin County Drainage Clerk, Tina Schlemme.

McClellan moved, Rickels seconded to approve the agenda as presented. All ayes. Motion carried.

Granzow opened the public hearing and publication was verified.

The hearing was turned over to Gallentine, who explained the project, as stated in the Engineer's Report dated April 21, 2015. The project began when a landowner called in a work order request for repair for water that was ponding on both sides of the railroad tracks in Section 27 of Concord Township. After being reviewed by Ryken Engineering, they found that the clay tile was on the verge of collapsing east of the railroad tracks and appeared to have collapsed under the tracks. They also found that west of the tracks had previously been repaired but had alignment issues. There was also two utility lines bored through the existing tile. Gallentine displayed televising photographs to show these conditions of the tile. He stated that they feel the tile is at or past the life expectancy. The cost of repair was large enough that a hearing and engineer's report was required. On January 7, 2014, The Trustees asked Ryken Engineering to create the engineer's report to repair the existing tile, as well as improvement options of replacing it with larger tile and/or moving lateral 3 from the east side of the tracks to the west side to avoid the railroad crossing.

The repair method is to replace approximately 1000' of lateral 3 tile from the east side of the railroad southeast to the northernmost limits of the 1974 tile relocation with 12" dual wall HDPE tile or concrete pipe, replace 100' of lateral 3 tile inside the railroad right of way with 12" dual wall HDPE tile or concrete pipe and to expose and televise lateral 3 tile west of the railroad to determine limits of questionable pipe and replace that pipe with 12" dual wall HDPE tile or concrete pipe. This repair method would have drainage capacity of 0.19" per acre per day at the railroad crossing, 0.27" at the connection point with the main tile and 0.11" on the existing main tile on the east side of the railroad right of way. This repair option would cost approximately \$195,750.00. A landowner asked if pipe bursting would be an option, but Gallentine explained that with the utility line in the tile, this would not be possible.

The improvement method is to replace 1000' of lateral 3 tile from the east side of the railroad southeast to the northernmost limits of the 1974 tile relocation with 10" dual wall HDPE tile or concrete pipe, sever the existing lateral 3 tile and plug the upstream end on the east end of the railroad as well as on the west side. This also includes abandoning the existing lateral 3 tile crossing under the railroad tracks and exposing and televising the existing lateral 3 tile west of the railroad to determine limits of questionable pipe and replace that pipe, estimated at 500', with 12" dual wall HDPE tile or concrete pipe. Approximately 2100' of new lateral 3 tile would be installed from west side of the railroad south along the west side of the railroad right of way to existing main tile just west of the railroad with 15" dual wall HDPE tile or concrete pipe. This would have drainage capacity of 0.56" per acre per day west of the railroad, 1.34" east of the railroad and 0.11" on the existing main tile on either side of the railroad. This improvement option would cost approximately \$228,825.00.

The original classification did not separate out the laterals, so the repair option would be paid by the entire district. If the improvement option is chosen, then Code of Iowa states that a reclassification would be required and just lateral 3 landowners would pay for the cost. Landowners were divided with what option they preferred. Some landowners would like to see the lateral tile on the west upsized for greater drainage capacity. If the lateral is upsized/improved, the main tile is still limited with its drainage capacity. Landowner, Leland Coburn, then submitted a formal request to have the main tile, all the way to the open ditch in DD H-S 35-1, investigated with an engineer's report for improvement to upsize that tile. Landowners agreed that the outcome of the report will help determine how they would like to proceed with this project, whether to repair or improve.

Schlemme gave the estimated cost per landowner based on the current classification and the engineer's cost estimates. Kevin Nissa presented a crop damage claim with exact cost to be determined at a later time.

Granzow closed the hearing.

McClellan moved, Rickels seconded to table any motion until the main tile is investigated and an engineer's report for improvement completed. All ayes. Motion carried.

Rickels moved, McClellan seconded to adjourn. All ayes. Motion carried.



# Drainage Work Order Request For Repair

## Hardin County

Date 6/17/2015 Project # 6501.3 Work Order # 90  
District # 25 Lateral Main Fund # 51048  
Township Concord Section \_\_\_\_\_ Twp \_\_\_\_\_ Rge \_\_\_\_\_ Qtr Sec \_\_\_\_\_

Repair Requested By Leland Coburn  
Address \_\_\_\_\_ Phone \_\_\_\_\_

Landowner \_\_\_\_\_  
Address \_\_\_\_\_ Phone \_\_\_\_\_

Request Taken By Tina Schlemme

Available for Repair Now?  Yes  No Date Available \_\_\_\_\_

Problem Description Investigate main tile for improvement within the entire district, all the way to the open ditch (including H-S 35-1).


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

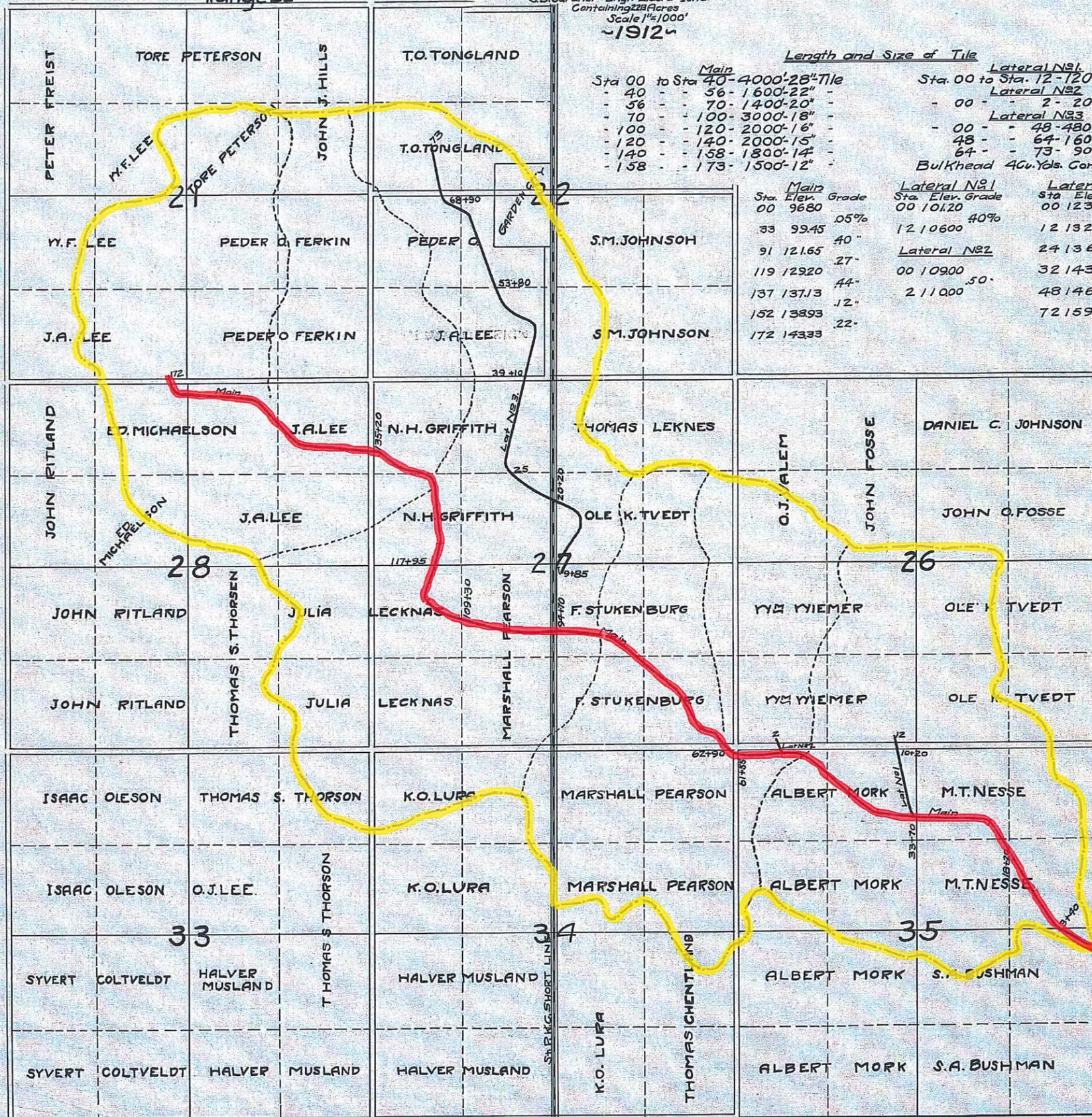
Hardin County Auditor's Office  
Attn: Tina Schlemme  
1215 Edgington Ave, Suite 1  
Eldora, IA 50627

For Office Use Only

Approved: \_\_\_\_\_ Date: \_\_\_\_\_

PLAT  
MORK  
DRAINAGE DISTRICT  
No 25  
HARDIN COUNTY  
IOWA  
S.B. Gardner Engr. Eldora Iowa.  
Containing 228 Acres  
Scale 1"=1000'  
1912

Range 22



Length and Size of Tile

Main		Lateral N#1	
Sta	to Sta	Sta	to Sta
40	40	00	12
56	56	2	200
70	70	48	4800
100	100	64	1600
120	120	64	1600
140	140	73	900
158	158		

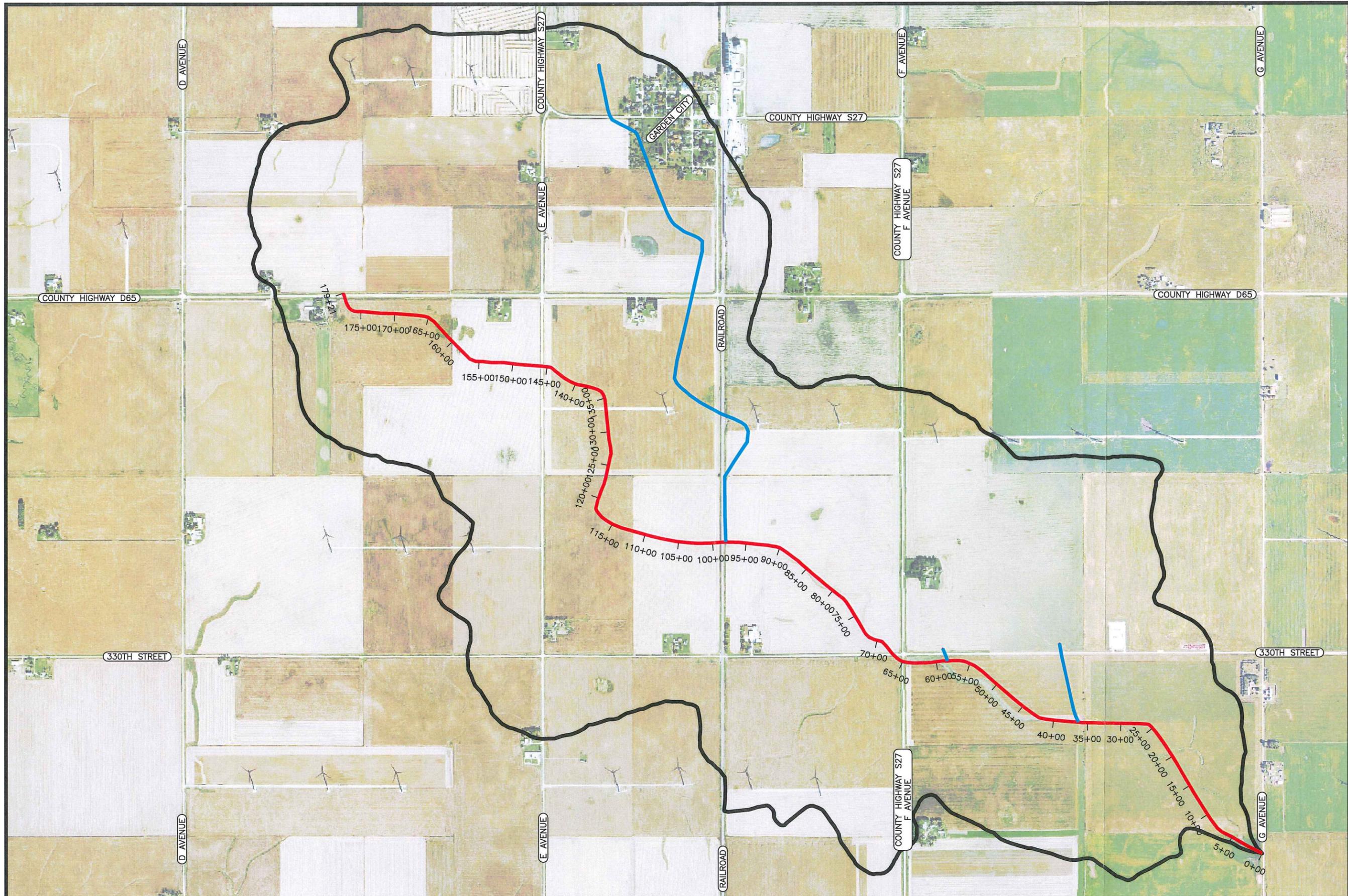
Tile sizes: 28", 22", 20", 18", 16", 15", 14", 12"

Main		Lateral N#1		Lateral N#3	
Sta	Elev.	Sta	Elev.	Sta	Elev.
00	9680	00	10120	00	12300
33	9945	12	10600	12	13200
91	12165			24	13600
119	12920	00	10900	32	14300
137	13713	2	11000	48	14620
152	13893			72	15920
172	14333				

Grades: .05%, .40%, .27%, .44%, .12%, .22%

— Drainage District Main  
— Drainage District Boundary

Twp 86.



— EXISTING LATERAL TILE  
— EXISTING MAIN TILE TO BE IMPROVED

DRAWN BY: Z.J.S. DATE: 02-25-2016 FIELD BK:	APPROVED BY: L.O.G. PROJ. NO.: 6501.3	REVISIONS:
P:\6501.3\CADD\CONCEPTS\6501.3 - LIDAR.DWG; 4/11/2016		

**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 #25  
 HARDIN COUNTY, IOWA  
 2016

SHEET NAME: LOCATION MAP OF IMPROVEMENTS



**Engineer's Opinion of Main Capacities**

Project: Main **Improvements** for D.D. #25

Location: Sections 21, 27, 28, 34, and 35, T86N, R22W, Hardin County, Iowa

By: Z.J.S.  
 Date: 2/25/2016  
 Checked By: L.O.G.  
 Date: 4/11/2016

STA	DESCRIPTION	INSTALLED		IMPROVEMENT (PARALLEL)		
		INSTALLED TILE SIZE (in)	INSTALLED TILE CAPACITY (in*acres/day)	1/2" DRAINAGE COEF.		COMBINED TILE CAPACITY (in*acres/day)
				PARALLEL TILE SIZE (in)	COMBINED TILE CAPACITY (in*acres/day)	
	<b>Main (1912 unless highlighted)</b>					
0+00	Main Tile Outlet into D.D. S.H. #1-35	28	0.08			
33+00	Grade Change 0.05% - 0.40%	28	0.25	48	0.49	0.95
33+70	Connection with Lateral 1	28	0.25	42	0.56	0.96
33+71	Upstream of Connection with Lateral 1	28	0.27	42	0.56	0.96
35+54	Grade Change 0.075% - 0.40% (1/2" Coef.)	28	0.27	36	0.50	1.06
38+50	Grade Change 0.10% - 0.40% (1" Coef.)	28	0.27	30	0.60	
40+00	Pipe size change 28" - 22"	22	0.15			42
54+50	Connection with Lateral 2	22	0.16	30	0.48	0.97
54+51	Upstream of Connection with Lateral 2	22	0.17	30	0.51	1.03
56+00	Pipe size change 22" - 20"	20	0.13	30	0.56	1.12
70+00	Pipe size change 20" - 18"	18	0.11	30	0.52	1.09
91+00	Grade Change 0.40% - 0.27%	18	0.10	30	0.52	1.13
94+75	Connection with Lateral 2	18	0.10	30	0.48	1.04
94+76	Upstream Connection with Lateral 2	18	0.13	30	0.50	1.07
100+00	Pipe size change 18" - 16"	16	0.10	30	0.65	0.97
119+00	Grade Change 0.27% - 0.44%	16	0.19	30	0.66	1.01
120+00	Pipe size change 16" - 15"	15	0.16	24	0.63	1.00
137+00	Grade Change 0.44% - 0.12%	15	0.10	24	0.61	0.97
140+00	Pipe size change 15" - 14"	14	0.11	24	0.65	1.09
152+00	Grade Change 0.12% - 0.22%	14	0.21	24	0.85	1.46
158+00	Pipe size change 14" - 12"	12	0.16	18	0.61	1.07
172+00	End Tile	12	0.16	18	0.62	1.16

PARALLEL TILE INSTALLATION



**Engineer's Opinion of Main Capacities**

Project: Main **Improvements** for D.D. #25

Location: Sections 21, 27, 28, 34, and 35, T86N, R22W, Hardin County, Iowa

By: Z.J.S.  
 Date: 2/25/2016  
 Checked By: L.O.G.  
 Date: 4/11/2016

STA	DESCRIPTION	INSTALLED		IMPROVEMENT (UPSIZING)					
		INSTALLED TILE SIZE (in)	INSTALLED TILE CAPACITY (in*acres/day)	1/2" DRAINAGE COEF.		1" DRAINAGE COEF.			
				UPSIZING TILE SIZE (in)	IMPROVED TILE CAPACITY (in*acres/day)		UPSIZING TILE SIZE (in)	IMPROVED TILE CAPACITY (in*acres/day)	
	<b>Main (1912 unless highlighted)</b>								
0+00	Main Tile Outlet into D.D. S.H. #1-35	28	0.08	48	0.48	66	1.12		
33+00	Grade Change 0.05% - 0.40%	28	0.25	48	0.52	60	0.94		
33+70	Connection with Lateral 1	28	0.25	48	0.52	60	0.95		
33+71	Upstream of Connection with Lateral 1	28	0.27	48	0.57	60	1.04		
38+50	Grade Change 0.10% - 0.40% (for improvements)	28	0.28	36	0.54	48	1.14		
40+00	Pipe size change 28" - 22"	22	0.15	36	0.55	48	1.17		
54+50	Connection with Lateral 2	22	0.16	36	0.58	48	1.25		
54+51	Upstream of Connection with Lateral 2	22	0.17	36	0.63	48	1.36		
56+00	Pipe size change 22" - 20"	20	0.13	36	0.63	48	1.36		
70+00	Pipe size change 20" - 18"	18	0.11	36	0.68	42	1.02		
91+00	Grade Change 0.40% - 0.27%	18	0.10	36	0.62	42	0.94		
94+75	Connection with Lateral 2	18	0.10	36	0.64	42	0.97		
94+76	Upstream Connection with Lateral 2	18	0.13	30	0.52	42	1.27		
100+00	Pipe size change 18" - 16"	16	0.10	30	0.55	42	1.36		
119+00	Grade Change 0.27% - 0.44%	16	0.19	30	0.81	36	1.32		
120+00	Pipe size change 16" - 15"	15	0.16	30	0.82	36	1.33		
137+00	Grade Change 0.44% - 0.12%	15	0.10	24	0.55	30	0.99		
140+00	Pipe size change 15" - 14"	14	0.11	24	0.74	30	1.34		
152+00	Grade Change 0.12% - 0.22%	14	0.21	24	0.87	30	1.57		
158+00	Pipe size change 14" - 12"	12	0.16	24	1.00	24	1.00		
172+00	End Tile	12							

TILE REPLACEMENT - UPSIZING



**Engineer's Opinion of Main Capacities**

Project: Main Improvements for D.D. #25

Location: Sections 21, 27, 28, 34, and 35, T86N, R22W, Hardin County, Iowa

By: Z.J.S.

Date: 2/25/2016

Checked By: L.O.G.

Date: 4/11/2016

STA	DESCRIPTION	INSTALLED		IMPROVEMENT (OPEN DITCH)	
		INSTALLED TILE SIZE (in)	INSTALLED TILE CAPACITY (in*acres/day)	MAIN	IMPROVED DITCH CAPACITY (in*acres/day)
	<b>Main</b>				
0+00	Main Tile Outlet into D.D. S.H. #1-35	28	0.08	Open	2.39
33+00	Grade Change 0.05% - 0.40%	28	0.25	Open	7.34
33+70	Connection with Lateral 1	28	0.25	Open	7.39
33+71	Upstream of Connection with Lateral 1	28	0.27	Open	8.10
40+00	Pipe size change 28" - 22"	22	0.15	Open	8.31
54+50	Connection with Lateral 2	22	0.16	Open	8.83
54+51	Upstream of Connection with Lateral 2	22	0.17	Open	9.64
56+00	Pipe size change 22" - 20"	20	0.13	Open	9.64
70+00	Pipe size change 20" - 18"	18	0.11	Open	10.33
91+00	Grade Change 0.40% - 0.27%	18	0.10	Open	9.52
94+75	Connection with Lateral 2	18	0.10	Open	9.72
94+76	Upstream Connection with Lateral 2	18	0.13	Open	12.80
100+00	Pipe size change 18" - 16"	16	0.10	Open	13.74
119+00	Grade Change 0.27% - 0.44%	16	0.19	Open	24.63
120+00	Pipe size change 16" - 15"	15	0.16	Open	24.75
137+00	Grade Change 0.44% - 0.12%	15	0.10	Open	15.65
140+00	Pipe size change 15" - 14"	14	0.11	Open	21.27
152+00	Grade Change 0.12% - 0.22%	14	0.21	Open	39.04
158+00	Pipe size change 14" - 12"	12	0.16	Open	44.87
172+00	End Tile	12			

OPEN DITCH

**Engineer's Opinion of Probable Construction Cost**  
**Project: Main Improvements for D.D. #25**  
 Location: Sections 21, 27, 28, 34, and 35, T86N, R22W, Hardin County, Iowa

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost
<b>CONSTRUCTION COSTS</b>						
101	48" REINFORCED CONCRETE TILE	\$ 200.00	LF	3300	LF	\$ 660,000.00
102	42" DUAL WALL POLYPROPYLENE TILE	\$ 100.00	LF	70	LF	\$ 7,000.00
103	36" DUAL WALL POLYPROPYLENE TILE	\$ 85.00	LF	183	LF	\$ 15,555.00
104	30" DUAL WALL POLYPROPYLENE TILE	\$ 70.00	LF	8146	LF	\$ 570,220.00
105	30" DUAL WALL POLYPROPYLENE TILE (JACK AND BORE) (ROAD CROSSING)	\$ 750.00	LF	50	LF	\$ 37,500.00
106	30" DUAL WALL POLYPROPYLENE TILE (ROAD CROSSING)	\$ 95.00	LF	50	LF	\$ 4,750.00
107	24" DUAL WALL POLYPROPYLENE TILE	\$ 65.00	LF	3250	LF	\$ 211,250.00
108	24" DUAL WALL POLYPROPYLENE TILE(ROAD CROSSING)	\$ 90.00	LF	50	LF	\$ 4,500.00
109	18" DUAL WALL POLYPROPYLENE TILE	\$ 50.00	LF	1950	LF	\$ 97,500.00
110	18" DUAL WALL POLYPROPYLENE TILE (JACK AND BORE) (ROAD CROSSING)	\$ 600.00	LF	50	LF	\$ 30,000.00
111	48" X 42" POLYPROPYLENE REDUCER	\$ 1,500.00	EA	1	EA	\$ 1,500.00
112	42" X 36" POLYPROPYLENE REDUCER	\$ 1,500.00	EA	1	EA	\$ 1,500.00
113	36" X 30" POLYPROPYLENE REDUCER	\$ 1,250.00	EA	1	EA	\$ 1,250.00
114	30" X 24" POLYPROPYLENE REDUCER	\$ 1,250.00	EA	1	EA	\$ 1,250.00
115	24" X 18" POLYPROPYLENE REDUCER	\$ 1,000.00	EA	1	EA	\$ 1,000.00
116	INTERCONNECTIONS	\$ 5,000.00	EA	13	EA	\$ 65,000.00
117	TOP COVER OVER CONCRETE PIPE (FOR PIPE PROTECTION)	\$ 50.00	LF	2900	LF	\$ 145,000.00
118	HICKENBOTTOM INTAKE	\$ 1,500.00	EA	10	EA	\$ 15,000.00
119	JACK AND BORE (RAILROAD CROSSING)	\$ 750.00	LF	100	LF	\$ 75,000.00
120	RAILROAD CROSSING PERMITTING, FLAGGING AND COORDINATION	\$ 20,000.00	LS	1	LS	\$ 20,000.00
121	CONCRETE COLLAR	\$ 400.00	EA	3	EA	\$ 1,200.00
122	SEEDING (RIGHT OF WAY)	\$ 5,000.00	LS	1	LS	\$ 5,000.00
123	TRAFFIC CONTROL	\$ 8,000.00	LS	1	LS	\$ 8,000.00
124	PRIVATE TILE CONNECTIONS	\$ 1,000.00	EA	20	EA	\$ 20,000.00
<b>CONSTRUCTION SUBTOTAL</b>						\$ 1,998,975.00
Contingency (10%)						\$ 199,897.50
<b>CONSTRUCTION TOTAL</b>						\$ 2,198,872.50
Engr. & Const. Observation (15%)						\$ 329,830.88
<b>TOTAL COST</b>						\$ 2,528,703.38
<b>CONSTRUCTION COSTS</b>						
201	60" REINFORCED CONCRETE TILE	\$ 325.00	LF	3300	LF	\$ 1,072,500.00
202	54" REINFORCED CONCRETE TILE	\$ 275.00	LF	550	LF	\$ 151,250.00
203	42" DUAL WALL POLYPROPYLENE TILE	\$ 100.00	LF	5525	LF	\$ 552,500.00
204	42" DUAL WALL POLYPROPYLENE TILE (JACK AND BORE) (ROAD CROSSING)	\$ 850.00	LF	50	LF	\$ 42,500.00
205	42" DUAL WALL POLYPROPYLENE TILE (ROAD CROSSING)	\$ 125.00	LF	50	LF	\$ 6,250.00
206	36" DUAL WALL POLYPROPYLENE TILE	\$ 85.00	LF	2325	LF	\$ 197,625.00
207	30" DUAL WALL POLYPROPYLENE TILE	\$ 70.00	LF	3250	LF	\$ 227,500.00
208	30" DUAL WALL POLYPROPYLENE TILE (ROAD CROSSING)	\$ 95.00	LF	50	LF	\$ 4,750.00
209	24" DUAL WALL POLYPROPYLENE TILE	\$ 65.00	LF	1950	LF	\$ 126,750.00
210	24" DUAL WALL POLYPROPYLENE TILE (JACK AND BORE) (ROAD CROSSING)	\$ 675.00	LF	50	LF	\$ 33,750.00
211	60" X 54" CONCRETE REDUCER	\$ 3,500.00	EA	1	EA	\$ 3,500.00
212	54" X 42" POLYPROPYLENE REDUCER	\$ 1,500.00	EA	1	EA	\$ 1,500.00
213	42" X 36" POLYPROPYLENE REDUCER	\$ 1,500.00	EA	1	EA	\$ 1,500.00
214	36" X 30" POLYPROPYLENE REDUCER	\$ 1,250.00	EA	1	EA	\$ 1,250.00
215	30" X 24" POLYPROPYLENE REDUCER	\$ 1,250.00	EA	1	EA	\$ 1,250.00
216	INTERCONNECTIONS	\$ 5,000.00	EA	13	EA	\$ 65,000.00
217	TOP COVER OVER CONCRETE PIPE (FOR PIPE PROTECTION)	\$ 50.00	LF	3850	LF	\$ 192,500.00
218	HICKENBOTTOM INTAKE	\$ 1,500.00	EA	10	EA	\$ 15,000.00
219	JACK AND BORE (RAILROAD CROSSING)	\$ 750.00	LF	100	LF	\$ 75,000.00
220	RAILROAD CROSSING PERMITTING, FLAGGING AND COORDINATION	\$ 20,000.00	LS	1	LS	\$ 20,000.00
221	CONCRETE COLLAR	\$ 400.00	EA	3	EA	\$ 1,200.00
222	SEEDING (RIGHT OF WAY)	\$ 5,000.00	LS	1	LS	\$ 5,000.00
223	TRAFFIC CONTROL	\$ 8,000.00	LS	1	LS	\$ 8,000.00
224	PRIVATE TILE CONNECTIONS	\$ 1,000.00	EA	20	EA	\$ 20,000.00
<b>CONSTRUCTION SUBTOTAL</b>						\$ 2,826,075.00
Contingency (10%)						\$ 282,607.50
<b>CONSTRUCTION TOTAL</b>						\$ 3,108,682.50
Engr. & Const. Observation (15%)						\$ 466,302.38
<b>TOTAL COST</b>						\$ 3,574,984.88

PARALLEL TILE INSTALLATION ( 1/2" COEFFICIENT)

PARALLEL TILE INSTALLATION ( 1" COEFFICIENT)

Note: Per Iowa Code, road crossings (highlighted orange) are not typically district expense

**Engineer's Opinion of Probable Construction Cost**  
**Project: Main Improvements for D.D. #25**  
 Location: Sections 21, 27, 28, 34, and 35, T86N, R22W, Hardin County, Iowa

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost
<b>CONSTRUCTION COSTS</b>						
301	48" REINFORCED CONCRETE TILE	\$ 200.00	LF	3850	LF	\$ 770,000.00
302	36" DUAL WALL POLYPROPYLENE TILE	\$ 85.00	LF	5525	LF	\$ 469,625.00
303	36" DUAL WALL POLYPROPYLENE TILE (JACK AND BORE) (ROAD CROSSING)	\$ 800.00	LF	50	LF	\$ 40,000.00
304	36" DUAL WALL POLYPROPYLENE TILE (ROAD CROSSING)	\$ 110.00	LF	50	LF	\$ 5,500.00
305	30" DUAL WALL POLYPROPYLENE TILE	\$ 70.00	LF	4075	LF	\$ 285,250.00
306	30" DUAL WALL POLYPROPYLENE TILE (ROAD CROSSING)	\$ 95.00	LF	50	LF	\$ 4,750.00
307	24" DUAL WALL POLYPROPYLENE TILE	\$ 65.00	LF	3450	LF	\$ 224,250.00
308	24" DUAL WALL POLYPROPYLENE TILE (JACK AND BORE) (ROAD CROSSING)	\$ 600.00	LF	50	LF	\$ 30,000.00
309	48" X 42" POLYPROPYLENE REDUCER	\$ 1,500.00	EA	1	EA	\$ 1,500.00
310	42" X 36" POLYPROPYLENE REDUCER	\$ 1,500.00	EA	1	EA	\$ 1,500.00
311	36" X 30" POLYPROPYLENE REDUCER	\$ 1,250.00	EA	1	EA	\$ 1,250.00
312	30" X 24" POLYPROPYLENE REDUCER	\$ 1,250.00	EA	1	EA	\$ 1,250.00
313	REMOVE EXISTING TILE	\$ 5.00	LF	17200	LF	\$ 86,000.00
314	ABONDON EXISTING RAILROAD CROSSING	\$ 5,000.00	EA	1	EA	\$ 5,000.00
315	TOP COVER OVER CONCRETE PIPE (FOR PIPE PROTECTION)	\$ 50.00	LF	3850	LF	\$ 192,500.00
316	HICKENBOTTOM INTAKE	\$ 1,500.00	EA	10	EA	\$ 15,000.00
317	JACK AND BORE (RAILROAD CROSSING)	\$ 1,000.00	LF	100	LF	\$ 100,000.00
318	RAILROAD CROSSING PERMITTING, FLAGGING AND COORDINATION	\$ 20,000.00	LS	1	LS	\$ 20,000.00
319	CONCRETE COLLAR	\$ 400.00	EA	3	EA	\$ 1,200.00
320	SEEDING (RIGHT OF WAY)	\$ 5,000.00	LS	1	LS	\$ 5,000.00
321	TRAFFIC CONTROL	\$ 8,000.00	LS	1	LS	\$ 8,000.00
322	PRIVATE TILE CONNECTIONS	\$ 1,000.00	EA	20	EA	\$ 20,000.00
<b>CONSTRUCTION SUBTOTAL</b>						\$ 2,287,575.00
Contingency (10%)						\$ 228,757.50
<b>CONSTRUCTION TOTAL</b>						\$ 2,516,332.50
Engr. & Const. Observation (15%)						\$ 377,449.88
<b>TOTAL COST</b>						\$ 2,893,782.38
<b>CONSTRUCTION COSTS</b>						
401	66" REINFORCED CONCRETE TILE	\$ 275.00	LF	3300	LF	\$ 907,500.00
402	60" REINFORCED CONCRETE TILE	\$ 250.00	LF	550	LF	\$ 137,500.00
403	48" REINFORCED CONCRETE TILE	\$ 200.00	LF	3050	LF	\$ 610,000.00
404	48" DUAL WALL POLYPROPYLENE TILE (JACK AND BORE) (ROAD CROSSING)	\$ 1,000.00	LF	50	LF	\$ 50,000.00
405	48" REINFORCED CONCRETE TILE (ROAD CROSSING)	\$ 250.00	LF	50	LF	\$ 12,500.00
406	42" REINFORCED CONCRETE TILE	\$ 175.00	LF	1000	LF	\$ 175,000.00
407	42" DUAL WALL POLYPROPYLENE TILE	\$ 125.00	LF	3800	LF	\$ 475,000.00
408	36" DUAL WALL POLYPROPYLENE TILE	\$ 85.00	LF	1750	LF	\$ 148,750.00
409	36" DUAL WALL POLYPROPYLENE TILE (ROAD CROSSING)	\$ 110.00	LF	50	LF	\$ 5,500.00
410	30" DUAL WALL POLYPROPYLENE TILE	\$ 70.00	LF	2100	LF	\$ 147,000.00
411	24" DUAL WALL POLYPROPYLENE TILE	\$ 65.00	LF	1350	LF	\$ 87,750.00
412	24" DUAL WALL POLYPROPYLENE TILE (JACK AND BORE) (ROAD CROSSING)	\$ 675.00	LF	50	LF	\$ 33,750.00
413	66" X 60" CONCRETE REDUCER	\$ 3,500.00	EA	1	EA	\$ 3,500.00
414	60" X 48" CONCRETE REDUCER	\$ 3,500.00	EA	1	EA	\$ 3,500.00
415	42" X 36" POLYPROPYLENE REDUCER	\$ 1,500.00	EA	1	EA	\$ 1,500.00
416	36" X 30" POLYPROPYLENE REDUCER	\$ 1,250.00	EA	1	EA	\$ 1,250.00
417	30" X 24" POLYPROPYLENE REDUCER	\$ 1,250.00	EA	1	EA	\$ 1,250.00
418	REMOVE EXISTING TILE	\$ 5.00	LF	17200	LF	\$ 86,000.00
419	ABONDON EXISTING RAILROAD CROSSING	\$ 5,000.00	LS	1	LS	\$ 5,000.00
420	TOP COVER OVER CONCRETE PIPE (FOR PIPE PROTECTION)	\$ 50.00	LF	3850	LF	\$ 192,500.00
421	HICKENBOTTOM INTAKE	\$ 1,500.00	EA	10	EA	\$ 15,000.00
422	JACK AND BORE (RAILROAD CROSSING)	\$ 850.00	LF	100	LF	\$ 85,000.00
423	RAILROAD CROSSING PERMITTING, FLAGGING AND COORDINATION	\$ 20,000.00	LS	1	LS	\$ 20,000.00
424	CONCRETE COLLAR	\$ 400.00	EA	3	EA	\$ 1,200.00
425	SEEDING (RIGHT OF WAY)	\$ 5,000.00	LS	1	LS	\$ 5,000.00
426	TRAFFIC CONTROL	\$ 8,000.00	LS	1	LS	\$ 8,000.00
427	PRIVATE TILE CONNECTIONS	\$ 1,000.00	EA	20	EA	\$ 20,000.00
<b>CONSTRUCTION SUBTOTAL</b>						\$ 3,238,950.00
Contingency (10%)						\$ 323,895.00
<b>CONSTRUCTION TOTAL</b>						\$ 3,562,845.00
Engr. & Const. Observation (15%)						\$ 534,426.75
<b>TOTAL COST</b>						\$ 4,097,271.75

Note: Per Iowa Code, road crossings (highlighted orange) are not typically district expense



ENGINEERING & LAND SURVEYING, INC.

By: Z.J.S.

Date: 11/18/2015

Checked By: L.O.G.

Date: 4/11/2016

**Engineer's Opinion of Probable Construction Cost**

Project: Main Improvements for D.D. #25

Location: Sections 21, 27, 28, 34, and 35, T86N, R22W, Hardin County, Iowa

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity		Total Cost
				Units		
<b>CONSTRUCTION COSTS</b>						
501	OPEN DITCH CONSTRUCTION	\$ 2,500.00	STA	172	STA	\$ 430,000.00
502	CMP OUTLET (LATERAL 1)	\$ 55.00	LF	20	LF	\$ 1,100.00
503	CMP OUTLET (LATERAL 2)	\$ 55.00	LF	20	LF	\$ 1,100.00
504	CMP OUTLET (LATERAL 3)	\$ 55.00	LF	20	LF	\$ 1,100.00
505	HEADWALL	\$ 10,000.00	EA	3	EA	\$ 30,000.00
506	RIP-RAP	\$ 40.00	TN	120	TN	\$ 4,800.00
507	CONCRETE COLLAR	\$ 400.00	EA	3	EA	\$ 1,200.00
508	RCP CULVERT (F AVE)	\$ 200,000.00	LS	1	LS	\$ 200,000.00
509	RCP CULVERT (330TH ST)	\$ 200,000.00	LS	1	LS	\$ 200,000.00
510	RCP CULVERT (E AVE)	\$ 200,000.00	LS	1	LS	\$ 200,000.00
511	RCP CULVERT (COUNTY HIGHWAY D65)	\$ 200,000.00	LS	1	LS	\$ 200,000.00
512	RCP CULVERT (WIND TOWER DRIVEWAY)	\$ 50,000.00	LS	1	LS	\$ 50,000.00
513	SURFACE DRAINS	\$ 2,000.00	EA	26	EA	\$ 52,000.00
514	PRIVATE TILE OUTLETS	\$ 2,000.00	EA	20	EA	\$ 40,000.00
515	SEEDING (OPEN DITCH)	\$ 500.00	STA	172	STA	\$ 86,000.00
516	SEEDING (RIGHT OF WAY)	\$ 5,000.00	LS	1	LS	\$ 5,000.00
517	TRAFFIC CONTROL	\$ 8,000.00	LS	1	LS	\$ 8,000.00
518	RCP CULVERT (RAILROAD)	\$ 200,000.00	LS	1	LS	\$ 200,000.00
519	REMOVE EXISTING TILE	\$ 5.00	LF	17200	LF	\$ 86,000.00
520	RIGHT OF WAY	\$ 12,000.00	AC	59	AC	\$ 708,000.00
<b>CONSTRUCTION SUBTOTAL</b>						\$ 2,504,300.00
Contingency (10%)						\$ 250,430.00
<b>CONSTRUCTION TOTAL</b>						\$ 2,754,730.00
Engr. & Const. Observation (15%)						\$ 413,209.50
<b>TOTAL COST</b>						\$ 3,167,939.50

OPEN DITCH

Note: Per Iowa Code, road crossings (highlighted orange) are not typically district expense