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October 25, 2019

Board of Supervisors
Pocahontas County Courthouse
99 Courthouse Square
Pocahontas, IA 50574

RE: Joint Drainage District No. 63 Branch C Preliminary Engineering Analysis
Pocahontas County
Project No.: P12.117963

Dear Supervisors:

A petition for drainage relief in Branch C of Joint Drainage District No. 63 was filed with the Board of Supervisors of Pocahontas County on October 15, 2018. The petition requests an investigation to determine repairs or improvements needed to bring drainage relief to the lands of the district. A copy of the petition is enclosed. The Board appointed Bolton & Menk, Inc. to provide an initial study of conditions of Branch C of Joint Drainage District No. 63.

Existing Tile System:

The watershed of Branch C spans approximately 1,422 acres in Sections 21, 22, 27, 28, 29, 32, & 33 of Powhatan Township (T-93-N, R-32-W) in Pocahontas County, Iowa. The petition for the establishment of Joint Drainage District No. 63 was filed in 1907, and Engineer's Report filed in 1910; construction then followed including Branch C tile and several sub-laterals.

Checking several sources of information including: the Engineer's Report, the original notice to prospective bidders, a letter from the engineer eliminating a sub-lateral and upsizing a portion of another, road plans, and the current drainage plat for Pocahontas County resulted in the discovery of various conflicting reports on the size of tile actually installed. Further research can be done if a full Engineer's Report is pursued, however we are reasonably confident in our conclusions based on the information currently available. As compared to the original design, generally larger tile appear to have been installed in the lower portion of Branch C, whereas smaller tile appear to have been installed in the upper extents of Branch C. Branch C-1 was not constructed, and Branch C-3-1 was added. Sub-laterals were either upsized or are the same as the original design.

Branch C and its sub-laterals include approximately 17,000 feet of tile ranging in size from 26 to 8 inches in diameter and outlets into the Main Open Ditch of Joint Drainage District No. 63 in the NE ¼ of Section 27. The size and drainage coefficient of each tile reach is analyzed and included in the table below, as well as a comparison to modern capacity. The coefficient represents the depth of excess water removed from the surface of the watershed in a 24-hour period. The modern standard of ½" of water removed from the surface area of the watershed in

24 hours (1/2" Dc) has been in use since the 1950s. However, due to the age of this system it is likely that the current capacity is roughly 80-90% of that shown in the table. Supplementing and paralleling the existing system and using the capacity of the old tile is not recommended because the desired function of the system would rely upon a century old tile. See also enclosed maps showing the existing tile system and drainage adequacy.

Existing Branch C Tile System								
<u>Branch</u>	<u>Dia (in)</u>	<u>Grade (%)</u>	<u>Ex Cap (cfs)</u>	<u>Approx. Length (ft)</u>	<u>Acres Drained</u>	<u>Ex DC (in/day)</u>	<u>Percent Std</u>	<u>Dia Needed* (in)</u>
C	22	0.88%	19.94	500	1422	0.33	66%	27
C	26	0.08%	9.39	3,600	1422	0.16	32%	42
C	24	0.08%	7.58	1,600	1052	0.17	34%	36
C	22	0.08%	6.01	1,400	841	0.17	34%	33
C	15	0.13%	2.76	1,560	394	0.17	34%	24
C	10	0.13%	0.94	1,560	218	0.10	20%	21
C	8	0.30%	0.78	1,400	176	0.11	22%	15
C-2	14	0.10%	2.01	1,710	95	0.50	100%	15
C-3	18	0.06%	3.05	2,000	457	0.16	32%	30
C-3	12	0.20%	1.89	680	71	0.63	126%	12
C-3-1	12	0.07%	1.12	650	329	0.08	16%	24
C-4	12	0.19%	1.84	523	125	0.35	70%	15

*: Size of tile needed for 1/2" drainage coefficient. Assumes same tile grade as existing.

The majority of the Branch C tile was originally designed with a drainage coefficient between 1/8" and 1/6"/day or 25-33% of the recommended minimum modern design. Generally, the sub-laterals have a higher drainage coefficient, C-3 and C-3-1 being exceptions. Branch C, C-3, and C-3-1 are 1/3rd (or less) of modern capacity for the lands they drain and if improved would greatly benefit the lands within the district.

A rough preliminary estimate of the construction cost to improve all Branch C tile is \$1.2 million for the tile sizes and lengths shown above, for an average construction cost of approximately \$844/acre. Note this estimate does not include basic engineering services, and other costs associated with the project. A full engineering report would include a more accurate cost estimate and design.

Drainage Issues Specific to Petitioners:

The petitioners land within the district is located near the very upper end of Branch C. It has been brought to our attention that frequent flooding occurs on the acreage owned by the petitioners. Upon investigation using LiDAR elevation information approximately 54 acres of surface runoff run to a depressional area in the southwest area of the acreage. The water could pond to approximately 1.5 feet in depth prior to overflowing to the southeast and away from the acreage. A tile improvement will not fully eliminate the ponding. As long as the area is not

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mapped as a wetland or farmed wetland (by the NRCS), one option would be to cut a farmable surface drain from the bottom of the depressional area through the knob just southwest of the acreage to allow the surface runoff to flow around the acreage. It would then flow to the west road ditch of 240th Ave.

Road plans for 240th Ave. show a 12" intake onto Branch C (8" at that location) near where the water would empty into the ditch, and further south twin 42" culverts exist. Based on the road plans surface runoff from approximately 1,550 acres currently empties to this location, mostly from outside the current Branch C assessment boundary. The small intake and district tile are not sufficient for the surface runoff, and as evidenced by aerial photography the water runs over the surface eastward on the lands of Branch C and eventually onto the lands of Branch B before entering the Main Open Ditch. Adding a surface drain to allow previously ponded water to bypass the acreage would increase the flow of surface water by only a very small percentage; however due to the issues already caused downstream by surface runoff and tile system inadequacy, pursuing even this relatively modest change may not prove popular to downstream landowners within the district.

The district could construct the surface drain, which, subject to the Board's approval, would allow for payment over 20 years; however the cost should be assessed only to the petitioners as only their land would benefit from the work and we suggest that it be done privately.

Recommendations:

We recommend scheduling an informational meeting with landowners in the district to discuss our findings and gauge interest on potential drainage improvements. If interest exists, we recommend the Board move forward with a full Engineer's Report.

Sincerely,

Bolton & Menk, Inc.



Collin Klingbeil, P.E.

Project Engineer

CC: *Palo Alto County Auditor*
James C Hudson, Attorney
Joseph & Mary Fischer, Petitioners

Encl. *Petition*
Existing Tile System & Adequacy Maps

OCT 15 2018

DRAINAGE PETITION

COUNTY AUDITOR &
COMMISSIONER OF ELECTIONS

TO: THE BOARD OF SUPERVISORS OF POCAHONTAS AND ~~CALHOUN~~ ^{Palo Alto} COUNTY, IOWA, ACTING ON
BEHALF OF JOINT DRAINAGE DISTRICT NO. 63 BRANCH C TILE WHICH BENEFITS LANDS IN
~~POCAHONTAS & CALHOUN~~ ^{Palo Alto} COUNTIES, IOWA.

COMES NOW, the undersigned Petitioners, being owners of the real estate in this established branch of the 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 and ~~Calhoun~~ ^{Palo Alto} Counties, Iowa:

1. That the lands of these petitioners are a part of and are included in the benefited area of Joint Drainage District No. 63 Branch C Tile 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 open ditch in their present condition are not sufficient to properly drain the water from the lands of these petitioners as well as other lands; that such lands are subject to overflow, 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 independent 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 this Joint Drainage District No. 63 Branch C Tile, 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 of Joint Drainage District No. 63 Branch C Tile appoint an independent 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 15 day of October, 2018

LANDOWNERS

Joseph Fischer
Mary Fischer

DESCRIPTION OF LAND

POCAHONTAS SEC. 29
" " "

ACKNOWLEDGED

DATE

BY

10/16/18
[Signature]



