

2017

ENGINEER'S REPORT

for

Drainage District # 34

WEBSTER COUNTY, IOWA

***MER ENGINEERING, INC.***

CONSULTING ENGINEERS

- Civil Engineers
- Environmental Engineers
- Land Surveyors
- Agricultural Engineers
- Geotechnical Engineers
- Architectural Engineers

2017

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Drainage District No. 34  
Open Ditch  
Webster County

MER #4092

	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.
	<u>Eldon F. Rossow</u> <u>8-22-17</u> ELDON F. ROSSOW (DATE)
	LICENSE NUMBER <u>7484</u>
	MY LICENSE RENEWAL DATE IS DECEMBER 31, <u>2017</u>
	PAGES OR SHEETS COVERED BY THIS SEAL: <u>All</u>

	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.
	<u>Toni R. Tabbert</u> <u>8-22-17</u> TONI R. TABBERT P.E. (DATE)
	LICENSE NUMBER <u>23885</u>
	MY LICENSE RENEWAL DATE IS DECEMBER 31, <u>2017</u>
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## SUMMARY AND ENGINEER'S RECOMMENDATION

This Engineer has reviewed the original plans for the open ditch of DD # 34, Webster County and has visited the site. An elevation survey of the existing ditch and siltation was conducted and is used as preliminary evidence of problems for this report.

### SUMMARY:

The open ditch of Drainage District #34 in Webster County, Iowa has become restricted by silt, vegetation, and structures. The Engineer's recommendation is to clean the ditch, remove the obstructions, change the side slopes to minimize bank slipping and restore the drainage to its original capacity.

- The open ditch from the headwall of the Open ditch to the Old Highway 50 (Station 0+00 to Station 112+90) has silt accumulation of approximately 2 ft. depth average or 10,000 cu yds.
- The side slopes of the ditch are showing signs of erosion and are sloughing off at various locations though out the length of the ditch.
- Tile outlets for Laterals A, B, C, D, and E are in good condition and do not need to be replaced.
- Tile outlet for Lateral F (Station 89+50) is deteriorated and in poor condition and should be repaired or replaced.
- The private farm crossing (Station 55+20) appears to have been adequately sized and installed according to plan grade.
- The corrugated metal pipe (CMP) at Station 26+80 under 300<sup>th</sup> Street is in good condition. The CMP was installed by the county and can be used as constructed.

### RECOMMENDATIONS:

In addition to, reviewing this report and scheduling a hearing to present this report to the owners of the lands included in DD #34 Webster County. We recommend Option #1 be completed to reestablish the original drainage.

- Option #1-Maintain the original flow line grade and repair side slopes. This option includes the following;
  - Perform a clean out, re-establish the 1906 plan grade, and slope existing side slopes to a 2:1 where sluffing is occurring
  - Leave existing farm and road crossings as constructed
  - Remove concrete headwall at the outlet for Lateral F and reconstruct the outlet

We also, recommend that the Board of Supervisors direct the Engineer to precede with design of a clean out of the Open ditch DD #34 from Station 0+00 to Station 112+90 (Existing headwall north to the bridge on Highway 50).

## INTRODUCTION

A petition has been filed February 14, 2017 by the property owners to remove the silt from the open ditch of DD #34, Webster County, IA and address the sliding of the existing side slopes in some areas.

The Boards of Supervisors acting as trustees for the Districts retained MER Engineering, Inc. to investigate the nature of the problems and prepare this report prior to proceeding with the repairs.

## LOCATION/SIZE

The open ditch of DD#34 provides agricultural drainage to the area just east of Highway 169 and south of Highway 50 in Webster County. Access to the ditch right of way is easiest from the paved county road D-20 (Old US Highway 20).

The drainage area includes the land in the following sections in Webster County:

- Sections #1, 11, 12, 13, 14, 23, 24, 25, and 26 Clay Twp.
- Sections #5, 6, 7, 8, 17, 18, 19, 20, 29, and 30 Burnside Twp.

The open ditch is approximately 11,400 ft. in length from the outlet into Crooked Creek near the west line of the NW ¼ of the NE ¼ of Section 8 in Burnside Township, Webster County, Iowa. The outlet for this open ditch of DD #34 is Crooked Creek to the Des Moines River. Numerous private tiles are connected to the existing open ditch.

## HISTORY/BACKGROUND

Drainage District #34 was established on September 15, 1909. The original district contained 6294 acres with an original assessment of \$49,423.00 to Webster County properties. The original grade of the Open ditch was 0.12%, with a bottom width of 4 feet, side slopes of 1 foot to 1 foot, and a berm width of 10 feet. Record drawings were recreated in March of 1958 and are on file in the office of the County Auditor. Please note that the tiles A, B, C, D, E, and F are designated as Branches and/or Laterals.

- September 5, 1919 project was completed for the installation of relief tiles for Laterals C, D and E with an assessment of \$18,361.00 on 2044.9 acres.
- In 1940 the open ditch was cleaned out. At this time the bottom width of the ditch was increased to 6'. The side slope and berm with remained the same.
- On March 20<sup>th</sup>, 1990, McClure Engineering submitted a report calling for improvements on the open ditch. The improvements included; dipping out the sediment in the ditch, removal of trees and brush, and the removal of two old farm bridges.
  - On October 23, 1990 McClure Engineering reported that the Contractor had completed the work according to the Plans and Specifications.
- On April 8, 1991 the Board of Supervisors agreed to move forward with making repairs to the existing head wall of the open ditch. This work was completed by July 1991.

- In June 1992 a farm crossing was installed, located in the SE1/4 of the SE1/4 of Section 7.
- In February 1994 McClure Engineering submitted a report evaluating the construction of a relief tile for Lateral A and Lateral B. The report also recommends that a waterway be constructed in order to remove excess surface runoff. These projects were not completed.
- In response to a petition for an alternative solution to the February 1994 report, on October 21, 1997, McClure Engineering submitted a report for an Alternative solution for the waterway improvements to Lateral B. This project was not completed.
- Between 1990 and 2000 Webster County replaced an existing bridge structure with a new CMP near Station 26+80 (300<sup>th</sup> St.).
- In April of 2010 the construction of a new relief tile for Lateral B and a section of Lateral A were approved. This project was completed by May 2011.
  - On July 11, 2011 Jacobson-Westergard & Associates, Inc. reported that the Contractor had completed the work according to the Plans and Specifications.
- In November 2015, McClure Engineering was retained to investigate the need for a relief tile along Lateral A

No additional information was acquired for this drainage study.

### INVESTIGATION

The 1958 record drawings were obtained from the District Records in July 2017 and were reviewed as part of this investigation.

This Engineer visually inspected the ditch and directed MER Engineering staff to survey the grade and determine the extent of the siltation. They also inspected the Lateral tile outlets draining into the ditch and the culverts providing ditch crossings.

The siltation was determined to average approximately 2 feet deep through the 11,400 feet of the ditch. This confirmed the visual inspection by the property owners and the District Trustee that had originally looked into the claim. The estimated quantity of silt presently in the ditch is approximately 10,000 cu yds. The silt depth was established by probe to a “hard bottom”. This probe method also indicated that the hard bottom is below the plan grade in many locations. This situation is evidence of erosion, soil conditions or previous cleaning.

The existing side slopes are showing signs of erosion and have sluffed off at various locations throughout the length of the ditch. This sluffing is prevalent where hard bottom is below plan grade.

The Lateral tile outlets draining into the ditch were also visually inspected for remaining in service after a possible cleanout. In general, the outlets for Laterals A, B, C, D and E appear to be in reasonably good condition and are operational. The outlet for Lateral F at Station 89+50 is operational but is showing significant signs of deterioration.

The original bridge crossing near station 26+80 (300<sup>th</sup> Street) was replaced with a 126 inch diameter CMP sometime between 1990 and 2000. This structure appears to have been adequately sized and installed according to the existing grade.

A private agricultural crossing was installed near station 55+20 in 1992. The crossing consists of a 90 inch diameter Corrugated Metal Pipe (CMP) used as a drainage structure under the earthen crossing. This structure was sized by an engineer and appears to have been installed according to plan grade.

## CONCLUSIONS

The original design for this district ditch was to provide an outlet for the drainage of the agricultural land inside the district. The construction of the improvements in 1909 and the subsequent maintenance has provided drainage and must be maintained. The original intent to provide drainage remains the responsibility of the district. In the opinion of this Drainage Engineer the ditch presently has problems as follows:

- There is approximately 10,000 cu yds of accumulated silt in the 11,400 ft of the ditch.
- The side slopes of the ditch are showing signs of erosion and are sluffing off at various locations though out the length of the ditch.
- Tile outlets for Laterals A, B, C, D, and E are in good condition and do not need to be replaced.
- Tile outlet for Lateral F is deteriorated and in poor condition and should be repaired or replaced.
- The private farm crossing appears to have been adequately sized and installed according to plan grade.
- The county road crossing appears to have been adequately sized and installed according to what the existing grade was at the time of construction.

Also, in the opinion of this drainage engineer there are principally two options that will reestablish drainage.

- Option #1-Maintain the original flow line grade and repair side slopes. This option includes the following;
  - Perform a clean out, re-establish the 1906 plan grade, and slope existing side slopes to a 2:1 where sluffing is occurring
  - Leave existing farm and road crossings as constructed
  - Remove concrete headwall at the outlet for Lateral F and reconstruct the outlet

- Option #2-Establish a new flowline grade and change all side slopes to 2:1 or better. This option includes the following;
  - Perform clean out, establish a new plan grade based on the existing hard bottom, and reconstruct all slope sides to a 2:1
  - Remove concrete headwall at the outlet for Lateral F and reconstruct the outlet
  - Remove private farm crossing and reinstall based on the new plan grade

### ESTIMATED COSTS

#### **ENGINEERS ESTIMATE – OPTION #1** **Drainage District #34, Open Ditch Webster Co.**

<u>No.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>UNIT PRICE</u>	<u>AMOUNT</u>
1.	Bonds, Mobilization, & Insurance	Lump Sum	XXX /LS	\$5,000.00
2.	Unclassified Excavation Silt Removal	10,000 CY	\$5.50 /CY	\$55,000.00
3.	Unclassified Excavation Side Slope 2:1 (Only where presently needed)	15,000 CY	\$5.00 /CY	\$45,000.00
4.	Level & Deep Till Spoil Banks	25,000 CY	\$3.00 /CY	\$75,000.00
5.	Furnish & Install 16 ga. CMP Drain Tile	1 LS	\$10,000 /LS	\$10,000.00
6.	Reconstruct Lateral F Outlet	1 LS	\$5,000.00 /LS	\$5,000.00
7.	Seeding (Foreslope)	114 STA	\$100.00 /STA	\$11,400.00
TOTAL CONSTRUCTION COST				\$206,400.00
Adm, Eng, & Legal				\$30,000.00
TOTAL CLEAN OUT COST				\$236,400.00

**ENGINEERS ESTIMATE – OPTION #2**  
**Drainage District #34, Open Ditch Webster Co.**

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<u>No.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>UNIT PRICE</u>	<u>AMOUNT</u>
1.	Bonds, Mobilization, & Insurance	Lump Sum	XXX /LS	\$5,000.00
2.	Unclassified Excavation Silt Removal	10,000 CY	\$5.50 /CY	\$55,000.00
3.	Unclassified Excavation Side Slope 2:1	46,000 CY	\$5.00 /CY	\$230,000.00
4.	Level & Deep Till Spoil Banks	56,000 CY	\$3.00 /CY	\$168,000.00
5.	Furnish & Install 16 ga. CMP Drain Tile	1 LS	\$20,000.00 /LS	\$20,000.00
6.	Reconstruct Lateral F Outlet	1 LS	\$5,000.00 /LS	\$5,000.00
7.	Reconstruct Private Drive CMP	1 LS	\$10,000.00 /LS	\$10,000.00
8.	Seeding (Foreslope)	114 STA	\$100.00 /STA	\$11,400.00
TOTAL CONSTRUCTION COST				\$504,400.00
ROW ACQUISITION		5.5 AC	\$10,000.00 /AC	\$55,000.00
Adm, Eng, & Legal				\$40,000.00
TOTAL RECONSTRUCTION COST				\$599,400.00

End Report

