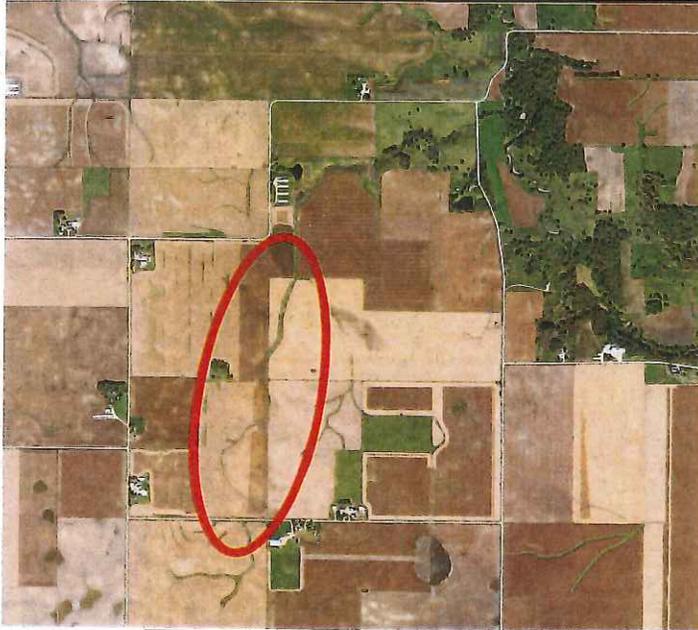


**HARDIN COUNTY, IOWA**

**2016**



**SUPPLEMENT TO  
ENGINEER'S  
REPORT ON REPAIR OR  
IMPROVEMENTS TO  
LATERAL 7 TILE,  
DRAINAGE DISTRICT 102  
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. GALLETINE, 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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Licensed and Insured for over 50 years

Ryken@RykenEng.com  
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# Supplement to Engineer's Report on Repair or Improvements to Lateral 7 Tile, Drainage District 102, Hardin County, Iowa

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# Supplement to Engineer's Report on Repair or Improvements to Lateral 7 Tile, Drainage District 102, Hardin County, Iowa

1.0 **INTRODUCTION** – The Hardin County Board of Supervisors, acting as District Trustees, requested Ryken Engineering to supplement the original report concerning repair and improvement to the Lateral 7 tile of Drainage District No. 102. The purpose of this supplement is to add a hybrid alternative of replacing the lower end of the existing Lateral 7 tile with an open ditch and replacing the upper end of said existing Lateral 7 tile with a larger tile. For reference, this request occurred at the public hearing held on August 10, 2016.

2.0 **IMPROVEMENT METHOD** – To improve drainage for the Lateral 7 tile as discussed in the original report, the following is an additional option:

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

- Remove and replace the existing Lateral 7 tile with an open ditch (bottom width of 5 feet, side slopes of 2 to 1 or flatter, and depths from 13 feet to 4 feet) on the lower end of Lateral 7 (1,750 feet for ½" coefficient and 4,300 feet for 1" coefficient). For reference, a chart with the open ditch capacities is included in Appendix Y.
- Remove and replace the existing Lateral 7 tile with new Lateral 7 tile of a larger size on the upper end of Lateral 7 (i.e. upstream of the open ditch). For reference, a chart with the required tile sizes and capacities is included in Appendix Y.
- Typically, the upsized Lateral 7 tile and open ditch would be in the same location as the existing Lateral 7 tile in order to locate private and lateral tiles. For reference, the route and limits for each coefficient are shown on the maps included in Appendix X.
- Disconnect all private and lateral tile encountered from the existing Lateral 7 tile.
- Reconnect all private and lateral tile to the new Lateral 7 tile or extend them to discharge into the open ditch.

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

- The proposed and existing capacities shown in Appendix Y are based on the assumptions that the 1917 Lateral 7 tile is both installed per its respective design and that it is functioning at full capacity (i.e. not collapsed, broken, etc).
- The open ditch installation method would involve the taking of right of way. However, some of this right of way may currently be grassed waterway.
- The pipe sizes shown in Appendix Y are those that are currently manufactured that meet or exceed the ½" and 1" drainage coefficients.
- 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

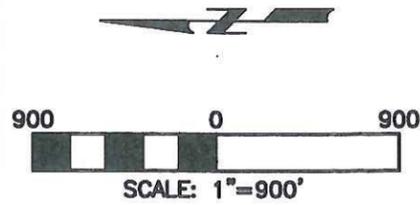
for the cost of the proposed improvement." The opinion of probable construction cost contained in the Opinion of Probable Construction Cost section of this report exceeds said \$50,000 limit. Therefore, a hearing or continuation of the August 10, 2016 hearing will be required. Per Iowa Code Chapter 468.126.4.e, the right of remonstrance may apply to the proposed improvement.

- 3.0 **OPINION OF PROBABLE CONSTRUCTION COST** – Using the above method of improvement, an itemized list of project quantities and associated opinion of probable construction cost was compiled and is included in Appendix Z of this report. A summary of said costs are as follows:

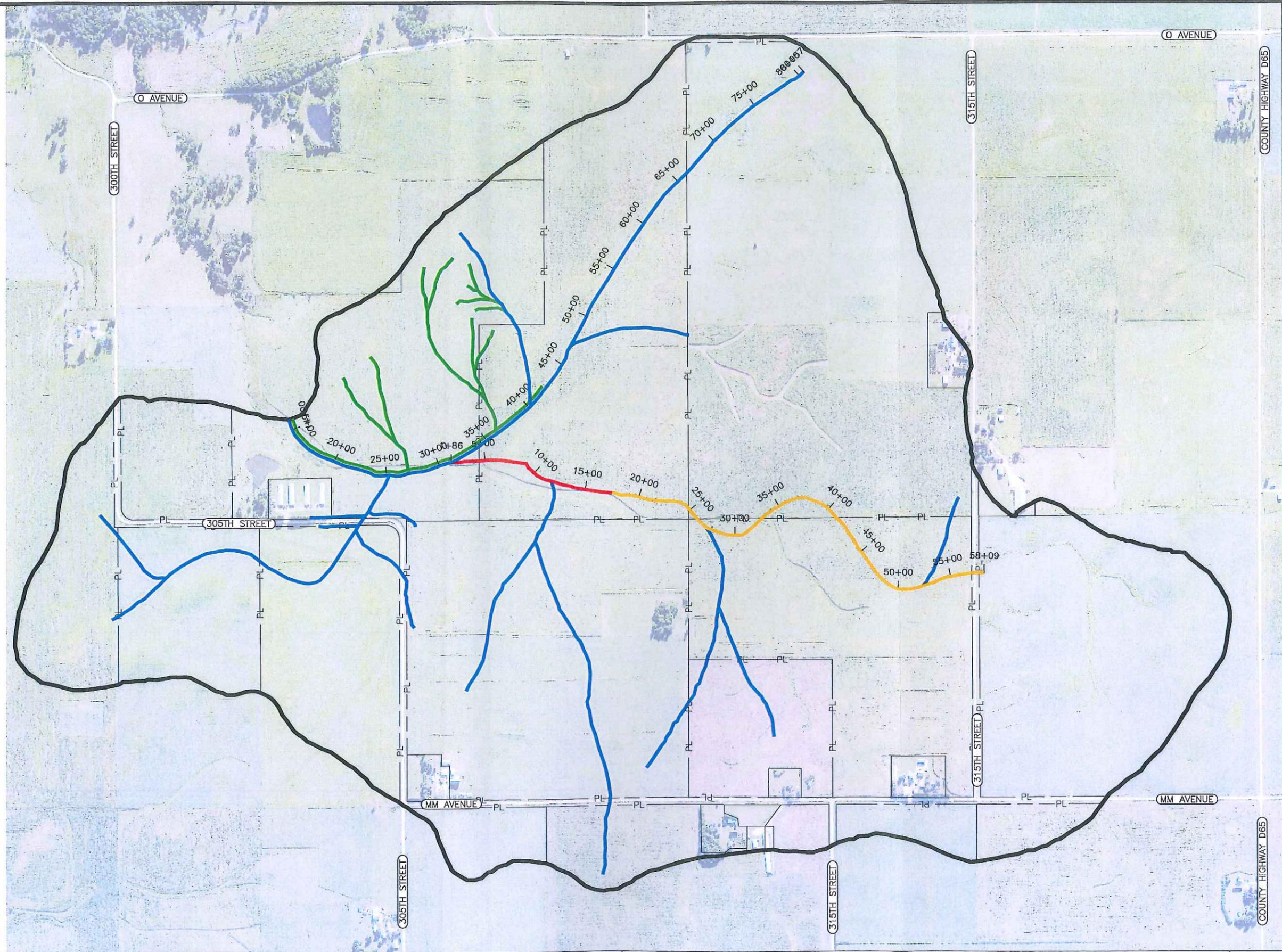
<u>METHOD</u>	<u>DRAINAGE COEFF.</u>	<u>TOTAL COST</u>	<u>ROAD CROSSING COST</u>
Hybrid (Improvement)	½"	\$ 560,274	\$ 3,250
	1"	\$ 662,178	\$ 3,500

It should be noted that said costs include materials, labor, and equipment supplied by the contractor to complete the necessary repair or improvement and includes applicable engineering, construction observation, and project administration fees by Ryken Engineering. It also includes right of way acquisition for the open ditch option only (assumed to require 4 acres at \$12,000 per acre for ½" coefficient and 10 acres at \$12,000 per acre for 1" coefficient). 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 either the above improvement or one of the repairs or improvements mentioned in the original 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.



- EXISTING PRIVATE TILE
- EXISTING MAIN OR LATERAL TILE
- EXISTING LATERAL 7 TILE TO BE CHANGED TO OPEN DITCH
- EXISTING LATERAL 7 TILE TO BE UPSIZED



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 DATE: 8/22/2016 PROJ. NO.: 6762.1  
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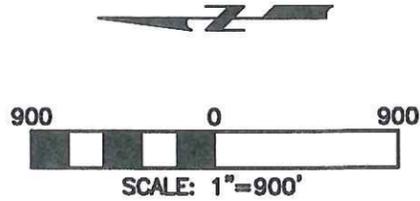
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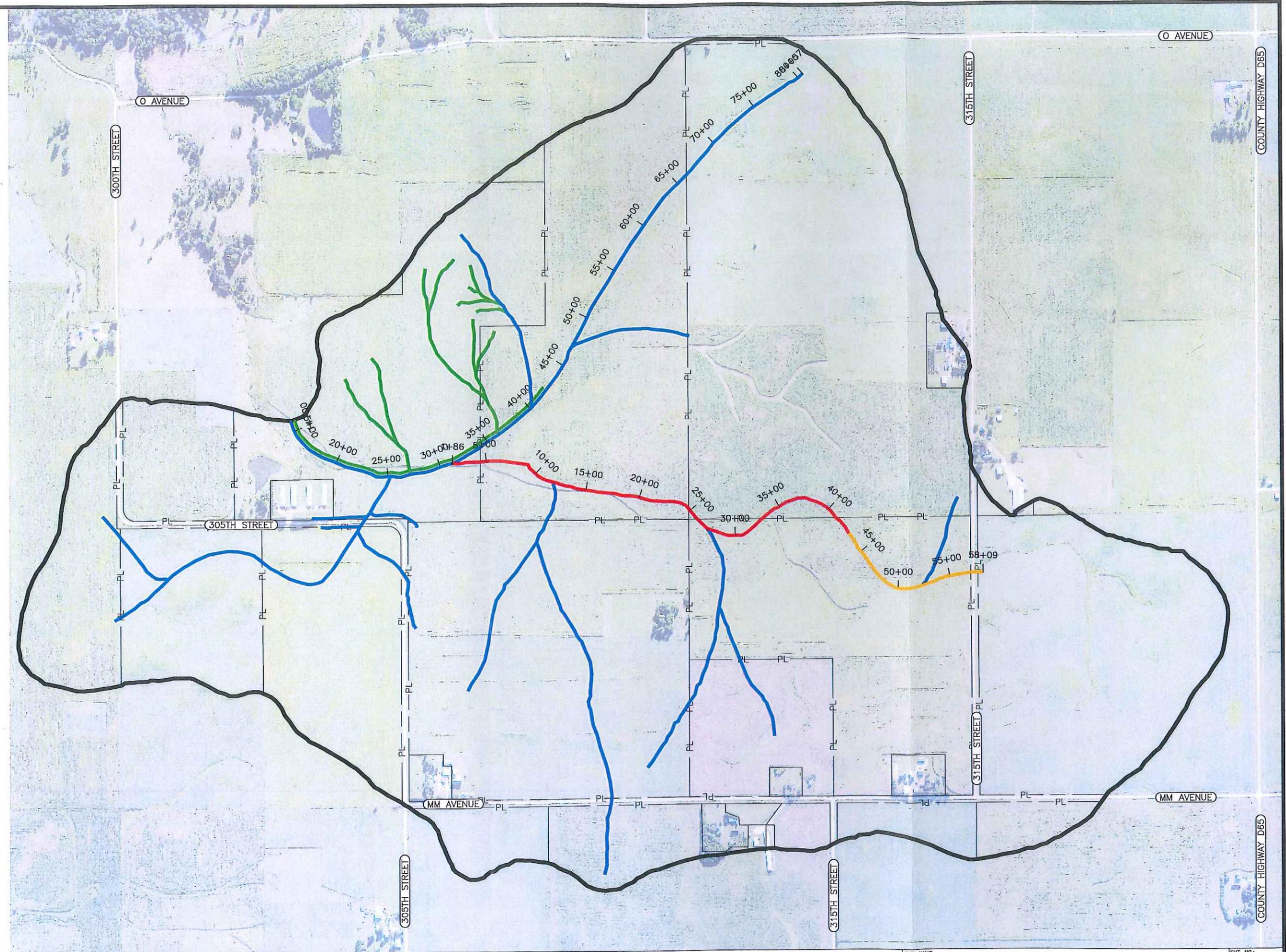
PROJECT:  
 DRAINAGE DISTRICT #102  
 HARDIN COUNTY, IOWA  
 2016

SHT. NAME:  
 LOCATION MAP OF HYBRID IMPROVEMENT  
 (1/2" COEFFICIENT)

SHT. NO.:  
 1 OF 1



- EXISTING PRIVATE TILE
- EXISTING MAIN OR LATERAL TILE
- EXISTING LATERAL 7 TILE TO BE CHANGED TO OPEN DITCH
- EXISTING LATERAL 7 TILE TO BE UPSIZED



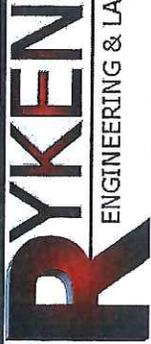
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DRAINAGE DISTRICT #102  
HARDIN COUNTY, IOWA  
2016

SHT. NAME:  
LOCATION MAP OF HYBRID IMPROVEMENT  
(1" COEFFICIENT)



**Engineer's Opinion of Lateral 7 Capacities**

**Project: Lateral 7 Tile Improvements for D.D. #102**

Location: Sections 18 and 19, T86N, R20W, Hardin County, Iowa  
 Sections 24, T86N, R21W, Hardin County, Iowa

By: L.O.G.

Date: 8/19/2016

Checked By: L.O.G.

Date: 8/22/2016

**TILE REPLACEMENT HYBRID (OPEN DITCH AND TILE UPSIZING) - IMPROVEMENT**

STA	DESCRIPTION	INSTALLED		IMPROVEMENT HYBRID			
		ORIGINAL INSTALLED TILE SIZE (in)	ORIGINAL INSTALLED TILE CAPACITY (in <sup>2</sup> *acres/day)	1/2" DRAINAGE COEF.	IMPROVED TILE CAPACITY (in <sup>2</sup> *acres/day)	UPSIZING TILE SIZE (in)	IMPROVED TILE CAPACITY (in <sup>2</sup> *acres/day)
0+00	Lateral 7 Lateral 7 Tile Connection with Main Tile	18	0.33	Open	13.6	Open	13.7
10+00	Tile size change 18" - 16" Grade change 0.50% - 1.40%	16	0.60	Open	12.4	Open	13.9
11+80	Connection with Lateral 8	16	0.60	Open	12.5	Open	19.7
11+81	Upstream of Connection with Lateral 8	16	0.73	Open	15.1	Open	24.0
17+50	Grade Change 1.40% - 0.60%	16	0.33	18	0.50	Open	19.2
25+00	Pipe size change 16" - 14" Grade change 0.60% - 0.90%	14	0.31	18	0.51	Open	20.2
30+00	Grade change 0.90% - 0.80%	14	0.30	15	0.50	Open	20.9
37+64	Connection with Private Lateral made District Tile	14	0.32	15	0.50	Open	20.1
37+65	Upstream of Connection with Private Lateral made District Tile	14	0.38	15	0.51	Open	24.0
43+00	Grade change 0.80% - 0.30%	14	0.34	15	0.53	18	1.03
55+00	Connection with Lateral 10 Pipe size change 14" - 10" Grade Change 0.30% - 0.80%	10	0.31	12	0.51	15	1.04
55+01	Upstream of Connection with Lateral 10	10	0.35	12	0.50	15	1.04
58+00	Pipe size change 10" - 8" Grade Change 0.80% - 1.70%	8	0.29	12	0.50	15	1.05
60+00	End Lateral 7 Tile						



ENGINEERING & LAND SURVEYING, INC.

By: L.O.G.  
 Date: 8/19/2016  
 Checked By: L.O.G.  
 Date: 8/22/2016

**Engineer's Opinion of Probable Construction Cost**  
**Project: Lateral 7 Tile Improvements for D.D. #102**  
 Location: Sections 18 and 19, T86N, R20W, Hardin County, Iowa  
 Section 24, T86N, R21W, Hardin County, Iowa

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost
<b>CONSTRUCTION COSTS</b>						
601	OPEN DITCH CONSTRUCTION					
602	18" DUAL WALL TILE	\$ 2,500.00	STA	17.5	STA	\$ 43,750.00
603	15" DUAL WALL TILE	\$ 50.00	LF	1250	LF	\$ 62,500.00
604	12" DUAL WALL TILE	\$ 45.00	LF	2500	LF	\$ 112,500.00
605	12" DUAL WALL TILE (ROAD CROSSING)	\$ 40.00	LF	450	LF	\$ 18,000.00
606	18" X 15" DUAL WALL REDUCER	\$ 65.00	LF	50	LF	\$ 3,250.00
607	15" X 12" DUAL WALL REDUCER	\$ 500.00	EA	1	EA	\$ 500.00
608	CMP OUTLET (LATERAL 8)	\$ 500.00	EA	1	EA	\$ 500.00
609	15" X 15" X 10" DUAL WALL WYE (PRIVATE LATERAL MADE DISTRICT TILE)	\$ 55.00	LF	40	LF	\$ 2,200.00
610	15" X 15" X 8" DUAL WALL WYE (LATERAL 10 CONNECTION)	\$ 1,000.00	EA	1	EA	\$ 1,000.00
611	HEADWALL	\$ 1,000.00	EA	1	EA	\$ 1,000.00
612	RIP-RAP	\$ 10,000.00	EA	1	EA	\$ 10,000.00
613	HICKENBOTTOM INTAKE	\$ 40.00	TN	100	TN	\$ 4,000.00
614	CONCRETE COLLAR	\$ 1,500.00	EA	3	EA	\$ 4,500.00
615	REMOVE EXISTING TILE	\$ 400.00	EA	5	EA	\$ 2,000.00
616	PRIVATE TILE CONNECTIONS	\$ 10.00	LF	6000	LF	\$ 60,000.00
617	SURFACE DRAINS	\$ 500.00	EA	21	EA	\$ 10,500.00
618	PRIVATE TILE OUTLETS	\$ 2,000.00	EA	9	EA	\$ 18,000.00
619	SEEDING (OPEN DITCH)	\$ 1,500.00	EA	9	EA	\$ 13,500.00
620	RIGHT OF WAY	\$ 500.00	STA	17.5	STA	\$ 8,750.00
		\$ 12,000.00	AC	4	AC	\$ 48,000.00
<b>CONSTRUCTION SUBTOTAL</b>						\$ 424,450.00
Contingency (10%)						\$ 42,445.00
<b>CONSTRUCTION TOTAL</b>						\$ 466,895.00
Engr. & Const. Observation (20%)						\$ 93,379.00
<b>TOTAL COST</b>						\$ 560,274.00
<b>CONSTRUCTION COSTS</b>						
701	OPEN DITCH CONSTRUCTION					
702	18" DUAL WALL TILE	\$ 2,500.00	STA	43	STA	\$ 107,500.00
703	15" DUAL WALL TILE	\$ 50.00	LF	1200	LF	\$ 60,000.00
704	15" DUAL WALL TILE (ROAD CROSSING)	\$ 45.00	LF	450	LF	\$ 20,250.00
705	15" DUAL WALL TILE (ROAD CROSSING)	\$ 70.00	LF	50	LF	\$ 3,500.00
706	CMP OUTLET (LATERAL 8)	\$ 55.00	LF	40	LF	\$ 2,200.00
707	CMP OUTLET (PRIVATE LATERAL CONNECTION MADE DISTRICT TILE)	\$ 55.00	LF	40	LF	\$ 2,200.00
708	18" X 18" X 8" DUAL WALL WYE (LATERAL 10 CONNECTION)	\$ 1,000.00	EA	1	EA	\$ 1,000.00
709	HEADWALL	\$ 10,000.00	EA	1	EA	\$ 10,000.00
710	RIP-RAP	\$ 40.00	TN	150	TN	\$ 6,000.00
711	HICKENBOTTOM INTAKE	\$ 1,500.00	EA	3	EA	\$ 4,500.00
712	CONCRETE COLLAR	\$ 400.00	EA	5	EA	\$ 2,000.00
713	REMOVE EXISTING TILE	\$ 10.00	LF	6000	LF	\$ 60,000.00
714	PRIVATE TILE CONNECTIONS	\$ 500.00	EA	8	EA	\$ 4,000.00
715	PRIVATE TILE OUTLETS	\$ 2,000.00	EA	22	EA	\$ 44,000.00
716	SEEDING (OPEN DITCH)	\$ 1,500.00	EA	22	EA	\$ 33,000.00
717	RIGHT OF WAY	\$ 500.00	STA	43	STA	\$ 21,500.00
		\$ 12,000.00	AC	10	AC	\$ 120,000.00
<b>CONSTRUCTION SUBTOTAL</b>						\$ 501,650.00
Contingency (10%)						\$ 50,165.00
<b>CONSTRUCTION TOTAL</b>						\$ 551,815.00
Engr. & Const. Observation (20%)						\$ 110,363.00
<b>TOTAL COST</b>						\$ 662,178.00

TILE REPLACEMENT HYBRID (OPEN DITCH AND TILE UPSIZING) - IMPROVEMENT (1/2" COEFFICIENT)

TILE REPLACEMENT HYBRID (OPEN DITCH AND TILE UPSIZING) - IMPROVEMENT (1" COEFFICIENT)

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