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ENGINEER'S REPORT

**JOINT DRAINAGE DISTRICT NO. 61
BRANCH 399 WEST TILE IMPROVEMENTS
DICKINSON COUNTY, IOWA**

PROJECT NO: E24106



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.

Collin Klingbeil

Date 1/2/25

Collin J. Klingbeil, P.E.
License number 24741

My license renewal date is December 31, 2025

Pages or sheets covered by this seal:

ALL

I. INTRODUCTION/HISTORY

A. Scope

A petition for drainage tile improvements in Emmet, Clay and Dickinson County Joint Drainage District No. 61 (JDD61) on Branch 398 Tile was filed with the Dickinson County Board of Supervisors. Since the lands involved are entirely located within Dickinson County, a resolution was adopted giving the Dickinson County Board of Supervisors authority "to take all further action on behalf of the joint district as it relates to the Branch 398 improvement project..."

After the petition was filed, the Dickinson County Board of Supervisors appointed Jacobson-Westergard & Associates, Inc. on July 23, 2024, to conduct the necessary survey, study, plan, and report. We note that in the original plans and profiles Branch 398 was referred to as Branch 399 West. We will use the original naming conventions in this report.

B. History

The history focuses on the Branch 399 West tile system of JDD61.

- Early 1912, petition filed for the establishment of JDD61
- March 7, 1912, the engineer's report was filed recommending the district be established and drains and ditches be constructed to improve drainage for approximately 25,324 acres in Emmet, Clay and Dickinson Counties.
- June 20, 1912, JDD61 is established and includes Lake Township in Clay County, Lloyd and Richland townships in Dickinson County, and Twelve Mile Lake and Estherville Townships in Emmet County.
- 1980's, record of letters between Dickinson County Engineer and landowner regarding possible improvements and petition for the Branch 399 West tile system.
- 1993, issue with water bubbling out of intake on west side of State Street in Terril.

II. EXISTING TILE STARTING POINT, ROUTE AND TERMINUS

See also the enclosed existing tile system map.

Branch 399 West Tile: The tile begins (outlets) into the Main Open Ditch of JDD61 in the SE SW ¼ of Section 11 of Lloyd Township (T-98-N, R-35-W). The tile runs West for approximately 4,600 feet and North for the remaining 5,600 feet. Branch 399 West consists of approximately 10,200 feet of tile, ranging in diameter from 28 inches at the outlet to 10 inches at the upper end. The tile crosses two gravel roads in order: 320th Avenue and 230th Street (two times). The system also crosses 310th Avenue (N14) (paved) and terminates on the west side.

Branch 399 West-13: This branch begins at Station 13 on Branch 399 West (1,300 feet from the outlet) in the SW SW ¼ of Section 11, Lloyd Township. It extends 1,100 feet south, crossing 230th Street (gravel road), and consists of 8-inch diameter tile throughout its length.

Branch 399 West-24: This branch starts at Station 24 on Branch 399 West in the SE SE ¼ of Section 10, Lloyd Township. It extends 4,100 feet generally north, with tile ranging in size from 16-inch diameter at the starting point to 8-inch diameter at the upper end.

Branch 399 West-24-21 Tile: This branch begins at Station 21 on Branch 399 West-24 in the NE SE ¼ of Section 10 of Lloyd Township, consisting of 8-inch diameter tile throughout. It extends northwest approximately 1,100 feet.

Branch 399 West-24-26 Tile: Starting at Station 26, this branch extends approximately 580 feet east and crosses 320th Ave (gravel), also with 8-inch diameter tile.

Branch 399 West-25: Begins at Station 25 on Branch 399 West in the SE SE ¼ of Section 10 of Lloyd Township. It extends south for approximately 2,960 feet with tile ranging in size from 14-inch diameter tile at the start to 10-inch diameter tile in the upper end. This branch crosses one road, 230th Street (gravel).

Branch 399 West-46: The branch starts at station 46 on Branch 399 West in the NE NW ¼ of Section 15 in Lloyd Township. It extends south and west towards the town of Terril and ends on the west side

of State Street, spanning approximately 2,410 feet. Branch 399 West-46 consists of 14-inch tile at the start of the branch and 10-inch tile at the upper end.

III. INVESTIGATION

A survey was made in August 2024, which included going to the site and locating culverts and tile intakes. In addition, Engineer’s reports and plats, plans, private tile, and profiles of district facilities were reviewed. We also completed a drone flight in September of 2024, and observed many areas that had been flooded out in the spring – early summer and had either been replanted or left. We acknowledge that the flooding of 2024 was historically extreme, but it is still evidence that drainage improvements would be beneficial.

Condition of Existing Tile System:

The condition of the existing tile system is mostly unknown to us. According to one landowner, the Branch 399 West tile is in poor condition and is cracked. We hope to learn more about the condition of the tile from landowners within the benefited area. We could also hire a contractor to run a crawler camera in the pipe to get a better understanding of the tile’s current condition, if that is desired.

We do note that the existing tile system is over 100 years old. The life expectancy of many of the tile systems installed during the early 1900’s was approximately 50 years. The current condition of tile systems installed in that era varies.

Design Capacity of Existing Tile System:

The adequacy of the existing tile system has been analyzed and is shown in the table below and enclosed drainage coefficient map. Note that the capacities shown assume the tile is in good condition, which is likely not the case. The design parameter commonly used for drainage tile is known as the *drainage coefficient (DC)*. According to the Iowa Drainage Guide, the drainage coefficient is the rate at which water can be removed from the land and is expressed as the equivalent depth of water covering the surface of the drained area that can be removed in 24 hours. In the early 1900’s tile systems were commonly designed at 1/4 to 1/8 inches per day or less DC. A design DC of 1/2 – 1 inches per day has been recommended in Iowa for the last several decades. Generally, the higher availability of surface drainage relief, the lower the DC required. For lands with no surface relief and many potholes and depressions, a higher drainage coefficient is required.

This district is somewhat unique in that it carries storm water flow from the City of Terril. The impervious paved streets, sidewalks, driveways, roofs, etc. generate more storm runoff than agricultural lands, necessitating larger tile to carry the extra water away during and following rainfall events. Branches 399 West and 399 West-46 tile serve as outlets for a portion of the City of Terril.

Design of Existing Tile Systems								
<u>Lateral</u>	<u>Starting Station</u>	<u>Dia. (in)</u>	<u>Grade (%)</u>	<u>Ex Capac. (cfs)</u>	<u>Velocity (fps)</u>	<u>Approx. Length</u>	<u>Acres Drained</u>	<u>DC (in/day)</u>
399 West	0+00	28	0.10%	12.75	2.98	2,500	1406.8	0.22
	25+00	24	0.10%	8.45	2.69	200	700.7	0.29
	27+00	18	0.20%	5.552	3.142	1,900	686.8	0.19
	46+00	12	0.50%	2.977	3.791	1,000	357.6	0.20
	56+00	14	0.20%	2.84	2.66	1,000	331.7	0.20
	66+00	10	0.60%	2.01	3.68	900	254.2	0.19
	75+00	10	0.80%	2.32	4.25	500	224.7	0.25
	80+00	14	0.10%	2.01	1.88	900	204.6	0.23
	89+00	12	0.10%	1.33	1.70	1,300	186.2	0.17
399 West-13	0+00	8	0.20%	0.64	1.83	1,100	49.0	0.31

<u>Lateral</u>	<u>Starting Station</u>	<u>Dia. (in)</u>	<u>Grade (%)</u>	<u>Ex Capac. (cfs)</u>	<u>Velocity (fps)</u>	<u>Approx. Length</u>	<u>Acres Drained</u>	<u>DC (in/day)</u>
399 West-24	0+00	16	0.10%	2.87	2.05	1,200	470.97	0.14
	12+00	14	0.10%	2.01	1.88	900	402.5	0.12
	21+00	12	0.10%	1.33	1.70	500	204.6	0.15
	26+00	10	0.10%	0.82	1.50	1,000	172.8	0.11
	36+00	8	0.10%	0.45	1.29	500	131.6	0.08
399 West-24-21	0+00	8	0.70%	1.19	3.42	800	117.5	0.24
399 West-24-26	0+00	8	0.66%	1.16	3.32	780	15.22	1.81
399 West-25	0+00	12	0.10%	1.33	1.70	1,700	164.6	0.19
	17+00	10	0.10%	0.82	1.50	1,263	88.9	0.22
399 West-46	0+00	14	0.10%	2.01	1.88	900	305.75	0.16
	9+00	10	0.90%	2.46	4.50	1,554	231.6	0.25

Generally, the Branch 399 West tile system, including laterals, appears to have been designed with a DC from roughly 1/10 to 1/4 inches per day. For today's farming and drainage needs, as well as the drainage of a portion of Terril, the existing tile system as a whole is completely inadequate. Drainage improvements would be beneficial for the entire Branch 399 West tile system. We recommend utilizing a 3/4 inches per day DC for the agricultural lands and 4 inches per day for the lands within the developed limits of Terril.

The Branch 399 West tile, which all other branches flow into, is significantly undersized, with existing DCs ranging from 0.17 to 0.29 inches per day. We would recommend tile capacities approximately **5X** the current design.

Currently, Branch 399 West-46, the primary branch serving Terril, has a DC of 0.16 – 0.25 inches per day. We recommend drainage capacities of approximately **10X** the current design.

Branch 399 West-24 is also significantly undersized. The branch has DCs ranging from 0.08 to 0.15 inches per day. We would recommend a DC of 3/4 inches per day for this Branch which would increase the capacity by **5X**.

Landowner input would be beneficial to determine what branches are desired to be improved.

IV. PROPOSED IMPROVEMENTS

The investigation has confirmed the need for drainage relief in the district. See also the enclosed proposed tile map.

A. Proposed Tile Improvements

Branch 399 West Tile:

The proposed Branch 399 West tile would span nearly 10,600 feet beginning in the SW corner of Section 11 of Lloyd Township (T-98-N, R-35-W). The tile would generally parallel the existing tile and range in diameter from 48 inches at the outlet to 18 inches at the upper end. The tile would cross two gravel roads 320th Avenue and 230th Street (twice). The tile would terminate on the west side of 310th Ave (N14), a paved road.

Branch 399 West-46 Tile:

The proposed Branch 399 West-46 would extend from Station 49+50 of the proposed Branch 399 West tile westward approximately 3,200 feet and parallel the existing tile. This branch would run through Terril and terminate on the west side of 310th Ave (N14) in the NE NE ¼ of Section 16 of Lloyd Township. The tile would range in diameter from 30 inches to 24 inches.

Branch 399 West-24 Tile:

The proposed Branch 399 West-24 would begin in the SE SE ¼ of Section 10 of Lloyd Township. This tile would parallel the existing Branch 399 West-24 and extend approximately 3,500 feet. It would consist of tile ranging in diameter from 30 inches to 24 inches.

Branch 399 West-25 Tile:

We propose to make a relatively short improvement to this branch, approximately 350 feet. It would start in the SE SE ¼ of Section 10 of Lloyd Township and extend from the improved Branch 399 West tile south across 230th Street with 18-inch diameter tile to give the lands south of the road access to a much-improved outlet.

Branch 399 West-13 Tile:

We would also propose making a short improvement to this branch, approximately 140 feet of 12-inch diameter tile. It would start in the SW SW ¼ of Section 11 of Lloyd Township at the proposed improved Branch 399 West tile and extend southward crossing 230th Street (gravel) and ending at approximately the south road right-of-way line where it would connect to the existing district tile.

B. Pipe Material

The two main pipe materials to be considered are reinforced concrete pipe (RCP) and dual-wall plastic. In terms of purchasing the pipe, dual-wall plastic is certainly less costly than RCP. However, dual-wall plastic is much more susceptible to deflection and pipe failure, and has been found to re-corrugate, restricting flow. Additionally, public installation standards for dual-wall plastic require installation in a water-free trench (dewatering required for water in the trench) and that the pipe be encased in a crushed rock envelope. Deflection testing is required 30 days after final backfill, which tests for deflection more than 5%. Excessively deflected pipe is required to be replaced at the cost of the contractor. The strength of dual-wall plastic highly depends on the strength of the material placed around it, particularly with large diameter pipe. This makes proper installation vital, and more inspection would be required, increasing the cost of engineering for the project. In our experience, the overall cost of dual-wall plastic pipe, including installation, is comparable to RCP. Over the expected lifetime of the new tile (+100 years) in our opinion RCP is the preferred pipe material. We can include a dual-wall plastic pipe alternative in the bid at the Board and/or landowners' request, to see how the cost would compare. The cost estimate in this report is based on the use of RCP.

C. What to do with the old tile

With drainage district tile improvement projects, it usually would be best if the new tile could be placed in the same trench as the old. This way the 100+ year old tile is no longer relied upon, and all existing tile have direct connections to the new tile system. One downside to this is that the old tile likely actively drained adjacent lands whereas the new tile will drain very little water itself and acts primarily as a collector main. In times of dry weather where the existing tile is not running, putting the new tile in the same trench as the old is feasible but is very difficult if not impossible for a contractor when the tiles have flowing water. An alternative is to install the new tile parallel to the old tile and either separately dig up and crush the old tile (and run all private tile lines encountered to the new tile), or intermittently make cross connections between the existing and new tile. This largely depends on the condition of the old tile. If the old tile is left in place, we recommend the drainage district abandon it. This will be a topic of conversation with landowners at the meeting(s). For this report and cost estimate we have assumed a parallel installation.

D. Work within Road Rights-of-Way

Iowa Code requires that for drainage district facility work within county road right-of-way, county secondary road funds pay for the cost of construction. For the preliminary design we have a total of seven (7) county road crossings, including five (5) gravel and two (2) paved. The two crossings of county road N14 would be bored, and the gravel road crossings would be open cut.

Iowa Code does not have an equivalent requirement for drainage district crossings of city streets. As part of the proposed project there would be crossings of North State Street and North 1st Street in Terril. The drainage district would be responsible for the road crossing cost, including restoring the street surfaces.

V. RIGHT-OF-WAY

The Iowa Code grants drainage district a permanent right of egress and ingress, and right of access for maintenance, repair, improvement, and inspection of drainage district facilities. Unless right-of-way is acquired, which we are not recommending, landowners will be reimbursed for any damages caused in the process of maintenance, repair, improvement, or inspection.

The district will need an area to perform the proposed work. The work limits for this project will generally be 50 feet from each side of the proposed tile on agricultural lands. In Terril the work limits will be limited to the minimum necessary to complete the work. Compensation for damages within the work limits is normally determined at the completion hearing and is subject to approval by the Board of Supervisors.

VI. COST ESTIMATE

SECTION 1: CONSTRUCTION ASSESSABLE TO PRIVATE LANDS

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
BRANCH 399 WEST TILE					
1	48" DIA. RCP APRON W/ANIMAL GUARD	1	EA	\$4,000.00	\$4,000.00
2	48" DIA. RCP, 2000D	2,471	LF	\$161.00	\$397,831.00
3	42" DIA. RCP, 2000D	1,283	LF	\$132.00	\$169,356.00
4	36" DIA. RCP, 2000D	1,000	LF	\$105.00	\$105,000.00
5	24" DIA. RCP, 3000D	870	LF	\$69.00	\$60,030.00
6	24" DIA. RCP, 2000D	750	LF	\$64.00	\$48,000.00
7	18" DIA. RCP, 3000D	1,400	LF	\$53.00	\$74,200.00
8	18" DIA. RCP, 2000D	2,450	LF	\$50.00	\$122,500.00
9	12" DIA. RCP, 2000D	392	LF	\$38.00	\$14,896.00
10	48" TO 42" DIA. RCP REDUCER	1	EA	\$3,400.00	\$3,400.00
11	42" TO 36" DIA. RCP REDUCER	1	EA	\$3,100.00	\$3,100.00
12	24" TO 18" DIA. RCP REDUCER	1	EA	\$2,200.00	\$2,200.00
13	RCP TEE, 30" ON 48" DIA.	2	EA	\$2,200.00	\$4,400.00
14	RCP TEE, 18" ON 48" DIA.	1	EA	\$2,200.00	\$2,200.00
15	RCP TEE, 12" ON 48" DIA.	1	EA	\$2,200.00	\$2,200.00
16	RCP TEE, 18" ON 42" DIA.	1	EA	\$1,900.00	\$1,900.00
17	RCP TEE, 12" ON 42" DIA.	1	EA	\$1,900.00	\$1,900.00
18	RCP TEE, 24" ON 36" DIA.	1	EA	\$1,600.00	\$1,600.00
19	RCP TEE, 12" ON 36" DIA.	1	EA	\$1,600.00	\$1,600.00
20	RCP TEE, 12" ON 24" DIA.	2	EA	\$1,200.00	\$2,400.00
21	RCP TEE, 12" ON 18" DIA.	1	EA	\$1,100.00	\$1,100.00
22	RCP TEE, 12" ON 12" DIA.	4	EA	\$1,000.00	\$4,000.00
23	30" DIA. RCP END CAP	1	EA	\$250.00	\$250.00
24	18" DIA. RCP END CAP	3	EA	\$175.00	\$525.00
25	12" DIA. RCP END CAP	7	EA	\$150.00	\$1,050.00
Branch 399 West Subtotal					\$1,029,638.00
BRANCH 399 WEST-13					
26	12" DIA. RCP, 3000D	60	LF	\$42.00	\$2,520.00
27	12" DIA. RCP END CAP	1	EA	\$150.00	\$150.00
Branch 399 West-13 Subtotal					\$2,670.00

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
BRANCH 399 WEST-24					
28	30" DIA. RCP, 2000D	2,100	LF	\$83.00	\$174,300.00
29	24" DIA. RCP, 2000D	1,376	LF	\$64.00	\$88,064.00
30	12" DIA. RCP, 2000D	152	LF	\$38.00	\$5,776.00
31	30" TO 24" DIA. RCP REDUCER	1	EA	\$1,900.00	\$1,900.00
32	RCP TEE, 12" ON 30" DIA.	1	EA	\$1,400.00	\$1,400.00
33	RCP TEE, 12" ON 24" DIA.	2	EA	\$1,200.00	\$2,400.00
34	RCP TEE, 12" ON 12" DIA.	3	EA	\$1,000.00	\$3,000.00
35	24" DIA. RCP END CAP	1	EA	\$200.00	\$200.00
36	15" DIA. RCP END CAP	1	EA	\$150.00	\$150.00
37	12" DIA. RCP END CAP	5	EA	\$150.00	\$750.00
Branch 399 West-24 Subtotal					\$277,940.00
BRANCH 399 WEST-25					
38	18" DIA. RCP, 2000D	276	LF	\$50.00	\$13,800.00
39	RCP TEE, 18" ON 18" DIA.	2	EA	\$1,100.00	\$2,200.00
40	RCP TEE, 12" ON 18" DIA.	1	EA	\$1,100.00	\$1,100.00
41	24" DIA. RCP END CAP	1	EA	\$200.00	\$200.00
42	18" DIA. RCP END CAP	1	EA	\$175.00	\$175.00
43	12" DIA. RCP END CAP	1	EA	\$150.00	\$150.00
Branch 399 West-25 Subtotal					\$17,625.00
BRANCH 399 WEST-46					
44	30" DIA. RCP, 2000D	900	LF	\$83.00	\$74,700.00
45	24" DIA. RCP, 2000D	1,137	LF	\$64.00	\$72,768.00
46	24" DIA. RCP, 2000D, GASKETED	800	LF	\$67.00	\$53,600.00
47	24" DIA. RCP, 3000D	200	LF	\$69.00	\$13,800.00
48	18" DIA. RCP, 2000D	41	LF	\$50.00	\$2,050.00
49	36" TO 30" DIA. RCP REDUCER	1	EA	\$3,000.00	\$3,000.00
50	30" TO 24" DIA. RCP REDUCER	1	EA	\$1,900.00	\$1,900.00
51	INTAKE, SW-512 (IDOT), CASE 1, 24" DIA.	1	EA	\$5,000.00	\$5,000.00
52	INTAKE CASTING, SW-604 (IDOT), TYPE 5 CASTING	1	EA	\$600.00	\$600.00
53	RCP TEE, 24" ON 24" DIA.	2	EA	\$1,200.00	\$2,400.00
54	RCP TEE, 18" ON 24" DIA.	1	EA	\$1,200.00	\$1,200.00
55	RCP TEE, 12" ON 24" DIA.	2	EA	\$1,200.00	\$2,400.00
56	24" DIA. RCP END CAP	2	EA	\$200.00	\$400.00
57	12" DIA. RCP END CAP	2	EA	\$150.00	\$300.00
58	URBAN SEEDING, FERTILIZING, AND MULCHING	0.50	AC	\$5,000.00	\$2,500.00
59	FULL DEPTH PATCH, HMA, 4"	53	SY	\$120.00	\$6,360.00
Branch 399 West-46 Subtotal					\$242,978.00
MISCELLANEOUS ITEMS					
60	TILE CONNECTIONS, LESS THAN 8"	60	EA	\$350.00	\$21,000.00
61	TILE CONNECTIONS, 8" DIA PLUS	15	EA	\$500.00	\$7,500.00
62	EXPLORATORY EXCAVATION	20	HR	\$250.00	\$5,000.00
63	TRENCH STAB. & BEDDING STONE	400	TN	\$40.00	\$16,000.00
64	MOBILIZATION	1	LS	\$64,000.00	\$64,000.00

ESTIMATED SECTION 1 COST: \$1,684,000

SECTION 2: CONSTRUCTION ASSESSABLE TO THE CITY OF BODE

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
65	48" DIA. RCP, 2000D	66	LF	\$161.00	\$10,626.00
66	42" DIA. RCP, 2000D	80	LF	\$132.00	\$10,560.00
67	24" DIA. RCP, 2000D	95	LF	\$64.00	\$6,080.00
68	18" DIA. RCP, 2000D	80	LF	\$50.00	\$4,000.00
69	12" DIA. RCP, 3000D	80	LF	\$45.00	\$3,600.00
70	RCP TEE, 18" ON 42" DIA.	1	EA	\$2,000.00	\$2,000.00
71	18" DIA. RCP END CAP	1	EA	\$175.00	\$175.00
72	26" DIA. STEEL CASING, JACKED & BORED	120	LF	\$550.00	\$66,000.00
73	20" DIA. STEEL CASING, JACKED & BORED	120	LF	\$450.00	\$54,000.00
74	INTAKE, SW-512 (IDOT), CASE 2, 30"	2	EA	\$6,000.00	\$12,000.00
75	INTAKE, SW-512 (IDOT), CASE 2, 24"	1	EA	\$5,000.00	\$5,000.00
76	INTAKE CASTING, SW-604 (IDOT), TYPE 5 CASTING	3	EA	\$600.00	\$1,800.00
77	HICKENBOTTOM INTAKE, APPROX.	3	EA	\$500.00	\$1,500.00
78	TRENCH STAB. & BEDDING STONE	180	TN	\$40.00	\$7,200.00
79	SILT FENCE, INSTALLATION AND REMOVAL	200	LF	\$5.00	\$1,000.00
80	SEEDING & FERTILIZING ROAD DITCHES	1	LS	\$3,000.00	\$3,000.00
81	MOBILIZATION	1	LS	\$20,000.00	\$20,000.00

ESTIMATED SECTION 2 COST: \$209,000

ESTIMATED SUBTOTAL CONSTRUCTION COST: \$1,893,000

CONSTRUCTION CONTINGENCIES \$189,000

ESTIMATED TOTAL CONSTRUCTION COST \$2,082,000

ESTIMATED TOTAL ASSESSABLE CONSTRUCTION COST \$1,873,000

NON-CONSTRUCTION COSTS

ENGINEERING - (REPORT, HEARINGS, PLANS & SPECS, BID LETTING, CONSTRUCTION, COMPLETION) **\$150,000**

LEGAL, PUBLICATIONS, MAILINGS, ETC. **\$5,000**

RE-CLASSIFICATION **\$10,000**

TEMPORARY EASEMENT (3 Acres @ \$1,000/AC) **\$37,000**

OTHER DAMAGES **\$6,000**

INTEREST **\$125,000**

ESTIMATED TOTAL DISTRICT COST \$2,206,000

AVERAGE COST PER ACRE (BASED ON 1,406 ACRES): \$1,568

AVERAGE COST PER ACRE PER YEAR AT 6% INTEREST FOR 10 YEARS: \$213

AVERAGE COST PER ACRE PER YEAR AT 6% INTEREST FOR 20 YEARS: \$137

VII. ECONOMIC ANALYSIS

The cost of the preliminary proposed drainage improvement project is high, and the landowners' decision on whether to support the project may be difficult. There are many factors to consider, but the overarching question is whether it is a worthwhile investment. We hope to provide some useful information for landowners to consider in this regard.

Studies have shown that improvements of this nature can result in yield improvements averaging 10-15%. We would expect the largest yield increases in areas that are frequently flooded out, and lesser yield increases on hilltops or naturally well drained soils. We do caution that a project of this nature is providing a better outlet, so yield increases will also depend on the amount of private tile in place. If a farm is already pattern tiled, we would expect large yield increases as compared to a farm that has very little existing private tile. To fully realize the benefits of a large drainage improvement additional private tile may need to be installed. We also expect that some portion of the observed yield increases have to do with improved timeliness of farming operations and less soil compaction. We would also expect increased market value of the property involved.

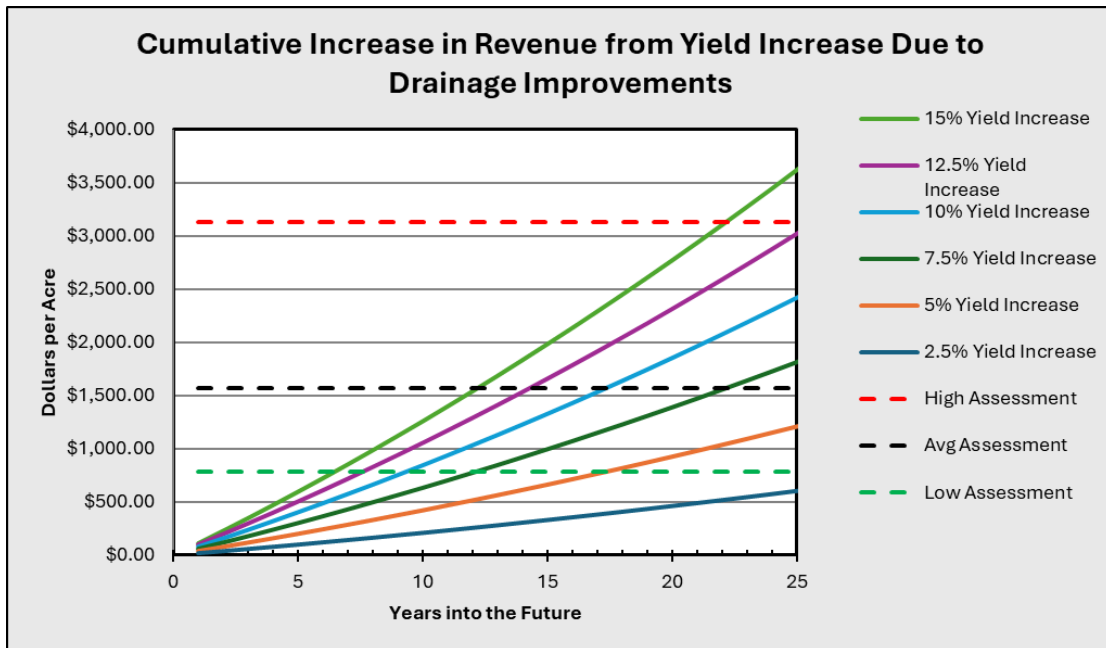
For the northern portion of Terril, drained by this tile system, we would expect better drainage and less issues with water. Our proposal includes extending the tile across N14 and place a large intake in the west road ditch to get as much water underground as soon as possible. We would also plan on replacing the existing intake on the west side of North State Street with a larger one connected to the new tile.

Drainage improvements have tax benefits and may be written off and/or depreciated. Speak with your tax advisor for more information.

There is flexibility in paying for a project of this nature. Landowners have the option of paying their entire assessment or paying installment payments over a period of 10 to 20 years (as set by the Board of Supervisors). Interest rates are set by the Board of Supervisors but have typically been 5-6%. If landowners can get a loan somewhere else for less than the rate set by the Board, they may consider taking out a loan and paying the drainage assessment all at once.

This is a multi-generational drainage improvement project. JDD61 was established and this tile system was installed over 100 years ago. The original system continues to age and be stressed by new tile connected into it. The intent of this project will be to provide adequate drainage for the next 100+ years.

Below is a chart showing dollar per acre assessments versus cumulative revenue increase over time due to yield increases resulting from the project. For example, with a 10% yield increase and an average dollar per acre assessment, the project would be expected to pay for itself in about 17 years.



If the project cost is deemed too high, lower cost alternatives may be considered. One option would be to remove the upper approximately 4,000 feet of the proposed Branch 399 West tile. This would lower the project cost by approximately \$225,000. Another option would be to remove the Branch 399 West-24 improvement from the project, which would save approximately \$290,000. Doing both the cost reductions would result in an average project cost of around \$1,203 per acre.

VIII. ASSESSMENT SCHEDULE REVIEW

Benefited Lands:

There are several tracts of land in the city limits of Terril that are not in the current assessment schedule of JDD61. However, these lands were in the 2019 JDD61 reclassification. It appears that changes in the properties were not updated in the assessment schedule. Annexation is not required to include them in JDD61 Branch 399 West assessment schedule(s) for this project. We would recommend inviting them to the hearings, even though they are not on the current Branch 399 West assessment schedule.

Existing Classification:

Joint Drainage District No. 61 was recently reclassified in 2019. Individual assessment schedules exist for each facility of the Branch 399 West tile system. However, if major improvements are completed, Iowa Code requires that reclassification be completed. The purpose of this is to ensure that the costs of the improvement are equitably assessed based on the benefit received.

Reclassification is done by a classification commission which includes an engineer and two Dickinson County landowners who neither own nor have any interest in the lands being reclassified. A report would be filed, and a public hearing would be held.

Pre-classification:

The assessment schedules currently in place are not useful for landowners to estimate their share of the proposed improvement costs. As part of this project we could complete a pre-classification, to give landowners a better estimate of their share of the proposed improvement costs. This is similar to the reclassification that the Board would consider at the end of the project but is an estimate and is to be used for informational purposes only. Work on the pre-classification can be reused as part of the final reclassification if an improvement is ultimately undertaken.

IX. FARM PROGRAM WETLAND COMPLIANCE

We have mailed letters to owners of lands that would receive benefits from the proposed improvements and are potentially in the USDA Farm Program, requesting certified wetland determinations from the Natural Resources Conservation Service (NRCS). Only landowners or their authorized agents may request the determination.

If any farmed wetlands exist on your property within Joint Drainage District No. 61 Branch 399 West, the construction of the proposed drainage improvements would all but certainly be considered by the NRCS to be a conversion and place you in jeopardy of being in violation of farm program rules and may be required to forfeit and/or refund farm program payments received after the work commences.

If the improvements are constructed and you have farmed wetlands that are converted, your options are to either cease farming the wetland acres or purchase mitigation credits through a wetland mitigation bank. The current fee is approximately \$15,000 - \$20,000 per acre. If you believe the wetland determination to be in error, you may request a review by the NRCS.

It is solely the responsibility of the landowner to keep themselves in farm program compliance, but because of the potential impacts to landowners within the district, we ask that you provide a certified wetland determination prior to the improvement hearing for the Board to consider.

As of the filing of this report we are not aware of any farmed wetlands located on the agricultural lands within the JDD61 Branch 399 West watershed and many of the certified wetland determinations have been received. See enclosed map.

X. CONCLUSION/RECOMMENDATIONS

This report confirms the need for drainage improvements within the area served by the Joint Drainage District No. 61 Branch 399 West tile system. We propose improvements to the Branch 399 West, 399 West-13, 399 West-24, 399 West-25, and 399 West-46 tiles. The improvements proposed will provide the drainage capacity needed now and for many decades to come. The estimated project cost for the recommended improvement is \$2,206,000 or an average of \$1,568 per acre. Yield increases for agricultural lands, better drainage within the City of Terrell, and increased market value of property are all potential benefits of the project.

If drainage improvements are pursued, reclassification will be required.

The Board of Supervisors, as trustees, for Joint Drainage District No. 61 Branch 399 West, should accept this report, and set a date for an informational meeting. At the meeting, the trustees should seek input from landowners. Once modifications to the report are made, if any, a formal hearing should be scheduled. At said hearing, the proposed improvement project should be approved, the engineer should be directed to develop plans and specifications and proceed toward bid letting, and the engineer should be directed to proceed with reclassification.

Sincerely,

JACOBSON-WESTERGARD & ASSOCIATES INC.



Collin J. Klingbeil, P.E.

Encl. Petition
 Branch 399 West Existing Tile System Map
 Branch 399 West Existing Drainage Coefficient Map
 Wetland Determination Status Map
 Proposed Tile Map

DRAINAGE PETITION

TO THE BOARD OF SUPERVISORS OF DICKINSON COUNTY, IOWA:

The undersigned ask that a drainage IMPROVEMENT STUDY OF JOINT DRAINAGE DISTRICT 61, BRANCH 39B TILE commencing at SE-SW of Section 11 of LLOYD TOWNSHIP

and running thence approximately 7,000 feet west & south to the NW-NW of SECTION 15
LLOYD TOWNSHIP

and terminating at AN INTAKE ON THE WEST SIDE OF NORTH STATE STREET IN THE CITY OF
TERRIL
be IMPROVED FOR DRAINAGE RELIEF

Your petitioners further state that the lands situated in SECTION 15 OF LLOYD TOWNSHIP

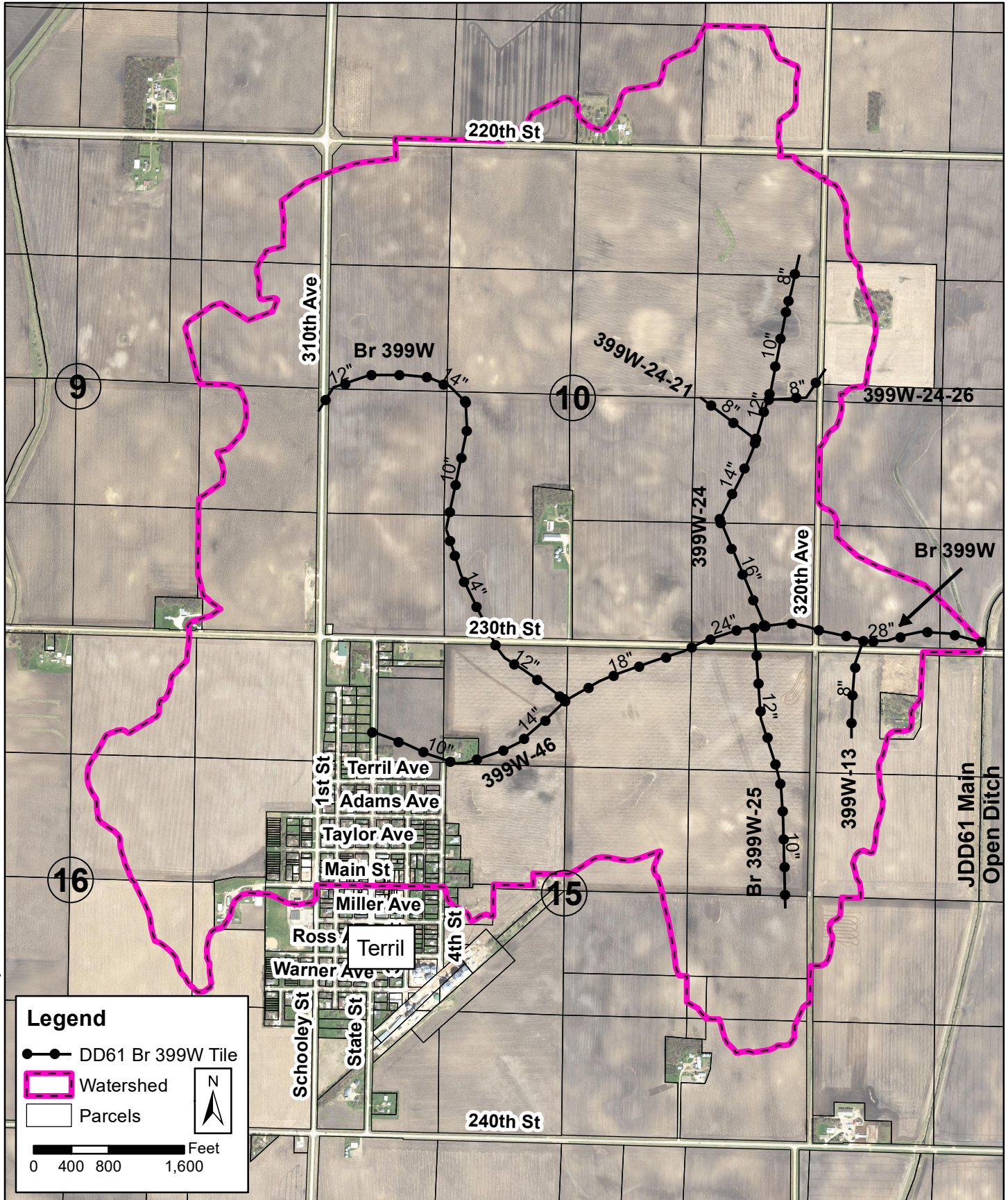
are subject to overflow (or are too wet for cultivation or subject to erosion or flood danger), and the public benefit, utility, health, convenience and welfare will be promoted by the above mentioned project.

NAMES

NAMES

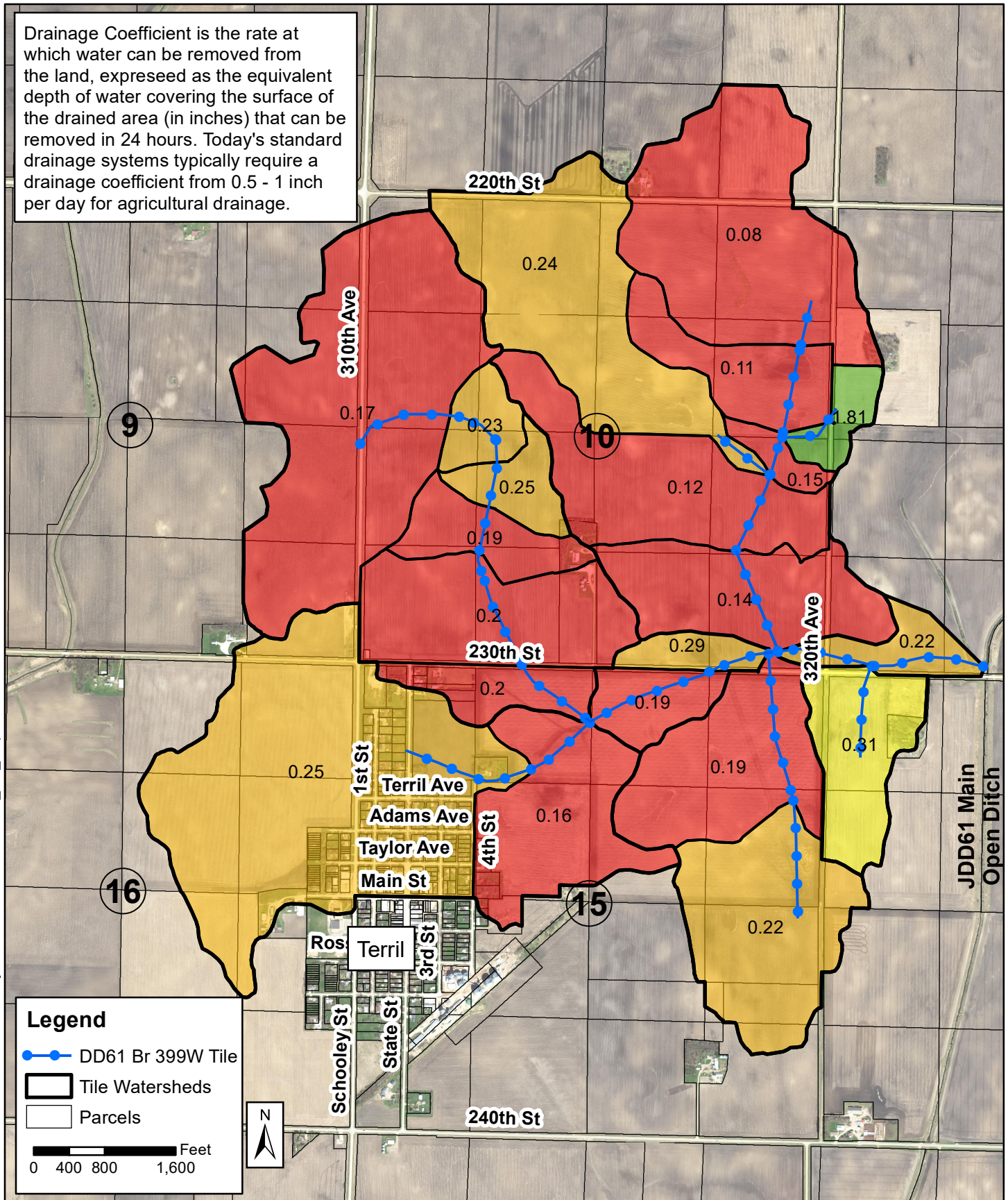
Lene Powell

Joint Drainage District No. 61
Branch 399 West
Existing Tile System Map
 Dickinson County, Iowa



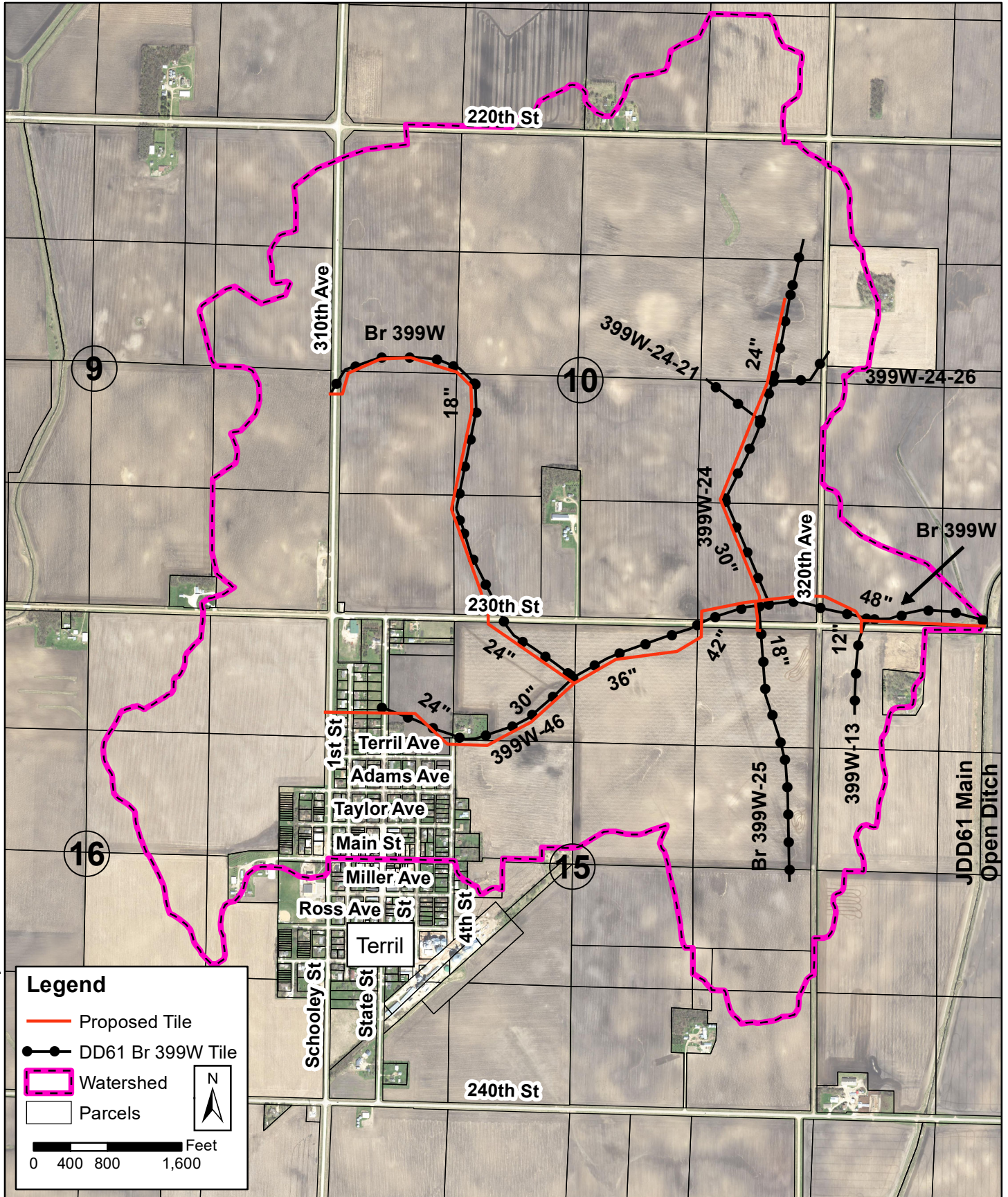
Joint Drainage District No. 61
Branch 399 West Tile
Existing Drainage Coefficient Map
 Dickinson County, Iowa

Drainage Coefficient is the rate at which water can be removed from the land, expressed as the equivalent depth of water covering the surface of the drained area (in inches) that can be removed in 24 hours. Today's standard drainage systems typically require a drainage coefficient from 0.5 - 1 inch per day for agricultural drainage.



Joint Drainage District No. 61 Branch 399 West Preliminary Proposed Tile Improvements Map

Dickinson County, Iowa



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