


**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.

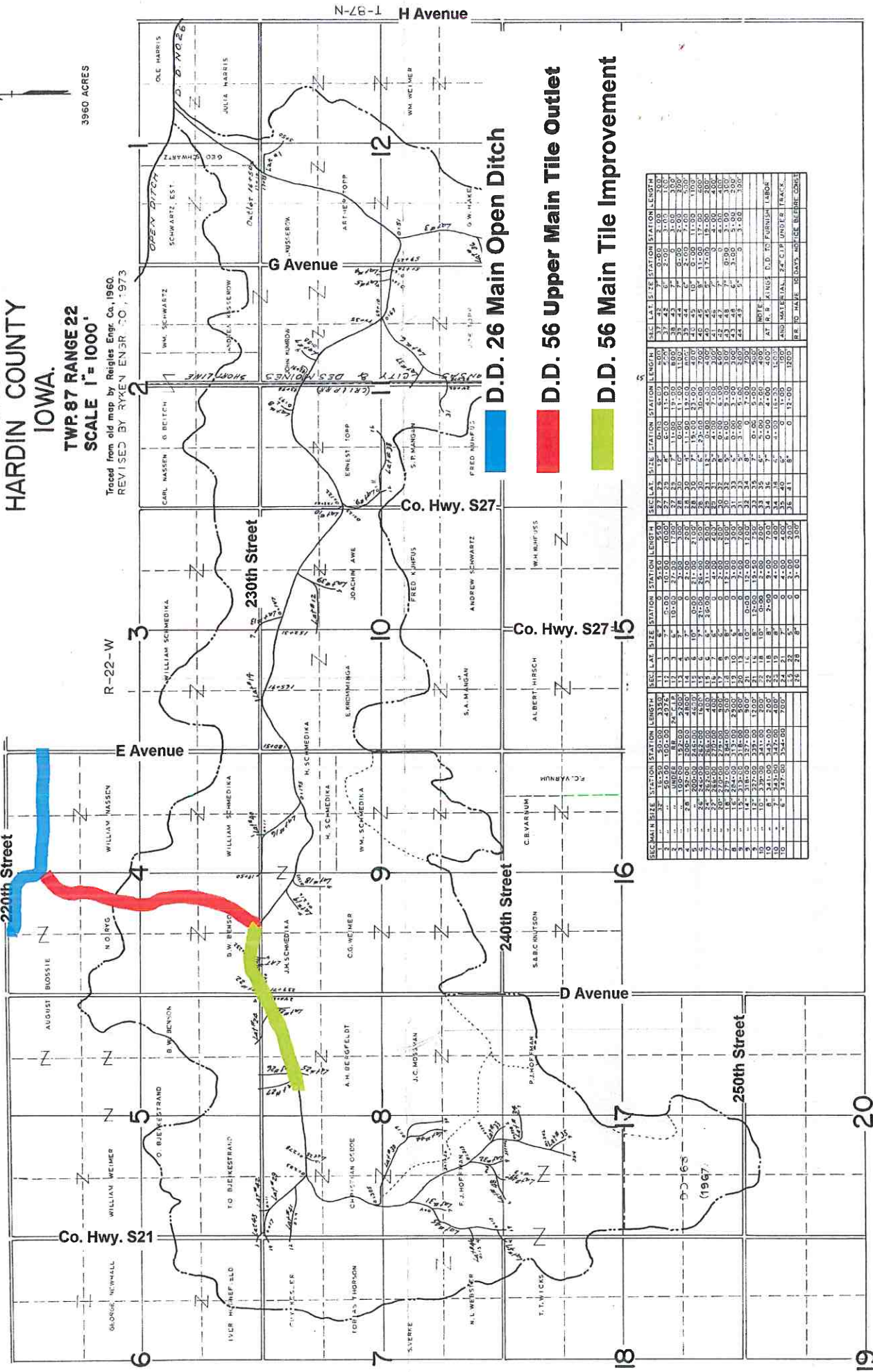
PLAT
OF
WICKS DRAINAGE DISTRICT
NO. 56
HARDIN COUNTY
IOWA.



3960 ACRES

TWP. 87 RANGE 22
SCALE 1" = 1000'

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



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.	DIET.	SECTION STATION	LENGTH	SEC. LAT.	DIET.	SECTION STATION	LENGTH	SEC. LAT.	DIET.	SECTION STATION	LENGTH
1	36.00	00.00	333.0	11	0	0.00	333.0	11	0	0.00	333.0	11	0	0.00	333.0
2	36.00	100.00	333.0	12	0	0.00	333.0	12	0	0.00	333.0	12	0	0.00	333.0
3	36.00	200.00	333.0	13	0	0.00	333.0	13	0	0.00	333.0	13	0	0.00	333.0
4	36.00	300.00	333.0	14	0	0.00	333.0	14	0	0.00	333.0	14	0	0.00	333.0
5	36.00	400.00	333.0	15	0	0.00	333.0	15	0	0.00	333.0	15	0	0.00	333.0
6	36.00	500.00	333.0	16	0	0.00	333.0	16	0	0.00	333.0	16	0	0.00	333.0
7	36.00	600.00	333.0	17	0	0.00	333.0	17	0	0.00	333.0	17	0	0.00	333.0
8	36.00	700.00	333.0	18	0	0.00	333.0	18	0	0.00	333.0	18	0	0.00	333.0
9	36.00	800.00	333.0	19	0	0.00	333.0	19	0	0.00	333.0	19	0	0.00	333.0
10	36.00	900.00	333.0	20	0	0.00	333.0	20	0	0.00	333.0	20	0	0.00	333.0
11	36.00	1000.00	333.0	21	0	0.00	333.0	21	0	0.00	333.0	21	0	0.00	333.0
12	36.00	1100.00	333.0	22	0	0.00	333.0	22	0	0.00	333.0	22	0	0.00	333.0
13	36.00	1200.00	333.0	23	0	0.00	333.0	23	0	0.00	333.0	23	0	0.00	333.0
14	36.00	1300.00	333.0	24	0	0.00	333.0	24	0	0.00	333.0	24	0	0.00	333.0
15	36.00	1400.00	333.0	25	0	0.00	333.0	25	0	0.00	333.0	25	0	0.00	333.0
16	36.00	1500.00	333.0	26	0	0.00	333.0	26	0	0.00	333.0	26	0	0.00	333.0
17	36.00	1600.00	333.0	27	0	0.00	333.0	27	0	0.00	333.0	27	0	0.00	333.0
18	36.00	1700.00	333.0	28	0	0.00	333.0	28	0	0.00	333.0	28	0	0.00	333.0
19	36.00	1800.00	333.0	29	0	0.00	333.0	29	0	0.00	333.0	29	0	0.00	333.0
20	36.00	1900.00	333.0	30	0	0.00	333.0	30	0	0.00	333.0	30	0	0.00	333.0

(1967)



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



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