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PRELIMINARY ENGINEERING REPORT

**DRAINAGE DISTRICT NO. 23,
LATERAL NO. 11
TILE IMPROVEMENTS
PALO ALTO COUNTY, IOWA**
JWA PROJECT NO: E18117

OWNER: Palo Alto County Board of Supervisors

Roger Faulstick
Ron Graettinger
Craig Merrill
Linus Solberg
Keith Wirtz

Carmen Moser, Auditor



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.

Richard A. Hopper Date 7/19/19

Richard A. Hopper, P.E., License number 8106

My license renewal date is December 31, 2019

Pages or sheets covered by this seal: Title, PSI & Location map

I. INTRODUCTION/HISTORY

A petition for establishment of Drainage District No. 23 in Palo Alto County was filed September 6, 1905 with the Board of Supervisors. On January 8, 1907, the board appointed Engineer Guy Campbell to investigate. His engineer's report was filed May 2, 1907, and recommended constructing a main ditch, with laterals 1-20 and lateral "A" and "B" at an estimated cost of \$32,000.00. The board accepted the report and set a hearing date. On October 22, 1907, the Board of Supervisors approved establishment of Drainage District No. 23, except that part of the main drain from the east and west quarter line of Section 26 to its source; and except that part of lateral No. 17, from the center of the northwest quarter of Section 26 to its source; and except laterals "A" and "B". On March 4, 1908, the board entered into a contract for construction of Drainage District No 23 open drain, Section 1 of the main line. On March 27, 1908, the board entered into a contract with a different contractor to construct the open drain in Sections 2-22 being all, except section one, which was to consist of construction of all but open work.

There was approximately 7140 acres in Drainage District No. 23. The main, as originally constructed consisted of 16,700 feet of open ditch, together with 11,000 feet of tile. The district also included multiple stretches of Lateral tile lines. The tile lines varied in size from 6 inch to 18 inch.

On August 19, 1909, Guy Campbell submitted his recommendation for acceptance of the open work on the main drain. On November 16, 1910, the engineer stated Drainage District No. 23 was complete and recommended acceptance. The original contract price was \$23,524.00 for the tile. The board accepted his recommendation. On December 20, 1910, the county levied an additional \$5,898.50 because the first levy of \$27,000.00 did not cover all costs incurred by the district.

On November 1, 1916, a petition was filed to have the main ditch cleaned out. On January 13, 1917, the contract was entered for the contractor to cleanout approximately 10,000 cubic yards at a price of \$0.30 per cubic yard.

On August 1, 1927, an engineering report was submitted to construct a relief tile system within Drainage District No. 23 that would outlet the Lateral No. 9 tile, which drained into Lateral 8 previously. The proposed tile was deemed Drainage District No. 153 and outlet Lateral 9 directly into the Main Open Ditch. The drain was accepted and constructed in the following year.

There was another petition filed for cleanout of the open ditch of Drainage District No. 23. On April 24, 1943, the submitted engineer's report recommended cleanout of the open ditch between Station 30 and the upper end of the ditch, a distance of about 14,000 feet. On September 15, 1943, the Board of Supervisors entered into a contract for said cleanout between STA 60 and STA 167+50 to excavate approximately 10,000 cubic yards at a price of \$1,600.00 and do some clearing and grubbing for approximately \$50.00.

On July 21, 1950, a petition was submitted to re-lay the 22 inch tile that outlets into the main open ditch just south of the center of the southeast quarter of Section 35-96-34 and extending north. The preliminary engineering investigation using profiles in the county auditor's office found the capacities of the drains very undersized with the present practice of drainage design. The board recommended a more thorough survey of the lands in Drainage District No. 23 be made and an Engineer's Report showing profiles of existing conditions together with a plan for relieving the system be submitted. It does not appear anything further was done for this.

An Engineer's Report for a proposed cleanout of Drainage District No. 23 dated October 23, 1962, recommended cleanout beginning at the east and west one-quarter line through Section 14, STA 11+12 and continuing to STA 168+19. Excavation was estimated at 19,181 cubic yards based on a four foot wide ditch bottom with 2:1 sideslopes. He also recommended not doing anything with the cleanout until the main tile outlet was fixed. On March 20, 1963, the board accepted the engineer's report, but delayed plans to a later date. On June 17, 1963, bids for work on the concrete bulkhead at the outlet of Drainage District No. 23 were received and awarded to Anderson Construction Co. in the amount of \$3,044.80.

I. INTRODUCTION/HISTORY (cont.)

On December 16, 1964, another petition for cleanout of the main open ditch was filed. The Supervisors accepted the petition April 1, 1965, and set an informal hearing date of April 15, 1965, to discuss repairs. They instructed Otto Engineering to re-survey the outlet and file an amended report. On June 3, 1965, after discussing the revised report, the board decided to send out a ballot to the landowners to determine their wishes. They could choose to: 1. Extend the outlet 2. Clean out ditch without extending the outlet 3. Reclassify lands 4. Do nothing.

On June 15, 1966, the Board of Supervisors opened bids for the cleanout and awarded the contract to Wayne Harriot at a bid of \$17,177.91. On February 1, 1967, the engineer presented the final report on the completion of the contract. The Board approved the report.

A petition was filed May 4, 1999, for improvements to the tile lines and open ditch located in Sections 23, 26,35 in Highland Township and Sections 2, 11, 14 in Silver Lake Township. On August 10, 1999, the board rejected the petition because of uncertainty of wetland determinations in the area and an appeal of wetland determinations by the petitioner.

On November 8, 2011, the board approved the NRCS waterway plan located in the southwest quarter of Section 26, Highland Township.

On December 9, 2014, Bolten & Menk presented a list of FEMA repairs for small projects on several drainage districts in Palo Alto County. On January 3, 2017, the bid specifications for repairs on three of the drainage districts, including Drainage District No. 23, were filed. On January 24, 2017, the bids were opened and the contract was awarded to King Excavation in the amount of \$44,414.78.

Recently on February 7, 2017, a petition for repair and to investigate improvement to the Drainage District No. 23 main tile in Sections 26 and 35 of Highland Township was filed and Rick Hopper, Jacobson-Westergard, was appointed as engineer. The Preliminary Engineering Report was filed on June 27, 2017, proposing improvements to the main tile system which was extremely undersized and damaged. On September 19, 2017 the Board of Supervisors accepted the proposed improvements the bid letting was held on January 30, 2018. On February 6, 2018 the contract was awarded to B & B Farm Drainage from Wallingford, IA. Construction of the proposed main tile started in the summer of 2018 and is continuing to date.

On September 18, 2018 a petition was filed for investigation of Lateral 8 and Lateral 11 drain tiles and Rick Hopper, Jacobson-Westergard, was appointed as engineer. The following report summarizes the existing system and proposes a system necessary to meet current and future drainage needs for Lateral 11 Tile.

II. STARTING POINT, ROUTE AND TERMINUS

The Lateral 11 tile outlets into Lateral 8 tile at approximately 200 feet south of the east quarter corner of Section 10 of Silver Lake Township. It runs west-southwest approximately 1000 feet before traveling southwest for 300 feet. The tile then continues west-southwest through Section 10-95-34 for 1500 feet until it reaches its inlet end, approximately 1100 feet south of the center of Section 10-95-34.

III. EXISTING IMPROVEMENTS

The existing Lateral 11 tile system consists of tile that is all 6" from inlet to outlet. The system is extremely undersized and has not been improved since it was installed over 100 years ago. The system has a drainage coefficient of 1/8-inch or less, with an average drainage coefficient of 1/12-inch.

IV. PROPOSED IMPROVEMENTS

The proposed improvements include two options.

The first option would be a new parallel tile that extends the entire length of the existing Lateral 11 Tile. The pipe for this option would be sized for a ½-inch drainage coefficient. A cost estimate for this option can be seen following in this report.

The second option would be a new parallel tile that extends the entire length of the existing Lateral 11 Tile. The pipe for this option would be sized for a 1-inch drainage coefficient. A cost estimate for this option can be seen following in this report.

V. RIGHT OF WAY

Since the lateral tile improvements will be offset from the existing tile, additional right-of-way will be required. This will be permanent right-of-way. The permanent right-of-way will be a 30-foot wide easement where most excavation will occur. There may also be crop damage to pay for, but the extent is unknown at this time.

VI. COST ESTIMATES

The first estimate is for a ½" drainage coefficient that improves the entire length of Lateral 11 Tile.

OPTION NO. 1 – 1/2" DRAINAGE COEFFICIENT

ITEM NO.	ITEM DESCRIPTION	QUANTITY & UNIT	UNIT PRICE	TOTAL PRICE
1.	12" RCP, 1500D	2800 L.F.	\$ 25.00	\$ 70,000.00
2.	Tee – 12" x 12" x 12"	2 Each	\$ 800.00	\$ 1,600.00
3.	Tile Connections	6 Each	\$ 350.00	\$ 2,100.00
5.	Exploratory Excavation	4 Hours	\$ 250.00	\$ 1,000.00
6.	Trench Stabilization	30 Ton	\$ 30.00	\$ 900.00
7.	Area Drain	2 Each	\$ 750.00	\$ 1,500.00
ESTIMATED CONSTRUCTION COST				\$ 77,100.00
CONTINGENCIES				\$ 7,710.00
ENGINEERING, LEGAL, PUBLICATION				\$ 12,000.00
CLASSIFICATION				\$ 500.00
PERMANENT EASEMENT (1.93 Acres @ \$2125)				\$ 4,100.00
INTEREST				\$ 3,500.00
ESTIMATED TOTAL DISTRICT COST				<u>\$ 104,910.00</u>

AVERAGE COST PER ACRE: \$582.83/acre (Based on 180 Acres)
(\$46.77/acre/year for 20 years)
(\$75.48/acre/year for 10 years)

The second estimate is for a 1" drainage coefficient that improves the entire length of Lateral 11 Tile.

OPTION NO. 1 – 1" DRAINAGE COEFFICIENT

ITEM NO.	ITEM DESCRIPTION	QUANTITY & UNIT	UNIT PRICE	TOTAL PRICE
1.	18" RCP, 1500D	2800 L.F.	\$ 30.00	\$ 84,000.00
2.	Tee – 18" x 18" x 12"	2 Each	\$ 850.00	\$ 1,700.00
3.	Tile Connections	6 Each	\$ 350.00	\$ 2,100.00
5.	Exploratory Excavation	4 Hours	\$ 250.00	\$ 1,000.00
6.	Trench Stabilization	30 Ton	\$ 30.00	\$ 900.00
7.	Area Drain	2 Each	\$ 750.00	\$ 1,500.00
ESTIMATED CONSTRUCTION COST				\$ 91,200.00
CONTINGENCIES				\$ 9,120.00
ENGINEERING, LEGAL, PUBLICATION				\$ 15,000.00
CLASSIFICATION				\$ 500.00
PERMANENT EASEMENT (1.93 Acres @ \$2125)				\$ 4,100.00
INTEREST				\$ 5,000.00
ESTIMATED TOTAL DISTRICT COST				<u>\$ 124,920.00</u>

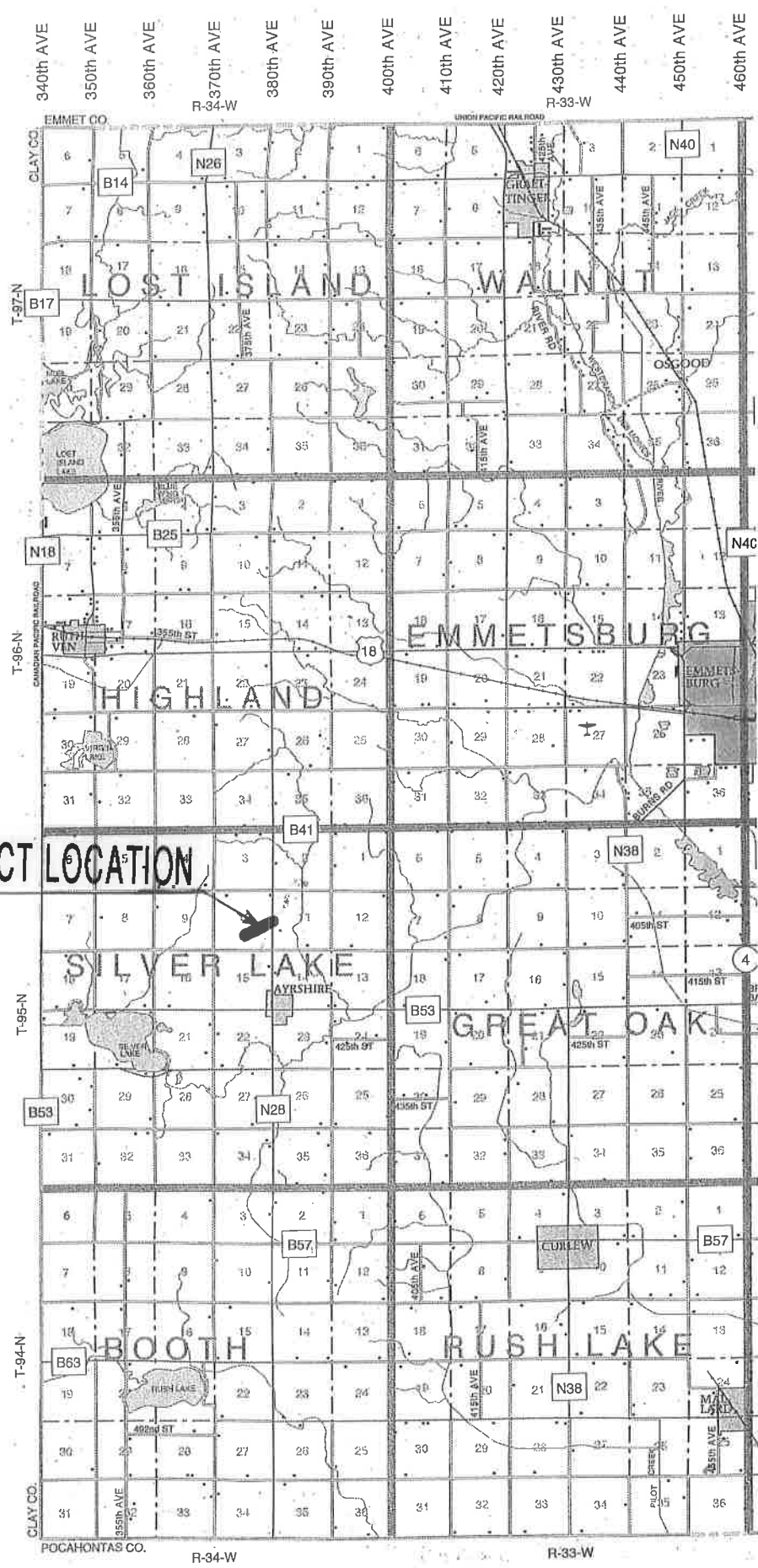
AVERAGE COST PER ACRE: \$694.00/acre (Based on 180 Acres)
(\$55.69/acre/year for 20 years)
(\$89.87/acre/year for 10 years)

VII. CONCLUSION/RECOMMENDATION

The proposed improvements include systems with 1/2-inch and 1-inch drainage coefficients. Either of the options will provide greatly improved drainage within the Lateral 11 watershed of the drainage district. The minimum improvement we would recommend is the 1/2-inch coefficient system.

The Board of Supervisors, as trustees, for DD#23, should accept this report and set a date for a public hearing. At the hearing the trustees should seek input from landowners regarding which options to pursue. More than one option could be bid with the final decision on which one to construct coming after the bid. A reclassification will be required with either of the options.

Improvements are drastically needed in this drainage district and we strongly recommend proceeding with improvements.

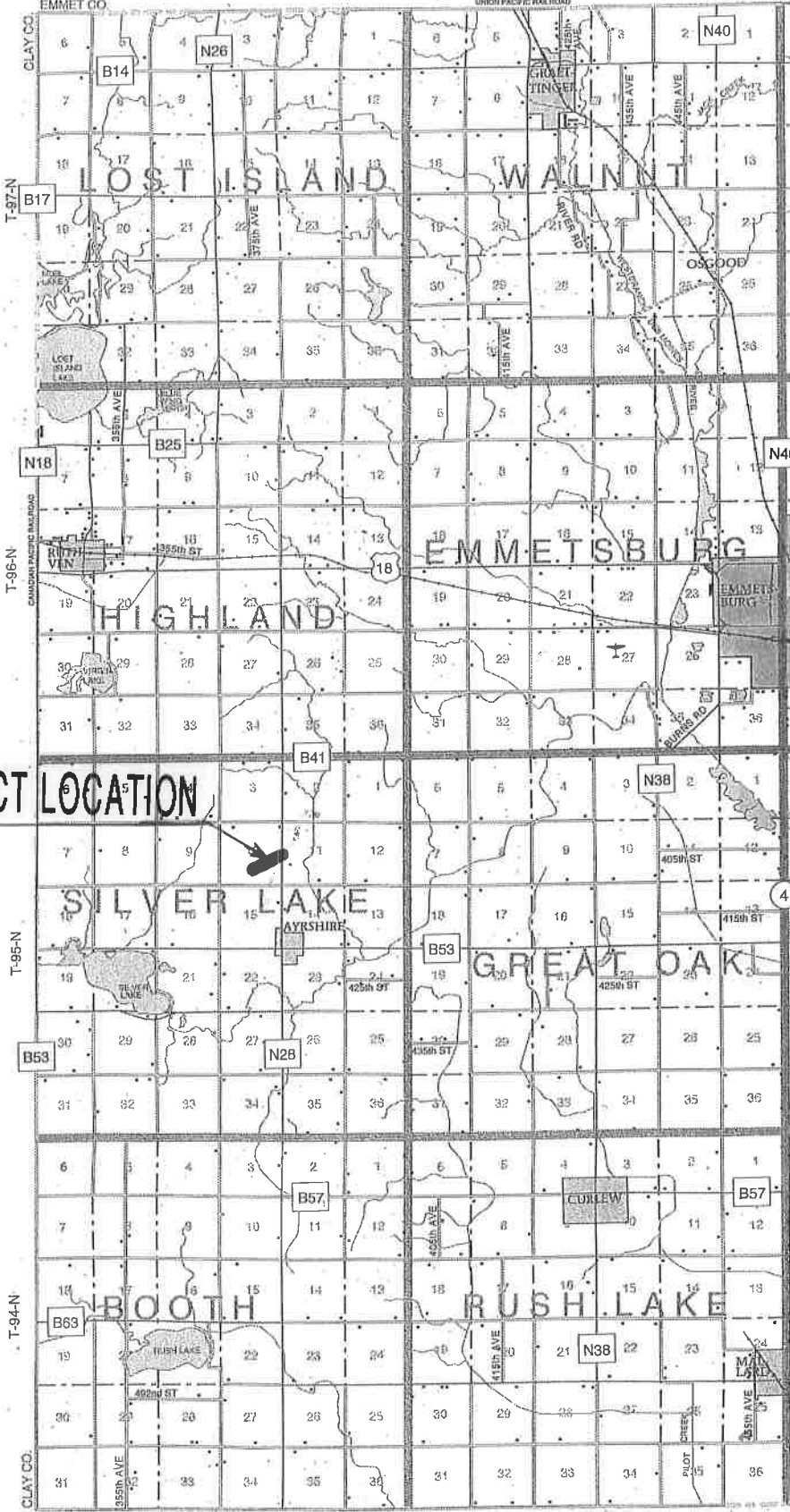


PROJECT LOCATION

R-34-W

R-33-W

340th AVE
350th AVE
360th AVE
370th AVE
380th AVE
390th AVE
400th AVE
410th AVE
420th AVE
430th AVE
440th AVE
450th AVE
460th AVE



POCAHONTAS CO.

CLAY CO.
T-97-N
T-96-N
T-95-N
T-94-N
CLAY CO.

UNION PACIFIC RAILROAD

EMMET CO.

R-33-W

EMMETTSBURG

SILVER LAKE

HIGHLAND

LOST ISLAND

EMMETTSBURG

AYRSHIRE

GREAT OAK

EMMETTSBURG

WALNUT

EMMETTSBURG

BOOTH

RUSH LAKE

EMMETTSBURG

OSGODD

EMMETTSBURG

TURN LAKE

CULLEW

EMMETTSBURG

EMMETTSBURG

EMMETTSBURG

415th ST

425th ST

435th ST

445th ST

455th ST

465th ST

475th ST

485th ST

495th ST

505th ST

515th ST

525th ST

535th ST

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785th ST

795th ST

805th ST

815th ST

825th ST

835th ST

845th ST

855th ST

865th ST

875th ST

885th ST

895th ST

905th ST

915th ST

925th ST

935th ST

945th ST

955th ST

965th ST

975th ST

985th ST

995th ST

1005th ST

1015th ST

1025th ST

1035th ST

1045th ST

1055th ST

1065th ST

1075th ST

1085th ST

1095th ST