

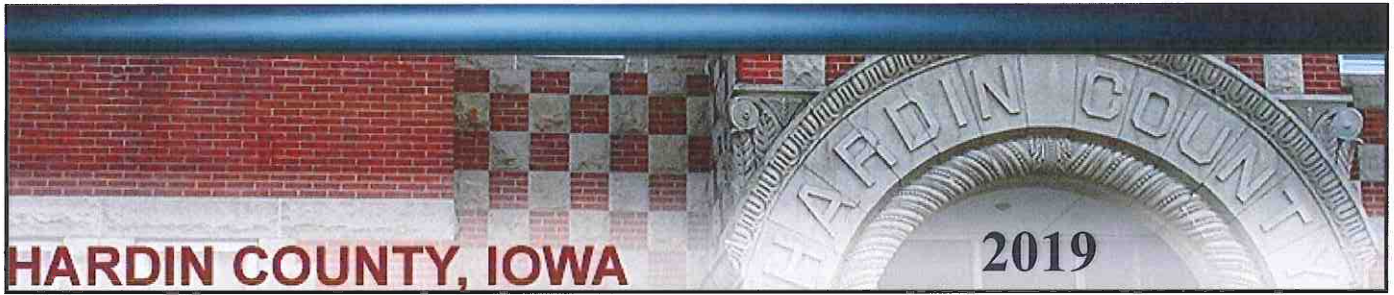
**PUBLIC HEARING AGENDA
ENGINEER'S REPORT ON IMPROVEMENTS TO MAIN TILE
DRAINAGE DISTRICT 56, HARDIN COUNTY, IOWA
MARCH 27, 2019 AT 1:00 P.M.**

1. Open Meeting
2. Approve Agenda
3. Introductions/Attendance
4. Open Public Hearing
5. Verify Publication
 - Published in the Times Citizen on Saturday, March 2, 2019
6. Explanation Of Project

Documents:


[DD 56 6830.1 SUPP TO ENGINEERS REPORT.PDF](#)
[DD 56 6830.1 - ENGINEERS REPORT.PDF](#)
[DD 56 6830.1 REVISED APP V - ENGINEERS REPORT.PDF](#)

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



**SUPPLEMENT TO
ENGINEER'S REPORT
ON
IMPROVEMENTS
TO
MAIN TILE
DRAINAGE DISTRICT
NO. 56
HARDIN COUNTY,
IOWA**



	<p>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</p> <p><i>Lee O. Gallentine</i>, P.E. P.E. Mark B. Ziegler LEE O. GALLENTINE, P.E. DATE</p> <p>LICENSE NUMBER: 15745 MY LICENSE RENEWAL DATE IS DECEMBER 31, 2020 PAGES OR SHEETS COVERED BY THIS SEAL: SHOWN ON TABLE OF CONTENTS</p>
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**Supplement to Engineer's Report on
Improvements to Main Tile,
Drainage District No. 56
Hardin County, Iowa**

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**Supplement to Engineer's Report on
Improvements to Main Tile,
Drainage District No. 56
Hardin County, Iowa**

1.0 INTRODUCTION

- SCOPE OF WORK – The Hardin County Board of Supervisors, acting as District Trustees, requested Clapsaddle-Garber Associates to investigate and report concerning improvements to the Main tile of Drainage District No. 56. At the regular drainage meeting held on February 27, 2019, the original Engineer's Report was discussed and reviewed by the District Trustees. As a result of this meeting, the District Trustees requested Clapsaddle-Garber Associates to move ahead with a supplemental report concerning an alternative outlet and improvement to portions of the Main tile.

2.0 IMPROVEMENT METHODS – To improve the drainage capacity for the upper reaches of the existing Main tile, the following options are additional options available:

Upper Main Outlet with Single Tile Upsizing

- Sever the existing Main tile, install a new outlet to the Main Open Ditch of Drainage District 26, and divert flows from the upper portion of the Main tile to the new outlet.
- For the specified length of the Main tile, remove and replace the existing Main tile with a single new Main tile of greater capacity. For reference, a chart with the required tile sizes and capacities is included in Appendix B.
- The point of severing and the new outlet would be at approximately ¼ mile east of D Avenue and run in a northerly direction (following the lower points of the land) until reaching the Main Open Ditch of Drainage District 26. 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 lateral connections. For reference, the general routes of both are shown on the map included in Appendix A.

Upper Main Outlet with Dual Tile Upsizing

- Sever the existing Main tile, install a new outlet to the Main Open Ditch of Drainage District 26, and divert flows from the upper portion of the Main tile to the new outlet.
- For the specified length of the Main tile, remove and replace the existing Main tile with two new Main tiles of greater capacity. For reference, a chart with the required tile sizes and capacities is included in Appendix C.
- The point of severing and the new outlet would be at approximately ¼ mile east of D Avenue and run in a northerly direction (following the lower points of the land) until reaching the Main Open Ditch of Drainage District 26. Typically, the replacement Main tiles would be in the same location as the existing Main tile in order to locate and reconnect private tile and lateral connections. For reference, the general routes of both are shown on the map included in Appendix A.

Upper Main Outlet with Parallel Tile Upsizing

- Sever the existing Main tile, install a new outlet to the Main Open Ditch of Drainage District 26, and divert flows from the upper portion of the Main tile to the new outlet.
- For the specified length of the Main tile, leave the existing Main tile in place and install a new parallel Main tile for greater combined capacity. For reference, a chart with the required tile sizes and capacities is included in Appendix D.
- Typically, the supplemental Main tile would be near the location of the existing Main tile in order to locate and reconnect private tile and lateral connections and interconnect the two for flow equalization. For reference, the general routes of both are shown on the map included in Appendix A.

With the aforementioned improvement methods, the following assumptions should be noted:

- Due to the soil types and soil cover, all tile will have rock bedding for additional stability and strength.
- The existing ground elevations shown in the original design are still accurate.
- The only tiles being improved are the tiles identified in Appendices B, C, and D. The remainder of the tiles are not being improved or modified in any manner.
- The proposed pipe sizes shown in Appendices B, C, and D are those that are currently manufactured that meet or exceed the ½” or 1” drainage coefficient and match upstream improvement sizes.

- The proposed and existing capacities shown in Appendices B, C, and D are based on the assumptions that the Main tile is installed per the original design and that it is functioning at full capacity (i.e. are not collapsed, broken, plugged, etc).
- The proposed and existing pipe sizes and capacities shown in Appendices B, C, and D are those to serve the lands within the existing District boundaries along with added areas due to the new outlet and not any discharges from other lands outside the District boundaries.
- Portions of the Single Tile Upsizing, Dual Tile Upsizing, and Parallel Tile Upsizing options may prohibit farming over the proposed Main tile at certain areas due to a lack of soil cover and may even require mounding of soil above the proposed Main tile.
- The Single Tile Upsizing and Dual Tile Upsizing options would allow for some lower maintenance costs in the future as the specified length of the Main tile is new.
- The Parallel Tile Upsizing option would require higher maintenance costs in the future as the specified portion of the existing Main tile is left in service and is over 100 years old.
- The options presented in this report would require the taking of right of way, which is not included in the opinion of probable construction costs contained in the next section of this report
- The options presented do not increase drainage capacity for those portions of the Main tile upstream of the specified improvement stretch. It just shortens the length of restrictions between that point and the Main Open Ditch of Drainage District 26.
- The options presented do increase drainage capacity for those portions of the Main tile downstream of the upper main tile outlet as a large portion of the Drainage District drainage area has been removed from the Main tile.
- The options presented would turn the drainage area upstream of the Upper Main Tile Outlet into a separate Drainage District.
- The options presented can freely discharge into the Main Open Ditch of Drainage District 26 without charge.
- The proposed new tile outlet route would be installed at some large depths (20'±).
- The options presented may require annexation to extend the district boundary to the north to allow for installation of the proposed tile.
- 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 costs contained in the next section of this report exceeds said \$50,000 limit. Therefore, a hearing will be required. Per Iowa Code Chapter 468.126.4.e, the right of remonstrance may apply to the proposed improvements.

3.0 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 were compiled and are included in Appendices F, G, and H of this report. A summary of said costs (to nearest dollar) are as follows:

METHOD	DRAINAGE COEFF.	DISTRICT COST	ROAD CROSSING COST
Upper Main Outlet with Single Tile Upsizing	½”	\$ 1,367,445	\$ 54,697
	1”	\$ 1,872,642	\$ 64,041
Upper Main Outlet with Dual Tile Upsizing	½”	\$ 1,894,818	\$ 64,975
	1”	\$ 2,433,147	\$ 75,253
Upper Main Outlet with Parallel Tile Upsizing	½”	\$ 1,218,087	\$ 46,288
	1”	\$ 1,800,735	\$ 59,369

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

4.0 RECOMMENDATIONS – There is a definite need to perform one of the above mentioned actions. The improvements would remove the current restrictions and impediments to the upper reaches of the Main tile, extend the lifespan of the same, and improve the capacity of both upper and lower reaches of the same. Therefore, it is recommended that the Hardin County Board of Supervisors, acting as District Trustees, should take action to accomplish the following:

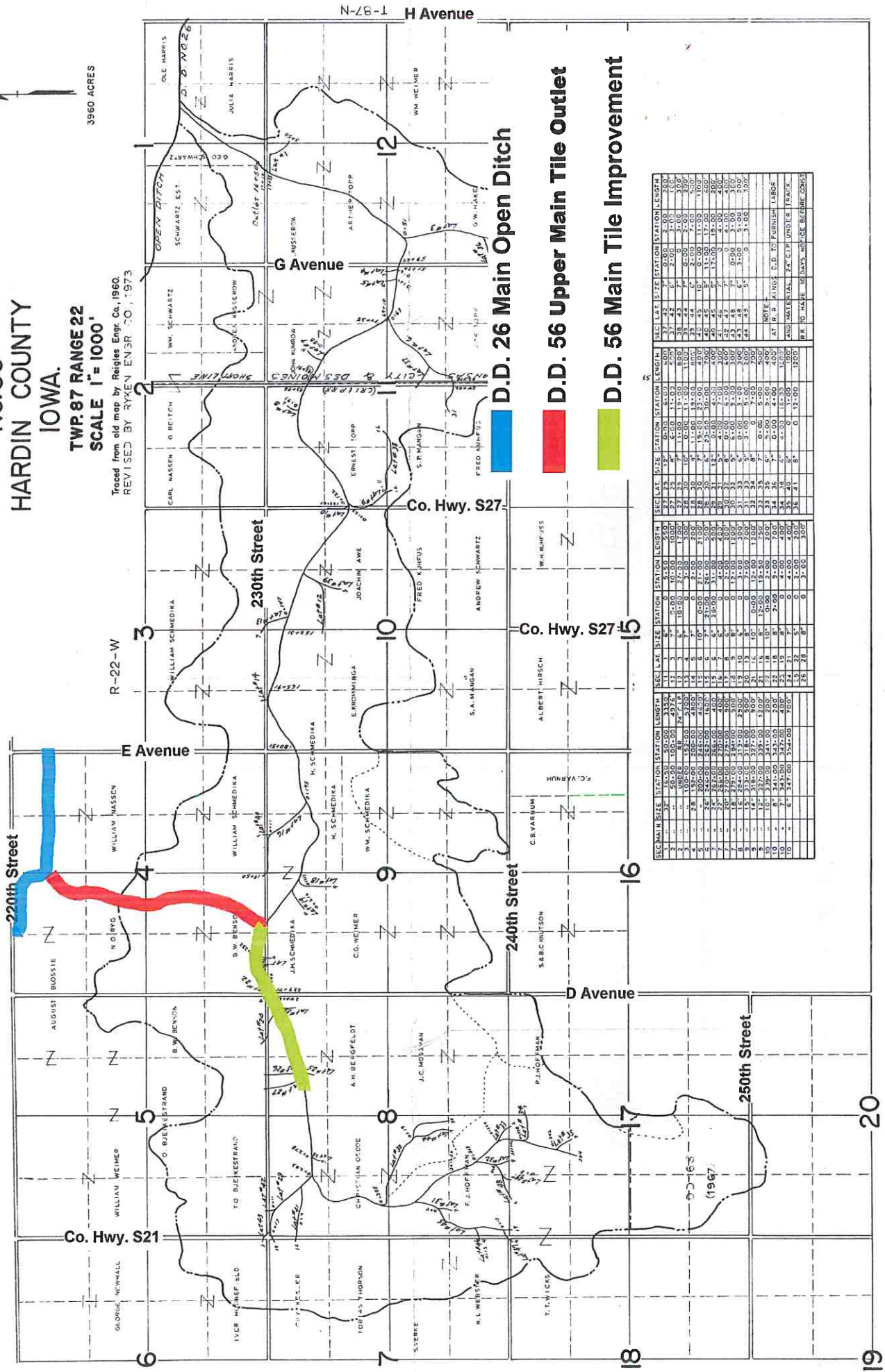
- Approve the Supplement to Engineer’s Report as prepared by Clapsaddle-Garber Associates.
- Hold the required hearing on the proposed improvements.
- Adopt one of the recommendations of the Original or Supplement to Engineer’s Report.
- If one of the options from this supplemental report are selected:
 - Confirm that Drainage District 56 should be split into two separate districts.
 - Confirm that the upper Main tile outlet can discharge freely into the Main Open Ditch of Drainage District 26 without charge.
 - Confirm if annexation is necessary to extend the the upper Main tile outlet to the north.
- Direct plans and specifications for the proposed improvements be prepared by Clapsaddle-Garber Associates.
- Proceed with receiving bids from interested contractors by Clapsaddle-Garber Associates.
- Award contract to the lowest responsible contractor.
- Seek legal advice whether reclassification is required.
- If desired or required by Iowa Code, proceed with reclassification proceedings.

PLAT
OF
WICKS DRAINAGE DISTRICT
NO. 56
HARDIN COUNTY
IOWA.

TWP. 87 RANGE 22
SCALE 1" = 1000'

Traced from old map by Reigies Engr. Co., 1960.
REVISED BY RYKEN ENGR. CO., 1973

3960 ACRES



D.D. 26 Main Open Ditch

D.D. 56 Upper Main Tile Outlet

D.D. 56 Main Tile Improvement

SECTION	SECTION SIZE	SECTION STATION	LENGTH	SEC. LAT.	DIST.	SECTION STATION	LENGTH	SEC. LAT.	DIST.	SECTION STATION	LENGTH	SEC. LAT.	DIST.	SECTION STATION	LENGTH
1	36.00	00.00	330.00	11	0	0.00	330.00	11	0	0.00	330.00	11	0	0.00	330.00
2	36.00	100.00	330.00	12	0	0.00	330.00	12	0	0.00	330.00	12	0	0.00	330.00
3	36.00	200.00	330.00	13	0	0.00	330.00	13	0	0.00	330.00	13	0	0.00	330.00
4	36.00	300.00	330.00	14	0	0.00	330.00	14	0	0.00	330.00	14	0	0.00	330.00
5	36.00	400.00	330.00	15	0	0.00	330.00	15	0	0.00	330.00	15	0	0.00	330.00
6	36.00	500.00	330.00	16	0	0.00	330.00	16	0	0.00	330.00	16	0	0.00	330.00
7	36.00	600.00	330.00	17	0	0.00	330.00	17	0	0.00	330.00	17	0	0.00	330.00
8	36.00	700.00	330.00	18	0	0.00	330.00	18	0	0.00	330.00	18	0	0.00	330.00
9	36.00	800.00	330.00	19	0	0.00	330.00	19	0	0.00	330.00	19	0	0.00	330.00
10	36.00	900.00	330.00	20	0	0.00	330.00	20	0	0.00	330.00	20	0	0.00	330.00
11	36.00	1000.00	330.00	21	0	0.00	330.00	21	0	0.00	330.00	21	0	0.00	330.00
12	36.00	1100.00	330.00	22	0	0.00	330.00	22	0	0.00	330.00	22	0	0.00	330.00
13	36.00	1200.00	330.00	23	0	0.00	330.00	23	0	0.00	330.00	23	0	0.00	330.00
14	36.00	1300.00	330.00	24	0	0.00	330.00	24	0	0.00	330.00	24	0	0.00	330.00
15	36.00	1400.00	330.00	25	0	0.00	330.00	25	0	0.00	330.00	25	0	0.00	330.00
16	36.00	1500.00	330.00	26	0	0.00	330.00	26	0	0.00	330.00	26	0	0.00	330.00
17	36.00	1600.00	330.00	27	0	0.00	330.00	27	0	0.00	330.00	27	0	0.00	330.00
18	36.00	1700.00	330.00	28	0	0.00	330.00	28	0	0.00	330.00	28	0	0.00	330.00
19	36.00	1800.00	330.00	29	0	0.00	330.00	29	0	0.00	330.00	29	0	0.00	330.00
20	36.00	1900.00	330.00	30	0	0.00	330.00	30	0	0.00	330.00	30	0	0.00	330.00
R.R. TO TAKE 15 DAYS NOTICE BEFORE COME															



By: J.V.S.
 Date: 3/1/2019
 Checked By: L.O.G.
 Date: 3/11/2019

Engineer's Opinion of Main tile Capacities

Project: Upper Main Tile Outlet with Single Tile Upsizing for D.D. #56

Location: Sections 1, 4, 7, 8, 9, 10, 11, 12 & 17 T87N, R22W Hardin County, Iowa

UPPER MAIN TILE OUTLET WITH SINGLE TILE UPSIZING (IMPROVEMENT)	EXISTING				IMPROVEMENT							
	STA	EXISTING DESCRIPTION	INSTALLED TILE SIZE (in)	INSTALLED TILE CAPACITY (cfs)	INSTALLED TILE CAPACITY (in/day)	PROPOSED DESCRIPTION	1/2" DRAINAGE COEFFICIENT			1" DRAINAGE COEFFICIENT		
							IMPROVED TILE SIZE (in)	IMPROVED TILE CAPACITY (cfs)	IMPROVED TILE CAPACITY (in/day)	IMPROVED TILE SIZE (in)	IMPROVED TILE CAPACITY (cfs)	IMPROVED TILE CAPACITY (in/day)
	0+00	Tile empties into D.D. 26 Main Open Ditch				Tile empties into D.D. 26 Main Open Ditch	48	176.4	2.47	60	319.8	4.48
	11+00	Grade change 1.5% - 0.20%				Grade change 1.5% - 0.20%	48	64.4	0.91	60	116.8	1.64
	13+88	Existing District Boundary				Existing District Boundary	48	64.4	0.91	60	116.8	1.65
	227+48/46+83	Tile connects to new outlet	28	12.8	0.18	Tile connects to new outlet	48	53.9	0.75	60	97.7	1.36
	230+00	Grade change 0.14% - 0.10%	28	10.8	0.17	Grade change 0.14% - 0.10%	48	45.5	0.70	60	82.6	1.27
	246+00	Size change: 28" - 26"	28/26	8.9	0.17		48/42	31.9	0.62	60/54	62.4	1.22
	260+00	Grade change: 0.10% - 0.16%	26	11.2	0.22	Grade change: 0.10% - 0.16%	42/36	26.8	0.53	54/48	57.6	1.14
	262+00	Size change: 26" - 24"	26/24	9.1	0.19	End of Main Tile Improvement	36	26.8	0.56	48	57.6	1.21
	266+00	Size change: 24" - 22"	24/22	7.2	0.17							
	270+00	Size change: 22" - 20", Grade change: 0.16% - 0.26%	22/20	7.1	0.17							
	279+00	Size change: 20" - 18"	20/18	5.4	0.14							
	284+00	Size change: 18" - 16"	18/16	3.9	0.13							
	286+00	Grade change: 0.26% - 0.18%	16	3.3	0.11							
	308+00	Grade change: 0.18% - 0.10%	16	2.4	0.10							
	313+00	Size change: 16" - 15"	16/15	2.0	0.09							
	318+00	Size change: 15" - 14"	15/14	1.7	0.10							
	327+00	Size change: 14" - 12"	14/12	1.1	0.07							
	339+00	Size change: 12" - 10"	12/10	0.7	0.06							
	341+00	Size change: 10" - 8"	10/8	0.4	0.04							
	343+00	Size change: 8" - 7"	8/7	0.3	0.03							
	347+00	Size change: 7" - 6", Grade change: 0.10% - 0.48%	7/6	0.4	0.05							
	351+00	Grade change: 0.48% - 0.90%	6	0.5	0.07							
	354+00	End of Main tile	6									



By: J.V.S.
 Date: 3/1/2019
 Checked By: L.O.G.
 Date: 3/11/2019

Engineer's Opinion of Main tile Capacities

Project: Upper Main Tile Outlet with Dual Tile Upsizing for D.D. #56

Location: Sections 1, 4, 7, 8, 9, 10, 11, 12 & 17 T87N, R22W Hardin County, Iowa

UPPER MAIN TILE OUTLET WITH DUAL TILE UPSIZING (IMPROVEMENT)

STA	EXISTING DESCRIPTION	EXISTING			PROPOSED DESCRIPTION	IMPROVEMENT							
		INSTALLED TILE SIZE (in)	INSTALLED TILE CAPACITY (cfs)	INSTALLED TILE CAPACITY (in/day)		1/2" DRAINAGE COEFFICIENT				1" DRAINAGE COEFFICIENT			
						IMPROVED PIPE 1 TILE SIZE (in)	IMPROVED PIPE 2 TILE SIZE (in)	TOTAL IMPROVED TILE CAPACITY (cfs)	TOTAL IMPROVED TILE CAPACITY (in/day)	IMPROVED PIPE 1 TILE SIZE (in)	IMPROVED PIPE 2 TILE SIZE (in)	TOTAL IMPROVED TILE CAPACITY (cfs)	TOTAL IMPROVED TILE CAPACITY (in/day)
0+00	Tile empties into D.D. 26 Main Open Ditch				Tile empties into D.D. 26 Main Open Ditch	36	30	132.3	1.85	48	36	258.3	3.62
11+00	Grade change 1.5% - 0.20%				Grade change 1.5% - 0.20%	36	30	48.3	0.68	48	36	94.3	1.33
13+88	Existing District Boundary				Existing District Boundary	36	30	48.3	0.68	48	36	94.3	1.33
227+48/46+83	Tile connects to new outlet	28	12.8	0.18	Tile connects to new outlet	36	30	40.4	0.62	48	36	78.9	1.21
230+00	Grade change 0.14% - 0.10%	28	10.8	0.17	Grade change 0.14% - 0.10%	36	30	34.2	0.53	48	36	66.7	1.03
246+00	Size change: 28" - 26"	28/26	8.9	0.17		36/30	30	26.0	0.51	48/42	36	53.0	1.04
260+00	Grade change: 0.10% - 0.16%	26	11.2	0.22	Grade change: 0.10% - 0.16%	30	30/27	28.9	0.57	42/36	36	53.5	1.06
262+00	Size change: 26" - 24"	26/24	9.1	0.19	End of Main Tile Improvement	30	27	24.8	0.52	36	36	53.5	1.13
266+00	Size change: 24" - 22"	24/22	7.2	0.17									
270+00	Size change: 22" - 20", Grade change: 0.16% - 0.26%	22/20	7.1	0.17									
279+00	Size change: 20" - 18"	20/18	5.4	0.14									
284+00	Size change: 18" - 16"	18/16	3.9	0.13									
286+00	Grade change: 0.26% - 0.18%	16	3.3	0.11									
308+00	Grade change: 0.18% - 0.10%	16	2.4	0.10									
313+00	Size change: 16" - 15"	16/15	2.0	0.09									
318+00	Size change: 15" - 14"	15/14	1.7	0.10									
327+00	Size change: 14" - 12"	14/12	1.1	0.07									
339+00	Size change: 12" - 10"	12/10	0.7	0.06									
341+00	Size change: 10" - 8"	10/8	0.4	0.04									
343+00	Size change: 8" - 7"	8/7	0.3	0.03									
347+00	Size change: 7" - 6", Grade change: 0.10% - 0.48%	7/6	0.4	0.05									
351+00	Grade change: 0.48% - 0.90%	6	0.5	0.07									
354+00	End of Main tile	6											



By: J.V.S.
 Date: 3/1/2019
 Checked By: L.O.G.
 Date: 3/11/2019

Engineer's Opinion of Main tile Capacities

Project: Upper Main Tile Outlet with Parallel Tile Upsizing for D.D. #56

Location: Sections 1, 4, 7, 8, 9, 10, 11, 12 & 17 T87N, R22W Hardin County, Iowa

UPPER MAIN TILE OUTLET WITH PARALLEL TILE UPSIZING (IMPROVEMENT)	EXISTING				IMPROVEMENT							
	STA	EXISTING DESCRIPTION	INSTALLED TILE SIZE (in)	INSTALLED TILE CAPACITY (cfs)	INSTALLED TILE CAPACITY (in/day)	PROPOSED DESCRIPTION	1/2" DRAINAGE COEFFICIENT			1" DRAINAGE COEFFICIENT		
							IMPROVED PARALLEL TILE SIZE (in)	TOTAL IMPROVED TILE CAPACITY (cfs)	TOTAL IMPROVED TILE CAPACITY (in/day)	IMPROVED PARALLEL TILE SIZE (in)	TOTAL IMPROVED TILE CAPACITY (cfs)	TOTAL IMPROVED TILE CAPACITY (in/day)
	0+00	Tile empties into D.D. 26 Main Open Ditch				Tile empties into D.D. 26 Main Open Ditch	42	123.6	1.73	54	241.5	3.38
	11+00	Grade change 1.5% - 0.20%				Grade change 1.5% - 0.20%	42	45.1	0.64	54	88.2	1.24
	13+88	Existing District Boundary				Existing District Boundary	42	45.1	0.64	54	88.2	1.24
	227+48/46+83	Tile connects to new outlet	28	12.8	0.18	Tile connects to new outlet	42	50.5	0.78	54	86.6	1.33
	230+00	Grade change 0.14% - 0.10%	28	10.8	0.17	Grade change 0.14% - 0.10%	42	42.7	0.66	54	73.2	1.13
	246+00	Size change: 28" - 26"	28/26	8.9	0.17		42/36	30.0	0.59	54/48	54.4	1.07
	260+00	Grade change: 0.10% - 0.16%	26	11.2	0.22	Grade change: 0.10% - 0.16%	36/30	27.7	0.55	48/42	51.6	1.03
	262+00	Size change: 26" - 24"	26/24	9.1	0.19	End of Main Tile Improvement	30	25.5	0.54	42	49.4	1.04
	266+00	Size change: 24" - 22"	24/22	7.2	0.17							
	270+00	Size change: 22" - 20", Grade change: 0.16% - 0.26%	22/20	7.1	0.17							
	279+00	Size change: 20" - 18"	20/18	5.4	0.14							
	284+00	Size change: 18" - 16"	18/16	3.9	0.13							
	286+00	Grade change: 0.26% - 0.18%	16	3.3	0.11							
	308+00	Grade change: 0.18% - 0.10%	16	2.4	0.10							
	313+00	Size change: 16" - 15"	16/15	2.0	0.09							
	318+00	Size change: 15" - 14"	15/14	1.7	0.10							
	327+00	Size change: 14" - 12"	14/12	1.1	0.07							
	339+00	Size change: 12" - 10"	12/10	0.7	0.06							
	341+00	Size change: 10" - 8"	10/8	0.4	0.04							
	343+00	Size change: 8" - 7"	8/7	0.3	0.03							
	347+00	Size change: 7" - 6", Grade change: 0.10% - 0.48%	7/6	0.4	0.05							
	351+00	Grade change: 0.48% - 0.90%	6	0.5	0.07							
	354+00	End of Main tile	6									



By: J.V.S.
 Date: 3/1/2019
 Checked By: L.O.G.
 Date: 3/12/2019

Engineer's Opinion of Main tile Capacities

Project: Upper Main Tile Outlet for D.D. #56

Location: Sections 1, 4, 7, 8, 9, 10, 11, 12 & 17 T87N, R22W Hardin County, Iowa

IMPROVED - DOWNSTREAM REACHES OF MAIN TILE

DOWNSTREAM OF UPPER MAIN TILE OUTLET (IMPROVEMENT)	STA	EXISTING DESCRIPTION	INSTALLED TILE SIZE (in)	INSTALLED TILE CAPACITY (cfs)	INSTALLED TILE CAPACITY (in/day)	IMPROVED TILE CAPACITY (cfs)	IMPROVED TILE CAPACITY (in/day)
	16+50	Existing Main tile empties into open ditch	32	12.0	0.07	12.0	0.13
	28+00	Grade change: 0.06% - 0.18%	32	20.7	0.13	20.7	0.24
	51+00	Lateral 3	32	20.7	0.14	20.7	0.27
	70+00	Grade change: 0.18% - 0.14%	32	18.3	0.13	18.3	0.28
	100+00	Grade change: 0.14% - 0.12%	32	16.9	0.13	16.9	0.30
	122+76	West side Co Hwy S27	32	16.9	0.14	16.9	0.35
	152+00	Size change: 32" - 28", Grade change: 0.12% - 0.28%	32/28	18.1	0.17	18.1	0.49
	168+50	Lateral 14	28	18.1	0.18	18.1	0.59
	180+00	Grade change: 0.28% - 0.24%	28	16.8	0.17	16.8	0.62
190+00	Grade change: 0.24% - 0.22%	28	16.0	0.17	16.0	0.62	
200+00	Grade change: 0.22 - 0.18%	28	14.5	0.17	14.5	1.09	
220+00	Grade change 0.18% - 0.14%	28	12.8	0.18	12.8	15.86	
227+48	End of Lower Reaches	28	12.8		12.8		



By: J.V.S.

Date: 3/1/2019

Checked By: L.O.G.

Date: 3/12/2019

Engineer's Opinion of Probable Construction Cost

Project: Upper Main Tile Outlet with Single Tile Upsizing for D.D. #56

Location: Sections 1, 4, 7, 8, 9, 10, 11, 12 & 17 T87N, R22W Hardin County, Iowa

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost
DISTRICT CONSTRUCTION COSTS						
1001	54" CMP TILE OUTLET	\$ 130.00	LF	40	LF	\$ 5,200.00
1002	48" TRIPLE WALL PPE or RCP TILE	\$ 130.00	LF	6365	EA	\$ 827,450.00
1003	42" TRIPLE WALL PPE or RCP TILE	\$ 90.00	LF	1400	LF	\$ 126,000.00
1004	36" TRIPLE WALL PPE or RCP TILE	\$ 75.00	LF	200	LF	\$ 15,000.00
1005	48" x 42" REDUCER	\$ 3,000.00	EA	1	EA	\$ 3,000.00
1006	42" x 36" REDUCER	\$ 2,500.00	EA	1	EA	\$ 2,500.00
1007	36" x 24" REDUCER	\$ 2,000.00	EA	1	EA	\$ 2,000.00
1008	54" RODENT GUARD	\$ 1,500.00	EA	1	EA	\$ 1,500.00
1009	BANK STABILIZATION	\$ 50.00	TON	50	TON	\$ 2,500.00
1010	PLUG EXISTING DOWNSTREAM MAIN TILE	\$ 1,000.00	LOC	1	LOC	\$ 1,000.00
1011	LATERAL TILE CONNECTIONS	\$ 1,000.00	EA	7	EA	\$ 7,000.00
1012	CONCRETE COLLAR	\$ 600.00	EA	2	EA	\$ 1,200.00
1013	PRIVATE TILE CONNECTIONS	\$ 500.00	EA	40	EA	\$ 20,000.00
1014	TILE LOCATION	\$ 150.00	STA	33.22	STA	\$ 4,983.00
1015	TILE REMOVAL	\$ 5.00	LF	3322	LF	\$ 16,610.00
CONSTRUCTION SUBTOTAL						\$ 1,035,943.00
Contingency (10%)						\$ 103,594.30
CONSTRUCTION TOTAL						\$ 1,139,537.30
Engr. & Const. Observation (20%)						\$ 227,907.46
TOTAL COST						\$ 1,367,444.76
ROAD CROSSING CONSTRUCTION COSTS						
1016	48" TILE - OPEN CUT (D AVENUE AND 230TH STREET)	\$ 175.00	LF	130	LF	\$ 22,750.00
1017	TILE REMOVAL	\$ 10.00	LF	130	LF	\$ 1,300.00
1018	HICKENBOTTOM INTAKE	\$ 2,000.00	EA	4	EA	\$ 8,000.00
1019	PERMANENT SEEDING AND WARRANTY	\$ 3,000.00	LOC	1	LOC	\$ 3,000.00
1020	TRAFFIC CONTROL	\$ 3,000.00	LOC	1	LOC	\$ 3,000.00
CONSTRUCTION SUBTOTAL						\$ 38,050.00
Contingency (15%)						\$ 5,707.50
CONSTRUCTION TOTAL						\$ 43,757.50
Engr. & Const. Observation (25%)						\$ 10,939.38
TOTAL COST						\$ 54,696.88

UPPER MAIN TILE OUTLET WITH SINGLE TILE UPSIZING - IMPROVEMENT (1/2")

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



By: J.V.S.

Date: 3/1/2019

Checked By: L.O.G.

Date: 3/12/2019

Engineer's Opinion of Probable Construction Cost

Project: **Upper Main Tile Outlet with Single Tile Upsizing for D.D. #56**

Location: Sections 1, 4, 7, 8, 9, 10, 11, 12 & 17 T87N, R22W Hardin County, Iowa

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost
DISTRICT CONSTRUCTION COSTS						
1101	72" CMP TILE OUTLET	\$ 175.00	LF	40	LF	\$ 7,000.00
1102	60" TRIPLE WALL PPE or RCP TILE	\$ 175.00	LF	6365	EA	\$ 1,113,875.00
1103	54" TRIPLE WALL PPE or RCP TILE	\$ 150.00	LF	1400	EA	\$ 210,000.00
1104	48" TRIPLE WALL PPE or RCP TILE	\$ 110.00	LF	200	LF	\$ 22,000.00
1105	60" x 54" REDUCER	\$ 4,000.00	EA	1	EA	\$ 4,000.00
1106	54" x 48" REDUCER	\$ 3,500.00	EA	1	EA	\$ 3,500.00
1107	48" x 24" REDUCER	\$ 3,000.00	EA	1	EA	\$ 3,000.00
1108	72" RODENT GUARD	\$ 2,000.00	EA	1	EA	\$ 2,000.00
1109	BANK STABILIZATION	\$ 50.00	TON	50	TON	\$ 2,500.00
1110	PLUG EXISTING DOWNSTREAM MAIN TILE	\$ 1,000.00	LOC	1	LOC	\$ 1,000.00
1111	LATERAL TILE CONNECTIONS	\$ 1,000.00	EA	7	EA	\$ 7,000.00
1112	CONCRETE COLLAR	\$ 600.00	EA	2	EA	\$ 1,200.00
1113	PRIVATE TILE CONNECTIONS	\$ 500.00	EA	40	EA	\$ 20,000.00
1114	TILE LOCATION	\$ 150.00	STA	33.22	STA	\$ 4,983.00
1115	TILE REMOVAL	\$ 5.00	LF	3322	LF	\$ 16,610.00
CONSTRUCTION SUBTOTAL						\$ 1,418,668.00
Contingency (10%)						\$ 141,866.80
CONSTRUCTION TOTAL						\$ 1,560,534.80
Engr. & Const. Observation (20%)						\$ 312,106.96
TOTAL COST						\$ 1,872,641.76
ROAD CROSSING CONSTRUCTION COSTS						
1116	60" TILE - OPEN CUT (D AVENUE AND 230TH STREET)	\$ 225.00	LF	130	LF	\$ 29,250.00
1117	TILE REMOVAL	\$ 10.00	LF	130	LF	\$ 1,300.00
1118	HICKENBOTTOM INTAKE	\$ 2,000.00	EA	4	EA	\$ 8,000.00
1119	PERMANENT SEEDING AND WARRANTY	\$ 3,000.00	LOC	1	LOC	\$ 3,000.00
1120	TRAFFIC CONTROL	\$ 3,000.00	LOC	1	LOC	\$ 3,000.00
CONSTRUCTION SUBTOTAL						\$ 44,550.00
Contingency (15%)						\$ 6,682.50
CONSTRUCTION TOTAL						\$ 51,232.50
Engr. & Const. Observation (25%)						\$ 12,808.13
TOTAL COST						\$ 64,040.63

UPPER MAIN TILE OUTLET WITH SINGLE TILE UPSIZING - IMPROVEMENT (1")

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



By: J.V.S.

Date: 3/1/2019

Checked By: L.O.G.

Date: 3/12/2019

Engineer's Opinion of Probable Construction Cost

Project: **Upper Main Tile Outlet with Dual Tile Upsizing** for D.D. #56

Location: Sections 1, 4, 7, 8, 9, 10, 11, 12 & 17 T87N, R22W Hardin County, Iowa

UPPER MAIN TILE OUTLET WITH DUAL TILE UPSIZING - IMPROVEMENT (1/2")

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost
DISTRICT CONSTRUCTION COSTS						
1201	42" CMP TILE OUTLET	\$ 110.00	LF	40	LF	\$ 4,400.00
1202	36" CMP TILE OUTLET	\$ 90.00	LF	40	LF	\$ 3,600.00
1203	36" TRIPLE WALL PPE or RCP TILE	\$ 90.00	LF	6365	EA	\$ 572,850.00
1204	30" DUAL WALL PPE or RCP TILE	\$ 75.00	LF	9365	EA	\$ 702,375.00
1205	27" DUAL WALL PPE or RCP TILE	\$ 50.00	LF	200	LF	\$ 10,000.00
1206	36" x 30" REDUCER	\$ 2,000.00	EA	1	EA	\$ 2,000.00
1207	30" x 27" REDUCER	\$ 1,800.00	EA	1	EA	\$ 1,800.00
1208	27" x 24" REDUCER	\$ 1,600.00	EA	1	EA	\$ 1,600.00
1209	30" x 24" REDUCER	\$ 1,800.00	EA	1	EA	\$ 1,800.00
1210	FLOW EQUALIZATION STRUCTURE	\$ 10,000.00	EA	8	EA	\$ 80,000.00
1211	42" RODENT GUARD	\$ 1,000.00	EA	1	EA	\$ 1,000.00
1212	36" RODENT GUARD	\$ 750.00	EA	1	EA	\$ 750.00
1213	BANK STABILIZATION	\$ 50.00	TON	50	TON	\$ 2,500.00
1214	PLUG EXISTING DOWNSTREAM MAIN TILE	\$ 1,000.00	LOC	1	LOC	\$ 1,000.00
1215	LATERAL TILE CONNECTIONS	\$ 1,000.00	EA	7	EA	\$ 7,000.00
1216	CONCRETE COLLAR	\$ 600.00	EA	2	EA	\$ 1,200.00
1217	PRIVATE TILE CONNECTIONS	\$ 500.00	EA	40	EA	\$ 20,000.00
1218	TILE LOCATION	\$ 150.00	STA	33.22	STA	\$ 4,983.00
1219	TILE REMOVAL	\$ 5.00	LF	3322	LF	\$ 16,610.00
CONSTRUCTION SUBTOTAL						\$ 1,435,468.00
Contingency (10%)						\$ 143,546.80
CONSTRUCTION TOTAL						\$ 1,579,014.80
Engr. & Const. Observation (20%)						\$ 315,802.96
TOTAL COST						\$ 1,894,817.76
ROAD CROSSING CONSTRUCTION COSTS						
1220	36" TILE - OPEN CUT (D AVENUE AND 230TH STREET)	\$ 125.00	LF	130	LF	\$ 16,250.00
1221	30" TILE - OPEN CUT (D AVENUE AND 230TH STREET)	\$ 105.00	LF	130	LF	\$ 13,650.00
1222	TILE REMOVAL	\$ 10.00	LF	130	LF	\$ 1,300.00
1223	HICKENBOTTOM INTAKE	\$ 2,000.00	EA	4	EA	\$ 8,000.00
1224	PERMANENT SEEDING AND WARRANTY	\$ 3,000.00	LOC	1	LOC	\$ 3,000.00
1225	TRAFFIC CONTROL	\$ 3,000.00	LOC	1	LOC	\$ 3,000.00
CONSTRUCTION SUBTOTAL						\$ 45,200.00
Contingency (15%)						\$ 6,780.00
CONSTRUCTION TOTAL						\$ 51,980.00
Engr. & Const. Observation (25%)						\$ 12,995.00
TOTAL COST						\$ 64,975.00

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



By: J.V.S.

Date: 3/1/2019

Checked By: L.O.G.

Date: 3/12/2019

Engineer's Opinion of Probable Construction Cost

Project: Upper Main Tile Outlet with Dual Tile Upsizing for D.D #56

Location: Sections 1, 4, 7, 8, 9, 10, 11, 12 & 17 T87N, R22W Hardin County, Iowa

UPPER MAIN TILE OUTLET WITH DUAL TILE UPSIZING - IMPROVEMENT (1")

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost
DISTRICT CONSTRUCTION COSTS						
1301	54" CMP TILE OUTLET	\$ 130.00	LF	40	LF	\$ 5,200.00
1302	42" CMP TILE OUTLET	\$ 110.00	LF	40	LF	\$ 4,400.00
1303	48" TRIPLE WALL PPE or RCP TILE	\$ 130.00	LF	6365	EA	\$ 827,450.00
1304	42" TRIPLE WALL PPE or RCP TILE	\$ 90.00	LF	1400	EA	\$ 126,000.00
1305	36" TRIPLE WALL PPE or RCP TILE	\$ 90.00	LF	8165	EA	\$ 734,850.00
1306	48" x 42" REDUCER	\$ 3,000.00	EA	1	EA	\$ 3,000.00
1307	42" x 36" REDUCER	\$ 2,500.00	EA	1	EA	\$ 2,500.00
1308	36" x 24" REDUCER	\$ 2,000.00	EA	2	EA	\$ 4,000.00
1309	FLOW EQUALIZATION STRUCTURE	\$ 10,000.00	EA	8	EA	\$ 80,000.00
1310	54" RODENT GUARD	\$ 1,500.00	EA	1	EA	\$ 1,500.00
1311	42" RODENT GUARD	\$ 1,100.00	EA	1	EA	\$ 1,100.00
1312	BANK STABILIZATION	\$ 50.00	TON	50	TON	\$ 2,500.00
1313	PLUG EXISTING DOWNSTREAM MAIN TILE	\$ 1,000.00	LOC	1	LOC	\$ 1,000.00
1314	LATERAL TILE CONNECTIONS	\$ 1,000.00	EA	7	EA	\$ 7,000.00
1315	CONCRETE COLLAR	\$ 600.00	EA	2	EA	\$ 1,200.00
1316	PRIVATE TILE CONNECTIONS	\$ 500.00	EA	40	EA	\$ 20,000.00
1317	TILE LOCATION	\$ 150.00	STA	33.22	STA	\$ 4,983.00
1318	TILE REMOVAL	\$ 5.00	LF	3322	LF	\$ 16,610.00
CONSTRUCTION SUBTOTAL						\$ 1,843,293.00
Contingency (10%)						\$ 184,329.30
CONSTRUCTION TOTAL						\$ 2,027,622.30
Engr. & Const. Observation (20%)						\$ 405,524.46
TOTAL COST						\$ 2,433,146.76
ROAD CROSSING CONSTRUCTION COSTS						
1319	48" TILE - OPEN CUT (D AVENUE AND 230TH STREET)	\$ 175.00	LF	130	LF	\$ 22,750.00
1320	36" TILE - OPEN CUT (D AVENUE AND 230TH STREET)	\$ 110.00	LF	130	LF	\$ 14,300.00
1321	TILE REMOVAL	\$ 10.00	LF	130	LF	\$ 1,300.00
1322	HICKENBOTTOM INTAKE	\$ 2,000.00	EA	4	EA	\$ 8,000.00
1323	PERMANENT SEEDING AND WARRANTY	\$ 3,000.00	LOC	1	LOC	\$ 3,000.00
1324	TRAFFIC CONTROL	\$ 3,000.00	LOC	1	LOC	\$ 3,000.00
CONSTRUCTION SUBTOTAL						\$ 52,350.00
Contingency (15%)						\$ 7,852.50
CONSTRUCTION TOTAL						\$ 60,202.50
Engr. & Const. Observation (25%)						\$ 15,050.63
TOTAL COST						\$ 75,253.13

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



ENGINEERS • LAND SURVEYORS

By: J.V.S.

Date: 3/1/2019

Checked By: L.O.G.

Date: 3/12/2019

Engineer's Opinion of Probable Construction Cost

Project: Upper Main Tile Outlet with Parallel Tile Upsizing for D.D. #56

Location: Sections 1, 4, 7, 8, 9, 10, 11, 12 & 17 T87N, R22W Hardin County, Iowa

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost
DISTRICT CONSTRUCTION COSTS						
1401	48" CMP TILE OUTLET	\$ 120.00	LF	40	LF	\$ 4,800.00
1402	42" TRIPLE WALL PPE or RCP TILE	\$ 110.00	LF	6365	LF	\$ 700,150.00
1403	36" TRIPLE WALL PPE or RCP TILE	\$ 75.00	LF	1400	LF	\$ 105,000.00
1404	30" DUAL WALL PPE or RCP TILE	\$ 60.00	LF	200	LF	\$ 12,000.00
1405	42" x 36" REDUCER	\$ 2,500.00	EA	1	EA	\$ 2,500.00
1406	36" x 30" REDUCER	\$ 2,000.00	EA	1	EA	\$ 2,000.00
1407	30" x 24" REDUCER	\$ 1,800.00	EA	1	EA	\$ 1,800.00
1408	FLOW EQUALIZATION STRUCTURE	\$ 10,000.00	EA	4	EA	\$ 40,000.00
1409	48" RODENT GUARD	\$ 1,250.00	EA	1	EA	\$ 1,250.00
1410	BANK STABILIZATION	\$ 50.00	TON	50	TON	\$ 2,500.00
1411	PLUG EXISTING DOWNSTREAM MAIN TILE	\$ 1,000.00	LOC	1	LOC	\$ 1,000.00
1412	LATERAL TILE CONNECTIONS	\$ 1,000.00	EA	7	EA	\$ 7,000.00
1413	CONCRETE COLLAR	\$ 600.00	EA	2	EA	\$ 1,200.00
1414	PRIVATE TILE CONNECTIONS	\$ 500.00	EA	40	EA	\$ 20,000.00
1415	TILE LOCATION	\$ 150.00	STA	33.22	STA	\$ 4,983.00
1416	TILE REMOVAL	\$ 5.00	LF	3322	LF	\$ 16,610.00
CONSTRUCTION SUBTOTAL						\$ 922,793.00
Contingency (10%)						\$ 92,279.30
CONSTRUCTION TOTAL						\$ 1,015,072.30
Engr. & Const. Observation (20%)						\$ 203,014.46
TOTAL COST						\$ 1,218,086.76
ROAD CROSSING CONSTRUCTION COSTS						
1417	42" TILE - OPEN CUT (D AVENUE AND 230TH STREET)	\$ 130.00	LF	130	LF	\$ 16,900.00
1418	TILE REMOVAL	\$ 10.00	LF	130	LF	\$ 1,300.00
1419	HICKENBOTTOM INTAKE	\$ 2,000.00	EA	4	EA	\$ 8,000.00
1420	PERMANENT SEEDING AND WARRANTY	\$ 3,000.00	LOC	1	LOC	\$ 3,000.00
1421	TRAFFIC CONTROL	\$ 3,000.00	LOC	1	LOC	\$ 3,000.00
CONSTRUCTION SUBTOTAL						\$ 32,200.00
Contingency (15%)						\$ 4,830.00
CONSTRUCTION TOTAL						\$ 37,030.00
Engr. & Const. Observation (25%)						\$ 9,257.50
TOTAL COST						\$ 46,287.50

UPPER MAIN TILE OUTLET WITH PARALLEL TILE UPSIZING - IMPROVEMENT (1/2")

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



By: J.V.S.

Date: 3/1/2019

Checked By: L.O.G.

Date: 3/12/2019

Engineer's Opinion of Probable Construction Cost

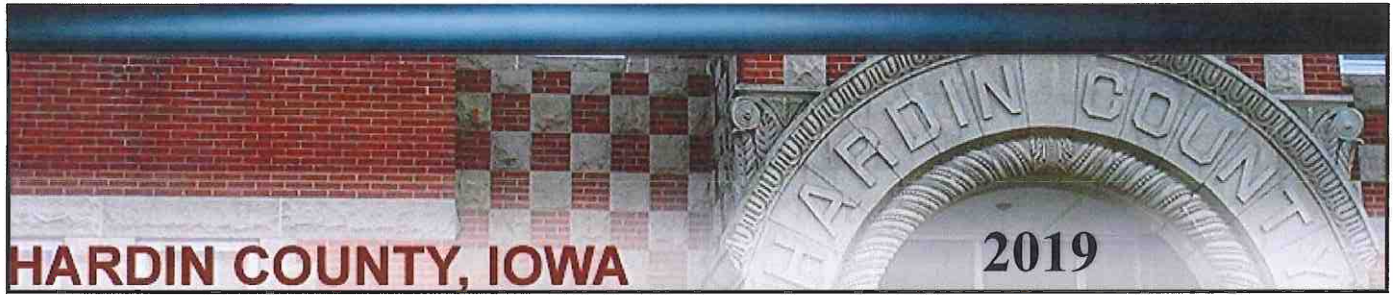
Project: Upper Main Tile Outlet with Parallel Tile Upsizing for D.D. #56

Location: Sections 1, 4, 7, 8, 9, 10, 11, 12 & 17 T87N, R22W Hardin County, Iowa

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost
DISTRICT CONSTRUCTION COSTS						
1501	60" CMP TILE OUTLET	\$ 140.00	LF	40	LF	\$ 5,600.00
1502	54" TRIPLE WALL PPE or RCP TILE	\$ 170.00	LF	6365	EA	\$ 1,082,050.00
1503	48" TRIPLE WALL PPE or RCP TILE	\$ 110.00	LF	1400	LF	\$ 154,000.00
1504	42" TRIPLE WALL PPE or RCP TILE	\$ 90.00	LF	200	LF	\$ 18,000.00
1505	54" x 48" REDUCER	\$ 3,500.00	EA	1	EA	\$ 3,500.00
1506	48" x 42" REDUCER	\$ 3,000.00	EA	1	EA	\$ 3,000.00
1507	42" x 24" REDUCER	\$ 3,000.00	EA	1	EA	\$ 3,000.00
1508	FLOW EQUILIZATION STRUCTURE	\$ 10,000.00	EA	4	EA	\$ 40,000.00
1509	60" RODENT GUARD	\$ 1,750.00	EA	1	EA	\$ 1,750.00
1510	BANK STABILIZATION	\$ 50.00	TON	50	TON	\$ 2,500.00
1511	PLUG EXISTING DOWNSTREAM MAIN TILE	\$ 1,000.00	LOC	1	LOC	\$ 1,000.00
1512	LATERAL TILE CONNECTIONS	\$ 1,000.00	EA	7	EA	\$ 7,000.00
1513	CONCRETE COLLAR	\$ 600.00	EA	2	EA	\$ 1,200.00
1514	PRIVATE TILE CONNECTIONS	\$ 500.00	EA	40	EA	\$ 20,000.00
1515	TILE LOCATION	\$ 150.00	STA	33.22	STA	\$ 4,983.00
1516	TILE REMOVAL	\$ 5.00	LF	3322	LF	\$ 16,610.00
CONSTRUCTION SUBTOTAL						\$ 1,364,193.00
Contingency (10%)						\$ 136,419.30
CONSTRUCTION TOTAL						\$ 1,500,612.30
Engr. & Const. Observation (20%)						\$ 300,122.46
TOTAL COST						\$ 1,800,734.76
ROAD CROSSING CONSTRUCTION COSTS						
1517	54" TILE - OPEN CUT (D AVENUE AND 230TH STREET)	\$ 200.00	LF	130	LF	\$ 26,000.00
1518	TILE REMOVAL	\$ 10.00	LF	130	LF	\$ 1,300.00
1519	HICKENBOTTOM INTAKE	\$ 2,000.00	EA	4	EA	\$ 8,000.00
1520	PERMANENT SEEDING AND WARRANTY	\$ 3,000.00	LOC	1	LOC	\$ 3,000.00
1521	TRAFFIC CONTROL	\$ 3,000.00	LOC	1	LOC	\$ 3,000.00
CONSTRUCTION SUBTOTAL						\$ 41,300.00
Contingency (15%)						\$ 6,195.00
CONSTRUCTION TOTAL						\$ 47,495.00
Engr. & Const. Observation (25%)						\$ 11,873.75
TOTAL COST						\$ 59,368.75


UPPER MAIN TILE OUTLET WITH PARALLEL TILE UPSIZING - IMPROVEMENT (1")


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



**ENGINEER'S REPORT
ON
IMPROVEMENTS
TO
MAIN TILE
DRAINAGE DISTRICT
NO. 56
HARDIN COUNTY,
IOWA**



	<p>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</p> <p><i>Lee O. Gallentine</i> P.E. Feb 8, 2019 LEE O. GALLENTINE, P.E. DATE</p> <p>LICENSE NUMBER: 15745 MY LICENSE RENEWAL DATE IS DECEMBER 31, 2020 PAGES OR SHEETS COVERED BY THIS SEAL: SHOWN ON TABLE OF CONTENTS</p>
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	<p>CLAPSADDLE-GARBER ASSOCIATES OFFICE LOCATIONS</p> <p>16 East Main Street, PO Box 754 Marshalltown, IA 50158 1523 S. Bell Avenue, Suite 101 Ames, IA 50010 5106 Nordic Drive Cedar Falls, IA 50613 739 Park Avenue Ackley, IA 50601 511 Bank Street Webster City, IA 50595</p>	<p>Project Office 739 Park Avenue Ackley, IA. 50601 Phone: 641-847-3273 Fax: 641-847-2303</p>
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**Engineer's Report on
Improvements to Main Tile,
Drainage District No. 56
Hardin County, Iowa**

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Engineer's Report on Improvements to Main Tile, Drainage District No. 56 Hardin County, Iowa

1.0 INTRODUCTION

- SCOPE OF WORK – The Hardin County Board of Supervisors, acting as District Trustees, requested Clapsaddle-Garber Associates to investigate and report concerning improvements to the Main tile of Drainage District No. 56. This report will summarize the history of repairs, investigate the necessity and feasibility of said improvements, and present opinions of probable construction costs associated with said improvements. At the Landowner's Meeting held on March 28, 2018, Work Order #204 was discussed and reviewed by the District Trustees. For reference, a copy of the meeting minutes is included in Appendix L and a copy of Work Order #204 is included in Appendix M. As a result of this meeting, the District Trustees requested Clapsaddle-Garber Associates to move ahead with an investigation and report concerning improvements to the Main tile.

- LOCATION – The area of investigation was the entire length of the Main tile. Said Main tile is located in Sections 1, 4, 7, 8, 9, 10, 11, 12, and 17, Township 87 North (T87N), Range 22 West (R22W), Hardin County, Iowa. Specifically, the downstream limit of investigation is in Section 1 where the Main tile outlets into the Main Open Ditch a few hundred feet north of 230th Street at approximately ½ mile east of G Avenue. Going upstream, the tile then crosses 230th Street and enters Section 12. It proceeds southwest across Section 12 and enters Section 11 when it crosses G Avenue at approximately ½ mile south of 230th Street. It then proceeds west, northwest, and southwest, and enters Section 10 when it crosses County Highway S27 at approximately ⅜ mile south of 230th Street. From here, it proceeds northwest and southwest across Section 10 and enters Section 9 when it crosses E Avenue at approximately ⅛ mile south of 230th Street. It then continues southwest and northwest and enters Section 4 when it crosses 230th Street at approximately ¼ mile east of D Avenue. In Section 4, it continues northwest and southwest and reenters Section 9 briefly at the intersection of D Avenue and 230th Street. From there it enters Section 8, where it proceeds southwest until it is approximately ⅜ mile south of 230th Street and approximately ⅜ mile east of County Highway S21. At that point, it turns south and southeast and enters Section 17 at approximately ⅜ mile east of County Highway S21. From there it continues south and ends at approximately ⅜ mile east and approximately ¼ south of the intersection of County Highway S21 and 240th Street. For reference, a map showing the limits of investigation is included in Appendix I.

2.0 DISTRICT HISTORY – The following is a summary of the pertinent history of Drainage District No. 56 as obtained from the Hardin County Auditor’s drainage minutes and records.

- 1914, April 2 Petition for the establishment of a drain starting in Section 11 and terminating in Section 17.
- 1915, Feb 2 Report filed by S.B Gardner, Engineer, for the establishment of a drainage district. It included an estimate of the materials for the construction of a Main and Laterals.
- 1915 Notice of hearing for the petition. Hearing to take place on March 12th.
- 1915, Mar 12 Hearing on the establishment of a drainage district held. Further hearing to take place on March 24th.
- 1915, Mar 24 Hearing on the establishment of a drainage district held. Lacking a quorum, meeting was adjourned, and meeting continued.
- 1915, July 13 Revision to the Engineer’s report recommending the elimination of Laterals 12, 14, 23, 24, 25, 26, 27, 36, 39, and 37. It also recommended that the Main tile not be constructed from Sta. 0+00 to 16+50 and that the bulkhead be constructed at Sta. 16+50.
- 1915, July 14 Drainage district established as specified in the report of E.W. Edwards, Engineer, and it was to be construction per the plans and specifications. E.W. Edwards appointed as engineer on the construction and the County Auditor instructed to advertise for bids for material and for labor for the construction. Said construction was to be completed by January 1, 1917.
- 1915, July Notice to contractors for the bid letting. Bids to be received until August 9th.
- 1915, Aug 9 Contract awarded to Evens & Howard Fire Brick Company of St. Louis.
- 1915, Dec 15 E.W. Edwards resigns as Drainage Engineer for construction.
- 1915, Dec 17 W.S. Porter appointed as Drainage Engineer for construction.
- 1917, Mar 20 NW¼ NW¼ Section 20; NE¼ NW¼ Section 20; SE¼ SW¼ Section 17; SW¼ SW¼ Section 17; SW¼ SE¼ Section 17, NW¼ SE¼ Section 17; NE¼ SW¼ Section 17; and NW¼ SW¼ of Section 17 exempted from assessments.
- 1918, Mar 19 Approval of Engineer’s letter recommending that the Main tile be constructed of cement 8” sewer pipe at Sta. 684+00 due to sand pockets found during construction.
- 1918, Nov 11 Bill for filling of ditch.
- 1918, Nov 18 Engineer’s report recommended a 2,500 feet long 12” relief tile beginning at Sta. 625 on the Main tile.
- 1919, May 5 Engineer’s report stated that Lateral 3 was found crushed at the connection to the Main tile and had been repaired.
- 1921, June 20 Engineer reported that the tile just above the outlet had never been filled and recommended that the four hundred feet be filled.
- 1929, Oct 15 3 bills for work done.
- 1929, Dec 17 Bill for work done.

1936, Nov 16	3 bills for work done.
1937, Apr 26	2 bills for work done to Main drain.
1937, Aug 13	Bill for work done.
1938, July 25	2 bills for work done.
1939, May 29	6 bills for work done.
1939, July 17	Bill for work done.
1941, May 6 th	6 bills for work done.
1943, June 14	3 bills for work done.
1943, Nov 16	8 bills for work done.
1944, June 16	Bill for work done.
1944, Sept 5	Bill for work done.
1944, Oct 24	Bill for work done.
1944, Nov 21	3 bills for work done.
1945, Oct 2	Bill for work done.
1946, Dec 3	2 bills for work done.
1947, Jan 21	21 bills for work done.
1947, Feb	5 bills for work done.
1947, Mar	Bill for work done.
1947, Apr 8	4 bills for work done.
1947, May 6	3 bills for work done.
1947, June 3	Bill for work done.
1948, Feb 24	4 bills for work done.
1948, Apr	4 bills for work done.
1948, May 5	2 bills for work done.
1949, Feb 1	4 bills for work done.
1949, May 2	3 bills for work done.
1949, Aug 15	Bill for work done.
1950, Sept	5 bills for work done.
1950, Dec 21	5 bills for work done.
1951, Mar 19	Bill for work done.
1951, June 27	5 bills for work done.
1953, Jan	3 bills for work done.
1953, Jan 28	Bill for work done in NE¼ Section 8 and NW¼ Section 12.
1953, May	Bill for work done.

1953, May 11-13 Repair in SE $\frac{1}{4}$ Section 11 and NW $\frac{1}{4}$ Section 12.

1953, May 18 Repair to 32" Main tile in SE $\frac{1}{4}$ Section 11.

1953, June 1^h Bill for work done.

1953, June 30 3 bills for work done.

1953, Nov Bill for work done.

1954, Jan 14 Bill for repair in SE $\frac{1}{4}$ Section 11 and NW $\frac{1}{4}$ Section 12.

1955, Jan 14 Bill for repair in NW $\frac{1}{4}$ Section 12.

1955, Aug 11 Repair to tile in NW $\frac{1}{4}$ Section 11.

1955, Nov 15 Repair to riser in NE $\frac{1}{4}$ Section 11.

1959, Apr 18 Bill for work done in N $\frac{1}{2}$ Section 11.

1959, May 13 Bill for repair to 30" Main tile in SE $\frac{1}{4}$ Section 11.

1959, July 20 Bill for repair to 32" Main tile in E $\frac{1}{2}$ Section 11.

1961, May 11 Bill for work done in NE $\frac{1}{4}$ Section 11.

1962, May 2 Bill for work done in Section 4.

1963, Aug 8 Repaired 32" Main tile in NW $\frac{1}{4}$ Section 12.

1964, Oct 23 Repair to 18" Main tile in NW $\frac{1}{4}$ Section 8.

1965, Oct 11 Work done in Section 12.

1965, Dec 15 Repair in NE $\frac{1}{4}$ Section 8.

1966, Apr 14 Repair in Section 8.

1969, May 12 Repair in Section 8.

1969, Sept 24 Bill for work done in Section 1.

1969, Dec 1 Repair to Main tile in Section 11.

1971, Feb 2 Large tile reported broken in two places in Section 8.

1971, Dec 7 Bill for work done in Section 10.

1973, May 31 Bill for work done in Section 11.

1974, May 1 Repair to Main tile in Section 8

1974, June 4 Repair in Section 8.

1975, June 3 Repair to broken intake and tile in road ditch in Section 9.

1975, Sept 12 Bill for work done in Sections 11 and 12.

1976, June 2 Repair to Main tile in NW $\frac{1}{4}$ Section 12.

1976, June 15 Engineer authorized to make preliminary report concerning cleanout and repair the Main drain.

1976, Dec 16 Request for cleanout of Main Open Ditch from Main tile outlet to Tipton Creek and creation of surface drain on west side of railroad in Section 11.

1977, Mar 11 Report on proposed improvement, repairs, and outlet extension submitted by Phil Haefner, engineer. Report included repairs to the Main tile, improvement to Main Open Ditch, and open channel extension from the Main tile outlet to Tipton Creek.

1977, Mar 16 Preliminary report by Phil Haefner tentatively accepted. Hearing date set for April 26, 1977.

1977, Mar 28 Notice of hearing for the proposed repairs, improvements and extension of outlet. Hearing is to take place April 26, 1977.

1977, Apr 26 Hearing for proposed repairs and improvement. Engineer's report approved.

1977, May 11 Repair to Main tile in NE $\frac{1}{4}$ Section 8.

1977, May 31 Engineer's report (including 450 feet of tile repairs) approved and bid opening date set for July 19th. Suggested commencement date set for October 30th and completion date set for May 1, 1978.

1977, June 25 Specifications for construction of drainage improvements and repairs submitted by Phil Haefner.

1977, July 19 Bid letting with bid from B & B Excavating of Parkersburg, Iowa accepted. Also, the design for the surface drain beneath the railroad was modified.

1977, Aug 3 Bill for repair to tile in Section 8.

1978, Apr 21 Request for extension of completion date granted due to weather.

1978, May 18 Modifications to proposed outlet extension due railroad pilings.

1978, June 26 Modifications to proposed outlet extension due to boulders.

1978, June 27 Engineer ordered to prepare report showing modifications to proposed outlet extension.

1978, Oct 16 Engineer submitted letter of completion.

1978, Oct 17 Engineer's report on completion accepted and hearing date set for November 9th.

1978, Nov 9 Repair and improvement accepted as completed by District Trustees.

1980, June 9 Repair to 12" tile in SW $\frac{1}{4}$ Section 8.

1980, Aug 13 Bill for repair to 12" tile in Section 8.

1981, July 21st Tile that outlets on surface reported washed out in SE $\frac{1}{4}$ SW $\frac{1}{4}$ Section 1. Secondary Road Department authorized to repair.

1981, Oct 21 Bill for repair of washed out tile in Section 1.

1982, July 12 Tile reported washed out in Section 11.

1983, May 2 36" Main tile reported broken in Section 12.

1983, Oct 24 Previously reported broken Main tile found to not be broken, but instead outlet needed repaired.

1984, Apr 24 Request for repair to broken 30" Main tile in NE $\frac{1}{4}$ Section 9.

1984, Apr 30 Blowout/sinkhole reported where tile is broken in Section 9.

1984, Oct 8 Blowout over 28" Main tile reported in Section 9.

1984, Oct 23	Bill for repair of broken 30" Main tile in NE $\frac{1}{4}$ Section 9.
1985, June 17	Bill for repair of broken 28" Main tile in NE $\frac{1}{4}$ NW $\frac{1}{4}$ Section 9.
1986, May 7	Request for repair of broken tile in NW $\frac{1}{4}$ Section 9.
1986, May 14	Broken tile reported in Section 9.
1986, June 18	Bill for repair of broken 30" Main tile in NW $\frac{1}{4}$ Section 9.
1986, Sept 8	Bill for replacement of 400 feet of 12" cement tile in SE $\frac{1}{4}$ SW $\frac{1}{4}$ Section 8.
1990, June 13	Bill for repair of broken intake and tile in NW $\frac{1}{4}$ Section 11.
1990, July 24	Request for repair to tile in NE $\frac{1}{4}$ Section 9 with crew to verify that tile is district tile.
1990, Aug 29	Request for repair with crew directed to check on condition of the Main tile.
1990, Oct 1	Bill for repair of broken tile in Section 9.
1991, Oct 30	Request for repair approved for broken tile in NE $\frac{1}{4}$ Section 9.
1992, Apr 14	Crew directed to verify and repair tile as requested in Section 10.
1992, Apr 15	Bill for repair to broken tile in NE $\frac{1}{4}$ Section 9.
1992, May 15	Bill for repair to broken tile in SE $\frac{1}{4}$ NE $\frac{1}{4}$ Section 10.
1994, May 11	Request for repair approved for broken tile in Section 8.
1994, May 23	Bill for repair of broken tile in NW $\frac{1}{4}$ and SW $\frac{1}{4}$ Section 8.
1998, July 15	Crew directed to verify and repair Main tile as requested in NE $\frac{1}{4}$ Section 9.
1998, Nov 16	Request for repair approved for two broken tiles in NW $\frac{1}{4}$ Section 10.
1999, July 21	Bill for repair to broken tile in NE $\frac{1}{4}$ Section 9.
2001, Dec 3	Request for repair to broken tile in NE $\frac{1}{4}$ SE $\frac{1}{4}$ Section 11.
2001, Dec	Bill for repair to broken tile in Section 11.
2008, June 9	Bill for repair to two broken tiles in SW $\frac{1}{4}$ Section 8.
2009, Apr 15	Repairs to tile intake approved in NW $\frac{1}{4}$ NW $\frac{1}{4}$ Section 8.
2009, May 20	Repairs approved for Lateral 29 connection to Main tile in NW $\frac{1}{4}$ Section 8.
2010, Apr 21	Request for repair to sinkhole/blowout and broken tile approved in NE $\frac{1}{4}$ Section 10.
2010, June 11	Bill for repair of broken Main tile in NW $\frac{1}{4}$ NE $\frac{1}{4}$ Section 10.

3.0 INVESTIGATION – For the investigation portion of this report, field observations and office investigations were performed. The field observation for this report was limited to determining a possible route for an upper Main tile outlet near E Avenue from the existing Main tile to the Main Open Ditch of Drainage District 26. Said observation was limited to visual observation (without excavation) and preliminary field survey of the same.

Office investigation started with a review of district history. Said review shows that there were repairs requested within 15 years after the initial construction of the Main tile. This is probably an indication of poor workmanship during construction, usage of inferior materials, or inadequate design. Since then, repairs have been pretty common with over 100 repairs during the last 90 years. Many details of these repairs have been lost to time, but it appears many of them have consisted of tile replacements due to blowouts and sinkholes. In addition, these repairs have been fairly consistent in their occurrence and do not appear to have accelerated over recent years.

All other office investigations were limited to office calculations and records research. Using this information, calculations were performed to determine the drainage coefficient for the length of the existing Main tile. It appears that the Main tile was designed to provide a drainage coefficient of 0.07 inches per day at the downstream and upstream ends, with the length of the Main tile varying from 0.03 to 0.22 inches per day.

4.0 DISCUSSION AND CONCLUSIONS – Based on the above, it is apparent that the Main tile has issues which warrant corrective actions. First, the Main tile has a history of failure based on the sheer number of repairs. In many drainage districts, repairs are attributable to physical deterioration as the tile reaches the end of its lifecycle. Although this may be true in this district also, the regularity of the repairs over the last 90 years indicates that something else is at play. These historic repairs are probably due to a combination of overloading of the tile, poor soil conditions, lack of soil over, or differential drainage capacity along the length of the Main tile. As mentioned in the Investigation section above, all of these can probably be attributed to poor workmanship during construction, usage of inferior materials, or inadequate design. Finally, the capacity of the existing Main tile is far below that of modern preferred drainage coefficients of ½ inch per day to 1 inch per day.

If some corrective action is not undertaken, the physical failures of the Main tile will accelerate. This will allow soil to enter the tile and the physical failures will manifest themselves as more sinkholes and soil infiltration. Also, if said corrective action does not increase the drainage capacity, the Main tile will continue to provide less than desirable drainage performance at best and in some locations continue the pattern of almost annual failures. When all the issues are combined, it will lead to further reduced drainage and liability exposure by the drainage district.

5.0 IMPROVEMENT METHODS – To improve the drainage capacity for the existing Main tile, the following options are the most straightforward available:

Upper Main Tile Outlet

- Sever the existing Main tile, install a new outlet to the Main Open Ditch of Drainage District 26, and divert flows from the upper portion of the Main tile to the new outlet. For reference, a chart with the required tile sizes and capacities is included in Appendix P.
- The point of severing and the new outlet would be at approximately ¼ mile east of E Avenue and run in a northerly direction (following the lower points of the land) until reaching the Main Open Ditch of Drainage District 26. For reference, the general route is shown on the map included in Appendix O.

Single Tile Upsizing

- For the entire length of the Main tile, remove and replace the existing Main tile with a single new Main tile of greater capacity. For reference, a chart with the required tile sizes and capacities is included in Appendix R.
- 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 lateral connections. For reference, the general route is shown on the map included in Appendix Q.

Dual Tile Upsizing

- For the entire length of the Main tile, remove and replace the existing Main tile with two new Main tiles of greater combined capacity with interconnections for flow equalization. For reference, a chart with the required tile sizes and capacities is included in Appendix S.
- Typically, the replacement Main tiles would be in the same location as the existing Main tile in order to locate and reconnect private tile and lateral connections. For reference, the general route is shown on the map included in Appendix Q.

Parallel Tile Upsizing

- For the entire length of the Main tile, leave the existing Main tile in place and install a new parallel Main tile for greater combined capacity. For reference, a chart with the required tile sizes and capacities is included in Appendix T.
- Typically, the supplemental Main tile would be near the location of the existing Main tile in order to locate and reconnect private tile and lateral connections and interconnect the two for flow equalization. For reference, the general route is shown on the map included in Appendix Q.

Open Ditch Construction

- For the entire length of the Main tile, remove and replace the existing Main tile with a Main Open Ditch. For reference, a chart with the open ditch depths and capacities is included in Appendix U.
- Typically, the Main Open Ditch would be in the same location and same depth as the existing Main tile in order to locate and outlet private tile and lateral connections. For reference, the general route is shown on the map included in Appendix Q.

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

- Due to the soil types and soil cover, all tile will have rock bedding for additional stability and strength.
- The existing ground elevations shown in the original design are still accurate.

- The only tiles being improved are the tiles identified in Appendices P, R, S, and T. The remainder of the tiles are not being improved or modified in any manner.
- The proposed pipe sizes shown in Appendices P, R, S, and T are those that are currently manufactured that meet or exceed the ½” or 1” drainage coefficient.
- The proposed and existing capacities shown in Appendices P, R, S, and T are based on the assumptions that the Main tile is installed per the original design and that it is functioning at full capacity (i.e. are not collapsed, broken, plugged, etc).
- The proposed and existing pipe sizes and capacities shown in Appendices P, R, S, and T are those to serve the lands within the existing District boundaries and not any discharges from other lands outside the District boundaries.
- Portions of the Single Tile Upsizing, Dual Tile Upsizing, and Parallel Tile Upsizing options may prohibit farming over the proposed Main tile at certain areas due to a lack of soil cover and may even require mounding of soil above the proposed Main tile.
- The Single Tile Upsizing, Dual Tile Upsizing, and Open Ditch Construction options would allow for lower maintenance costs in the future as the entire Main is new.
- The Upper Main Tile Outlet and Parallel Tile Upsizing options would require higher maintenance costs in the future as the remaining portions of the existing Main tile are left in service and are over 100 years old.
- The Upper Main Tile Outlet and Open Ditch Construction options would require the taking of right of way, which is not included in the opinion of probable construction costs contained in the next section of this report
- The Upper Main Tile Outlet option does not increase drainage capacity for those portions of the Main tile upstream of the upper main tile outlet. It just shortens the length of restrictions between that point and the Main Open Ditch of Drainage District 26.
- The Upper Main Tile Outlet option does increase drainage capacity for those portions of the Main tile downstream of the upper main tile outlet as a large portion of the Drainage District drainage area has been removed from the Main tile.
- The Upper Main Tile Outlet option would turn the drainage area upstream of the Upper Main Tile Outlet into a separate Drainage District.
- The Upper Main Tile Outlet option can freely discharge into the Main Open Ditch of Drainage District 26 without charge.
- The proposed tile on the Upper Main Tile Outlet would be installed at some large depths (20'±).
- The Upper Main Tile Outlet option may require annexation to extend the district boundary to the north to allow for installation of the proposed tile.
- 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 costs contained in the next section of this report exceeds said \$50,000 limit. Therefore, a hearing will be required. Per Iowa Code Chapter 468.126.4.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 were compiled and are included in Appendices V, W, X, Y and Z of this report. A summary of said costs are as follows:

METHOD	DRAINAGE COEFF.	DISTRICT COST	ROAD CROSSING COST
Upper Main Tile Outlet	Varies	\$ 468,625.00	\$ 22,281.25
Single Tile Upsizing	½”	\$ 5,641,191.60	\$206,353.13
	1”	\$ 7,803,417.60	\$236,971.88
Dual Tile Upsizing	½”	\$ 7,448,733.60	\$281,318.75
	1”	\$10,681,413.60	\$326,384.38
Parallel Tile Upsizing	½”	\$ 4,769,397.60	\$193,990.63
	1”	\$ 7,471,305.60	\$225,903.13
Open Ditch Construction	Varies	\$ 1,989,504.00	\$862,125.00

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

7.0 OWNERSHIP AND CLASSIFICATIONS – Any and all information concerning ownership of lands and classifications of said lands within Drainage District No. 56 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 appears that a reclassification separating laterals may be required if any of the above options were deemed to be an improvement, said improvement were to move forward, and the laterals had not already been separated. Since the proposed project does not involve the laterals, it is not clear if this portion of code is applicable and it is our recommendation that the District Trustees seek advice from their legal counsel.

8.0 RECOMMENDATIONS – There is a definite need to perform one of the above mentioned actions. The improvements would remove the current restrictions and impediments to the Main tile, extend the lifespan of the same, even out the capacity . 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 Clapsaddle-Garber Associates.
- Hold the required hearing on the proposed improvements.
- Adopt one of the recommendations of the Engineer’s Report.
- If the Upper Main Tile Outlet option is selected:
 - Confirm that Drainage District 56 should be split into two separate districts.
 - Confirm that the upper Main tile outlet can discharge freely into the Main Open Ditch of Drainage District 26 without charge.
 - Confirm if annexation is necessary to extend the the upper Main tile outlet to the north.
- Direct plans and specifications for the proposed improvements be prepared by Clapsaddle-Garber Associates.
- Proceed with receiving bids from interested contractors by Clapsaddle-Garber Associates.
- Award contract to the lowest responsible contractor.
- Seek legal advice whether reclassification is required.
- If desired or required by Iowa Code, proceed with reclassification proceedings.

**DRAINAGE DISTRICT 56
LANDOWNER MEETING**

3/28/2018 - Minutes

1. Open Meeting

Hardin County Board of Supervisors Co-Chairperson, Renee McClellan, opened the meeting. Also present was Hardin County Supervisor, Lance Granzow; Landowner, Matt Topp, Bob Topp, Betty Thomas, Kevin Sheldahl, Lynn Holechek, Jon Kuhfus, Mike Bostrom, Brad Fjelland, Brian Krause, Ben Krause, Harold Bahr Jr, Marjorie Krause, Jacob Handsaker and Mike McCartney; Lee Gallentine and Heather Thomas with Clapsaddle-Garber Associates (CGA); Drainage Clerk, Tina Schlemme. Absent: BJ Hoffman.

2. Approve Agenda

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

3. Attendance/Introductions

Introductions were made and attendance verified.

4. Explanation Of Landowner Request

Schlemme explained that a landowner had requested that his drainage west of E Avenue be improved. There were a couple possibilities mentioned to him that included upsizing the tile lying west of E Avenue or severing the tile from DD 56 and draining north into DD 26 open ditch.

5. Comments/Discussion

There was much discussion between landowners and the Trustees. Gallentine stated that a project this size would more than likely not be less than \$500,000. Landowners asked approximately how much an engineer's report cost to produce, in which Gallentine answered roughly \$3,000 to \$5,000. It was discussed that this project would probably be considered an improvement so a reclassification would need completed, in which Gallentine estimated another \$3,000 to \$6,000 for the reclass report.

Other options were discussed, such as not severing the tile but adding a tile that would go north along E Avenue and pay an outlet fee to DD 26. Replacing all tile in the district with larger tile, an open ditch and installing a parallel tile were also discussed. When Trustees asked for a show of hands from landowners who supported the engineer creating a report, all hands were raised.

6. Possible Action

Granzow moved, McClellan seconded for CGA to research the district and create an engineer's report with multiple options, as discussed. (1. Install tile to the north along E Avenue so all water from the west would flow north. 2. Replace all tile in the district with larger tile. 3. Install two new parallel tiles. 4. Install an open ditch. 5. Parallel the old tile with a new.) All ayes. Motion carried.

7. Other Business

None.

8. Adjourn Meeting

Granzow moved, McClellan seconded to adjourn the meeting. All ayes. Motion carried.



Drainage Work Order Request For Repair

Hardin County

Date 3/1/2018 Work Order # 204
District # 56 Lateral _____ Fund # 51087
Township Sherman Section 9 Twp 87 Rge 22 Qtr Sec NW1/4

Repair Requested By Lynn Holechek
Address lynn.holechek@gmail.com Phone (515) 460-1425

Landowner same
Address _____ Phone _____

Request Taken By Tina Schlemme

Available for Repair Now? Yes Date Available _____

Problem Description Lynn would like more drg capacity for his land. Sheldahl Bros believe it best to sever the tile west of E Ave & annex into DD 26 to drain to Tipton Creek. The land east of E Ave, that's flat, would benefit from not taking all the water from the west.

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

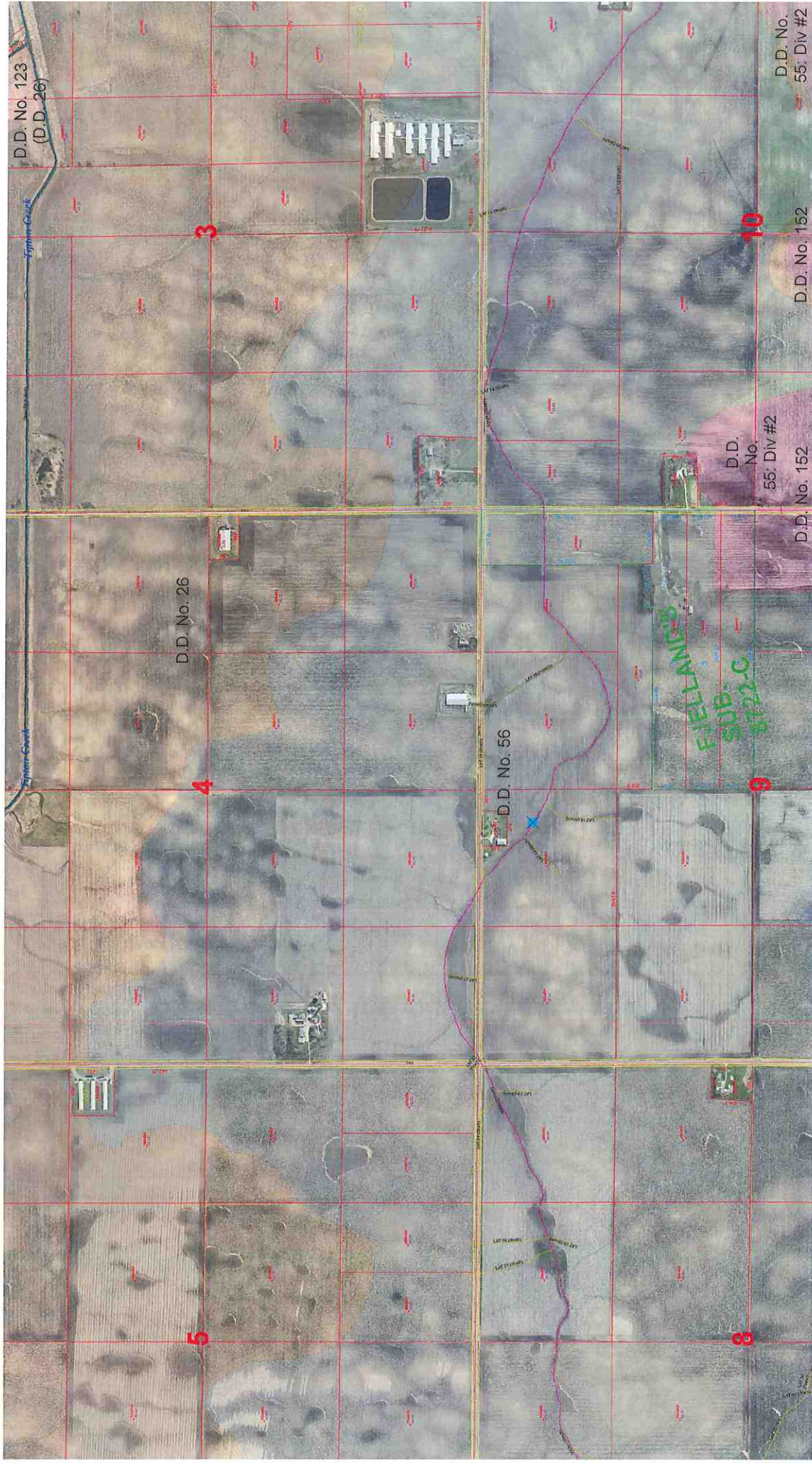
Approved: _____ Date: _____



D.D. No. 56 ^{2643.6}

9

FJELLAND
SUB. 8722-C



D.D. No. 123
(D.D. 26)

D.D. No. 26

D.D. No. 56

D.D. No.
55: Div #2

D.D. No. 152

D.D. No. 152

D.D.
No.
55: Div #2

FIELDWINDS
SUB-6722-C

3

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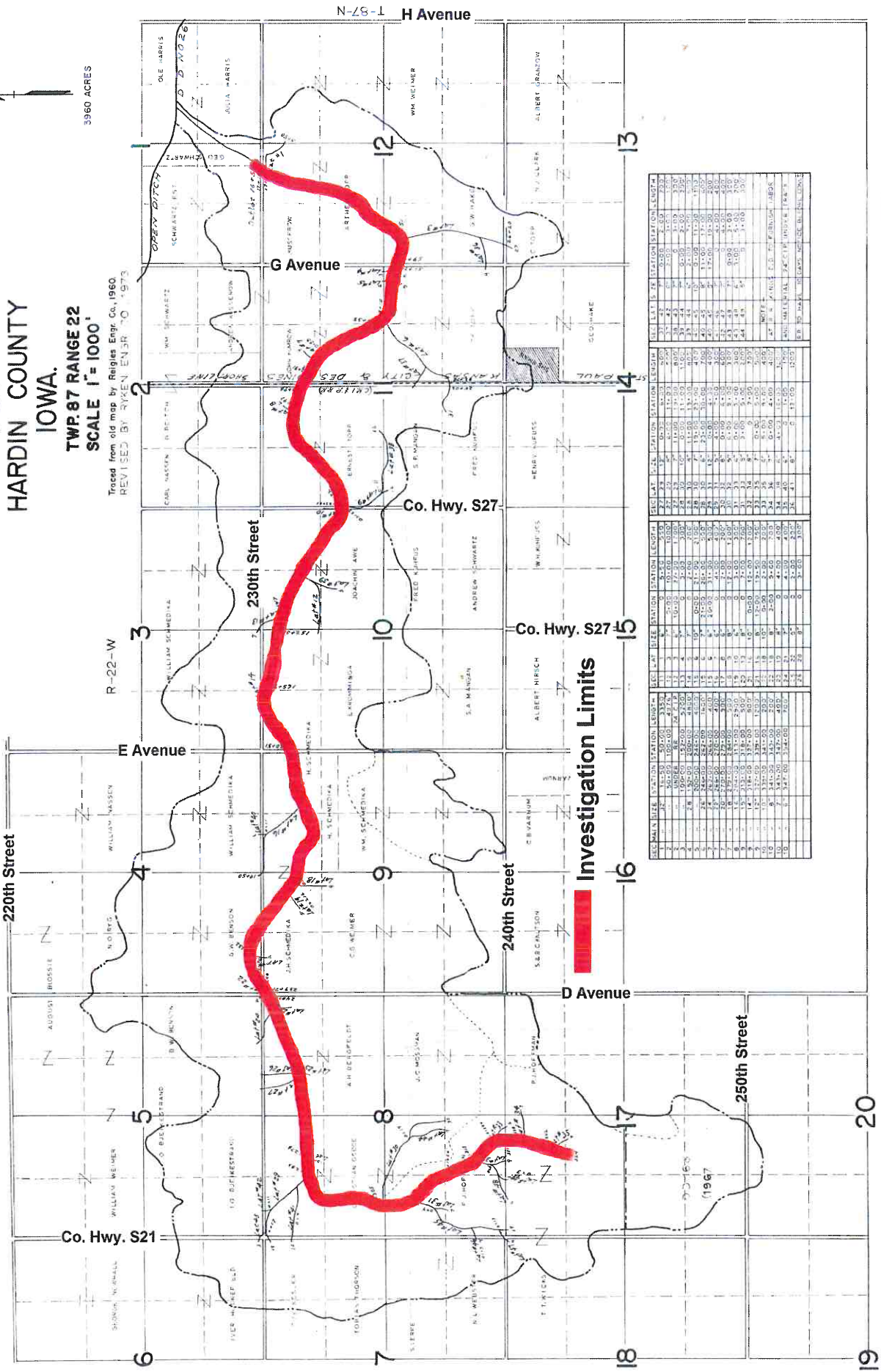
PLAT
OF
WICKS DRAINAGE DISTRICT
NO. 56
HARDIN COUNTY
IOWA.



3960 ACRES

TWP. 87 RANGE 22
SCALE 1" = 1000'

Traced from old map by Religies Engr. Co., 1960
REVISED BY: RYKEN ENGR. CO. 1973



Investigation Limits

SECTION	AREA	STATION	LENGTH	AREA	STATION	LENGTH	AREA	STATION	LENGTH	AREA	STATION	LENGTH	AREA	STATION	LENGTH	AREA	STATION	LENGTH	AREA
6	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
7	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
8	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
9	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
10	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
11	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
12	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
14	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
15	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
16	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
17	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
18	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
19	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

1967



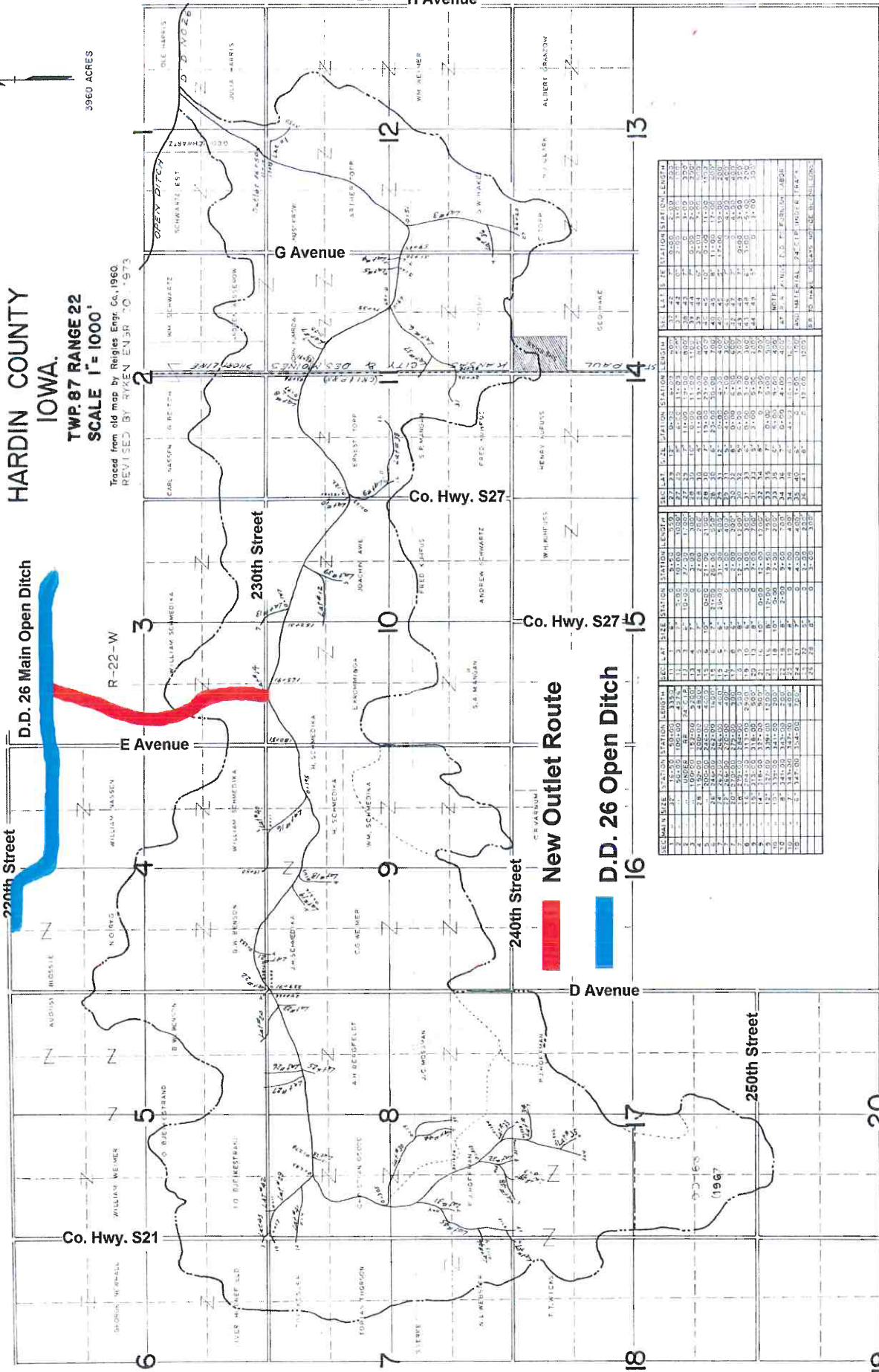
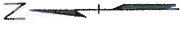
**PLAT OF
WICKS DRAINAGE DISTRICT
NO. 56**

**HARDIN COUNTY
IOWA.**

**TWP 87 RANGE 22
SCALE 1" = 1000'**

Traced from old map by Reiges Eng. Co., 1960.
REVISED BY RYAN ENJR. CO., 1973

3960 ACRES



SECTION	AREA	PERCENT	ACRES	AREA	PERCENT	ACRES	AREA	PERCENT	ACRES	AREA	PERCENT	ACRES	AREA	PERCENT	ACRES
2	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47
3	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47
4	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47
5	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47
6	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47
7	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47
8	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47
9	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47
10	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47
11	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47
12	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47
13	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47
14	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47
17	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47
18	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47
19	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47
20	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47	12.47	100.00	12.47

New Outlet Route

D.D. 26 Open Ditch

250th Street

1967

Co. Hwy. S21

Co. Hwy. S27

Co. Hwy. S27

City of Des Moines

D.D. 26 Main Open Ditch

R-22-W

230th Street

H Avenue

N-28-1

Ole Harris

Schwartz

Wm. Meier

Albert Granting

Wm. Meier

Albert Granting

Wm. Meier

Albert Granting

Wm. Meier

Albert Granting

Wm. Meier

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Wm. Meier

Albert Granting

Wm. Meier

Albert Granting

Wm. Meier

Albert Granting



By: J.V.S.
 Date: 1/28/2019
 Checked By: L.O.G.
 Date: 2/4/2019

Engineer's Opinion of Main tile Capacities

Project: Upper Main Tile Outlet for D.D. #56

Location: Sections 1, 4, 7, 8, 9, 10, 11, 12 & 17 T87N, R22W Hardin County, Iowa

IMPROVED - DOWNSTREAM OF UPPER MAIN TILE OUTLET

DOWNSTREAM OF UPPER MAIN TILE OUTLET (IMPROVEMENT)	STA	EXISTING DESCRIPTION	INSTALLED TILE SIZE (in)	INSTALLED TILE CAPACITY (cfs)	INSTALLED TILE CAPACITY (in/day)	IMPROVED TILE CAPACITY (cfs)	IMPROVED TILE CAPACITY (in/day)
	16+50	Existing Main tile empties into open ditch	32	12.0	0.07	12.0	0.19
	28+00	Grade change: 0.06% - 0.18%	32	20.7	0.13	20.7	0.37
	51+00	Lateral 3	32	20.7	0.14	20.7	0.44
	70+00	Grade change: 0.18% - 0.14%	32	18.3	0.13	18.3	0.53
	100+00	Grade change: 0.14% - 0.12%	32	16.9	0.13	16.9	0.64
	122+76	West side Co Hwy S27	32	16.9	0.14	16.9	0.98
	152+00	Size change: 32" - 28", Grade change: 0.12% - 0.28%	32/28	18.1	0.17	18.1	3.01
	168+50	Lateral 14/End of Lower Stretch	28	18.1		18.1	



By: J.V.S.
 Date: 1/28/2019
 Checked By: L.O.G.
 Date: 2/4/2019

Engineer's Opinion of Main tile Capacities

Project: **Upper Main Tile Outlet** for D.D. #56

Location: Sections 1, 4, 7, 8, 9, 10, 11, 12 & 17 T87N, R22W Hardin County, Iowa

IMPROVED - UPSTREAM OF UPPER MAIN TILE OUTLET

STA	EXISTING DESCRIPTION	INSTALLED	INSTALLED	INSTALLED	IMPROVED	IMPROVED	IMPROVED
		TILE SIZE (in)	TILE CAPACITY (cfs)	TILE CAPACITY (in/day)	TILE SIZE (in)	TILE CAPACITY (cfs)	TILE CAPACITY (in/day)
0+00	Proposed Main tile empties into D.D. 26 Open Ditch				48	70.6	0.68
19+40/168+50	Lateral 14, Grade change: 0.24% - 0.28%	28	18.1	0.18			
180+00	Grade change: 0.28% - 0.24%	28	16.8	0.17			
190+00	Grade change: 0.24% - 0.22%	28	16.0	0.17			
200+00	Grade change: 0.22% - 0.18%	28	14.5	0.17			
220+00	Grade change 0.18% - 0.14%	28	12.8	0.18			
230+00	Grade change 0.14% - 0.10%	28	10.8	0.17			
246+00	Size change: 28" - 26"	28/26	8.9	0.17			
260+00	Grade change: 0.10% - 0.16%	26	11.2	0.22			
262+00	Size change: 26" - 24"	26/24	9.1	0.19			
266+00	Size change: 24" - 22"	24/22	7.2	0.17			
270+00	Size change: 22" - 20", Grade change: 0.16% - 0.26%	22/20	7.1	0.17			
279+00	Size change: 20" - 18"	20/18	5.4	0.14			
284+00	Size change: 18" - 16"	18/16	3.9	0.13			
286+00	Grade change: 0.26% - 0.18%	16	3.3	0.11			
308+00	Grade change: 0.18% - 0.10%	16	2.4	0.10			
313+00	Size change: 16" - 15"	16/15	2.0	0.09			
318+00	Size change: 15" - 14"	15/14	1.7	0.10			
327+00	Size change: 14" - 12"	14/12	1.1	0.07			
339+00	Size change: 12" - 10"	12/10	0.7	0.06			
341+00	Size change: 10" - 8"	10/8	0.4	0.04			
343+00	Size change: 8" - 7"	8/7	0.3	0.03			
347+00	Size change: 7" - 6", Grade change: 0.10% - 0.48%	7/6	0.4	0.05			
351+00	Grade change: 0.48% - 0.90%	6	0.5	0.07			
354+00	End of Main tile	6					

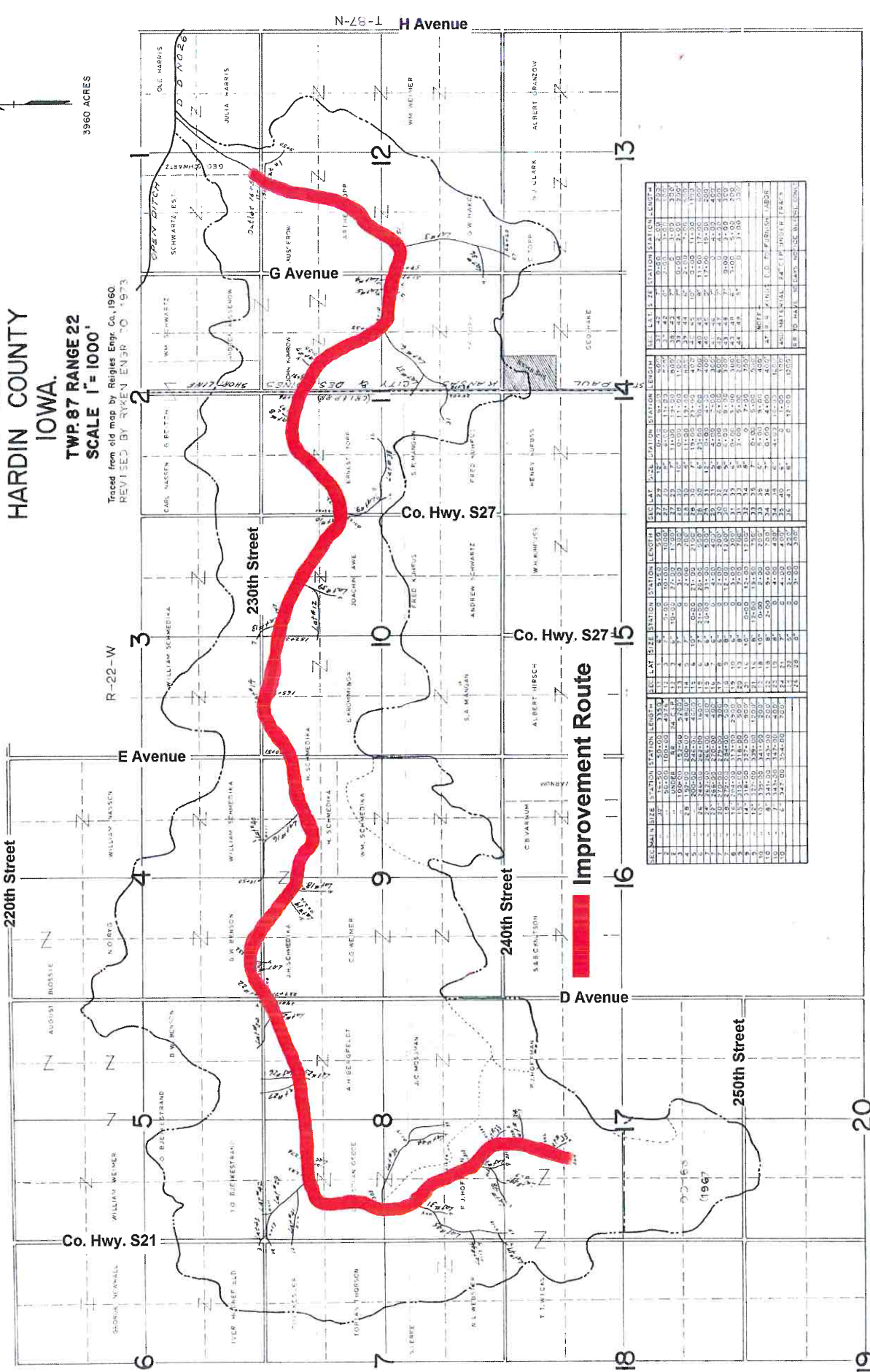
UPSTREAM OF UPPER MAIN TILE OUTLET (IMPROVEMENT)

PLAT
OF
WICKS DRAINAGE DISTRICT
NO. 56
HARDIN COUNTY
IOWA.

TWP. 87 RANGE 22
SCALE 1" = 1000'

Toned from old map by Reigles Engr. Co., 1960
REVISED BY RYKEN ENGR. CO., 1973

3960 ACRES



SECTION	ACRES	OWNER	ACRES	OWNER	ACRES	OWNER	ACRES	OWNER	ACRES	OWNER	ACRES	OWNER	ACRES	OWNER	ACRES	OWNER
6	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS
7	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS
8	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS
9	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS
10	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS
11	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS
12	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS
13	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS
14	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS
15	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS
16	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS
17	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS	36.00	WILLIAM WICKS

Improvement Route



1-87-N H Avenue

G Avenue

Co. Hwy. S27

Co. Hwy. S27-15

Co. Hwy. S21

250th Street

D Avenue

220th Street

240th Street

20

19

18

16

15

14

13

12

11

2

3

4

5

6

9

8

7

R-22-W

SHORT LINE

230th Street

10

11

12

13

14

15

16

17

18

19

20



By: J.V.S.
 Date: 1/28/2019
 Checked By: L.O.G.
 Date: 2/4/2019

Engineer's Opinion of Main tile Capacities

Project: **Single Tile Upsizing** for D.D. #56

Location: Sections 1, 4, 7, 8, 9, 10, 11, 12 & 17 T87N, R22W Hardin County, Iowa

STA	EXISTING DESCRIPTION	EXISTING			IMPROVEMENT						
		INSTALLED TILE SIZE (in)	INSTALLED TILE CAPACITY (cfs)	INSTALLED TILE CAPACITY (in/day)	PROPOSED DESCRIPTION	1/2" DRAINAGE COEFFICIENT			1" DRAINAGE COEFFICIENT		
						IMPROVED TILE SIZE (in)	IMPROVED TILE CAPACITY (cfs)	IMPROVED TILE CAPACITY (in/day)	IMPROVED TILE SIZE (in)	IMPROVED TILE CAPACITY (cfs)	IMPROVED TILE CAPACITY (in/day)
16+50	Existing Main tile empties into open ditch	32	12.0	0.07	Existing Main tile empties into open ditch	66	82.5	0.50	90	188.6	1.15
28+00	Grade change: 0.06% - 0.18%	32	20.7	0.13	Grade change: 0.06% - 0.18%	66/54	83.7	0.53	90/72	180.2	1.14
51+00	Lateral 3	32	20.7	0.14	Lateral 3	54	83.7	0.56	72	180.2	1.21
70+00	Grade change: 0.18% - 0.14%	32	18.3	0.13	Grade change: 0.18% - 0.14%	54	73.8	0.54	72	158.9	1.17
100+00	Grade change: 0.14% - 0.12%	32	16.9	0.13	Grade change: 0.14% - 0.12%	54	68.3	0.53	72	147.1	1.15
122+76	West side Co Hwy S27	32	16.9	0.14	West side Co Hwy S27	54	68.3	0.57	72	147.1	1.24
152+00	Size change: 32" - 28", Grade change: 0.12% - 0.28%	32/28	18.1	0.17	Grade change: 0.12% - 0.28%	54/48	76.2	0.71	72/60	138.2	1.28
168+50	Lateral 14	28	18.1	0.18	Lateral 14	48	76.2	0.75	60	138.2	1.36
180+00	Grade change: 0.28% - 0.24%	28	16.8	0.17	Grade change: 0.28% - 0.24%	48	70.6	0.72	60	127.9	1.30
190+00	Grade change: 0.24% - 0.22%	28	16.0	0.17	Grade change: 0.24% - 0.22%	48	67.6	0.70	60	122.5	1.27
200+00	Grade change: 0.22% - 0.18%	28	14.5	0.17	Grade change: 0.22% - 0.18%	48	61.1	0.72	60	110.8	1.31
220+00	Grade change 0.18% - 0.14%	28	12.8	0.18	Grade change 0.18% - 0.14%	48	53.9	0.75	60	97.7	1.36
230+00	Grade change 0.14% - 0.10%	28	10.8	0.17	Grade change 0.14% - 0.10%	48	45.5	0.70	60	82.6	1.27
246+00	Size change: 28" - 26"	28/26	8.9	0.17		48/42	31.9	0.62	60/54	62.4	1.22
260+00	Grade change: 0.10% - 0.16%	26	11.2	0.22	Grade change: 0.10% - 0.16%	42/36	26.8	0.53	54/48	57.6	1.14
262+00	Size change: 26" - 24"	26/24	9.1	0.19		36	26.8	0.56	48	57.6	1.21
266+00	Size change: 24" - 22"	24/22	7.2	0.17		36	26.8	0.63	48	57.6	1.35
270+00	Size change: 22" - 20", Grade change: 0.16% - 0.26%	22/20	7.1	0.17	Grade change: 0.16% - 0.26%	36	34.1	0.81	48/42	51.4	1.21
279+00	Size change: 20" - 18"	20/18	5.4	0.14		36/30	21.0	0.54	42	51.4	1.32
284+00	Size change: 18" - 16"	18/16	3.9	0.13		30	21.0	0.71	42	51.4	1.75
286+00	Grade change: 0.26% - 0.18%	16	3.3	0.11	Grade change: 0.26% - 0.18%	30	17.4	0.59	42	42.8	1.46
308+00	Grade change: 0.18% - 0.10%	16	2.4	0.10	Grade change: 0.18% - 0.10%	30	13.0	0.52	42	31.9	1.27
313+00	Size change: 16" - 15"	16/15	2.0	0.09		30	13.0	0.58	42	31.9	1.42
318+00	Size change: 15" - 14"	15/14	1.7	0.10		30/27	9.8	0.59	42/36	21.1	1.27
327+00	Size change: 14" - 12"	14/12	1.1	0.07		27	9.8	0.63	36	21.1	1.36
339+00	Size change: 12" - 10"	12/10	0.7	0.06		27/24	7.2	0.63	36/30	13.0	1.13
341+00	Size change: 10" - 8"	10/8	0.4	0.04		24/21	5.0	0.52	30/27	9.8	1.02
343+00	Size change: 8" - 7"	8/7	0.3	0.03		21	5.0	0.52	27	9.8	1.02
347+00	Size change: 7" - 6", Grade change: 0.10% - 0.48%	7/6	0.4	0.05	Grade change: 0.10% - 0.48%	21/15	4.5	0.55	27/21	11.0	1.36
351+00	Grade change: 0.48% - 0.90%	6	0.5	0.07	Grade change: 0.48% - 0.90%	15	6.1	0.80	21/18	10.0	1.30
354+00	End of Main tile	6			End of Main tile	15			18		

SINGLE TILE UPSIZING (IMPROVEMENT)



By: J.V.S.
 Date: 1/28/2019
 Checked By: L.O.G.
 Date: 2/4/2019

Engineer's Opinion of Main tile Capacities

Project: Dual Tile Upsizing for D.D. #56

Location: Sections 1, 4, 7, 8, 9, 10, 11, 12 & 17 T87N, R22W Hardin County, Iowa

STA	EXISTING				IMPROVEMENT								
	EXISTING DESCRIPTION	INSTALLED TILE SIZE (in)	INSTALLED TILE CAPACITY (cfs)	INSTALLED TILE CAPACITY (in/day)	PROPOSED DESCRIPTION	1/2" DRAINAGE COEFFICIENT				1" DRAINAGE COEFFICIENT			
						IMPROVED PIPE 1 TILE SIZE (in)	IMPROVED PIPE 2 TILE SIZE (in)	TOTAL IMPROVED TILE CAPACITY (cfs)	TOTAL IMPROVED TILE CAPACITY (in/day)	IMPROVED PIPE 1 TILE SIZE (in)	IMPROVED PIPE 2 TILE SIZE (in)	TOTAL IMPROVED TILE CAPACITY (cfs)	TOTAL IMPROVED TILE CAPACITY (in/day)
16+50	Existing Main tile empties into open ditch	32	12.0	0.07	Existing Main tile empties into open ditch	51	51	82.9	0.51	72	60	168.0	1.02
28+00	Grade change: 0.06% - 0.18%	32	20.7	0.13	Grade change: 0.06% - 0.18%	51/42	51/42	85.6	0.54	72/54	60/54	167.3	1.06
51+00	Lateral 3	32	20.7	0.14	Lateral 3	42	42	85.6	0.58	54	54	167.3	1.13
70+00	Grade change: 0.18% - 0.14%	32	18.3	0.13	Grade change: 0.18% - 0.14%	42	42	75.5	0.55	54	54	147.6	1.08
100+00	Grade change: 0.14% - 0.12%	32	16.9	0.13	Grade change: 0.14% - 0.12%	42	42	69.9	0.54	54	54	136.6	1.06
122+76	West side Co Hwy S27	32	16.9	0.14	West side Co Hwy S27	42	42	69.9	0.59	54	54	136.6	1.15
152+00	Size change: 32" - 28", Grade change: 0.12% - 0.28%	32/28	18.1	0.17	Grade change: 0.12% - 0.28%	42/36	42/30	57.2	0.53	54/48	54/36	111.6	1.04
168+50	Lateral 14	28	18.1	0.18	Lateral 14	36	30	57.2	0.56	48	36	111.6	1.10
180+00	Grade change: 0.28% - 0.24%	28	16.8	0.17	Grade change: 0.28% - 0.24%	36	30	52.9	0.54	48	36	103.3	1.05
190+00	Grade change: 0.24% - 0.22%	28	16.0	0.17	Grade change: 0.24% - 0.22%	36	30	50.7	0.52	48	36	98.9	1.02
200+00	Grade change: 0.22% - 0.18%	28	14.5	0.17	Grade change: 0.22 - 0.18%	36	30	45.8	0.54	48	36	89.5	1.06
220+00	Grade change 0.18% - 0.14%	28	12.8	0.18	Grade change 0.18% - 0.14%	36	30	40.4	0.56	48	36	78.9	1.10
230+00	Grade change 0.14% - 0.10%	28	10.8	0.17	Grade change 0.14% - 0.10%	36	30	34.2	0.53	48	36	66.7	1.03
246+00	Size change: 28" - 26"	28/26	8.9	0.17	Size change: 28" - 26"	36/30	30	26.0	0.51	48/42	36	53.0	1.04
260+00	Grade change: 0.10% - 0.16%	26	11.2	0.22	Grade change: 0.10% - 0.16%	30	30/27	28.9	0.57	42/36	36	53.5	1.06
262+00	Size change: 26" - 24"	26/24	9.1	0.19		30/27	27	24.8	0.52	36	36	53.5	1.13
266+00	Size change: 24" - 22"	24/22	7.2	0.17		27	27/24	21.5	0.50	36	36/30	43.2	1.01
270+00	Size change: 22" - 20", Grade change: 0.16% - 0.26%	22/20	7.1	0.17	Grade change: 0.16% - 0.26%	27/24	24	23.1	0.55	36	30	55.1	1.30
279+00	Size change: 20" - 18"	20/18	5.4	0.14		24	24	23.1	0.59	36/30	30	41.9	1.08
284+00	Size change: 18" - 16"	18/16	3.9	0.13		24	24	23.1	0.78	30	30	41.9	1.42
286+00	Grade change: 0.26% - 0.18%	16	3.3	0.11	Grade change: 0.26% - 0.18%	24	24	19.2	0.66	30	30	34.9	1.19
308+00	Grade change: 0.18% - 0.10%	16	2.4	0.10	Grade change: 0.18% - 0.10%	24	24	14.3	0.57	30	30	26.0	1.04
313+00	Size change: 16" - 15"	16/15	2.0	0.09		24	24	14.3	0.64	30	30	26.0	1.16
318+00	Size change: 15" - 14"	15/14	1.7	0.10		24	24/18	10.5	0.63	30/27	30/27	19.6	1.18
327+00	Size change: 14" - 12"	14/12	1.1	0.07		24	18	10.5	0.67	27	27/24	17.0	1.09
339+00	Size change: 12" - 10"	12/10	0.7	0.06		24/18	18	6.7	0.58	27/24	24	14.3	1.25
341+00	Size change: 10" - 8"	10/8	0.4	0.04		18	18/15	5.4	0.56	24/21	24/21	10.0	1.04
343+00	Size change: 8" - 7"	8/7	0.3	0.03		18	15	5.4	0.56	21	21	10.0	1.05
347+00	Size change: 7" - 6", Grade change: 0.10% - 0.48%	7/6	0.4	0.05	Grade change: 0.10% - 0.48%	18/12	15/12	5.0	0.61	21/15	21/15	9.0	1.11
351+00	Grade change: 0.48% - 0.90%	6	0.5	0.07	Grade change: 0.48% - 0.90%	12/10	12/10	4.2	0.54	15	15	12.3	1.60
354+00	End of Main tile	6			End of Main tile	10	10			15	15		

DUAL TILE UPSIZING (IMPROVEMENT)



By: J.V.S.
 Date: 1/28/2019
 Checked By: L.O.G.
 Date: 2/4/2019

Engineer's Opinion of Main tile Capacities

Project: Parallel Tile Upsizing for D.D. #56

Location: Sections 1, 4, 7, 8, 9, 10, 11, 12 & 17 T87N, R22W Hardin County, Iowa

STA	EXISTING				IMPROVEMENT						
	EXISTING DESCRIPTION	INSTALLED TILE SIZE (in)	INSTALLED TILE CAPACITY (cfs)	INSTALLED TILE CAPACITY (in/day)	PROPOSED DESCRIPTION	1/2" DRAINAGE COEFFICIENT			1" DRAINAGE COEFFICIENT		
						IMPROVED PARALLEL TILE SIZE (in)	TOTAL IMPROVED TILE CAPACITY (cfs)	TOTAL IMPROVED TILE CAPACITY (in/day)	IMPROVED PARALLEL TILE SIZE (in)	TOTAL IMPROVED TILE CAPACITY (cfs)	TOTAL IMPROVED TILE CAPACITY (in/day)
16+50	Existing Main tile empties into open ditch	32	12.0	0.07	Existing Main tile empties into open ditch	66	94.4	0.58	90	200.6	1.22
28+00	Grade change: 0.06% - 0.18%	32	20.7	0.13	Grade change: 0.06% - 0.18%	66/48	81.8	0.52	90/66	163.6	1.03
51+00	Lateral 3	32	20.7	0.14	Lateral 3	48	81.8	0.55	66	163.6	1.10
70+00	Grade change: 0.18% - 0.14%	32	18.3	0.13	Grade change: 0.18% - 0.14%	48	72.2	0.53	66	144.3	1.06
100+00	Grade change: 0.14% - 0.12%	32	16.9	0.13	Grade change: 0.14% - 0.12%	48	66.8	0.52	66	133.6	1.04
122+76	West side Co Hwy S27	32	16.9	0.14	West side Co Hwy S27	48	66.8	0.56	66	133.6	1.12
152+00	Size change: 32" - 28", Grade change: 0.12% - 0.28%	32/28	18.1	0.17	Grade change: 0.12% - 0.28%	48/42	71.5	0.66	66/54	122.4	1.14
168+50	Lateral 14	28	18.1	0.18	Lateral 14	42	71.5	0.70	54	122.4	1.20
180+00	Grade change: 0.28% - 0.24%	28	16.8	0.17	Grade change: 0.28% - 0.24%	42	66.2	0.67	54	113.4	1.15
190+00	Grade change: 0.24% - 0.22%	28	16.0	0.17	Grade change: 0.24% - 0.22%	42	63.4	0.65	54	108.5	1.12
200+00	Grade change: 0.22% - 0.18%	28	14.5	0.17	Grade change: 0.22 - 0.18%	42	57.3	0.68	54	98.2	1.16
220+00	Grade change 0.18% - 0.14%	28	12.8	0.18	Grade change 0.18% - 0.14%	42	50.5	0.70	54	86.6	1.21
230+00	Grade change 0.14% - 0.10%	28	10.8	0.17	Grade change 0.14% - 0.10%	42	42.7	0.66	54	73.2	1.13
246+00	Size change: 28" - 26"	28/26	8.9	0.17	Size change: 28" - 26"	42/36	30.0	0.59	54/48	54.4	1.07
260+00	Grade change: 0.10% - 0.16%	26	11.2	0.22	Grade change: 0.10% - 0.16%	36/30	27.7	0.55	48/42	51.6	1.03
262+00	Size change: 26" - 24"	26/24	9.1	0.19		30	25.5	0.54	42	49.4	1.04
266+00	Size change: 24" - 22"	24/22	7.2	0.17		30	23.6	0.55	42	47.5	1.11
270+00	Size change: 22" - 20", Grade change: 0.16% - 0.26%	22/20	7.1	0.17	Grade change: 0.16% - 0.26%	30	28.1	0.66	42	58.6	1.38
279+00	Size change: 20" - 18"	20/18	5.4	0.14		30	26.3	0.68	42	56.8	1.46
284+00	Size change: 18" - 16"	18/16	3.9	0.13		30	24.9	0.84	42	55.4	1.88
286+00	Grade change: 0.26% - 0.18%	16	3.3	0.11	Grade change: 0.26% - 0.18%	30	20.7	0.71	42	46.1	1.57
308+00	Grade change: 0.18% - 0.10%	16	2.4	0.10	Grade change: 0.18% - 0.10%	30	15.4	0.62	42	34.3	1.37
313+00	Size change: 16" - 15"	16/15	2.0	0.09		30	15.1	0.67	42/36	23.2	1.03
318+00	Size change: 15" - 14"	15/14	1.7	0.10		30/24	8.9	0.53	36	22.9	1.37
327+00	Size change: 14" - 12"	14/12	1.1	0.07		24	8.3	0.53	36	22.3	1.43
339+00	Size change: 12" - 10"	12/10	0.7	0.06		24	7.9	0.69	36/30	13.7	1.19
341+00	Size change: 10" - 8"	10/8	0.4	0.04		24/21	5.4	0.56	30/27	10.2	1.06
343+00	Size change: 8" - 7"	8/7	0.3	0.03		21	5.3	0.55	27	10.1	1.05
347+00	Size change: 7" - 6", Grade change: 0.10% - 0.48%	7/6	0.4	0.05	Grade change: 0.10% - 0.48%	21/15	4.9	0.60	27/21	11.4	1.41
351+00	Grade change: 0.48% - 0.90%	6	0.5	0.07	Grade change: 0.48% - 0.90%	15/12	3.9	0.51	21/18	10.5	1.37
354+00	End of Main tile	6			End of Main tile	12			18		

PARALLEL TILE UPSIZING (IMPROVEMENT)



By: J.V.S.
 Date: 1/28/2019
 Checked By: L.O.G.
 Date: 2/4/2019

Engineer's Opinion of Main tile Capacities

Project: Open Ditch Construction for D.D. #56

Location: Sections 1, 4, 7, 8, 9, 10, 11, 12 & 17 T87N, R22W Hardin County, Iowa

OPEN DITCH CONSTRUCTION (IMPROVEMENT)	EXISTING					IMPROVEMENT			
	STA	EXISTING DESCRIPTION	INSTALLED TILE SIZE (in)	INSTALLED TILE CAPACITY (cfs)	INSTALLED TILE CAPACITY (in/day)	PROPOSED DESCRIPTION	OPEN DITCH		
							APPROX. OPEN DITCH DEPTH (ft)	IMPROVED OPEN DITCH CAPACITY (cfs)	IMPROVED OPEN DITCH CAPACITY (in/day)
	16+50	Existing Main tile empties into open ditch	32	12.0	0.07	Start of Proposed Open Ditch	6	276.7	1.69
	28+00	Grade change: 0.06% - 0.18%	32	20.7	0.13	Grade change: 0.06% - 0.18%	6	479.3	3.03
	51+00	Lateral 3	32	20.7	0.14	Lateral 3	6	479.3	3.22
	70+00	Grade change: 0.18% - 0.14%	32	18.3	0.13	Grade change: 0.18% - 0.14%	6	422.7	3.11
	100+00	Grade change: 0.14% - 0.12%	32	16.9	0.13	Grade change: 0.14% - 0.12%	7	562.5	4.38
	122+76	West side Co Hwy S27	32	16.9	0.14	West side Co Hwy S27	7	562.5	4.73
	152+00	Size change: 32" - 28", Grade change: 0.12% - 0.28%	32/28	18.1	0.17	Grade change: 0.12% - 0.28%	6	597.7	5.54
	168+50	Lateral 14	28	18.1	0.18	Lateral 14	5	392.0	3.85
	180+00	Grade change: 0.28% - 0.24%	28	16.8	0.17	Grade change: 0.28% - 0.24%	5	362.9	3.70
	190+00	Grade change: 0.24% - 0.22%	28	16.0	0.17	Grade change: 0.24% - 0.22%	5	347.5	3.59
	200+00	Grade change: 0.22% - 0.18%	28	14.5	0.17	Grade change: 0.22 - 0.18%	5	314.3	3.73
	220+00	Grade change 0.18% - 0.14%	28	12.8	0.18	Grade change 0.18% - 0.14%	5	277.2	3.86
	230+00	Grade change 0.14% - 0.10%	28	10.8	0.17	Grade change 0.14% - 0.10%	6	357.2	5.50
	246+00	Size change: 28" - 26"	28/26	8.9	0.17		6	357.2	7.00
	260+00	Grade change: 0.10% - 0.16%	26	11.2	0.22	Grade change: 0.10% - 0.16%	5	296.3	5.89
	262+00	Size change: 26" - 24"	26/24	9.1	0.19		5	296.3	6.23
	266+00	Size change: 24" - 22"	24/22	7.2	0.17		5	296.3	6.94
	270+00	Size change: 22" - 20", Grade change: 0.16% - 0.26%	22/20	7.1	0.17	Grade change: 0.16% - 0.26%	6	576.0	13.60
	279+00	Size change: 20" - 18"	20/18	5.4	0.14		6	576.0	14.81
	284+00	Size change: 18" - 16"	18/16	3.9	0.13		6	576.0	19.55
	286+00	Grade change: 0.26% - 0.18%	16	3.3	0.11	Grade change: 0.26% - 0.18%	6	479.3	16.34
	308+00	Grade change: 0.18% - 0.10%	16	2.4	0.10	Grade change: 0.18% - 0.10%	7	513.5	20.50
	313+00	Size change: 16" - 15"	16/15	2.0	0.09		7	513.5	22.91
	318+00	Size change: 15" - 14"	15/14	1.7	0.10		7	513.5	30.81
	327+00	Size change: 14" - 12"	14/12	1.1	0.07		7	513.5	32.96
	339+00	Size change: 12" - 10"	12/10	0.7	0.06		7	513.5	44.77
	341+00	Size change: 10" - 8"	10/8	0.4	0.04		6	357.2	36.95
	343+00	Size change: 8" - 7"	8/7	0.3	0.03		6	357.2	37.19
	347+00	Size change: 7" - 6", Grade change: 0.10% - 0.48%	7/6	0.4	0.05	Grade change: 0.10% - 0.48%	6	782.6	96.62
	351+00	Grade change: 0.48% - 0.90%	6	0.5	0.07	Grade change: 0.48% - 0.90%	5	702.8	91.35
	354+00	End of Main tile	6			End of Open Ditch	4		



By: J.V.S.

Date: 1/28/2019

Checked By: L.O.G.

Date: 2/4/2019

Engineer's Opinion of Probable Construction Cost

Project: **Upper Main Tile Outlet** for D.D. #56

Location: Sections 3 & 10 T87N, R22W Hardin County, Iowa

UPPER MAIN TILE OUTLET (IMPROVEMENT)	ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost	
	DISTRICT CONSTRUCTION COSTS							
	1	54" CMP TILE OUTLET	\$ 140.00	LF	40	LF	\$ 5,600.00	
	2	48" TRIPLE WALL PPE or RCP TILE	\$ 150.00	LF	1900	LF	\$ 285,000.00	
	3	54" RODENT GUARD	\$ 1,000.00	EA	1	EA	\$ 1,000.00	
	4	JUNCTION STRUCTURE	\$ 10,000.00	EA	1	EA	\$ 10,000.00	
	5	BANK STABILIZATION	\$ 50.00	TON	50	TON	\$ 2,500.00	
	6	PLUG EXISTING DOWNSTREAM MAIN TILE	\$ 1,000.00	LOC	1	LOC	\$ 1,000.00	
	7	CONCRETE COLLAR	\$ 600.00	EA	1	EA	\$ 600.00	
	8	PRIVATE TILE CONNECTIONS	\$ 1,000.00	EA	20	EA	\$ 20,000.00	
9	TILE LOCATION	\$ 150.00	STA	2	STA	\$ 300.00		
						CONSTRUCTION SUBTOTAL	\$ 326,000.00	
						Contingency (15%)	\$ 48,900.00	
						CONSTRUCTION TOTAL	\$ 374,900.00	
						Engr. & Const. Observation (25%)	\$ 93,725.00	
						TOTAL COST	\$ 468,625.00	
ROAD CROSSING CONSTRUCTION COSTS								
10	48" TILE - OPEN CUT (230TH STREET)	\$ 250.00	LF	30	LF	\$ 7,500.00		
11	HICKENBOTTOM INTAKE	\$ 2,000.00	EA	2	EA	\$ 4,000.00		
12	PERMANENT SEEDING AND WARRANTY	\$ 2,000.00	LOC	1	LOC	\$ 2,000.00		
13	TRAFFIC CONTROL	\$ 2,000.00	LOC	1	LOC	\$ 2,000.00		
						CONSTRUCTION SUBTOTAL	\$ 15,500.00	
						Contingency (15%)	\$ 2,325.00	
						CONSTRUCTION TOTAL	\$ 17,825.00	
						Engr. & Const. Observation (25%)	\$ 4,456.25	
						TOTAL COST	\$ 22,281.25	

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



By: J.V.S.

Date: 1/28/2019

Checked By: L.O.G.

Date: 2/4/2019

Engineer's Opinion of Probable Construction Cost

Project: **Single Tile Upsizing for D.D. #56**

Location: Sections 1, 4, 7, 8, 9, 10, 11, 12 & 17 T87N, R22W Hardin County, Iowa

SINGLE TILE UPSIZING - IMPROVEMENT (1/2")

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost
DISTRICT CONSTRUCTION COSTS						
101	72" CMP TILE OUTLET	\$ 175.00	LF	40	LF	\$ 7,000.00
102	66" RCP TILE	\$ 200.00	LF	1080	LF	\$ 216,000.00
103	54" TRIPLE WALL PPE or RCP TILE	\$ 150.00	LF	12230	EA	\$ 1,834,500.00
104	48" TRIPLE WALL PPE or RCP TILE	\$ 110.00	LF	9270	EA	\$ 1,019,700.00
105	42" TRIPLE WALL PPE or RCP TILE	\$ 90.00	LF	1400	LF	\$ 126,000.00
106	36" TRIPLE WALL PPE or RCP TILE	\$ 75.00	LF	1900	LF	\$ 142,500.00
107	30" DUAL WALL PPE or RCP TILE	\$ 60.00	LF	3900	LF	\$ 234,000.00
108	27" DUAL WALL PPE or RCP TILE	\$ 50.00	LF	2100	EA	\$ 105,000.00
109	24" DUAL WALL PPE or RCP TILE	\$ 40.00	LF	200	LF	\$ 8,000.00
110	21" DUAL WALL PPE or RCP TILE	\$ 32.50	LF	600	LF	\$ 19,500.00
111	15" DUAL WALL PPE or RCP TILE	\$ 27.50	LF	700	LF	\$ 19,250.00
112	54" TILE - JACK AND BORE (RAILROAD)	\$ 1,400.00	LF	100	LF	\$ 140,000.00
113	66" x 54" REDUCER	\$ 4,000.00	EA	1	EA	\$ 4,000.00
114	54" x 48" REDUCER	\$ 3,500.00	EA	1	EA	\$ 3,500.00
115	48" x 42" REDUCER	\$ 3,000.00	EA	1	EA	\$ 3,000.00
116	42" x 36" REDUCER	\$ 2,500.00	EA	1	EA	\$ 2,500.00
117	36" x 30" REDUCER	\$ 2,000.00	EA	1	EA	\$ 2,000.00
118	30" x 27" REDUCER	\$ 1,800.00	EA	1	EA	\$ 1,800.00
119	27" x 24" REDUCER	\$ 1,600.00	EA	1	EA	\$ 1,600.00
120	24" x 21" REDUCER	\$ 1,400.00	EA	1	EA	\$ 1,400.00
121	21" x 15" REDUCER	\$ 1,200.00	EA	1	EA	\$ 1,200.00
122	72" RODENT GUARD	\$ 2,000.00	EA	1	EA	\$ 2,000.00
123	BANK STABILIZATION	\$ 50.00	TON	75	TON	\$ 3,750.00
124	HEADWALL REMOVAL AND REPLACEMENT	\$25,000.00	EA	1	EA	\$ 25,000.00
125	LATERAL TILE CONNECTIONS	\$ 1,000.00	EA	22	EA	\$ 22,000.00
126	CONCRETE COLLAR	\$ 600.00	EA	2	EA	\$ 1,200.00
127	PRIVATE TILE CONNECTIONS	\$ 500.00	EA	200	EA	\$ 100,000.00
128	TILE LOCATION	\$ 150.00	STA	334.2	STA	\$ 50,130.00
129	TILE ABANDONMENT	\$ 100.00	LF	100	LF	\$ 10,000.00
130	TILE REMOVAL	\$ 5.00	LF	33420	LF	\$ 167,100.00
CONSTRUCTION SUBTOTAL						\$ 4,273,630.00
Contingency (10%)						\$ 427,363.00
CONSTRUCTION TOTAL						\$ 4,700,993.00
Engr. & Const. Observation (20%)						\$ 940,198.60
TOTAL COST						\$ 5,641,191.60
ROAD CROSSING CONSTRUCTION COSTS						
131	54" TILE - JACK AND BORE (CO HWY S27)	\$ 1,400.00	LF	40	LF	\$ 56,000.00
132	66" TILE - OPEN CUT (230TH STREET)	\$ 250.00	LF	30	LF	\$ 7,500.00
133	54" TILE - OPEN CUT (G AVENUE)	\$ 200.00	LF	30	LF	\$ 6,000.00
134	48" TILE - OPEN CUT (E AND D AVENUE AND 230TH STREET)	\$ 155.00	LF	130	LF	\$ 20,150.00
135	TILE ABANDONMENT	\$ 100.00	LF	40	LF	\$ 4,000.00
136	TILE REMOVAL	\$ 10.00	LF	190	LF	\$ 1,900.00
137	HICKENBOTTOM INTAKE	\$ 2,000.00	EA	12	EA	\$ 24,000.00
138	PERMANENT SEEDING AND WARRANTY	\$ 2,000.00	LOC	6	LOC	\$ 12,000.00
139	TRAFFIC CONTROL	\$ 2,000.00	LOC	6	LOC	\$ 12,000.00
CONSTRUCTION SUBTOTAL						\$ 143,550.00
Contingency (15%)						\$ 21,532.50
CONSTRUCTION TOTAL						\$ 165,082.50
Engr. & Const. Observation (25%)						\$ 41,270.63
TOTAL COST						\$ 206,353.13

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



By: J.V.S.

Date: 1/28/2019

Checked By: L.O.G.

Date: 2/4/2019

Engineer's Opinion of Probable Construction Cost

Project: **Single Tile Upsizing** for D.D. #56

Location: Sections 1, 4, 7, 8, 9, 10, 11, 12 & 17 T87N, R22W Hardin County, Iowa

SINGLE TILE UPSIZING - IMPROVEMENT (1)

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost
DISTRICT CONSTRUCTION COSTS						
201	90" CMP TILE OUTLET	\$ 200.00	LF	40	LF	\$ 8,000.00
202	90" RCP TILE	\$ 250.00	LF	1080	LF	\$ 270,000.00
203	72" RCP TILE	\$ 200.00	LF	12230	EA	\$ 2,446,000.00
204	60" TRIPLE WALL PPE or RCP TILE	\$ 175.00	LF	9270	EA	\$ 1,622,250.00
205	54" TRIPLE WALL PPE or RCP TILE	\$ 150.00	LF	1400	EA	\$ 210,000.00
206	48" TRIPLE WALL PPE or RCP TILE	\$ 110.00	LF	1000	LF	\$ 110,000.00
207	42" TRIPLE WALL PPE or RCP TILE	\$ 90.00	LF	4800	LF	\$ 432,000.00
208	36" TRIPLE WALL PPE or RCP TILE	\$ 75.00	LF	2100	LF	\$ 157,500.00
209	30" DUAL WALL PPE or RCP TILE	\$ 60.00	LF	200	EA	\$ 12,000.00
210	27" DUAL WALL PPE or RCP TILE	\$ 50.00	LF	600	LF	\$ 30,000.00
211	21" DUAL WALL PPE or RCP TILE	\$ 32.50	LF	400	LF	\$ 13,000.00
212	18" DUAL WALL PPE or RCP TILE	\$ 30.00	LF	300	LF	\$ 9,000.00
213	72" TILE - JACK AND BORE (RAILROAD)	\$ 1,600.00	LF	100	LF	\$ 160,000.00
214	90" x 72" REDUCER	\$ 5,000.00	EA	1	EA	\$ 5,000.00
215	72" x 60" REDUCER	\$ 4,500.00	EA	1	EA	\$ 4,500.00
216	60" x 54" REDUCER	\$ 4,000.00	EA	1	EA	\$ 4,000.00
217	54" x 48" REDUCER	\$ 3,500.00	EA	1	EA	\$ 3,500.00
218	48" x 42" REDUCER	\$ 3,000.00	EA	1	EA	\$ 3,000.00
219	42" x 36" REDUCER	\$ 2,500.00	EA	1	EA	\$ 2,500.00
220	36" x 30" REDUCER	\$ 2,000.00	EA	1	EA	\$ 2,000.00
221	30" x 27" REDUCER	\$ 1,800.00	EA	1	EA	\$ 1,800.00
222	27" x 21" REDUCER	\$ 1,500.00	EA	1	EA	\$ 1,500.00
223	21" x 18" REDUCER	\$ 1,200.00	EA	1	EA	\$ 1,200.00
224	90" RODENT GUARD	\$ 2,500.00	EA	1	EA	\$ 2,500.00
225	BANK STABILIZATION	\$ 50.00	TON	100	TON	\$ 5,000.00
226	HEADWALL REMOVAL AND REPLACEMENT	\$ 25,000.00	EA	1	EA	\$ 25,000.00
227	LATERAL TILE CONNECTIONS	\$ 1,000.00	EA	22	EA	\$ 22,000.00
228	CONCRETE COLLAR	\$ 600.00	EA	2	EA	\$ 1,200.00
229	PRIVATE TILE CONNECTIONS	\$ 500.00	EA	200	EA	\$ 100,000.00
230	TILE LOCATION	\$ 150.00	STA	334.2	STA	\$ 50,130.00
231	TILE ABANDONMENT	\$ 100.00	LF	300	LF	\$ 30,000.00
232	TILE REMOVAL	\$ 5.00	LF	33420	LF	\$ 167,100.00
CONSTRUCTION SUBTOTAL						\$ 5,911,680.00
Contingency (10%)						\$ 591,168.00
CONSTRUCTION TOTAL						\$ 6,502,848.00
Engr. & Const. Observation (20%)						\$ 1,300,569.60
TOTAL COST						\$ 7,803,417.60
ROAD CROSSING CONSTRUCTION COSTS						
233	72" TILE - JACK AND BORE (CO HWY S27)	\$ 1,600.00	LF	40	LF	\$ 64,000.00
234	90" TILE - OPEN CUT (230TH STREET)	\$ 325.00	LF	30	LF	\$ 9,750.00
235	72" TILE - OPEN CUT (G AVENUE)	\$ 265.00	LF	30	LF	\$ 7,950.00
236	60" TILE - OPEN CUT (E AND D AVENUE AND 230TH STREET)	\$ 225.00	LF	130	LF	\$ 29,250.00
237	TILE ABANDONMENT	\$ 100.00	LF	40	LF	\$ 4,000.00
238	TILE REMOVAL	\$ 10.00	LF	190	LF	\$ 1,900.00
239	HICKENBOTTOM INTAKE	\$ 2,000.00	EA	12	EA	\$ 24,000.00
240	PERMANENT SEEDING AND WARRANTY	\$ 2,000.00	LOC	6	LOC	\$ 12,000.00
241	TRAFFIC CONTROL	\$ 2,000.00	LOC	6	LOC	\$ 12,000.00
CONSTRUCTION SUBTOTAL						\$ 164,850.00
Contingency (15%)						\$ 24,727.50
CONSTRUCTION TOTAL						\$ 189,577.50
Engr. & Const. Observation (25%)						\$ 47,394.38
TOTAL COST						\$ 236,971.88

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



By: J.V.S.

Date: 1/28/2019

Checked By: L.O.G.

Date: 2/4/2019

Engineer's Opinion of Probable Construction Cost

Project: **Dual Tile Upsizing** for D.D. #56

Location: Sections 1, 4, 7, 8, 9, 10, 11, 12 & 17 T87N, R22W Hardin County, Iowa

DUAL TILE UPSIZING - IMPROVEMENT (1/2")

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost
DISTRICT CONSTRUCTION COSTS						
301	60" CMP TILE OUTLET	\$ 110.00	LF	80	LF	\$ 8,800.00
302	54" TRIPLE WALL PPE or RCP TILE	\$ 150.00	LF	2160	LF	\$ 324,000.00
303	42" TRIPLE WALL PPE or RCP TILE	\$ 90.00	LF	24460	EA	\$ 2,201,400.00
304	36" TRIPLE WALL PPE or RCP TILE	\$ 75.00	LF	9270	EA	\$ 695,250.00
305	30" DUAL WALL PPE or RCP TILE	\$ 60.00	LF	12270	EA	\$ 736,200.00
306	27" DUAL WALL PPE or RCP TILE	\$ 50.00	LF	1400	LF	\$ 70,000.00
307	24" DUAL WALL PPE or RCP TILE	\$ 40.00	LF	12100	LF	\$ 484,000.00
308	18" DUAL WALL PPE or RCP TILE	\$ 30.00	LF	3100	LF	\$ 93,000.00
309	15" DUAL WALL PPE or RCP TILE	\$ 27.50	LF	600	EA	\$ 16,500.00
310	12" DUAL WALL PPE or RCP TILE	\$ 25.00	LF	800	LF	\$ 20,000.00
311	10" DUAL WALL PPE or RCP TILE	\$ 22.50	LF	600	LF	\$ 13,500.00
312	42" TILE - JACK AND BORE (RAILROAD)	\$ 1,200.00	LF	200	LF	\$ 240,000.00
313	54" x 42" REDUCER	\$ 3,250.00	EA	2	EA	\$ 6,500.00
314	42" x 36" REDUCER	\$ 2,500.00	EA	1	EA	\$ 2,500.00
314	42" x 30" REDUCER	\$ 2,500.00	EA	1	EA	\$ 2,500.00
315	36" x 30" REDUCER	\$ 2,000.00	EA	1	EA	\$ 2,000.00
316	30" x 27" REDUCER	\$ 1,800.00	EA	2	EA	\$ 3,600.00
317	27" x 24" REDUCER	\$ 1,600.00	EA	2	EA	\$ 3,200.00
318	24" x 18" REDUCER	\$ 1,400.00	EA	2	EA	\$ 2,800.00
319	18" x 15" REDUCER	\$ 1,000.00	EA	1	EA	\$ 1,000.00
320	18" x 12" REDUCER	\$ 800.00	EA	1	EA	\$ 800.00
321	15" x 12" REDUCER	\$ 600.00	EA	1	EA	\$ 600.00
322	12" x 10" REDUCER	\$ 400.00	EA	2	EA	\$ 800.00
323	FLOW EQUALIZATION STRUCTURE	\$10,000.00	EA	33	EA	\$ 330,000.00
324	54" RODENT GUARD	\$ 1,500.00	EA	2	EA	\$ 3,000.00
325	BANK STABILIZATION	\$ 50.00	TON	100	TON	\$ 5,000.00
326	HEADWALL REMOVAL AND REPLACEMENT	\$25,000.00	EA	1	EA	\$ 25,000.00
327	LATERAL TILE CONNECTIONS	\$ 1,000.00	EA	22	EA	\$ 22,000.00
328	CONCRETE COLLAR	\$ 600.00	EA	3	EA	\$ 1,800.00
329	PRIVATE TILE CONNECTIONS	\$ 500.00	EA	200	EA	\$ 100,000.00
330	TILE LOCATION	\$ 150.00	STA	334.2	STA	\$ 50,130.00
331	TILE ABANDONMENT	\$ 100.00	LF	100	LF	\$ 10,000.00
332	TILE REMOVAL	\$ 5.00	LF	33420	LF	\$ 167,100.00
CONSTRUCTION SUBTOTAL						\$ 5,642,980.00
Contingency (10%)						\$ 564,298.00
CONSTRUCTION TOTAL						\$ 6,207,278.00
Engr. & Const. Observation (20%)						\$ 1,241,455.60
TOTAL COST						\$ 7,448,733.60
ROAD CROSSING CONSTRUCTION COSTS						
333	42" TILE - JACK AND BORE (CO HWY S27)	\$ 1,200.00	LF	80	LF	\$ 96,000.00
334	54" TILE - OPEN CUT (230TH STREET)	\$ 200.00	LF	60	LF	\$ 12,000.00
335	42" TILE - OPEN CUT (G AVENUE)	\$ 130.00	LF	60	LF	\$ 7,800.00
336	36" TILE - OPEN CUT (E AND D AVENUE AND 230TH STREET)	\$ 110.00	LF	130	LF	\$ 14,300.00
337	30" TILE - OPEN CUT (E AND D AVENUE AND 230TH STREET)	\$ 90.00	LF	130	LF	\$ 11,700.00
338	TILE ABANDONMENT	\$ 100.00	LF	40	LF	\$ 4,000.00
339	TILE REMOVAL	\$ 10.00	LF	190	LF	\$ 1,900.00
340	HICKENBOTTOM INTAKE	\$ 2,000.00	EA	12	EA	\$ 24,000.00
341	PERMANENT SEEDING AND WARRANTY	\$ 2,000.00	LOC	6	LOC	\$ 12,000.00
342	TRAFFIC CONTROL	\$ 2,000.00	LOC	6	LOC	\$ 12,000.00
CONSTRUCTION SUBTOTAL						\$ 195,700.00
Contingency (15%)						\$ 29,355.00
CONSTRUCTION TOTAL						\$ 225,055.00
Engr. & Const. Observation (25%)						\$ 56,263.75
TOTAL COST						\$ 281,318.75

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



By: J.V.S.
 Date: 1/28/2019
 Checked By: L.O.G.
 Date: 2/4/2019

Engineer's Opinion of Probable Construction Cost

Project: Dual Tile Upsizing for D.D. #56

Location: Sections 1, 4, 7, 8, 9, 10, 11, 12 & 17 T87N, R22W Hardin County, Iowa

DUAL TILE UPSIZING - IMPROVEMENT (1")

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost
DISTRICT CONSTRUCTION COSTS						
401	84" CMP TILE OUTLET	\$ 200.00	LF	40	LF	\$ 8,000.00
402	72" CMP TILE OUTLET	\$ 175.00	LF	40	LF	\$ 7,000.00
403	72" RCP TILE	\$ 200.00	LF	1080	LF	\$ 216,000.00
404	60" TRIPLE WALL PPE or RCP TILE	\$ 175.00	LF	1080	LF	\$ 189,000.00
405	54" TRIPLE WALL PPE or RCP TILE	\$ 150.00	LF	24460	LF	\$ 3,669,000.00
406	48" TRIPLE WALL PPE or RCP TILE	\$ 110.00	LF	9270	EA	\$ 1,019,700.00
407	42" TRIPLE WALL PPE or RCP TILE	\$ 90.00	LF	1400	EA	\$ 126,000.00
408	36" TRIPLE WALL PPE or RCP TILE	\$ 75.00	LF	13170	EA	\$ 987,750.00
409	30" DUAL WALL PPE or RCP TILE	\$ 60.00	LF	9100	EA	\$ 546,000.00
410	27" DUAL WALL PPE or RCP TILE	\$ 50.00	LF	3000	LF	\$ 150,000.00
411	24" DUAL WALL PPE or RCP TILE	\$ 40.00	LF	1600	LF	\$ 64,000.00
412	21" DUAL WALL PPE or RCP TILE	\$ 32.50	LF	1200	LF	\$ 39,000.00
413	15" DUAL WALL PPE or RCP TILE	\$ 27.50	LF	1400	EA	\$ 38,500.00
414	54" TILE - JACK AND BORE (RAILROAD)	\$ 1,400.00	LF	200	LF	\$ 280,000.00
415	72" x 54" REDUCER	\$ 4,500.00	EA	1	EA	\$ 4,500.00
416	60" x 54" REDUCER	\$ 4,000.00	EA	1	EA	\$ 4,000.00
416	54" x 48" REDUCER	\$ 3,500.00	EA	1	EA	\$ 3,500.00
417	54" x 36" REDUCER	\$ 3,250.00	EA	1	EA	\$ 3,250.00
418	48" x 42" REDUCER	\$ 3,000.00	EA	1	EA	\$ 3,000.00
419	42" x 36" REDUCER	\$ 2,500.00	EA	1	EA	\$ 2,500.00
420	36" x 30" REDUCER	\$ 2,000.00	EA	2	EA	\$ 4,000.00
421	30" x 27" REDUCER	\$ 1,800.00	EA	2	EA	\$ 3,600.00
422	27" x 24" REDUCER	\$ 1,600.00	EA	2	EA	\$ 3,200.00
423	24" x 21" REDUCER	\$ 1,400.00	EA	2	EA	\$ 2,800.00
424	21" x 15" REDUCER	\$ 1,200.00	EA	2	EA	\$ 2,400.00
425	FLOW EQUALIZATION STRUCTURE	\$ 10,000.00	EA	33	EA	\$ 330,000.00
426	84" RODENT GUARD	\$ 2,250.00	EA	1	EA	\$ 2,250.00
427	72" RODENT GUARD	\$ 2,000.00	EA	1	EA	\$ 2,000.00
427	BANK STABILIZATION	\$ 50.00	TON	100	TON	\$ 5,000.00
428	HEADWALL REMOVAL AND REPLACEMENT	\$ 25,000.00	EA	1	EA	\$ 25,000.00
429	LATERAL TILE CONNECTIONS	\$ 1,000.00	EA	22	EA	\$ 22,000.00
430	CONCRETE COLLAR	\$ 600.00	EA	3	EA	\$ 1,800.00
431	PRIVATE TILE CONNECTIONS	\$ 500.00	EA	200	EA	\$ 100,000.00
432	TILE LOCATION	\$ 150.00	STA	334.2	STA	\$ 50,130.00
433	TILE ABANDONMENT	\$ 100.00	LF	100	LF	\$ 10,000.00
434	TILE REMOVAL	\$ 5.00	LF	33420	LF	\$ 167,100.00
CONSTRUCTION SUBTOTAL						\$ 8,091,980.00
Contingency (10%)						\$ 809,198.00
CONSTRUCTION TOTAL						\$ 8,901,178.00
Engr. & Const. Observation (20%)						\$ 1,780,235.60
TOTAL COST						\$ 10,681,413.60
ROAD CROSSING CONSTRUCTION COSTS						
435	54" TILE - JACK AND BORE (CO HWY S27)	\$ 1,400.00	LF	80	LF	\$ 112,000.00
436	72" TILE - OPEN CUT (230TH STREET)	\$ 265.00	LF	30	LF	\$ 7,950.00
437	60" TILE - OPEN CUT (230TH STREET)	\$ 225.00	LF	30	LF	\$ 6,750.00
438	54" TILE - OPEN CUT (G AVENUE)	\$ 200.00	LF	60	LF	\$ 12,000.00
439	48" TILE - OPEN CUT (E AND D AVENUE AND 230TH STREET)	\$ 155.00	LF	130	LF	\$ 20,150.00
440	36" TILE - OPEN CUT (E AND D AVENUE AND 230TH STREET)	\$ 110.00	LF	130	LF	\$ 14,300.00
441	TILE ABANDONMENT	\$ 100.00	LF	40	LF	\$ 4,000.00
442	TILE REMOVAL	\$ 10.00	LF	190	EA	\$ 1,900.00
443	HICKENBOTTOM INTAKE	\$ 2,000.00	EA	12	EA	\$ 24,000.00
444	PERMANENT SEEDING AND WARRANTY	\$ 2,000.00	LOC	6	LOC	\$ 12,000.00
445	TRAFFIC CONTROL	\$ 2,000.00	LOC	6	LOC	\$ 12,000.00
CONSTRUCTION SUBTOTAL						\$ 227,050.00
Contingency (15%)						\$ 34,057.50
CONSTRUCTION TOTAL						\$ 261,107.50
Engr. & Const. Observation (25%)						\$ 65,276.88
TOTAL COST						\$ 326,384.38

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



By: J.V.S.

Date: 1/28/2019

Checked By: L.O.G.

Date: 2/4/2019

Engineer's Opinion of Probable Construction Cost

Project: **Parallel Tile Upsizing for D.D. #56**

Location: Sections 1, 4, 7, 8, 9, 10, 11, 12 & 17 T87N, R22W Hardin County, Iowa

PARALLEL TILE UPSIZING - IMPROVEMENT (1/2")

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost
DISTRICT CONSTRUCTION COSTS						
501	72" CMP TILE OUTLET	\$ 175.00	LF	40	LF	\$ 7,000.00
502	66" RCP TILE	\$ 200.00	LF	1080	LF	\$ 216,000.00
503	48" TRIPLE WALL PPE or RCP TILE	\$ 110.00	LF	12230	EA	\$ 1,345,300.00
504	42" TRIPLE WALL PPE or RCP TILE	\$ 90.00	LF	9270	LF	\$ 834,300.00
505	36" TRIPLE WALL PPE or RCP TILE	\$ 75.00	LF	1400	LF	\$ 105,000.00
506	30" DUAL WALL PPE or RCP TILE	\$ 60.00	LF	5800	LF	\$ 348,000.00
507	24" DUAL WALL PPE or RCP TILE	\$ 40.00	LF	2300	LF	\$ 92,000.00
508	21" DUAL WALL PPE or RCP TILE	\$ 32.50	LF	600	LF	\$ 19,500.00
509	15" DUAL WALL PPE or RCP TILE	\$ 27.50	LF	400	LF	\$ 11,000.00
510	12" DUAL WALL PPE or RCP TILE	\$ 25.00	LF	300	LF	\$ 7,500.00
511	48" TILE - JACK AND BORE (RAILROAD)	\$ 1,300.00	LF	100	LF	\$ 130,000.00
512	66" x 48" REDUCER	\$ 3,750.00	EA	1	EA	\$ 3,750.00
513	48" x 42" REDUCER	\$ 3,000.00	EA	1	EA	\$ 3,000.00
514	42" x 36" REDUCER	\$ 2,500.00	EA	1	EA	\$ 2,500.00
515	36" x 30" REDUCER	\$ 2,000.00	EA	1	EA	\$ 2,000.00
516	30" x 24" REDUCER	\$ 1,800.00	EA	1	EA	\$ 1,800.00
517	24" x 21" REDUCER	\$ 1,400.00	EA	1	EA	\$ 1,400.00
518	21" x 15" REDUCER	\$ 1,200.00	EA	1	EA	\$ 1,200.00
519	15" x 12" REDUCER	\$ 600.00	EA	1	EA	\$ 600.00
520	FLOW EQUALIZATION STRUCTURE	\$ 10,000.00	EA	33	EA	\$ 330,000.00
521	72" RODENT GUARD	\$ 2,000.00	EA	1	EA	\$ 2,000.00
522	BANK STABILIZATION	\$ 50.00	TON	100	TON	\$ 5,000.00
523	HEADWALL REMOVAL AND REPLACEMENT	\$ 25,000.00	EA	1	EA	\$ 25,000.00
524	LATERAL TILE CONNECTIONS	\$ 1,000.00	EA	8	EA	\$ 8,000.00
525	CONCRETE COLLAR	\$ 600.00	EA	2	EA	\$ 1,200.00
526	PRIVATE TILE CONNECTIONS	\$ 500.00	EA	100	EA	\$ 50,000.00
527	TILE ABANDONMENT	\$ 100.00	LF	100	LF	\$ 10,000.00
528	TILE LOCATION	\$ 150.00	STA	334.2	STA	\$ 50,130.00
CONSTRUCTION SUBTOTAL						\$ 3,613,180.00
Contingency (10%)						\$ 361,318.00
CONSTRUCTION TOTAL						\$ 3,974,498.00
Engr. & Const. Observation (20%)						\$ 794,899.60
TOTAL COST						\$ 4,769,397.60
ROAD CROSSING CONSTRUCTION COSTS						
529	48" TILE - JACK AND BORE (CO HWY S27)	\$ 1,300.00	LF	40	LF	\$ 52,000.00
530	66" TILE - OPEN CUT (230TH STREET)	\$ 250.00	LF	30	LF	\$ 7,500.00
531	48" TILE - OPEN CUT (G AVENUE)	\$ 155.00	LF	30	LF	\$ 4,650.00
532	42" TILE - OPEN CUT (E AND D AVENUE AND 230TH STREET)	\$ 130.00	LF	130	LF	\$ 16,900.00
533	TILE ABANDONMENT	\$ 100.00	LF	40	LF	\$ 4,000.00
534	TILE REMOVAL	\$ 10.00	LF	190	LF	\$ 1,900.00
535	HICKENBOTTOM INTAKE	\$ 2,000.00	EA	12	EA	\$ 24,000.00
536	PERMANENT SEEDING AND WARRANTY	\$ 2,000.00	LOC	6	LOC	\$ 12,000.00
537	TRAFFIC CONTROL	\$ 2,000.00	LOC	6	LOC	\$ 12,000.00
CONSTRUCTION SUBTOTAL						\$ 134,950.00
Contingency (15%)						\$ 20,242.50
CONSTRUCTION TOTAL						\$ 155,192.50
Engr. & Const. Observation (25%)						\$ 38,798.13
TOTAL COST						\$ 193,990.63

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



By: J.V.S.

Date: 1/28/2019

Checked By: L.O.G.

Date: 2/4/2019

Engineer's Opinion of Probable Construction Cost

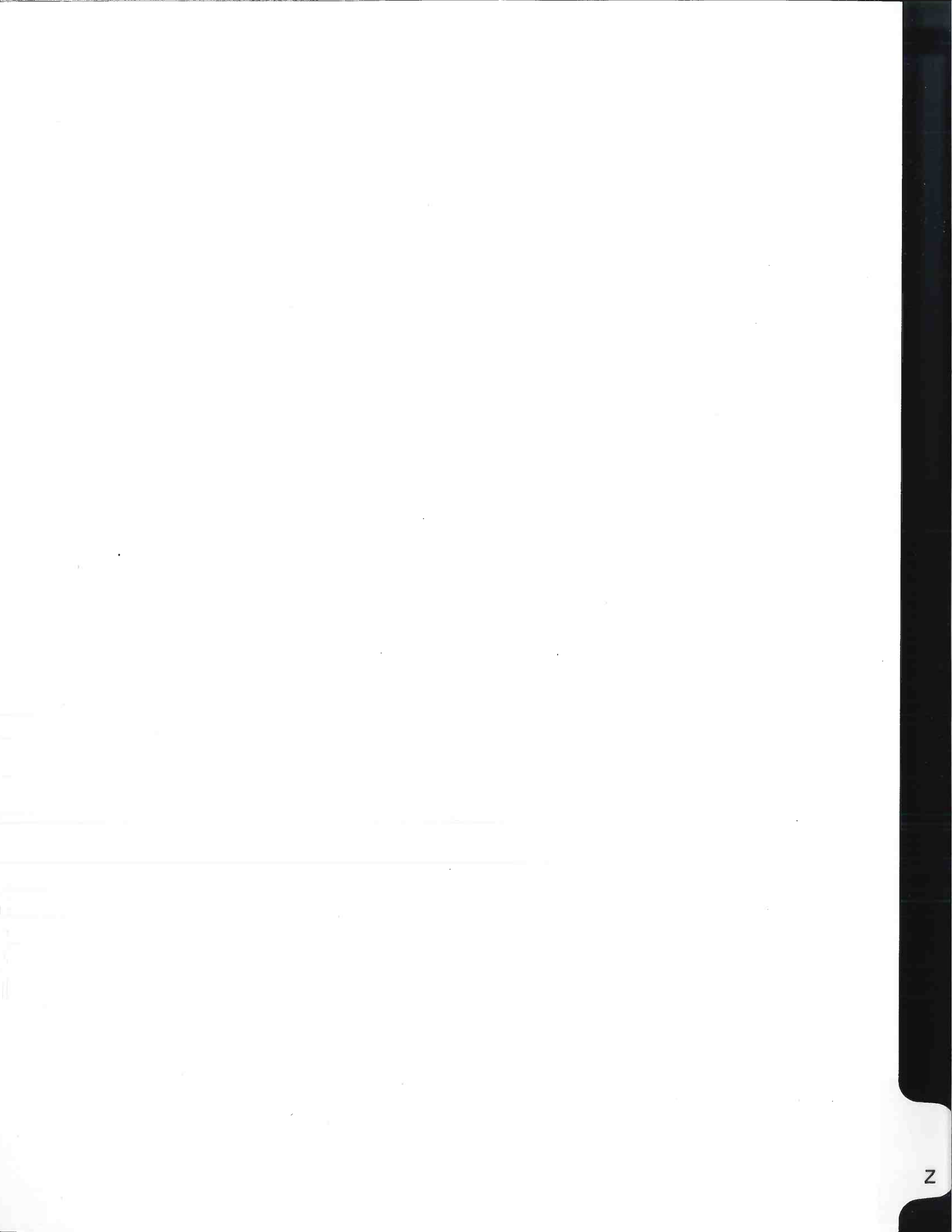
Project: **Parallel Tile Upsizing** for D.D. #56

Location: Sections 1, 4, 7, 8, 9, 10, 11, 12 & 17 T87N, R22W Hardin County, Iowa

PARALLEL TILE UPSIZING - IMPROVEMENT (1')

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost
DISTRICT CONSTRUCTION COSTS						
601	90" CMP TILE OUTLET	\$ 200.00	LF	40	LF	\$ 8,000.00
602	90" RCP TILE	\$ 250.00	LF	1080	LF	\$ 270,000.00
603	66" RCP TILE	\$ 200.00	LF	12230	LF	\$ 2,446,000.00
604	54" TRIPLE WALL PPE or RCP TILE	\$ 150.00	LF	9270	EA	\$ 1,390,500.00
605	48" TRIPLE WALL PPE or RCP TILE	\$ 110.00	LF	1400	LF	\$ 154,000.00
606	42" TRIPLE WALL PPE or RCP TILE	\$ 90.00	LF	5300	LF	\$ 477,000.00
607	36" DUAL WALL PPE or RCP TILE	\$ 75.00	LF	2600	LF	\$ 195,000.00
608	30" DUAL WALL PPE or RCP TILE	\$ 60.00	LF	200	LF	\$ 12,000.00
609	27" DUAL WALL PPE or RCP TILE	\$ 50.00	LF	600	LF	\$ 30,000.00
610	21" DUAL WALL PPE or RCP TILE	\$ 32.50	LF	400	LF	\$ 13,000.00
611	18" DUAL WALL PPE or RCP TILE	\$ 30.00	LF	300	LF	\$ 9,000.00
612	66" TILE - JACK AND BORE (RAILROAD)	\$ 1,500.00	LF	100	LF	\$ 150,000.00
613	90" x 66" REDUCER	\$ 4,750.00	EA	1	EA	\$ 4,750.00
614	66" x 54" REDUCER	\$ 4,000.00	EA	1	EA	\$ 4,000.00
615	54" x 48" REDUCER	\$ 3,500.00	EA	1	EA	\$ 3,500.00
616	48" x 42" REDUCER	\$ 3,000.00	EA	1	EA	\$ 3,000.00
617	42" x 36" REDUCER	\$ 2,500.00	EA	1	EA	\$ 2,500.00
618	36" x 30" REDUCER	\$ 2,000.00	EA	1	EA	\$ 2,000.00
619	30" x 27" REDUCER	\$ 1,800.00	EA	1	EA	\$ 1,800.00
620	27" x 21" REDUCER	\$ 1,500.00	EA	1	EA	\$ 1,500.00
621	21" x 18" REDUCER	\$ 1,200.00	EA	1	EA	\$ 1,200.00
622	FLOW EQUALIZATION STRUCTURE	\$ 10,000.00	EA	33	EA	\$ 330,000.00
623	90" RODENT GUARD	\$ 2,000.00	EA	1	EA	\$ 2,000.00
624	BANK STABILIZATION	\$ 50.00	TON	100	TON	\$ 5,000.00
625	HEADWALL REMOVAL AND REPLACEMENT	\$ 25,000.00	EA	1	EA	\$ 25,000.00
626	LATERAL TILE CONNECTIONS	\$ 1,000.00	EA	8	EA	\$ 8,000.00
627	CONCRETE COLLAR	\$ 600.00	EA	2	EA	\$ 1,200.00
628	PRIVATE TILE CONNECTIONS	\$ 500.00	EA	100	EA	\$ 50,000.00
629	TILE ABANDONMENT	\$ 100.00	LF	100	LF	\$ 10,000.00
630	TILE LOCATION	\$ 150.00	STA	334.2	STA	\$ 50,130.00
CONSTRUCTION SUBTOTAL						\$ 5,660,080.00
Contingency (10%)						\$ 566,088.00
CONSTRUCTION TOTAL						\$ 6,226,088.00
Engr. & Const. Observation (20%)						\$ 1,245,217.60
TOTAL COST						\$ 7,471,305.60
ROAD CROSSING CONSTRUCTION COSTS						
631	66" TILE - JACK AND BORE (CO HWY S27)	\$ 1,500.00	LF	40	LF	\$ 60,000.00
632	90" TILE - OPEN CUT (230TH STREET)	\$ 325.00	LF	30	LF	\$ 9,750.00
633	66" TILE - OPEN CUT (G AVENUE)	\$ 250.00	LF	30	LF	\$ 7,500.00
634	54" TILE - OPEN CUT (E AND D AVENUE AND 230TH STREET)	\$ 200.00	LF	130	LF	\$ 26,000.00
635	TILE ABANDONMENT	\$ 100.00	LF	40	LF	\$ 4,000.00
636	TILE REMOVAL	\$ 10.00	LF	190	LF	\$ 1,900.00
637	HICKENBOTTOM INTAKE	\$ 2,000.00	EA	12	EA	\$ 24,000.00
638	PERMANENT SEEDING AND WARRANTY	\$ 2,000.00	LOC	6	LOC	\$ 12,000.00
639	TRAFFIC CONTROL	\$ 2,000.00	LOC	6	LOC	\$ 12,000.00
CONSTRUCTION SUBTOTAL						\$ 157,150.00
Contingency (15%)						\$ 23,572.50
CONSTRUCTION TOTAL						\$ 180,722.50
Engr. & Const. Observation (25%)						\$ 45,180.63
TOTAL COST						\$ 225,903.13

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





ENGINEERS • LAND SURVEYORS

By: J.V.S.

Date: 1/28/2019

Checked By: L.O.G.

Date: 2/4/2019

Engineer's Opinion of Probable Construction Cost

Project: **Open Ditch Construction** for D.D. #56

Location: Sections 1, 4, 7, 8, 9, 10, 11, 12 & 17 T87N, R22W Hardin County, Iowa

OPEN DITCH CONSTRUCTION (IMPROVEMENT)	ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost	
	DISTRICT CONSTRUCTION COSTS							
	701	OPEN DITCH EXCAVATION	\$ 1,850.00	STA	337.5	STA	\$ 624,375.00	
	702	OPEN DITCH SEEDING	\$ 100.00	STA	337.5	STA	\$ 33,750.00	
	703	CULVERT - JACK AND BORE (RAILROAD)	\$ 2,500.00	LF	50	LF	\$ 125,000.00	
	704	SURFACE DRAINS	\$ 1,900.00	EA	100	EA	\$ 190,000.00	
	705	LATERAL TILE OUTLET	\$ 1,350.00	EA	22	EA	\$ 29,700.00	
	706	PRIVATE TILE OUTLET	\$ 1,350.00	EA	200	EA	\$ 270,000.00	
	707	HEADWALL REMOVAL	\$ 5,000.00	EA	1	EA	\$ 5,000.00	
	708	TILE LOCATION	\$ 150.00	STA	337.5	STA	\$ 50,625.00	
709	TILE ABANDONMENT	\$ 100.00	LF	100	LF	\$ 10,000.00		
710	TILE REMOVAL	\$ 5.00	LF	33750	LF	\$ 168,750.00		
						CONSTRUCTION SUBTOTAL	\$ 1,507,200.00	
						Contingency (10%)	\$ 150,720.00	
						CONSTRUCTION TOTAL	\$ 1,657,920.00	
						Engr. & Const. Observation (20%)	\$ 331,584.00	
						TOTAL COST	\$ 1,989,504.00	
ROAD CROSSING CONSTRUCTION COSTS								
711	CULVERT - OPEN CUT (ALL ROADS)	\$ 90,000.00	LOC	6	LOC	\$ 540,000.00		
712	TILE REMOVAL	\$ 10.00	LF	300	LF	\$ 3,000.00		
713	REVTMENT	\$ 50.00	TN	1200	TN	\$ 60,000.00		
714	PERMANENT SEEDING AND WARRANTY	\$ 2,000.00	LOC	6	LOC	\$ 12,000.00		
715	TRAFFIC CONTROL	\$ 2,000.00	LOC	6	LOC	\$ 12,000.00		
						CONSTRUCTION SUBTOTAL	\$ 627,000.00	
						Contingency (10%)	\$ 62,700.00	
						CONSTRUCTION TOTAL	\$ 689,700.00	
						Engr. & Const. Observation (25%)	\$ 172,425.00	
						TOTAL COST	\$ 862,125.00	

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



By: J.V.S.

Date: 1/28/2019

Checked By: L.O.G.

Date: 2/4/2019

Revised By: L.O.G.

Date: 3/21/2019

Revised Engineer's Opinion of Probable Construction Cost

Project: **Upper Main Tile Outlet** for D.D. #56

Location: Sections 3 & 10 T87N, R22W Hardin County, Iowa

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost
DISTRICT CONSTRUCTION COSTS						
1	54" CMP TILE OUTLET	\$ 140.00	LF	40	LF	\$ 5,600.00
2	48" TRIPLE WALL PPE or RCP TILE	\$ 150.00	LF	4900	LF	\$ 735,000.00
3	54" RODENT GUARD	\$ 1,000.00	EA	1	EA	\$ 1,000.00
4	JUNCTION STRUCTURE	\$ 10,000.00	EA	1	EA	\$ 10,000.00
5	BANK STABILIZATION	\$ 50.00	TON	50	TON	\$ 2,500.00
6	PLUG EXISTING DOWNSTREAM MAIN TILE	\$ 1,000.00	LOC	1	LOC	\$ 1,000.00
7	CONCRETE COLLAR	\$ 600.00	EA	1	EA	\$ 600.00
8	PRIVATE TILE CONNECTIONS	\$ 1,000.00	EA	20	EA	\$ 20,000.00
9	TILE LOCATION	\$ 150.00	STA	2	STA	\$ 300.00
CONSTRUCTION SUBTOTAL						\$ 776,000.00
Contingency (15%)						\$ 116,400.00
CONSTRUCTION TOTAL						\$ 892,400.00
Engr. & Const. Observation (20%)						\$ 178,480.00
TOTAL COST						\$ 1,070,880.00
ROAD CROSSING CONSTRUCTION COSTS						
10	48" TILE - OPEN CUT (230TH STREET)	\$ 250.00	LF	30	LF	\$ 7,500.00
11	HICKENBOTTOM INTAKE	\$ 2,000.00	EA	2	EA	\$ 4,000.00
12	PERMANENT SEEDING AND WARRANTY	\$ 2,000.00	LOC	1	LOC	\$ 2,000.00
13	TRAFFIC CONTROL	\$ 2,000.00	LOC	1	LOC	\$ 2,000.00
CONSTRUCTION SUBTOTAL						\$ 15,500.00
Contingency (15%)						\$ 2,325.00
CONSTRUCTION TOTAL						\$ 17,825.00
Engr. & Const. Observation (25%)						\$ 4,456.25
TOTAL COST						\$ 22,281.25

UPPER MAIN TILE OUTLET (IMPROVEMENT)

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