



**JACOBSON-WESTERGARD
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"Bettering Iowa since 1970"

January 2, 2025

RE: Drainage District No. 25 Branch 48-9 Tile
Tree Root Issue
Dickinson County, Iowa
JWA PROJECT NO: E24143

Dear Board members:

A. Introduction

A request for repairs was submitted for blocked tile with possible tree roots in the Branch 48-9 tile of Drainage District No. 25 (DD25) of Dickinson County, Iowa. The tile is located in the SW ¼ of Section 3 of Milford Township (T-98-N, R-36-W). Generally, the site is approximately 3 miles east of Milford on County Road A34 (220th St). Jacobson-Westergard & Associates, Inc. was appointed to investigate the situation and provide appropriate recommendations.

B. Investigation

The Branch 48-9 tile system drains approximately 285 acres of land primarily in Sections 3 and 10 of Milford Township. It includes several sub-branches, and has tile ranging in size from 14" to 6" in diameter. In the SW ¼ of Section 3 the tile is 14" in diameter and crosses through an acreage owned by April Kinkade and Curt Guthrie (see enclosed map). A grove of trees on the acreage is growing over the tile. We estimate approximately 1,000 feet of tile to be affected. The acreage is not shown on the 1915 drainage plat map for DD25, so it was presumably established after the tile system was constructed. In review of historical aerial imagery, we see an acreage established at this location by 1939.

After the 2024 harvest, we had Sam Wedeking run a camera into the tile at an intake in the NE corner of the acreage. He found thick tree roots in the tile both directions from the intake. Based on the original profiles of the tile we estimate there to be approximately 3 – 4 feet of cover over the 14" tile through the grove. With trees growing over the tile for 85+ years we can fairly safely assume that throughout the acreage the tile is severely restricted by tree roots. We also have concerns about the condition of the tile, as tree roots growing in the joints eventually crack the tile.

The preferred method of repair in our opinion is to re-route the tile around the acreage. We would recommend keeping the tile 100 feet from the acreage. We have not physically located the tile to know its exact location, but based on the information currently available we estimate that approximately 1,600 feet of pipe would be needed to complete the re-route (additional approximately 400 feet). A repair would mean that 15" diameter tile would be used, at approximately 0.20% grade (we would need to do exploratory excavation to confirm the exact grade would need to be used).

The only other alternative would be to remove trees over the tile, remove the tree roots from the tile, and hope the tile is still in good enough condition to continue to be used. If it is not, the tile would have to be replaced.

Before committing to a repair, it is advisable to investigate the design capacities of the existing tile. If the existing system is inadequate, now would be a good time to consider an improvement. 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. A design drainage coefficient of 1/2" – 1" per day is commonly used in Iowa. However, in the early 1900's tile systems were commonly designed at a drainage coefficient of 1/4" to 1/8" or less.

As part of our investigation, we analyzed the existing tile system to determine its adequacy for the 285 acres it serves. See the table below. Note that the capacities shown assume the tile is in good condition.

Original Design of Branch 48-9 Tile								
<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>
Branch 48-9	0+00	14	0.815%	5.73	5.36	1,200	285	0.48
	12+00	14	1.00%	6.35	5.94	600	265	0.57
	18+00	14	0.20%	2.84	2.66	1,000	224	0.30
	28+00	14	0.12%	2.20	2.06	1,900	188	0.28
	47+00	14	0.10%	2.01	1.88	500	103	0.46

We also note that the Branch 48-9 tile flows into Branch 48 tile, which is a 16" diameter tile with a drainage coefficient of 0.27 inches per day. That tile flows into the 48" diameter Main Tile of DD25, which was improved to a 1 inch per day drainage coefficient in 2019.

A large portion of the tile through the acreage is at 0.20% and is undersized at 0.30 inches per day. An 18" diameter tile at 0.20% grade would increase the drainage coefficient to 0.59 inches per day. The lower portions of the Branch 48-9 tile are near or above 0.50 inches per day and as long as they are in reasonable operating condition could be left as they are.

Although the downstream Branch 48 tile would still be undersized, there is over 15 feet of fall from the proposed tile re-route which would help "push" the water from Branch 48-9 on through to the improved Main Tile.

Above the reach with tree root issues, there is nearly a 2,000 ft stretch of tile at 0.12% grade which is at a 0.28 inch per day drainage coefficient. If improvements are desired, we could consider continuing the improvements at least to the south side of County Road A34, if not further.

C. Cost Estimates

REPAIR COST ESTIMATE

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	15" DIA. RCP, 2000D	1,600	LF	\$43.00	\$68,800.00
2	RCP TEE, 15" ON 15" DIA.	3	EA	\$725.00	\$2,175.00
3	RCP END CAP, 15" DIA.	2	EA	\$150.00	\$300.00
4	TILE CONNECTIONS, 8" DIA. OR LESS	8	EA	\$400.00	\$3,200.00
5	EXPLORATORY EXCAVATION	3	HR	\$250.00	\$750.00
6	TRENCH STABILIZATION AND BEDDING STONE	20	TN	\$35.00	\$700.00
7	MOBILIZATION	1	LS	\$4,000.00	\$4,000.00
ESTIMATED SUBTOTAL CONSTRUCTION COST:					\$80,000

CONSTRUCTION CONTINGENCIES	\$8,000
ESTIMATED TOTAL ASSESSABLE CONSTRUCTION COST	\$88,000
NON-CONSTRUCTION COSTS	
ENGINEERING - (REPORT, HEARINGS, PLANS & SPECS, BID LETTING, CONSTRUCTION, COMPLETION)	\$25,000
LEGAL, PUBLICATIONS, MAILINGS, ETC.	\$1,000
TEMPORARY EASEMENT (3.7 Acres @ \$1,000/AC)	\$3,700
INTEREST	\$8,000
ESTIMATED TOTAL DISTRICT COST	\$126,000
AVG COST PER ACRE (BASED ON 285 ACRES):	\$442
AVERAGE COST PER ACRE PER YEAR AT 5% INTEREST FOR 10 YEARS:	\$60
AVERAGE COST PER ACRE PER YEAR AT 5% INTEREST FOR 20 YEARS:	\$39

IMPROVEMENT COST ESTIMATE					
ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	18" DIA. RCP, 2000D	1,600	LF	\$49.00	\$78,400.00
2	RCP TEE, 15" ON 18" DIA.	3	EA	\$850.00	\$2,550.00
3	RCP END CAP, 18" DIA.	2	EA	\$175.00	\$350.00
4	TILE CONNECTIONS, 8" DIA. OR LESS	8	EA	\$400.00	\$3,200.00
5	EXPLORATORY EXCAVATION	3	HR	\$250.00	\$750.00
6	TRENCH STABILIZATION AND BEDDING STONE	20	TN	\$35.00	\$700.00
7	MOBILIZATION	1	LS	\$4,000.00	\$4,000.00

ESTIMATED SUBTOTAL CONSTRUCTION COST: \$90,000

CONSTRUCTION CONTINGENCIES	\$9,000
ESTIMATED TOTAL ASSESSABLE CONSTRUCTION COST	\$99,000
NON-CONSTRUCTION COSTS	
ENGINEERING - (REPORT, HEARINGS, PLANS & SPECS, BID LETTING, CONSTRUCTION, COMPLETION)	\$25,000
LEGAL, PUBLICATIONS, MAILINGS, ETC.	\$1,000
RECLASSIFICATION	\$3,000
TEMPORARY EASEMENT (3.7 Acres @ \$1,000/AC)	\$3,700
INTEREST	\$8,000

ESTIMATED TOTAL DISTRICT COST \$140,000

AVG COST PER ACRE (BASED ON 285 ACRES): \$491
AVERAGE COST PER ACRE PER YEAR AT 5% INTEREST FOR 10 YEARS: \$67
AVERAGE COST PER ACRE PER YEAR AT 5% INTEREST FOR 20 YEARS: \$43

D. Discussion & Recommendations

For this project, at a minimum a repair is required, whereas the proposed improvement is optional. In this case, we highly recommend the improvement, as it is only an additional \$14,000 (\$49/acre) to effectively double the capacity of the existing tile. Yield increases and increased market value of the property are all potential benefits of the project. There are tax benefits (write-offs) to improvements as well. **If an improvement is desired, an improvement petition must be filed by one or more of the landowners served by the Branch 48-9 Tile system.** If an improvement is desired, we could also discuss what extent of improvements are desired.

We recommend the proposed tile be constructed using reinforced concrete pipe (RCP). Dual wall HDPE is much more susceptible to deflection and relies heavily on the strength of the backfill material around it. Public installation standards require installation in a water-free trench and that the pipe be encased in a crushed rock envelope. Video testing is required 30 days after final backfill. Excessively deflected pipe is required to be replaced. We can include a dual-wall plastic pipe alternative in the bid at the Board and/or landowners' request.

We recommend that the original Branch 48-9 tile through the acreage be abandoned as part of this project. This will ensure that the district is not responsible for future repairs to the tile.

If an improvement is pursued, we note that if any farmed wetlands exist on property within the lands drained by the Branch 48-9 Tile of DD25, the construction of drainage improvements could be considered by the NRCS to be a conversion and place landowners 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 a repair is pursued, the existing assessment schedule for Branch 48-9 of DD25 could be used. However, if an improvement is pursued a reclassification would be required. We could do a pre-classification to give landowners a better understanding of what their cost might be.

We recommend that the Board of Supervisors of Dickinson County, acting as trustees for Branch 48-9 of Drainage District No. 25, schedule an informational meeting to discuss our findings, receive landowner input, and decide what next steps should be taken. Letters should be mailed to the landowners benefited by the Branch 48-9 Tile system.

Specific decision items include, but are not limited to:

- Whether there is interest in pursuing an improvement vs. repair
 - If an improvement is desired, what extent?
- Whether to do pre-classification

Sincerely,

JACOBSON-WESTERGARD & ASSOCIATES, INC.



Collin J. Klingbeil, PE

Encl: Repair Request
Map
Drainage Coefficient Map

REQUEST FOR REPAIRS

IN THE MATTER OF DRAINAGE DISTRICT Number: 25 Lateral: 48-9
To the Board of Supervisors, Dickinson County, Iowa:

I, the undersigned, hereby state that I am the owner of land described below and that repairs are necessary to tile lines and/or open ditches of the organized drainage district and I hereby request that repairs be made at the earliest possible date.

Drainage Ditch Number 25

Section Number 3

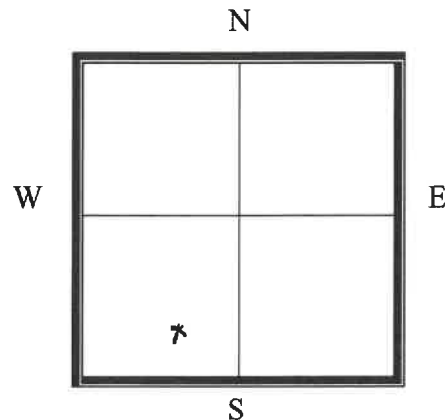
Township Milford

NW 1/4

NE 1/4

SW 1/4

SE 1/4



(Grave possible tree roots??)

Please locate any adjoining buildings, fences, etc., that may help locate site.

Name of owner-operator THOMAS KAISER

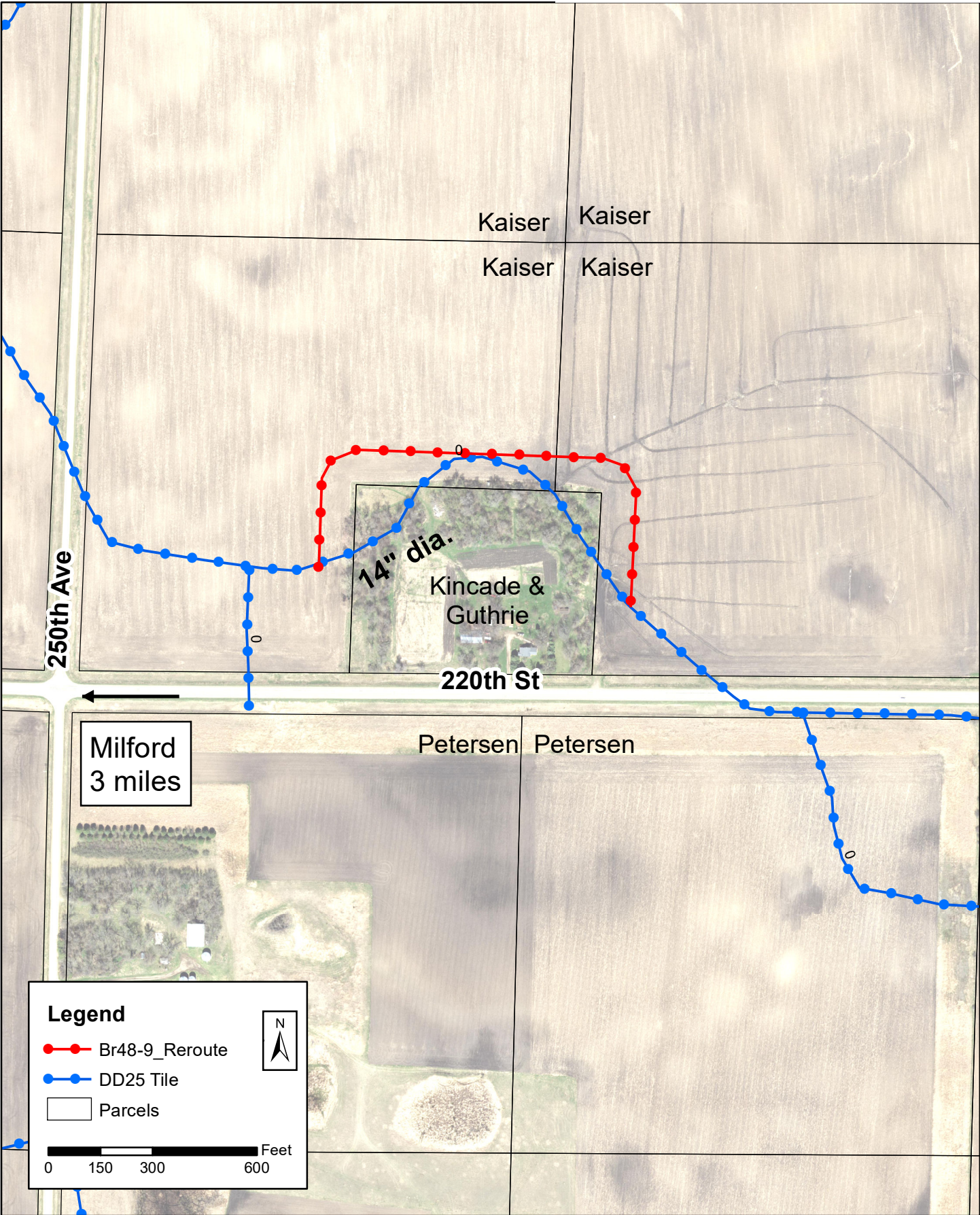
Requested by [Signature] Contact Number 712-320-4073

Nature of problem/work to be done Tile Blocked, televisc to locate problem then repair/clean tile

Authorized by [Signature] Date _____

Comments _____

Drainage District No. 25 Branch 48-9
Tile Re-Route Map
Dickinson County, Iowa



Drainage District No. 25 Branch 48-9 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 inches per day.

