JACOBSON-WESTERGARD & ASSOCIATES, INC.
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DRAFT ENGINEER'S REPORT

DRAINAGE DISTRICT NO. 51
POCAHONTAS COUNTY, IOWA

PROJECT NO: E23062

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.

_____ Date _____

Collin J. Klingbeil, P.E.
License number 24741
My license renewal date is December 31, 2023
Pages or sheets covered by this seal:

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I. INTRODUCTION/HISTORY

A. Scope

A petition for drainage improvements in Drainage District No. 51 (DD51) of Pocahontas County, Iowa was filed with the Board of Supervisors on May 18, 2023, and is enclosed. The Pocahontas County Board of Supervisors, acting as trustees for DD51, appointed Jacobson-Westergard & Associates, Inc. to complete the necessary survey, study, plan, and report.

DD51 is located in Sections 5 and 8 of Garfield Township (T-92-N, R-31-W) of Pocahontas County. A majority of the land area in DD51 is located within the corporate limits of the City of Rolfe.

B. History

- August 31, 1908 – petition filed
- April 15, 1909 – Engineer's Report filed by F.A. Malcolm recommending construction of a drainage system including a Main No. 1, Main No. 2, Branch A, Branch B, Branch B-1, and Branch D ranging in size from 20" to 6" in diameter at an estimated cost of $3,406.
    - *"…I have recommended 20" tile for the main which is about three times as large as would be needed for farm drainage. The large size is necessary on account of the thorough drainage desirable for town property."*
- August 30, 1909 – hearing on establishment held, district established
- March 10, 1910 – bid letting, all bids were rejected. Subsequently the contract completion dates were changed, and project was rebid.
- July 29, 1910 – second bid letting was held, awarded contract to G.S. Robinson for $5,595.
- November 28, 1910 – construction completed
- January 26, 1911 – commissioners (classification) report filed
- March 22, 1911 – classification hearing held, continued six (6) times before classification rejected and other commissioners were appointed.
- July 8, 1911 – subsequent commissioners report filed
- August 28, 1911 – classification hearing held and report approved
- July 16, 1968 – District entered into a "Permit Agreement" with the town of Rolfe giving the town the right to construct and maintain gas pipelines across the drainage district facilities.
- August 2, 1983 – contractor hired to clean out the outlet to the main tile of DD51.
- June 14, 1994 – approved crossing of district tile with proposed sanitary sewer at Oak Street and Elm Street in Rolfe.
- August 12, 2016 – City of Rolfe requested repair to the open ditch of DD51. Work was done in the fall of 2016.
- August 15, 2018 – video inspection of portions of Main No. 1 tile completed, tree roots observed in tile.
- May 2023 – outlet channel cleaned again between tile outlets and railroad tracks.
- May 18, 2023 – Petition filed for improvements following rain events resulting in significant ponding in the City of Rolfe
- June 2023 – Rehab Services hired to remove roots from Main No. 1 tile.

II. EXISTING TILE STARTING POINT, ROUTE AND TERMINUS

See also the enclosed map showing existing tile systems and their approximate locations.

Main No. 1 begins in the NE ¼ NW ¼ of Section 5 of Garfield Township (T-92-N, R-31-W) on the west side of the Union Pacific Railroad as a short open channel approximately 100 ft in length in a southwesterly direction. From the upstream end of the open ditch Main No. 1 runs generally south and east through and south of the City of Rolfe with tile ranging in size from 20 inches to 8 inches in diameter. The tile system crosses two railroad tracks and also 470th St, a gravel road. The entire system is approximately 5,030 feet in length.

Branch A Tile outlets into Main No. 1, where it crosses Broad St (Hwy 15). Branch A extends generally southeast with tile ranging from 10 inches to 8 inches in diameter. It crosses a railroad track

and ends near the intersection of Railroad St. and Garfield St. The tile is approximately 1,200 ft in length.

Branch B Tile outlets into Main No. 1, on the south side of railroad tracks in what is currently elevator property. Branch B extends generally east and is approximately 1,010 feet of 10-inch and 8-inch diameter tile. It crosses two railroad tracks and ends south of the intersection of Railroad St. and Garfield St.

Branch B1 Tile outlets into Branch B tile in the NE ¼ SE ¼ of Section 5 of Garfield Township (T-92-N, R-31-W) and extends approximately 400 feet south with 8-inch diameter tile.

Main No. 2 Tile starts in the NE ¼ NW ¼ of Section 5 of Garfield Township (T-92-N, R-31-W) where it outlets into the Main No. 1 open channel. It extends generally south and west to the intersection of Oak St. and 1st St. where it turns southward and follows 1st St. The tile system is approximately 1,400 feet in total length and includes tile ranging in size from 12 inches to 10 inches in diameter. It ends near the intersection of 1st St. and Walnut St. in the town of Rolfe. It appears as though at some point in time Main No. 2 was supplemented, upgraded, or replaced possibly with 18 and 21-inch diameter pipe. We unfortunately were not able to locate any drainage district or City records describing what was done, or by whom.

Branch D Tile outlets into Main No. 2 Tile in the intersection of Elm St. and 1st St. in the town of Rolfe. It extends approximately 400 feet eastward along Elm St. with 8-inch diameter tile.

III. INVESTIGATION

Survey data was collected in June of 2023. In addition, engineer's reports and plats, plans, and profiles of district facilities were reviewed.

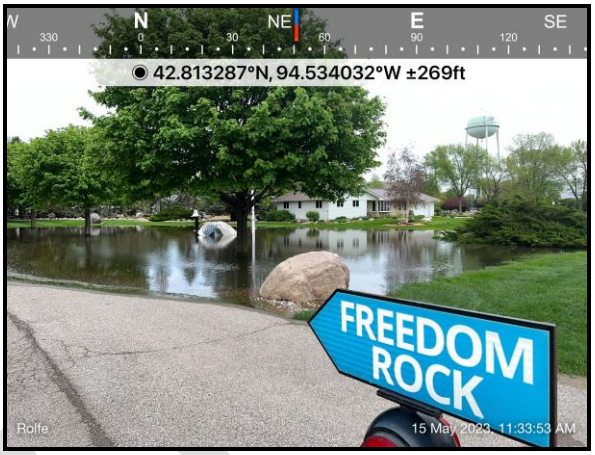
A. Tree Roots:

Video inspection was completed in 2018 on several reaches of the Main No. 1 Tile. The videos show varying degrees of tree root intrusion into the tile, from none to near complete blockage. The videos can be viewed on the county website at: https://pocahontascounty.iowa.gov/drainage/drainagevideos/. Below are pictures taken from the video inspection showing tree roots in the tile.

The tree roots have easy access through the joints between the tiles. Root intrusion tends to accelerate more rapidly in dry years when tree roots are following the water in search of moisture. The video inspection was completed five years ago, and especially due to the last few dry years tree root intrusion is expected to be more extensive today.

After a rainfall event in May 2023 the Main No. 1 tile was backed up and flooding occurred. See pictures below taken along Broad St. (Hwy 15) between 1st Street and the railroad tracks. The primary cause was blockage due to tree roots. Even if the roots themselves do not cause full blockage, a partial blockage can cause a buildup of leaves, grass clippings, and other debris that may enter the

system via intakes and exacerbate the issue. We understand that tile repair, outlet channel cleanout, and jetting of tree roots in the tile were completed this summer, for a cost to date of **$13,129.75**.



We note that in several areas trees are located in close proximity to the drainage district tile system. There are several options for dealing with roots in the tile system, but unfortunately there is no perfect solution. Options are discussed below:

1. Periodic Inspection & Maintenance:
   With this option a maintenance plan would be in place to periodically inspect the district tile system and mechanically remove tree roots on an as needed basis. The goal would be to do this as preventative maintenance in order to prevent flooding. We do not recommend chemical treatment, as it would be impractical and expensive for pipe this large.

2. Lining the Tile:
   Installing an inner plastic liner in the tile may seem like a logical method of blocking roots from entering the system. However, it's important to note that the same tile joints that the tree roots grow through allow drainage of excess subsurface water. There may be unintended consequences (saturated soils, more water in basements, etc.) if subsurface drainage is inhibited. We therefore do not recommend pursuing this option.

3. Tree Removal and Planting Restrictions:
   With this option trees growing in close proximity to the tile system would be cleared, and the drainage district would adopt a resolution prohibiting planting trees within a certain distance of the tile (ideally 30 – 50 feet). We understand that this is a highly intrusive option, would be costly, and would be undesirable to those who have trees for the beautification of their property. However, it is the only option that does not require ongoing maintenance of some kind.

B. Design Capacity of Existing Tile System:

The adequacy of the existing tile system has been analyzed and is shown in the tables below. Note that the capacities shown assume the tile is in good working condition. The lands in the district are comprised of farmland, a golf course, an elevator, residential neighborhoods, streets, railroad, etc. All have different needs when it comes to drainage.

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 for agricultural lands. In the early 1900's agricultural tile systems were commonly designed at a drainage coefficient of 1/4" to 1/8" or less. The impervious paved streets, sidewalks, driveways, roofs, etc. in the City of Rolfe generate more storm runoff than agricultural lands, necessitating larger tile to carry the extra water away during and following rainfall events and to protect buildings and homes from flood damages. This is reflected in the design drainage coefficient of the existing tile system. In the engineer's report for the original district establishment, it was noted that Main No. 1 was designed to be about three (3) times as large as would have been needed for farmland. However, in the over 100 years since the tile system was installed, land use within the

district has changed. In comparing a 1939 aerial photo with a 2021 aerial photo of the area we observe more homes have been built, an elevator was built on farmland, etc. all leading to additional demands on the constructed tile system.

Design of Existing Tile Systems

Lateral	Starting Station	Dia. (in)	Grade (%)	Ex Capac. (cfs)	Approx. Length	Acres Drained	DC (in/day)
Main 1	1+00	20	0.20%	7.35	1,765	234	0.75
	18+65	18	0.20%	5.55	659	187	0.71
	25+24	14	0.20%	2.84	476	174	0.39
	30+00	14	0.14%	2.38	200	174	0.33
	32+00	12	0.14%	1.58	900	81	0.46
	41+00	10	0.14%	0.97	600	67	0.34
	47+00	8	0.52%	1.03	300	44	0.56
Branch A	0+00	10	0.25%	1.29	700	13	2.37
	7+00	8	0.25%	0.71	500	13	1.31
Branch B	0+00	10	0.20%	1.16	880	15	1.84
	8+80	8	0.20%	0.64	130	3	5.07
Branch B1	0+00	8	0.12%	0.49	400	6	1.96
Main 2[1]	0+00	12	0.35%	2.49	1,000	36	1.65
	10+00	10	0.35%	1.53	400	15	2.43
Branch D	0+00	8	0.25%	0.71	400	3	5.67

[1]: Design specified in drainage district records. Survey and City storm sewer map show much larger tile, 18" and 21" in diameter. Neither the City nor district have any records related to this. Assuming the same grades, the DC's would be 7.32 and 11.65 inches/day.

The lower reaches of Main No. 1, within the City of Rolfe, have a drainage coefficient that would be considered adequate if the entire contributing area was farmland. However, less than half the watershed is farmland. Considering the higher drainage needs of the lands in the City of Rolfe, the existing Main No. 1 tile is significantly undersized. We estimate that the lower reaches of the system would need in upwards of **15X** the current capacity (a 60-inch diameter tile may be needed).

It appears as though at some point in time Main No. 2 was supplemented, upgraded, or replaced. We unfortunately were not able to locate any records describing what was done. However, in our opinion, because of the prior work done upgrades are not recommended at this time. We also do not recommend upgrades to any of the branch tile systems at this time.

C. Outlet Channel / Pilot Creek:

All tile in the district ultimately outlet to a small channel/ditch north of Oak Street and the ballfield. From the tile outlets the channel extends about 130 feet northward to the railroad tracks. There is a single 24-inch diameter concrete culvert through the railroad tracks, that is only about 3 inches lower than the Main No. 1 tile outlet. On the east side of the railroad tracks there is another 24-inch diameter culvert under a lane, then a winding and overgrown channel that ultimately leads to Pilot Creek. There is approximately 14 feet of elevation drop (fall) from the railroad tracks to Pilot Creek. In looking at flood conditions of Pilot Creek, the highest expected flood would still be more than 5 feet lower than the culvert through the railroad tracks, and the district tile systems. We conclude that with the existing tile system the series of channels and culverts that carry the water to Pilot Creek are acceptable. However, if a tile improvement is done and the tile outlet(s) are lowered, the channel and culverts would need to be lowered and improved as well.

IV. RIGHT-OF-WAY

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, landowners will be reimbursed for any damages caused in the process of maintenance, repair, improvement, or inspection. If construction is pursued, compensation for damages within the work limits is normally determined at the completion hearing and is subject to approval by the Board of Supervisors.

V. ASSESSMENT SCHEDULE REVIEW

Benefited Lands:
There are numerous parcels/lots that are materially benefited by district facilities that are not included in the existing assessment schedule. We recommend annexing these lands into Drainage District No. 51, which would require further analysis, a separate report, and a public hearing. The estimated cost of annexation is $2,500. We recommend it be done regardless of whether improvements are pursued.

Existing Classification:
This district is still under its original assessment schedule from when it was established in 1909. All drainage district facilities are included in this single assessment schedule. Under this schedule all lands are assessed for work done on **any** tile in the district, regardless of whether the lands benefit from it. Lands that utilize Main No. 1 do not use Main No. 2, but under the current schedule they would help pay for work on Main No. 2, and vice versa. The remedy for this is to develop separate assessment schedules for each district facility, to make the cost of improvements and future repairs more equitable. This process is called re-classification, and we recommend it be done regardless of whether improvements are pursued. Re-classification is done by a classification commission which includes an engineer and two Pocahontas County landowners who neither own nor have any interest in the lands being re-classified. A report would be filed, and a public hearing would be held. The estimated cost of re-classification is $7,500.

Pre-Classification:
We also note that the existing assessment schedule is of no use in estimating parcel-by-parcel costs associated with this project. To give landowners a better estimate of their share of the project costs we could develop a pre-classification. This is similar to the re-classification that the Board would consider at the end of the project but would be an estimate and to be used for informational purposes only. Work on the pre-classification could be reused as part of the final reclassification.

VI. FARM PROGRAM WETLAND COMPLIANCE

We have mailed letters to owners of lands that would receive benefits from the potential improvements and are potentially in the USDA Farm Program, requesting certified wetland determinations from the Natural Resources Conservation Service (NRCS). We cannot directly obtain wetland determinations from the NRCS. Only landowners or their authorized agents may request the determination.

If any farmed wetlands exist on your property within Drainage District No. 51, the construction of drainage improvements may 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 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 $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.

At this time we are not aware of any farmed wetlands located on the agricultural lands within the DD51 watershed.

VII. CONTROL OF THE DRAINAGE DISTRICT

By Iowa Code, when a drainage district is initially established it falls under the control of the county Board of Supervisors. In other words, the presently serving Board of Supervisors acts as trustees for the district and generally manages its affairs. However, Iowa Code Chapter 468.322-326 makes provision for transfer of control of a drainage district to a City Council if certain criteria are met. If this happened the drainage district would still exist, but the trustees for the district would be the City Council rather than the county Board of Supervisors. In order for the control of a district to be eligible to be transferred to the City Council, at least 25% of its land area must fall within City limits, the district cannot have any outstanding debts, and the Board must agree to relinquish control. We can confirm that in excess of 25% of the land in DD51 falls within Rolfe City limits.

The district has debts, so it is not eligible to be transferred to the City of Rolfe at the present time. There are pros and cons to transferring control of DD51 to the City of Rolfe. We feel it is important to point out this option, and are open to further discussion regarding this matter.

VIII. CONCLUSION/RECOMMENDATIONS

At this point in time we conclude it would be best to hold an informational meeting to discuss our findings, receive input from landowners and the Board, and to chart a path forward. A full improvement of Main No. 1 Tile would be very expensive, likely in excess of a million dollars. For an approximate drainage area of 234 acres at a million dollars, the average assessment would be $4,274 per acre. We feel it would be best to discuss this project with the Board and landowners before we proceed further, and accrue the engineering fees associated with completing a full design for an improvement.

We recommend the Board of Supervisors, as trustees, for Drainage District No. 51, set a date for an informational meeting.

Sincerely,

JACOBSON-WESTERGARD & ASSOCIATES INC.

Collin J. Klingbeil, P.E.

Encl. Petition
Drainage District Map

DRAINAGE PETITION

TO: THE BOARD OF SUPERVISORS OF POCAHONTAS COUNTY, IOWA, ACTING ON BEHALF OF DRAINAGE DISTRICT NO. 51 WHICH BENEFITS LANDS SOLEY IN POCAHONTAS COUNTY, IOWA.

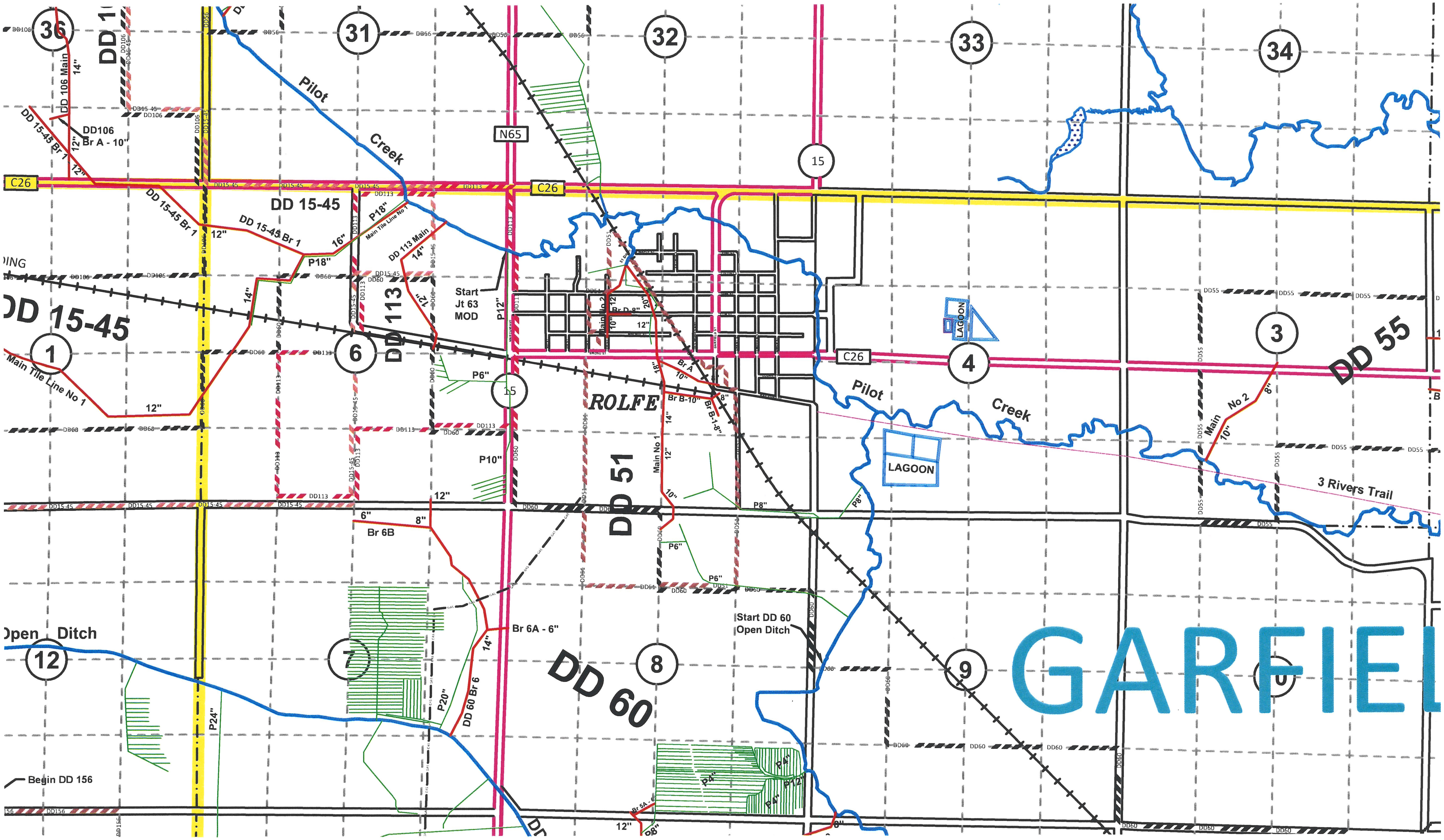
COMES NOW, the undersigned Petitioners, being owners of the real estate in this established drainage district and in making this petition for drainage relief for the drainage of said lands respectfully state to the Board of Supervisors of Pocahontas County, Iowa:

1. That the lands of these petitioners are a part of and are included in Drainage District No. 51 in Pocahontas County, Iowa, and that said lands are assessed for drainage tax by virtue of the improvements in said branch of the district.
2. That the drainage facilities of Drainage District No. 51 in their present condition in section 5-92-31 are not sufficient to properly drain the water from the lands of these petitioners as well as other lands; that such lands are too wet for timely cultivation, too wet to support good crop production, and are subject to erosion and flood danger; that if the original improvements in said drainage district were properly improved to correct the current situation, the public benefit, utility, health and welfare would be promoted.
3. That these petitioners do not have exact knowledge or information as to the exact nature of the work to be done to correct the situation, but that these petitioners are of the belief that an investigation of the situation by a qualified engineer would determine the exact nature of the work required to provide adequate drainage for the lands of these petitioners and adjoining lands.
4. That these petitioners, being the owners of lands which are part of the benefited area of Drainage District No. 51, are entitled to adequate drainage from improvements of the drainage district.
5. That these petitioners are signing this petition pursuant to Section 468.126 of the Code of Iowa.

WHEREFORE, these petitioners respectfully request that the Board of Supervisors of Pocahontas County, Iowa, acting on behalf of the owners of lands benefited by Drainage District No. 51 appoint an qualified engineer to investigate the drainage situation herein referred to with respect to petitioners land and other lands; and that the board order that district facilities be improved, to provide adequate drainage relief for the lands of these petitioners and adjoining lands as described above.

Dated this 18th day of May, 2023

LANDOWNERS	DESCRIPTION OF LAND
[signature]	Block 12


36
31
32
33
34
DD 106 Main 14"
DD 15-45 Br 1
DD106 Br A - 10"
12"
Pilot
Creek
N65
15
C26
C26
DD 15-45
DD 15-45 Br 1
12"
DD 15-45 Br 1
16"
P18"
P18"
Main Tile Line No 1
DD 113 Main 14"
DD 15-45
DD 113
Start Jt 63 MOD
P12"
14"
12"
1
Main Tile Line No 1
12"
6
P6"
15
ROLFE
Br D-8"
20"
12"
Br A 10"
Br B-10"
Br B-1-8"
Main No 1 12"
14"
18"
C26
4
Pilot
Creek
LAGOON
LAGOON
3
DD 55
Main No 2 10"
8"
3 Rivers Trail
P10"
DD 51
12"
6"
8"
Br 6B
P6"
P6"
P8"
P8"
10"
Br 6A - 6"
14"
Start DD 60 Open Ditch
Open Ditch
12
7
P20"
DD 60 Br 6
P24"
DD 60
8
9
GARFIEL
Begin DD 156
P4"
P4"
P4"
P12"
12"
P8"
8"

Drainage District No. 51 Map

Pocahontas County, Iowa

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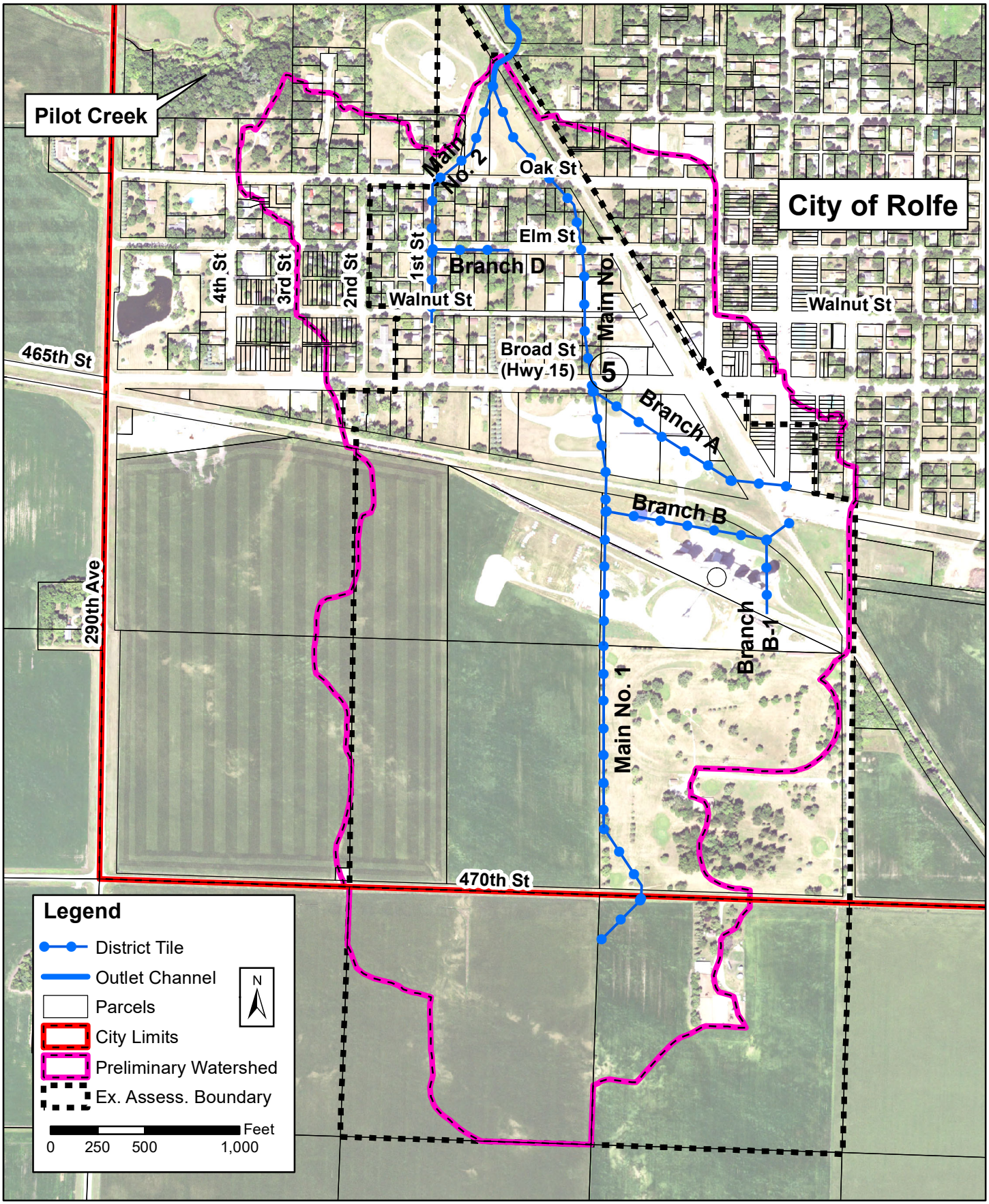

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