MEC# WEC 10417012

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ENGINEER'S REPORT
DRAINAGE DISTRICT NO. 57
WEBSTER COUNTY, IOWA
MAIN OPEN DITCH INVESTIGATION
SEPTEMBER 2017

LICENSED PROFESSIONAL ENGINEER
JUSTIN W. MILLER
22635
IOWA

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.

09/25/2017

Justin W. Miller, P.E. No. 22635 (Date)

My license renewal date is December 31, 2018.

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Appendices

1 Introduction

The Webster County Auditor received a drainage petition on June 21st, 2017 requesting a cleanout of a portion of the main open ditch of Drainage District No. 57 from the southeast quarter of the northeast part of Section 31 of Newark Township running west then south to Section 1 of Cooper Township.

The Webster County Board of Supervisors, acting as trustees for Drainage District No. 57, motioned for McClure Engineering Company (MEC) to conduct an investigation and prepare a report. This report is required by and prepared in accordance to Iowa Code Chapter 468. This report summarizes the findings of the engineer in response to the drainage petition which includes the investigation results, recommendations, and engineer's opinion of probable cost.

2 District History

Drainage District 57 was originally constructed in 1909 with an initial assessment of $35,889 specifically for the construction and establishment of the main open ditch which included a watershed of 7,261.65 acres.

Records indicate several repairs and improvements to the District as a whole and specifically request for cleanouts of the main ditch leading to projects in 1937, 1947, 1958 and 1999. In 2013 a re-alignment of a portion of the ditch was initiated involving the segment of ditch in Section 12, T89N, R28W which does not include any of the portion mentioned in the petition. That project was completed in 2016 and was formally accepted by the Board of Supervisors acting as Trustees in August of 2017.

3 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 to evaluate the condition of the existing ditch system and to evaluate the feasibility of benefit of possible repairs and/or improvements.

4 Existing Conditions

The original Main Open Ditch design for the portion of ditch as indicated on written records and plat maps is described on the table below. The running grade of the ditch is 0.071% then 0.036% on the upper end which is very flat. Ditches with grades this flat are typically susceptible to settling of silt and sedimentation with their respective low-velocity flows. Additionally, many outlets and culvert pipes were found to be submerged in silt and/or underwater as seen in the figures below.

Table 1: Main Open Ditch Design

Station Range	Grade (%)	Base Width (ft)	Sideslopes (H:V)
46+25 – 108+50	0.047	8	1.5:1
108+50 – 119+35	0.047	6	1.5:1
119+35 – 200+00	0.050	6	1.5:1
**200+00 – 357+50	0.071	6	1.5:1
**357+50 – 428+00	0.036	6	1.5:1

**Includes the segment of ditch specified in the drainage petition

Figure 1: Submerged and sinking outlet

Figure 2: Deteriorating, submerged outlet

Figure 3: Existing Condition

As seen in Figure 3 above, the accumulation of silt has led to vegetation covering most of the ditch bottom and standing above the normal water levels making the ditch appear to need a cleanout. Survey data revealed approximately 2,600 cubic yards of material needs to be cleaned out beginning just north of D14 extending to the end of the ditch near the center of Section 31 to restore the ditch to design capacity. Statistically that is not a lot of removal compared to other ditch cleanouts with similar lengths.

The watershed tributary to the upper portion of DD 57 Main Open Ditch is primarily made up of Nicollet, Webster, and Canisteo clay loam soils classified as poorly drained by the Natural Resource Conservation Service.

5 Proposed Options

Upon review of the existing ditch conditions, MEC proposes to "dip" the bottom of the ditch to remove approximately 2,600 cubic yards of material to restore design capacity and replace surface and sub-surface outlets. Although 2,600 is less volume than many ditches see for removal, this volume has a greater negative impact on the functionality of this specific ditch due to the extremely flat grade. As this will not increase capacity of the facility, this option would be considered a "Repair" project pertaining to Iowa Drainage Code. Therefore, proceedings associated with "Improvement" projects will not be required.

6 Engineer's Opinion of Probable Costs

Table 2: Engineer's Opinion of Probable Cost – Main Open Ditch Cleanout

Total Estimated Construction Cost	Total Estimated Administrative/Engineering Cost	Total Estimated Cost for Repairs
$111,906	$35,800	$147,706

7 Regulatory Overview

While a Drainage District may have the authority to maintain the original capacity of its existing facilities through or adjacent to wetlands, a property owner is ultimately the responsible party for disturbance of jurisdictional wetlands located within the owned parcel. The United States Department of Agriculture (USDA) Farm Program requires conservation measures administered through the National Resources Conservation Service (NRCS) which include wetlands, those same or other wetlands may fall under the jurisdiction of the United States Army Corps of Engineers (USACE). USACE regulates wetlands and other aquatic habitat through Section 404 of the Clean Water Act and the United States Environmental Protection Agency regulates water quality to those jurisdictional wetlands or waters through Section 401 of the Clean Water Act. The proposed option in this report is limited to repairs and maintenance of an existing drainage district facility and MEC does not anticipate mitigation or permitting requirements.

8 Reclassification / Annexation

The purpose of a reclassification is simply to make the assessments for landowners equitable to their benefit from a drainage district facility. Iowa Code provides structure for when and how to conduct a reclassification. MEC compiles four factors to analyze benefit for each parcel within the District including an outlet charge, proximity factor, soil type and slope of land. Record research indicates Drainage District 57 has not been reclassified as part of any past projects. If a repair option such as the option proposed earlier in this report is pursued, a reclassification will not be automatically required as part of this project. The Board may consider whether the

current assessment schedule and its respective apportionment of costs are inequitable. If the apportion of costs are found to be inequitable, the Board shall choose to order a reclassification at any time.

Due to the extended time since the original classification was established and the quantity of recent projects, MEC recommends a reclassification for Drainage District 57 as part of this project to provide independent assessment schedules for Lateral 1, Lateral 2 and the Main Open Ditch so only those benefited by repairs or improvements for each individual facility would pay towards that facility. As it is currently scheduled, any work performed on Lateral 1 would be financially spread across everyone in the District. Lateral 2 was reclassified as part of an improvement project in 1970 so if a reclassification is ordered for the District, that schedule will be reviewed for possible adjustments but may not need updating. Since this project is located on the upper end of the District, the Board may find it desirable to appoint commissioners to develop a one-time-use classification schedule to assess only those on the upper end of the District.

With any reclassification, the Board shall appoint three commissioners to adjust the assessments schedule. Two of said commissioners shall be uninterested, unbiased landowners from Webster County without any physical or financial ties to the District and the third shall be an engineer. During the process of a reclassification, neighboring lands are reviewed to determine the feasibility of annexation. Annexation proceedings can occur concurrently with reclassifications per Iowa Code. Reclassifications such as this are estimated to cost approximately $2.25/acre in each watershed.

9 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 trustees' consideration. The drainage district trustees shall hold a hearing to consider the acceptance and must provide notice of the meeting to all owners within the District. Any claims for damages shall be submitted in writing to the Auditor's office prior to or at the completion hearing for consideration by the Board.

10 Administration

If estimated project costs exceed $50,000, a public hearing on the proposed options for repair would need to be held prior to ordering the work be completed per Iowa Code. Similarly, if estimated project costs exceed $135,000, a competitive bid process would be required. In this case, a public hearing and competitive bid process will be required upon tentative approval of this report. Proper notice shall still be given per Iowa Code if the Board pursues a public hearing and/or competitive bid letting.

APPENDIX A

REPORT EXHIBIT

R 28 W

R 27 W

T 90 N

T 89 N

150TH ST

160TH ST

170TH ST

180TH ST

QUAIL AVE

RACINE AVE

SAMSON AVE

TAYLOR AVE

UNION AVE

P63

D14

FORT DODGE

NORTH

Not To Scale

LEGEND

- PROPOSED OPEN DITCH CLEAN OUT
- EXISTING TILE
- EXISTING OPEN DITCH
- DISTRICT BOUNDARY

McCLURE™ ENGINEERING Co.

building strong communities.

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Report Exhibit

Drainage District No. 57

Webster county, Iowa

WEC 10417012
August 2017

DRAWING NO. 1

SHEET NO. 1 / 1

APPENDIX B

ENGINEER'S OPINION OF PROBABLE COSTS

McCLURE ENGINEERING Co.

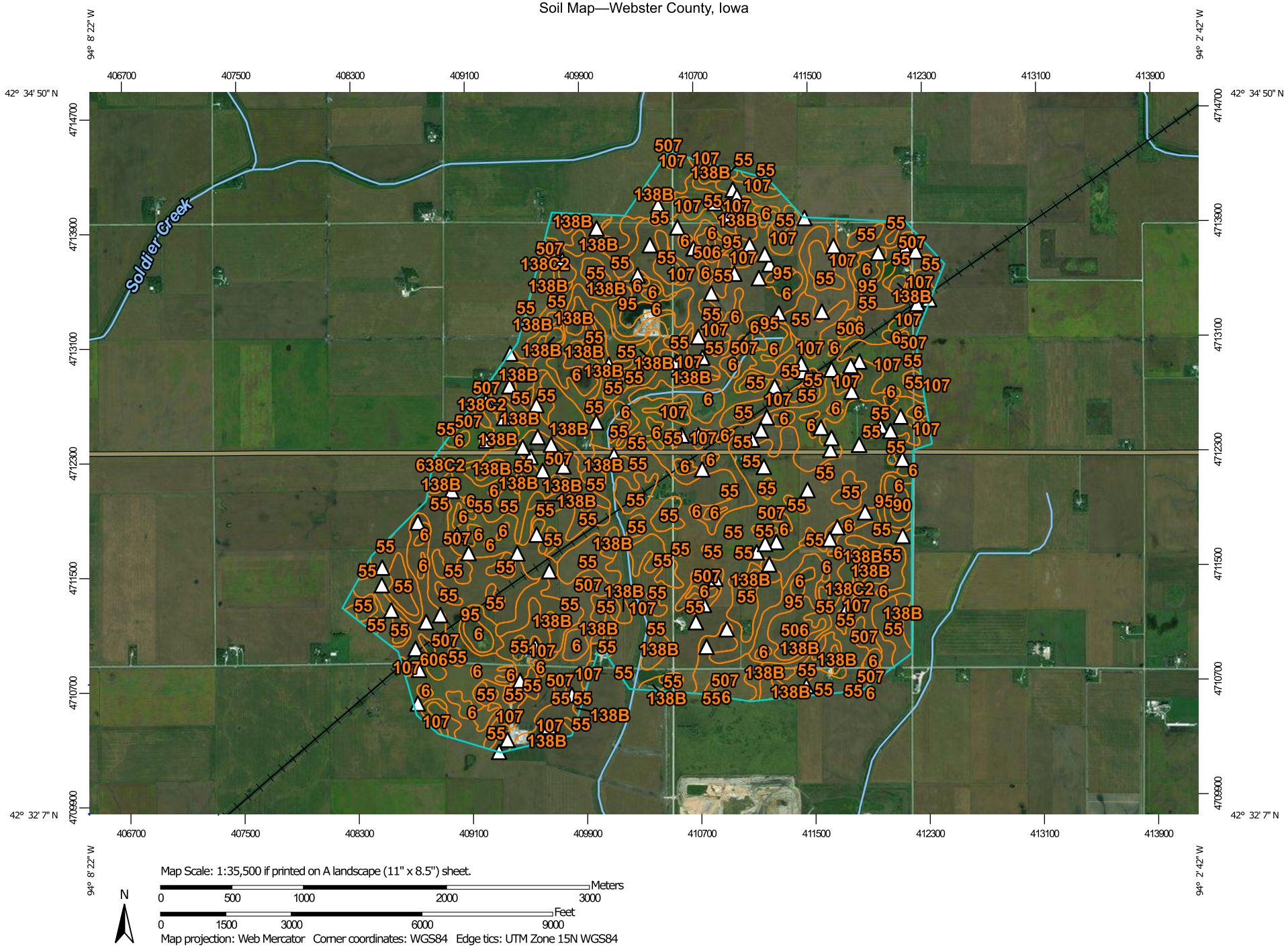
Engineer's Opinion of Probable Costs
Drainage District 57 - Main Open Ditch - Webster County
Ditch Cleanout

Item No.	Description	Unit	Est. Qty	Unit Price	Extended Price
1	Channel Excavation	CY	2,600	$ 5.00	$ 13,000.00
2	Spoil Leveling	STA	107	$ 175.00	$ 18,725.00
3	Seeding Ditch Side Slopes	AC	3	$ 1,000.00	$ 2,500.00
5	12" CMP	LF	690	$ 24.00	$ 16,560.00
6	15" CMP	LF	370	$ 28.00	$ 10,360.00
7	18" CMP	LF	320	$ 30.00	$ 9,600.00
8	21" CMP	LF	350	$ 30.00	$ 10,500.00
9	24" CMP	LF	100	$ 35.00	$ 3,500.00
10	30" CMP	LF	55	$ 42.00	$ 2,310.00
10	36" CMP	LF	40	$ 50.00	$ 2,000.00
11	Rip Rap	TON	60	$ 70.00	$ 4,200.00
SUBTOTAL CONSTRUCTION (Item 1 through 10)					$ 93,255.00
	CONTINGENCY (20%)				$ 18,651.00
TOTAL CONSTRUCTION					$ 111,906.00
	Report and Hearings				$ 12,200.00
	Engineering, Design, and Construction				$ 23,600.00
	Reclassification costs will vary depending on the extent of reclassification				
TOTAL PROJECT COST					**$ 147,706.00**

APPENDIX C

NRCS SOILS MAP - DRAINAGE

Soil Map—Webster County, Iowa



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Webster County, Iowa
Survey Area Data: Version 31, Sep 22, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 18, 2011—Feb 17, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Webster County, Iowa (IA187)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
6	Okoboji silty clay loam, 0 to 1 percent slopes	215.0	7.5%
55	Nicollet clay loam, 1 to 3 percent slopes	589.7	20.5%
90	Okoboji mucky silty clay loam, depressional, 0 to 1 percent slopes	5.4	0.2%
95	Harps clay loam, 0 to 2 percent slopes	90.5	3.2%
107	Webster clay loam, 0 to 2 percent slopes	991.1	34.5%
138B	Clarion loam, 2 to 6 percent slopes	186.2	6.5%
138C2	Clarion loam, 6 to 10 percent slopes, moderately eroded	7.1	0.2%
506	Wacousta silty clay loam, depressional, 0 to 1 percent slopes	26.7	0.9%
507	Canisteo clay loam, 0 to 2 percent slopes	751.1	26.2%
606	Lanyon silty clay loam, depressional, 0 to 1 percent slopes	6.1	0.2%
638C2	Clarion-Storden complex, 6 to 10 percent slopes, moderately eroded	2.3	0.1%
Totals for Area of Interest		**2,871.3**	**100.0%**