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PRELIMINARY ENGINEERING REPORT

**DRAINAGE DISTRICT NO. 15
TILE IMPROVEMENTS
DICKINSON COUNTY, IOWA
PROJECT NO: E18106**



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.

Richard A. Hopper Date 7/16/19
Richard A. Hopper, P.E., License number 8106
My license renewal date is December 31, 2019
Pages or sheets covered by this seal: Title, Pg 1-6, Location Map

I. INTRODUCTION/HISTORY

A petition for the establishment of the drainage district was filed January 21, 1911. An engineer was appointed and the preliminary engineering report was dated March 30, 1911. It was recommended that the district be established.

Bids for the project were opened and the construction awarded on June 27, 1911. The Engineer's Report on Permanent Survey of Drainage District No. 15 was filed June 27, 1911. The Engineer's final report dated February 10, 1914, noted that in the fall of 1912 it was discovered a considerable number of tile as laid on the main drain had partially disintegrated under the action of some chemical solvent. The contractor replaced the defective tile and the engineer recommended the Board accept the work with the condition that the contractor furnish a five-year guarantee bond covering a percentage of the value of the tile laid.

In 1928 an engineer was appointed to investigate the district. He reported that the district was in need of extensive repairs, some land was left out that should not have been and most of the main tile is too small. He recommended annexing in the land that was left out of the district but there is no record as to board action.

In 1966 the board entered into a group enterprise agreement with the Dickinson County Soil Conservation District on Drainage District No. 15. There is a preliminary engineering report done by the SCS engineer in 1969. It stated the capacity of the existing tile varied from adequate to one-fifth the capacity required for good agricultural drainage. It recommended installing a relief tile parallel to the existing tile, with a 38-inch tile being the largest tile size required. It does not appear this project was constructed.

A bid letting on the cleanout of Drainage District No. 15 was held on November 20, 1979. The board accepted the bid of Estherville Sand and Gravel in the amount of \$2,757.60.

In 1980 there was correspondence with the IDOT regarding some Drainage District No. 15 tile that was removed due to a box culvert that was constructed when the county road was relocated in 1970. It appears the IDOT was going to work with the County to reconnect the tile.

On July 12, 1984, the county dug up and took some shots on the Drainage District No. 15 main located in the SW¼ of Section 3, Excelsior Township. According to a 1980 private tile map of this area in the County Engineer's office, there are two county 22" mains with the good tile located 15 feet to 20 feet west of the old main. When the County dug up the tile in 1984, their drawing does not indicate there are two mains.

Recently the Iowa Department of Natural Resources Great Lakes Wildlife Unit requested permission to complete a small wetlands project within the Drainage District No. 15 watershed. The proposed wetland restoration is on the tile Branch 0, where the 10-inch tile will outlet into the wetland basin. Construction was intended to be done in the summer or fall of 2017.

A petition was filed that a drainage study be conducted to improve drainage from the existing tile outlet in Section 9 of Excelsior Township north and easterly to benefit drainage in Sections 3, 4 and 10 of Excelsior Township. Dickinson County employees investigated the existing tile main this fall and noted there were two mains north of the acreage located in the NW¼ of Section 10, of said Township, but only one of the mains is operational. One had been abandoned. The County planned to continue investigation this spring because of possible tree roots in the tile near the acreages.

II. STARTING POINT, ROUTE AND TERMINUS

The main drain begins at a point 300 feet south and 50 feet east of the east quarter-corner of Section 9-99-38 and extends in a northwesterly and northeasterly direction through Section 9 to cross into Section 10-99-38 at a point 635 feet south of the northeast corner of said Section 9, thence in a northeasterly direction through said Section 10 to cross into Section 3-99-38 at a point 1140 feet east of the southwest corner of said Section 3; thence in a general northwesterly and northeasterly and northwesterly direction through said Section 3 to cross into Section 34-100-38 at a point 245 feet east of the northwest corner of the NE¼ of the NW¼ of said Section 3, thence in a northwesterly direction through said Section 34 to cross into Section 33-100-38 at a point 740 feet north of the southwest

II. STARTING POINT, ROUTE AND TERMINUS (cont.)

corner of said Section 34; thence in said Section 33 in a westerly direction for a distance of 1100 feet and terminating at the western edge of a pond located therein.

III. EXISTING IMPROVEMENTS

The existing main tile system consists of tile that ranges in size from 6" to 26". It does not appear there have been any major improvements done in the district since it was established over 100 years ago. The existing drainage coefficient is mainly around 1/8" or less.

IV. PROPOSED IMPROVEMENTS

The proposed improvements include two options.

The first option would be a new parallel tile with a 1/2-inch drainage coefficient. The pipe for this option would range in size from 12-inch to 42-inch pipe. A cost estimate for this option can be seen following in this report.

The second option would be a new parallel tile with a 1-inch drainage coefficient. The pipe for this option would range in size from 15-inch to 54-inch. A cost estimate for this option can be seen following in this report.

V. RIGHT OF WAY

Since the main tile improvements will be offset from the existing main tile, additional right-of-way will be required. This will be permanent right-of-way. The permanent right-of-way will be a 30-foot wide easement where most excavation will occur. There may also be crop damage to pay for, but the extent of this is unknown at this time.

VI. COST ESTIMATES

The first estimate will be for a 1/2" drainage coefficient system.

OPTION NO. 1 – 1/2" DRAINAGE COEFFICIENT

ITEM NO.	ITEM DESCRIPTION	QUANTITY & UNIT	UNIT PRICE	TOTAL PRICE
1.	42" Apron with rip rap	1 Each	\$ 5,000.00	\$ 5,000.00
*2.	42" RCP, 2000D	150 L.F.	\$ 100.00	\$ 15,000.00
3.	42" RCP, 1500D	5550 L.F.	\$ 85.00	\$ 471,750.00
4.	36" RCP, 1500D	1100 L.F.	\$ 65.00	\$ 71,500.00
5.	30" RCP, 1500D	1060 L.F.	\$ 55.00	\$ 58,300.00
6.	24" RCP, 1500D	730 L.F.	\$ 40.00	\$ 29,200.00
7.	18" RCP, 1500D	670 L.F.	\$ 30.00	\$ 20,100.00
*8.	18" Steel Casing, Jacked & Bored	160 L.F.	\$ 400.00	\$ 64,000.00

9.	Tees	15 Each	\$ 1,650.00	\$ 24,750.00
10.	Tile Connections	20 Each	\$ 350.00	\$ 7,000.00
11.	Exploratory Excavation	12 Hours	\$ 250.00	\$ 3,000.00
12.	Trench Stabilization	100 Ton	\$ 40.00	\$ 4,000.00
13.	Area Drain	2 Each	\$ 1,500.00	\$ 3,000.00

ESTIMATED SUBTOTAL CONSTRUCTION COST	\$ 776,600.00
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ESTIMATED TOTAL DISTRICT CONSTRUCTION COST	\$ 697,600.00
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CONTINGENCIES	\$ 69,760.00
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ENGINEERING, LEGAL, PUBLICATION	\$ 150,000.00
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CLASSIFICATION	\$ 10,000.00
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PERMANENT EASEMENT (7.8 Acres @ \$2500)	\$ 19,500.00
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TEMPORARY EASEMENT (25.9 Acres @ \$1460)	\$ 37,814.40
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INTEREST	<u>\$ 42,000.00</u>
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ESTIMATED TOTAL DISTRICT COST	<u><u>\$1,026,674.00</u></u>
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AVERAGE COST PER ACRE: \$612.94 acre (Based on 1675 Acres)
(\$49.18/acre/year for 20 years)
(\$79.38/acre/year for 10 years)

*Secondary Road or IDOT Costs

The second option is for a parallel 1" coefficient system.

OPTION NO. 2 – 1" DRAINAGE COEFFICIENT

ITEM NO.	ITEM DESCRIPTION	QUANTITY & UNIT	UNIT PRICE	TOTAL PRICE
1.	54" Apron with rip rap	1 Each	\$ 5,800.00	\$ 5,800.00
*2.	54" RCP, 2000D	150 L.F.	\$ 150.00	\$ 22,500.00
3.	54" RCP, 1500D	5550 L.F.	\$ 130.00	\$ 721,500.00
4.	48" RCP, 1500D	1100 L.F.	\$ 110.00	\$ 121,000.00
5.	36" RCP, 1500D	1700 L.F.	\$ 65.00	\$ 110,500.00
6.	30" RCP, 1500D	60 L.F.	\$ 55.00	\$ 3,300.00
7.	24" RCP, 1500D	670 L.F.	\$ 40.00	\$ 26,800.00
8.	18" RCP, 1500D	30 L.F.	\$ 30.00	\$ 900.00
*9.	24" Steel Casing, Jacked & Bored	160 L.F.	\$ 500.00	\$ 80,000.00

10.	Tees	15 Each	\$ 1,650.00	\$ 24,750.00
11.	Tile Connections	20 Each	\$ 350.00	\$ 7,000.00
12.	Exploratory Excavation	12 Hours	\$ 250.00	\$ 3,000.00
8.	Trench Stabilization	100 Ton	\$ 40.00	\$ 4,000.00
9.	Area Drain	2 Each	\$ 1,500.00	\$ 3,000.00

ESTIMATED SUBTOTAL CONSTRUCTION COST	\$1,134,050.00
ESTIMATED TOTAL DISTRICT CONSTRUCTION COST	\$1,031,550.00
CONTINGENCIES	\$ 103,155.00
ENGINEERING, LEGAL, PUBLICATION	\$ 150,000.00
CLASSIFICATION	\$ 10,000.00
PERMANENT EASEMENT (7.8 Acres @ \$2500)	\$ 19,500.00
TEMPORARY EASEMENT (25.9 Acres @ \$1460)	\$ 37,814.00
INTEREST	<u>\$ 60,000.00</u>
ESTIMATED TOTAL DISTRICT COST	<u>\$1,412,019.00</u>

AVERAGE COST PER ACRE: \$843.00/acre (Based on 1675 Acres)
(\$67.64/acre/year for 20 years)
(\$109.17/acre/year for 10 years)

*Secondary Road or IDOT Costs

Branch No. 4 drains over a third of the district and only has an existing drainage coefficient of around 1/8". The main of Branch No. 4 also appears to stop just on the west side of County Road M27 and does not extend into Section No. 4 to provide much benefit to the low area in the SW¼ of said section. In order to provide better improvement to this area we looked at improving the main tile of Branch No. 4 and extending it through the majority of the SW¼ of Section No. 4, Excelsior Township.

The third option is for a parallel 1/2" coefficient system for Branch No. 4

OPTION NO. 3 – BRANCH NO. 4 – 1/2" DRAINAGE COEFFICIENT

ITEM NO.	ITEM DESCRIPTION	QUANTITY & UNIT	UNIT PRICE	TOTAL PRICE
1.	24" RCP, 1500D	7000 L.F.	\$ 40.00	\$ 280,000.00
*2.	24" Steel Casing, Jacked & Bored	140 L.F.	\$ 500.00	\$ 70,000.00
3.	Tees/Elbows	5 Each	\$ 1500.00	\$ 7,500.00
4.	Tile Connections	6 Each	\$ 350.00	\$ 2,100.00
5.	Exploratory Excavation	4 Hours	\$ 250.00	\$ 1,000.00

6.	Trench Stabilization	75 Ton	\$	40.00	\$	3,000.00
7.	Area Drain	3 Each	\$	1,500.00	\$	4,500.00
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ESTIMATED SUBTOTAL CONSTRUCTION COST						\$ 368,100.00
ESTIMATED TOTAL DISTRICT CONSTRUCTION COST						\$ 298,100.00
CONTINGENCIES						\$ 29,810.00
ENGINEERING, LEGAL, PUBLICATION						\$ 41,000.00
PERMANENT EASEMENT (4.8 Acres @ \$2500)						\$ 12,000.00
TEMPORARY EASEMENT (16.1 Acres @ \$1460)						\$ 23,506.00
INTEREST						<u>\$ 18,405.00</u>
ESTIMATED TOTAL DISTRICT COST						<u>\$ 422,821.00</u>

AVERAGE COST PER ACRE: \$704.70/acre (Based on 600 Acres)
(\$56.55/acre/year for 20 years)
(\$91.26/acre/year for 10 years)

*Secondary Road or IDOT Costs

The fourth option is for a parallel 1" coefficient system for Branch No. 4

OPTION NO. 4 – BRANCH NO. 4 – 1" DRAINAGE COEFFICIENT

ITEM NO.	ITEM DESCRIPTION	QUANTITY & UNIT	UNIT PRICE	TOTAL PRICE
1.	36" RCP, 1500D	7000 L.F.	\$ 65.00	\$ 455,000.00
*2.	36" Steel Casing, Jacked & Bored	140 L.F.	\$ 600.00	\$ 84,000.00
3.	Tees/Elbows	5 Each	\$ 1500.00	\$ 7,500.00
4.	Tile Connections	6 Each	\$ 350.00	\$ 2,100.00
5.	Exploratory Excavation	4 Hours	\$ 250.00	\$ 1,000.00
6.	Trench Stabilization	75 Ton	\$ 40.00	\$ 3,000.00
7.	Area Drain	3 Each	\$ 1,500.00	\$ 4,500.00
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ESTIMATED SUBTOTAL CONSTRUCTION COST				\$ 557,100.00
ESTIMATED TOTAL DISTRICT CONSTRUCTION COST				\$ 473,100.00
CONTINGENCIES				\$ 47,310.00
ENGINEERING, LEGAL, PUBLICATION				\$ 66,000.00
PERMANENT EASEMENT (4.8 Acres @ \$2500)				\$ 12,000.00
TEMPORARY EASEMENT (16.1 Acres @ \$1460)				\$ 23,506.00

INTEREST

\$ 27,900.00

ESTIMATED TOTAL DISTRICT COST

\$ 649,816.00

AVERAGE COST PER ACRE: \$1083.03/acre (Based on 600 Acres)
(\$86.90/acre/year for 20 years)
(\$140.26/acre/year for 10 years)

*Secondary Road or IDOT Costs

VII. CONCLUSION/RECOMMENDATION

The proposed improvements include systems with 1/2-inch and 1-inch drainage coefficients. Either of the options will provide greatly improved drainage in the main of the drainage district. Improvements to Branch No. 4 were also presented with a 1/2-inch and 1-inch drainage coefficient.

The minimum improvement we would recommend is the 1/2-inch coefficient system.

The Board of Supervisors, as trustees, for DD#15, should accept this report and set a date for a public hearing. Letters were sent out to landowners within the boundary of Drainage District No. 15 to obtain information regarding possible wetlands. Wetland mitigation could have an impact on the cost of the proposed improvements depending on the information gathered.

At the hearing, the trustees should seek input from landowners regarding which options to pursue. More than one option could be bid with the final decision on which one to construct coming after the bid.

A reclassification will be required with either of the options.

Improvements are drastically needed in this drainage district and we strongly recommend proceeding with improvements.

