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Engineer's Report

Drainage District No. 10
Lateral 2
Lateral Tile Improvements

Hancock County, Iowa

Filed: October 26, 2026

Submitted by:
Bolton & Menk, Inc.
1609 U.S. Hwy 18 East
Algona, IA 50511
P: 515-395-3140

Proj. No. 26X.143397.000

Certification

Engineer's Report

for

Drainage District No. 10
Lateral 2
Lateral Tile Improvement

Hancock County, Iowa

October 26, 2026



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, 2027.

By: _____
Tyler A. Conley, P.E.
License No. 25044

Date: 10/26/2026

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I. INTRODUCTION

A. SCOPE OF WORK

The purpose of this report is to provide information related to drainage relief requested by landowners of Drainage District No. 10, Hancock County, Iowa (DD10). The Board of Supervisors, acting as Trustees, appointed Tyler A. Conley, P.E., Bolton & Menk, Inc. to complete the necessary preliminary survey, study, and engineering report.

This report addresses landowner requests for facility improvements associated with Lateral 2. This report examines the conditions that would be necessary to improve the drainage capacity of the district facility to the modern drainage capacity recommendation. A copy of the drainage petition is attached with this report in Appendix A.

B. LOCATION & DISTRICT FACILITIES

The watershed of DD10 Lateral 2 lies within Hancock County, located generally northwest of the town of Hutchins. The watershed of Lateral 2 is located in Sections 19, 20, 28, 29, 30, and 32 of Orthel Township (T-96-N, R-26-W).

The Watershed of DD10 is much larger and encompasses land in both Boone, Orthel, and a small part of Magor Township, and includes DD97, DD51, and DD40 as sub-districts within its watershed. The Open Ditch of DD10 starts just west of Corwith Iowa on an improved stretch on the Boone River in Section 5 of Magor Township (T-94-N, R-26-W).

The Lateral 2 tile outlets into Drainage Ditch No. 10. at a headwall in Section 29 of Orthel Township. The headwall is in the north ditch of US HWY 18 near a box culvert that crosses underneath the highway.

From the outlet, Lateral 2 continues upstream in a northwest direction through Section 29 of Orthel Township. It crosses Birch Avenue and turns slightly north. Lateral 2 ends after crossing 240th St. in the northeast corner of Section 19, Orthel Township.

From the Lateral 2 outlet water continues downstream in Drainage Ditch No. 10 where it connects with the Boone River in Section 29 of Boone Township (T-95-N, R-26-W). The Boone River continues until it merges with the Des Moines River and eventually the Mississippi River.

A map of the facility locations and lateral tile watershed is included in Appendix D.

II. INVESTIGATION

A. SURVEY & INVESTIGATION

A field review and preliminary survey were performed for the Lateral 2 tile facility of DD10. It was determined that Lateral 2 is undersized by today's standards. This is most evident after heavy rainfalls when standing water is observed in the fields and running water is visible in the North Ditch of US HWY 18. The outlet of Lateral 2 into the Lateral 2 Open Ditch of Drainage Ditch No. 10 was also examined as part of the investigation. This was done to determine if there was sufficient depth in the Open Ditch to allow for a larger diameter pipe without restricting the outlet. There were also discussions with landowners who had a local contractor excavate and investigate the existing tile system. The contractor was able to camera a portion of the tile and determined that the last ½ mile of lateral 2 is back laid and no longer at the designed grade.

The Iowa Department of Transportation (IDOT) is also planning a project to move the existing box culvert to the east to better align with the upstream and downstream channels. Based on this relocation and the fact that the IDOT is responsible for the cost of constructing a district tile across the Highway right-of-way, it would appear to be the most economical to extend and improve the Lateral 2 tile as part of that culvert relocation project anticipated in 2027.

B. CAPACITY ANALYSIS

The standard design method for sub-surface tile drains utilizes drainage coefficients. The drainage coefficient is the rate at which water can be removed and is expressed as the equivalent depth of water covering the design area that can be removed in 24 hours.

Based on the existing profiles of Lateral 2, the capacity of the facility could be calculated. By today's standards, Lateral 2 is undersized, the majority of the tile is at or below 0.10" per day, or 20% of the modern drainage coefficient standard. The standard drainage coefficient at the time of construction would have been between ⅛" and ¼" per day, however today's drainage standard is ½" per day with good surface drainage, and up to 1" per day for depressional areas. Additionally, because the theoretical drainage coefficient is calculated using the size, grade, and drainage area, the actual capacity of the tile systems could be considerably less due to factors such as material age, tile damage, tile blockages, sedimentation and joint displacement. Appendix B displays the estimated tile capacities for Lateral 2.

Because of the existing tile capacities and landowner interest for an improvement of the system, we included pipe sizing for ½", ¾", and 1" drainage coefficients. It is recommended the landowners consider these options and take action to gain a minimum of a ½" per day drainage coefficient for the Lateral 2 tile systems.

III. PROPOSED IMPROVEMENT

A. LATERAL 2 IMPROVEMENTS

The Lateral 2 tile is undersized by the design standards of today and consideration should be made for an improvement to increase capacity. The existing tile should be replaced with the appropriately sized pipe at the correct grade to provide, at minimum a ½" drainage coefficient, while also being installed at a depth to provide approximately 3 feet of ground cover.

Based on the analysis of the system, appropriate size and grade could be achieved to gain the ½", ¾", or the 1" drainage coefficient. Based on the area drained, grade of the proposed system, and the conventional tile sizes it is likely that the ½" drainage coefficient option would be increased in at least the lower two sections tile to a size of tile that would constitute the ¾" drainage coefficient. The capacity analysis shows the minimum pipe size needed for the ½" drainage coefficient. Those downstream sizes are a 27-inch and 21-inch pipe. These sizes are not conventionally made and would likely cost the same or more than the next available sizes of 30-inch and 24-inch, respectively. Therefore the cost estimate in Appendix C contains estimates upsized to the most conventionally available sizes for the most economical estimate of prices.

There are several conditions that need to be considered with an improvement project. First, with any improvement, under Iowa Code Chapter 468.126, any upstream farmed wetlands in the District could be assumed converted and mitigation of these converted acres would be required, at a minimum acre for acre basis, to meet Farm Program Compliance. Additional information on Farm Program Compliance can be found in Section V of this report.

Second, district improvement projects can be halted by a process known as "remonstrance". For remonstrance to be met, objections must be made to the auditor by "*a majority of the landowners in the district, and these remonstrants must in the aggregate own seventy percent or more of the lands to be assessed for benefits or taxed for said improvement*" – Iowa Code Chapter 468.28.

Third, if the improvement options are approved, reclassification is required as stated in Chapter 468.131 of the Iowa Code: "*When an assessment for improvements…exceeds twenty-five percent of the original assessment and the original or subsequent assessment or report of the benefit commission as confirmed did not designate separately the amount each tract should pay for the main ditch and tile lateral drains then the boards shall order a reclassification.*"

Lastly, if the tile is improved in longer segments that cross public roadways, the cost associated with any tile work for crossing state highways or county secondary roads will be the responsibility of the Iowa DOT and Hancock County Secondary Roads Department respectively. Appendix C contains a cost estimate for these improvement options including right-of-way crossing expenses and non-construction expenses such as engineering and finance estimates.

B. WORK LIMITS & DAMAGES

Landowners are entitled to full reimbursement for damages resulting from the work on their lands, outside of the District right-of-way. These damages will be established at a project completion hearing after the work is complete. The contractor will be assigned temporary work limits along each side of the tile lines to allow for construction activities. The work limits for the tile would be set at approximately 40 to 65 feet on either side of the tile centerline.

It is anticipated that the work will commence in the Spring of 2027 and continue into the fall of 2027. Crops that are damaged during construction would be paid for by the District, based on crop appraisals. The construction zone would be minimized, and the work scheduled to minimize the loss of crops.

Buffer Strips may exist within the work area. Seeding of these areas is typically performed by the landowner, with reimbursement being made at the project completion hearing. Seed mixes for these lands are often specific for the type of conservation practice which is utilized.

If there are 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 and conservation acres.

The destruction of buffer strip vegetation by spoil placement or leveling along the open ditch and tile installation 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 and tile installation if seeding restoration in compliance with NRCS requirements, is done. If the work on the tile is authorized, all farm program owners on the improvement portion of the tile must independently seek the FSA County Committee waivers. This process can take two or three months and should be initiated immediately if this improvement is authorized.

IV. OPINIONS OF PROBABLE COST

The cost estimates for the improvement options are contained in Appendix C. 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. Cost Estimates are provided for the ½", ¾" and 1" drainage coefficients.

V. FARM PROGRAM COMPLIANCE

A. FARM PROGRAM WETLAND CONSERVATION RULES

The farm program wetland conservation rules are administered by the USDA Farm Service Agency. The USDA Natural Resources Conservation Service (NRCS) provides technical assistance. This technical assistance includes policing program violations and making certified wetland determinations. At the time of the filing of this report, we would request landowners receiving benefits from the proposed improvements to secure certified wetland determinations from the USDA/NRCS and provide them to the District. Only landowners or their authorized agents may request the determinations from the USDA. Most landowners will have valid wetland determinations in their USDA files. If the improvement goes forward, wetland determinations will be needed for all the agricultural or potentially agricultural land in the District.

The USDA has in recent years adopted a few revised interpretations of the farm program wetland conservation rules which are applicable here.

● For any improvements constructed by a drainage district, the NRCS will make a rebuttable assumption that every farmed wetland in the drainage district will be converted. This assumption can be appealed by the impacted landowners, but not by the drainage district.

● Mitigation of converted farmed wetland must compensate for all lost wetland functions and must also be made at a minimum acre for acre basis.

● A plan for the mitigation of all converted farmed wetland in the drainage district must be approved by the NRCS prior to the beginning of the construction of the improvements. After all opportunities for appeals are exhausted, the farmed wetland not covered by that mitigation plan would be found converted and the landowner and tenant would be in technical violation of the farm program. Penalties can be avoided when a drainage district causes the conversion, but only at the price of abandoning farming of the converted farmed wetlands or ceasing to participate in the farm program.

● The planned mitigation must be in place and functioning no later than the completion of the project which converts the farmed wetlands.

If a landowner does not provide a certified wetland determination and he/she happens to end up with a converted farmed wetland which he/she continues to crop, he/she will find himself in technical violation of the farm program rules and be subject to a USDA claim for the forfeiture and possibly refund of farm program payments when the work commences.

The Boards of Supervisors in Iowa may approve and authorize construction of the proposed improvements without accruing risk to the drainage district from farm program wetland conservation rules violations. Obviously, the Board will want to know the wetlands status of all landowners and to help to keep them all in farm program compliance, but the Board cannot

allow the failure of an individual landowner to share wetland information to influence the very important decisions they are charged to make for all of the benefitted landowners. By the rules, the program penalties will fall solely to the owners of the converted farmed wetlands for which cropping continues and compensatory mitigation is not secured. **It is then fully up to each landowner to cooperate with his/her drainage district toward keeping himself/herself in farm program compliance.**

B. CONVERTED WETLAND MITIGATION ALTERNATIVES

Since 1987, the USDA has assumed jurisdiction over the conversion (or improved drainage of) what has become commonly termed "farmed wetland". It being the rebuttable assumption of the current USDA policies that all farmed wetlands will be converted and that acre-for-acre mitigation will be necessary to put the converted farmed wetlands back into production, the decision process is actually made a little easier—although mitigation is made costlier.

Mitigation options include the purchase of wetland credits in a mitigation bank. Mitigation banks are not common, and their credits are not cheap. New sites for mitigation are currently available from the Iowa Agriculture Mitigation Bank, Inc. (IAMBI). The current price for mitigation at the IAMBI is approximately $15,000 per acre.

Another alternative is for the District to self-mitigate, wherein a mitigation plan to use a suitable site inside or outside the District, on which to create wetlands for mitigation of impacted wetlands is developed for review and approval by the NRCS.

A third alternative is to have the District pay the owner of a converted farmed wetland a portion of the cost for mitigation. The landowner may then either purchase mitigation on his own or let the land lay idle until mitigation is acquired.

Farm program rules clearly provide that when a farmed wetland is converted by a drainage district, the conversion act is attributed to the owner of the farmed wetland. **However, the farm program rules also clearly provide that the owner of the converted farmed wetland may remain eligible for farm program benefits by opting to not farm the converted farmed wetland.** If for some reason mitigation is delayed, this can be a temporary solution for the farmed wetland owners in a drainage district. It is also an option for those who choose not to provide certified farmed wetland determinations and end up with a converted farmed wetland.

C. WETLAND MITIGATION POLICY

How drainage districts address mitigation is relatively new and a statewide standard practice has not yet evolved. This includes how the costs of the mitigation are paid. In several counties, the mitigation costs have been shared between the district and the owners of the converted farmed wetlands, when wetland mitigation credits were available. In some counties, mitigation has been left entirely to the owners of the converted farmed wetlands. Each drainage district's circumstances are different, and the Boards of Supervisors in other counties have exercised flexibility in addressing mitigation on a case by case and district by district basis.

In some other counties, the Board of Supervisors have adopted resolutions that spell out how farmed wetlands will be dealt with for drainage districts under their supervision when drainage improvements are considered.

The resolution provides that if an improvement project is authorized, the drainage district will exercise the third mitigation alternative described above. The owners of all farmed wetlands known at the time of the hearing, and which the USDA eventually determines will be

converted by the drainage district project, will be credited or paid up to $7,500 per acre of converted farmed wetland. This is intended to offset a part of the cost of mitigation.

In order to retain farm program eligibility, the converted farmed wetland owner may need to forego cropping of the converted farmed wetland until mitigation becomes available. In the future the landowner could purchase mitigation and resume farming of the converted farmed wetland or opt to leave the converted wetland site permanently idle.

VI. WATER QUALITY

The hydrologic impacts to tile drainage entails a complex interaction of processes dependent upon landscape, climatic and human influences, watershed scale, soil permeability and rainfall event size. There is a popular and often accepted idea, that an increase in subsurface drainage facilities adds to an increase in both peak and total rainfall values, thereby increasing flooding. Recently published research, from the University of Iowa's IIHR – Hydroscience and Engineering Center, refutes that perception. This University of Iowa report was the result of a water model study of the Clear Creek Watershed in Iowa and Johnson Counties and found that an increase in field tile and subsurface drainage decreases peak flows, for most storm events. The field scale DRAINMOD model was used in the research, in conjunction with a simplified routing equation, to analyze the impact of tile drains in the Clear Creek Watershed.

However, additional steps are required to slow, impound, or infiltrate water in order to receive benefits in water quality. Water quality is a growing topic throughout the nation and more recently throughout Iowa. The particle loads and nutrient levels within drainage water is a concern that is receiving increased scrutiny. Processes and reduction practices are being developed and incorporated on farms and into projects throughout Iowa, which reduce nitrogen loss and improve water quality. Enhancement of water quality is possible through many different drainage applications that can see both immediate and long-term benefits.

We encourage the landowners of this District to consider multi-purpose drainage management, which incorporates Best Management Practices (BMPs), which utilize effective measures aimed at reducing sediment and nutrient loading and improving water quality. These BMPs are divided into three (3) areas: preventative measures, control measures, and treatment measures.

Preventative measures that can be applied throughout the watershed include crop rotation, cover crops, residue management, and nutrient management. These measures are aimed at controlling sediment, minimizing erosion and nutrient loss, and sustaining the soil's health, all without dramatically changing the current land use of the landscape.

Control measures are practices aimed at improving water quality directly associated with the flow of water by reducing peak flows, providing in stream storage, sedimentation, and nutrient uptake. Examples of control measures include alternative tile intakes, grassed waterways, two (2) stage ditches, water control structures, and controlled subsurface drainage. These practices are directly linked to the conveyance of subsurface tile water or open channel ditch flow.

The function of **treatment measures** is to improve water quality, by directly removing sediment and nutrients from the subsurface or surface water flow throughout a watershed. Examples of treatment measures include surge basins (storage ponds), filter/buffer strips, wetland restorations, woodchip bioreactors, and water and sediment control basins (WASCOBs).

These practices may be incorporated into either the public or private drainage systems.

Funding options are available to landowners through the Environmental Quality Incentives Program (EQIP) and the Iowa Water Quality Initiative. EQIP is a voluntary program that provides financial assistance to individual landowners for various conservative practices as identified above. Also, the State of Iowa, through the Iowa Water Quality Initiative, provides cost share funds to participating landowners to voluntarily install nutrient reduction practices.

A unique opportunity may exist when a wetland is created within the district for the treatment of the tile and/or surface waters of the watershed. A properly sized and created wetland may be able to be utilized as a mitigation site for any farmed wetlands that are found within the drainage district. With the possibility of a large share of the created wetland being funded by the Iowa Water Quality Initiative program, any potential farmed wetlands could be mitigated at a much reduced cost.

If there is landowner interest in any of these water quality features and funding options, further study and review would be required to select, site, and fund the water quality measures appropriate for the area.

VII. ANNEXATION

Upon review of the existing watershed and assessment boundary, it was found that lands that are benefiting from the existing district facilities are not assessed for the benefit that they receive, and land that is not benefiting from the existing district facilities are assessed for benefits that they do not receive. These areas are outside the existing district facility assessment boundary, but drain to the existing facilities of the District, and should be added to the schedule of DD10 Lateral 2. The Board of Supervisors are able to annex these lands under Section 468.119. of the Iowa Code which states *"…if the board becomes convinced that additional lands contiguous to the district, and without regard to county boundaries, are benefited by the improvement to said district as contemplated in Section 468.126, the board may adopt with or without a petition from owners of the proposed annexed lands, a resolution of necessity for annexation of such addition land."*

It would be cost effective to perform this annexation as part of the proposed project. Most landowners now in the drainage district would likely support the annexation; those being annexed would tend to be opposed. It should be emphasized to the owners of the annexed lands that the assessments are based upon relative benefit and that if the benefit is small, the assessment is also relatively small. It should also be noted that the number of acres to be annexed is based on a preliminary model, the actual number of acres annexed is likely to change with a more refined model if annexation proceeds.

We recommend annexation of all those materially benefiting areas as they have the specific benefits of being able to drain their land to the facilities of the District and have surface drainage which flows to the facilities of the District.

VIII. RECLASSIFICATION

As stated earlier, if any of the improvement options is approved, reclassification is required as stated in Section 468.131 of the Iowa Code: *"When an assessment for improvements…exceeds twenty-five percent of the original assessment and the original or subsequent assessment or report of the benefit commission as confirmed did not designate separately the amount each tract should pay for the main ditch and tile lateral drains then the boards shall order a reclassification."*

IX. SUMMARY & DISCUSSION

Recommendations

Lateral 2 Improvement Recommended

This report has confirmed the need for drainage relief for Drainage District No. 10. The Lateral 2 tile of DD10 is aging and undersized. The work described herein can accomplish that relief. At a minimum, we recommend proceeding with at minimum the ½" drainage coefficient improvement option. The proposed improvement is considered to be of public benefit and is conducive to public health, convenience or welfare.

Reclassification and Annexation Recommended

There are material inequities in the current Lateral 2 assessment schedule used by the District. The Iowa Code Section 468.65 states: "*When, after a drainage or levee district has been established… or when a repair, improvement, or extension has become necessary, the board may consider whether the existing assessments are equitable as a basis for payment of the expense of maintaining the district and of making the repair, improvement or extension. If they find the assessments to be generally inequitable, they shall order a reclassification of all property subject to assessment.*" Additionally, if these inequities were to be fixed, it is recommended that annexation be considered in order to fairly distribute the costs of future maintenance, as well as any repair or improvements to lands not currently included in the current assessment schedule.

Installment Payments

Iowa drainage law allows drainage district costs for large projects to be spread 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 twenty 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. 10 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 improvement alternate recommended for construction, modified as deemed appropriate, to satisfy the desires of the District.
3. Direct the engineer to prepare final plans and specifications for the adopted plan and proceed toward a bid letting.
4. Initiate annexation of benefited lands not on the assessment schedule. A separate report on annexation and public hearing on the annexation report would be required.
5. Initiate reclassification of benefits for Drainage District No. 10 Lateral 2. A separate commissioners' report on reclassification and public hearing on commissioners' report would be required.

Respectfully submitted,
Bolton & Menk, Inc.

Tyler A. Conley, P.E.
Project Manager

Appendix A: Petition

PETITION FOR REPAIRS/IMPROVEMENT

I wish to call your attention to the necessity for repair/improvement to Drainage District:

DD # 10 Lat. # 2

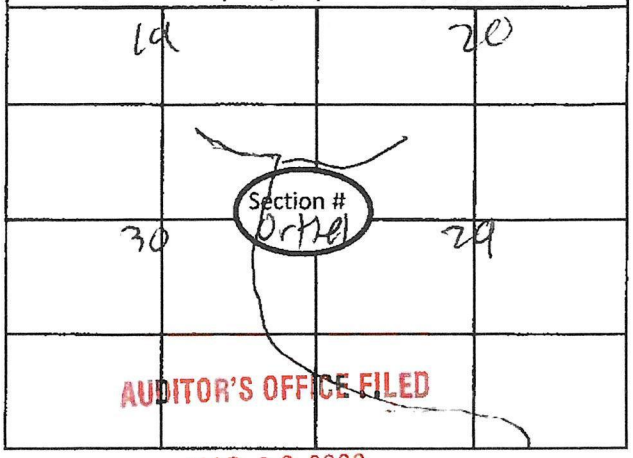
Section: 30, 29, 19, 20

Township: Orthel

Landowner(s): Darin Kruger

Phone: [redacted]

Please draw a diagram showing where the repair/improvement is needed



AUDITOR'S OFFICE FILED
MAR 26 2026
MICHELLE K. EISENMAN
HANCOCK COUNTY AUDITOR

Description of problem (be specific):

the tile is off grade when it get north of Birch ave. for over ½ mile (Cody Dornbier camera the file winter 2026

*****NOTICE TO PETITIONER*****

By signing this petition for improvement or repair, I understand that the trustees of the drainage district are required to assign and involve an outside engineer. The costs and fees of the appointed engineer may be substantial in amount and will accure prior to the public hearing or informational hearing described below.

I understand, after investigation by the engineer, their findings will be presented to the trustees who will set a time and date for a public hearing or informational meeting. Landowners of the petitioned drainage district will be notified of the hearing date and what the petition concerns.

At the time of public hearing, the petition will either be approved or remonstranced if it is an improvement

In the event of approval, withdrawal or remonstrance, it is the responsibility of that drainage district to cover any associated fees on this petition.

Signature: Darin Kruger Date: 3-23-26

Office Use Only Below:

Engineer Assigned: Bolton + Menk

Chairperson Signature: [signature]

Date: 3-30-26

Appendix B: Existing Tile Capacities

DISTRICT FACILITY CAPACITY
0.5" DRAINAGE COEFFICIENT
DRAINAGE DISTRICT NO. 10, LATERAL 2
HANCOCK COUNTY, IOWA
Lateral 2

Segment	Station Start	Station End	Size (in)	Grade (%)	n	S (ft/ft)	A (ft)	P (ft)	R (ft)	Flow Capacity (cfs)	Drainage Area (Ac)	Drainage Coefficient (in/day)	% of 0.5" Coefficient	Required Size
1	0+00	38+00	12	0.300	0.013	0.0030	0.79	3.14	0.25	1.96	680	0.068	13.7%	27
2	38+00	47+00	10	0.300	0.013	0.0030	0.55	2.62	0.21	1.20	340	0.084	16.8%	21
3	47+00	73+00	8	0.300	0.013	0.0030	0.35	2.09	0.17	0.66	173	0.091	18.3%	15

DISTRICT FACILITY CAPACITY
0.75" DRAINAGE COEFFICIENT
DRAINAGE DISTRICT NO. 10, LATERAL 2
HANCOCK COUNTY, IOWA
Lateral 2

Segment	Station Start	Station End	Size (in)	Grade (%)	n	S (ft/ft)	A (ft)	P (ft)	R (ft)	Flow Capacity (cfs)	Drainage Area (Ac)	Drainage Coefficient (in/day)	% of 0.75" Coefficient	Required Size
1	0+00	38+00	12	0.300	0.013	0.0030	0.79	3.14	0.25	1.96	680	0.068	9.1%	30
2	38+00	47+00	10	0.300	0.013	0.0030	0.55	2.62	0.21	1.20	340	0.084	16.8%	24
3	47+00	73+00	8	0.300	0.013	0.0030	0.35	2.09	0.17	0.66	173	0.091	18.3%	18

DISTRICT FACILITY CAPACITY
1" DRAINAGE COEFFICIENT
DRAINAGE DISTRICT NO. 10, LATERAL 2
HANCOCK COUNTY, IOWA
Lateral 2

Segment	Station Start	Station End	Size (in)	Grade (%)	n	S (ft/ft)	A (ft)	P (ft)	R (ft)	Flow Capacity (cfs)	Drainage Area (Ac)	Drainage Coefficient (in/day)	% of 1" Coefficient	Required Size
1	0+00	38+00	12	0.300	0.013	0.0030	0.79	3.14	0.25	1.96	680	0.068	6.8%	36
2	38+00	47+00	10	0.300	0.013	0.0030	0.55	2.62	0.21	1.20	340	0.084	16.8%	30
3	47+00	73+00	8	0.300	0.013	0.0030	0.35	2.09	0.17	0.66	173	0.091	18.3%	24

Appendix C: Opinions of Probable Cost

Engineer's Opinion of Probable Cost
Drainage District No. 10
Lateral 2 Tile Improvements
Hancock County, Iowa
2026

Division 1 - Lateral 2 - Work On Private Property - Drainage Coefficient 0.5"

Item	Description	Unit	Quantity	Unit Price	Total
101A	Lateral Tile Connections, 10" Dia. Or Smaller	EA	10	$300	$3,000
102A	Lateral Tile Connections, 12" Dia. Or Larger	EA	1	$500	$500
103A	30" Dia. HDPE Elbow Section, Fabrication Only	EA	11	$1,300	$14,300
104A	24" Dia. HDPE Elbow Section, Fabrication Only	EA	6	$1,200	$7,200
105A	15" Dia. HDPE Elbow Section, Fabrication Only	EA	9	$750	$6,750
106A	Spot Tile Exploration	HR	16	$200	$3,200
107A	Trench Foundation Stone	TN	500	$30	$15,000
108A	Drain Tile, Trenched, HDPE, 30" Dia.	LF	3,800	$75	$285,000
109A	Drain Tile, Trenched, HDPE, 24" Dia.	LF	900	$50	$45,000
110A	Drain Tile, Trenched, HDPE, 15" Dia.	LF	2,600	$25	$65,000
111A	Fence Cuts	EA	2	$100	$200
112A	Mobilization	LS	1	$22,300	$22,300
113A	Construction Contingency	LS	1	$47,550	$47,550

Estimated Construction Cost - Div.1 - Lat.2 - Work on Private Property - 0.5" DC **$515,000**

Division 2 - Lateral 2 - State Highway Road Crossing - US-18 - Drainage Coefficient 0.5"

Item	Description	Unit	Quantity	Unit Price	Total
201A	4" PVC Inspection Tubes	LF	20	$25	$500
202A	Drain Tile, Trenched, Class III R.C.P., 30" Dia.	LF	103	$125	$12,875
203A	Traffic Control	LS	1	$1,500	$1,500
204A	Seeding & Fertilization (Rural)	AC	0.1	$25,000	$2,500
205A	Mulch Furnished and Placed	AC	0.1	$25,000	$2,500
206A	Silt Fence, Installation and Removal	LF	100	$5	$500
207A	Mobilization	LS	1	$2,625	$2,625

Estimated Construction Cost - Div.2 - Lat.2 - State Highway Road Crossing - US-18 - 0.5" DC **$23,000**

Division 3 - Lateral 2 - Road Crossing Birch Ave. - Drainage Coefficient 0.5"

Item	Description	Unit	Quantity	Unit Price	Total
301A	Drain Tile, Trenched, Class III R.C.P., 24" Dia.	LF	66	$105	$6,930
302A	Traffic Control	LS	1	$1,500	$1,500
303A	Safety Closure	EA	2	$1,500	$3,000
304A	Seeding and Fertilization (Rural)	AC	0.1	$25,000	$2,500
305A	Silt Fence, Installation and Removal	LF	200	$5	$1,000
306A	Construction Contingency	LS	1	$1,570	$1,570

Estimated Construction Cost - Div.3 - Lat.2 - Birch Ave. Crossing - 0.5" DC **$16,500**

Engineer's Opinion of Probable Cost
Drainage District No. 10
Lateral 2 Tile Improvements
Hancock County, Iowa
2026
Division 4 - Lateral 2 - Road Crossing 240th St. - Drainage Coefficient 0.5"

Item	Description	Unit	Quantity	Unit Price	Total
401A	Drain Tile, Trenched, Class III R.C.P., 15" Dia.	LF	66	$85	$5,610
402A	Traffic Control	LS	1	$1,500	$1,500
403A	Safety Closure	EA	2	$1,500	$3,000
404A	Seeding and Fertilization (Rural)	AC	0.1	$25,000	$2,500
405A	Silt Fence, Installation and Removal	LF	200	$5	$1,000
406A	Construction Contingency	LS	1	$1,390	$1,390

Estimated Construction Cost - Div.4 - Lat.2 - 240th St. Crossing - 0.5" DC	**$15,000**
Estimated Total Construction Cost - Lateral 2 - 0.5" Drainage Coeffcient	**$569,500**

Non-Construction Costs

Construction Related Damages	$16,000
Basic Engineering Services	
Survey, Study & Report, Meetings & Hearing	$30,000
Wetland Regulations Administration	$7,000
Annexation & Reclassification	$30,000
Construction Plans, Specifications, & Bid Letting	$45,000
Construction Engineering Services, Staking, & Inspection	$50,000
Legal Services, Publications, Mailings, Etc..	$1,500
Finance, Interest & Contingency	$28,500
Estimated Total Non-Construction Costs	**$208,000**
Estimated Total Assessable Project Cost - 0.5" Drainage Coefficient Lateral 2 Improvement	**$723,000**
Estimated Average Cost Per Benefited Acre (680)	$1,063
Estimated Average Cost Per Acre Per Year (10 years, 5% interest)	$131.14
Estimated Average Cost Per Acre Per Year (20 years, 5% interest)	$81.25

Engineer's Opinion of Probable Cost
Drainage District No. 10
Lateral 2 Tile Improvements
Hancock County, Iowa
2026

Division 1 - Lateral 2 - Work On Private Property - Drainage Coefficient 0.75"

Item	Description	Unit	Quantity	Unit Price	Total
101B	Lateral Tile Connections, 10" Dia. Or Smaller	EA	10	$300	$3,000
102B	Lateral Tile Connections, 12" Dia. Or Larger	EA	1	$500	$500
103B	30" Dia. HDPE Elbow Section, Fabrication Only	EA	11	$1,300	$14,300
104B	24" Dia. HDPE Elbow Section, Fabrication Only	EA	6	$1,200	$7,200
105B	18" Dia. HDPE Elbow Section, Fabrication Only	EA	9	$950	$8,550
106B	Spot Tile Exploration	HR	16	$200	$3,200
107B	Trench Foundation Stone	TN	500	$30	$15,000
108B	Drain Tile, Trenched, HDPE, 30" Dia.	LF	3,800	$75	$285,000
109B	Drain Tile, Trenched, HDPE, 24" Dia.	LF	900	$50	$45,000
110B	Drain Tile, Trenched, HDPE, 18" Dia.	LF	2,600	$40	$104,000
111B	Fence Cuts	EA	2	$100	$200
112B	Mobilization	LS	1	$24,300	$24,300
113B	Construction Contingency	LS	1	$49,750	$49,750

Estimated Construction Cost - Div.1 - Lat.2 - Work on Private Property - 0.75" DC **$560,000**

Division 2 - Lateral 2 - State Highway Road Crossing - US-18 - Drainage Coefficient 0.75"

Item	Description	Unit	Quantity	Unit Price	Total
201B	4" PVC Inspection Tubes	LF	20	$25	$500
202B	Drain Tile, Trenched, Class III R.C.P., 30" Dia.	LF	103	$125	$12,875
203B	Traffic Control	LS	1	$1,500	$1,500
204B	Seeding & Fertilization (Rural)	AC	0.1	$25,000	$2,500
205B	Mulch Furnished and Placed	AC	0.1	$25,000	$2,500
206B	Silt Fence, Installation and Removal	LF	100	$5	$500
207B	Mobilization	LS	1	$2,625	$2,625

Estimated Construction Cost - Div.2 - Lat.2 - State Highway Road Crossing - US-18 - 0.75" DC **$23,000**

Division 3 - Lateral 2 - Road Crossing Birch Ave. - Drainage Coefficient 0.75"

Item	Description	Unit	Quantity	Unit Price	Total
301B	Drain Tile, Trenched, Class III R.C.P., 24" Dia.	LF	66	$105	$6,930
302B	Traffic Control	LS	1	$1,500	$1,500
303B	Safety Closure	EA	2	$1,500	$3,000
304B	Seeding and Fertilization (Rural)	AC	0.1	$25,000	$2,500
305B	Silt Fence, Installation and Removal	LF	200	$5	$1,000
306B	Construction Contingency	LS	1	$1,570	$1,570

Estimated Construction Cost - Div.3 - Lat.2 - Birch Ave. Crossing - 0.75" DC **$16,500**

Engineer's Opinion of Probable Cost
Drainage District No. 10
Lateral 2 Tile Improvements
Hancock County, Iowa
2026
Division 4 - Lateral 2 - Road Crossing 240th St. - Drainage Coefficient 0.75"

Item	Description	Unit	Quantity	Unit Price	Total
401B	Drain Tile, Trenched, Class III R.C.P., 18" Dia.	LF	66	$95	$6,270
402B	Traffic Control	LS	1	$1,500	$1,500
403B	Safety Closure	EA	2	$1,500	$3,000
404B	Seeding and Fertilization (Rural)	AC	0.1	$25,000	$2,500
405B	Silt Fence, Installation and Removal	LF	200	$5	$1,000
406B	Construction Contingency	LS	1	$1,230	$1,230
	Estimated Construction Cost - Div.4 - Lat.2 - 240th St. Crossing - 0.75" DC				**$15,500**
	Estimated Total Construction Cost - Lateral 2 - 0.75" Drainage Coeffcient				**$615,000**

Non-Construction Costs

Construction Related Damages	$16,000
Basic Engineering Services	
Survey, Study & Report, Meetings & Hearing	$30,000
Wetland Regulations Administration	$6,700
Annexation & Reclassification	$30,000
Construction Plans, Specifications, & Bid Letting	$45,000
Construction Engineering Services, Staking, & Inspection	$50,000
Legal Services, Publications, Mailings, Etc..	$1,500
Finance, Interest & Contingency	$30,800
Estimated Total Non-Construction Costs	**$210,000**
Estimated Total Assessable Project Cost - 0.75" Drainage Coefficient Lateral 2 Improvement	**$770,000**
Estimated Average Cost Per Benefited Acre (680)	$1,132
Estimated Average Cost Per Acre Per Year (10 years, 5% interest)	$139.66
Estimated Average Cost Per Acre Per Year (20 years, 5% interest)	$86.54

Engineer's Opinion of Probable Cost
Drainage District No. 10
Lateral 2 Tile ImprovementS
Hancock County, Iowa
2026

Division 1 - Lateral 2 - Work On Private Property - Drainage Coefficient 1"

Item	Description	Unit	Quantity	Unit Price	Total
101C	Lateral Tile Connections, 10" Dia. Or Smaller	EA	10	$300	$3,000
102C	Lateral Tile Connections, 12" Dia. Or Larger	EA	1	$500	$500
103C	36" Dia. HDPE Elbow Section, Fabrication Only	EA	11	$1,650	$18,150
104C	30" Dia. HDPE Elbow Section, Fabrication Only	EA	6	$1,300	$7,800
105C	24" Dia. HDPE Elbow Section, Fabrication Only	EA	9	$1,200	$10,800
106C	Spot Tile Exploration	HR	16	$200	$3,200
107C	Trench Foundation Stone	TN	500	$30	$15,000
108C	Drain Tile, Trenched, HDPE, 36" Dia.	LF	3,800	$90	$342,000
109C	Drain Tile, Trenched, HDPE, 30" Dia.	LF	900	$75	$67,500
110C	Drain Tile, Trenched, HDPE, 24" Dia.	LF	2,600	$50	$130,000
111C	Fence Cuts	EA	2	$100	$200
112C	Mobilization	LS	1	$29,900	$29,900
113C	Construction Contingency	LS	1	$61,950	$61,950

Estimated Construction Cost - Div.1 - Lat.2 - Work on Private Property - 1" DC **$690,000**

Division 2 - Lateral 2 - State Highway Road Crossing - US-18 - Drainage Coefficient 1"

Item	Description	Unit	Quantity	Unit Price	Total
201C	4" PVC Inspection Tubes	LF	20	$25	$500
202C	Drain Tile, Trenched, Class III R.C.P., 36" Dia.	LF	103	$150	$15,450
203C	Traffic Control	LS	1	$1,500	$1,500
204C	Seeding & Fertilization (Rural)	AC	0.1	$25,000	$2,500
205C	Mulch Furnished and Placed	AC	0.1	$25,000	$2,500
206C	Silt Fence, Installation and Removal	LF	100	$5	$500
207C	Mobilization	LS	1	$2,550	$2,550

Estimated Construction Cost - Div.2 - Lat.2 - State Highway Road Crossing - US-18 - 1" DC **$25,500**

Division 3 - Lateral 2 - Road Crossing Birch Ave. - Drainage Coefficient 1"

Item	Description	Unit	Quantity	Unit Price	Total
301C	Drain Tile, Trenched, Class III R.C.P., 30" Dia.	LF	66	$125	$8,250
302C	Traffic Control	LS	1	$1,500	$1,500
303C	Safety Closure	EA	2	$1,500	$3,000
304C	Seeding and Fertilization (Rural)	AC	0.1	$25,000	$2,500
305C	Silt Fence, Installation and Removal	LF	200	$5	$1,000
306C	Construction Contingency	LS	1	$1,750	$1,750

Estimated Construction Cost - Div.3 - Lat.2 - Birch Ave. Crossing - 1" DC **$18,000**

Engineer's Opinion of Probable Cost
Drainage District No. 10
Lateral 2 Tile ImprovementS
Hancock County, Iowa
2026
Division 4 - Lateral 2 - Road Crossing 240th St. - Drainage Coefficient 1"

Item	Description	Unit	Quantity	Unit Price	Total
	Drain Tile, Trenched, Class III R.C.P., 24" Dia.	LF	66	$105	$6,930
	Traffic Control	LS	1	$1,500	$1,500
	Safety Closure	EA	2	$1,500	$3,000
	Seeding and Fertilization (Rural)	AC	0.1	$25,000	$2,500
	Silt Fence, Installation and Removal	LF	200	$5	$1,000
	Construction Contingency	LS	1	$1,570	$1,570
	Estimated Construction Cost - Div.4 - Lat.2 - 240th St. Crossing - 1" DC				**$16,500**
	Estimated Total Construction Cost - Lateral 2 - 1" Drainage Coeffcient				**$750,000**
	Non-Construction Costs				
	Construction Related Damages				$16,000
	Basic Engineering Services				
	Survey, Study & Report, Meetings & Hearing				$30,000
	Wetland Regulations Administration				$7,000
	Annexation & Reclassification				$30,000
	Construction Plans, Specifications, & Bid Letting				$45,000
	Construction Engineering Services, Staking, & Inspection				$50,000
	Legal Services, Publications, Mailings, Etc..				$1,500
	Finance, Interest & Contingency				$37,500
	Estimated Total Non-Construction Costs				**$217,000**
	Estimated Total Assessable Project Cost - 1" Drainage Coefficient Lateral 2 Improvement				**$907,000**
	Estimated Average Cost Per Benefited Acre (680)				$1,334
	Estimated Average Cost Per Acre Per Year (10 years, 5% interest)				$164.51
	Estimated Average Cost Per Acre Per Year (20 years, 5% interest)				$101.93

Appendix D: Preliminary Plans