



**Story
County**
IOWA - 1853



HARDIN COUNTY, IOWA

2016



**ENGINEER'S REPORT ON
IMPROVEMENTS TO
MAIN TILE OF
DRAINAGE DISTRICT
NO. 1-35
STORY AND HARDIN
COUNTIES**



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, P.E. *Apr 11/2016*
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

RYKEN

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Engineer's Report on Improvements to Main Tile of Drainage District No. 1-35, Story and Hardin Counties, Iowa

Table of Contents	Pg. 1
Report	
Introduction	Pg. 2
District History	Pgs. 3-5
Investigation	Pg. 6
Discussion and Conclusions	Pg. 6
Improvement Methods	Pgs. 6-7
Opinion of Probable Construction Costs	Pg. 8
Ownership and Classifications	Pg. 8
Recommendations	Pg. 9
Appendices	
Work Order Request #90	App. A
1912 Drainage District No. 1-35 Map	App. B
Location Map of Improvements	App. C
Main Capacities Chart - Parallel Tile Installation	App. D
Main Capacities Chart - Tile Replacement Upsizing	App. E
Main Capacities Chart - Open Ditch	App. F
Opinion of Probable Construction Cost - Parallel Tile Installation	App. G
Opinion of Probable Construction Cost - Tile Replacement Upsizing	App. H
Opinion of Probable Construction Cost - Open Ditch	App. I

Engineer's Report on Improvements to Main Tile of Drainage District No. 1-35, Story and Hardin Counties, Iowa

1.0 INTRODUCTION

- **SCOPE OF WORK** – The Story and Hardin County Boards of Supervisors, acting as District Trustees, requested Ryken Engineering to investigate and report concerning improvements to the main tile of Drainage District No. 1-35. This report will summarize the history of improvements and repairs, 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 the main tile capacity of Drainage District No. 25 and the main tile capacity of this Drainage District No. 1-35, which is downstream of Drainage District No. 25. As a result, the District Trustees requested Ryken Engineering to move ahead with an investigation and report concerning improvement to said main tile per Work Order Request #90 (copy included in Appendix A).

- **LOCATION** – The area of investigation included the entire main tile, which is located in Section 36, Township 86 North, Range 22 West, Hardin County, Iowa; Section 1, Township 85 North, Range 22 West, Story County, Iowa; and Section 6, Township 85 North, Range 21 West, Story County, Iowa. Specifically, the downstream limit was the main tile outlet on the east side of Section 6, T85N, R21W (west side of 630th Street in Story County) at approximately ½ mile South of 100th Street (Story County). The main tile then goes west across said Section 6 and crosses 620th Street (Story County) at approximately ¾ mile south of 100th Street (Story County). It then continues northwest across Section 1, T85N, R22W and crosses the Story-Hardin county line at 100th Street (Story County) (also known as 340th Street in Hardin County) at approximately ¾ mile west of 620th Street (Story County). It then continues northwest across Section 36, T86N, R22W and crosses G Avenue at approximately ¾ mile north of 340th Street (Hardin County). The main continues into Section 35, T86N, R22W with the upstream limit of investigation being on the west side of 340th Street (Hardin County) where it provides the outlet for the main tile of Drainage District No. 25 outlet. For reference, a copy of the 1912 Drainage District No. 1-35 map, showing said limits and the district boundary is included in Appendix B.

2.0 **DISTRICT HISTORY** – The following is a summary of the pertinent history of the main tile of Drainage District No. 1-35 as obtained from the Hardin County Auditor’s drainage minutes and records and those of Ryken Engineering and Land Surveying.

- 1912, Jun. 12 Petition and Bond for establishment of Drainage District Story-Hardin No. 1-35 was filed. Said petition indicated that a main drain, sub-mains, and laterals should be installed. Specifically, it indicated that the main should start on the east side of Section 6, T85N, R21W, Story County; run west into Section 1, T85N, R22W, Story County; run northwest across said Section 1 into Section 36, T86N, R22W, Hardin County; and run west across said Section 36 into Section 35, T86N, R22W, Hardin County where it would continue northwest and terminate at the boundary of Drainage District No. 25, Hardin County.

- 1912, Jul. 6 Engineer's Report by S.B. Gardner was filed. It called for a 2,500 feet of main open ditch, 10,500 feet of main tile (36 inch diameter to 28 inch diameter), 8,200 feet of Lateral 1 tile (16 inch diameter to 8 inch diameter), 5,000 feet of Lateral 2 tile (12 inch diameter to 5 inch diameter), and 1,600 feet of Lateral 3 tile (8 inch diameter to 7 inch). The estimated total cost of construction was \$27,306.00

- 1912 Publication of Notice for Drainage District establishment.

- 1912, Sept. 2 Petition for a reduction be made in the main tile size from 28 inch to 26 inch.

- 1912, Sept. 4 Request for improvement to have the engineer investigate the grade of the 32 inch tile within the W½ and SE¼ SW¼ of Section 36, T86N, R22W.

- 1912, Sept. Notice to Contractors for construction of Drainage District Story-Hardin No. 1-35 facilities with a bid date of Sept. 20, 1912.

- 1912, Sept. 20 Tile Contract with Marshalltown Sewer Pipe and Tile Company of Marshalltown for \$1,029.00 for supplying tile was entered.

- 1912, Sept. 20 Tile Contract with Lehigh Sewer Pipe and Tile Company of Fort Dodge for \$8,820.00 for supplying tile was entered.

- 1912, Sept. 20 2 Tile Contract with The Plymouth Clay Products Co. of Fort Dodge, one for \$3,780.00 and another for \$1,145.00 for supplying tile was entered.

- 1912, Sept. 20 Tile Contract with The North Iowa Brick and Tile Company of Mason City for \$268.00 for supplying tile was entered.

- 1912, Sept. 20 Construction Contract with Gade Excavating Company for \$11,500.00 construction of drainage district facilities was entered.

- 1913, Jun. 2 Appointment of Commission to inspect and classify lands in Drainage District Story-Hardin No. 1-35.

- 1913, Nov. 24 Notice of Assessment for Benefits for Drainage District Story-Hardin No. 1-35.

- 1917, Feb. 7 John M. Wells was appointed by the Board as Engineer to examine and file his report in regards to the advisability and necessity of cleaning out, repairing or closing the open ditch outlet and extending same of Drainage District Story-Hardin No. 1-35.

- 1917, Dec. 28 Engineer's Report was filed in the County Auditor's Office by John M. Wells. It stated "...the open ditch has become partly filled, obstructing the outlet to the 36 inch tile...." and "I recommend that this open ditch portion be cleaned out and re-dug..."
- 1951, Dec. 26 Petition and Bond for establishment of Drainage District was filed. Said petition indicated that the main be an open waterway. Specifically, it indicated that the main should start on the E½ SE¼ Section 26, T86N, R22W run easterly across the SW¼ Section 25, T86N, R22W; thence southerly across the NW¼ Section 36, T86N, R22W and terminating in the SW¼ Section 36, T86N, R22W at the main drain of Drainage District Story-Hardin No. 1-35.
- 1952, Jan. 21 Engineer's Report was filed by F.J. Reigles. It reviewed the area of interest in the 1951 petition and recommended that an open waterway and 2 laterals be constructed. The estimated total cost of construction was \$8,917.78
- 1952, Mar. 5 Publication of Notice of plans for an open ditch within Drainage District Story-Hardin No. 1-35.
- 1952, Mar. 28 District Trustee's review of Engineer's Report dated. They stated "...that although the work of F.J. Reigles is approved and such report should be accepted, the same should not be adopted but should be placed on file for future reference and for the improvement of such district if and when such improvement should be effected"
- 1955, May 6 Bill for repairs to tile located in SW¼ Section 36, T86N, R22W, Hardin County.
- 1961, Oct. 13 Bill for repairs to tile located in SW¼ Section 36, T86N, R22W, Hardin County.
- 1963, Apr. 16 Bill for repairs to tile located in Section 36, T86N, R22W, Hardin County.
- 1966, Jun. 29 Bill for repairs to tile located in Section 36, T86N, R22W, Hardin County.
- 1969, Nov. 28 Bill for repairs to tile located in SW¼ Section 36, T86N, R22W, Hardin County.
- 1972, Jun. 6 Bill for repairs to tile located in Section 36, T86N, R22W, Hardin County.
- 1975, May 15 Bill for repairs to tile located in Section 36, T86N, R22W, Hardin County.
- 1975, Oct. 31 Bill for repairs to tile located in Section 36, T86N, R22W, Hardin County.
- 1975, Nov. 4 Bill for repairs to tile located in Section 36, T86N, R22W, Hardin County.
- 1976, Aug. 11 Bill for repairs to clean out trees located in Section 36, T86N, R22W, Hardin County.

1977, Oct. 19 Bill for repairs to tile located in Section 36, T86N, R22W, Hardin County.

1978, May 3 Bill for repairs to tile located in Section 36, T86N, R22W, Hardin County.

1982, Oct. 25 Bill for repairs to tile located in Section 36, T86N, R22W, Hardin County.

1984, Oct. 29 Approval of repair of broken tile located in Section 36, T86N, R22W, Hardin County.

1984, Nov. 8 Bill for repairs to tile located in SW $\frac{1}{4}$ Section 36, T86N, R22W, Hardin County.

1984, Nov. 13 Approval of repair of tile blowout located in SE $\frac{1}{4}$ Section 35, T86N, R22W, Hardin County.

1986, Nov. 5 Approval of repair of broken tile located in Section 36, T86N, R22W, Hardin County.

1987, Apr. 22 Bill for repairs to tile located in Section 36, T86N, R22W, Hardin County.

1988, Apr. 20 Approval of repair of tile blowout located in Section 35, T86N, R22W, Hardin County.

1991, Jul. 10 Approval of repair of broken tile located in Section 36, T86N, R22W, Hardin County.

1993, Nov. 3 Approval of repair of 2 broken tiles located in SW $\frac{1}{4}$ Section 36, T86N, R22W, Hardin County.

1994, Sept. 28 Approval of repair of broken tile located in Section 36, T86N, R22W, Hardin County.

1994, Oct. 6 Bill for repairs to tile located in SW $\frac{1}{4}$ Section 36, T86N, R22W, Hardin County.

1996, Oct. 9 Approval of repair of tile located in Section 36, T86N, R22W, Hardin County.

1998, Sept. 9 Approval of repair of tile located in Section 36, T86N, R22W, Hardin County.

3.0 **INVESTIGATION** – Review of district history shows that landowners on the main tile have requested 25 repairs of broken tile, blowouts and other repairs over the last 61 years. The majority of these repairs were located within the SW $\frac{1}{4}$ Section 36. For the purposes of this report, all investigations were limited to office and records research only. Therefore, a review of the original 1912 Engineer's Report and resulting profile was done and no additional field investigation was performed. Based on said documents, the current district main consists of the original 1912 tile and laterals 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 0.11 to 0.18 inches per acre per day.

4.0 **DISCUSSION AND CONCLUSIONS** – Based on the above, it is obvious that the installed 1912 tile is undersized to meet current agricultural demands for drainage and that this area has experienced a significant number of repairs on a regular basis (on average one every 29 months over the last 61 years). This provides a patchwork of 1912 pipe linked together by repairs of varying vintage. Although the main tile may have some useful life left, it is evident that said main tile may be at the end of its life cycle. 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

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

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 F.
- Typically, the open ditch 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 C.

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

- 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 D, E, and F 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 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 are proposed in this report.
- 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 D and E 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 Story and Hardin County NRCS offices 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 repair and improvement, an itemized list of project quantities and associated opinions of probable construction cost for each option was compiled and are included in Appendices G, H, and I of this report. A summary of said costs are as follows:

<u>METHOD</u>	<u>DRAINAGE COEFF.</u>	<u>TOTAL COST</u>	<u>ROAD CROSSING COST</u>
Parallel Tile Installation (Improvement)	½"	\$ 3,634,851	\$ 39,750
	1"	\$ 5,428,305	\$ 47,250
Tile Replacement - Upsizing (Improvement)	½"	\$ 5,199,024	\$ 42,250
	1"	\$ 6,668,321	\$ 56,000
Open Ditch (Improvement)	NA	\$ 1,734,315	\$ 404,500

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 36 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. 1-35 can be obtained from the Hardin and Story County Auditor's offices.

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. The improvements are especially needed if any improvement is done on to the main of Drainage District No. 25, which discharges into the main tile of this Drainage District. Therefore, it is recommended that the Hardin County Board of Supervisors and the Story 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.



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: _____

Z

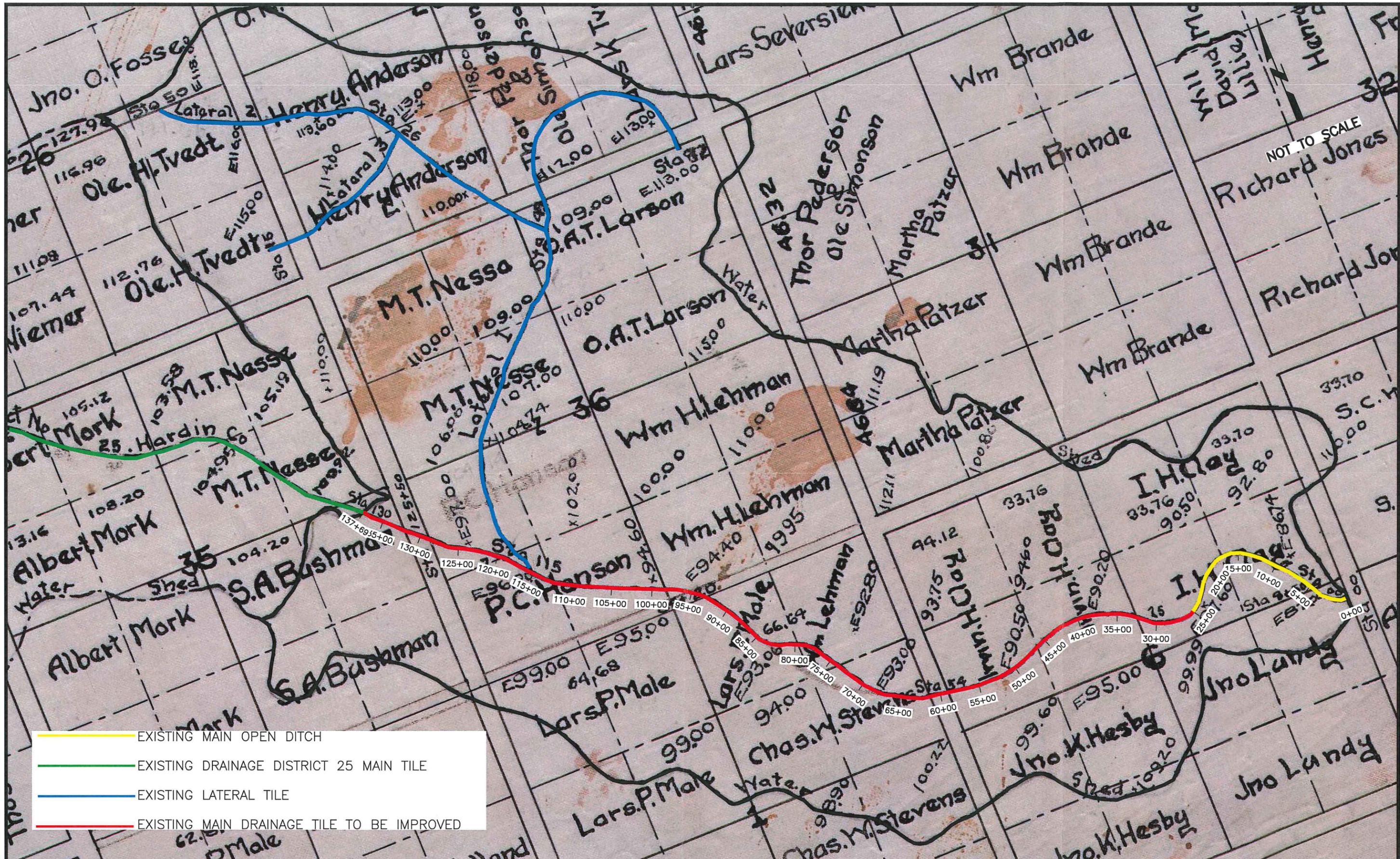
PLAT
OF
STORY-HARDIN
INTER-COUNTY DRAINAGE DISTRICT
STORY No. 10-HARDIN No. 35

Containing 4150 Acres
Scale 2 1/2" = 1 Mile
S. B. GARDNER, ENG.
ELDORA IOWA
1912

concord



— Drainage District Main
— Drainage District Boundary



- EXISTING MAIN OPEN DITCH
- EXISTING DRAINAGE DISTRICT 25 MAIN TILE
- EXISTING LATERAL TILE
- EXISTING MAIN DRAINAGE TILE TO BE IMPROVED

DRAWN BY: Z.J.S.	APPROVED BY: L.O.G.	REVISIONS:
DATE: 03-21-2016	PROJ. NO.: 6852	
FIELD BK: -		
P:\6852\CADD\CONCEPTS\6852 - LIDAR.DWG; 4/12/2016		

RYKEN
ENGINEERING & LAND SURVEYING, INC.

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

PROJECT: DRAINAGE DISTRICT
STORY NO. 1 - HARDIN NO. 35
STORY & HARDIN COUNTY, IOWA 2016

SHT. NAME: LOCATION MAP OF IMPROVEMENTS
STA. 25+00 - STA. 130+00



ENGINEERING & LAND SURVEYING, INC.

Engineer's Opinion of Main Capacities

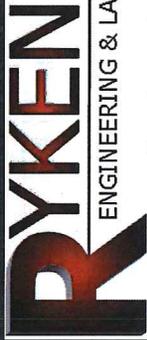
Project: Main Improvements for Story-Hardin D.D. #1-35

Location: Section 36, T86N, R22W, Hardin County, Iowa
 Section 1, T85N, R22W, Story County, Iowa
 Section 6, T85N, R21W, Story County, Iowa

By: Z.J.S.
 Date: 3/21/2016
 Checked By: L.O.G.
 Date: 4/11/2016

PARALLEL TILE INSTALLATION

STA	DESCRIPTION	INSTALLED		IMPROVEMENT (PARALLEL)					
		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)	
	Main								
0+00	Main Tile Outlet, just east of H Ave.	Open Ditch		Open Ditch		Open Ditch			
25+00	Open Ditch to 36" Tile	36	0.13	54	0.50	72	0.93		
55+00	Pipe size change 36" - 34"	34	0.12	54	0.53	72	1.00		
77+00	Pipe size change 34" - 32" Connection with Lateral 1	32	0.11	54	0.54	72	1.03		
115+00	Pipe size change 28" - 22"	28	0.18	54	0.56	72	1.11		
115+01	Upstream of Connection with Lateral 1	28	0.11	48	0.56	60	0.93		
130+00	Connection with D.D. #25	28	0.12						



ENGINEERING & LAND SURVEYING, INC.

Engineer's Opinion of Main Capacities

Project: Main Improvements for Story-Hardin D.D. #1-35

Location: Section 36, T86N, R22W, Hardin County, Iowa

Section 1, T85N, R22W, Story County, Iowa

Section 6, T85N, R21W, Story County, Iowa

By: Z.J.S.

Date: 3/21/2016

Checked By: L.O.G.

Date: 4/11/2016

TILE REPLACEMENT - UPSIZING

STA	DESCRIPTION	INSTALLED		IMPROVEMENT (UPSIZING)		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)
	Main						
0+00	Main Tile Outlet, just east of H Ave.	Open Ditch		Open Ditch		Open Ditch	
25+00	Open Ditch to 36" Tile	36	0.13	60	0.49	78	0.99
55+00	Pipe size change 36" - 34"	34	0.12	60	0.54	78	1.09
77+00	Pipe size change 34" - 32"	32	0.11	60	0.57	72	0.93
115+00	Connection with Lateral 1 Pipe size change 28" - 22"	28	0.18	60	0.57	72	1.03
115+01	Upstream of Connection with Lateral 1	28	0.11	48	0.45	66	1.06
130+00	Connection with D.D. #25	28	0.12				



ENGINEERING & LAND SURVEYING, INC.

Engineer's Opinion of Main Capacities
Project: Main Improvements for Story-Hardin D.D. #1-35
 Location: Section 36, T86N, R22W, Hardin County, Iowa
 Section 1, T85N, R22W, Story County, Iowa
 Section 6, T85N, R21W, Story County, Iowa

By: Z.J.S.
 Date: 3/21/2016
 Checked By: L.O.G.
 Date: 4/11/2016

OPEN DITCH

STA	DESCRIPTION	INSTALLED		IMPROVEMENT (OPEN DITCH)	
		INSTALLED TILE SIZE (in)	INSTALLED TILE CAPACITY (in ² acres/day)	MAIN	IMPROVED TILE CAPACITY (in ² acres/day)
	Main				
0+00	Main Tile Outlet, just east of H Ave.	Open Ditch		Open Ditch	
25+00	Open Ditch to 36" Tile	36	0.13	Open Ditch	1.92
55+00	Pipe size change 36" - 34"	34	0.12	Open Ditch	2.11
77+00	Pipe size change 34" - 32"	32	0.11	Open Ditch	2.23
115+00	Connection with Lateral 1	28	0.18	Open Ditch	2.47
115+01	Upstream of Connection with Lateral 1	28	0.11	Open Ditch	3.22
130+00	Connection with D.D. #25	28	0.12	Open Ditch	



ENGINEERING & LAND SURVEYING, INC.

By: Z.J.S.

Date: 3/21/2016

Checked By: L.O.G.

Date: 4/11/2016

Engineer's Opinion of Probable Construction Cost

Project: Main Improvements for Story-Hardin D.D. #1-35

Location: Section 36, T86N, R22W, Hardin County, Iowa

Section 1, T85N, R22W, Story County, Iowa

Section 6, T85N, R21W, Story County, Iowa

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost
CONSTRUCTION COSTS						
101	48" REINFORCED CONCRETE TILE	\$ 200.00	LF	1450	LF	\$ 290,000.00
102	48" REINFORCED CONCRETE TILE (ROAD CROSSING)	\$ 250.00	LF	50	LF	\$ 12,500.00
103	54" REINFORCED CONCRETE TILE	\$ 275.00	LF	8910	LF	\$ 2,450,250.00
104	54" REINFORCED CONCRETE TILE (ROAD CROSSING)	\$ 325.00	LF	50	LF	\$ 16,250.00
105	54" X 48" CONCRETE REDUCER	\$ 3,500.00	EA	1	EA	\$ 3,500.00
106	54" x 54" x 18" CONCRETE WYE (LATERAL CONNECTION)	\$ 3,500.00	EA	1	EA	\$ 3,500.00
107	TILE INTERCONNECTIONS	\$ 5,000.00	EA	9	EA	\$ 45,000.00
108	54" CMP OUTLET	\$ 225.00	LF	40	LF	\$ 9,000.00
109	CONCRETE COLLAR	\$ 800.00	EA	3	EA	\$ 2,400.00
110	HICKENBOTTOM INTAKE	\$ 1,500.00	EA	4	EA	\$ 6,000.00
111	PRIVATE TILE CONNECTIONS	\$ 1,000.00	EA	30	EA	\$ 30,000.00
112	TRAFFIC CONTROL	\$ 4,000.00	LS	1	LS	\$ 4,000.00
113	SEEDING (RIGHT OF WAY)	\$ 1,000.00	LS	1	LS	\$ 1,000.00
CONSTRUCTION SUBTOTAL						\$ 2,873,400.00
Contingency (10%)						\$ 287,340.00
CONSTRUCTION TOTAL						\$ 3,160,740.00
Engr. & Const. Observation (15%)						\$ 474,111.00
TOTAL COST						\$ 3,634,851.00
PARALLEL TILE INSTALLATION (1/2" COEFFICIENT)						
ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost
CONSTRUCTION COSTS						
201	60" REINFORCED CONCRETE TILE	\$ 325.00	LF	1450	LF	\$ 471,250.00
202	60" REINFORCED CONCRETE TILE (ROAD CROSSING)	\$ 350.00	LF	50	LF	\$ 17,500.00
203	72" REINFORCED CONCRETE TILE	\$ 325.00	LF	8910	LF	\$ 2,895,750.00
204	72" REINFORCED CONCRETE TILE (ROAD CROSSING)	\$ 375.00	LF	50	LF	\$ 18,750.00
205	72" X 60" CONCRETE REDUCER	\$ 3,750.00	EA	1	EA	\$ 3,750.00
206	72" x 72" x 18" CONCRETE WYE (LATERAL CONNECTION)	\$ 3,750.00	EA	1	EA	\$ 3,750.00
207	TILE INTERCONNECTIONS	\$ 5,000.00	EA	9	EA	\$ 45,000.00
208	72" CMP OUTLET	\$ 300.00	LF	40	LF	\$ 12,000.00
209	CONCRETE COLLAR	\$ 800.00	EA	3	EA	\$ 2,400.00
210	TOP COVER OVER CONCRETE PIPE (FOR PROTECTION)	\$ 75.00	LF	10400	LF	\$ 780,000.00
211	HICKENBOTTOM INTAKE	\$ 1,500.00	EA	4	EA	\$ 6,000.00
212	PRIVATE TILE CONNECTIONS	\$ 1,000.00	EA	30	EA	\$ 30,000.00
213	TRAFFIC CONTROL	\$ 4,000.00	LS	1	LS	\$ 4,000.00
214	SEEDING (RIGHT OF WAY)	\$ 1,000.00	LS	1	LS	\$ 1,000.00
CONSTRUCTION SUBTOTAL						\$ 4,291,150.00
Contingency (10%)						\$ 429,115.00
CONSTRUCTION TOTAL						\$ 4,720,265.00
Engr. & Const. Observation (15%)						\$ 708,039.75
TOTAL COST						\$ 5,428,304.75

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



ENGINEERING & LAND SURVEYING, INC.

By: Z.J.S.

Date: 3/21/2016

Checked By: L.O.G.

Date: 4/11/2016

Engineer's Opinion of Probable Construction Cost

Project: Main Improvements for Story-Hardin D.D. #1-35

Location: Section 36, T86N, R22W, Hardin County, Iowa
 Section 1, T85N, R22W, Story County, Iowa
 Section 6, T85N, R21W, Story County, Iowa

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost
CONSTRUCTION COSTS						
301	48" REINFORCED CONCRETE TILE	\$ 200.00	LF	1450	LF	\$ 290,000.00
302	48" REINFORCED CONCRETE TILE (ROAD CROSSING)	\$ 250.00	LF	50	LF	\$ 12,500.00
303	60" REINFORCED CONCRETE TILE	\$ 325.00	LF	8910	LF	\$ 2,895,750.00
304	60" REINFORCED CONCRETE TILE (ROAD CROSSING)	\$ 375.00	LF	50	LF	\$ 18,750.00
305	60" X 48" CONCRETE REDUCER	\$ 3,500.00	EA	1	EA	\$ 3,500.00
306	60" x 60" x 18" CONCRETE WYE (LATERAL CONNECTION)	\$ 3,500.00	EA	1	EA	\$ 3,500.00
307	TILE REMOVAL	\$ 5.00	LF	10500	LF	\$ 52,500.00
308	60" CMP OUTLET	\$ 250.00	LF	40	LF	\$ 10,000.00
309	CONCRETE COLLAR	\$ 800.00	EA	3	EA	\$ 2,400.00
310	TOP COVER OVER CONCRETE PIPE (FOR PROTECTION)	\$ 75.00	LF	10400	LF	\$ 780,000.00
311	HICKENBOTTOM INTAKE	\$ 1,500.00	EA	4	EA	\$ 6,000.00
312	PRIVATE TILE CONNECTIONS	\$ 1,000.00	EA	30	EA	\$ 30,000.00
313	TRAFFIC CONTROL	\$ 4,000.00	LS	1	LS	\$ 4,000.00
314	SEEDING (RIGHT OF WAY)	\$ 1,000.00	LS	1	LS	\$ 1,000.00
CONSTRUCTION SUBTOTAL						\$ 4,109,900.00
Contingency (10%)						\$ 410,990.00
CONSTRUCTION TOTAL						\$ 4,520,890.00
Engr. & Const. Observation (15%)						\$ 678,133.50
TOTAL COST						\$ 5,199,023.50
CONSTRUCTION COSTS						
401	66" REINFORCED CONCRETE TILE	\$ 350.00	LF	1450	LF	\$ 507,500.00
402	66" REINFORCED CONCRETE TILE (ROAD CROSSING)	\$ 400.00	LF	50	LF	\$ 20,000.00
403	72" REINFORCED CONCRETE TILE	\$ 400.00	LF	3800	LF	\$ 1,520,000.00
404	78" REINFORCED CONCRETE TILE (ROAD CROSSING)	\$ 500.00	LF	50	LF	\$ 25,000.00
405	78" REINFORCED CONCRETE TILE	\$ 450.00	LF	5110	LF	\$ 2,299,500.00
406	78" X 72" CONCRETE REDUCER	\$ 4,000.00	EA	1	EA	\$ 4,000.00
407	72" X 66" CONCRETE REDUCER	\$ 3,750.00	EA	1	EA	\$ 3,750.00
408	72" x 72" x 18" CONCRETE WYE (LATERAL CONNECTION)	\$ 3,750.00	EA	1	EA	\$ 3,750.00
409	TILE REMOVAL	\$ 5.00	LF	10500	LF	\$ 52,500.00
410	78" CMP OUTLET	\$ 300.00	LF	40	LF	\$ 12,000.00
411	CONCRETE COLLAR	\$ 800.00	EA	3	EA	\$ 2,400.00
412	TOP COVER OVER CONCRETE PIPE (FOR PROTECTION)	\$ 75.00	LF	10400	LF	\$ 780,000.00
413	HICKENBOTTOM INTAKE	\$ 1,500.00	EA	4	EA	\$ 6,000.00
414	PRIVATE TILE CONNECTIONS	\$ 1,000.00	EA	30	EA	\$ 30,000.00
415	TRAFFIC CONTROL	\$ 4,000.00	LS	1	LS	\$ 4,000.00
416	SEEDING (RIGHT OF WAY)	\$ 1,000.00	LS	1	LS	\$ 1,000.00
CONSTRUCTION SUBTOTAL						\$ 5,271,400.00
Contingency (10%)						\$ 527,140.00
CONSTRUCTION TOTAL						\$ 5,798,540.00
Engr. & Const. Observation (15%)						\$ 869,781.00
TOTAL COST						\$ 6,668,321.00

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



ENGINEERING & LAND SURVEYING, INC.

By: Z.J.S.

Date: 3/21/2016

Checked By: L.O.G.

Date: 4/11/2016

Engineer's Opinion of Probable Construction Cost

Project: Main Improvements for Story-Hardin D.D. #1-35

Location: Section 36, T86N, R22W, Hardin County, Iowa

Section 1, T85N, R22W, Story County, Iowa

Section 6, T85N, R21W, Story County, Iowa

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity		Total Cost
				Units		
CONSTRUCTION COSTS						
501	OPEN DITCH CONSTRUCTION	\$ 2,500.00	STA	105	STA	\$ 262,500.00
502	CMP OUTLET	\$ 55.00	LF	40	LF	\$ 2,200.00
503	HEADWALL	\$ 10,000.00	EA	2	EA	\$ 20,000.00
504	RIP-RAP	\$ 40.00	TN	100	TN	\$ 4,000.00
505	CONCRETE COLLAR	\$ 400.00	EA	2	EA	\$ 800.00
506	RCP CULVERT (ROAD CROSSING)	\$ 200,000.00	LS	2	LS	\$ 400,000.00
507	SURFACE DRAINS	\$ 2,000.00	EA	40	EA	\$ 80,000.00
508	PRIVATE TILE OUTLETS	\$ 2,000.00	EA	30	EA	\$ 60,000.00
509	SEEDING (OPEN DITCH)	\$ 500.00	STA	105	STA	\$ 52,500.00
510	SEEDING (RIGHT OF WAY)	\$ 500.00	LS	1	LS	\$ 500.00
511	TRAFFIC CONTROL	\$ 4,000.00	LS	1	LS	\$ 4,000.00
512	REMOVE EXISTING TILE	\$ 5.00	LF	10500	LF	\$ 52,500.00
513	RIGHT OF WAY	\$ 12,000.00	AC	36	AC	\$ 432,000.00
CONSTRUCTION SUBTOTAL						\$ 1,371,000.00
Contingency (10%)						\$ 137,100.00
CONSTRUCTION TOTAL						\$ 1,508,100.00
Engr. & Const. Observation (15%)						\$ 226,215.00
TOTAL COST						\$ 1,734,315.00

CONVERT TO OPEN DITCH

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