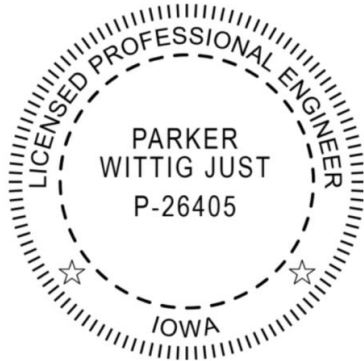



ENGINEER'S REPORT  
DRAINAGE DISTRICT NO. 34  
WEBSTER COUNTY, IOWA  
LATERAL A INVESTIGATION  
JULY 16, 2025

	<p>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.</p>
	<p> 7/16/25</p> <hr/> <p>Parker Just, P.E. No. P26405 (Date)</p> <p>My license renewal date is December 31, 2025.</p> <p>Pages or sheets covered by this seal: All pages</p>

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## Introduction

This report is written in response to a drainage petition filed with the Webster County Auditor during January 2025 requesting Lateral A of Drainage District 34 be improved to provide a more current drainage coefficient. On February 11, 2025, the Webster County Board of Supervisors motioned for McClure Engineering Company (MEC) to conduct an investigation and prepare a report for options to improve the drainage coefficient in Lateral A. MEC had previously conducted a similar study in December 2015 although no action was taken to improve Lateral A at that time. The newly requested report is considered to be an update to the previous report delivered in December 2015. This report is required by and in accordance to Iowa Code Chapter 468.126. This report summarizes the findings of the engineer in response to the Drainage Petition which includes the investigation results, along with Engineer's Opinion of Probable Costs and recommendations.

Lateral A commences at the outlet to the Main Open drainage ditch of Drainage District 34 in the NW  $\frac{1}{4}$  of the SE  $\frac{1}{4}$  of Section 18 of Burnside Township (T87N, R28W) and extends to the uplands in the NE  $\frac{1}{4}$  of the SE  $\frac{1}{4}$  of Section 13 of Clay Township (T87N, R29W). The Main Open drainage ditch is a tributary to Crooked Creek of the Des Moines River Watershed.

## History and Original Improvements

Webster County Drainage District 34 was established on September 15<sup>th</sup>, 1909. The District was constructed under an initial assessment of \$50,005. Original drainage improvements for the District included an open ditch approximately 11,400 feet long or approximately 2 miles. In addition to the main open ditch, 6 systems of laterals were included in the original construction totaling 52,650 feet or approximately 10 miles consisting of various sizes.

On May 8, 1918, a plat of relief drains for Laterals C, D, and E was approved for the Drainage District. Relief drains for Laterals C, D, and E were installed between May 8, 1918 and September 5, 1919 and the assessments totaled \$18,361.00.

In 1941 the open ditch starting at the outlet of Laterals A and E was cleaned out.

During 2011 and 2012 relief tile installed for Lateral B and that portion of Lateral A between the Main Open Ditch and the junction with Lateral B. The District was reclassified for Lateral A and B at that time.

On August 22, 2013, as built plans were filed for the tile improvements for Laterals A and Lateral B of Drainage District 34.

On December 3, 2015, McClure Engineering delivered an Engineers Report on Lateral A Tile Investigation but no action was taken to improve the tile at that time. A reclassification was completed at this time.

On April 13, 2016, a reclassification was issued covering the un-improved portion of Lateral A. This portion was renamed Lateral A1.

On August 22, 2017, MER Engineering submitted an Engineers Report for improvements to the open ditch in Drainage District #34.

On February 10, 2021, McClure Engineering delivered a report titled 'Headwall Investigation' regarding the headwall where Laterals A, C and D discharge. The recommended improvements were completed in September 2022 by Ubben Tiling.

## Soils

Approximately 65% of soils within the tributary area for Lateral A of Drainage District No. 34 are considered very poorly drained soil found in upland depressions subject to ponding (Marna). Another 10% of the soils are considered poorly drained (Brownton) and 18% somewhat poorly drained (Nicollet). Providing and maintaining an adequate outlet for District tile and private tile systems is essential for supporting cultivation in the area (See soils map in Appendix C).

## Wetlands

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 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.

This improvement project has the potential to affect regulated wetlands. Jurisdictional determinations through NRCS are strongly recommended to determine if any jurisdictional wetlands are proposed to be disturbed by the proposed improvement. If a landowner finds that the proposed improvement will result in disturbance of jurisdictional wetlands, the findings must be presented to the board of supervisors at the public hearing or prior to the approval of the proposed improvement.

## Methodology

This investigation has included a review of court records and available record drawings to establish original construction cost, improvements and original design. A field survey was conducted in 2015 to establish ground elevations and tile outlet elevations in order to determine correlation with available record information, digital information through the Iowa Department of Natural Resources and other data sources. This information was collected in order to evaluate the condition of the existing tile system and to evaluate the potential benefits of repair or improvements in order to improve the drainage coefficient of the tile lateral.

## Report Update Summary

The original tile mains in Webster County were constructed with clay pipe over 100 years ago. More recent repairs have used reinforced concrete pipe (RCP). Advances in High Density Polyethylene (HDPE) technology has made it an affordable alternative. Material and installation costs range from 30-50% cheaper for HDPE compared with RCP. This report explores 4 different improvement options for each of the pipe material types. The previous report only evaluated RCP as an option.

HDPE pipe has a lower Manning's Coefficients than RCP pipe. Manning's Coefficients represent the roughness of a pipe or surface that storm water flows over or through. A higher Manning's Coefficient effectively reduces the capacity of a pipe while lower Manning's Coefficient effectively increases the capacity of a pipe. In this report, RCP is estimated to have a Manning's Coefficient of 0.013 while HDPE has a Manning's Coefficient of 0.012.

HDPE pipe has a more limited range of sizes than RCP leading, in some cases, for the pipe to be oversized to achieve the drainage coefficient goals. HDPE pipe is available with inside diameters of 12 in, 15 in, 18 in, 24 in, 30 in, 36 in and 42 in while RCP comes in a wider variety of sizes. RCP comes in 6 to 8 foot sections and is easier to manipulate in the field to adjust to deviations in the route. HDPE comes in 20-foot sections and is more limited in the type of bends available so field adjustments are more challenging.

## Existing Conditions

Drainage District #34 is comprised of approximately 6,028 acres. Lateral A1 is made up of clay pipe and drains approximately 830 acres. Lateral A1 runs from station 112+50 to station 22+00. Lateral A and Lateral A Relief Tile run parallel from station 22+00 to station 00+00. Drainage from Lateral B and Lateral B Relief also joins the relief tile at station 22+00 and increases the total drainage area running through Lateral A (and adjacent relief tiles) to 2,273 acres. According to record drawings the slope of the original tile line for Lateral A1 is 0.184% and the slope of the Lateral A and Lateral A Relief tile is 0.150%. A summary of existing drainage conditions is contained in Table 1 below.

**Table 1: Existing Lateral A1, Lateral A and Lateral A Relief Drainage Capacity**

Existing Conditions							
Sta. Begin	Sta. End	Tile Size (in)	Slope (%)	Drainage Area (Acres)	Tile Capacity (CFS)	Drainage Coefficient (in/day/acre)	Combined DC (in/day/acre)
112+50	92+00	12	0.184	186	1.53	0.20	-
92+00	76+00	15	0.184	290	2.77	0.23	-
76+00	49+00	16	0.184	440	3.29	0.18	-
49+00	22+00	22	0.184	830	7.69	0.22	-
22+00	00+00	28	0.150	2273	13.22	0.14	0.41
22+00	00+00	36	0.150		25.83	0.27	

The drainage capacity of Lateral A1 trends towards a 1/4" per day drainage coefficient which does not meet modern standards for drainage of row crop agricultural lands. Lateral A1 joins Lateral A and Lateral A Relief tile at an existing 84" diameter concrete manhole installed in 2011 and 2012. Lateral A and Lateral A Relief tile outlet through a headwall to the Main Open Ditch in Section 18 of Burnside Township (T87N, R28W).

Existing Lateral A1, Lateral A and Lateral A Relief tile restrict the combined drainage coefficient to 0.41 in/day. Modern drainage coefficients trend toward 0.50 in/day up to 0.75 inch/day. Improvement of the drainage coefficient will require addition of a relief line to Lateral A1 or replacement of Lateral A1, in addition to another relief tile running from station 22+00 to 00+00 which we are calling Lateral A Relief 2.

## Proposed Options

The existing district tile system provides a low level of drainage for the lands drained by existing Lateral A1. The agricultural lands within the system may greatly benefit from increased drainage capacity. Per the request of the

petition, construction of a relief tile was investigated. Also, due to the age of the system, options have been included to show total replacement of existing Lateral A1. This report includes multiple cost estimates for the relief tile or total replacement of Lateral A1 using both RCP and HDPE materials along with the required additional relief tile running parallel to Lateral A. Consideration has been given to the following options for improving the existing drainage conditions:

- **Option A1 (RCP):** Construct RCP relief tile along existing Lateral A1 and Lateral A Relief to obtain combined drainage coefficient of  $\frac{1}{2}$ " per day. See Table 2.
- **Option A2 (HDPE):** Construct HDPE relief tile along existing Lateral A1 and Lateral A Relief to obtain combined drainage coefficient of  $\frac{1}{2}$ " per day. See Table 3.
- **Option B1 (RCP):** Construct RCP relief tile along existing Lateral A1 and Lateral A Relief and obtain combined drainage coefficient of  $\frac{3}{4}$ " per day. See Table 4.
- **Option B2 (HDPE):** Construct HDPE relief tile along existing Lateral A1 and Lateral A Relief to obtain combined drainage coefficient of  $\frac{3}{4}$ " per day. See Table 5.
- **Option C1 (RCP):** Replace existing Lateral A1 drain tile with RCP pipes and add additional relief tile (Lateral A Relief 2) parallel to existing Lateral A Relief to improve drainage to  $\frac{1}{2}$ " per day. See Table 6.
- **Option C2 (HDPE):** Replace existing Lateral A1 drain tile with HDPE pipes and add additional relief tile (Lateral A Relief 2) parallel to existing Lateral A Relief to improve drainage to  $\frac{1}{2}$ " per day. See Table 7.
- **Option D1 (RCP):** Replace existing Lateral A1 drain tile with RCP pipes and add additional relief tile (Lateral A Relief 2) parallel to existing Lateral A Relief to improve drainage to  $\frac{3}{4}$ " per day. See Table 8.
- **Option D2 (HDPE):** Replace existing Lateral A1 drain tile with HDPE pipes and add additional relief tile (Lateral A Relief 2) parallel to existing Lateral A Relief to improve drainage to  $\frac{3}{4}$ " per day. See Table 9.

Options A1, B1, C1 and D1 use RCP pipe. Option A2, B2, C2 and D2 use HDPE pipe for all sections besides stations 40+00 to 44+00 where polypropylene pipe with enhanced stiffness is needed to account for reduced cover height. All options require additional relief tile parallel to existing Lateral A and Lateral A Relief running from 22+00 to 00+00 (Lateral A Relief 2). Installing relief tile will improve the drainage of the system but does not address any concerns which accompany the maintenance of the existing century old clay drainage tile. Replacing the existing tile (Options C1, C2, D1, D2) will achieve the drainage coefficient goals while alleviating future maintenance concerns of the existing system.

Table 2: Option A1 (RCP) – Relief Line,  $\frac{1}{2}$ " DC

Option A1 (RCP) - Relief Line, 1/2" DC							
Sta. Begin	Sta. End	Tile Size	Slope	Drainage Area	Tile Capacity	Drainage Coefficient	Combined DC
		(in)	(%)	(Acres)	(CFS)	(in/day/acre)	(in/day/acre)
112+50	92+00	15	0.23	186	3.10	0.40	0.59
92+00	76+00	15	0.25	290	3.23	0.27	0.49
76+00	49+00	21	0.20	440	7.09	0.38	0.56
49+00	22+00	27	0.10	830	9.79	0.28	0.50
22+00	00+00	28	0.15	2273	13.22	0.14	0.55
22+00	00+00	28	0.15		13.22	0.14	
22+00	00+00	36	0.15		25.83	0.27	

Table 3: Option A2 (HDPE) – Relief Line, 1/2" DC

Option A2 (HDPE) - Relief Line, 1/2" DC							
Sta. Begin	Sta. End	Tile Size	Slope	Drainage Area	Tile Capacity	Drainage Coefficient	Combined DC
		(in)	(%)	(Acres)	(CFS)	(in/day/acre)	(in/day/acre)
112+50	92+00	15	0.23	186	3.36	0.43	0.63
92+00	76+00	15	0.25	290	3.50	0.29	0.51
76+00	49+00	24	0.20	440	10.96	0.59	0.77
49+00	22+00	30	0.10	830	14.05	0.40	0.62
22+00	00+00	24	0.15	2273	9.50	0.10	0.51
22+00	00+00	28	0.15		13.22	0.14	
22+00	00+00	36	0.15		25.83	0.27	

Table 4: Option B1 (RCP) – Relief Line, 3/4" DC

Option B1 (RCP) - Relief Line, 3/4"DC							
Sta. Begin	Sta. End	Tile Size	Slope	Drainage Area	Tile Capacity	Drainage Coefficient	Combined DC
		(in)	(%)	(Acres)	(CFS)	(in/day/acre)	(in/day/acre)
112+50	92+00	18	0.23	186	5.04	0.64	0.84
92+00	76+00	21	0.25	290	7.92	0.65	0.88
76+00	49+00	27	0.20	440	13.85	0.75	0.93
49+00	22+00	36	0.10	830	21.09	0.60	0.83
22+00	00+00	28	0.15	2273	13.22	0.14	0.82
22+00	00+00	36	0.15		25.83	0.27	
22+00	00+00	42	0.15		38.96	0.41	

Table 5: Option B2 (HDPE) – Relief Line, 3/4" DC

Option B2 (HDPE) - Relief Line, 3/4"DC							
Sta. Begin	Sta. End	Tile Size	Slope	Drainage Area	Tile Capacity	Drainage Coefficient	Combined DC
		(in)	(%)	(Acres)	(CFS)	(in/day/acre)	(in/day/acre)
112+50	92+00	18	0.23	186	5.46	0.70	0.89
92+00	76+00	24	0.25	290	12.25	1.01	1.23
76+00	49+00	27	0.20	440	15.00	0.81	0.99
49+00	22+00	36	0.10	830	22.85	0.66	0.88
22+00	00+00	28	0.15	2273	13.22	0.14	0.85
22+00	00+00	36	0.15		25.83	0.27	
22+00	00+00	42	0.15		42.21	0.44	

Table 6: Option C1 (RCP) – Replace Lateral A1, 1/2" DC

Option C1 (RCP) - Replace Lat A, 1/2" DC							
Sta. Begin	Sta. End	Tile Size	Slope	Drainage Area	Tile Capacity	Drainage Coefficient	Combined DC
		(in)	(%)	(Acres)	(CFS)	(in/day/acre)	(in/day/acre)
112+50	92+00	18	0.23	186	5.04	0.64	-
92+00	76+00	21	0.25	290	7.92	0.65	-
76+00	49+00	24	0.20	440	10.12	0.55	-
49+00	22+00	36	0.10	830	21.09	0.60	-
22+00	00+00	28	0.15	2273	13.22	0.14	0.55
22+00	00+00	28	0.15		13.22	0.14	
22+00	00+00	36	0.15		25.83	0.27	

Table 7: Option C2 (HDPE) – Replace Lateral A1, 1/2" DC

Option C2 (HDPE) - Replace Lat A, 1/2" DC							
Sta. Begin	Sta. End	Tile Size	Slope	Drainage Area	Tile Capacity	Drainage Coefficient	Combined DC
		(in)	(%)	(Acres)	(CFS)	(in/day/acre)	(in/day/acre)
112+50	92+00	18	0.23	186	5.46	0.70	-
92+00	76+00	24	0.25	290	12.25	1.01	-
76+00	49+00	24	0.20	440	10.96	0.59	-
49+00	22+00	36	0.10	830	22.85	0.66	-
22+00	00+00	24	0.15	2273	9.5	0.10	0.51
22+00	00+00	28	0.15		13.22	0.14	
22+00	00+00	36	0.15		25.83	0.27	

Table 8: Option D1 (RCP) – Replace Lateral A1, 3/4" DC

Option D1 (RCP) - Replace Lat A, 3/4" DC							
Sta. Begin	Sta. End	Tile Size	Slope	Drainage Area	Tile Capacity	Drainage Coefficient	Combined DC
		(in)	(%)	(Acres)	(CFS)	(in/day/acre)	(in/day/acre)
112+50	92+00	21	0.23	186	7.60	0.97	-
92+00	76+00	24	0.25	290	11.31	0.93	-
76+00	49+00	27	0.20	440	13.85	0.75	-
49+00	22+00	42	0.10	830	31.81	0.91	-
22+00	00+00	28	0.15	2273	13.22	0.14	0.82
22+00	00+00	36	0.15		25.83	0.27	
22+00	00+00	42	0.15		38.96	0.41	

Table 9: Option D2 (HDPE) – Replace Lateral A1, 3/4" DC

Option D2 (HDPE) - Replace Lat A, 3/4"DC							
Sta. Begin	Sta. End	Tile Size	Slope	Drainage Area	Tile Capacity	Drainage Coefficient	Combined DC
		(in)	(%)	(Acres)	(CFS)	(in/day/acre)	(in/day/acre)
112+50	92+00	24	0.23	186	11.75	1.50	-
92+00	76+00	24	0.25	290	12.25	1.01	-
76+00	49+00	30	0.20	440	19.87	1.07	-
49+00	22+00	42	0.10	830	34.46	0.99	-
22+00	00+00	28	0.15	2273	13.22	0.14	0.85
22+00	00+00	36	0.15		25.83	0.27	
22+00	00+00	42	0.15		42.21	0.45	

### Engineer's Opinion of Probable Costs Summary

The recommended tile replacement costs are broken down in the Engineers Opinion of Probable Costs in Appendix B. Pipe bends are incidental to pipe costs. The table on the next page summarizes the costs associated with RCP and HDPE options as well as relief tile options.

Table 10: Engineer's Opinion of Probable Cost

Option	Total EOPC	Avg \$/Acre
<b>Option A1 (RCP):</b> Construct RCP relief tile along existing Lateral A1 and Lateral A Relief to obtain combined drainage coefficient of 1/2" per day.	\$ 1,086,000	\$ 477.78
<b>Option A2 (HDPE):</b> Construct HDPE relief tile along existing Lateral A1 and Lateral A Relief to obtain combined drainage coefficient of 1/2" per day.	\$ 892,000	\$ 392.43
<b>Option B1 (RCP):</b> Construct RCP relief tile along existing Lateral A1 and Lateral A Relief to obtain combined drainage coefficient of 3/4 " per day.	\$ 1,303,000	\$ 573.25
<b>Option B2 (HDPE):</b> Construct HDPE relief tile along existing Lateral A1 and Lateral A Relief to obtain combined drainage coefficient of 3/4" per day.	\$ 1,033,000	\$ 454.47
<b>Option C1 (RCP):</b> Replace existing Lateral A1 drain tile with RCP pipes and add additional relief tile parallel to existing Lateral A Relief to improve drainage to 1/2" per day.	\$ 1,150,000	\$ 505.94
<b>Option C2 (HDPE):</b> Replace existing Lateral A1 drain tile with HDPE pipes and add additional relief tile parallel to existing Lateral A Relief to improve drainage to 1/2" per day.	\$ 917,000	\$ 403.43
<b>Option D1 (RCP):</b> Replace existing Lateral A1 drain tile with RCP pipes and add additional relief tile parallel to existing Lateral A Relief to improve drainage to 3/4 " per day.	\$ 1,370,000	\$ 602.73
<b>Option D2 (HDPE):</b> Replace existing Lateral A1 drain tile with HDPE pipes and add additional relief tile parallel to existing Lateral A Relief to improve drainage to 3/4 " per day.	\$ 1,080,000	\$ 475.14

## Crop Damages

Crop damages will be paid to land owners based on the area impacted during construction. Areas which will be considered for crop damage payment must fall outside of the drainage right-of-way. Other crop damages may be considered by the Board of Supervisors acting as drainage district trustees and their appointed drainage district commissioners. Property owners will be required to file a claim for crop damages with the county. Crop damages are not included in the Engineers Opinion of Probable Cost due to uncertainty of market conditions and future decisions made by drainage district commissioners.

## Completion and Final Settlement

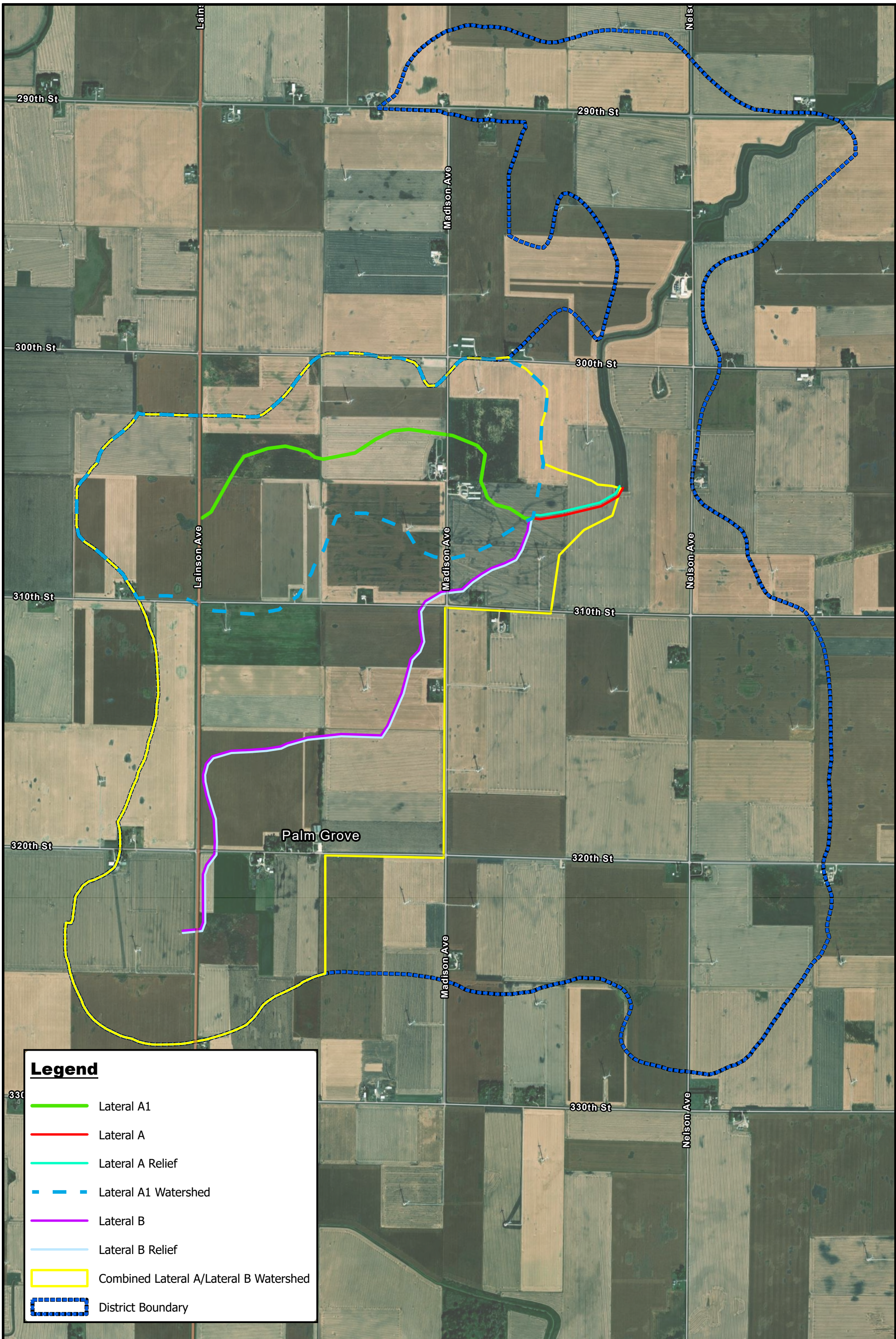
In accordance with Iowa Code 468.101-468.103 once the work is completed the engineer shall issue a report of completion for the drainage district trustees consideration. The drainage district trustees shall hold a hearing to consider the acceptance and must provide notice of the meeting to all owners within the District.

## Administration

If this report is tentatively approved, The Code of Iowa requires a public hearing date be set regarding this Report and notice given to all district landowners in the Drainage District No. 34 Section 13 of Clay Township and Section 18 of Burnside Township (Section 468.126, para 1.c.). If the project is approved, public bid letting will also be required (Section 468.34). Landowners may discuss whether they think the present apportionment of costs is fair or not, and if not the Board may order a reclassification. As prescribed in Section 468.41, para 2, classification schedules for District Tile Laterals shall also be completed so that only those lands using a particular District Lateral shall be assessed and not the entire District.

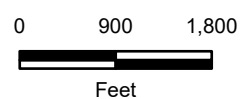
**APPENDIX A**

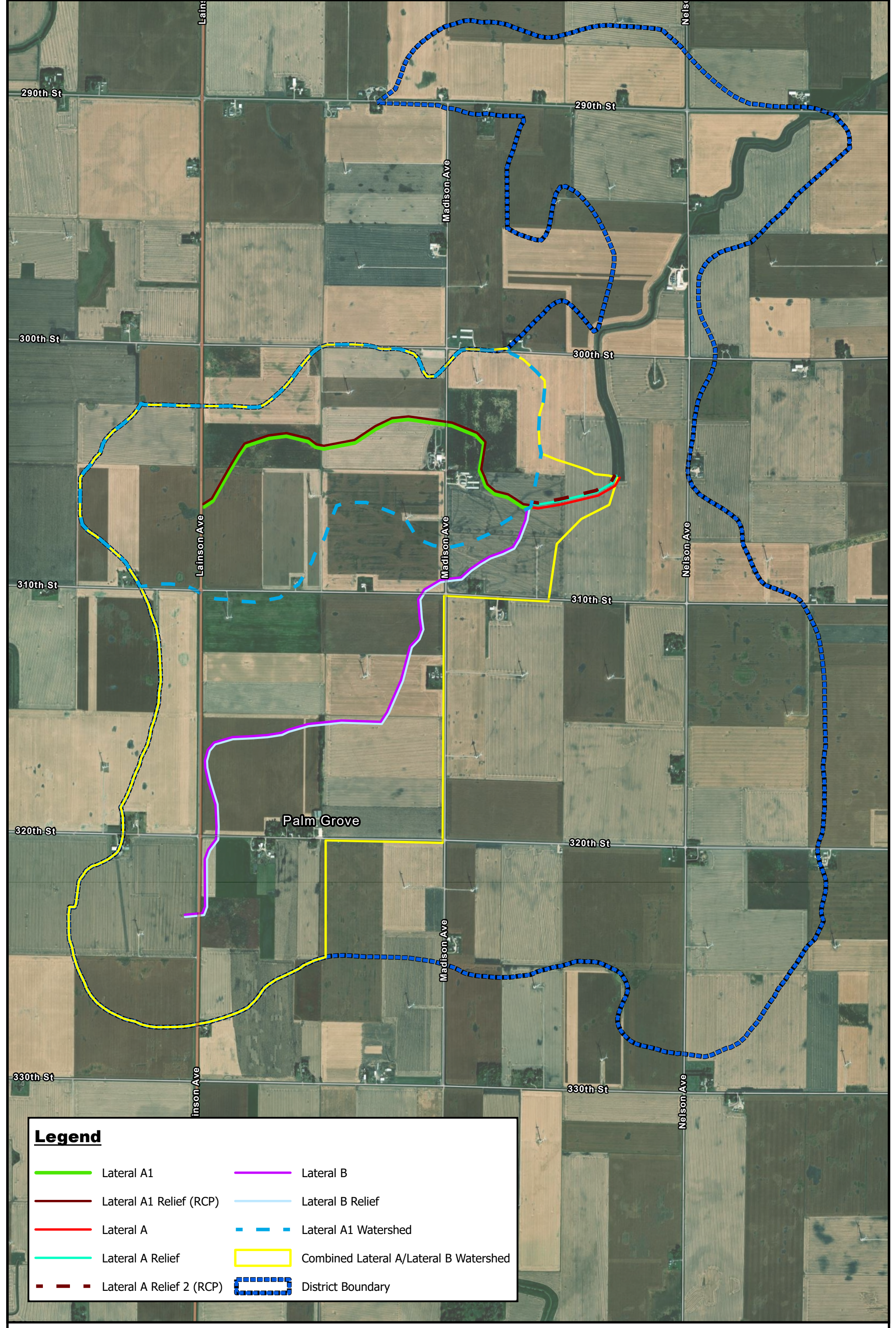
REPORT EXHIBIT  
TILE PROFILES













### Existing Conditions

Lateral A | Webster County, Iowa | 7/14/2025

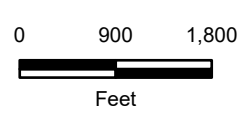


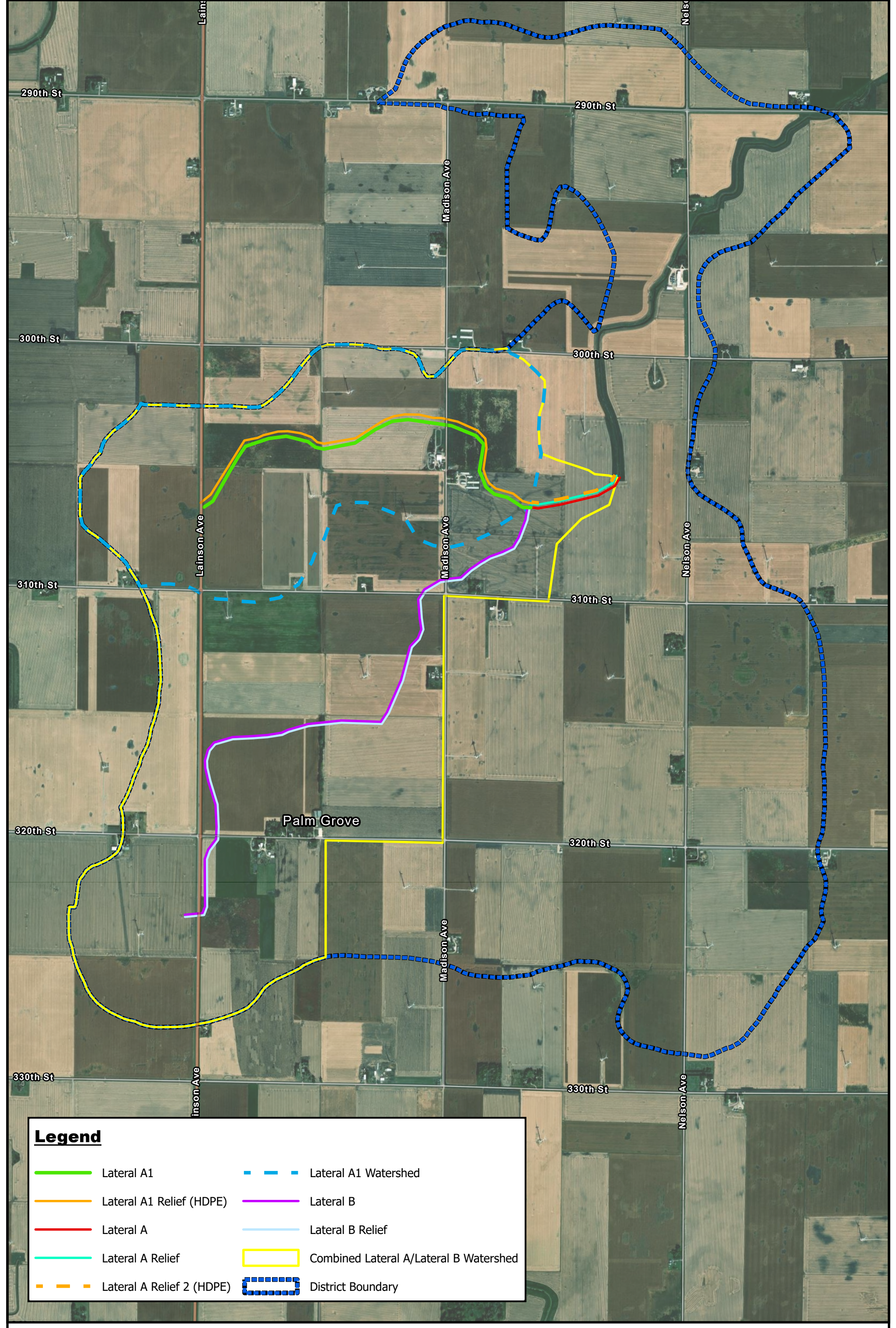


**Legend**











- |  |  |
|--|--|
|  Lateral A1               |  Lateral B                              |
|  Lateral A1 Relief (RCP)  |  Lateral B Relief                       |
|  Lateral A                |  Lateral A1 Watershed                   |
|  Lateral A Relief         |  Combined Lateral A/Lateral B Watershed |
|  Lateral A Relief 2 (RCP) |  District Boundary                      |

**Option A1 and B1 (RCP)**  
Drainage District 34 Lateral A | Webster County, Iowa | 7/14/2025

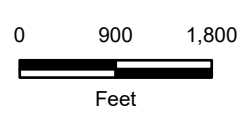




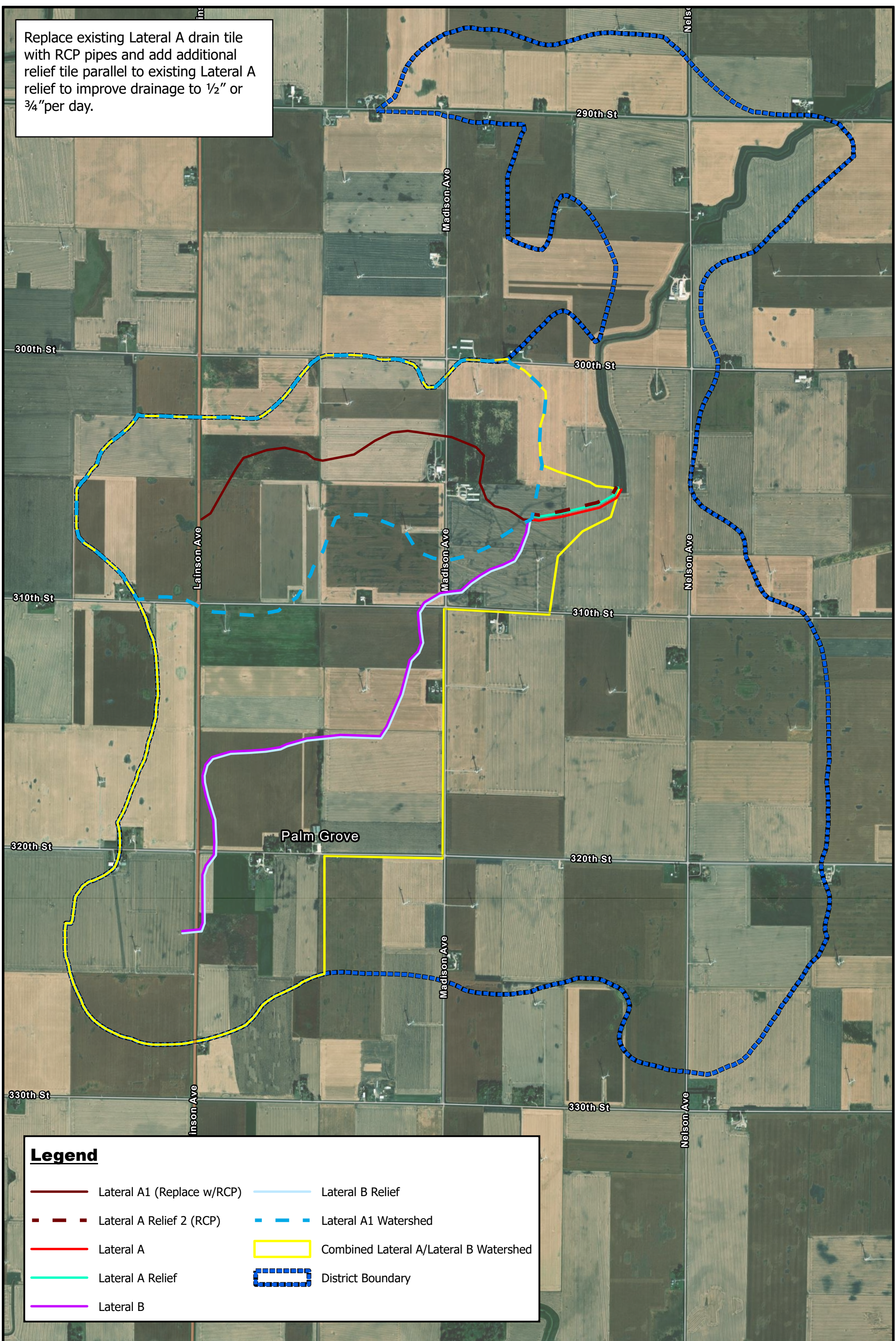
**Legend**

- |   |  |
|---|--|
|  Lateral A1                |  Lateral A1 Watershed                   |
|  Lateral A1 Relief (HDPE)  |  Lateral B                              |
|  Lateral A                 |  Lateral B Relief                       |
|  Lateral A Relief          |  Combined Lateral A/Lateral B Watershed |
|  Lateral A Relief 2 (HDPE) |  District Boundary                      |

**Option A2 and B2 (HDPE)**  
Drainage District 34 Lateral A | Webster County, Iowa | 7/14/2025



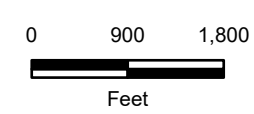
Replace existing Lateral A drain tile with RCP pipes and add additional relief tile parallel to existing Lateral A relief to improve drainage to 1/2" or 3/4" per day.

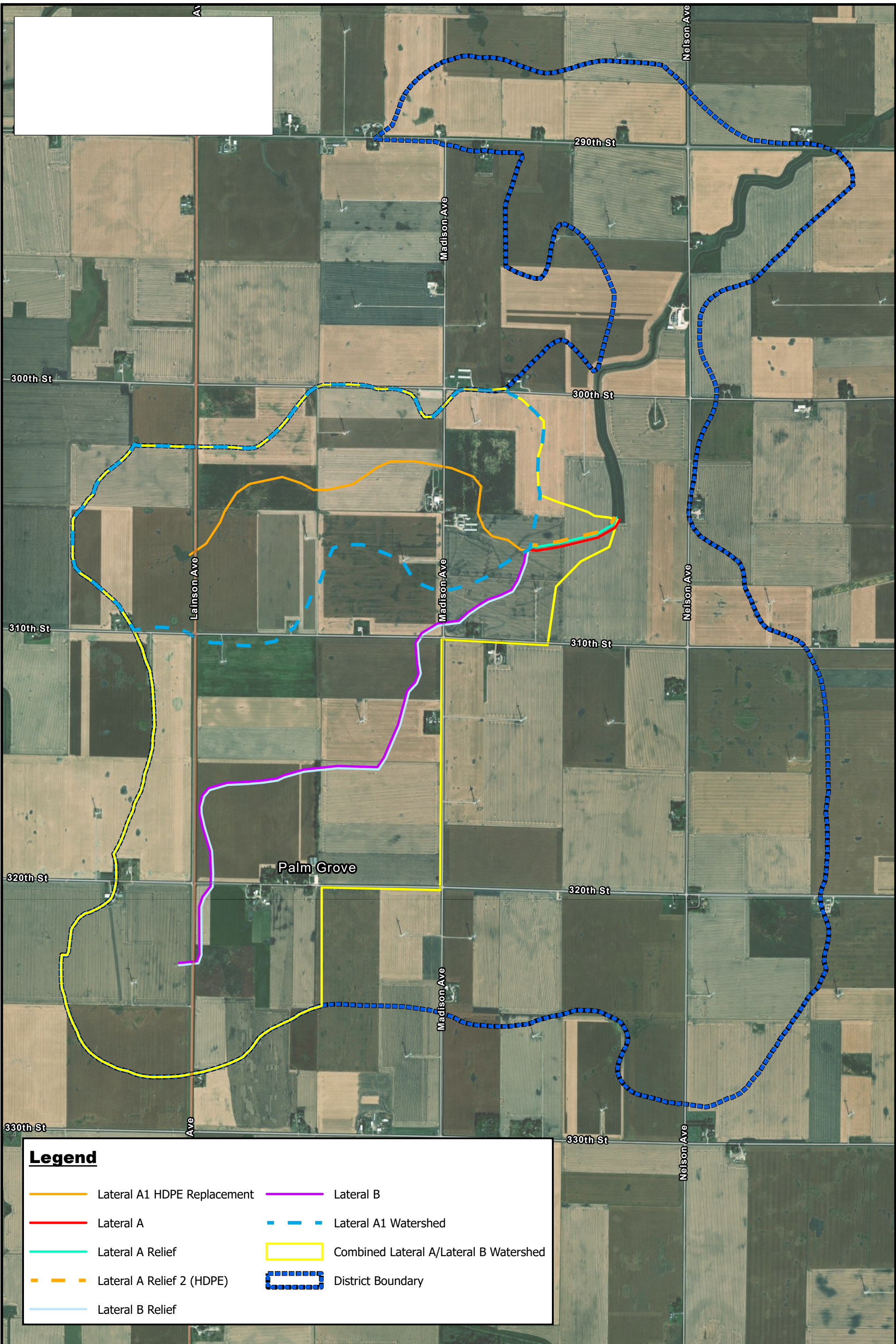


**Legend**

- Lateral A1 (Replace w/RCP)
- - - Lateral A Relief 2 (RCP)
- Lateral A
- Lateral A Relief
- Lateral B
- Lateral B Relief
- - - Lateral A1 Watershed
- Combined Lateral A/Lateral B Watershed
- District Boundary

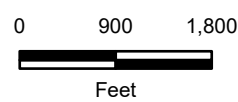
**Option C1 and D1 (RCP)**  
 Drainage District 34 Lateral A | Webster County, Iowa | 7/14/2025





### Option C2 and D2 (HDPE)

Lateral A | Webster County, Iowa | 7/14/2025





























**APPENDIX B**

ENGINEER'S OPINION OF PROBABLE COSTS

**Engineer's Opinion of Probable Costs**  
**Drainage District 34 - Lateral A1 - Webster County**  
**Option A1 (RCP) - Relief Line, 1/2" D.C.**

Item No.	Description	Unit	Est. Qty	Unit Price	Extended Price
1	TRENCH FOUNDATION	TON	2,750	\$ 35.00	\$ 96,250.00
2	15 IN. RCP	LF	3,650	\$ 40.00	\$ 146,000.00
3	21 IN. RCP	LF	2,700	\$ 50.00	\$ 135,000.00
4	27 IN. RCP	LF	2,700	\$ 60.00	\$ 162,000.00
5	28 IN RCP RELIEF TILE	LF	2,200	\$ 60.00	\$ 132,000.00
6	HEAD WALL OUTLET MODIFICATIONS	EA	1	\$ 10,000.00	\$ 10,000.00
7	FLOW EQUALIZATION STRUCTURES	EA	10	\$ 7,500.00	\$ 75,000.00
8	TILE EXPLORATION	HRS	18	\$ 250.00	\$ 4,500.00
9	FIELD TILE CONNECTIONS	EA	75	\$ 500.00	\$ 37,500.00
10	CATCH BASIN	EA	7	\$ 2,500.00	\$ 17,500.00
11	SEEDING	AC	5	\$ 1,500.00	\$ 7,500.00
12	TRAFFIC CONTROL	LS	1	\$ 2,500.00	\$ 2,500.00
<b>SUBTOTAL CONSTRUCTION</b>					<b>\$ 825,750.00</b>
CONTINGENCY (10%)					\$ 82,575.00
MOBILIZATION (10%)					\$ 82,575.00
<b>TOTAL CONSTRUCTION</b>					<b>\$ 990,900.00</b>
	Report and Hearings				\$ 20,000.00
	Engineering, Design, and Construction Administration				\$ 75,000.00
<b>TOTAL PROJECT COST</b>					<b>\$ 1,086,000</b>
<b>AVERAGE COST PER ACRE**</b>					<b>\$ 477.78</b>
<b>Additional Project Costs</b>					
1	Trenchless 18 inch RCP under US-169 (IADOT) See note.*	LF	86	\$ 1,000.00	\$ 86,000.00
2	Trenched 15 inch RCP inside US-169 right-of-way (IADOT)	LF	34	\$ 40.00	\$ 1,360.00
3	Trenched 21 inch RCP under Madison Avenue (Webster Co. Secondary Roads)	LF	66	\$ 50.00	\$ 3,300.00
4	Restoration of Madison Avenue (Webster Co. Secondary Roads)	LS	1	\$ 4,000.00	\$ 4,000.00
<b>Notes:</b>					
*Pipe diameter increased to next largest diameter to allow for future upsizing.					

**Engineer's Opinion of Probable Costs**  
**Drainage District 34 - Lateral A1 - Webster County**  
**Option A2 (HDPE) - Relief Line, 1/2" D.C.**

Item No.	Description	Unit	Est. Qty	Unit Price	Extended Price
1	TRENCH FOUNDATION	TON	2,900	\$ 35.00	\$ 101,500.00
2	15 IN. HDPE	LF	3,650	\$ 28.00	\$ 102,200.00
3	24 IN. HDPE	LF	2,700	\$ 38.50	\$ 103,950.00
4	30 IN. HDPE	LF	2,300	\$ 42.00	\$ 96,600.00
5	30 IN. POLYPROPYLENE	LF	400	\$ 50.00	\$ 20,000.00
6	24 IN. HDPE RELIEF TILE	LF	2,200	\$ 38.50	\$ 84,700.00
7	HEAD WALL OUTLET MODIFICATIONS	EA	1	\$ 10,000.00	\$ 10,000.00
8	FLOW EQUALIZATION STRUCTURES	EA	10	\$ 7,500.00	\$ 75,000.00
9	TILE EXPLORATION	HRS	18	\$ 250.00	\$ 4,500.00
10	FIELD TILE CONNECTIONS	EA	75	\$ 500.00	\$ 37,500.00
11	CATCH BASIN	EA	7	\$ 2,500.00	\$ 17,500.00
12	SEEDING	AC	5	\$ 1,500.00	\$ 7,500.00
13	TRAFFIC CONTROL	LS	1	\$ 2,500.00	\$ 2,500.00
<b>SUBTOTAL CONSTRUCTION</b>					\$ 663,450.00
CONTINGENCY (10%)					\$ 66,345.00
MOBILIZATION (10%)					\$ 66,345.00
<b>TOTAL CONSTRUCTION</b>					\$ 796,140.00
	Report and Hearings				\$ 20,000.00
	Engineering, Design, and Construction Administration				\$ 75,000.00
<b>TOTAL PROJECT COST</b>					<b>\$ 892,000</b>
<b>AVERAGE COST PER ACRE</b>					<b>\$ 392.43</b>
<b>Additional Project Costs</b>					
1	Trenchless 18 inch HDPE under US-169 (IADOT) See note.*	LF	86	\$ 1,000.00	\$ 86,000.00
2	Trenched 15 inch HDPE inside US-169 right-of-way (IADOT)	LF	34	\$ 28.00	\$ 952.00
3	Trenched 24 inch HDPE under Madison Avenue (Webster Co. Secondary Roads)	LF	66	\$ 38.50	\$ 2,541.00
4	Restoration of Madison Avenue (Webster Co. Secondary Roads)	LS	1	\$ 4,000.00	\$ 4,000.00
<b>Notes:</b>					
*Pipe diameter increased to next largest diameter to allow for future upsizing.					

**Engineer's Opinion of Probable Costs**  
**Drainage District 34 - Lateral A1 - Webster County**  
**Option B1 (RCP) - Relief Line, 3/4" D.C.**

Item No.	Description	Unit	Est. Qty	Unit Price	Extended Price
1	TRENCH FOUNDATION	TON	4,750	\$ 35.00	\$ 166,250.00
2	18 IN. RCP	LF	2,050	\$ 45.00	\$ 92,250.00
3	21 IN. RCP	LF	1,600	\$ 50.00	\$ 80,000.00
4	27 IN. RCP	LF	2,700	\$ 60.00	\$ 162,000.00
5	36 IN. RCP	LF	2,700	\$ 65.00	\$ 175,500.00
6	42 IN. RCP RELIEF TILE	LF	2,200	\$ 80.00	\$ 176,000.00
7	HEAD WALL OUTLET MODIFICATIONS	EA	1	\$ 10,000.00	\$ 10,000.00
8	FLOW EQUALIZATION STRUCTURES	EA	10	\$ 7,500.00	\$ 75,000.00
9	TILE EXPLORATION	HRS	18	\$ 250.00	\$ 4,500.00
10	FIELD TILE CONNECTIONS	EA	75	\$ 500.00	\$ 37,500.00
11	CATCH BASIN	EA	7	\$ 2,500.00	\$ 17,500.00
12	SEEDING	AC	5	\$ 1,500.00	\$ 7,500.00
13	TRAFFIC CONTROL	LS	1	\$ 2,500.00	\$ 2,500.00
<b>SUBTOTAL CONSTRUCTION</b>					\$ 1,006,500.00
CONTINGENCY (10%)					\$ 100,650.00
MOBILIZATION (10%)					\$ 100,650.00
<b>TOTAL CONSTRUCTION</b>					\$ 1,207,800.00
	Report and Hearings				\$ 20,000.00
	Engineering, Design, and Construction Administration				\$ 75,000.00
<b>TOTAL PROJECT COST</b>					<b>\$ 1,303,000</b>
<b>AVERAGE COST PER ACRE</b>					<b>\$ 573.25</b>
<b>Additional Project Costs</b>					
1	Trenchless 21 inch RCP under US-169 (IADOT) See note.*	LF	86	\$ 1,000.00	\$ 86,000.00
2	Trenched 18 inch RCP inside US-169 right-of-way (IADOT)	LF	34	\$ 45.00	\$ 1,530.00
2	Trenched 27 inch RCP under Madison Avenue (Webster Co. Secondary Roads)	LF	66	\$ 60.00	\$ 3,960.00
3	Restoration of Madison Avenue (Webster Co. Secondary Roads)	LS	1	\$ 4,000.00	\$ 4,000.00
<b>Notes:</b>					
*Pipe diameter increased to next largest diameter to allow for future upsizing.					

**Engineer's Opinion of Probable Costs**  
**Drainage District 34 - Lateral A1 - Webster County**  
**Option B2 (HDPE) - Relief Line, 3/4" D.C.**

Item No.	Description	Unit	Est. Qty	Unit Price	Extended Price
1	TRENCH FOUNDATION	TON	4,200	\$ 35.00	\$ 147,000.00
2	18 IN. HDPE	LF	2,050	\$ 31.50	\$ 64,575.00
3	24 IN. HDPE	LF	4,300	\$ 38.50	\$ 165,550.00
4	36 IN. HDPE	LF	2,300	\$ 45.50	\$ 104,650.00
5	36 IN. POLYPROPYLENE	LF	400	\$ 53.50	\$ 21,400.00
6	42 IN. HDPE RELIEF TILE	LF	2,200	\$ 56.00	\$ 123,200.00
7	HEAD WALL OUTLET MODIFICATIONS	EA	1	\$ 10,000.00	\$ 10,000.00
8	FLOW EQUALIZATION STRUCTURES	EA	10	\$ 7,500.00	\$ 75,000.00
9	TILE EXPLORATION	HRS	18	\$ 250.00	\$ 4,500.00
10	FIELD TILE CONNECTIONS	EA	75	\$ 500.00	\$ 37,500.00
11	CATCH BASIN	EA	7	\$ 2,500.00	\$ 17,500.00
12	SEEDING	AC	5	\$ 1,500.00	\$ 7,500.00
13	TRAFFIC CONTROL	LS	1	\$ 2,500.00	\$ 2,500.00
<b>SUBTOTAL CONSTRUCTION</b>					<b>\$ 780,875.00</b>
CONTINGENCY (10%)					\$ 78,087.50
MOBILIZATION (10%)					\$ 78,087.50
<b>TOTAL CONSTRUCTION</b>					<b>\$ 937,050.00</b>
Report and Hearings					\$ 20,000.00
Engineering, Design, and Construction Administration					\$ 75,000.00
<b>TOTAL PROJECT COST</b>					<b>\$ 1,033,000</b>
<b>AVERAGE COST PER ACRE</b>					<b>\$ 454.47</b>
<b>Additional Project Costs</b>					
1	Trenchless 24inch HDPE under US-169 (IADOT) See note.*	LF	86	\$ 1,100.00	\$ 94,600.00
2	Trenched 18 inch HDPE inside US-169 right-of-way (IADOT)	LF	34	\$ 31.50	\$ 1,071.00
2	Trenched 24 inch HDPE under Madison Avenue (Webster Co. Seconda	LF	66	\$ 38.50	\$ 2,541.00
3	Restoration of Madison Avenue (Webster Co. Secondary Roads	LS	1	\$ 4,000.00	\$ 4,000.00
<b>Notes:</b>					
*Pipe diameter increased to next largest diameter to allow for future upsizing.					

**Engineer's Opinion of Probable Costs**  
**Drainage District 34 - Lateral A1 - Webster County**  
**Option C1 (RCP) - Replace Lateral A1, 1/2" D.C.**

Item No.	Description	Unit	Est. Qty	Unit Price	Extended Price
1	CRUSH AND BURY EXISTING TILE	LF	9,050	\$ 5.00	\$ 45,250.00
2	TRENCH FOUNDATION	TON	3,600	\$ 35.00	\$ 126,000.00
3	18 IN. RCP	LF	2,050	\$ 45.00	\$ 92,250.00
4	21 IN. RCP	LF	1,600	\$ 50.00	\$ 80,000.00
5	24 IN. RCP	LF	2,700	\$ 55.00	\$ 148,500.00
6	36 IN. RCP	LF	2,700	\$ 65.00	\$ 175,500.00
7	28 IN. RCP RELIEF TILE	LF	2,200	\$ 60.00	\$ 132,000.00
8	HEAD WALL OUTLET MODIFICATIONS	EA	1	\$ 10,000.00	\$ 10,000.00
9	TILE EXPLORATION	HRS	18	\$ 250.00	\$ 4,500.00
10	FIELD TILE CONNECTIONS	EA	75	\$ 500.00	\$ 37,500.00
11	CATCH BASIN	EA	7	\$ 2,500.00	\$ 17,500.00
12	SEEDING	AC	5	\$ 1,500.00	\$ 7,500.00
13	TRAFFIC CONTROL	LS	1	\$ 2,500.00	\$ 2,500.00
<b>SUBTOTAL CONSTRUCTION</b>					<b>\$ 879,000.00</b>
CONTINGENCY (10%)					\$ 87,900.00
MOBILIZATION (10%)					\$ 87,900.00
<b>TOTAL CONSTRUCTION</b>					<b>\$ 1,054,800.00</b>
Report and Hearings					\$ 20,000.00
Engineering, Design, and Construction Administration					\$ 75,000.00
<b>TOTAL PROJECT COST</b>					<b>\$ 1,150,000</b>
<b>AVERAGE COST PER ACRE</b>					<b>\$ 505.94</b>
<b>Additional Project Costs</b>					
1	Trenchless 21 inch RCP under US-169 (IADOT) See note.*	LF	86	\$ 1,000.00	\$ 86,000.00
2	Trenched 18 inch RCP inside US-169 right-of-way (IADOT)	LF	34	\$ 45.00	\$ 1,530.00
2	Trenched 24 inch RCP under Madison Avenue (Webster Co. Secondary Roads)	LF	66	\$ 55.00	\$ 3,630.00
3	Restoration of Madison Avenue (Webster Co. Secondary Roads)	LS	1	\$ 4,000.00	\$ 4,000.00
<b>Notes:</b>					
*Pipe diameter increased to next largest diameter to allow for future upsizing.					

**Engineer's Opinion of Probable Costs**  
**Drainage District 34 - Lateral A1 - Webster County**  
**Option C2 (HDPE) - Replace Lateral A1, 1/2" D.C.**

Item No.	Description	Unit	Est. Qty	Unit Price	Extended Price
1	CRUSH AND BURY EXISTING TILE	LF	9,050	\$ 5.00	\$ 45,250.00
2	TRENCH FOUNDATION	TON	3,400	\$ 35.00	\$ 119,000.00
3	18 IN. HDPE	LF	2,050	\$ 31.50	\$ 64,575.00
4	24 IN. HDPE	LF	4,300	\$ 38.50	\$ 165,550.00
5	36 IN. HDPE	LF	2,300	\$ 45.50	\$ 104,650.00
6	36 IN. POLYPROPYLENE	LF	400	\$ 53.50	\$ 21,400.00
7	24 IN. HDPE RELIEF TILE	LF	2,200	\$ 38.50	\$ 84,700.00
8	HEAD WALL OUTLET MODIFICATIONS	EA	1	\$ 10,000.00	\$ 10,000.00
9	TILE EXPLORATION	HRS	18	\$ 250.00	\$ 4,500.00
10	FIELD TILE CONNECTIONS	EA	75	\$ 500.00	\$ 37,500.00
11	CATCH BASIN	EA	7	\$ 2,500.00	\$ 17,500.00
12	SEEDING	AC	5	\$ 1,500.00	\$ 7,500.00
13	TRAFFIC CONTROL	LS	1	\$ 2,500.00	\$ 2,500.00
<b>SUBTOTAL CONSTRUCTION</b>					\$ 684,625.00
CONTINGENCY (10%)					\$ 68,462.50
MOBILIZATION (10%)					\$ 68,462.50
<b>TOTAL CONSTRUCTION</b>					\$ 821,550.00
	Report and Hearings				\$ 20,000.00
	Engineering, Design, and Construction Administration				\$ 75,000.00
<b>TOTAL PROJECT COST</b>					\$ 917,000
<b>AVERAGE COST PER ACRE</b>					\$ 403.43

**Additional Project Costs**

1	Trenchless 24 inch HDPE under US-169 (IADOT) See note.*	LF	86	\$ 1,100.00	\$ 94,600.00
2	Trenched 18 inch HDPE inside US-169 right-of-way (IADOT)	LF	34	\$ 31.50	\$ 1,071.00
2	Trenched 24 inch HDPE under Madison Avenue (Webster Co. Secondary Roads)	LF	66	\$ 38.50	\$ 2,541.00
3	Restoration of Madison Avenue (Webster Co. Secondary Roads)	LS	1	\$ 4,000.00	\$ 4,000.00

**Notes:**

\*Pipe diameter increased to next largest diameter to allow for future upsizing.

**Engineer's Opinion of Probable Costs**  
**Drainage District 34 - Lateral A1 - Webster County**  
**Option D1 (RCP) - Replace Lateral A1, 3/4" D.C.**

Item No.	Description	Unit	Est. Qty	Unit Price	Extended Price
1	CRUSH AND BURY EXISTING TILE	LF	9,050	\$ 5.00	\$ 45,250.00
2	TRENCH FOUNDATION	TON	5,500	\$ 35.00	\$ 192,500.00
3	21 IN. RCP	LF	2,050	\$ 50.00	\$ 102,500.00
4	24 IN. RCP	LF	1,600	\$ 55.00	\$ 88,000.00
5	27 IN. RCP	LF	2,700	\$ 60.00	\$ 162,000.00
6	42 IN. RCP	LF	2,700	\$ 80.00	\$ 216,000.00
7	42 IN. RCP RELIEF TILE	LF	2,200	\$ 80.00	\$ 176,000.00
8	HEAD WALL OUTLET MODIFICATIONS	EA	1	\$ 10,000.00	\$ 10,000.00
9	TILE EXPLORATION	HRS	18	\$ 250.00	\$ 4,500.00
10	FIELD TILE CONNECTIONS	EA	75	\$ 500.00	\$ 37,500.00
11	CATCH BASIN	EA	7	\$ 2,500.00	\$ 17,500.00
12	SEEDING	AC	5	\$ 1,500.00	\$ 7,500.00
13	TRAFFIC CONTROL	LS	1	\$ 2,500.00	\$ 2,500.00
<b>SUBTOTAL CONSTRUCTION</b>					<b>\$ 1,061,750.00</b>
CONTINGENCY (10%)					\$ 106,175.00
MOBILIZATION (10%)					\$ 106,175.00
<b>TOTAL CONSTRUCTION</b>					<b>\$ 1,274,100.00</b>
	Report and Hearings				\$ 20,000.00
	Engineering, Design, and Construction Administration				\$ 75,000.00
<b>TOTAL PROJECT COST</b>					<b>\$ 1,370,000</b>
<b>AVERAGE COST PER ACRE</b>					<b>\$ 602.73</b>
<b>Additional Project Costs</b>					
1	Trenchless 24 inch RCP under US-169 (ADOT) See note.*	LF	86	\$ 1,100.00	\$ 94,600.00
2	Trenched 21 inch RCP inside US-169 right-of-way (ADOT)	LF	34	\$ 50.00	\$ 1,700.00
2	Trenched 27 inch RCP under Madison Avenue (Webster Co. Secondary Roads)	LF	66	\$ 60.00	\$ 3,960.00
3	Restoration of Madison Avenue (Webster Co. Secondary Roads)	LS	1	\$ 4,000.00	\$ 4,000.00
<b>Notes:</b>					
*Pipe diameter increased to next largest diameter to allow for future upsizing.					

**Engineer's Opinion of Probable Costs**  
**Drainage District 34 - Lateral A1 - Webster County**  
**Option D2 (HDPE) - Replace Lateral A1, 3/4" D.C.**

Item No.	Description	Unit	Est. Qty	Unit Price	Extended Price
1	CRUSH AND BURY EXISTING TILE	LF	9,050	\$ 5.00	\$ 45,250.00
2	TRENCH FOUNDATION	TON	4,700	\$ 35.00	\$ 164,500.00
3	24 IN. HDPE	LF	3,650	\$ 38.50	\$ 140,525.00
4	30 IN. HDPE	LF	2,700	\$ 42.00	\$ 113,400.00
5	42 IN. HDPE	LF	2,300	\$ 56.00	\$ 128,800.00
6	42 IN. POLYPROPYLENE	LF	400	\$ 64.00	\$ 25,600.00
7	42 IN. HDPE RELIEF TILE	LF	2,200	\$ 56.00	\$ 123,200.00
8	HEAD WALL OUTLET MODIFICATIONS	EA	1	\$ 10,000.00	\$ 10,000.00
9	TILE EXPLORATION	HRS	18	\$ 250.00	\$ 4,500.00
10	FIELD TILE CONNECTIONS	EA	75	\$ 500.00	\$ 37,500.00
11	CATCH BASIN	EA	7	\$ 2,500.00	\$ 17,500.00
12	SEEDING	AC	5	\$ 1,500.00	\$ 7,500.00
13	TRAFFIC CONTROL	LS	1	\$ 2,500.00	\$ 2,500.00
<b>SUBTOTAL CONSTRUCTION</b>					<b>\$ 820,775.00</b>
CONTINGENCY (10%)					\$ 82,077.50
MOBILIZATION (10%)					\$ 82,077.50
<b>TOTAL CONSTRUCTION</b>					<b>\$ 984,930.00</b>
Report and Hearings					\$ 20,000.00
Engineering, Design, and Construction Administration					\$ 75,000.00
<b>TOTAL PROJECT COST</b>					<b>\$ 1,080,000</b>
<b>AVERAGE COST PER ACRE</b>					<b>\$ 475.14</b>
<b>Additional Project Costs</b>					
1	Trenchless 30 inch HDPE under US-169 (IADOT) See note.*	LF	86	\$ 1,200.00	\$ 103,200.00
2	Trenched 24 inch HDPE inside US-169 right-of-way (IADOT)	LF	34	\$ 38.50	\$ 1,309.00
2	Trenched 30 inch HDPE under Madison Avenue (Webster Co. Secondary Roads)	LF	66	\$ 42.00	\$ 2,772.00
3	Restoration of Madison Avenue (Webster Co. Secondary Roads)	LS	1	\$ 4,000.00	\$ 4,000.00
<b>Notes:</b>					
*Pipe diameter increased to next largest diameter to allow for future upsizing.					

**APPENDIX C**

NRCS SOILS MAP - DRAINAGE



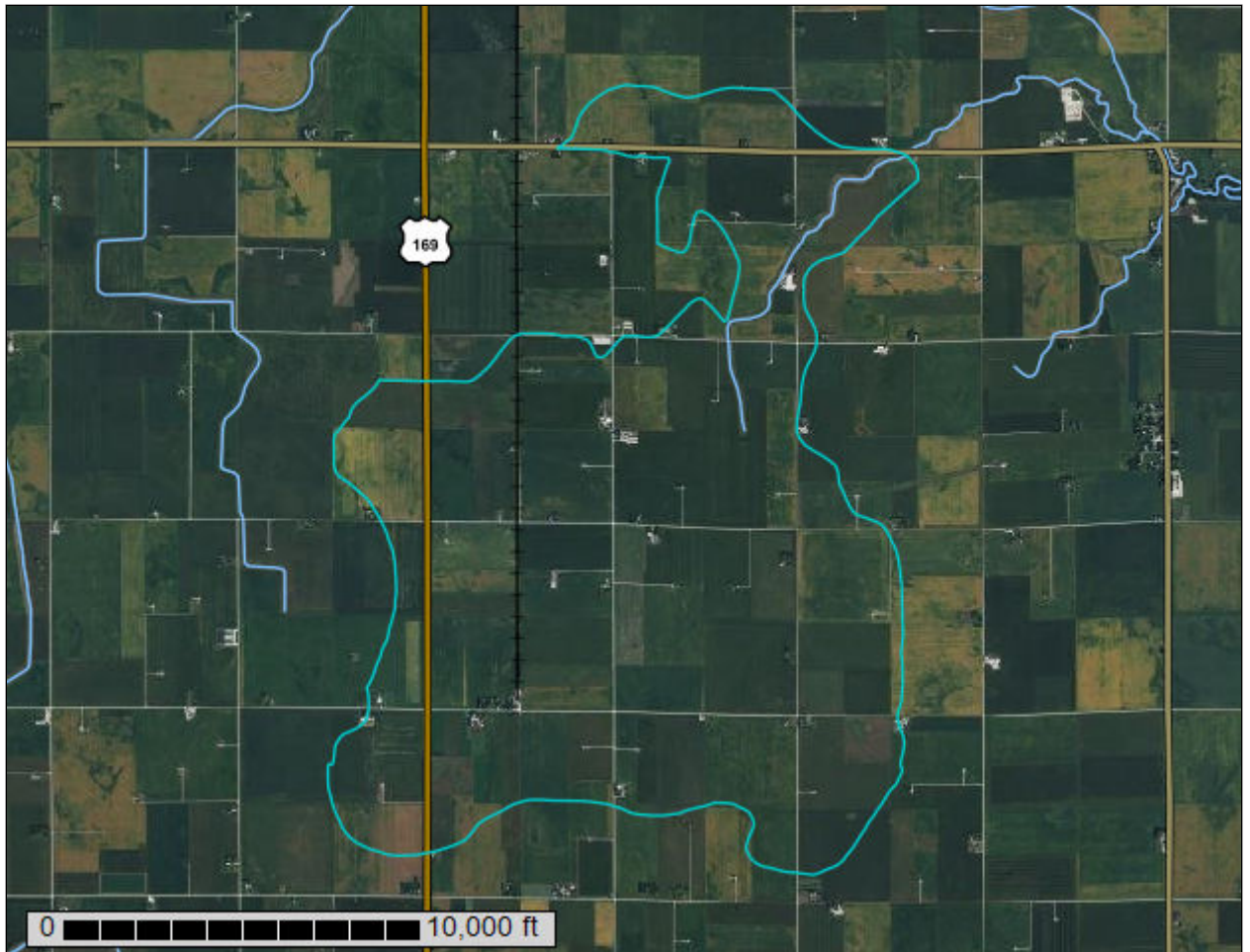
United States  
Department of  
Agriculture

NRCS

Natural  
Resources  
Conservation  
Service

A product of the National  
Cooperative Soil Survey,  
a joint effort of the United  
States Department of  
Agriculture and other  
Federal agencies, State  
agencies including the  
Agricultural Experiment  
Stations, and local  
participants


# Custom Soil Resource Report for 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 41, Aug 29, 2024

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

Date(s) aerial images were photographed: Sep 5, 2021—Oct 14, 2021

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.

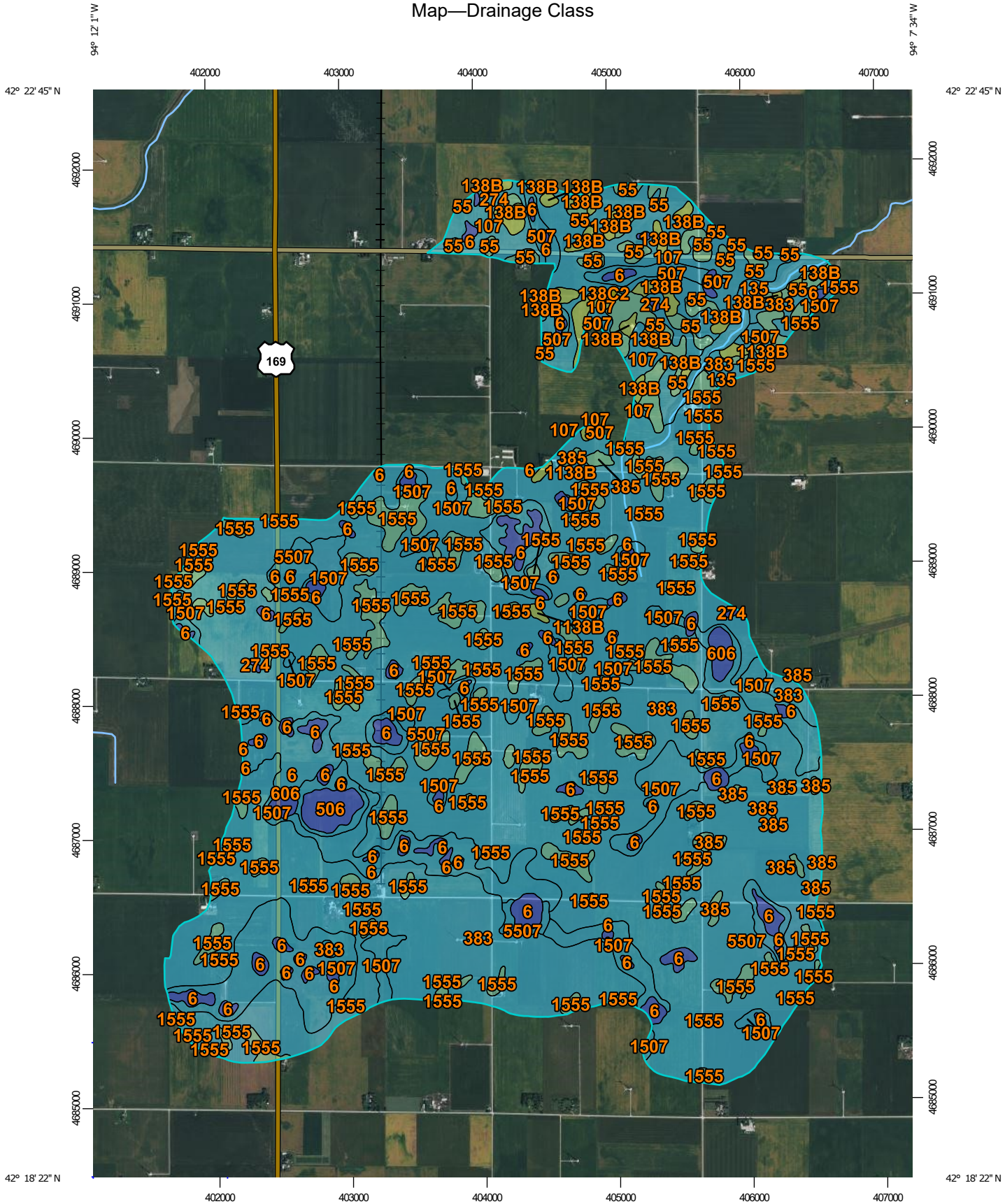
## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
6	Okoboji silty clay loam, 0 to 1 percent slopes	201.6	3.9%
55	Nicollet clay loam, 1 to 3 percent slopes	135.5	2.6%
107	Webster clay loam, 0 to 2 percent slopes	297.9	5.7%
135	Coland clay loam, 0 to 2 percent slopes, occasionally flooded	39.5	0.8%
138B	Clarion loam, 2 to 6 percent slopes	89.5	1.7%
138C2	Clarion loam, 6 to 10 percent slopes, moderately eroded	2.9	0.1%
274	Rolfe silt loam, 0 to 1 percent slopes	4.1	0.1%
383	Marna silty clay loam, 0 to 2 percent slopes	3,081.6	59.1%
385	Guckeen clay loam, 1 to 3 percent slopes	30.5	0.6%
506	Wacousta silty clay loam, depressional, 0 to 1 percent slopes	28.7	0.6%
507	Canisteo clay loam, 0 to 2 percent slopes	41.9	0.8%
606	Lanyon silty clay loam, depressional, 0 to 1 percent slopes	22.3	0.4%
1138B	Clarion clay loam, 2 to 5 percent slopes	9.7	0.2%
1507	Brownton silty clay loam, 0 to 2 percent slopes	626.4	12.0%
1555	Nicollet-Guckeen complex, 1 to 3 percent slopes	523.5	10.0%
5507	Corvuso-Brownton complex, 0 to 2 percent slopes	76.4	1.5%
<b>Totals for Area of Interest</b>		<b>5,212.2</b>	<b>100.0%</b>

## Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

# Custom Soil Resource Report Map—Drainage Class



Map Scale: 1:39,500 if printed on A portrait (8.5" x 11") sheet.

0 500 1000 2000 3000 Meters


0 1500 3000 6000 9000 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84



### MAP LEGEND

**Area of Interest (AOI)**

 Area of Interest (AOI)

**Soils**

**Soil Rating Polygons**

-  Excessively drained
-  Somewhat excessively drained
-  Well drained
-  Moderately well drained
-  Somewhat poorly drained
-  Poorly drained
-  Very poorly drained
-  Subaqueous
-  Not rated or not available


**Soil Rating Lines**

-  Excessively drained
-  Somewhat excessively drained
-  Well drained
-  Moderately well drained
-  Somewhat poorly drained
-  Poorly drained
-  Very poorly drained
-  Subaqueous
-  Not rated or not available






**Soil Rating Points**

-  Excessively drained
-  Somewhat excessively drained
-  Well drained
-  Moderately well drained
-  Somewhat poorly drained
-  Poorly drained
-  Very poorly drained
-  Subaqueous
-  Not rated or not available


**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 41, Aug 29, 2024

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

Date(s) aerial images were photographed: Sep 5, 2021—Oct 14, 2021

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.

Custom Soil Resource Report

**Table—Drainage Class**

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
6	Okoboji silty clay loam, 0 to 1 percent slopes	Very poorly drained	201.6	3.9%
55	Nicollet clay loam, 1 to 3 percent slopes	Somewhat poorly drained	135.5	2.6%
107	Webster clay loam, 0 to 2 percent slopes	Poorly drained	297.9	5.7%
135	Coland clay loam, 0 to 2 percent slopes, occasionally flooded	Poorly drained	39.5	0.8%
138B	Clarion loam, 2 to 6 percent slopes	Moderately well drained	89.5	1.7%
138C2	Clarion loam, 6 to 10 percent slopes, moderately eroded	Well drained	2.9	0.1%
274	Rolfe silt loam, 0 to 1 percent slopes	Very poorly drained	4.1	0.1%
383	Marna silty clay loam, 0 to 2 percent slopes	Poorly drained	3,081.6	59.1%
385	Guckeen clay loam, 1 to 3 percent slopes	Somewhat poorly drained	30.5	0.6%
506	Wacousta silty clay loam, depression, 0 to 1 percent slopes	Very poorly drained	28.7	0.6%
507	Canisteo clay loam, 0 to 2 percent slopes	Poorly drained	41.9	0.8%
606	Lanyon silty clay loam, depression, 0 to 1 percent slopes	Very poorly drained	22.3	0.4%
1138B	Clarion clay loam, 2 to 5 percent slopes	Moderately well drained	9.7	0.2%
1507	Brownton silty clay loam, 0 to 2 percent slopes	Poorly drained	626.4	12.0%
1555	Nicollet-Guckeen complex, 1 to 3 percent slopes	Somewhat poorly drained	523.5	10.0%
5507	Corvuso-Brownton complex, 0 to 2 percent slopes	Poorly drained	76.4	1.5%
<b>Totals for Area of Interest</b>			<b>5,212.2</b>	<b>100.0%</b>

**Rating Options—Drainage Class**

*Aggregation Method: Dominant Condition*  
*Component Percent Cutoff: None Specified*  
*Tie-break Rule: Higher*