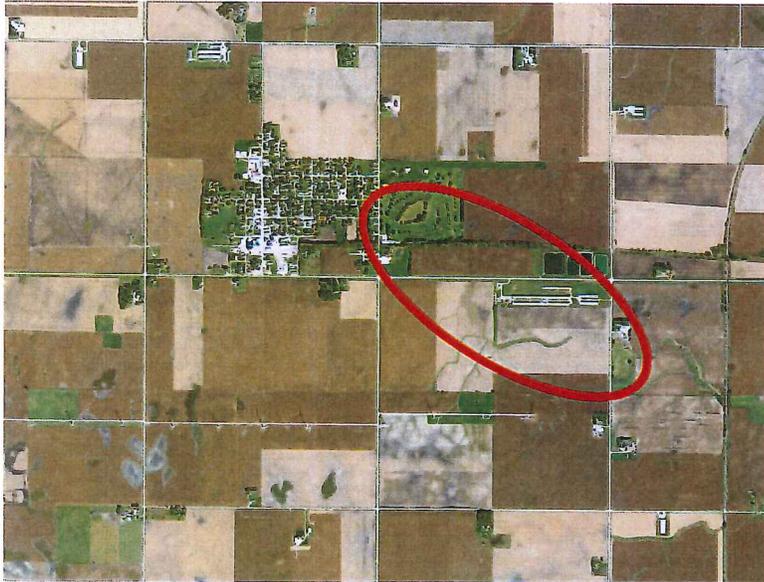


**HARDIN COUNTY, IOWA**

**2016**



**2ND SUPPLEMENT  
TO ENGINEER'S  
REPORT ON  
REPAIR AND  
IMPROVEMENT  
TO MAIN OF  
DRAINAGE  
DISTRICT NO. 143  
HARDIN COUNTY**



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

*Lee O. Gallentine, P.E.* April 19, 2016  
LEE O. GALLENTINE, P.E. DATE

LICENSE NUMBER: 15745  
MY LICENSE RENEWAL DATE IS DECEMBER 31, 2016  
PAGES OR SHEETS COVERED BY THIS SEAL:  
SHOWN ON TABLE OF CONTENTS

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**2<sup>nd</sup> Supplement to Engineer's Report  
on Repair and Improvement to  
Main of Drainage District No. 143,  
Hardin County, Iowa**

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## **2<sup>nd</sup> Supplement to Engineer's Report on Repair and Improvement to Main of Drainage District No. 143, Hardin County, Iowa**

1.0 INTRODUCTION – The Hardin County Board of Supervisors, acting as District Trustees, requested Ryken Engineering to create a second supplement the original report concerning repair and improvement to the main of Drainage District No. 143. The purpose of this supplement is to add a hybrid alternative of upsizing the existing main tile through the golf course (i.e. that portion of Section 28 Township 87 North (T87N), Range 22 West (R22W), Hardin County, Iowa north of the abandoned railroad) and replacing the existing main tile downstream of this point with an open ditch or just upsizing the existing main tile through said golf course. For reference, this request occurred as a result of the comments received at the Drainage District No. 143 public hearing held on April 6, 2016.

2.0 IMPROVEMENT METHODS – To improve the plugged existing main tile issues through the golf course and possibly improve drainage downstream of County Highway S-27 as discussed in the original report, the following are additional options:

### Hybrid (Tile Upsizing and Open Ditch Installation)

- Replace the 3 broken pipe or pipe in disrepair upstream of the golf course.
- Remove and replace the existing main tile through the golf course and abandoned railroad with new main of a larger size. For reference, a chart with the required tile sizes and capacities is included in Appendix N.
- Remove and replace the existing main tile with an open ditch downstream of the abandoned railroad. For reference, a chart with the open ditch capacities is included in Appendix N.
- Typically, the replacement main tile and open ditch would be in the same location as the existing main tile in order to locate and reconnect private tile. For reference, the route is shown on the map included in Appendix M.

### Partial Tile Upsizing

- Replace the 3 broken pipe or pipe in disrepair upstream of the golf course.
- Replace the 6 broken pipe lengths ready to collapse downstream of the golf course.
- Remove all trees within 50 feet of either side (100 feet total) of the existing main tile.
- Remove the existing main tile through the entire length of the golf course.
- Install a new upsized main tile at the same location as the existing main tile. For reference, the route is shown on the map included in Appendix O.
- Reconnect the main relief tile and all private tile encountered to the new main tile.

With the above mentioned improvement methods, the following should be noted:

- The combined drainage coefficient of the existing main tile and the existing main relief tile at the west edge of the golf course is 0.3± inches per acre per day. Said improvements will not increase the drainage capacity upstream from this point.
- The drainage coefficient of the existing main tile at the south edge of the golf course is 0.3± inches per acre per day. The partial tile upsizing improvement method will not increase the drainage capacity downstream from this point.
- The upsized portion of the tile would allow for lower maintenance costs in the future as the entire main tile is new in the golf course.
- The partial tile upsizing improvement method includes repairs for those portions of the main tile that have been televised outside of the golf course. No repairs are proposed for those portions of the existing main tile that have not been televised.
- The upsized portion of the tile is based on a need of 55.5 cfs at the west side of the golf course, which is 2.3± to 2.6± inches per acre per day. This is similar to a design storm of 2.67 inches per day for a 1 year return period.
- The open ditch portion of the project would involve the taking of right of way. However, some of this right of way is currently grassed waterway.
- The open ditch portion of the project would provide far greater capacity (23.3± inches per acre per day) than the other improvement methods. This exceeds a design storm of 9.37 inches per day for a 500 year return period. This capacity would probably better match the current land usage and landowner expectations within the drainage district boundaries.
- With the above options, trees should not be allowed to be replanted in the future within 50 feet of either side (100 feet total) of the main.
- The pipe sizes shown in Appendix N are those that are currently manufactured that meet or exceed the ½" and 1" drainage coefficients.
- It is our understanding of Iowa Code that the removal of hedges, trees, and obstruction is a power given to the Drainage District Trustees through Iowa Code Chapter 468.138 and 468.139.
- Improvements have historically been viewed as having an impact on jurisdictional wetlands. As such, individual landowners should consult with applicable staff at the Hardin County NRCS office to determine the existence of said jurisdictional wetlands and what said impact may be on them.

Per Iowa Code Chapter 468.126, the above actions would be considered an improvement. As such, Subsection 4, paragraph c of Chapter 468.126 states "If the estimated cost of the improvement does not exceed fifty thousand dollars, the board may order the work done without conducting a hearing on the matter. Otherwise, the board shall set a date for a hearing on whether to construct the proposed improvement and whether there shall be a reclassification of benefits for the cost of the proposed improvement." The opinion of probable construction cost contained in the Opinion of Probable Construction Costs section of this report exceeds said \$50,000 limit. Therefore, a hearing will be required. Per Iowa Code Chapter 468.126.4.e, the right of remonstrance may apply to the proposed improvements.

3.0 OPINION OF PROBABLE CONSTRUCTION COSTS – Using the above method of improvement, an itemized list of project quantities and associated opinion of probable construction costs were compiled and are included in Appendices P and Q.

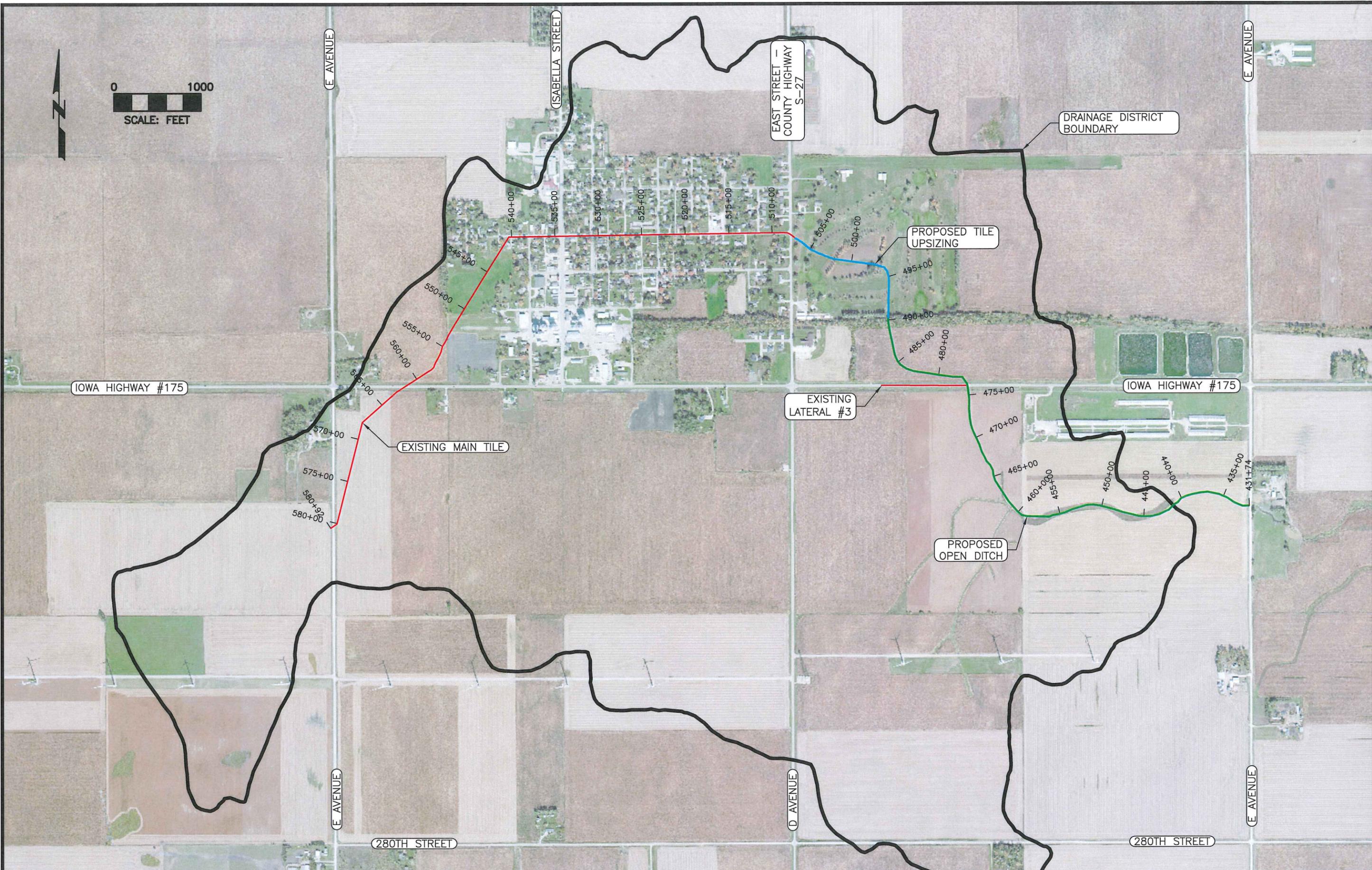
<u>METHOD</u>	<u>DRAINAGE</u> <u>COEFF.</u>	<u>TOTAL</u> <u>COST</u>	<u>ROAD</u> <u>CROSSING</u> <u>COST</u>
Hybrid (Tile Upsizing and Open Ditch)	½” or 1”	\$1,378,660.80	\$ 212,000
Partial Tile Upsizing	Existing	\$ 454,080.00	\$ 0

It should be noted that said costs include materials, labor, and equipment supplied by the contractor to complete the necessary improvement and includes applicable engineering, construction observation, and project administration fees by Ryken Engineering. It also includes right of way acquisition for the hybrid option (assumed to require 17 acres at \$12,000 per acre). However, said costs do not include any interest, legal fees, county administrative fees, crop damages, other damages, previous repairs, engineering fees to date, or reclassification fees (if applicable). As always, all costs shown are opinions of Ryken Engineering based on previous lettings on other projects. Said costs are just a guideline and are not a guarantee of actual costs.

4.0 RECOMMENDATIONS – There is a definite need to perform one of the above improvements or one of the repairs or improvements mentioned in the original report or supplemental report. Therefore, it is recommended that the Hardin County Board of Supervisors, acting as District Trustees, should take the actions stated in the original report.



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SCALE: FEET



DRAWN BY: ZJS	APPROVED BY: LOG	REVISIONS:
DATE: 10-08-2015	PROJ. NO.: 6771	
FIELD BK:		

**RYKEN**  
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PROJECT:  
DRAINAGE DISTRICT #143  
HARDIN COUNTY, IOWA  
2016

SHT. NAME:  
HYBRID INSTALLATION  
MAP



**Engineer's Opinion of Main Capacities**

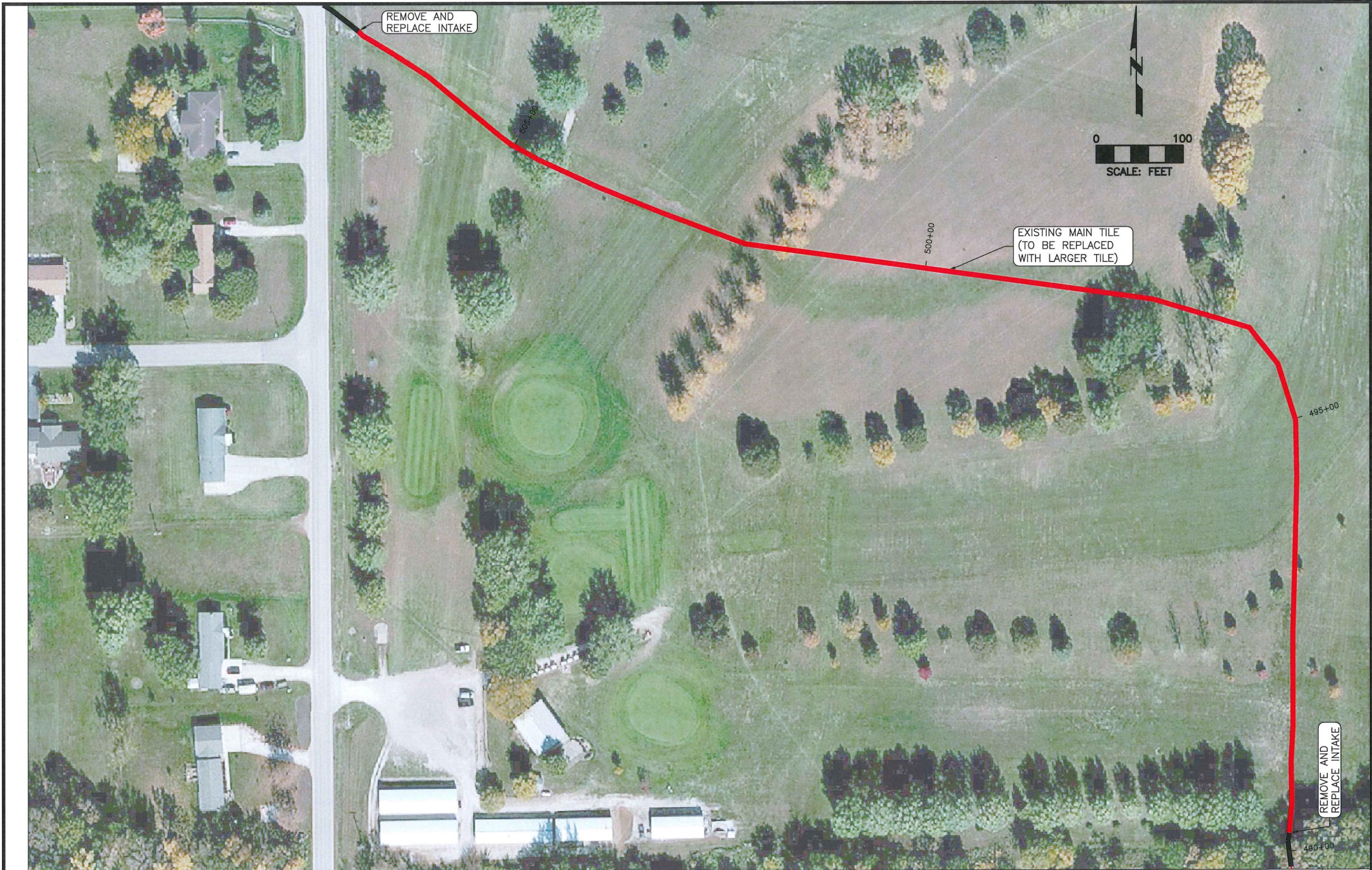
**Project: Main Improvements for D.D. #143**

Location: Sections 28, 29, and 33, T87N, R22W, Hardin County, Iowa

By: L.O.G.  
 Date: 4/15/2016  
 Checked By: L.O.G.  
 Date: 4/18/2016

**HYBRID - UPSIZING AND OPEN DITCH**

STA	DESCRIPTION	INSTALLED		IMPROVEMENT (HYBRID)			
		INSTALLED TILE SIZE (in)	INSTALLED TILE CAPACITY (in*acres/day)	1/2" DRAINAGE COEF.	IMPROVED MAIN CAPACITY (in*acres/day)	UPSIZING TILE SIZE (in)	IMPROVED TILE CAPACITY (in*acres/day)
	<b>Main</b>						
431+74	Main Tile Outlet on west side of E Avenue	30	0.35				
437+25	Pipe size change 30" - 28"	28	0.29	Open	8.57	Open	8.57
441+50	Boundary of Drainage District #143	28	0.29	Open	8.67	Open	8.67
455+00	Pipe size change 28" - 26"	26	0.25	Open	8.77	Open	8.77
464+00	Pipe size change 26" - 24"	24	0.23	Open	9.20	Open	9.20
476+36	Connection with Lateral 3	24	0.26	Open	10.55	Open	10.55
476+37	Upstream of Connection with Lateral 3 - pipe size change 24" - 22"	22	0.26	Open	19.10	Open	19.10
489+50	Start of Open Ditch - South Right of Way line former Railroad	22	0.26	Open	20.43	Open	20.43
489+51	End of Upsized Tile - South Right of Way line former Railroad	22	0.26	Open	20.43	Open	20.43
491+00	Pipe size change 22" - 20"	20	0.28	42	1.87	42	2.00
503+00	Boundary of original Drainage District #2	18 or 20	0.34	42	1.87	42	2.00
508+00	Connection with Main on east side of Co Hwy S-27	18 and 18	0.34	42	2.15	42	2.29



DRAWN BY: ZJS	APPROVED BY: LOG	REVISIONS:
DATE: 10-07-2015	PROJ. NO.: 6771	
FIELD BK:		
P:\6771\CADD\CONCEPTS\6771 - SUPPLEMENTAL CONCEPT-2.DWG; 4/18/2016		

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PROJECT:  
 DRAINAGE DISTRICT #143  
 HARDIN COUNTY, IOWA  
 2016

SHT. NAME:  
 PARTIAL UPSIZING INSTALLATION  
 MAP

SHT. NO.:  
 1 OF 1



ENGINEERING & LAND SURVEYING, INC.

By: L.O.G.  
 Date: 4/15/2016  
 Checked By: L.O.G.  
 Date: 4/19/2016

**Engineer's Opinion of Probable Construction Cost**

**Project: Main Improvements for D.D. #143**

Location: Sections 28, 29, and 33, T87N, R22W, Hardin County, Iowa

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity		Total Cost
<b>CONSTRUCTION COSTS</b>						
1100	42" DUAL WALL HDPE TILE	\$ 100.00	LF	1850	LF	\$ 185,000.00
1101	HICKENBOTTOM INTAKE	\$ 1,500.00	EA	2	EA	\$ 3,000.00
1102	SEEDING (GOLF COURSE)	\$ 10,000.00	LS	1	LS	\$ 10,000.00
1103	PRIVATE TILE CONNECTIONS	\$ 500.00	EA	10	EA	\$ 5,000.00
1104	STRUCTURE REMOVAL	\$ 500.00	EA	3	EA	\$ 1,500.00
1105	INTAKE/MANHOLE	\$ 7,000.00	EA	1	EA	\$ 7,000.00
1106	48" CMP OUTLET	\$ 100.00	LF	40	LF	\$ 4,000.00
1107	OPEN DITCH CONSTRUCTION	\$ 2,500.00	STA	57.8	STA	\$ 144,500.00
1108	CMP OUTLET	\$ 55.00	LF	40	LF	\$ 2,200.00
1109	HEADWALL	\$ 10,000.00	EA	2	EA	\$ 20,000.00
1110	RIP-RAP	\$ 40.00	TN	120	TN	\$ 4,800.00
1111	CONCRETE COLLAR	\$ 500.00	EA	2	EA	\$ 1,000.00
1112	RCP CULVERT (IDOT CROSSING)	\$ 200,000.00	LS	1	LS	\$ 200,000.00
1113	SURFACE DRAINS	\$ 2,000.00	EA	35	EA	\$ 70,000.00
1114	PRIVATE TILE OUTLETS	\$ 2,000.00	EA	30	EA	\$ 60,000.00
1115	SEEDING (OPEN DITCH)	\$ 500.00	STA	57.8	STA	\$ 28,900.00
1116	SEEDING (IDOT RIGHT OF WAY)	\$ 2,000.00	LS	1	LS	\$ 2,000.00
1117	TRAFFIC CONTROL	\$ 10,000.00	LS	1	LS	\$ 10,000.00
1118	TREE REMOVAL	\$ 400.00	EA	40	EA	\$ 16,000.00
1119	SPOT REPAIR	\$ 1,500.00	EA	3	EA	\$ 4,500.00
1120	REMOVE EXISTING TILE	\$ 8.00	LF	7630	LF	\$ 61,040.00
1121	RIGHT OF WAY	\$ 12,000.00	AC	17	AC	\$ 204,000.00
<b>CONSTRUCTION SUBTOTAL</b>						\$ 1,044,440.00
Contingency (10%)						\$ 104,444.00
<b>CONSTRUCTION TOTAL</b>						<b>\$ 1,148,884.00</b>
Engr. & Const. Observation (20%)						\$ 229,776.80
<b>TOTAL COST</b>						<b>\$ 1,378,660.80</b>

HYBRID - UPSIZING AND OPEN DITCH

Note: Per Iowa Code, road crossings (highlighted orange) are not typically district expense



ENGINEERING & LAND SURVEYING, INC.

By: L.O.G.

Date: 4/19/2016

Checked By: L.O.G.

Date: 4/19/2016

**Engineer's Opinion of Probable Construction Cost**

**Project: Main Improvements for D.D. #143**

Location: SE¼ Section 29 and SW¼ Section 28, T87N, R22W, Hardin County, Iowa

PARTIAL UPSIZING	ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost
		<b>CONSTRUCTION COSTS</b>					
	1100	42" REINFORCED CONCRETE TILE	\$ 150.00	LF	1800	LF	\$ 270,000.00
	1101	HICKENBOTTOM INTAKE	\$ 1,500.00	EA	2	EA	\$ 3,000.00
	1102	MAIN RELIEF TILE JUNCTION MANHOLE	\$ 10,000.00	EA	1	EA	\$ 10,000.00
	1103	SEEDING (GOLF COURSE)	\$ 10,000.00	LS	1	LS	\$ 10,000.00
	1104	PRIVATE TILE CONNECTIONS	\$ 500.00	EA	10	EA	\$ 5,000.00
	1105	STRUCTURE REMOVAL	\$ 500.00	EA	3	EA	\$ 1,500.00
	1106	CONCRETE COLLAR	\$ 500.00	EA	2	EA	\$ 1,000.00
	1107	TREE REMOVAL	\$ 400.00	EA	30	EA	\$ 12,000.00
1108	SPOT REPAIR	\$ 1,500.00	EA	9	EA	\$ 13,500.00	
1109	REMOVE EXISTING TILE	\$ 10.00	LF	1800	LF	\$ 18,000.00	
	<b>CONSTRUCTION SUBTOTAL</b>						\$ 344,000.00
	Contingency (10%)						\$ 34,400.00
	<b>CONSTRUCTION TOTAL</b>						\$ 378,400.00
	Engr. & Const. Observation (20%)						\$ 75,680.00
	<b>TOTAL COST</b>						\$ 454,080.00