

ENGINEER'S REPORT
DRAINAGE DISTRICT NO. 49
WEBSTER COUNTY, IOWA
NOVEMBER 23, 2016

MEC 10416009

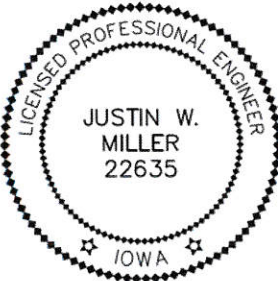
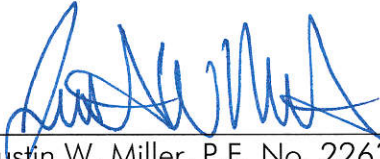
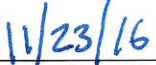
 <p>Seal of a Licensed Professional Engineer, Justin W. Miller, No. 22635, State of Iowa.</p>	<p>I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.</p> <p> Justin W. Miller, P.E. No. 22635</p> <p> (Date)</p> <p>My license renewal date is December 31, 2016</p>
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I. Introduction

A drainage petition was filed for a ditch cleanout to Drainage District No. 49 Main Open Ditch due to excessive foliage overgrowth, sloughing, and sedimentation causing a reduction to the amount of water flowing away. Typical cleanouts include tree and brush removal, excavation of silt from the ditch bottom to match original design grade, leveling the spoil, seeding the disturbed side slopes if necessary, and replacing damaged tile outlets and surface drain outlets with corrugated metal pipe. The Webster County Board of Supervisors, serving as Trustees to DD 49 made a motion to appoint McClure Engineering as the engineer to investigate the feasibility of the submitted petition. This report is required by and prepared in accordance to Iowa Code Chapter 468.126.

II. History and Original Improvements/Repairs

Drainage District #49 was established on December 1, 1910 to include 3,959.42 acres. The original improvements were completed for \$30,640.00 on October 6, 1915. As with most ditches, small repairs have been completed throughout the years such as brush control, tree removal and outlet replacements. Additionally there have been two ditch cleanouts over the years. Additional acres were found to benefit from the District Main Ditch for a total of 4,738.82 acres shown on the current assessment schedule.

Originally the Main Ditch was designed for 10,765 feet of open channel and estimated at 47,200 cubic yards of earth removal. The design had a 6' bottom, 8' berm and a side slope constructed at 1:1. There were also 4 branches of Drainage District tile established with this ditch. Furthermore many private subsurface and surface drains were installed to drain into the ditch.

The Main Ditch is located in Dayton Township commencing in the Southeast $\frac{1}{4}$ of Section 3 just north of 350th Street and extends north and west to the Northeast $\frac{1}{4}$ of the Northwest $\frac{1}{4}$ of Section 4.

As with most open ditches, many requests have been made for repairs over the years. Many of the requests were small repairs with more notable requests including a Main Ditch cleanout that began with an engineer's recommendation in 1936. This cleanout project was for the Main Ditch between stations 0+00 and 92+37. One profile is on record for this cleanout at the courthouse. Dayton Farm Drainage completed a minor cleanout on March, 9, 1987 for \$4,000. There was no plan or profile on record for this cleanout.

III. Methodology

This investigation has included a review of written courthouse records and available record drawings to establish original construction cost, repairs and original design. An extensive field survey was completed to accurately determine the extent of possible repairs. This survey included ditch cross-sections, existing ditch bottom elevations, and conditions of all outlets, culverts, crossings, and side slope washouts.

The survey data was then used to correlate with available record information, digital information through the Iowa Department of Natural Resources and other data sources. This information is collected in order to evaluate the condition of the existing ditch system and to evaluate the feasibility of benefit of possible repairs and/or improvements.

IV. Existing Conditions

With many tributaries draining to this ditch, silt has the potential to build up quickly. There are certain sections of the ditch in question that have about 2 feet of silt and sedimentation. Normally, with large amounts of silt, landowners notice their outlets are partially or completely submerged in silt or water most of the year and that was no different in this case.

These photos display existing conditions when the topographical survey of the ditch was recorded.



Figure 1: Slope Sloughing



Figure 2: Vegetation Covered in Silt



Figure 3: Deteriorated bridge



Figure 4: Outlet submerged in silt



Figure 5: Silt in outlets



Figure 6: Erosion around headwall

As seen in Figure 3, the ditch contains an old bridge. While it is not clear if this bridge is utilized and is of poor condition, it does not appear to adversely affect drainage capacity in its current state. Many of the side slopes throughout the length of the ditch have started to slump down or lose their shape.

There are 42 different outlets in the existing ditch located during the survey. Assuming approximately 10% were missed due to vegetation coverage and/or outlet submersion under silt or water, there are a large amount of both private and District outlets relying on an efficient ditch. In a ditch repair project, deteriorated outlets would be replaced and original designed grades would be reestablished.

The design grades of the Main Ditch were projected based on survey data, record profiles, and plans that show elevations for other District systems that outlet in the Main. This led to the determination of grades to be 0.11%, for the majority of the ditch. Considering surveys show as much as two feet of silt in some areas, it is apparent that this grade is flat enough to cause settling of silt and sedimentation.

V. Recommendation

With intense row-cropping, the need for effective drainage is vitally important, and to compound the issue, the added pattern tiling over the years has more than ever created a greater need for more subsurface drainage capacity. Subsurface drainage systems are only as efficient as their outlet.

"Economics of Tile Drainage" is an article by Don Hofstrand in the Iowa Drainage Guide where the following advantages of tile drainage are listed:

1. More consistent yields
 - Allows for more efficient use of resources
 - Reduces financial risk
2. Earlier and more timely planting
3. Improved harvesting conditions
4. Less wear and tear on equipment
5. Less power required for field operations
6. Better plant stand
7. Less plant stress
8. Fewer plant diseases
9. Less soil compaction

Source: <http://www.extension.iastate.edu/agdm/articles/hof/HofJuly10.html>, "Economics of tile drainage", Don Hofstrand, Iowa Drainage Guide, Iowa State University Extension, Special Report 13, revised June 2008.

As with any open ditch, Drainage District No. 49 Main Ditch needs regular maintenance. After analyzing field data and all existing conditions, it is apparent that the Main Ditch will need to be repaired in the near future. We recommend clearing and grubbing all brush, removing silt to the original grade of each ditch, touching up side slopes to at least a 1.5:1 slope, leveling spoil to a 15:1 slope to allow for cultivation, and replacing surface drain outlets and subsurface drain outlets. Estimated costs for repairing the stretch of ditch can be found in the appendices.

Private farm crossings are not considered an entity of the Drainage District therefore the maintenance or improvement cost of said crossings would not be a burden of the District. The Board of Supervisors acting as Trustees for Drainage District 49 can act to ensure private farm crossings are maintained. It is recommended that the landowners privately address the condition of their farm crossings such as the bridge located during the field survey. If a ditch cleanout project is approved, landowners may have the opportunity to work with the project contractor to minimize cost for existing or future farm crossings.

VI. Wetlands

The United States Department of Agriculture (USDA) Farm Service Agency requires that farmers follow wetland compliance provisions (Swampbuster). Those provisions are specifically important for Drainage District projects which increase capacity and drainage as mitigation can be required in order to maintain USDA benefit eligibility. The proposed actions in this report are not intended to improve the Drainage District by increasing capacity. The proposed actions are intended to bring the District facilities back to the original capacity and efficiency. We do not anticipate the need for mitigation for these repairs but landowners are ultimately responsible for meeting any mitigation requirements. The USDA's Natural Resource Commission provides technical resources to complete wetland determinations and provide guidance on whether mitigation is required to the landowners.

VII. Reclassification/Annexation

Reclassification is a process where a Commission appointed by the Board is tasked with classifying the lands benefitted by the District in order to assess costs to the District for maintenance, repairs and improvements. Reclassification is not required for a repair project however, Iowa Code allows for the Board to reclassify the District into separate assessment schedules during a repair project.

We have reviewed the current land classification schedule with respect to the proposed repairs and find that the current classification schedule does not provide an equitable basis to pay for the proposed repairs. We offer the following reasons in support of reclassification:

1. The classification for the district does not separate laterals and mains.
2. There are several parcels which would be charged more than 3 times the average per acre for the repairs and as much as 8 times the average per acre.
3. The methodology of classifying land has change over the years to include several factors to identify the benefit to lands such as proximity, soil types, slopes, outlet charge and topography.
4. Technology and data resources have been greatly improved with Lidar, GIS and programs that lead to improved accuracy and reduced costs.

By reclassifying the District into separate laterals, landowners may only be assessed for repairs and improvements to those facilities which they benefit from. Reclassification can be discussed at the public hearing. If a reclassification were to be ordered, a thorough review of adjacent lands would be conducted to ensure all benefitted lands are included in the District. If additional lands are found to receive benefit from the original improvements, annexation may be considered.

VIII. Completion and Final Settlement

In accordance with Iowa Code 468.101-468.103, once the work is completed the engineer shall issue a report of completion for the Drainage District Board's consideration. The Board shall hold a hearing to consider the acceptance and must provide notice of the meeting to all owners within the District. All claims for damages are required at or before the time of the completion hearing.

IX. Administration

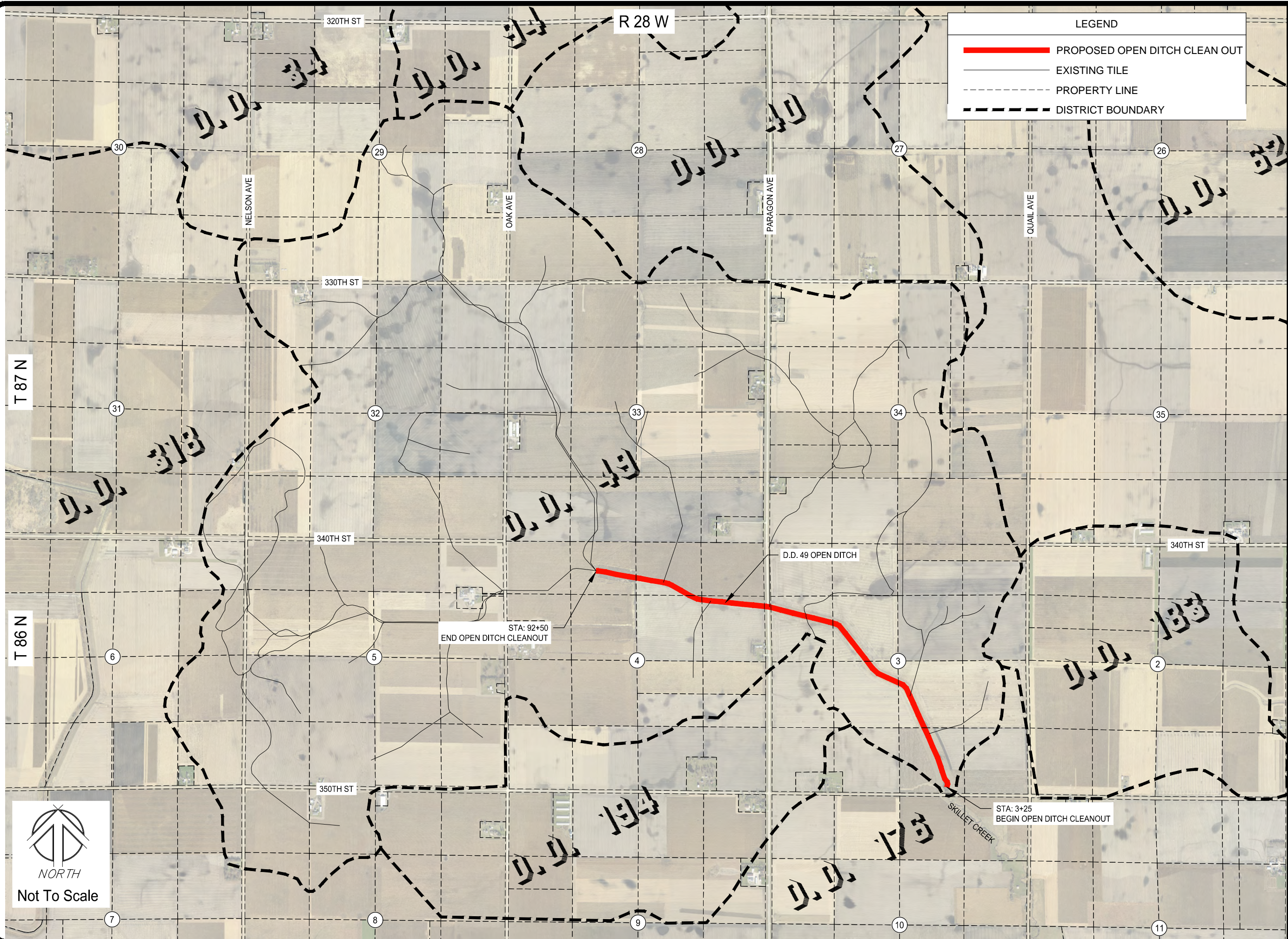
If this report is tentatively approved by the Board of Supervisors, The Code of Iowa requires a public hearing date be set regarding this report and notice given to all landowners in Drainage District No. 49 (Section 468.126, para 4.a.). A public bid letting will also be required (Section 468.34) if the repair is ordered as recommended. Landowners may discuss whether the current apportionment of costs are fair or not and if not, the Board may order a reclassification.

We anticipate the following steps in order to move forward with this report and project:

- Tentatively approve this report
- Set a date and time for the public hearing allowing time to provide notice to landowners
- Notice shall be provided to all landowners pursuant to Sections 468.14 through 468.18 of Iowa Code.
- Conduct public hearing
 - Hear objections to the feasibility of the proposed improvements
 - Hear arguments for or against reclassification
 - Order the repairs or improvements that are found to be desirable
 - Set a letting date and time
- Hold a public bid letting
- Award bid to lowest, responsive, responsible bidder
- Construct the repairs or improvements
- Hold completion hearing

APPENDIX

APPENDIX A
REPORT EXHIBIT



Report Exhibit
Drainage District No. 49
WEBSTER COUNTY, IOWA

APPENDIX B
ENGINEER'S OPINION OF PROBABLE COST

**Engineer's Opinion of Probable Costs
Drainage District 49 - Main Open Ditch - Webster County
Ditch Cleanout**

Item No.	Description	Unit	Est. Qty	Unit Price	Extended Price
1	Channel Excavation	CY	5,700	\$ 5.00	\$ 28,500.00
2	Spoil Leveling	STA	92	\$ 175.00	\$ 16,100.00
3	Seeding Ditch Side Slopes	AC	7	\$ 1,000.00	\$ 7,000.00
5	12" CMP	LF	280	\$ 24.00	\$ 6,720.00
6	18" CMP	LF	120	\$ 30.00	\$ 3,600.00
7	24" CMP	LF	80	\$ 35.00	\$ 2,800.00
8	30" CMP	LF	20	\$ 40.00	\$ 800.00
9	36" CMP	LF	40	\$ 50.00	\$ 2,000.00
10	Rip Rap	TON	50	\$ 70.00	\$ 3,500.00
SUBTOTAL CONSTRUCTION (Item 1 through 10)					\$ 71,020.00
CONTINGENCY (20%)					\$ 14,204.00
TOTAL CONSTRUCTION					\$ 85,224.00
	Report and Hearings				\$ 12,000.00
	Engineering, Design, and Construction				\$ 24,000.00
TOTAL PROJECT COST					\$ 121,224.00
AVERAGE COST PER ACRE					\$ 25.58