



**BOLTON
& MENK**

Real People. Real Solutions.

Engineer's Report for

Proposed Drainage & Water Quality Improvements Drainage District No. 175 Pocahontas County, Iowa 2021

Submitted by:

Bolton & Menk, Inc.
218 11th St SW Plaza
Spencer, IA 51301
P: 712-580-5075

Certification

Engineer's Report

for

Proposed Drainage & Water Quality Improvements

Drainage District No. 175
Pocahontas County, Iowa
P12.120415

2021



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, 2021.

By: Collin Klingbeil
Collin J. Klingbeil, P.E.
License No. 24741

Date: August 20, 2021

Table of Contents

I.	Introduction	1
A.	Scope of Work.....	1
B.	Location	1
C.	History.....	1
II.	Investigation	2
A.	Main A Tile & Laterals.....	2
B.	Drainage District No. 24 Main Tile	3
C.	Main B Tile	3
D.	Private Tile Main	4
III.	Farm Program Compliance	4
A.	Farm Program Wetland Conservation Rules	4
B.	Converted Wetland Mitigation Alternatives.....	5
C.	Mitigation Policy of the Pocahontas County Board of Supervisors	5
D.	Farmed Wetlands in Benefitted Area	6
E.	Probable Erroneous Wetland Determinations	6
IV.	Clean Water Act Compliance	7
V.	Proposed Work	7
A.	Tile Improvements	7
B.	Benefit to Drainage District No. 24 & Private Tile System.....	9
C.	Water Quality Wetland	10
D.	Estimated Construction Costs.....	10
E.	Road Crossings	11
VI.	Assessment Schedule Review	11
A.	Benefitted Lands not now Assessed	11
B.	Existing Assessment Schedule Review	11
C.	Drainage District No. 24 & Drainage District No. 41 Branch 32.....	12
D.	Drainage District No. 41 Branch 22.....	12
E.	General Reclassification Methodology	12
VII.	Discussions & Recommendations	13

Tables

Existing Main A Tile	3
Existing Lat 1 Tile.....	3
Existing Lat 2 Tile.....	3
Existing Main B Tile	4
Relieved DD24 Main Tile.....	9
Main Tile Replacement Estimated Cost Savings	9
Estimated Construction Costs.....	10
Summary of Road Crossings.....	11

Appendices

Appendix A: Petition; Wetland Determinations Received; Mitigation Policy of the Pocahontas County Board of Supervisors; & 1954 DD24 Engineer’s Report
Appendix B: Pre-classification; & Existing Assessment Schedule
Appendix C: Engineer’s Opinion of Probable Costs
Proposed Plans

I. INTRODUCTION

A. Scope of Work

A petition requesting relief for lands drained by Drainage District No. 175 (DD175) Main B was filed with the Board of Supervisors. The Board appointed Bolton & Menk, Inc. to complete the necessary survey, study, plan, and report. The petitioner has tentatively agreed to allow a water quality improvement wetland to be constructed on their land as long as they are kept whole and the district takes responsibility for the wetland. This report addresses the petitioners' request for drainage improvements within DD175 as well as a water quality improvement wetland. A copy of the petition is contained in Appendix A of this report.

An application was submitted to the Iowa Finance Authority for a low interest loan for the construction of drainage district improvements that can be discharged to a nutrient-removal wetland meeting Iowa Department of Agriculture and Land Stewardship (IDALS) standards. Unfortunately the loan request was not approved. However, the wetland remains eligible for full cost assistance to construct under state-funded IDALS Water Quality Initiative.

This is an opportunity to combine water quality improvements with the replacement of aging and inadequate district tile with a new system designed to meet drainage needs now and into the future. Projects of this nature within drainage districts could be a model for future projects, showing that the current and preferred voluntary adoption of water quality improvement practices is effective and feasible, making regulatory intervention unnecessary.

B. Location

The existing watershed of DD175 is served by two separate tile systems, Main A & Main B. Main A covers an area of approximately 733 acres in Sections 32 & 33 of Swan Lake township (T-93-N, R-34-W) and Sections 4 & 5 of Marshall township (T-92-N, R-34-W) and outlets to the Drainage District No. 24 (DD24) Main Tile. Main B drains an area of approximately 305 acres in Section 33 & 34 of Swan Lake Township (T-93-N, R-34-W) and outlets to the Drainage District No. 41 Main Open Ditch.

C. History

The history of DD175 is closely intertwined with DD24, pertinent details regarding both districts are covered. Also, because the tile systems in DD175 were privately constructed as mutual drain systems prior to the district being established, drainage records are somewhat scarce.

Nov 7, 1905	Petition was submitted requesting the establishment of a drainage district to include lands in sections 32, 33 & 34 of Swan Lake Township and sections 3, 4, 5, 9 and 10 of Marshall Township
Mar 20, 1906	W.B. Warrington filed engineer's report, recommending a tile system and approximately 2 miles of open ditch to drain the lands of what currently makes up DD24 and DD175
Aug 6, 1906	DD24 established
Nov 13, 1906	Bid for construction as proposed in Warrington report was rejected.
c. 1913	Main B mutual drain system installed (outlet to DD41 Main Open Ditch)
c. 1913	Main A mutual drain system installed, presumably approximately following the tile plans submitted in the original Warrington engineer's report

1913	Engineer F.A Malcolm submitted plans for an all tile system for DD24 starting where the recently constructed Main A mutual drain ended
Aug 13, 1953	Petition for the establishment of a sub-district within DD24 in Marshall township and requested relief.
Jan 14, 1954	Engineer's report filed by W.C. Otto with proposals including (1) a large relief tile for DD24, and (2) a tile system to route Main A mutual drain east to outlet to the DD41 Main Open Ditch, thus relieving the existing DD24 tile
March 4, 1954	Proposal for a sub-district and drainage relief as outlined in the W.C. Otto report were rejected and dismissed at hearing due to large number of objections by landowners
1964	Approximately 600 feet of Main A mutual drain system was replaced
Jul 21, 1970	Drainage District No. 175 established, mutual drains are district facilities
Aug 6, 1971	Howard E. Watts filed Engineer's report to attempt to identify location and size of district tile for DD175

II. INVESTIGATION

A survey was made of the existing tile systems, and review of available Engineer's reports on file with the district was conducted.

A. Main A Tile & Laterals

From available records it appears as though Main A includes nearly 8,500 feet of tile ranging from 18" in diameter at the outlet to DD24 Main Tile to 7" at the upper end. Two laterals (Lat 1 & Lat 2) connect to the existing Main A Tile system. Lateral 1 includes approximately 1,700 feet of 12" diameter tile. Lateral 2 includes approximately 1,600 feet of 10" – 8" diameter tile. Main A was originally planned to be part of the DD24 tile system, but the bid for the work was rejected in 1906. It was subsequently built as a mutual drain between 1906 and 1913, but whether the original design plans and profiles were followed is unclear.

Due to limited records the locations where the tile changes sizes is not clear, nor are tile profiles showing the grade (slope) of the existing tile available. In order to evaluate the adequacy of the existing tile system we have used best engineering judgment and cross-referenced with engineer Warrington profiles on record in order to estimate grades and locations where tile sizes change. The data is shown in the table below. The coefficient represents the depth of excess water removed from the surface of the watershed in a 24-hour period. The modern standard of ½" of water removed from the surface area of the watershed in 24 hours (½" Dc) has been in use since the 1950s. This standard is intended for lands without adequate surface drainage.

Existing Main A Tile							
<u>Reach</u>	<u>Length (LF)</u>	<u>Dia (in)</u>	<u>Grade</u>	<u>Ex Cap (cfs)</u>	<u>Approx Acres</u>	<u>½" Dc (cfs)</u>	<u>Per Std</u>
1	2,000	18	0.20%	4.7	733	15.4	31%
2	3,250	16	0.30%	4.2	498	10.5	40%
3	1,650	12	0.10%	1.1	183	3.8	29%
4	800	8	0.10%	0.4	42	0.9	43%
5	700	7	0.10%	0.3	14	0.3	91%
Existing Lat 1 Tile							
<u>Reach</u>	<u>Length (LF)</u>	<u>Dia (in)</u>	<u>Grade</u>	<u>Ex Cap (cfs)</u>	<u>Approx Acres</u>	<u>½" Dc (cfs)</u>	<u>Per Std</u>
1	1,700	12	0.20%	1.6	174	3.7	44%
Existing Lat 2 Tile							
<u>Reach</u>	<u>Length (LF)</u>	<u>Dia (in)</u>	<u>Grade</u>	<u>Ex Cap (cfs)</u>	<u>Approx Acres</u>	<u>½" Dc (cfs)</u>	<u>Per Std</u>
1	800	10	0.80%	2.0	97	2.0	96%
2	800	8	0.80%	1.1	41	0.9	126%

The coefficients and percent of modern capacity shown above assume the tile is clean, straight and unrestricted. However, due to the age of this system it is likely that the actual capacity of the existing system is roughly 80-90% or less of that shown in the table. Supplementing and paralleling the existing system and using the capacity of the old tile is not recommended because the desired function of the system would rely upon a century old tile. Engineers of that era placed a 50-year life on the clay and concrete tile drains installed at that time.

The Main A Tile in this district appears to have been originally designed at 30-40% of the recommended minimum modern design capacity. Lateral 1 tile would benefit from improvements as well. Lateral 2 tile does not appear to need improvements at this time.

The requested investigation of capacities indicates that the Main A Tile system has struggled to effectively serve the drainage needs of the landowners for many years and would greatly benefit from improvements.

B. Drainage District No. 24 Main Tile

The Main Tile of DD24 drains approximately 2,164 acres and ranges from 30" to 18" in diameter and spans from the head of DD41 Branch 32 open ditch to where DD175 Main A connects to it. The inadequacy of the existing DD24 Main Tile system is documented in W.C. Otto's 1954 engineer's report, included in Appendix A. It was concluded that the capacity of the DD24 Main Tile is less than 25% of the recommended minimum modern design of ½" Dc. The DD175 Main A tile system currently relies on the DD24 Main Tile as an outlet. Both tile systems are inadequate and in need of improvements. The DD24 Main Tile must be considered as part of any potential improvements to DD175 Main A.

C. Main B Tile

From available records Main B includes approximately 5,000 feet of tile ranging from 14" in diameter at the outlet to DD41 Main Open Ditch to 10" at the upper end.

Due to limited records the locations where the tile changes sizes is not clear, nor are tile

profiles showing the grade (slope) of the existing tile available. In order to evaluate the adequacy of the existing tile system we have used best engineering judgment to estimate grades and locations where tile sizes change. The data is shown in the table below. Note that the first approximately 1,500 feet of Main B is on a very steep grade but drains very little additional land and is not shown in the table.

Existing Main B Tile							
<u>Reach</u>	<u>Length (LF)</u>	<u>Dia (in)</u>	<u>Grade</u>	<u>Ex Cap (cfs)</u>	<u>Approx Acres</u>	<u>½" Dc (cfs)</u>	<u>Per Std</u>
1	2,900	14	0.10%	1.7	305	6.4	27%
2	2,100	10	0.10%	0.7	234	4.9	14%

The Main B tile system is severely undersized, at 14 – 27% of the modern drainage standard. The lands currently drained by Main B would greatly benefit from improvements.

D. Private Tile Main

There is a private tile system in place south of 450th St in the northern extents of sections 33 & 34 of Swan Lake Township that outlets directly into the Main Open Ditch of DD41 north approximately 1,800 feet north from the DD175 Main B outlet. This system drains approximately 270 acres of agricultural land.

Road plans show the private main to be 15" diameter pipe running east under 130th Ave. (N28) towards the open ditch. Beyond that, sizes and grades of the private main are unknown. Historical aerial images show areas that regularly drown out, and the system may benefit from an improvement.

III. 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 provides technical assistance. This technical assistance includes policing for program violations and making certified wetland determinations. We have made written requests of landowners receiving benefits from the proposed improvements to secure certified wetland determinations from the USDA/NRCS and to provide them to the district. Only landowners or their authorized agents may request the determinations. Several have not yet provided this information.

The USDA has recently adopted a few new 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 request a certified wetland determination and they happen to end up with a converted farmed wetland, they will find themselves 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 Board of Supervisors may approve and authorize construction of the proposed improvements without accruing risk to the 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 it is charged to make for all of the benefitted landowners. However, by the rules, the program penalties will fall solely to the owners of the converted farmed wetlands for which compensatory mitigation is not secured. It is fully up to the landowner to cooperate with the 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 more costly.

Mitigation options include the purchase of wetland credits in a mitigation bank. Mitigation banks are not common and their credits are not cheap. The current fee is \$15,000 - \$20,000 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 report certified farmed wetland determinations and for which mitigation will not be provided.

C. Mitigation Policy of the Pocahontas County Board of Supervisors

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 often been shared between the district and the owners of the converted farmed wetlands, when wetland mitigation credits were available. In other counties mitigation has been left entirely to the owners of the converted farmed wetlands. Each drainage district’s circumstances are different and the Board of Supervisors need the flexibility to address mitigation on a case by case basis.

The justification for the sharing of the costs is that although the owner of a farmed wetland directly benefits from the mitigation needed to make his wet property more productive; the district’s project cannot be permitted and proceed until mitigation is addressed. Even if a farmed wetland owner must pay all of the cost of mitigation, passing it through his drainage

district enables him to pay for it over the period of installment payments set by the Board of Supervisors.

The Pocahontas County Board of Supervisors has adopted a resolution which spells out how farmed wetlands will be dealt with for drainage districts under their supervision when drainage improvements are considered. The resolution is provided in Appendix A.

The resolutions provide 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.

Until mitigation is secured, in order to retain farm program eligibility the converted farmed wetland owner will need to forego cropping of the converted farmed wetland. If mitigation is available in a bank the landowner could purchase mitigation and resume farming of the converted farmed wetland, or opt to leave the converted wetland site permanently idle.

D. Farmed Wetlands in Benefitted Area

As of the date of this report we have not received certified wetland determinations from several landowners in the impacted watershed. A map showing which wetland determinations have been received is included in Appendix A. It will be important for any owners of farmed wetland to provide their certified wetland determination before the public hearing is closed.

For this report an assumed farmed wetland area of 10 acres will be used to estimate the cost of mitigation. We have assumed mitigation costs of \$15,000 per acre. Using the board's mitigation policy, the estimated cost to the district for mitigation will be \$75,000.

These acres and cost estimate could vary substantially as more could be reported or a landowner could forego qualifying for mitigation assistance. Substantial changes should be reflected in a revised cost estimate which should be made at the time of the public hearing, after all determinations to be provided are in. It will be important for owners of farmed wetlands to provide their certified wetland determination before the public hearing is closed.

E. Probable Erroneous Wetland Determinations

Recent changes in technology and in NRCS policies have presented an opportunity to appeal from and reduce or eliminate farmed wetland acres. It took the NRCS eighteen years to recognize the 8th Circuit Court of Appeals decision in *Barthel v. USDA*. The court required that farmed wetland determinations be based upon the best historic level of drainage. This forces a mathematical modeling of wetland hydrology and has resulted in dramatic reductions in farmed wetland acres in drainage districts in recent years. Forty acres were eliminated by appeal in 2017 in a district near Fonda. Forty acres were also eliminated in a Worth County district the year before.

We recommend that the board authorize Bolton & Menk to assist the landowners in appealing their determinations. It requires landowner cooperation but the cost is justified in that for every acre of wetland reduced, the district saves \$7,500 acres in mitigation assistance.

IV. CLEAN WATER ACT COMPLIANCE

Dredging and filling of water of the United States (WOTUS) is regulated under Section 404 of the Clean Water Act. In the 1990's the USEPA & USACE adopted rules to extend section 404 jurisdiction to isolated wetlands, including farmed wetlands. For a few years it became necessary to get CWA Sec 404 permits for drainage district improvements where farmed wetland conversions were expected. Drainage districts were helped at the time with the issuance of a memorandum of understanding entered into by 4 regulatory agencies. This agreement gave the NRCS primacy in mapping and regulating wetlands on agricultural land. Great relief came in 2001 when the U.S. Supreme Court ruled that isolated wetlands were not subject to CWA Sec 404 jurisdiction.

However, in 2012 the USEPA launched an aggressive rulemaking procedure to re-establish jurisdiction of isolated wetlands by revising the definition of "waters of the United States" (WOTUS) to include isolated wetlands. This massive rule change became effective on August 28, 2015. The 2015 WOTUS rule 1) expanded CWA Sec 404 jurisdiction to include all isolated farmed wetlands and even drained prairie potholes, 2) identified more jurisdictional wetland than has the USDA has identified under the farm program and 3) demanded more stringent and costly mitigation for the conversion of farmed wetland.

Under the previous administration, the 2015 WOTUS Rule was repealed, and subsequently replaced on January 23, 2020. The rule was not perfect but a step in the right direction. However, under the new administration it has recently been announced that the WOTUS Rule will yet again be re-written. It is likely intended to go back towards something similar to the 2015 WOTUS Rule, which is concerning.

We are reasonably confident that there will be no CWA Section 404 jurisdictional wetlands found in the benefited area. But, this is a reminder that environmental regulations tend to get tougher over time and that consideration should be made in light when the opportunity for improvements is presented.

V. PROPOSED WORK

The investigation has confirmed the need for drainage relief in the district. Modern farming practices rely upon well drained soils to achieve maximum productivity. A ½" Dc standard applies to land with surface relief and limited ponding. This standard is contained in the Iowa Drainage Guide and has been in place since the 1950's. The ½" Dc is adequate for virtually all of the drainage districts in Pocahontas County and is a cost effective design to maximize the productivity of today's farming practices.

A. Tile Improvements

We recommend replacement of the existing Main A and Main B tile with a single new Main Tile system that would outlet to a water quality wetland prior to entering DD41 Main Open Ditch, approximately 3,000 feet downstream of the Laurens wastewater treatment plant. Main A currently outlets to DD24 Main Tile and flows south; however, with the proposed tile improvements, approximately 725 acres would be re-routed to flow eastward and out of the existing DD24 tile system, providing the lower lands in DD24 drainage relief.

The proposed Main Tile would begin in the SE ¼ NE ¼ Section 34-93-34 at an outlet structure to a water quality wetland, extend approximately 2 miles, and end in the SW ¼ SE ¼ Section 32-93-34. The proposed Main Tile would approximately parallel existing Main B for about 1 mile and parallel existing Main A for about 1 mile. Tile would range in size from 36" to 15" in diameter and replace and improve the function of the existing Main A and Main B tile systems.

We also recommend the construction of new Branches A, B, & C that would connect into the

proposed new Main Tile system. Proposed Branch A would replace and improve the function of an existing private tile system that currently drains approximately 180 acres, and provide outlet for proposed Branch B. The proposed Branch A tile would extend approximately 4,000 feet with tile ranging from 18" to 12" in diameter.

Branch B would intercept and relieve the private tile main referenced in Section II Part D of this report, that currently drains eastward across County Road N28 and outlets to the DD41 Main Open Ditch. Approximately 120 acres of privately drained land would be diverted into Branch B which would outlet into proposed Branch A. Proposed Branch B would be approximately 1,700 feet in length of 18" diameter tile. The lands still drained by the private main (downstream) would have their drainage coefficient more than doubled as a result.

Proposed Branch C would intercept the existing Main A tile just north of 460th St. The proposed tile would take the Main A tile that currently flows southward, and turn it northward and connect it into the proposed Main Tile system. A large intake would be placed in the road ditch to prevent as much surface water as possible from flowing south into DD24. Proposed Branch C would extend approximately 1,700 feet with 15" diameter tile.

Where the existing tile is connected to the proposed tile, the upstream end will be connected to the proposed tile and the downstream end will be capped to allow the tile to continue functioning as a collector to bring private tile systems to the new main drains. The function of the existing tile will be replaced by the new system and it is recommended that the surviving reaches of the Main A and Main B tile systems be abandoned as district facilities. Maintenance responsibilities for these tiles should be turned over to the landowners following the completion of the project. However, if a reach of the old tile is found to be in poor repair during construction, it can be uncovered and broken down in place.

We recommend the proposed new drains be constructed using reinforced concrete pipe, RCP. For the RCP capacity design we have used a Manning's n flow resistance factor of 0.011 as recommended by the Iowa Drainage Guide. A dual-wall HDPE tile would have a materially higher Manning's n factor and a markedly shorter design life. If installed as per the plastic pipe industry standards for a public facility the cost would be as much as or more than the cost of the recommended RCP system. When the life cycle costs are compared the RCP advantage over HDPE is even greater.

B. Benefit to Drainage District No. 24 & Private Tile System

As stated in the previous section, with the proposed tile improvements approximately 725 acres of land that currently drains into the DD24 Main Tile would be routed to combine into a single new Main Tile system for DD175 that would outlet to DD41 Main Open Ditch. The existing DD24 Main Tile has less than 25% of the recommended modern standard design capacity, however this will improve with less contributing drainage area. With 725 acres subtracted from the table in the W.C. Otto 1954 engineer's report, the resulting adequacy of the existing DD24 Main Tile is shown in the table below.

Relieved DD24 Main Tile								
<u>Reach</u>	<u>Length (LF)</u>	<u>Dia (in)</u>	<u>Grade</u>	<u>Ex Cap (cfs)</u>	<u>Relieved Acres</u>	<u>½" Dc (cfs)</u>	<u>Per Std</u>	<u>Increase in Dc (in/day)</u>
1	1,000	28	0.10%	10.8	1,465	30.8	35%	0.06
2	3,000	30	0.07%	10.9	1,255	26.4	41%	0.08
3	3,200	26	0.07%	7.4	947	19.9	37%	0.08
4	2,400	24	0.07%	6.0	783	16.4	36%	0.09
5	1,300	22	0.07%	4.8	609	12.8	37%	0.10
6	700	20	0.07%	3.7	485	10.2	36%	0.11
7	1151	18	0.20%	4.7	119	2.5	188%	0.81

The relief of the DD24 Main Tile would result in a drainage coefficient increase ranging from 0.06 – 0.11 in/day. It would bring the capacity from being about 1/5th the modern standard to 2/5th the recommended modern standard. Additionally, at such a time when the existing DD24 Main Tile system needs to be replaced/improved, the size of tile required would be less and thus the cost of the project would be reduced. Assuming the same lengths and grades as the existing tile system, an estimated cost savings can be calculated. See table below.

Main Tile Replacement Estimated Cost Savings						
<u>Reach</u>	<u>Length (LF)</u>	<u>½ Dc (cfs)</u>		<u>Tile Size Req'd</u>		<u>Est. Pipe Cost Savings</u>
		<u>Existing</u>	<u>Relieved</u>	<u>Existing</u>	<u>Relieved</u>	
1	1,000	46.0	30.8	54	42	\$38,000
2	3,000	41.6	26.4	54	42	\$114,000
3	3,200	35.1	19.9	48	42	\$80,000
4	2,400	31.7	16.4	48	36	\$101,000
5	1,300	28.0	12.8	48	36	\$55,000
6	700	25.4	10.2	42	30	\$20,000
7	1,151	17.7	2.5	30	15	\$21,000
Total Pipe Cost Savings						\$429,000

Also, an option of future DD24 tile improvement would be to supplement the existing system. The supplemental tile would not need to be as large with the relieved system. The cost savings under this scenario is still estimated to be in excess of \$400,000.

We recommend a one-time assessment to DD24 based on the following:

1. Typical average cost to build a tile system with a drainage coefficient of 1/2 in/day is around \$800/acre.
2. In this case, the existing drainage coefficient for the system is about 0.1 in/day. Proportionally, cost to increase drainage coefficient by 0.08 in/day would be about \$160/acre.
3. Over the area of land relieved (approximately 1,380 acres), at \$160/acre, we recommend a total one-time assessment of \$220,800.

The potential cost savings for future DD24 Main Tile improvements are estimated to exceed the one-time assessment prepared in this report by over \$200,000.

The existing drainage coefficient of the private tile system that stands to be relieved is unknown. We thus recommend using the same \$160/acre as the basis for the one-time assessment, which totals \$20,800 for the approximately 130 acres relieved.

C. Water Quality Wetland

We recommend the construction of a water quality wetland as part of the proposed tile system, contingent on full cost share from the Iowa Department of Agriculture and Land Stewardship (IDALS). The wetland would remove 40-50% of the nitrate that would otherwise be sent to the ditch and ultimately to the Gulf of Mexico. It is a practice in the Iowa Nutrient Reduction Strategy developed by IDALS, the Iowa Department of Natural Resources and Iowa State University. The wetland would be located adjacent to the Drainage District No. 41 Main Open Ditch south of Laurens, and receive 100% of the tile flow, by gravity, from the proposed DD175 tile system. There is 15 feet of elevation drop in the last 1,100 feet before the ditch, so upstream drainage will not be impacted.

The wetland would have a permanent pool area of 5.94 acres, and a maximum depth of 3 feet (average 0.7 feet). At times the wetland may be dry, but most of the time it should have standing water. The total easement area is currently estimated to be 13.7 acres, but flexibility remains. The inlet and outlet to the wetland would be 3' x 3' intake boxes. The tile would connect to the inlet box, and the outlet box would connect to the open ditch.

In order ensure the pooled water does not saturate adjacent farmlands we recommend installation of a ring tile, 6" in diameter. Additionally, in order to protect the adjacent open ditch bank we recommend a toe drain (6") and flattening the bank slope to 3:1. The spoils would be used to construct the small dike for the wetland.

D. Estimated Construction Costs

A summary of the total estimated construction costs allocation for the proposed improvements follow.

Estimated Construction Costs		
<u>Facility</u>	<u>Acres Served</u>	<u>Estimated Construction Cost</u>
Main Tile	1,150 acres	\$660,000
Branch A	338 acres	\$159,000
Branch B	132 acres	\$67,000
Branch C	83 acres	\$68,000
Wetland	1,150 acres	\$132,000

The estimated project cost for the recommended improvements is \$1,436,000. Minus the proposed one-time assessment for DD24 & private tile system, the estimated project cost for the recommended improvements is \$1,194,400. A detailed opinion of probable cost is included in Appendix C of this report.

The district will need an area within which to perform the proposed work. The work limits will typically be set out to 50 feet from the tile on each side. Landowners will be entitled to compensation for damages within the work area. It is recommended that whenever possible, a landowner not crop the work area and instead accept fair rent for the land. Compensation for use of and damages within the temporary work area is normally determined at the project completion hearing. This is included in the cost estimate.

E. Road Crossings

Two road crossings will be required as a part of the proposed work. Additionally some work will be done in the right-of-way of 460th St although the road will not be crossed. Iowa Code Chapter 468 requires that all costs of primary and secondary road crossings be paid from funds available to the entity that controls the road. The table below summarizes the road crossings that are a part of the proposed tile improvement project.

Summary of Road Crossings				
Road	Control Agency	Facility	Type	Diameter
130 th Ave (N28)	Pocahontas County	Main Tile	Bore	36"
120 th Ave		Main Tile	Open Cut	21"
460 th St		Branch C	Open Cut (not crossing road)	15"

We estimate the total cost to the County Secondary Roads for the recommended improvement to be \$97,000.

VI. ASSESSMENT SCHEDULE REVIEW

A. Benefited Lands not now Assessed

There are currently a total of 30 parcels included in the DD175 assessment schedule. The area currently served by DD175 Main A & Main B is approximately 1,008 acres, approximately 140 acres of which are benefited by the existing district facilities but are not on the existing assessment schedule. With the proposed improvements another approximately 120 acres would be benefited. We also recommend that the lands downstream from the private tile system proposed to be relieved be annexed, for the sole purpose of assessing the lands once, for their benefit from having approximately 130 acres of subsurface drainage diverted away from their system. A separate Annexation Report and hearing would be required to further analyze the lands and give final recommendations. It would be cost effective to do this annexation for the entire watershed as part of the proposed project. It should be emphasized to the owners of the annexed lands that assessments are based upon relative benefits and that if the benefit is small, the assessment is also relatively small.

B. Existing Assessment Schedule Review

DD175 was classified at the time the district was established, in 1970, under a single assessment schedule. It has never been reclassified. The number of acres within each parcel to be included in the district was not specified. As has been previously discussed, DD175 is

served by two separate Main Tile systems (A & B) that serve different portions of the district and outlet to differing locations. Main A also has two laterals that outlet into it.

It has become a common and legal practice with reclassification to separate all facilities within a district into individual schedules to allow equitable assessments of cost to only the landowners who receive benefit from a particular named facility. Whether the project moves forward or not, it is recommended that the drainage facilities be divided into separate maintenance schedules to make the cost of new construction and future repairs more equitable.

The Board of Supervisors has directed us to develop an estimate for the cost of the proposed project for each benefitted parcel. This pre-classification is similar to what the Benefit Commission would consider at the end of the project. Please be reminded that a pre-classification is an estimate only. The final approved distribution would still be subject to a recommendation of the Commission appointed by the Board, and to the final adjustments made by the Board at the reclassification public hearing at the end of the project. Work on the pre-classification can be reused as part of the final reclassification. The pre-classification is included in Appendix B of this report.

We recommend that the several district facilities be divided and reclassified to give each facility an appropriate schedule upon which to spread the costs of this project as applicable and any future maintenance.

C. Drainage District No. 24 & Drainage District No. 41 Branch 32

The lands currently served by Main A of DD175 are in the current DD24 tile and DD41 Branch 32 open ditch assessment schedules. The improvements recommended in this report would re-route the tile outlet of the existing Main A into a new Main Tile that would outlet directly into DD41 Main Open Ditch, not into DD41 Br 32 open ditch via DD24 Main Tile. If this project proceeds we would recommend that the parcels fully diverted into DD175 be removed from the DD24 and DD41 Br 32 assessment schedules, under Iowa Code 468.188 and with legal advisement.

D. Drainage District No. 41 Branch 22

An improvement project was constructed in 2016, and re-classification followed in 2017. Branch 23, a supposed lateral of Branch 22, was included in the re-classification and lands assessed. Branch 23 was shown to cross 450th St. and serve approximately 125 acres of the same lands that we found to be served by a private tile system we are proposing to intercept and bring into DD175. Upon further research we believe that if Branch 23 exists at all, it does not cross 450th St, and the approximately 125 acres assessed for the DD41 Br 22 project were wrongly assessed. We recommend removing these lands from the DD41 Br 22 assessment schedule used to levy the costs of the improvement, discontinuing use of the DD41 Br 23 maintenance schedule (it would go under Br 22), and a reimbursement by DD41 Branch 22 to the landowners affected.

E. General Reclassification Methodology

The process of reclassification uses several factors to equitably spread project costs based upon benefits received. The four common factors are: Benefited Area, Facility Use, Proximity to Outlet, and Soil Wetness.

The Use Factor takes into account how much of the facility is required to bring an outlet to a particular location. The more of a facility used by any given property, the higher the use factor on that property. A parcel using one mile of a facility would have a lower use factor than a parcel using five miles of the facility.

The Proximity Factor takes into account the portion of the outlet provided. Lands nearer to

the tile or ditch receive a Higher Proximity Factor because they have easy access to district facilities. Lands farther from the facility must invest in additional private drainage to access the facility. A 40 acre tract which is crossed by a tile should pay more than a 40 acre tract a mile away which must build a private system or also pay for a lateral to reach the tile.

The Soil Wetness Factor accounts for the soil types' varying natural wetness and need for drainage. Wet soils in a pothole are assigned higher wet factors because the soils have more need for drainage than drier soils on the hill tops.

Many other considerations may be necessary to achieve equitable benefit classifications and fair assessments.

VII. DISCUSSIONS & RECOMMENDATIONS

This report confirms the need to improve the drainage efficiency and capacity of the DD175 drainage system. The work described herein can accomplish that improvement. The improvements proposed will provide the drainage capacity needed for modern farming practices. The estimated assessable cost of the recommended improvement is \$1,437,000. We find that the proposed project will be practicable, feasible, and beneficial to the public. We recommend that these improvements be constructed.

Annexation Recommended. Approximately 260 acres outside the parcels in the existing assessment schedule of DD175 appear to benefit from the proposed district facilities. In order for these lands to now be assessed to help pay for future maintenance it is necessary to bring them into the DD175 benefited area. These lands are included in the pre-classification shown in Appendix B of this report.

Annexation is expected to cost approximately \$5,000. For the proposed improvement, the annexed lands will bring more dollars into the district than it will cost to annex them. In order for these lands to be assessed to help pay for the proposed improvements and for future maintenance there would be no better time to bring them into the district. It is recommended that procedures to annex lands outside of DD175 which benefit from district facilities be initiated.

Reclassification Recommended. All of the facilities in the district are currently maintained under one assessment schedule. The existing schedule is extremely inequitable and the district should be reclassified, separating the several district facilities into separate maintenance schedules at the same time. Reclassification is expected to cost approximately \$3-\$4 per acre for each schedule developed. Additionally, the 2017 re-classification of DD41 Br 22 & 23 should be corrected. Lastly, if the improvement project proceeds, DD24 and DD41 Br 32 should have the diverted parcels removed from their schedules, to take into account the change in the course of water and thus, benefit.

Installment Payments. Iowa drainage district law provides that large improvement assessments may be paid in no less than ten nor more than twenty annual installments at the discretion of the Board of Supervisors. We anticipate that the board will spread assessments of the magnitude contemplated in this report over twenty years. If we assume that the board will allow twenty annual installments at 5% interest, the recommended improvement costs for benefited lands would be about \$79 per acre per year. Please be reminded that assessments are based upon benefits and that following reclassification some highly benefited parcels will bear up to 2 to 2 ½ times the average assessments.

Included in Appendix C is a financial analysis of the probable costs and the likely payback period for different assessment thresholds at different yield increases resulting from this project. The financial analysis uses current commodity prices and average yields from the Agricultural Decision Maker website. Varying yield increases have been used to estimate pay back periods for a range of possible assessments. Iowa State University and University of Minnesota research indicates a likely

average yield increase of 10% and more for an improvement of this type.

Assuming corn averages \$3.00/bushel over the next 20 years and using only the increase in revenue from an assumed 10% yield increase, an average assessment for the recommended improvements could be repaid in approximately nineteen years. At \$5.00/bushel the payback period is approximately eleven years. These improvements would likely continue to function well for another century bringing continued benefit to future generations of owners. The market value of the land should also increase.

It is recommended that the Pocahontas County Board of Supervisors, acting as trustees for DD175, take appropriate action with legal guidance to accomplish the following:

- Tentatively approve this engineer's report.
- Direct the engineer to contact owners of reported farmed wetlands and to assist with appeals where judged likely beneficial to the district.
- Schedule and conduct a public hearing on the proposed improvements including discussions regarding annexation and reclassification.
- Adopt the recommended improvement plan, modified as deemed appropriate to satisfy the needs of the district.
- Direct the engineer to prepare the necessary plans and specifications and to proceed toward a bid letting.
- Initiate procedures to annex benefited lands.
- Initiate procedures for reclassification.

Respectfully submitted,

Bolton & Menk, Inc.



Collin J. Klingbeil, P.E.

Project Engineer

Appendix A: -Petition

-Wetland Determinations
Received

-Mitigation Policy of Pocahontas
County Board of Supervisors

-1954 DD24 Engineer's Report

DRAINAGE PETITION

To the Board of Supervisors of Pocahontas County, Iowa acting in their capacity as a Board of Trustees for Drainage District Number 175 in Pocahontas County.

Comes now the undersigned being the owner of real estate which is set opposite his signature below and in making this Petition for drainage relief for said land respectfully states:

- 1) That land of the Petitioner is included in Drainage District Number 175 of Pocahontas County and that such land is now assessed for the payment of costs incurred by reason of the existing improvements in said drainage district.
- 2) That the district's Main B tile drain, which passes through the Petitioner's land, is in poor condition and is subject to frequent repairs and that it also lacks the depth, efficiency and capacity needed to properly drain excess waters from the Petitioner's land and other lands.
- 3) That improvement of the Main B tile drain in Drainage District No. 175 is needed and that if an improved Main B tile drain is constructed the public benefit, utility, health and welfare will be promoted.
- 4) And further, that the undersigned Petitioner owns the SE $\frac{1}{4}$ NW $\frac{1}{4}$ of Section 34-93-34 (Swan Lake Township), containing Main B, and is aware of interest expressed by the IDALS in financially supporting the construction of a nutrient removal wetland on land including approximately 5 acres of land in the SE corner of said parcel for the purpose of naturally removing excess nutrients from the tile main discharge waters of DD#175. Petitioner supports this proposed water quality improvement project and agrees to consider voluntarily selling the needed land, or granting a permanent easement, to Drainage District No. 175 for fair compensation for the purpose of constructing the said nutrient removal wetland.

WHEREFORE, the undersigned Petitioner respectfully requests that the Board of Supervisors, acting in behalf of Drainage District Number 175, appoint a qualified engineer to investigate the facilities of the district and to recommend feasible improvements thereto to address the concerns and requests expressed herein.

Dated this 27th day of January, 2020


PETITIONER
(Signature)

DESCRIPTION OF LAND

Arthur L. Dahl

NW $\frac{1}{4}$, Section 34-93-34, (Swan Lake Township)

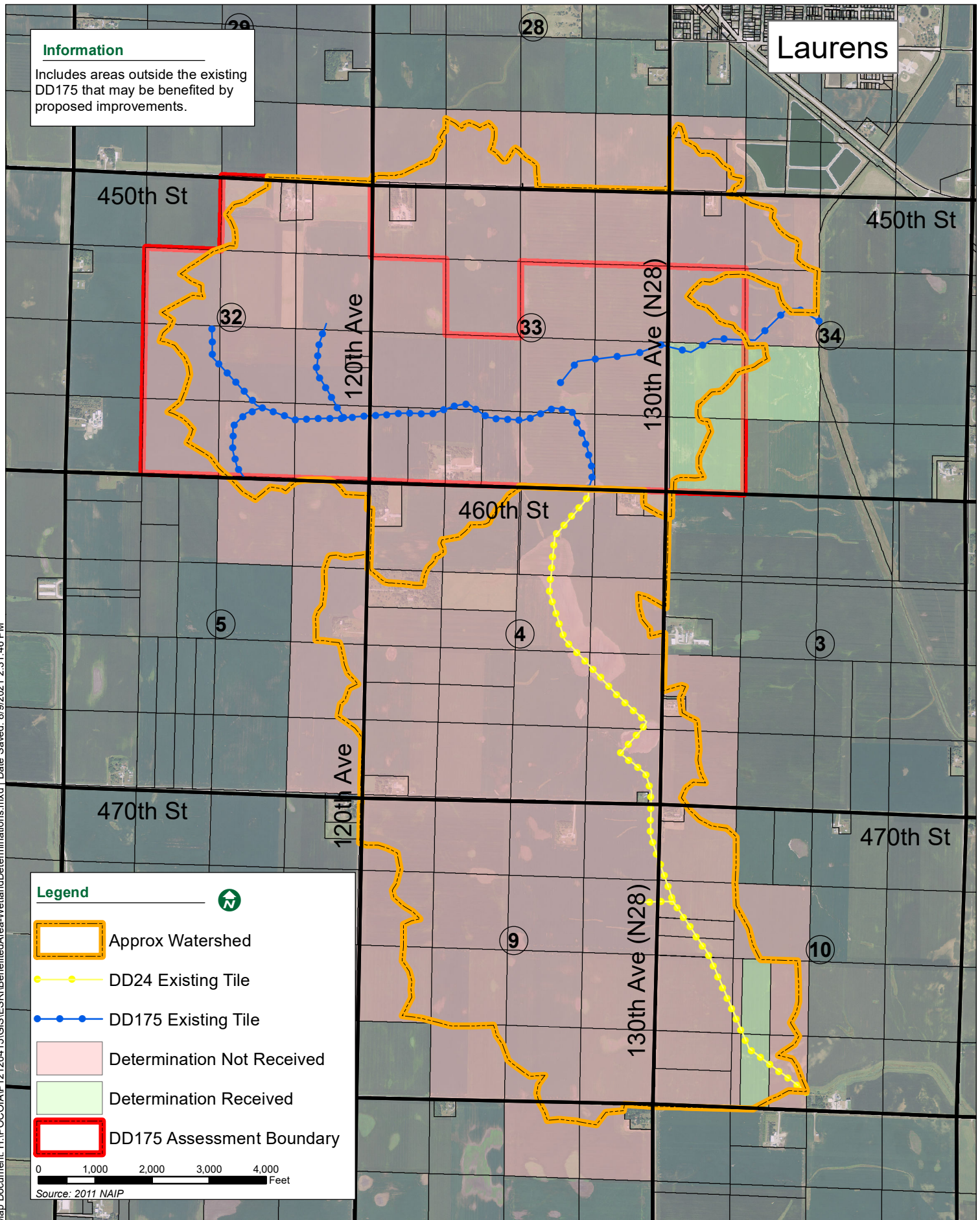


Roselyn P. Dahl

RECEIVED

JAN 30 2020

COUNTY AUDITOR &
COMMISSIONER OF ELECTIONS



Resolution - 12-2014 # 10

**Policy for the Mitigation of Converted Farmed Wetlands
in Benefited Areas of Drainage District Improvement Projects in Pocahontas County.**

WHEREAS the Board of Supervisors is charged under the law to conduct studies and to consider at public hearing, together with the owners of the benefited lands, the adoption of drainage improvements by and for drainage districts in the county.

WHEREAS drainage districts improvements may be found by the USDA to cause the conversion of farmed wetlands subject to wetland conservation rules of the federal farm program and thereby cause the owners of the converted wetlands to be subjected to heavy penalties for violations of the program rules.

WHEREAS the Board has historically and consistently supported the inclusion of mitigation for converted farmed wetlands in drainage district projects and to have drainage districts share the costs of mitigation with the owners of the converted farmed wetlands.

WHEREAS the Board anticipates that several drainage districts will in 2015 consider improvements which will, if approved at public hearing, result in the conversion of farmed wetlands in the benefited areas and the Board has learned that there is no affordable converted wetland mitigation currently available, but that mitigation is also anticipated to be available in the future.

WHEREAS farm program rules allow the owners and tenants of farmed wetland converted by drainage districts to avoid program penalties and retain eligibility if they do not crop the area of the converted farmed wetland.

WHEREAS the Board believes it is important for drainage districts to continue to support mitigation of farmed wetlands converted by drainage district improvement projects when affordable mitigation is not available so that the projects may be considered for approval and, if approved, be constructed all in a timely manner.

IT IS HEREBY RESOLVED that for all proposed drainage district improvements projects in the county that will hereafter be considered for adoption at public hearing in the county and which are under the sole jurisdiction of the Board, and subject to the following conditions, the drainage district will credit or pay up to \$7,500 per farmed wetland acre to each owner of farmed wetland that will be converted by the drainage district project, the funds then to be used toward the owners' independent pursuit of compensatory mitigation if desired.

- Condition 1. The drainage district determines either through a jurisdictional determination of the Corps of Engineers or by the opinion of the drainage district's appointed engineer that the farmed wetland is not subject to regulation under Section 404 of the federal Clean Water Act. If it is subject to Clean Water Act jurisdiction then no mitigation offset will be provided and the drainage district will need to apply for a permit and deal with mitigation directly.
- Condition 2. An owner of a farmed wetland that may be converted by the proposed project must timely provide to the drainage district a copy of a USDA issued or approved certified wetland determination for land in the benefited area. So that the added cost of the

mitigation offset may be included in the board's considerations, this documentation must be placed on file with the county before the time that the board finalizes its decision at public hearing to approve the construction of drainage improvements in the district. If the farmed wetland documentation is not timely provided then no mitigation offset credits or payments will be provided by the drainage district.

- Condition 3. The owner of a farmed wetland must exhaust all reasonable options available through the local or area USDA staff to minimize the size of the farmed wetland as may be available to them at or after the time of their receipt of the notice of the public hearing. If this is not done the Board reserves the option to adjust down the credit or payment that it would otherwise approve to be provided for the mitigation offset.
- Condition 4. Before credits or payments for a mitigation offset will be released to a farmed wetland owner the owner must provide a statement in writing from the USDA that the farmed wetland will be converted by the drainage district project and that continued cropping of the farmed wetland after it is converted will affect the owner's farm program eligibility. (This statement is required even if the landowner is not a farm program participant.)
- Condition 5. If federal or state laws or associated implementing regulations thereof change prior to the completion of the credit or payment for the mitigation offset so that the drainage district may no longer transfer compensatory mitigation responsibilities to the farmed wetland owners in this way then no mitigation offset will be provided to landowners for the affected farmed wetlands and the drainage district will need to apply for a permit and deal with mitigation directly.

The Board may alter this policy separately at each public hearing as may be needed to accomplish the intent of the resolution, to account for unusual circumstances, to comply with changing laws and regulations, and to promote fairness.

Adopted and approved this 23rd day of December 2014.



Vincent L. Triggs, Chairman
Board of Supervisors
Pocahontas County

ATTEST:



Margene A. Bunda, County Auditor

ENGINEER'S REPORT

TO THE HONORABLE BOARD OF SUPERVISORS
POCAHONTAS COUNTY, IOWA

Jan 14, 1954

GENTLEMEN;

Having been appointed Engineer to report on a petition for relief on Drainage District No. 24, Pocahontas County, Iowa, I now wish to submit this preliminary report for your consideration.

The petition requested relief on lands now located within the watershed of Drainage District No. 24 of said county. The petitioner more specifically requested the establishment of a sub-district within the boundaries of Drainage District No. 24, to start near the center of the north boundary line of Section 4, Marshall Township, running thence south and easterly, following the course of the present tile drain in Drainage District No. 24 through Sections 4, 9 and 10 in Marshall Township, with the outlet terminating near the present outlet of said Drainage District No. 24 in Section 10, Marshall Township, Pocahontas County, Iowa. The petition requested a relief tile to carry off surplus water from the lands within the proposed sub-district.

The area for which the improvements have been proposed lies approximately one and one-half (1 1/2) miles south of Laurens, Iowa. The entire district has been investigated by us, and this report represents our information at this time. We shall present three proposals for your consideration, along with our recommendations.

HISTORY:

On November 7, 1905 a petition was submitted to the Board of Supervisors, Pocahontas County, Iowa, requesting the establishment of a drainage district to include a part or all of the following tracts of land;

Sections 32, 33 and 34, T-93-N R-34-W (Swan Lake Township)

Sections 3, 4, 5, 9 and 10, T-92-N R-34-W (Marshall Township)

On March 20, 1906, a W.B. Warrington was appointed Engineer. In his report, he proposed a tile system to begin at a point approximately 775 feet south of the center of Section 32 (Swan Lake Township); proceed in a south and easterly direction across Section 32 and Section 33. The proposed line was to terminate at a point 40 rods east and 90 rods south of the south 1/4 corner of Section 33. Warrington's plan called for approximately 10,200 feet of open ditch below the proposed tile.

The open ditch was to follow the general water course across Sections 4, 9 and 10, T-92-N R-34-W (Marshall Township). Said open ditch was to terminate in a natural waterway on the Southwest quarter (SW 1/4), Section 10.

The District was established August 6, 1906, however, at a later date bids for the construction as proposed were rejected. Approximately seven years later, F.A. Malcolm (Engineer) submitted plans for an all tile system. Said plan included a main tile to begin on the north line of Section 4, Marshall Township and follow the general water course across Sections 4, 9 and 10, to terminate on the east line of the Southwest quarter (SW 1/4), Section 10.

This plan was submitted because between 1906 and the year 1913 a mutual drain was completed which drained the north one-half of Section 33 (Swan Lake Township) through the divide to the east. This is a 14 inch line terminating in the middle of the N 1/2, SW 1/4 of said Section 33. Also between the above given years Section 32 and the S 1/2 of Section 33 (Swan Lake Township) had been drained with a 16 inch tile to the south line of Section 33. We have no information as to how the later tile system was completed but appears to be similar to the original plans as submitted in the Warrington report.

PRESENT SYSTEM:

The plan as presented by F. A. Malcolm was adopted and constructed, and now constitutes the present Drainage District No. 24. The boundaries include land in Sections 32, 33 and 34, T-93-N R-34-W (Swan Lake Township) and Sections 3, 4, 5, 9 and 10, T-92-N R-34-W (Marshall Township). The drainage area within the boundaries of Drainage District No. 24 is approximately 2,360 acres and has a 28 inch tile for an outlet.

The stations, lengths and sizes of the old existing tile as determined from the records on file in the County Auditor's office on Drainage District No. 24 appear below. A profile of the tile was not available, however, from additional records it appears the grade on approximately the entire line to be 0.07 per 100 feet.

STATION	LENGTH	SIZE
0-10	1000'	28"
10-40	3000'	30"
40-72	3200'	26"
72-96	2400'	24"
96-109	1300'	22"
109-116	700'	20"
116-127/51	1151'	18"

A study was made of the entire tile system as it now exists. We have made a complete breakdown of the whole tile system. We have found the lands situated within the present boundaries of Drainage District No. 24 (especially the E 1/2, Section 32, NE 1/4, Section 33, Swan Lake Township and NE 1/4, Section 4, Marshall Township) are not afforded sufficient outlet for the proper drainage required.

Under the present system, approximately 800 acres is tiled into the 18 inch tile (Station 127/51) on the north line of Section 4 (Marshall Township). This is wholly insufficient and inadequate to carry the subsurface drainage. It should be stated here the subsurface drainage is dependent upon the adequate disposal of surface water. The surface runoff from approximately 460 acres will pond on the SW 1/4, Section 33 to the extent of 1 1/2 feet before it will flow over ground to the south. A similar condition exists at two points on the E 1/2, Section 32, whereby there is little or no surface runoff. Under these conditions additional capacity is needed to prevent drowning out of crops.

Below listed in chart form is a tile summary. Included in this summary is tile size, length, grade, capacity, approximate area drained and capacity required for 1/2" and 3/8" runoff per acre per 24 hour period. In cases where there is limited or no runoff, we feel a system should be designed to remove 1/2 inch per acre per 24 hour period.

FILE SUMMARY OF PRESENT TILE SYSTEM D.D. NO. 24, POCAHONTAS COUNTY, IOWA

STA*STA	AREA	LENGTH	SIZE	GRADE	CAP	1/2"	3/8"
	ACRE				GFS		
127/51-116	844	1151'	18"	0.20	4.07	17.72	13.29
116-109	1210	700'	20"	0.07	3.19	25.41	19.06
109-96	1334	1300'	22"	0.07	4.00	28.01	21.01
96-72	1508	2400'	24"	0.07	5.19	31.67	23.75
72-40	1672	3200'	26"	0.07	6.38	35.11	26.33
40-10	1980	3000'	30"	0.07	9.40	41.58	31.18
10-0	2190	1000'	28"	0.10	9.37	45.99	34.49

From this summary it can be concluded the present capacity is less than 1/4 the required capacity,

PROPOSAL NO. 1

To meet with the request of the petition, we wish to submit the following plan. Starting with a 34 inch tile, at a point on the north line of Section 4 (Marshall Township), thence running south and easterly, following the course of the present tile drain in Drainage District No. 24 through Sections 4, 9 and 10 in Marshall Township, with the outlet terminating near or at the present outlet.

This 34 inch tile line would offer a sufficient outlet for approximately 930 acres lying above Section 4. The capacity of this tile would offer 1/2 inch runoff per acre per 24 hours on all land included in Section 32, 33 and 34, Swan Lake Township.

This proposal would require the cleanout of the open ditch below the outlet and terminating at the open ditch in Drainage District No. 41, Pocahontas County, Iowa.

COST ESTIMATE
PROPOSAL NO. 1

Sec 1.	Excavation	30,000 Cu. Yds @ \$0.10	\$ 3,000.00
Sec 2.	Main tile		
	3950' - 34" tile Ave Dp 8.1'		
	Tile	@ \$3.25	12,837.50
	Installation	@ \$1.70	6,715.00
	30' - 36" C.I.P.	@ \$7.25	217.50
	2 intakes	@ \$75.00	150.00
Sec 3.	Main Tile		
	3516' - 34" tile Ave Dp 10.0'		
	Tile	@ \$3.25	11,427.00
	Installation	@ \$1.90	6,680.40
	1200' - 34" Extra Quality Av Dp 11.5		
	Tile	@ \$3.45	4,140.00
	Installation	@ \$2.10	2,520.00
	84' - 36" 2000D Tile	@ \$7.00	588.00
	1 intake	@ \$75.00	75.00
Sec 4	Main Tile		
	3952' - 34" tile Ave. Dp. 7.4'		
	Tile	@ \$3.25	12,844.00
	Installation	@ \$1.65	6,520.80
	42' - 36" 2000D tile	@ \$6.35	266.70
	2 intakes	@ \$75.00	150.00
Engr., Legal Fees, Publication, & Etc.;			10,250.00
TOTAL			\$ 78,381.90

PROPOSAL NO. 2

The plan now to be submitted shall hereafter be known as Proposal No. 2. Included in this report is plat, profiles, tile summary and cost estimate, all of which constitute a part of this report.

This plan shall consist of a main tile line and four branches. The main shall begin at a point on the north line of the S 1/2, SE 1/4, Section 32, Swan Lake Township, and run in an easterly direction through Section 32 and Section 33. This plan shall cut through the water shed divide in Section 34, Swan Lake Township, following the general course of the mutual drain now in place, terminating in the open ditch on Drainage District No. 41, Pocahontas County, Iowa. The system proposed would offer 1/2 inch runoff for the proposed sub-district.

On the plat (sheet 1 of 5) showing the original watershed of Drainage District No. 24, we show the new boundary proposed to establish the sub-district. On the enlarged plat (sheet 2 of 5) of the sub-district is shown proposed tile alignment, size and property owners within the sub-district.

The enclosed profiles (sheet 3 of 5 and sheet 4 of 5) lists tile sizes, lengths and depths under this plan. We propose to completely cut off the 16 inch tile now in place at the west line of the SE 1/4, Section 33, empty it into the proposed new line.

The object here is to give relief to the tile line which flows south through Sections 4, 9 and 10, Marshall Township.

Listed below in table form is a complete tile summary of the proposed sub-district. We have made a complete breakdown of the tile system, showing the area to be drained, size and grade of proposed tile and capacity needed to give 1/2 inch and 3/8 inch runoff per acre per 24 hour period.

TILE SUMMARY
SUB-DISTRICT OF DD. NO. 24

STA-STA RANCH "D"	INC AREA	AREA LAT	TOTAL AREA	LENGTH	3/8"	1/2"	PRO TILE	PRO GR.	CAP CFS.
15-9	40	40		600'	0.63	0.84	8"	0.36	0.63
9-4	40	80		500'	1.26	1.68	10"	1.12	1.58
4-0	20	100	100	400'	1.58	2.10	10"	0.60	2.18
BRANCH "C"									
15-9	70	70		600'	1.10	1.47	10"	0.70	1.58
9-0	41	111	211	900'	1.75	2.33	14"	0.20	2.08
MAIN									
109-70-101			211	870'	3.33	4.43	18"	0.16	3.64
101-94		30	241	700'	3.80	5.06	20"	0.16	4.83
BRANCH "B"									
17-75-12	135	135		575'	2.12	2.83	14"	0.30	2.63
12-0	49	184	425	1200'	2.90	3.86	16"	0.30	3.75
MAIN									
94-80		50	475	1400'	7.48	9.98	24"	0.16	7.84
80-61		193	668	1900'	10.52	14.03	24"	0.28	10.38
61-53		20	688	800'	10.85	14.45	26"	0.20	10.79
53-43		120	808	1000'	12.69	16.97	28"	0.20	13.25
BRANCH "A"									
2-75-0	56	56	764	275'	0.88	1.18	10"	0.40	1.20
MAIN									
43-29		74	938	1400'	13.76	19.69	30"	0.20	15.90
29-28-28				72'			36"	2000D	
28-28-12				1628'			30"	0.20	15.90
12-11				100'			26"	1.40	18.69
11-0				1100'			24"	0.70	16.40

Below listed in table form is a cost estimate for Proposal No. 2. The estimate is broken down to indicate the probable cost of each portion of the tile main and branches. Under this plan any or all branches may be eliminated.

COST ESTIMATE
PROPOSAL NO. 2

STA-STA	LENGTH	TILE SIZE	INSTALL COST	TILE COST	UNIT COST	TOTAL COST
109-70-101	870'	18"	0.81	1.00	1.81	1,574.70
101-94	700'	20"	1.12	1.20	2.32	1,624.00
94-87-28	672'	24"	1.20	1.75	2.95	1,982.40
87-28-86-92	36'	24" 2000D	1.80	3.60	5.40	194.40
86-92-61	2592'	24"	1.20	1.75	2.95	7,646.40
61-53	800'	26"	1.15	2.00	3.15	2,520.00
53-43	1000'	28"	1.28	2.15	3.43	3,430.00
43-34	900'	30"	1.65	2.75	4.40	3,960.00
34-29	500'	30" E.Q.	1.85	2.90	4.75	2,375.00
29-28-28	72'	30" 2000D	1.95	5.20	7.15	514.80
28-28-20	828'	30" E.Q.	1.85	2.90	4.75	3,933.00
20-12	800'	30"	1.80	2.75	4.55	3,640.00
12-11	100'	26"	0.95	2.00	2.95	295.00
11-0	1100'	24"	0.85	1.75	2.60	2,860.00
24' x 30" Corr. Pipe		@ \$ 6.00				144.00
2 - intakes		@ \$75.00				150.00
BRANCH "D"						
15-10	500'	8"	0.40	0.21	0.61	305.00
10-4	600'	10"	0.45	0.30	0.75	450.00
4-0	400'	12"	0.58	0.44	1.02	408.00
BRANCH "C"						
14-77-9	577'	10"	0.42	0.30	0.72	415.44
9-0	900'	14"	0.66	0.58	1.24	1,116.00
BRANCH "B"						
16-75-12	475'	14"	0.68	0.58	1.26	598.50
12-0	1200'	16"	0.92	0.63	1.55	1,860.00

BRANCH "A"

275-0

275'

10"

0.44

0.30

0.74

203.50

Engr., Legal Fees, Publication, & Etc;

6,330.00

TOTAL

\$ 48,530.14

A description of the lands, owners and approximate acres with the proposed sub-district are as follows:

IONA C. SHANER -----	SW 1/4 NW 1/4 Sec. 34	T-93-N R-34-W	19	Ac.
	SE 1/4 NW 1/4 Sec. 34	T-93-N R-34-W	14	Ac.
GUNDY & COMPANY-----	NE 1/4 SW 1/4 Sec. 34	T-93-N R-34-W	4	Ac.
	NW 1/4 SW 1/4 Sec. 34	T-93-N R-34-W	27	Ac.
	SW 1/4 SW 1/4 Sec. 34	T-93-N R-34-W	18	Ac.
	NE 1/4 SE 1/4 Sec. 33	T-93-N R-34-W	39	Ac.
	NW 1/4 SE 1/4 Sec. 33	T-93-N R-34-W	40	Ac.
	SW 1/4 SE 1/4 Sec. 33	T-93-N R-34-W	33	Ac.
	SE 1/4 SE 1/4 Sec. 33	T-93-N R-34-W	35.5	Ac.
MARY LINDSAY -----	NW 1/4 NW 1/4 Sec. 3	T-92-N R-34-W	4	Ac.
MINNIE A. LUNDELAD-----	NE 1/4 NE 1/4 Sec. 4	T-92-N R-34-W	5	Ac.
	NW 1/4 NE 1/4 Sec. 5	T-92-N R-34-W	5	Ac.
ROBERT FULLERTON -----	SE 1/4 SE 1/4 Sec. 33	T-93-N R-34-W	35	Ac.
	SW 1/4 SE 1/4 Sec. 33	T-93-N R-34-W	22	Ac.
A.D. & F.C. PETERSON----	NE 1/4 NW 1/4 Sec. 4	T-92-N R-34-W	28	Ac.
	NW 1/4 NW 1/4 Sec. 4	T-92-N R-34-W	29.5	Ac.
EVERTT SEE-----	NE 1/4 SW 1/4 Sec. 33	T-93-N R-34-W	40	Ac.
	NW 1/4 SW 1/4 Sec. 33	T-93-N R-34-W	39	Ac.
	SW 1/4 SW 1/4 Sec. 33	T-93-N R-34-W	38	Ac.
	SE 1/4 SW 1/4 Sec. 33	T-93-N R-34-W	39	Ac.
G.W. RUBEL -----	SW 1/4 NW 1/4 Sec. 33	T-93-N R-34-W	12	Ac.
A.C. SWANSON-----	NE 1/4 NE 1/4 Sec. 32	T-93-N R-34-W	38	Ac.
G.D. WENELL-----	NW 1/4 NE 1/4 Sec. 32	T-93-N R-34-W	20	Ac.
	SW 1/4 NE 1/4 Sec. 32	T-93-N R-34-W	40	Ac.
	SE 1/4 NE 1/4 Sec. 32	T-93-N R-34-W	39	Ac.
	NW 1/4 SE 1/4 Sec. 32	T-93-N R-34-W	40	Ac.
A.D. PETERSON-----	NE 1/4 SE 1/4 Sec. 32	T-93-N R-34-W	39	Ac.
F.C. PETERSON-----	SW 1/4 SE 1/4 Sec. 32	T-93-N R-34-W	40	Ac.
	SE 1/4 SE 1/4 Sec. 32	T-93-N R-34-W	39	Ac.
	SE 1/4 SW 1/4 Sec. 32	T-93-N R-34-W	5	Ac.
HOWARD WASSOM -----	NE 1/4 NE 1/4 Sec. 5	T-92-N R-34-W	34.5	Ac.
	NW 1/4 NE 1/4 Sec. 5	T-92-N R-34-W	33	Ac.
	SW 1/4 NE 1/4 Sec. 5	T-92-N R-34-W	2	Ac.
	SE 1/4 NE 1/4 Sec. 5	T-92-N R-34-W	2	Ac.
I.T. & K. FRANTZ -----	SE 1/4 NW 1/4 Sec. 32	T-93-N R-34-W	16	Ac.
M. & J. GUSTAFSON -----	NE 1/4 SW 1/4 Sec. 32	T-93-N R-34-W	28	Ac.

PROPOSAL NO. 3

The plan submitted below shall hereafter be referred to as proposal No. 3.

It can be assumed the original drain was designed to give similar benefits. Because of the lay of the land, the NE 1/4, Section 4, Marshall Township is subject to overflow and too wet for cultivation.

Under proposal No. 3, we propose a surface drain be constructed beginning on the north line of the S 1/2, NE 1/4, Section 4, Marshall Township, and run in a southeasterly direction following the general course of the tile main in place and terminate in the north road ditch on the south line of Section 4. This surface ditch to have a 10 foot bottom and 3 to 1 side slopes with a maximum cut of 4 1/2 feet.

This plan would eliminate the above mentioned ponding. At the present time water can stand approximately 2 1/2 feet deep on the SW 1/4 NE 1/4, Section 4, Marshall Township, before it will flow over the surface to the south toward the outlet. Through this plan the above condition could be eliminated in a limited manner.

We would propose such work to be done by scoops. The profile of this surface drain is shown on sheet 5 of 5.

COST ESTIMATE
PROPOSAL NO. 3

Sec. 1. 4,200 Cu. Yds.	@	\$0.25	\$1,050.00
------------------------	---	--------	------------

This proposal can be used in conjunction with Proposal No. 1 or Proposal No. 2.

RECOMMENDATIONS:

- (1.) We recommend a subdistrict be established, and the plan as submitted in proposal no. 2 be carried out. The boundary is shown upon the enclosed plat (sheet 2 of 5).
- (2.) We recommend the 16 inch tile at the west line of SE 1/4, Section 33 be connected to the new tile line, thereby creating additional capacity for the lands to the south of this new sub-district.
- (3.) We have shown the need for proposal no. 3. In most instances we do not recommend the construction of surface drains, however, in this instance, since the cost is low we feel it to be justifiable. This would tend to adjust the inequality that has existed since the construction of the original drain through Sections 4, 9 and 10, Marshall Township.

We have examined the lands described in the petition and others which would be benefitted by said improvement. We believe the improvement is practical and feasible, and carries out the purpose of the petition, but in a different manner. The end result from proper drainage will be better crops, produced at a reduced cost of operation. The bettering of farm conditions as to sanitation, appearance and crop yield means that the farm is more valuable, hence there follows an increase in property value.

We believe the construction of this improvement as outlined will be of public benefit or utility and that said improvement would be conducive to public health, convenience and welfare.

Respectfully Submitted

W.C. Otto

W.C. Otto
W.C. Otto Engr. Co.
Sac City, Iowa

WCL/rgw

100-10000

RECEIVED
JAN 19 1954

100-10000

RECEIVED

RECEIVED
JAN 19 1954
100-10000

RECEIVED
JAN 19 1954
100-10000

Maie Davis
POCAHONTAS CO. AUDITOR

FILED

JAN 19 1954

RECEIVED
JAN 19 1954
100-10000

RECEIVED

RECEIVED
JAN 19 1954
100-10000

RECEIVED
JAN 19 1954
100-10000

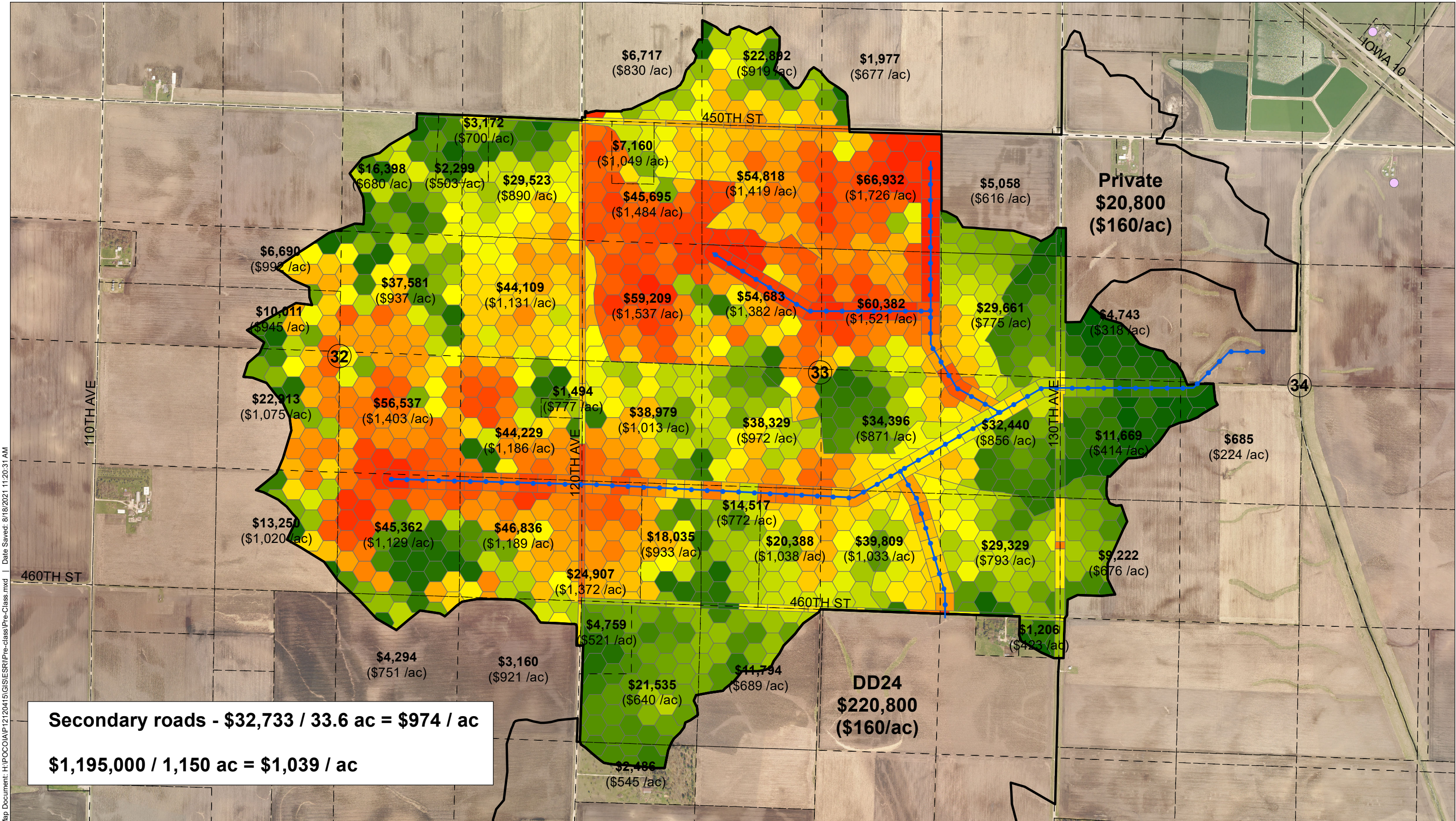
RECEIVED
JAN 19 1954
100-10000

RECEIVED
JAN 19 1954
100-10000

RECEIVED
JAN 19 1954
100-10000

RECEIVED
JAN 19 1954
100-10000

Appendix B: Pre-Classification Existing Assessment Schedule



PRELIMINARY COMBINED BENEFITS SCHEDULE
DRAINAGE DISTRICT NO. 175, POCAHONTAS COUNTY, IOWA

Dollars shown are approximate. Final assessments will be based on actual project costs, annexation, and a classification commission

Deedholder	Parcel Number	Legal Description	Sec-Twp-Rng	2021 PROPOSED IMPROVEMENTS			COMBINED BENEFITS		
				Main Tile & Branch C	Branch A	Branch B	Benefited Acres	Combined Assess. (\$)	Class (%)
Booge Properties Limited Partnership c/o Kirk Ivener	0133400001	NW SE	33-93-34	30,307.07	4,089.02	-	39.49	34,396.09	51%
Booge Properties Limited Partnership c/o Kirk Ivener	0133400002	NE SE	33-93-34	29,522.98	2,917.02	-	37.88	32,440.00	48%
Booge Properties Limited Partnership c/o Kirk Ivener	0133400003	SW SE	33-93-34	39,809.17	-	-	38.55	39,809.17	59%
Booge Properties Limited Partnership c/o Kirk Ivener	0133400004	SE SE	33-93-34	29,328.50	-	-	37.0	29,328.50	44%
Brent, Carlton R & Brent, Melissa S	0504100008	W 559.92' N 785.73' NW NW	4-92-34	4,758.88	-	-	9.14	4,758.88	7%
Dahl, Arthur L	0134100003	SW NW	34-93-34	4,742.82	-	-	14.9	4,742.82	7%
Dubbert, Daniel R, Et Al	0133300001	NW SW	33-93-34	38,978.59	-	-	38.5	38,978.59	58%
Dubbert, Daniel R, Et Al	0133300002	NE SW	33-93-34	33,898.96	4,429.72	-	39.5	38,328.68	57%
Dubbert, Daniel R, Et Al	0133300003	W 1/2 SW SW	33-93-34	24,907.06	-	-	18.2	24,907.06	37%
Dubbert, Daniel R, Et Al	0133300004	E 1/2 SW SW	33-93-34	18,034.72	-	-	19.32	18,034.72	27%
Dubbert, Daniel R, Et Al	0133300005	W 1/2 SE SW	33-93-34	14,517.43	-	-	18.8	14,517.43	22%
Dubbert, Daniel R, Et Al	0133300006	E 1/2 SE SW	33-93-34	20,388.02	-	-	19.63	20,388.02	30%

PRELIMINARY COMBINED BENEFITS SCHEDULE
DRAINAGE DISTRICT NO. 175, POCAHONTAS COUNTY, IOWA

Dollars shown are approximate. Final assessments will be based on actual project costs, annexation, and a classification commission

Deedholder	Parcel Number	Legal Description	Sec-Twp-Rng	2021 PROPOSED IMPROVEMENTS			COMBINED BENEFITS		
				Main Tile & Branch C	Branch A	Branch B	Benefited Acres	Combined Assess. (\$)	Class (%)
Dubbert, James W Trustee & Dubbert, Carolyn Z Trustee	0134300001	NW SW RD 1.48	34-93-34	11,669.21	-	-	28.2	11,669.21	17%
Dubbert, James W Trustee & Dubbert, Carolyn Z Trustee	0134300002	NE SW	34-93-34	684.75	-	-	3.1	684.75	1%
Dubbert, James W Trustee & Dubbert, Carolyn Z Trustee	0134300003	SW SW	34-93-34	9,221.85	-	-	13.6	9,221.85	14%
Dudding Land & Cattle Ltd, Dudding Consulting Ltd	0133200001	NW NE RD 1.00	33-93-34	13,436.74	14,228.45	39,266.87	38.8	66,932.06	100%
Dudding Land & Cattle Ltd, Dudding Consulting Ltd	0133200002	NE NE	33-93-34	3,004.54	2,053.18	-	8.22	5,057.72	8%
Dudding Land & Cattle Ltd, Dudding Consulting Ltd	0133200003	SW NE	33-93-34	20,425.69	37,061.94	2,894.53	39.70	60,382.16	90%
Dudding Land & Cattle Ltd, Dudding Consulting Ltd	0133200004	SE NE	33-93-34	20,493.76	9,167.28	-	38.27	29,661.04	44%
Ekstam, Dorothy M & Ekstam, John C	0504100002	N1/2 SW NW	4-92-34	2,486.09	-	-	4.56	2,486.09	4%
Gustafson, John Allen & Gustafson, Bryana Rose	0132100009	SE NW	32-93-34	6,689.79	-	-	6.74	6,689.79	10%
Gustafson, Randy L	0132300004	SE SW	32-93-34	13,250.16	-	-	13.0	13,250.16	20%

PRELIMINARY COMBINED BENEFITS SCHEDULE
DRAINAGE DISTRICT NO. 175, POCAHONTAS COUNTY, IOWA

Dollars shown are approximate. Final assessments will be based on actual project costs, annexation, and a classification commission

Deedholder	Parcel Number	Legal Description	Sec-Twp-Rng	2021 PROPOSED IMPROVEMENTS			COMBINED BENEFITS		
				Main Tile & Branch C	Branch A	Branch B	Benefited Acres	Combined Assess. (\$)	Class (%)
Gustafson, Randy L & Gustafson, Carla K	0132100010	SE NW	32-93-34	10,011.43	-	-	10.6	10,011.43	15%
Gustafson, Randy L & Gustafson, Carla K	0132300002	NE SW	32-93-34	22,912.57	-	-	21.3	22,912.57	34%
Kraft, Dale F & Kraft, Judy J	0504200004	E 443' N 436.4' NE NE	4-92-34	1,205.71	-	-	2.85	1,205.71	2%
Larsen Living Trust, Evangeline Tusa	0505200001	NW NE	5-92-34	4,294.48	-	-	5.7	4,294.48	6%
Larsen Living Trust, Evangeline Tusa	0505200002	NE NE	5-92-34	3,159.53	-	-	3.43	3,159.53	5%
Lindquist, Ethan C	0132200006	4.61 AC TR NE COR NW NE	32-93-34	2,299.37	-	-	4.6	2,299.37	3%
Lindquist, Ethan C	0132200008	5.39 AC TR NW COR NE NE RD .24	32-93-34	3,172.44	-	-	4.5	3,172.44	5%
Lindsey Farms Inc	0504100004	NE NW	4-92-34	11,793.80	-	-	17.11	11,793.80	18%
Lindsey Farms Inc	0504100007	NW NW(EXC W 559.92' N 785.73')	4-92-34	21,534.91	-	-	33.66	21,534.91	32%
Railsback Revocable Trust, The Dennis Dale	0132400003	SW SE	32-93-34	45,361.54	-	-	40.19	45,361.54	68%
Railsback Revocable Trust, The Dennis Dale	0132400004	SE SE	32-93-34	46,835.69	-	-	39.38	46,835.69	70%

PRELIMINARY COMBINED BENEFITS SCHEDULE
DRAINAGE DISTRICT NO. 175, POCAHONTAS COUNTY, IOWA

Dollars shown are approximate. Final assessments will be based on actual project costs, annexation, and a classification commission

Deedholder	Parcel Number	Legal Description	Sec-Twp-Rng	2021 PROPOSED IMPROVEMENTS			COMBINED BENEFITS		
				Main Tile & Branch C	Branch A	Branch B	Benefited Acres	Combined Assess. (\$)	Class (%)
Rubel, Craig, Brendel, Cathy, Rubel, Craig A, Niemeyer Trust-2017, Lynne A	0128300003	SW SW	28-93-34	1,561.65	1,470.35	3,684.50	8.09	6,716.50	10%
Rubel, Jessie A	0133100002	NE NW	33-93-34	11,733.07	18,692.99	24,392.29	38.64	54,818.35	82%
Rubel, Jessie A	0133100003	SW NW	33-93-34	13,788.44	45,420.07	-	38.5	59,208.51	88%
Rubel, Jessie A	0133100004	SE NW	33-93-34	11,952.77	42,564.88	165.36	39.6	54,683.01	82%
Rubel, Jessie A	0133100005	NW NW (EXC LOT 660' X462'-321'E NW COR	33-93-34	8,441.40	33,212.56	4,041.05	30.79	45,695.01	68%
Rubel, Jessie A	0133100006	LOT 660'X462'-321' E OF NW COR NW NW	33-93-34	1,518.58	3,838.14	1,803.36	6.8	7,160.08	11%
Ryon Family Trust, Ryon, Roger L & Andrea C	0128300004	SE SW	28-93-34	5,524.21	4,848.84	12,518.77	24.90	22,891.82	34%
Ryon Family Trust, Ryon, Roger L & Andrea C	0128400004	SW SE	28-93-34	450.47	413.32	1,113.19	2.9	1,976.98	3%
Sikma, Ronald S	0132200003	SW NE	32-93-34	37,581.08	-	-	40.1	37,581.08	56%
Sikma, Ronald S	0132200004	SE NE	32-93-34	44,109.08	-	-	38.998084	44,109.08	66%
Sikma, Ronald S	0132200005	NW NE(EXC 4.61 AC TR NE COR)	32-93-34	16,397.93	-	-	24.108287	16,397.93	24%

PRELIMINARY COMBINED BENEFITS SCHEDULE
DRAINAGE DISTRICT NO. 175, POCAHONTAS COUNTY, IOWA

Dollars shown are approximate. Final assessments will be based on actual project costs, annexation, and a classification commission

Deedholder	Parcel Number	Legal Description	Sec-Twp-Rng	<u>2021 PROPOSED IMPROVEMENTS</u>			<u>COMBINED BENEFITS</u>		
				Main Tile & Branch C	Branch A	Branch B	Benefited Acres	Combined Assess. (\$)	Class (%)
Sikma, Ronald S	0132200007	NE NE(EXC 5.39 AC TR NW COR)	32-93-34	29,522.83	-	-	33.19	29,522.83	44%
Wenell, John P & Wenell, Jean E	0132400001	NW SE	32-93-34	56,536.84	-	-	40.31	56,536.84	84%
Wenell, John P & Wenell, Jean E	0132400005	NE SE(EXC 2.08 AC TR - 432.50' S NE COR)	32-93-34	44,228.93	-	-	37.30	44,228.93	66%
Wenell, Kyle	0132400006	2.08 AC TR- 432.50' S NE COR NE SE	32-93-34	1,494.29	-	-	1.9	1,494.29	2%
Pocahontas County Secondary Roads			0-0-0	27,020.18	2,592.24	3,120.08	33.6	32,732.50	
Totals				875,000	227,000	93,000	1,148.03	1,195,000	

Date: 8/04/21
Time: 11:26:12

Drainage Real Estate
Edit Listing

Program: DRL0001
Page: 1

		386- District / Lateral							
Tract	Taxing Dist	Parcel Sec	-Twp	-Rng	Entity	Legal	Acres	% Benefit	Units Assessed
.5	20 000	01 32 100 009 032 093 034			Gustafson, John Allen 309 E Arthur St Laurens, IA 50554	N 1/2 SE NW			15.260
1.0	20 000	01 32 100 010 032 093 034			Gustafson, Randy L 45860 110th Ave Laurens, IA 50554	S 1/2 SE NW			15.250
2.0	20 000	01 32 200 005 032 093 034			Sikma, Ronald S 6336 Southern Hills Dr Fort Worth, TX 76132	NW NE(EXC 4.61 AC TR NE COR) RD .80	35.390		
2.2	20 000	01 32 200 006 032 093 034			Lindquist, Ethan C 11766 450th St Laurens, IA 50554	4.61 AC TR NE COR NW NE RD .20	4.610		
3.0	20 000	01 32 200 007 032 093 034			Sikma, Ronald S 6336 Southern Hills Dr Fort Worth, TX 76132	NE NE(EXC 5.39 AC TR NW COR) RD 1.76	34.610		
3.2	20 000	01 32 200 008 032 093 034			Lindquist, Ethan C 11766 450th St Laurens, IA 50554	5.39 AC TR NW COR NE NE RD .24	5.390		
4.0	20 000	01 32 200 003 032 093 034			Sikma, Ronald S 6336 Southern Hills Dr Fort Worth, TX 76132	SW NE			73.860
5.0	20 000	01 32 200 004 032 093 034			Sikma, Ronald S 6336 Southern Hills Dr Fort Worth, TX 76132	SE NE RD 1.00			158.150
6.0	20 000	01 32 300 002 032 093 034			Gustafson, Randy L Gustafson, Carla 45860 110th Ave Laurens, IA 50554	NE SW			51.780
7.0	20 000	01 32 300 004 032 093 034			Gustafson, Randy L 45860 110th Ave	SE SW			1.610

Program: DRL0001
Page: 2

Tract	Taxing Dist	Parcel Sec	-Twp	-Rng	Entity	Legal	Acres	% Benefit	Units Assessed
8.0	20 000	01 032	32 093	400 001 034	Laurens, IA 50554 Wenell, John P 441 Lawman Ln Laurens, IA 50554	NW SE			151.730
9.0	20 000	01 032	32 093	400 005 034	Wenell, John P 441 Lawman Ln Laurens, IA 50554	NE SE(EXC 2.08 AC TR -432.50' S NE COR) RD .85	37.920		
9.2	20 000	01 032	32 093	400 006 034	Wenell, Kyle 49568 120th Ave Albert City, IA 50510	2.08 AC TR-432.50' S NE COR NE SE RD .15	2.080		
10.0	20 000	01 032	32 093	400 003 034	Railsback Revocable Trust, The Dennis Da 3078 Market Ave Ida Grove, IA 51445	SW SE			93.530
11.0	20 000	01 032	32 093	400 004 034	Railsback Revocable Trust, The Dennis Da 3078 Market Ave Ida Grove, IA 51445	SE SE RD 1.00			155.340
12.0	20 000	01 033	33 093	100 003 034	Rubel, Jessie A 2240 Rolling Green Ln North Mankato, MN 56003	SW NW RD 1.00			6.820
13.0	20 000	01 033	33 093	200 003 034	Dudding Land & Cattle Ltd 7306 SW 34th Ave, Ste #1 PMB 350 Amarillo, TX 79121	SW NE			57.000
14.0	20 000	01 033	33 093	200 004 034	Dudding Land & Cattle Ltd 7306 SW 34th Ave, Ste #1 PMB 350 Amarillo, TX 79121	SE NE RD 1.60			84.290
15.0	20 000	01 033	33 093	300 001 034	Dubbert, Kevin H 45640 150th Ave Laurens, IA 50554	NW SW RD 1.00			161.760
16.0	20 000	01	33	300 002	Dubbert, Kevin H	NE SW			342.800

Date: 8/04/21
Time: 11:26:12

Drainage Real Estate
Edit Listing

Program: DRL0001
Page: 3

		386-			District / Lateral							
		-			-		-					
Tract	Taxing Dist	Parcel Sec	-Twp	-Rng	Entity	Legal	Acres	% Benefit	Units Assessed			
		033	093	034	45640 150th Ave Laurens, IA 50554							
17.0	20 000	01 033	33 093	300 034	Dubbert, Kevin H	W 1/2 SW SW RD 1.50			102.560			
					45640 150th Ave Laurens, IA 50554							
18.0	20 000	01 033	33 093	300 034	Dubbert, Kevin H	E 1/2 SW SW RD .50			102.560			
					45640 150th Ave Laurens, IA 50554							
19.0	20 000	01 033	33 093	300 034	Dubbert, Kevin H	W 1/2 SE SW RD .50			122.630			
					45640 150th Ave Laurens, IA 50554							
20.0	20 000	01 033	33 093	300 034	Dubbert, Kevin H	E 1/2 SE SW RD .50			122.630			
					45640 150th Ave Laurens, IA 50554							
21.0	20 000	01 033	33 093	400 034	Booge Properties Limited Partnership c/o Kirk Ivener 1201 46th St Sioux City, IA 51104	NW SE			504.560			
22.0	20 000	01 033	33 093	400 034	Booge Properties Limited Partnership c/o Kirk Ivener 1201 46th St Sioux City, IA 51104	NE SE RD 1.59			261.710			
23.0	20 000	01 033	33 093	400 034	Booge Properties Limited Partnership c/o Kirk Ivener 1201 46th St Sioux City, IA 51104	SW SE RD 1.00			759.050			
24.0	20 000	01 033	33 093	400 034	Booge Properties Limited Partnership c/o Kirk Ivener 1201 46th St Sioux City, IA 51104	SE SE RD 2.60			383.340			
25.0	20 000	01 034	34 093	100 034	Dahl, Arthur L 413 W 9th St Alta, IA 51002	SW NW RD 1.62			2.810			
26.0	20 000	01	34	300	Dubbert, James W	NW SW			10.030			

Date: 8/04/21
Time: 11:26:12

Drainage Real Estate
Edit Listing

Program: DRL0001
Page: 4

Tract	Taxing Dist	Parcel Sec -Twp -Rng	Entity	District / Lateral	Legal	Acres	% Benefit	Units Assessed
		034 093 034	Trustee 411 Walnut St #1517 Green Cove Springs, FL 32043-3443	386- - - / - -	RD 1.48			
27.0	20 000	01 34 300 003 034 093 034	Dubbert, James W Trustee 411 Walnut St #1517 Green Cove Springs, FL 32043-3443		SW SW RD 1.61			10.030
	386-	- - / - -			Count: 31 Totals:	120.000		3,751.090 *
				Count: 31	Grand Totals:	120.000		3,751.090

Appendix C: Engineer's Opinion of Probable Costs

Drainage District No. 175
Proposed Drainage Improvements &
Water Quality Wetland
Pocahontas County, Iowa
OPINION OF PROBABLE COSTS
Wednesday, August 4, 2021



Real People. Real Solutions.

Construction Division 1--Tile Work on Private Lands

Item	Description	Unit	Quantity	Unit Price	Total
101	1500D R.C.P., 36" Dia.	LF	400	\$73	\$29,200
102	2000D R.C.P., 36" Dia.	LF	1,150	\$79	\$90,850
102	3000D R.C.P., 36" Dia.	LF	1,475	\$90	\$132,750
103	2000D R.C.P., 30" Dia.	LF	337	\$63	\$21,231
104	3000D R.C.P., 30" Dia.	LF	919	\$67	\$61,573
105	1500D R.C.P., 21" Dia.	LF	1,699	\$40	\$67,960
106	2000D R.C.P., 21" Dia.	LF	2,180	\$43	\$93,740
107	3000D R.C.P., 21" Dia.	LF	200	\$45	\$9,000
108	1500D R.C.P., 18" Dia.	LF	2,414	\$35	\$84,490
109	2000D R.C.P., 18" Dia.	LF	1,531	\$37	\$56,647
110	3000D R.C.P., 18" Dia.	LF	398	\$42	\$16,716
111	1500D R.C.P., 15" Dia.	LF	1,582	\$31	\$49,042
112	2000D R.C.P., 15" Dia.	LF	1,340	\$33	\$44,220
113	1500D R.C.P., 12" Dia.	LF	1,357	\$29	\$39,353
114	2000D R.C.P., 12" Dia.	LF	669	\$31	\$20,739
115	18" on XX" Dia. R.C.P. Tee, Fabrication Only	EA	1	\$500	\$500
116	15" on XX" Dia. R.C.P. Tee, Fabrication Only	EA	4	\$450	\$1,800
117	12" on XX" Dia. R.C.P. Tee, Fabrication Only	EA	13	\$400	\$5,200
118	36" Dia., R.C.P. Elbow Section, Fabrication Only	EA	5	\$600	\$3,000
119	21" Dia., R.C.P. Elbow Section, Fabrication Only	EA	2	\$500	\$1,000
120	18" Dia., R.C.P. Elbow Section, Fabrication Only	EA	3	\$450	\$1,350
121	15" Dia., R.C.P. Elbow Section, Fabrication Only	EA	3	\$425	\$1,275
122	30" Dia., R.C.P. Reducer Section, Fabrication Only	EA	1	\$1,426	\$1,426
123	21" Dia., R.C.P. Reducer Section, Fabrication Only	EA	1	\$972	\$972
124	18" Dia., R.C.P. Reducer Section, Fabrication Only	EA	1	\$853	\$853
125	15" Dia., R.C.P. Reducer Section, Fabrication Only	EA	1	\$796	\$796
126	12" Dia., R.C.P. Reducer Section, Fabrication Only	EA	1	\$774	\$774
127	18" Dia., R.C.P. Endcap	EA	5	\$150	\$750
128	15" Dia., R.C.P. Endcap	EA	2	\$120	\$240
129	12" Dia., R.C.P. Endcap	EA	10	\$100	\$1,000
130	Old to New Main Drains, All Sizes, Installation Only	EA	7	\$500	\$3,500
131	Lateral Tile Connections, 10" Dia. or Smaller	EA	58	\$300	\$17,400
132	Lateral Tile Connections, 12" Dia. or Larger	EA	12	\$500	\$6,000
133	Tile Trench Stabilization and Cradling Rock	TN	350	\$35	\$12,250
134	Topsoil Stripping	CY	4,667	\$4	\$18,668
134	Administration of Erosion Management Plan	LS	1	\$3,000	\$3,000
135	Silt Fence Install and Review	LF	860	\$4	\$3,440
136	Spot Tile Exploration	HR	20	\$200	\$4,000
137	Fence Cuts	EA	8	\$150	\$1,200
138	Mobilization	LS	1	\$45,400	\$45,400

Estimated Division 1 Subtotal \$953,000

Drainage District No. 175
Proposed Drainage Improvements &
Water Quality Wetland
Pocahontas County, Iowa
OPINION OF PROBABLE COSTS
Wednesday, August 4, 2021



Real People. Real Solutions.

Construction Division 2--Water Quality Wetland

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
201	Topsoil Stripping, Salvaging and Respread	CY	2,645	\$4.50	\$11,903
202	Excavation, Dike & Waterway Construction	CY	5,600	\$7.50	\$42,000
203	Intake, SW-513 Modified, 48" x 48"	EA	2	\$3,500	\$7,000
204	1500D R.C.P., 36" Dia.	LF	85	\$73	\$6,205
205	Berm Seeding & Fertilizing	AC	1.6	\$2,000	\$3,200
206	Buffer Seeding	AC	7	\$500	\$3,500
207	C.P.D.T, Single Wall, 6" DIA.	LF	3,002	\$10	\$30,020
208	Porous Backfill	CY	240	\$35	\$8,400
209	HDPE End Cap, 6"	EA	2	\$50	\$100
210	HDPE Tee, 6" ON 6"	EA	1	\$100	\$100
211	Tile Extension, CMP, 12" Dia.	LF	40	\$30	\$1,200
212	Surface Drain, CMP, 36" Dia.	LF	80	\$75	\$6,000
213	Silt Fence-Install and Remove	LF	2,000	\$3	\$6,000
214	Mobilization	LS	1	\$6,300	\$6,300

Estimated Division 2 Subtotal **\$132,000**

Construction Division 3--County Secondary Roads

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
301	Drain Tile, Trenchless, Steel, 11/32" wall, 36" Dia.	LF	106	\$750	\$79,500
302	2000D R.C.P., 21" Dia.	LF	66	\$45	\$2,970
303	2000D R.C.P., 15" Dia.	LF	8	\$36	\$288
304	Intake, 24", SW-512 Case 1, SW-604 Type 5 Casting	EA	1	\$3,000	\$3,000
305	Tile Trench Stabilization and Cradling Rock	TN	72	\$35	\$2,520
306	Seeding and Fertilizing (Rural)	LS	1	\$2,000	\$2,000
307	Traffic Control	LS	1	\$1,500	\$1,500
308	Silt Fence-Install and Remove	LF	150	\$6	\$900
309	Mobilization	LS	1	\$4,600	\$4,600

Estimated Division 3 Subtotal **\$97,000**

Subtotal of Construction Divisions 1 - 3 **\$1,182,000**

Construction Contingency **\$59,000**

Total Estimated Construction Cost **\$1,241,000**

Estimated Secondary Roads Construction Costs Paid by Others **\$97,000**

Estimated Wetland Construction Costs Paid by Others **\$110,000**

Total Estimated Assessable Construction Cost **\$1,034,000**

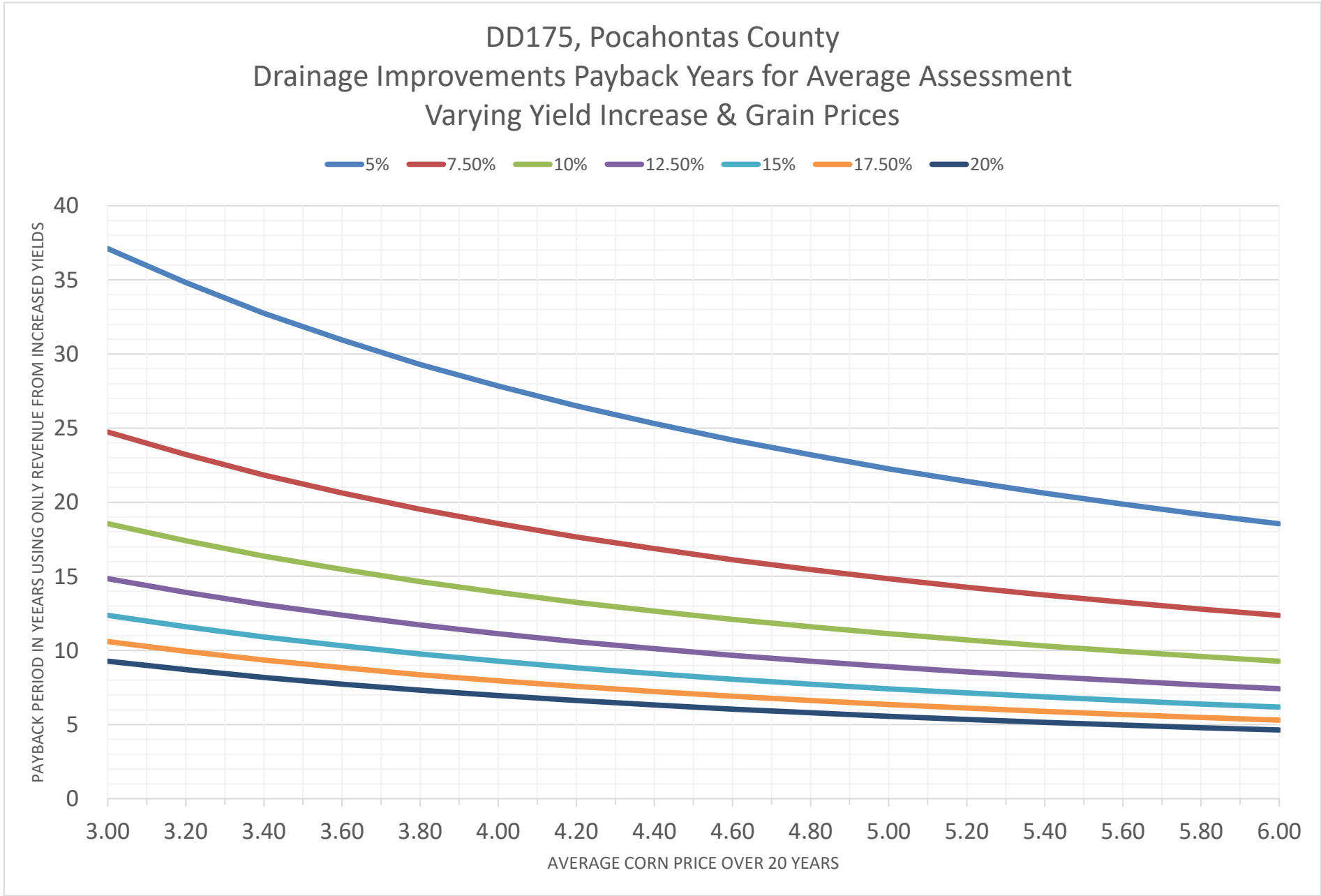
Drainage District No. 175
Proposed Drainage Improvements &
Water Quality Wetland
Pocahontas County, Iowa
OPINION OF PROBABLE COSTS
Wednesday, August 4, 2021



Real People. Real Solutions.

Construction Related Damages	
Work Area Rental (40.1 ac)	\$16,000
Other Damages	\$31,000
Basic Engineering Services	
Survey, Study & Report, Meetings & Hearing	\$75,000
Wetland Regulations Administration	\$15,000
Construction Plans, Specifications, & Bid Letting	\$26,000
Construction Engineering Services	\$75,000
Wetland Easement (13.99 ac X \$10,780/ac)	\$151,000
Legal Services, Publications, Mailings, Etc.	\$13,000
Farmed Wetland Mitigation Assistance (10 ac X \$7,500/ac)	\$75,000
Finance, Interest & Contingency	<u>\$76,000</u>
Less Wetland Easement (Reimbursed by IDALS WQI)	<u>-\$151,000</u>
Total Estimated Assessable Project Cost	<u>\$1,436,000</u>
Minus One-Time Assessments to DD24 & Private Tile System	<u>\$1,194,400</u>
Estimated Average Cost Per Benefited Acre (1,150 ac)	\$1,039
Estimated Average Cost Per Acre Per Year at 5% interest (10 years)	\$132
Estimated Average Cost Per Acre Per Year at 5% interest (20 years)	\$79

Appendix C - Payback Analysis of Drainage District System Replacement Costs



Assumed Rotation CCB: Soybean Price: 260% of Corn.

Appendix C

This worksheet is based upon one prepared by Dr. Stewart Melvin, ISU Extension Agricultural Engineer, Retired

Appendix C - Payback Analysis of Drainage District System Replacement Costs

Drainage District:

DD175

ACRES IN DD

Enter>

1,150

ac

% Corn Acreage

Enter>

63

%

% Soybeans Acreage

Enter>

33

%

% Other (Roads, Etc)

Enter>

4

%

Base Corn Yield

Enter>

183

bu/a

Base Soybeans Yield

Enter>

51

bu/a

Total Increase in Yield, Corn

bu

Total Increase in Yield, Soybeans

bu

Enter Estimated Average Annual Yield Increase
Over the Next 20 Years, % (See Footnote)

1.5%

<< The historic annual yield increase for corn in Iowa has been 2.1% since the 1930's, using less is a conservative assumption

Avg Price of Corn Next 20 Years

\$ 7.31

Avg Price of Soybeans Next 20 Years

\$ 15.92

From Corn

From Soybean

Total

Increased Revenue/acre

Increased Revenue/acre over the anticipated life of the facility (100 years)

Average Yield Improvement Due to Better Drainage Outlet, %

2.5

5

7.5

10

12.5

15

17.5

20

3,315

6,629

9,944

13,258

16,573

19,888

23,202

26,517

484

968

1,452

1,935

2,419

2,903

3,387

3,871

Annual Increase in Revenue

\$ 24,230

\$ 48,459

\$ 72,689

\$ 96,919

\$ 121,148

\$ 145,378

\$ 169,607

\$ 193,837

\$ 7,703

\$ 15,406

\$ 23,109

\$ 30,812

\$ 38,515

\$ 46,219

\$ 53,922

\$ 61,625

\$ 31,933

\$ 63,865

\$ 95,798

\$ 127,731

\$ 159,664

\$ 191,596

\$ 223,529

\$ 255,462

\$ 28

\$ 56

\$ 83

\$ 111

\$ 139

\$ 167

\$ 194

\$ 222

\$ 2,777

\$ 5,554

\$ 8,330

\$ 11,107

\$ 13,884

\$ 16,661

\$ 19,437

\$ 22,214

Payback Period For Revenues From Only Yield Increase (Years)

Very High Assessment

\$2,597

per ac

250% of Avg

93.5

46.8

31.2

23.4

18.7

15.6

13.4

11.7

High Assessment

\$2,077

per ac

200% of Avg

74.8

37.4

24.9

18.7

15.0

12.5

10.7

9.4

Above Average Assessment

\$1,558

per ac

150% of Avg

56.1

28.1

18.7

14.0

11.2

9.4

8.0

7.0

Average Assessment

\$1,039

per ac

100% of Avg

37.4

18.7

12.5

9.4

7.5

6.2

5.3

4.7

Low Assessment

\$519

per ac

50% of Avg

18.7

9.4

6.2

4.7

3.7

3.1

2.7

2.3

Very Low Assessment

\$260

per ac

25% of Avg

9.4

4.7

3.1

2.3

1.9

1.6

1.3

1.2

Average Yield Improvement Due to Better Drainage Outlet, %

Appendix C

This worksheet is based upon one prepared by Dr. Stewart Melvin, ISU Extension Agricultural Engineer, Retired

Appendix C - Payback Analysis of Drainage District System Replacement Costs

Drainage District Law Allows For Payment of Assessments in 20 Annual Installments

Assuming a 1.5% annual yield improvement over 20 years for corn currently priced at \$6.23 and soybeans at \$13.57

A very high cost assessment (250% of average) would be paid off in	15.6	years on a 15% average yield increase.
A high cost assessment (200% of average) would be paid off in	15.0	years on a 12.5% average yield increase.
An above avg cost assessment (150% of average) would be paid off in	14.0	years on a 10% average yield increase.
An average cost assessment (100% of average) would be paid off in	12.5	years on a 7.5% average yield increase.
A low cost assessment (50% of average) would be paid off in	9.4	years on a 5% average yield increase.
A very low cost assessment (25% of average) would be paid off in	9.4	years on a 2.5% average yield increase.

Yield Improvements on 40 acres if Drowned Areas

		Percent Increase over Current Conditions					
		Percent of Average Yield Achieved by Improvements					
		50%	60%	70%	80%	90%	100%
Drowned Area ac	1	1.3%	1.5%	1.8%	2.1%	2.3%	2.6%
	2.5	3.3%	4.0%	4.7%	5.3%	6.0%	6.7%
	5	7.1%	8.6%	10.0%	11.4%	12.9%	14.3%
	7.5	11.5%	13.8%	16.2%	18.5%	20.8%	23.1%
	10	16.7%	20.0%	23.3%	26.7%	30.0%	33.3%
	15	30.0%	36.0%	42.0%	48.0%	54.0%	60.0%

Assumes Avg. Co. Yield on Non-Drowned Area

Future Prices to Reflect Annual Yield Change Trend

Corn Today	\$6.23	Date
Beans Today	\$13.57	8/4/2021
Price Adj. for Yield Change		
Average Annual Yield Change	CORN 20-Year Avg. Price	SOYBEANS 20-Year Avg Price
0.0%	\$6.23	\$13.57
0.5%	\$6.56	\$14.28
1.0%	\$6.92	\$15.06
1.5%	\$7.31	\$15.92
2.0%	\$7.74	\$16.87
2.5%	\$8.22	\$17.90
3.0%	\$8.74	\$19.04
3.5%	\$9.31	\$20.29

Existing Farm Yield vs. Potential Farm Yield

		Current Average Corn Yield over Entire Field bu/ac					
		90	110	130	150	170	190
Average Field Yield with Improvement bu/ac	90	0.0%					
	100	11.1%					
	110	22.2%	0.0%				
	120	33.3%	9.1%				
	130	44.4%	18.2%	0.0%			
	140	55.6%	27.3%	7.7%			
	150	66.7%	36.4%	15.4%	0.0%		
	160	77.8%	45.5%	23.1%	6.7%		
	170	88.9%	54.5%	30.8%	13.3%	0.0%	
	180	100.0%	63.6%	38.5%	20.0%	5.9%	
	190	111.1%	72.7%	46.2%	26.7%	11.8%	0.0%
	200	122.2%	81.8%	53.8%	33.3%	17.6%	5.3%

Appendix C - Payback Analysis of Drainage District System Replacement Costs

Payback Years for Average Yield Improvements for Range of Average Grain Prices
Proposed Drainage Improvements in Drainage District No. 175

Assumptions

Long-term Soybean/Corn price ratio is 2.6

Average assessment of \$1,039/acre

1.5% average annual yield improvement due to causes other than better drainage.

A flat grain price is assumed in this analysis.

Average Current Grain

Price Used Over

Payback Period

		Average Yield Response Due to Drainage Improvements						
Corn	Soybeans	5%	7.50%	10%	12.50%	15%	17.50%	20%
3.00	7.80	37.11	24.74	18.55	14.84	12.37	10.60	9.28
3.20	8.32	34.82	23.21	17.41	13.93	11.61	9.95	8.70
3.40	8.84	32.74	21.82	16.37	13.09	10.91	9.35	8.18
3.60	9.36	30.94	20.63	15.47	12.38	10.31	8.84	7.74
3.80	9.88	29.29	19.52	14.64	11.71	9.76	8.37	7.32
4.00	10.40	27.84	18.56	13.92	11.14	9.28	7.96	6.96
4.20	10.92	26.50	17.66	13.25	10.60	8.83	7.57	6.62
4.40	11.44	25.31	16.87	12.65	10.12	8.44	7.23	6.33
4.60	11.96	24.19	16.13	12.10	9.68	8.06	6.91	6.05
4.80	12.48	23.20	15.46	11.60	9.28	7.73	6.63	5.80
5.00	13.00	22.25	14.84	11.13	8.90	7.42	6.36	5.56
5.20	13.52	21.41	14.27	10.71	8.56	7.14	6.12	5.35
5.40	14.04	20.60	13.74	10.30	8.24	6.87	5.89	5.15
5.60	14.56	19.88	13.25	9.94	7.95	6.63	5.68	4.97
5.80	15.08	19.18	12.79	9.59	7.67	6.39	5.48	4.79
6.00	15.60	18.55	12.37	9.27	7.42	6.18	5.30	4.64

Footnotes:

It is important to note that after it is paid for, the drainage system will continue to foster improved crop yields for more than a century.

No credit is given in the above calculations for an immediate increase in land value resulting from the improved productivity.

The average annual yield increase is intended to reflect through price adjustment the long term historic yield increase trend rather than to predict future grain price changes. In effect this analysis uses a stagnant current grain price tied to a reliable yield improvement trend. An entry of 0% assumes no average yield improvement or price increase over the next twenty years.

Appendix C

This worksheet is based upon one prepared by Dr. Stewart Melvin, ISU Extension Agricultural Engineer, Retired

Proposed Plans

PRELIMINARY PLANS FOR

DRAINAGE DISTRICT NO. 175

PROPOSED TILE IMPROVEMENTS & WETLAND

POCAHONTAS COUNTY, IOWA

2021

PLAN REVISIONS		
REV	ISSUED FOR	DATE



NOTE: THE CONTRACTOR SHALL FIELD VERIFY EXACT LOCATIONS PRIOR TO COMMENCING CONSTRUCTION AS REQUIRED BY STATE LAW. NOTIFY IOWA ONE CALL, 811 OR 1-800-292-8989.

THE SUBSURFACE UTILITY INFORMATION IN THIS PLAN IS UTILITY QUALITY LEVEL D. THIS UTILITY QUALITY LEVEL WAS DETERMINED ACCORDING TO THE GUIDELINES OF CI/ASCE 38-02, ENTITLED "STANDARD GUIDELINES FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA."

SHEET LIST TABLE	
SHEET NUMBER	SHEET TITLE
A.01	TITLE SHEET
A.02	LANDOWNER PLAT
B.01	OLD TO NEW TILE CONNECTIONS
B.02	WETLAND SITE PLAN
G.01	ALIGNMENT GEOMETRY
M.01 - M.04	PLAN & PROFILE - MAIN TILE
M.05 - M.06	PLAN & PROFILE - BRANCH A
M.07	PLAN & PROFILE - BRANCH B
M.08	PLAN & PROFILE - BRANCH C
M.09	PLAN & PROFILE - SOUTH RING TILE, TOE DRAIN, & WETLAND OUTLET
M.10	PLAN & PROFILE - NORTH RING TILE
V.01	BORING DETAIL - 130TH AVE (N28)

GOVERNING SPECIFICATIONS

THE 2020 EDITION OF THE "SUDAS SPECIFICATIONS FOR PUBLIC IMPROVEMENTS" SHALL GOVERN.

IOWA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGE CONSTRUCTION", SERIES 2015 AND ALL CURRENT GENERAL SUPPLEMENTAL SPECIFICATIONS AND MATERIALS INSTRUCTIONAL MEMORANDUM SHALL GOVERN AS REFERENCED.

ALL APPLICABLE FEDERAL, STATE, AND LOCAL LAWS AND ORDINANCES WILL BE COMPLIED WITH IN THE CONSTRUCTION OF THIS PROJECT.

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.

COLLIN J. KLINGBEIL, P.E.

REG. NO. 24741 DATE:

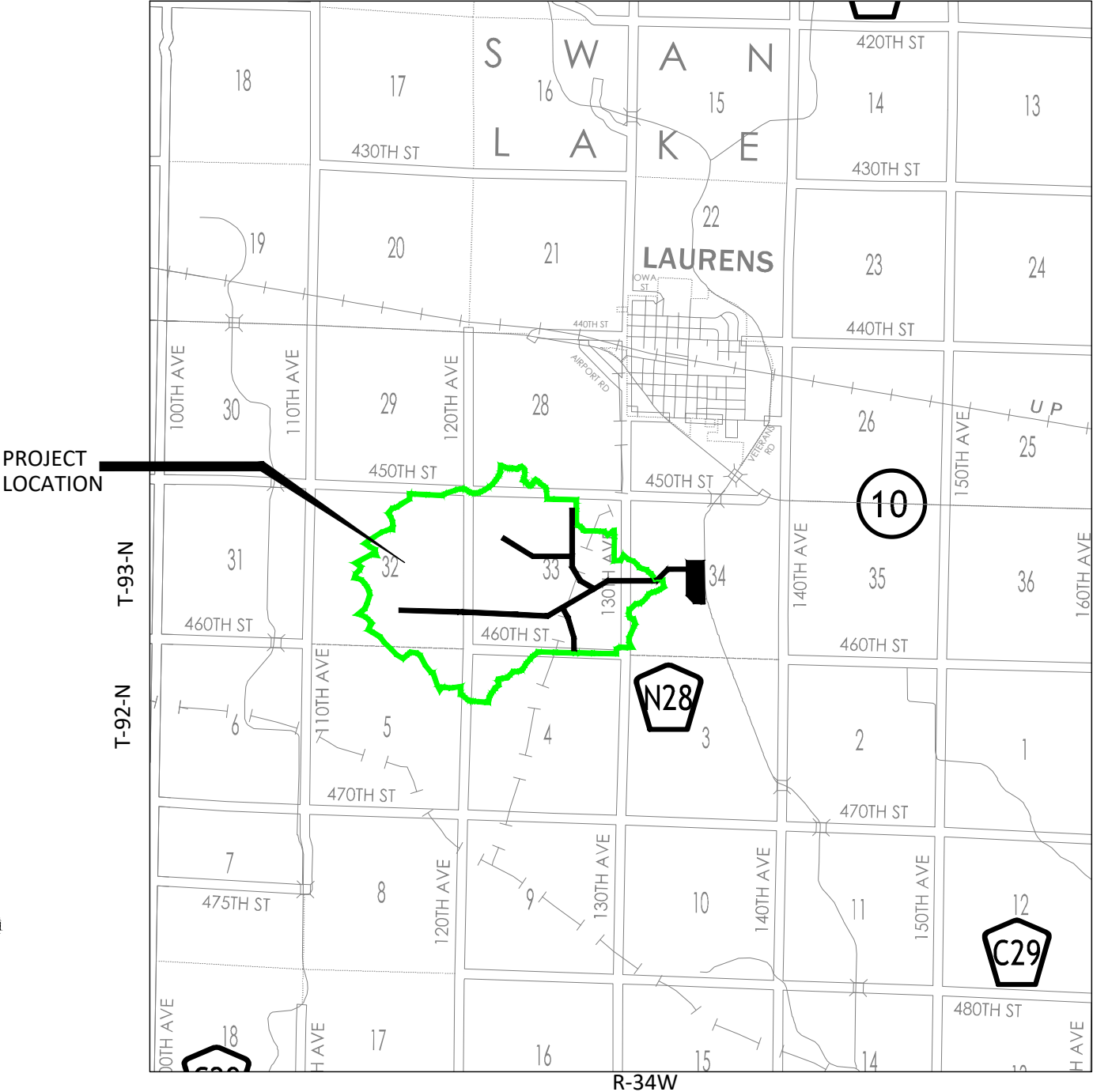
MY LICENSE RENEWAL DATE IS DECEMBER 31, 2021

PAGES OR SHEETS COVERED BY THIS SEAL:

ALL SHEETS

DATUM EQUATION	PROJECT DATUM: IOWA STATE PLANE - NORTH - US FEET
PREVIOUSLY A MUTUAL DRAIN, LIMITED RECORDS. NO DATUM EQUATION.	HORIZONTAL: NAD 83
	VERTICAL: NAVD 1988

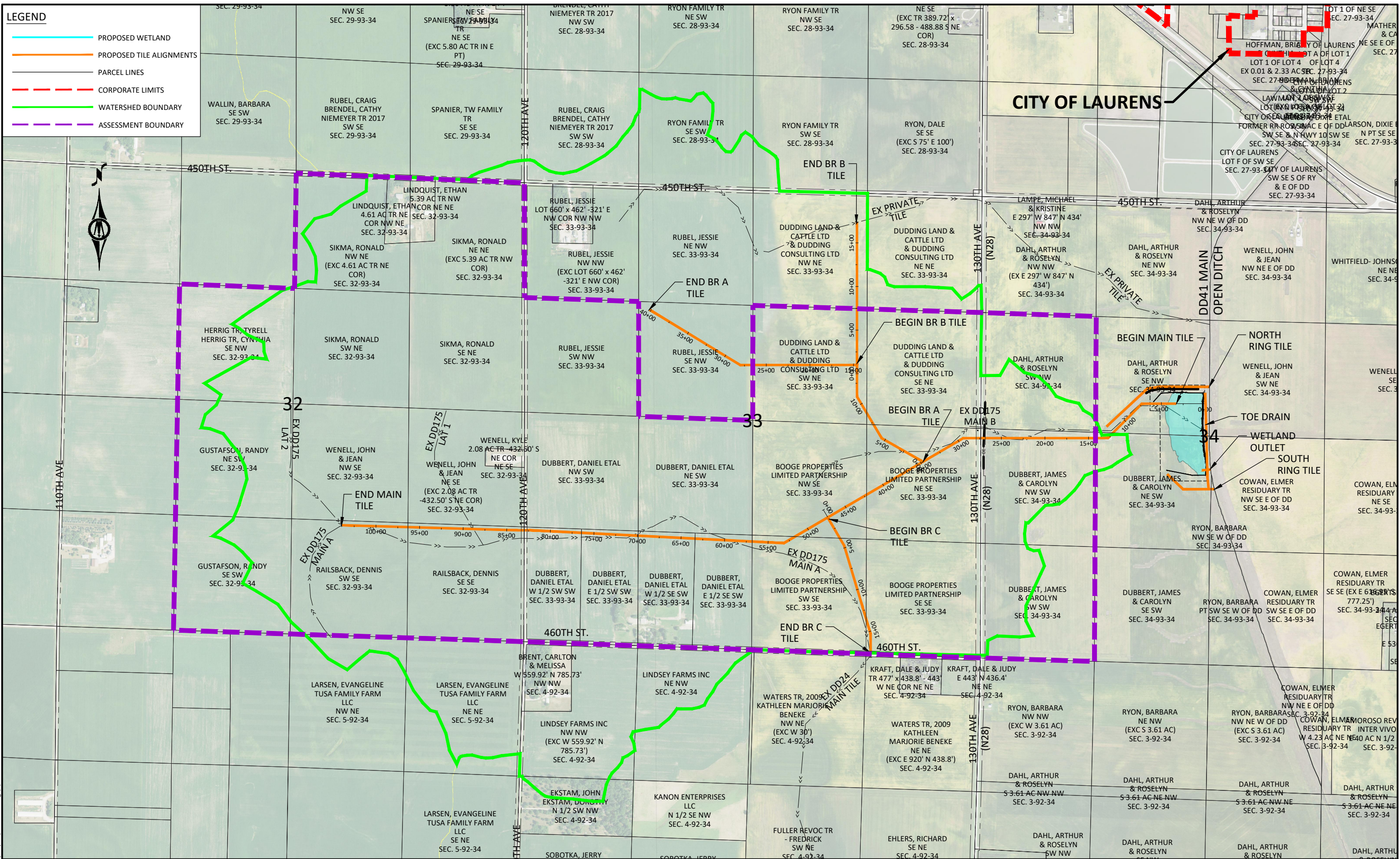
DD NO. 175 PROPOSED TILE IMPROVEMENTS AND WETLAND	SHEET
POCAHONTAS COUNTY, IOWA	A.01
TITLE SHEET	



218 11TH STREET SW PLAZA
SPENCER, IOWA 51301
Phone: (712) 580-5075
Email: Spencer@bolton-menk.com
www.bolton-menk.com

DESIGNED	NO.	ISSUED FOR	DATE
CJK			
DRAWN			
CJK			
CHECKED			
CJK/JPR			
CLIENT PROJ. NO.			

- LEGEND**
- PROPOSED WETLAND
 - PROPOSED TILE ALIGNMENTS
 - PARCEL LINES
 - CORPORATE LIMITS
 - WATERSHED BOUNDARY
 - ASSESSMENT BOUNDARY



© Bolton & Menk, Inc. 2021. All Rights Reserved.
A:\POCAHONTAS\DD NO. 175\DD NO. 175.dwg 3/1/2021 11:31:58 AM



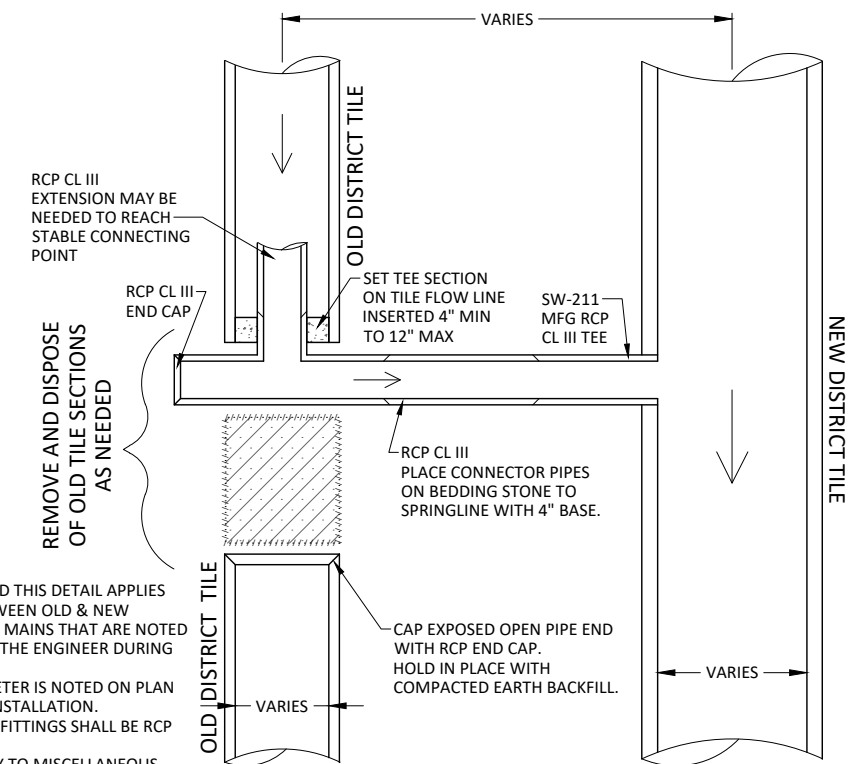
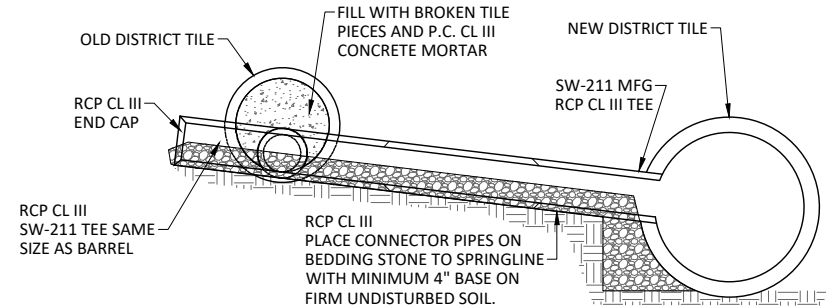
218 11TH STREET SW PLAZA
SPENCER, IOWA 51301
Phone: (712) 580-5075
Email: Spencer@bolton-menk.com
www.bolton-menk.com

DRAWN	NO.	ISSUED FOR	DATE
CJK			
CJK			
CJK/JPR			
CLIENT PROJ. NO.			

DD NO. 175 PROPOSED TILE IMPROVEMENTS AND WETLAND
POCAHONTAS COUNTY, IOWA
LANDOWNER PLAT

SHEET
A.02

STANDARD DETAIL
OLD TO NEW MAIN DRAINS CONNECTION
(WHERE FLOW IS NOT CONTINUED IN OLD DRAIN)



- NOTES:
- 1.UNLESS OTHERWISE DIRECTED THIS DETAIL APPLIES ONLY TO CONNECTIONS BETWEEN OLD & NEW DISTRICT DRAINS OR PRIVATE MAINS THAT ARE NOTED ON THE PLANS OR ADDED BY THE ENGINEER DURING CONSTRUCTION.
 - 2.THE CONNECTOR PIPE DIAMETER IS NOTED ON PLAN AND IS CONSTANT IN EACH INSTALLATION.
 - 3.ALL CONNECTING PIPES AND FITTINGS SHALL BE RCP CLASS III.
 - 4.THIS DETAIL DOES NOT APPLY TO MISCELLANEOUS LATERAL CONNECTIONS PAID UNDER SEPARATE BID ITEMS.
 - 5.FIELD FABRICATE RCP ELBOWS, MAXIMUM 30° TURNS, WHERE NECESSARY. PRIOR APPROVAL OF ENGINEER REQUIRED.

WORK PAID UNDER SEPARATE BID ITEMS

- TEE FABRICATION
- RCP PIPE, TEES, END CAPS
- BEDDING STONE
- TOPSOIL WORK, WHERE APPLICABLE
- MOBILIZATION
- TILE SEARCH

WORK INCLUDED IN OLD TO NEW MAIN DRAINS BID ITEM

- ADDITIONAL HANDLING AND WORK BEYOND THAT INCLUDED IN SEPARATE BID ITEMS.
- PIPE CUTTING, WORKING OF JOINTS, NECESSARY CONCRETE COLLARS WHERE NOT FULLY SEATED PIPE JOINTS.
- CONNECTING RCP TEE TO OLD TILE AND FILLING PIPE OPENING.
- REMOVE & DISPOSED DRAIN TILE

DATA TABLE FOR OLD TO NEW MAIN DRAIN CONNECTIONS					
NEW DRAIN	STA	NEW DRAIN DIA.	OLD DRAIN	OLD DRAIN DIA.	CROSS CONNECT DIA.
MAIN	24+54	36"	DD175 MAIN B	14"	12"
MAIN	53+31	21"	DD175 MAIN A	18"	15"
MAIN	60+31	21"	DD175 MAIN A	16"	12"
MAIN	70+81	21"	DD175 MAIN A	16"	12"
MAIN	78+31	21"	DD175 MAIN A	16"	12"
BR A	3+66	21"	DD175 MAIN B	10"	12"
BR C	12+50	15"	DD175 MAIN A	18"	12"



**BOLTON
& MENK**

218 11TH STREET SW PLAZA
SPENCER, IOWA 51301
Phone: (712) 580-5075
Email: Spencer@bolton-menk.com
www.bolton-menk.com

DESIGNED	NO.	ISSUED FOR	DATE
CJK			
DRAWN			
CJK			
CHECKED			
CJK/JPR			
CLIENT PROJ. NO.			

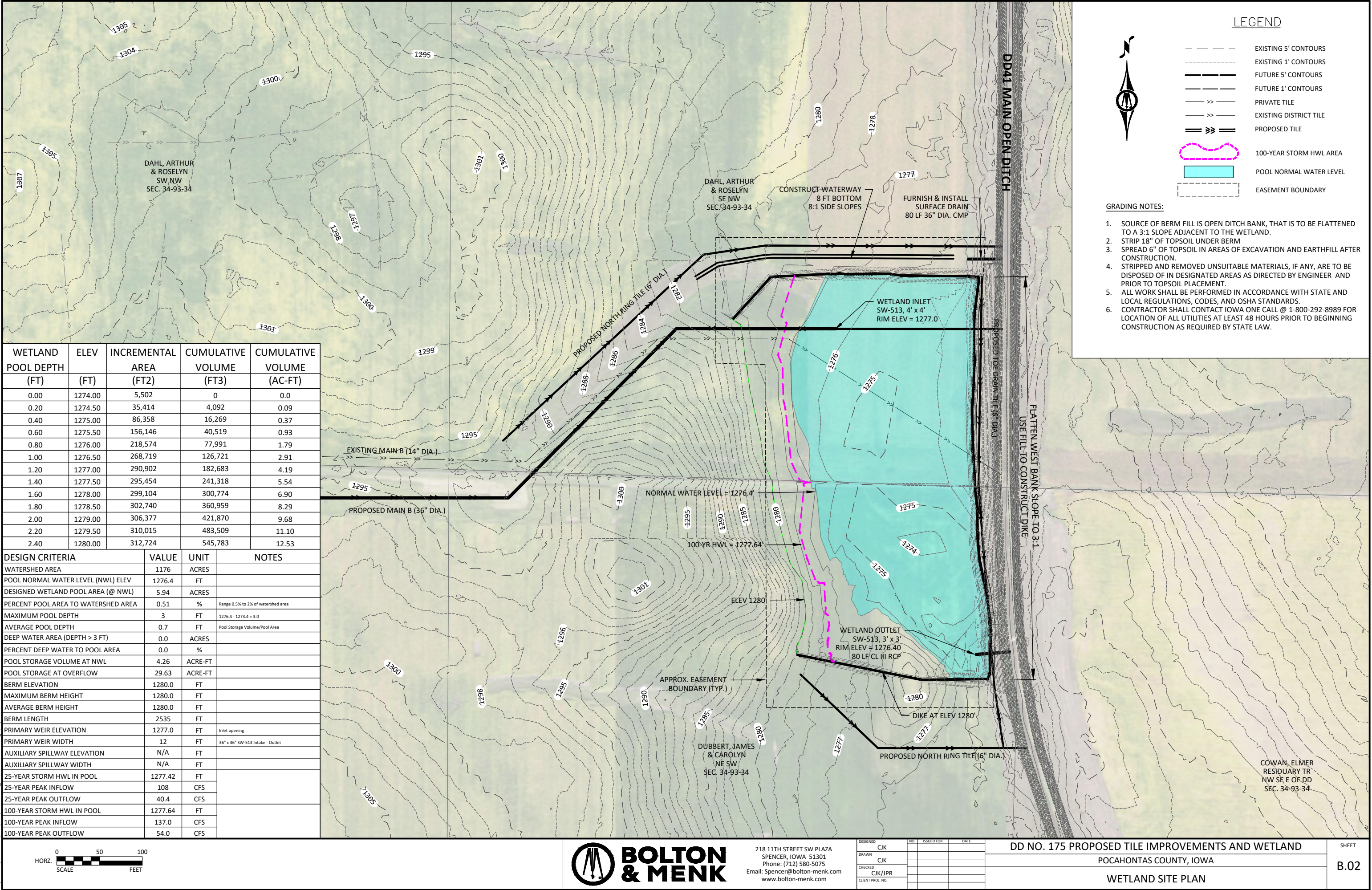
DD NO. 175 PROPOSED TILE IMPROVEMENTS AND WETLAND

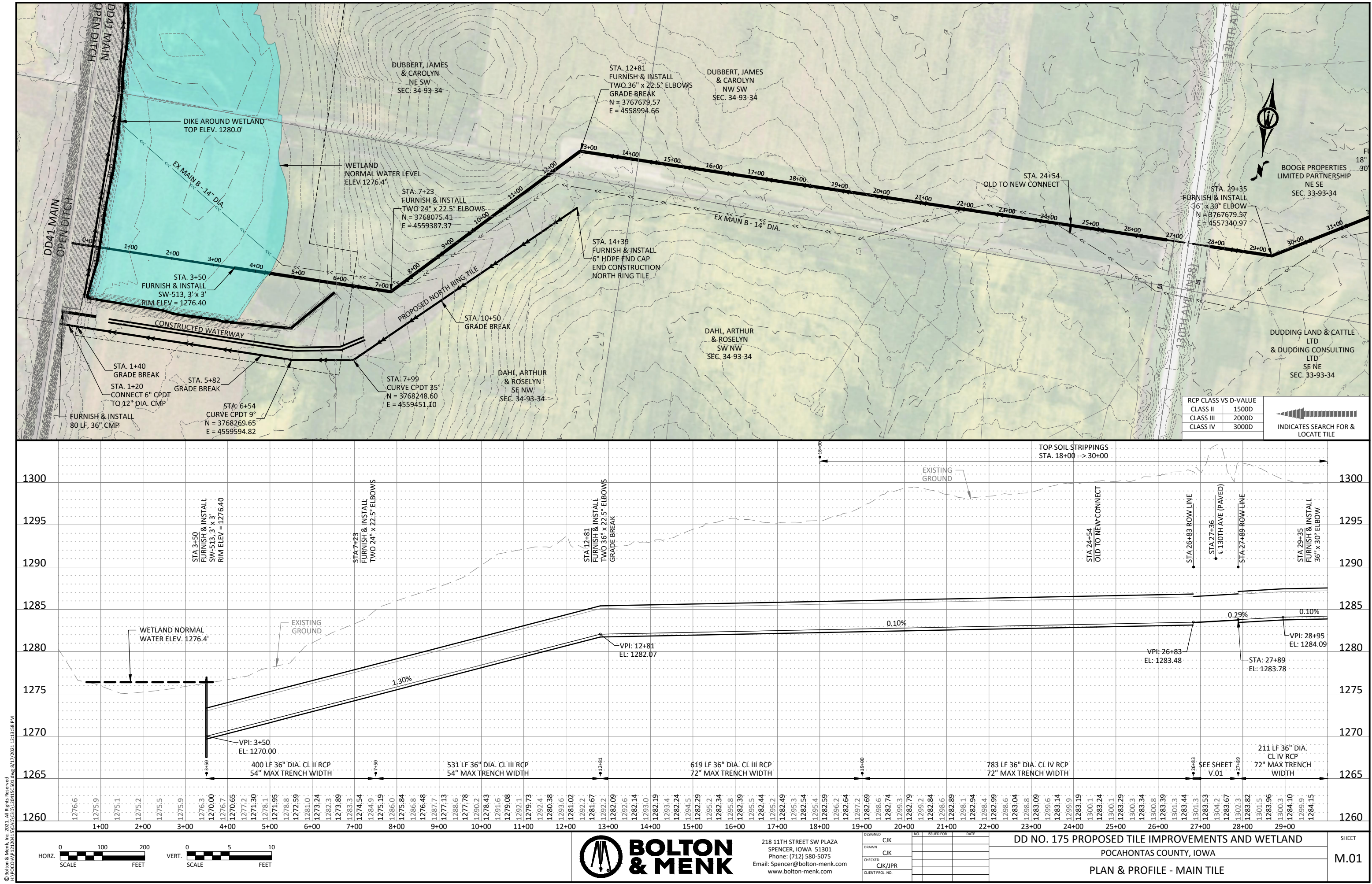
POCAHONTAS COUNTY, IOWA

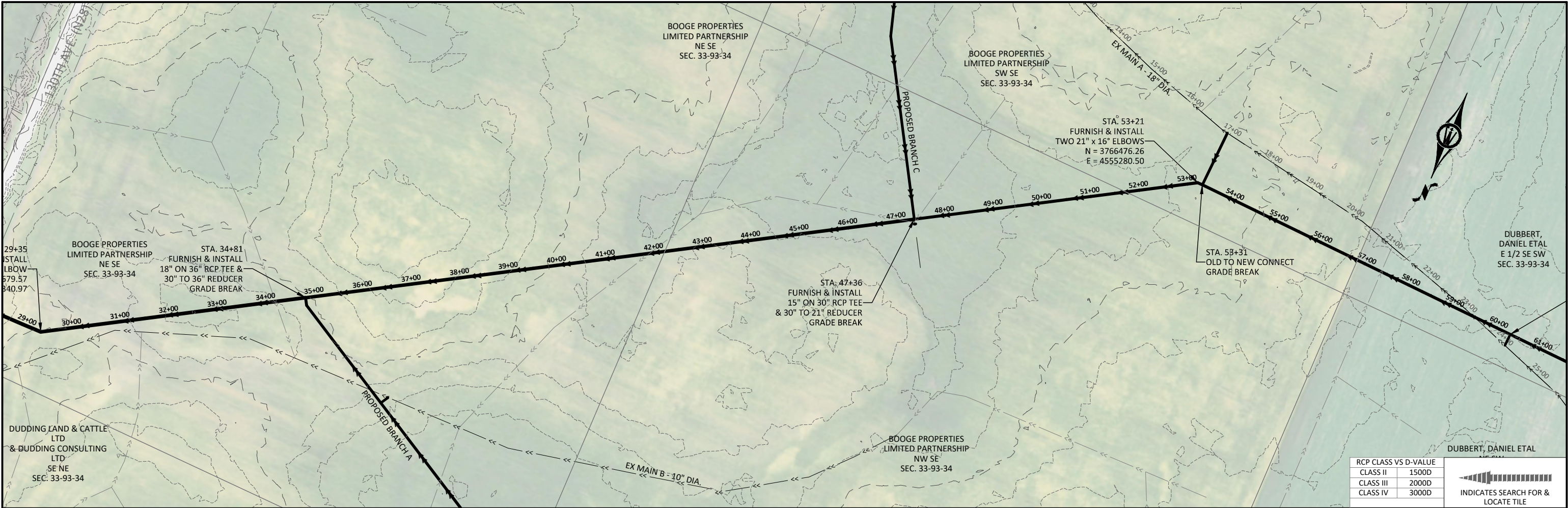
OLD TO NEW TILE CONNECTIONS

SHEET


B.01

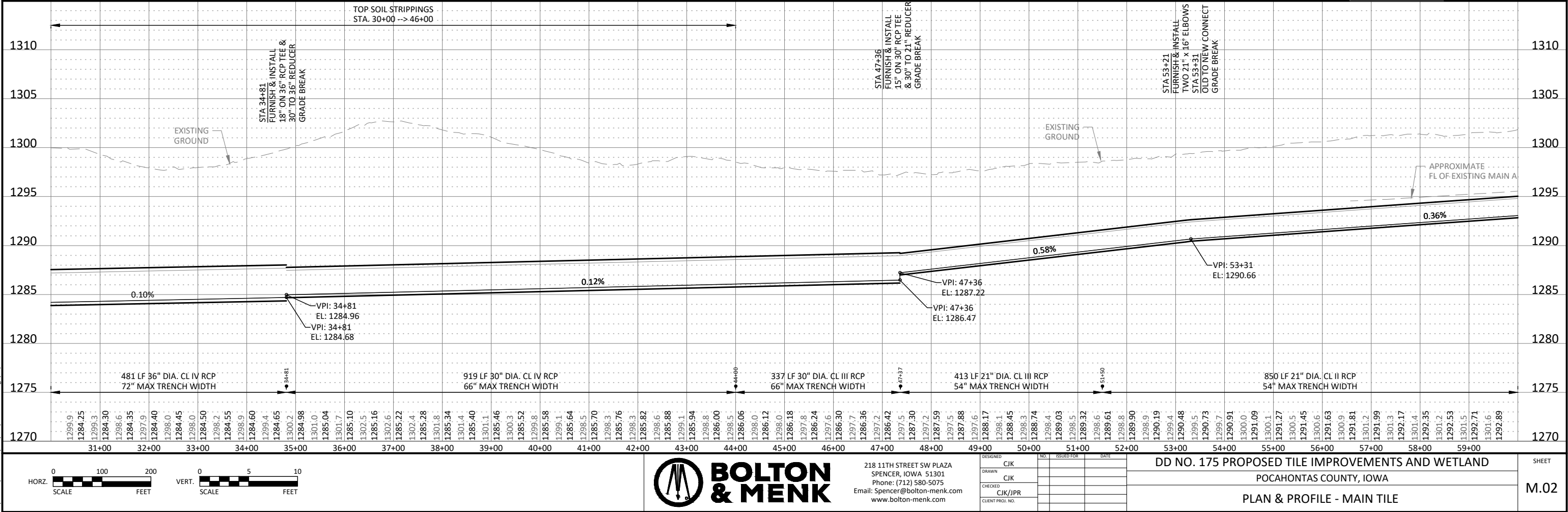




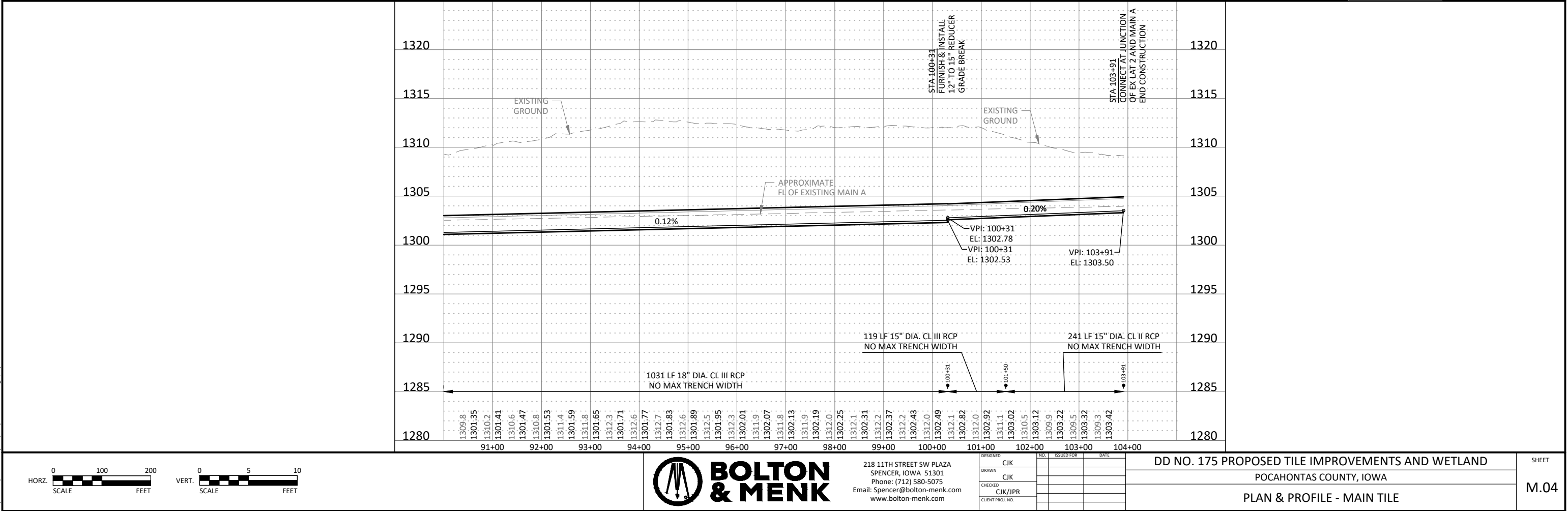
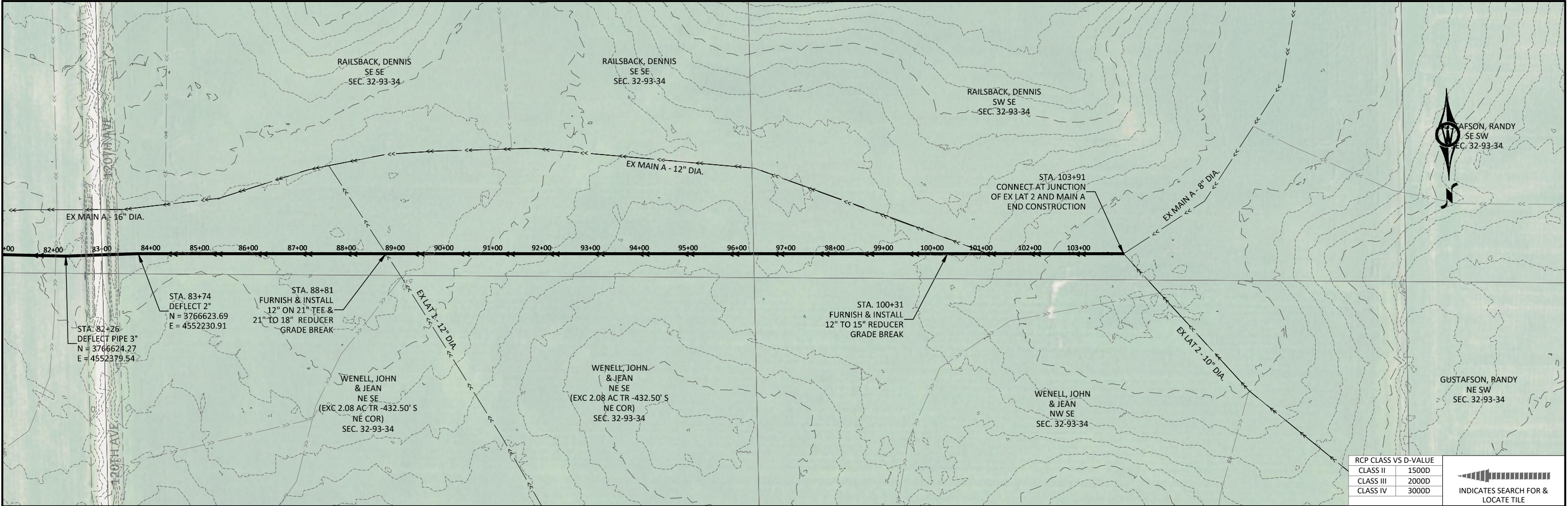


RCP CLASS VS D-VALUE	
CLASS II	1500D
CLASS III	2000D
CLASS IV	3000D

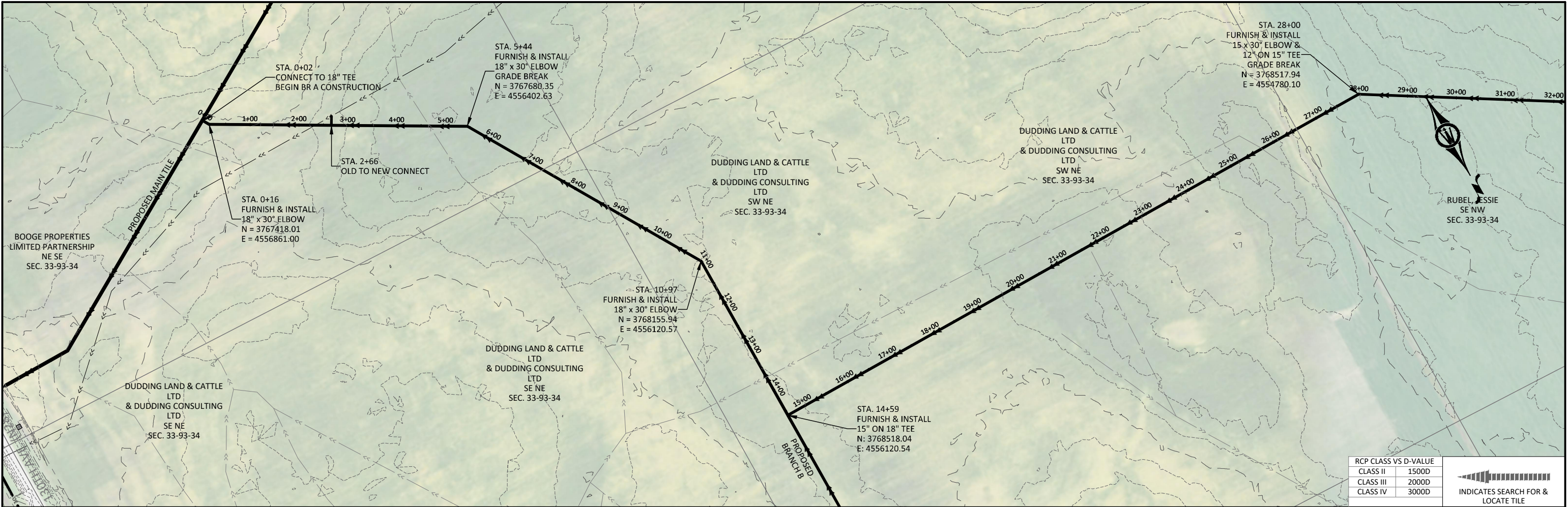

INDICATES SEARCH FOR & LOCATE TILE



© Bolton & Menk, Inc. 2021. All Rights Reserved.
11/03/2021 11:06:57 AM

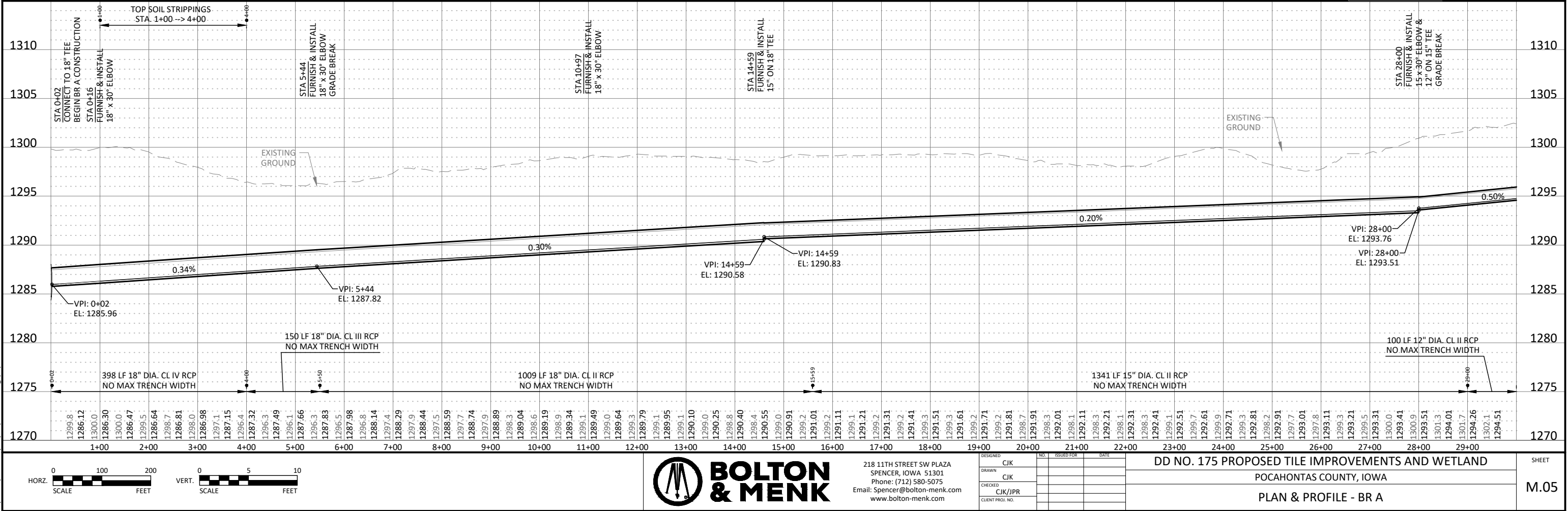


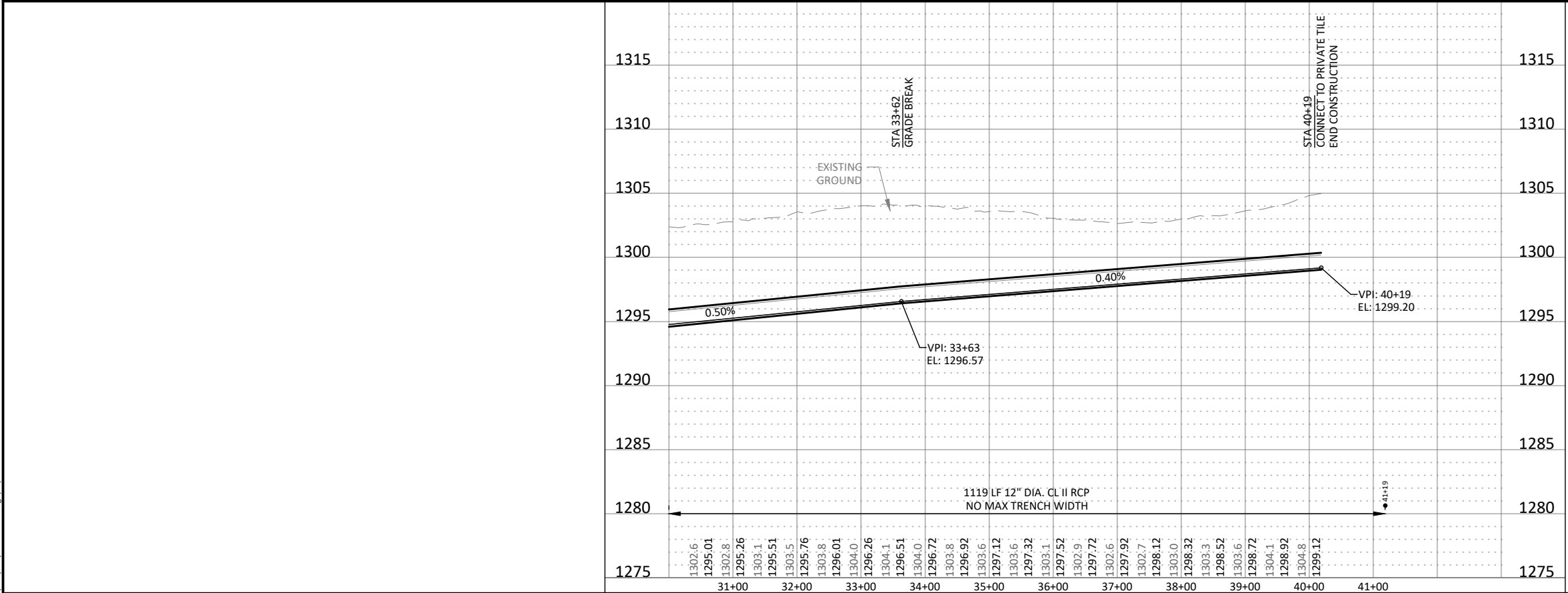
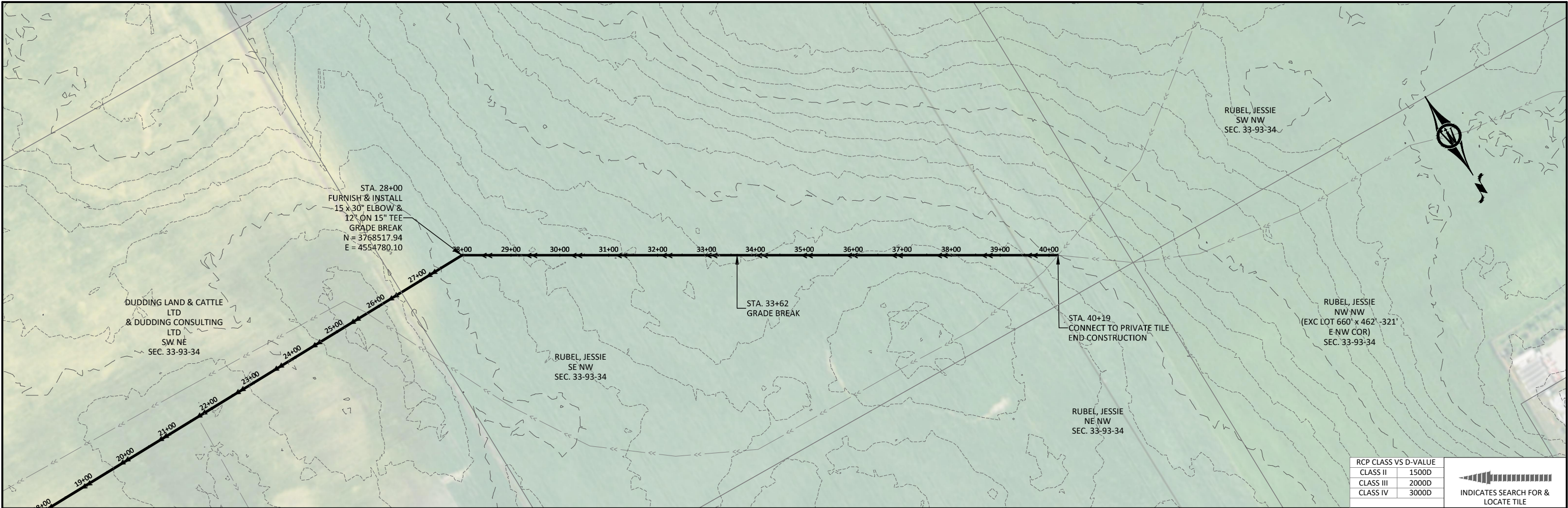
© Bolton & Menk, Inc. 2021. All Rights Reserved.
A:\PROJECTS\DD NO. 175\DD NO. 175-01.dwg 8/17/2021 11:07:20 AM

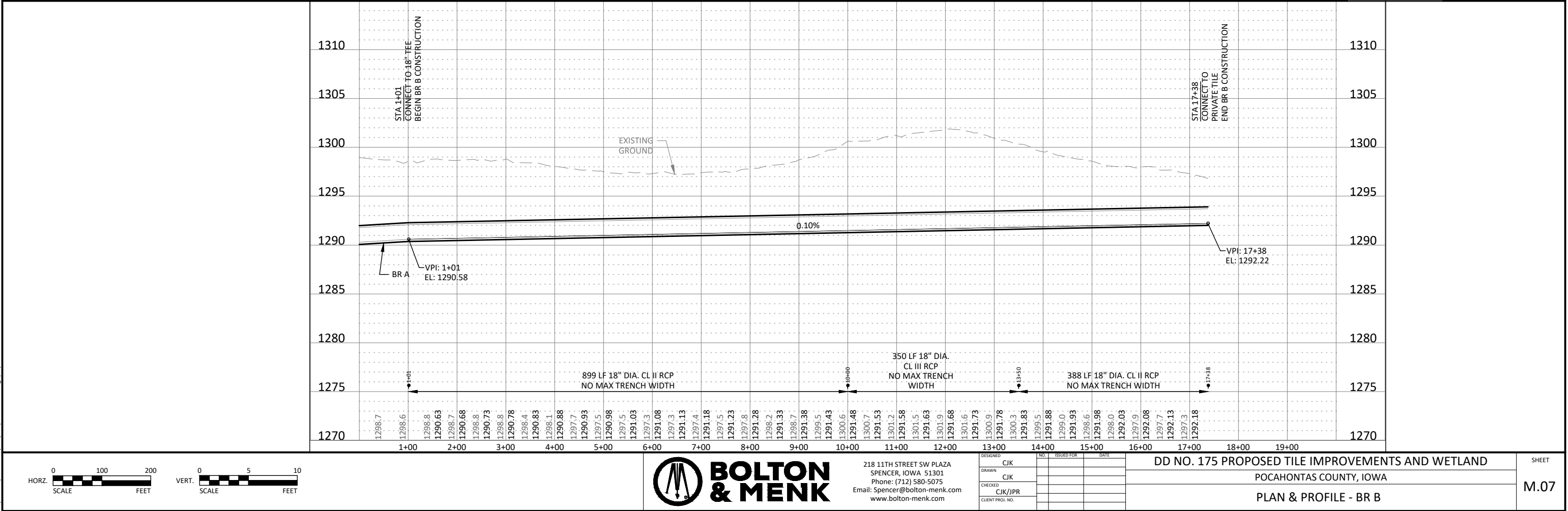
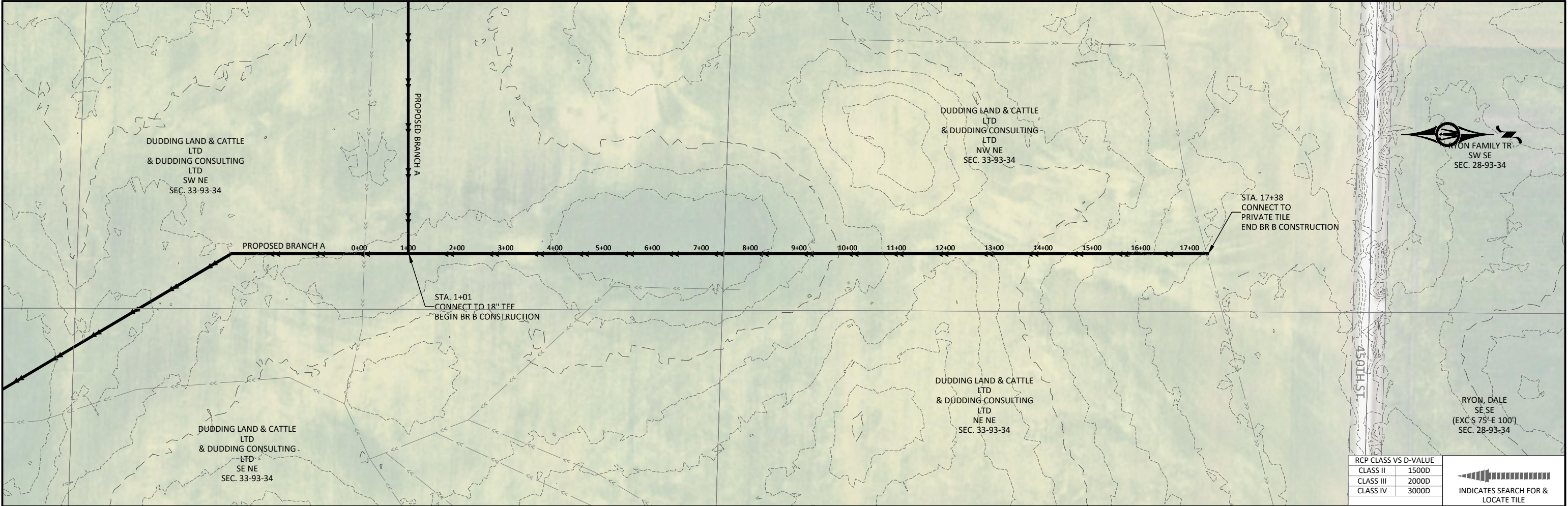


RCP CLASS VS D-VALUE	
CLASS II	1500D
CLASS III	2000D
CLASS IV	3000D

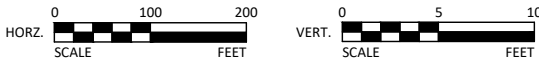

INDICATES SEARCH FOR &
LOCATE TILE







© Bolton & Menk, Inc. 2021. All Rights Reserved.
11/17/2021 11:07:59 AM



**BOLTON
& MENK**

218 11TH STREET SW PLAZA
SPENCER, IOWA 51301
Phone: (712) 580-5075
Email: Spencer@bolton-menk.com
www.bolton-menk.com

DESIGNED	CJK	NO.	ISSUED FOR	DATE
DRAWN	CJK			
CHECKED	CJK/JPR			
CLIENT PROJ. NO.				

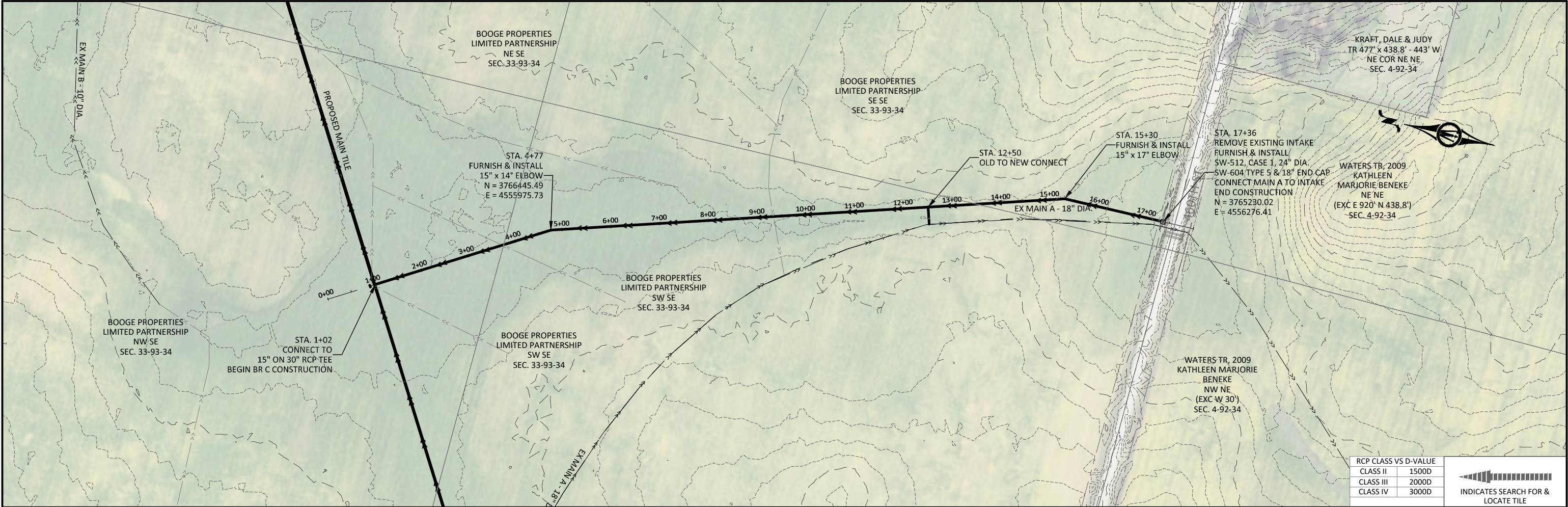
DD NO. 175 PROPOSED TILE IMPROVEMENTS AND WETLAND

POCAHONTAS COUNTY, IOWA

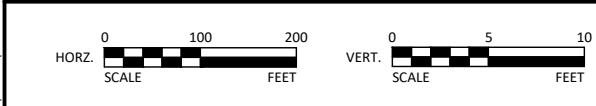
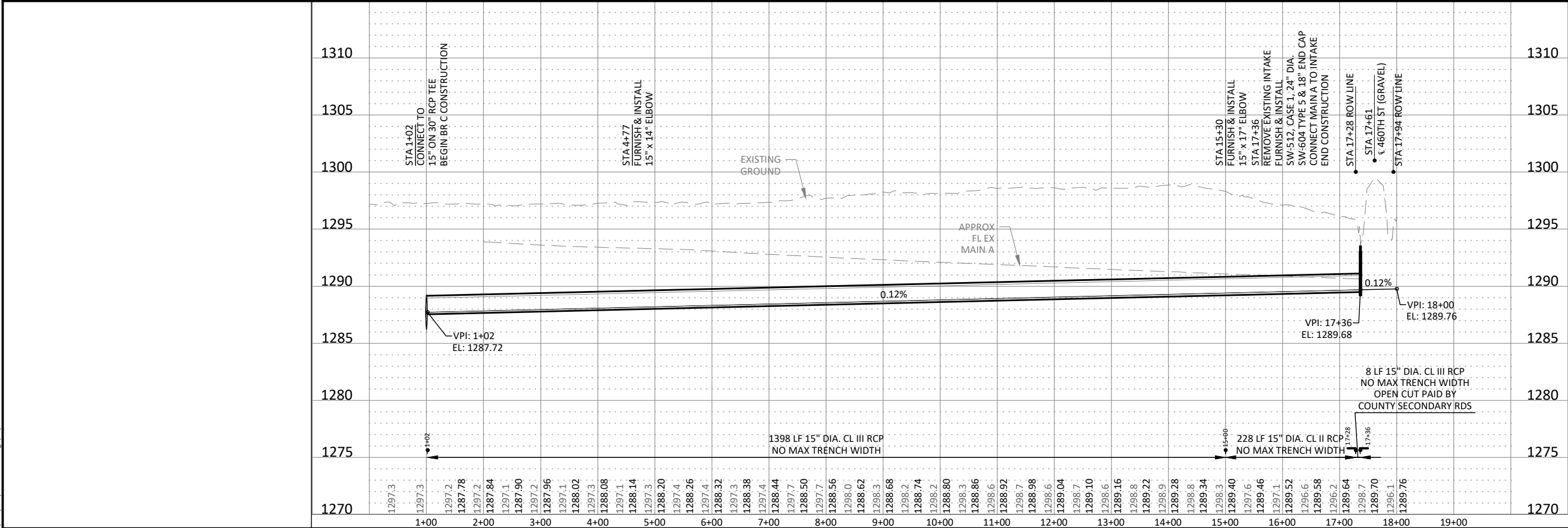
PLAN & PROFILE - BR B

SHEET

M.07



RCP CLASS VS D-VALUE	
CLASS II	1500D
CLASS III	2000D
CLASS IV	3000D

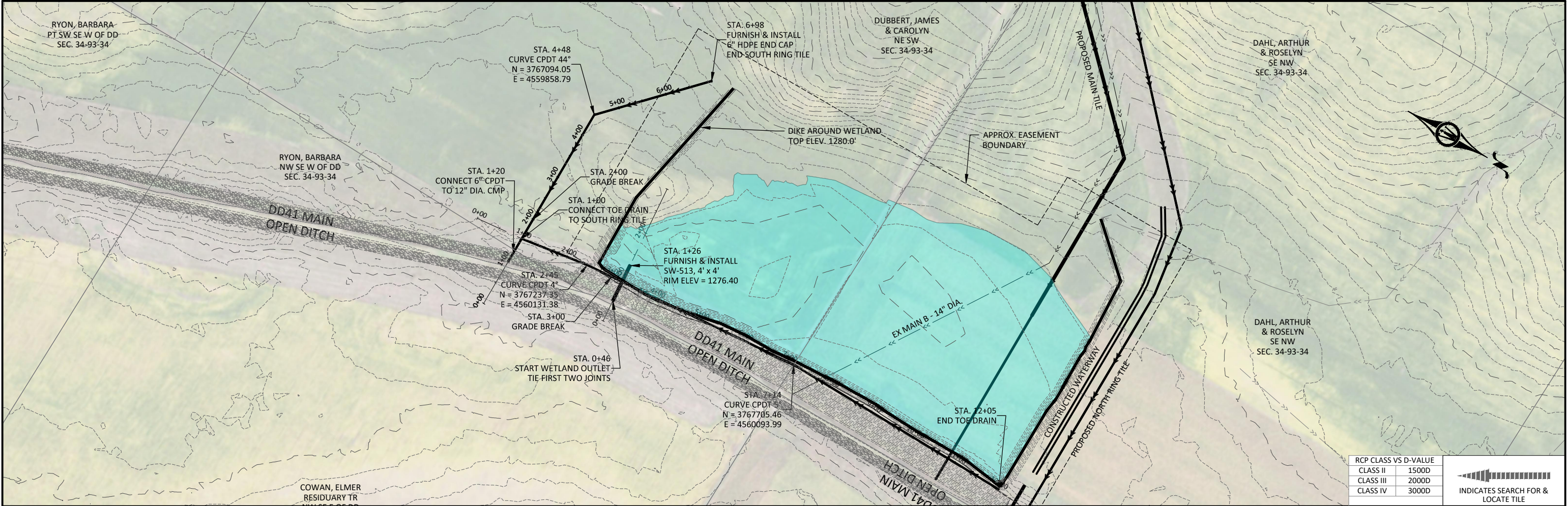


218 11TH STREET SW PLAZA
SPENCER, IOWA 51301
Phone: (712) 580-5075
Email: Spencer@bolton-menk.com
www.bolton-menk.com

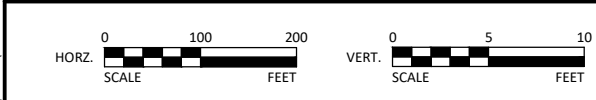
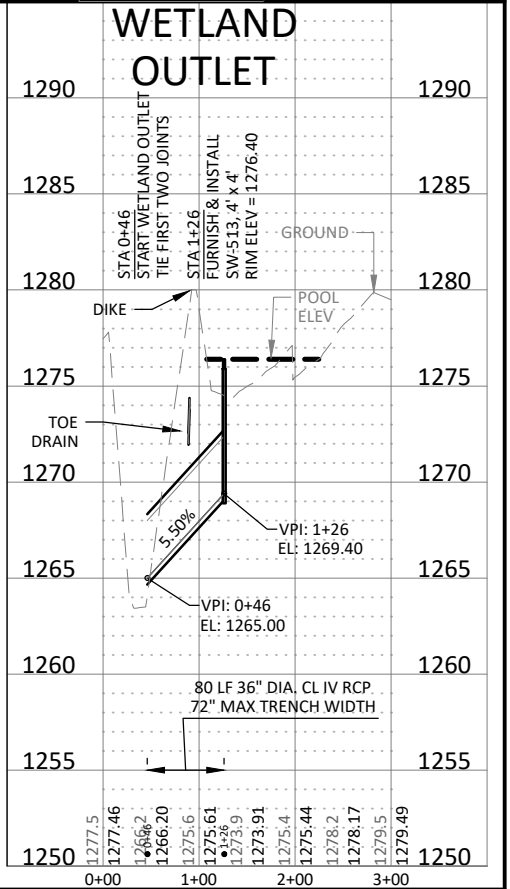
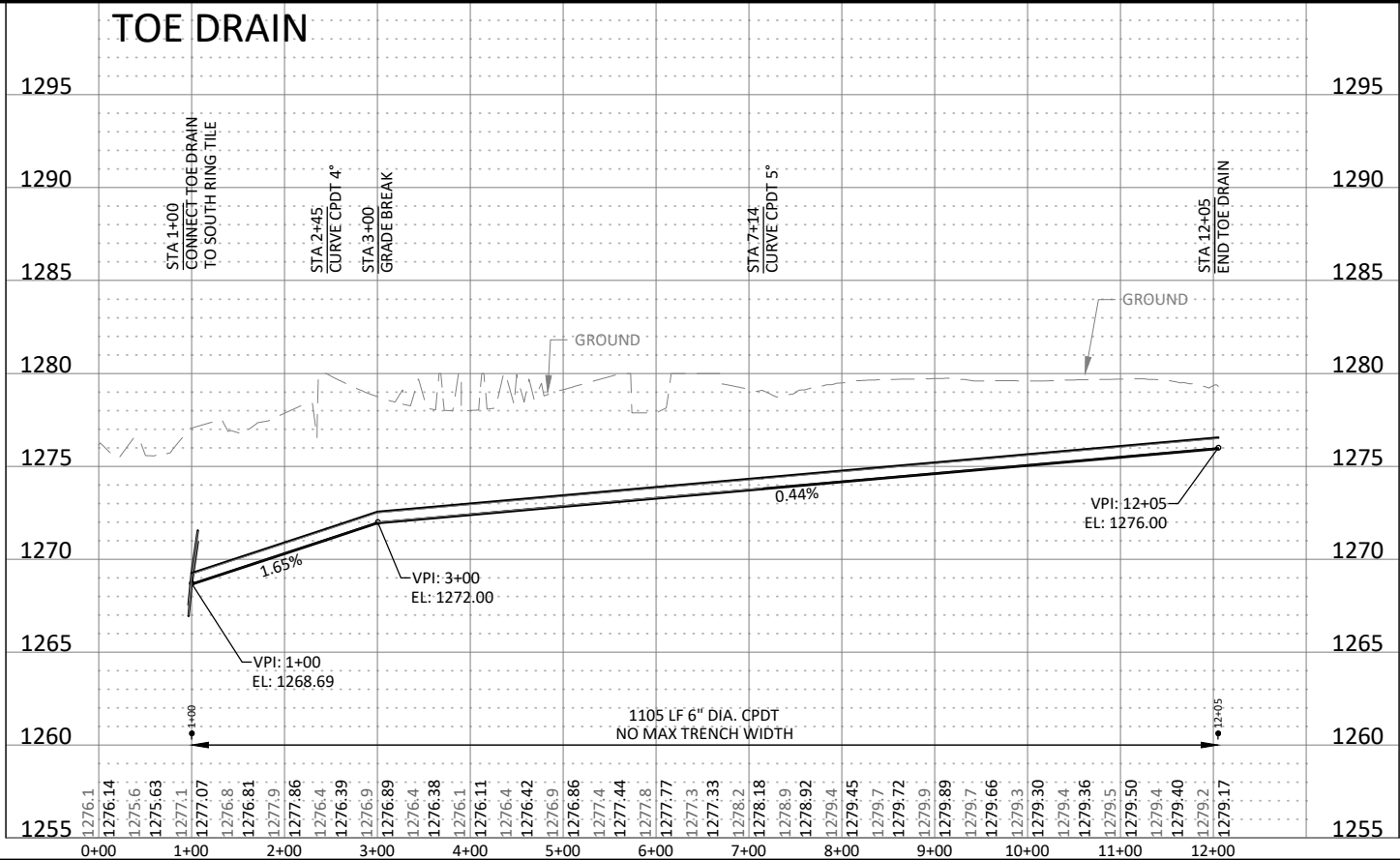
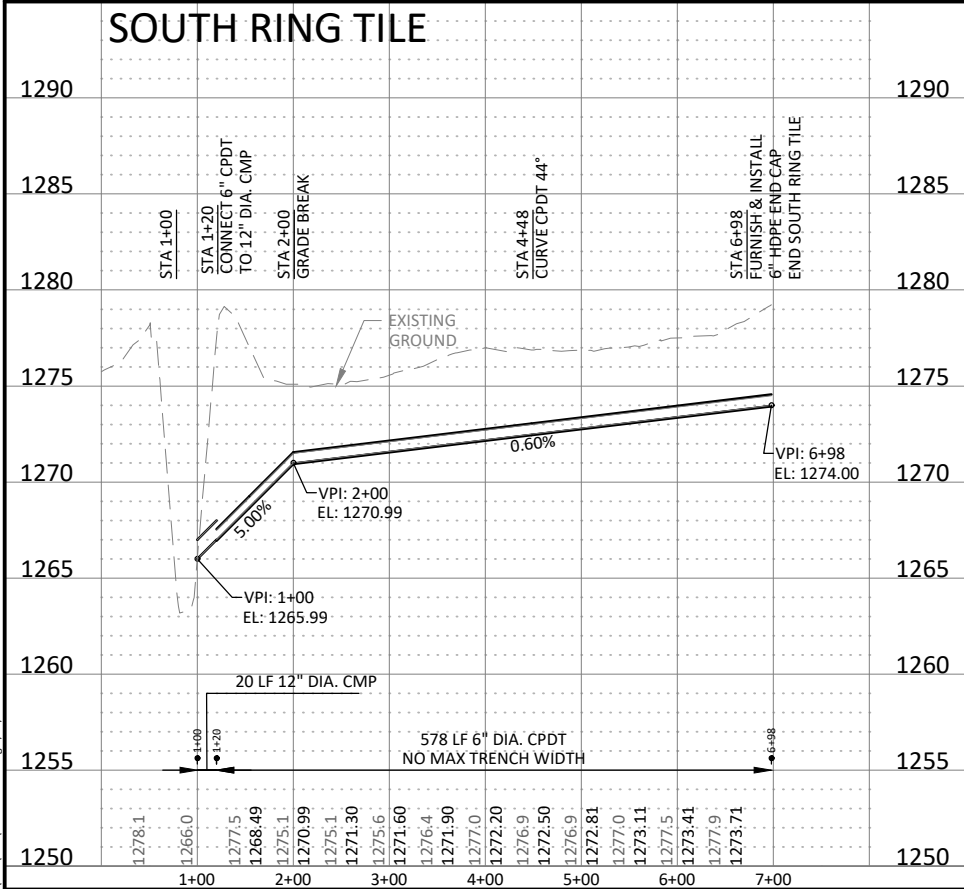
DESIGNED	CJK
DRAWN	CJK
CHECKED	CJK/JPR
CLIENT PROJ. NO.	

DD NO. 175 PROPOSED TILE IMPROVEMENTS AND WETLAND
POCAHONTAS COUNTY, IOWA
PLAN & PROFILE - BR C

SHEET
M.08



RCP CLASS VS D-VALUE	
CLASS II	1500D
CLASS III	2000D
CLASS IV	3000D



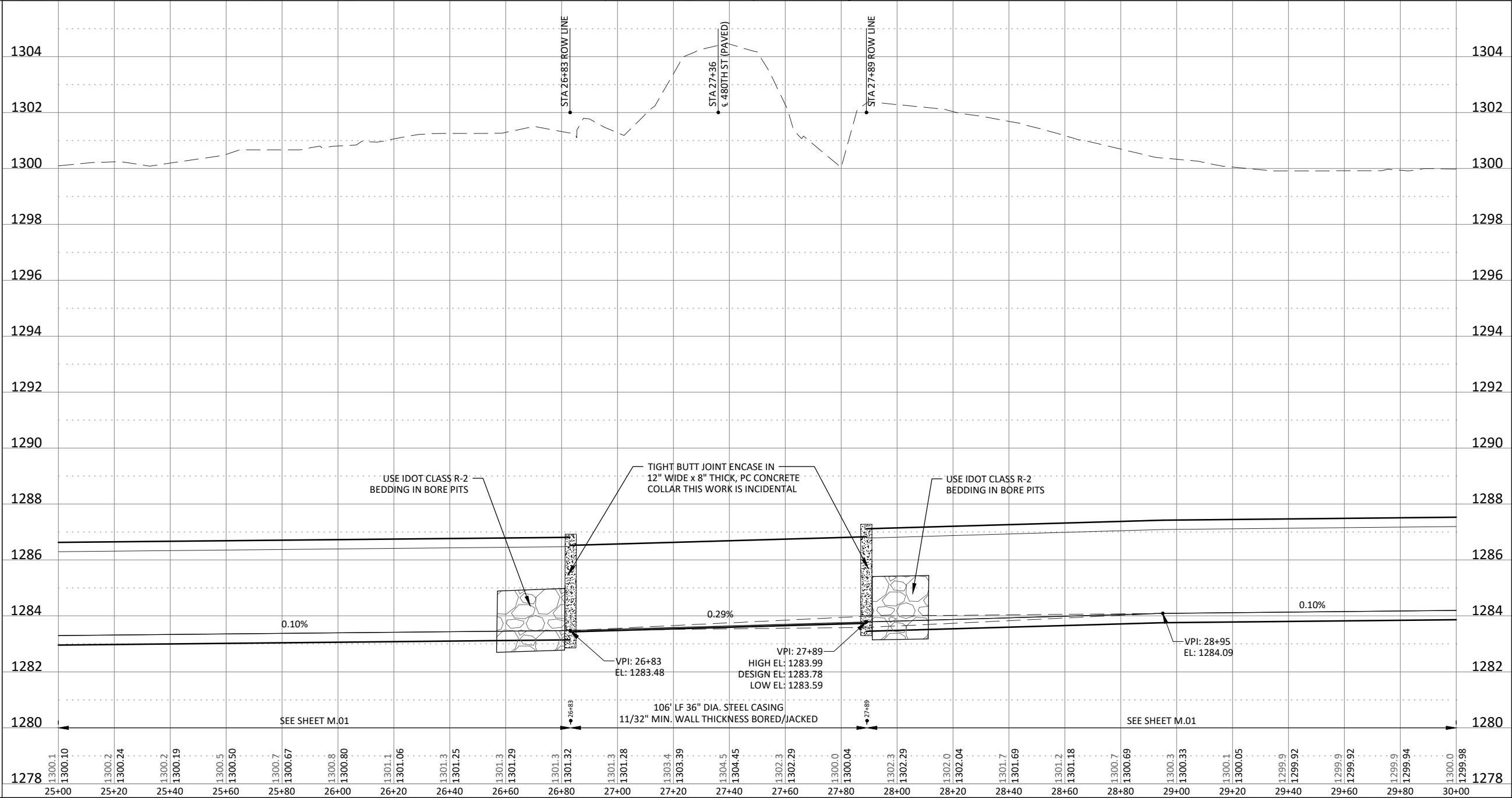
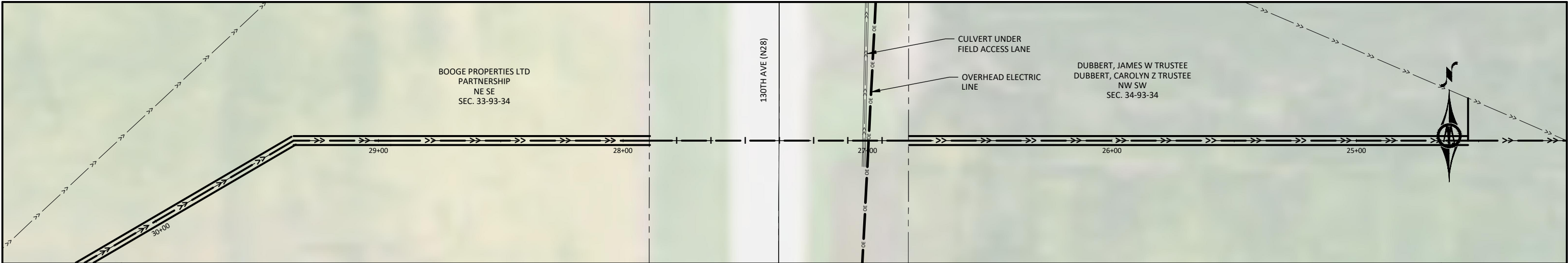
218 11TH STREET SW PLAZA
SPENCER, IOWA 51301
Phone: (712) 580-5075
Email: Spencer@bolton-menk.com
www.bolton-menk.com

DESIGNED	CIJ	NO.	ISSUED FOR	DATE
DRAWN	CIJ			
CHECKED	CIJ/JPR			
CLIENT PROJ. NO.				

DD NO. 175 PROPOSED TILE IMPROVEMENTS AND WETLAND
POCAHONTAS COUNTY, IOWA
PLAN & PROFILE - SOUTH RING TILE, TOE DRAIN, & WETLAND OUTLET

SHEET
M.09

© Bolton & Menk, Inc. 2021. All Rights Reserved.
11/10/2021 12:14:30 PM



© Bolton & Menk, Inc. 2021. All Rights Reserved
A:\VOCAD\175\1750413\1750413-01\1750413-01.dwg 3/1/2021 12:19:36 PM



**BOLTON
& MENK**

218 11TH STREET SW PLAZA
SPENCER, IOWA 51301
Phone: (712) 580-5075
Email: Spencer@bolton-menk.com
www.bolton-menk.com

DESIGNED	CJK	NO.	ISSUED FOR	DATE
DRAWN	CJK			
CHECKED	CJK/JPR			
CLIENT PROJ. NO.				

DD NO. 175 PROPOSED TILE IMPROVEMENTS AND WETLAND

POCAHONTAS COUNTY, IOWA

BORING DETAIL - 130TH AVE (N28)

SHEET

V.01