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Engineer's Report

**Drainage District No. 4**

**FEMA Main Open Ditch Repairs/Mitigation**

Kossuth County, Iowa

Filed: January 19, 2021

**Submitted by:**

Bolton & Menk, Inc.  
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Algona, IA 50511  
P: 515-395-3140

**Proj. No. P13.122324**

# Certification

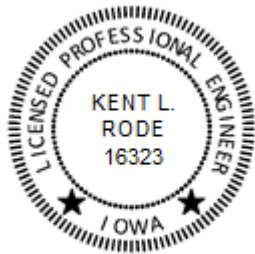
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for

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FEMA Main Open Ditch Repair/Mitigation

Kossuth County, Iowa

January 19, 2021



I hereby certify that this plan, specification or report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Iowa. My renewal date is December 31, 2021.

By: *Kent L. Rode*  
Kent L. Rode, P.E.  
License No. 16323

Date: 1-19-2021

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## **I. BACKGROUND & INVESTIGATION**

The information in this report is regarding the damage sustained by the Main Open Ditch of Drainage District No. 4 (DD4) caused by large rain events. The Main Open Ditch of DD4, which serves approximately 46,874 acres, had recently been repaired to the channel's original conditions in 2017. These excessive rainfall events then occurred causing facility failures. During the summer of 2020, in order to better determine and categorize the extents of the damage, a field review and survey were performed from the outlet of the Main Open Ditch of DD4 at the junction with the East Fork of the Des Moines River to the ditch crossing at 90th Avenue (approximately 10 miles of ditch length). A survey of 2 miles of the Main Open Ditch west of 90<sup>th</sup> Avenue (P30) to 420<sup>th</sup> Street was also later performed. Topographic data was gathered along the open ditch to determine the existing sediment levels. Additionally, topographic data was obtained for inline structures on the open ditch as well as pipe elevations entering the ditch. Further investigation included a drone flight of the open ditch to better visualize the damages to the facility. Using all the available field data, it was found that large portions of the channel side-slopes had failed structurally and sloughed into the ditch. These side-slope sloughs caused large amounts of dirt and debris to accumulate in the bottom of the open ditch impacting drainage flows. Additionally, inlet pipes and tile outlets were damaged when these facilities were unable to handle the excess water volumes. At a minimum, the open ditch facility will need to be repaired to the original conditions to insure adequate drainage capacity.

## **II. REPAIR OPTION**

To repair the facility a cleanout of all dirt, silt, and debris would be completed. This cleanout would restore the drainage capacity to the original planned capacity. To achieve this the open ditch would generally be restored to the original slope, shape, and capacity by creating a cross section based on the original plans. This cross section would have side-slopes of 1.5 feet horizontal and 1 foot vertical (1.5:1). Additionally, riprap would be placed along sections of the open ditch that have experienced significant soil loss to stabilize the banks and reduce further soil loss. Lastly, where damaged tile extensions and surface drainpipes exist, they will be repaired with new tile extensions and surface drains to further protect the open ditch from erosive forces.

## **III. MITIGATION OPTION**

Alternately, a mitigation plan could be implemented that would further reduce the opportunities for soil loss and erosion. In addition to placing riprap and repairing all damaged pipes entering the open ditch, the open ditch could be cleaned and excavated so that the side-slopes of the channel were 2 feet horizontal and 1 foot vertical (2:1). This change in side-slope would provide increased stability and require less riprap than the repair option. This mitigation option would also better protect the areas of the open ditch that saw lesser amounts of damage from experiencing further damage in the future. For these reasons, it is recommended that the mitigation option be selected.

#### IV. OPINIONS OF PROBABLE COST

The itemized cost estimate for the repair and mitigation options are attached to this report. The total cost estimates per option are:

Repair Option ----- \$2,000,000.00

Mitigation Option - \$2,040,000.00

These estimates represent our best judgment of the probable cost based upon our experience with similar projects. The quantities and unit costs for construction are believed to be reasonably accurate for use in this report and hearing. Actual costs are subject to the market for the respective components and to other economic forces. These estimates carry no actual or implied guarantees.

#### V. DISTRICT RIGHT-OF-WAY

Under Iowa Code Section 468.27 Dismissal or Establishment – Permanent Easement – second paragraph “Following its establishment, the drainage district is deemed to have acquired by permanent easement all right-of way for drainage district ditches, tile lines, settling basins and other improvements, unless they are acquired by fee simple, in the dimensions shown on the survey, plat and profile, if one is made.” To facilitate maintenance now and into the future, a wide right-of-way is typically required to accommodate today’s construction equipment. It is understood that Kossuth County has established, by resolution, the right-of-way on all open ditch district facilities at 115 feet wide. Open ditch right-of-ways are essential to maintaining district quality and efficiency. These right-of- way purchases include the right of ingress and egress across adjoining land and the right of access for maintenance, repair, improvement and inspection.

For the mitigation option with the 2:1 side-slopes, the top of bank will be cut further into the existing ground by a range of 5 to 10 feet from the current location. Typically, it is necessary to have a minimum width of right-of-way to contain the top width of the ditch and to have approximately 15 feet on each side of the ditch for access. The top width of the open ditch varies from 50 to 100 feet for the mitigation option. Therefore, to provide a minimum of 15 feet on each side of the ditch would necessitate a width of right-of-way of 130 feet in the wider sections of the channel. We have provided a tabulation of those areas requiring the wider 130 foot right-of-way.

Drainage district open ditch right-of-ways are exempt from real estate taxes and drainage assessments. Therefore, deductions should be made to the net acres of those affected parcels and the property records for those affected parcels should be adjusted accordingly. Any additional right-of-way that is purchased would need to be removed from the properties’ real estate taxes. Under Iowa law, landowners have the right to the beneficial use of the spoil bank in the right-of-way subject only to the district’s use of the right-of-way to protect and maintain the open ditch. Appendix A has a tabulation of the acreage of land required from each forty tract or fraction thereof as right-of-way.

## VI. BUFFER STRIPS

It appears there may be some farm program buffer strips in place along the open ditch. There are some manageable drawbacks which must be addressed by the owners of the buffer strips.

If farm program buffer strips do exist, the destruction of buffer strip vegetation by spoil placement or leveling from cleaning the open ditch places the landowner in violation of farm program conservation rules. The penalties can include loss of the CRP contract, forfeiture of back CRP payments, and penalties. To avoid these, landowners must request a waiver from the USDA Farm Service Agency County Committee. The county committee will grant waivers for ditch maintenance if seeding restoration in compliance with NRCS requirements is completed. If the work on the open ditch is authorized, all farm program buffer strip owners on the repair portion of the ditch must independently seek the FSA County Committee waivers. This process will take two or three months and should be initiated immediately if ditch maintenance is authorized.

In conversations with the NRCS, staff has indicated the changes in slope will not affect existing CRP Buffer Contracts.

## VII. SUMMARY & DISCUSSION

This report has confirmed the need for drainage relief for Drainage District No. 4. The work described herein for the Repair or Mitigation Option can accomplish that relief. It is recommended to proceed with the Mitigation Option. The proposed mitigation is considered to be of public benefit and is conducive to the public health, convenience or welfare.

### **Mitigation Recommended**

The existing Main Open Ditch has siltation that requires removal and side-slope stability issues that require addressing. Areas of damaged side slopes, surface drain pipes, and tile blowouts need to be repaired. Rusted and damaged CMP tile extensions should also be repaired. The proposed mitigation is considered to be of public benefit and is conducive to the public health, convenience or welfare.

### **Installment Payments**

Iowa drainage law allows for drainage district costs for large projects to be payed between ten to twenty years at the discretion of the Board of Supervisors. Typically, the board would spread assessments of the magnitude contemplated in this report over ten years. Be reminded that final individual assessments are based upon benefits and that some parcels will likely bear two to three times the average per acre costs.

### **Recommended Steps**

It is recommended that the Board of Supervisors acting as trustees for Drainage District No. 4 take appropriate action, with legal guidance, to accomplish the following:

1. Tentatively approve this engineer's report and schedule a public hearing to receive and consider the input of the District landowners.
2. Adopt the repair or mitigation option for construction, modified as deemed appropriate, to satisfy the desires of the District.
3. Consider right-of-way acquisition for the mitigation option.
4. Direct the engineer to prepare final plans and specifications for the adopted plan and proceed toward a bid letting.

Respectfully submitted,  
**Bolton & Menk, Inc.**



**Kent L. Rode, P.E.**  
Senior Project Manager

## Appendix A: Right-of-Way Tabulation



**Open Ditch Right-of-Way  
Drainage District No. 4  
Kossuth County, Iowa  
2021**

Landowner	Parcel ID	Section-Township-Range	Legal Description	Additional ROW (ac)
BANCROFT TOWN OF	1013400008	13-98-29	TRACT IN SE1/4 AS DESC BY WD BK 108 PG 452-454	0.70
	1013100007	13-98-29	THAT PART SE NW S OF MUD CREEK & LYNG E OF HWY #169 13 98 29	0.04
	1013200003	13-98-29	TRACT IN E1/2 SEC 13 AS DESC BY WD BK 102 PG 129	0.10
BORMANN, PAUL E, BORMANN, MARY ANN	525100007	25-99-30	NE NW EX PARCEL 1 DESC BY SURVEY DOC #2005-1409	0.65
DEGEETER, JOSEPH W, DEGEETER, PATRICIA D	1025400002	25-98-29	NE SE	0.46
	1025200002	25-98-29	NE NE	0.54
	1130100001	30-98-28	TR 12' X 876.13' IN NW COR NW NW	0.05
GOCHE, THOMAS J LIVING TRUST	1013100004	13-98-29	SW NW	0.49
	1013100009	13-98-29	SE NW LYING W OF HWY EX PART OF TRACT A AS DESC BY SURVEY DOC #2003-5456	0.34
HELMKE, DOROTHY	525200002	25-99-30	NE NE	0.47
	525200001	25-99-30	NW NE	0.52
KEMNA, DORIS A L E ET AL	1036200003	36-98-29	SW NE	0.13
KENNEDY, ELLENGRAY GUTZMAN	1024476004	24-98-29	SE SE	0.14
LAMPE, DENNIS J LAMPE, JULIE N	1036200004	36-98-29	SE NE	0.35
MCNERTNEY, DORIS YVONNE REV LVG TRST - 1/2 INT MCNERTNEY, DONALD E REV LVG TRST - 1/2 INT	1013400007	13-98-29	SE SE EX PT OF TRACT DESC IN BOOK 108 PAGE 452-454 TO CITY OF BANCROFT	0.29
	1013400010	13-98-29	SW SE EX INDUSTRIAL PARK FIRST SUBDIV & EX TO TOWN OF BANCRO FT BY WD BK 108 PG 452-4 & EX PART OF	0.05
	1013400011	13-98-29	NW SE EX PART OF TRACT TO TOWN OF BANCRO FT DESC BY WD BK 102 PG 129 & EX PART OF TRACT TO TOWN OF	0.25
	1013100006	13-98-29	TR OF LAND LYNG N OF MUD CREEK & E OF HWY #169 IN SE NW	0.03
MERRON, RICHARD J & PAMELA S - 1/2 INT MERRON, PATRICK F & MAXINE K - 1/2 INT	1119300003	19-98-28	SW SW	0.54
	1119100006	19-98-28	SE NW	0.45
NORTH KOSSUTH GOLF CLUB INC	1024226009	24-98-29	NE NE EX 1.34A KENNEDYS ADD & EX PL AT OF NORTH KOSSUTH GOLF ADD & EX OUTLOT A DESC BY SURVEY	0.01
RAHE, DEAN	1118300007	18-98-28	TRACT 1 LOC IN SW SW OF 18-98-28 & TRACT 1 LOC IN NW NW OF 19-98-28 AS DESC BY SURVEY RECORDED BY	0.00
RAHE, LAWRENCE J, RAHE, DARLENE	1119100002	19-98-28	NE NW	0.20
	1119100009	19-98-28	NW NW EX TRACT 1 BY SURVEY BY DOC #2002- 2764	0.45
	1118300005	18-98-28	SW SW EX TRACT 1 BY SURVEY RECRD BY DOC #2002-2764	0.03
VASKE, KEITH J, VASKE, DENISE M	1119300004	19-98-28	SE SW EX TR CONT 8.12A	0.17
	1119300002	19-98-28	NE SW	0.45

Total 3.03

# Appendix B: Opinions of Probable Costs

**Engineer's Opinion of Probable Cost - Repair  
Drainage District No. 4  
Kossuth Counties, Iowa  
2020**

**Main Open Ditch Repair**

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
1	Open Ditch Excavation	STA	598.5	\$400	\$239,400
2	Spoil Bank Leveling (Two Sides)	STA	598.5	\$200	\$119,700
3	Open Ditch Seeding & Fertilizing	STA	598.5	\$150	\$89,775
4	CMP Tile Extension, 12" Dia.	LF	840	\$27	\$22,680
5	CMP Tile Extension, 15" Dia.	LF	390	\$30	\$11,700
6	CMP Tile Extension, 18" Dia.	LF	300	\$32	\$9,600
7	CMP Tile Extension, 30" Dia.	LF	60	\$45	\$2,700
8	CMP Tile Extension, 54" Dia.	LF	60	\$60	\$3,600
9	Animal Guards, 12 Dia.	EA	10	\$100	\$1,000
10	CMP Surface Drain, 15" Dia.	LF	350	\$42	\$14,700
11	CMP Surface Drain, 18" Dia.	LF	400	\$45	\$18,000
12	CMP Surface Drain, 24" Dia.	LF	180	\$50	\$9,000
13	CMP Surface Drain, 30" Dia.	LF	300	\$55	\$16,500
14	CMP Surface Drain Apron, 15" Dia.	EA	5	\$330	\$1,650
15	CMP Surface Drain Apron, 18" Dia.	EA	7	\$350	\$2,450
16	CMP Surface Drain Apron, 24" Dia.	EA	4	\$400	\$1,600
17	CMP Surface Drain Apron, 30" Dia.	EA	5	\$450	\$2,250
18	Geotextile Fabric	SY	31,950	\$5	\$159,750
19	Riprap, IDOT Class E	TN	25,160	\$40	\$1,006,400
20	Fence Cuts	EA	40	\$100	\$4,000
21	Mobilization	LS	1	\$86,800	\$86,800
22	Construction Contingency	LS	1	\$180,261	\$176,745

**Total Estimated Main Open Ditch Repair Construction Cost      \$2,000,000**

**Non-Construction Costs**

Construction Related Damages	\$42,600
Basic Engineering Services	
Survey, Study & Report, Meetings & Hearing	\$35,000
Construction Plans, Specifications, & Bid Letting	\$68,000
Construction Engineering Services, Staking, and Inspection	\$74,800
Legal Services, Publications, Mailings, Etc..	\$3,000
Finance, Interest & Contingency	<u>\$100,000</u>

<b>Total Assessable Project Cost</b>	<b>\$2,323,400</b>
Federal Emergency Management Agency Funds (75%)	\$1,742,550
State Funds (10%)	\$232,340
Assessable to District (15%)	\$348,510
Average Assessable Cost per Acre (46,874 ac)	\$7.44

**Engineer's Opinion of Probable Cost - Mitigation (Changing 1.5:1 Side-Slopes to 2:1)**  
**Drainage District No. 4**  
**Kossuth Counties, Iowa**  
**2020**

**Main Open Ditch Mitigation**

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
1	Open Ditch Excavation	CY	275,000	\$3	\$825,000
2	Spoil Bank Leveling (Two Sides)	STA	598.5	\$200	\$119,700
3	Open Ditch Seeding & Fertilizing	STA	598.5	\$150	\$89,775
4	CMP Tile Extension, 12" Dia.	LF	840	\$27	\$22,680
5	CMP Tile Extension, 15" Dia.	LF	390	\$30	\$11,700
6	CMP Tile Extension, 18" Dia.	LF	300	\$32	\$9,600
7	CMP Tile Extension, 30" Dia.	LF	60	\$45	\$2,700
8	CMP Tile Extension, 54" Dia.	LF	60	\$60	\$3,600
9	Animal Guards, 12 Dia.	EA	10	\$100	\$1,000
10	CMP Surface Drain, 15" Dia.	LF	350	\$42	\$14,700
11	CMP Surface Drain, 18" Dia.	LF	400	\$45	\$18,000
12	CMP Surface Drain, 24" Dia.	LF	180	\$50	\$9,000
13	CMP Surface Drain, 30" Dia.	LF	300	\$55	\$16,500
14	CMP Surface Drain Apron, 15" Dia.	EA	5	\$330	\$1,650
15	CMP Surface Drain Apron, 18" Dia.	EA	7	\$350	\$2,450
16	CMP Surface Drain Apron, 24" Dia.	EA	4	\$400	\$1,600
17	CMP Surface Drain Apron, 30" Dia.	EA	5	\$450	\$2,250
18	Geotextile Fabric	SY	22,000	\$5	\$110,000
19	Riprap, IDOT Class E	TN	12,580	\$40	\$503,200
20	Fence Cuts	EA	40	\$100	\$4,000
21	Mobilization	LS	1	\$88,500	\$88,500
22	Construction Contingency	LS	1	\$182,395	\$182,395

**Total Estimated Main Open Ditch Mitigation Construction Cost    \$2,040,000**

**Non-Construction Costs**

Construction Related Damages	\$42,600
Basic Engineering Services	
Survey, Study & Report. Meetings & Hearing	\$35,000
Construction Plans, Specifications, & Bid Letting	\$68,000
Construction Engineering Services, Staking, and Inspection	\$84,800
Legal Services, Publications, Mailings, Etc..	\$3,000
Finance, Interest & Contingency	<u>\$102,000</u>

<b>Total Assessable Project Cost</b>	<b>\$2,375,400</b>
Federal Emergency Management Agency Funds (75%)	\$1,781,550
State Funds (10%)	\$237,540
Assessable to District (15%)	\$356,310
Average Assessable Cost per Acre (46,874 ac)	\$7.60

# Appendix C: Preliminary Plans