BOLTON & MENK

Real People. Real Solutions.

Engineer's Report for

Proposed Tile Improvements
Drainage District No. 56 Main 2
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 Tile Improvements

Drainage District No. 56 Main 2
Pocahontas County, Iowa
0P1.123316

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: September 30, 2021

Table of Contents

Tables

Appendices

I. INTRODUCTION

A. Scope of Work

A petition for drainage relief in Drainage District No. 56 Main 2 (DD56) of Pocahontas County, Iowa was filed with the Board of Supervisors on December 1, 2020. The petition requests an investigation and a report recommending repairs or improvements needed to bring drainage relief to lands in the district. The Board appointed Bolton & Menk, Inc. to complete the necessary survey, study, plan, and report. This report addresses the petitioners' request for improvements in the portion of the watershed served by the Main 2 Tile system of DD56. A copy of the petition is contained in Appendix A of this report.

B. Location

The watershed of DD56 Main 2 Tile serves an area of approximately 614 acres in Sections 29 – 32 of Des Moines Township (T-93-N, R-31-W) in Pocahontas County, Iowa.

C. History

April 23, 1909	Petition filed for drainage relief
June 14, 1909	Second petition filed for drainage relief on additional lands
August 30, 1909	Original engineer's report filed, including two main tile systems and laterals
February 10, 1910	Hearing on proposed drainage district
March 11, 1910	Drainage district No. 56 established
July 29, 1910	Bid letting for construction of district facilities, low bid $5,874.90 submitted by G. S. Robinson
1910 – 1911	Construction of original district facilities
January 3, 1911	Report of Classification Commission filed
April 26, 1911	Classification hearing, report approved with changes
December 1, 2020	Petition filed for drainage relief

II. INVESTIGATION

A survey was made of the existing Main 2 Tile system. In addition to the survey, review of Engineer's reports and plans on file with the district was conducted.

Unfortunately no plats or plans of the existing DD56 tile facilities were able to be located. However, using a combination of historic DD56 meeting minutes, existing countywide drainage facility maps, aerial imagery, topographic maps, road plans, and survey we were able to approximate the location, size, depth, and grade of the existing tile system.

The size and drainage coefficient (Dc) of the Main 2 Tile and its laterals have been analyzed, and the data is shown on the table below. The Dc 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 2 Tile Capacities

Reach	Length (LF)	Dia (in)	Grade	Ex Cap (cfs)	Approx. Acres	½" Dc (cfs)	Ex Dc (in/day)	Per Std
1	500	12	2.11%	5.2	548*	11.5	0.23	45.1%
2	2,268	15	0.05%	1.4	544*	11.4	0.06	12.7%
3	1,932	14	0.16%	2.2	416	8.7	0.12	24.7%
4	1,100	12	0.70%	3.0	190	4.0	0.37	74.9%
5	500	10	0.66%	1.8	99	2.1	0.43	85.8%
6	987	6	0.13%	0.2	20	0.4	0.24	48.3%

Branches of Main 2 Tile Capacities

Branch	Reach	Length (LF)	Dia (in)	Grade	Ex Cap (cfs)	Approx. Acres	½" Dc (cfs)	Ex Dc (in/day)	Per Std
1	1	961	8	0.10%	0.4	82*	1.7	0.11	22.2%
2	1	856	6	0.25%	0.3	48	1.0	0.14	27.9%
3	1	1,300	8	0.25%	0.6	71	1.5	0.20	40.6%
3	2	200	6	2.05%	0.8	36	0.8	0.53	106.6%

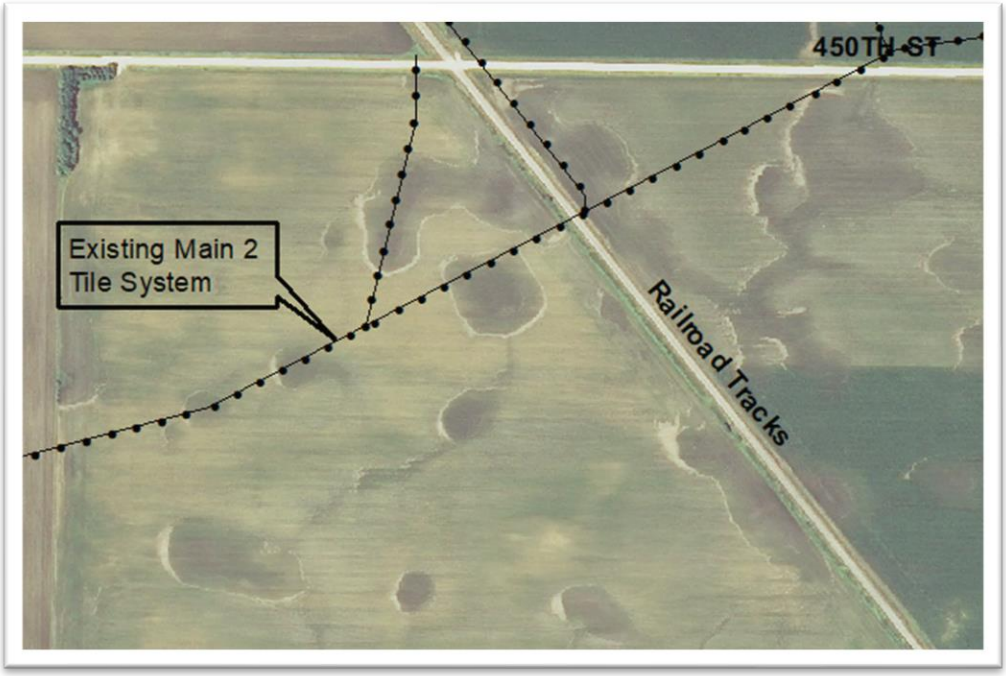
*: Watershed includes approximately 94 acres that is actually tiled to Main 1 of DD56. Acres adjusted to reflect 30% of water entering the Main 2 watershed.

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 110 years old, it is likely that the actual capacity of the existing system is less than 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 lower 4,700 feet of the existing Main 2 Tile appear to be significantly undersized and are 13 – 45% of the recommended minimum modern design. Additionally, Branches 1 & 2 of the Main 2 tile are similarly undersized. The requested investigation of capacities indicates that the Main 2 Tile system has struggled to effectively serve the drainage needs of the landowners for many years and would greatly benefit from improvements.

We also note that where the existing Main 2 Tile crosses the railroad tracks, just south of 450th St in Section 31, an old railroad strip map shows a culvert through the railroad, carrying surface water from west to east. Based on topography, we would expect a culvert in this location, however one was not

located during survey. It is unclear whether the culvert has been buried or removed. With legal guidance, the option exists to request the railroad reconstruct the necessary culvert (Iowa Code 468.109). Historical imagery shows the area is quite wet at times.



2013 NAIP Aerial Image

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 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 he happens to end up with a converted farmed wetland, he will find himself in technical violation of the farm program rules and be subject to a USDA claim for the forfeiture and possibly refund of farm program payments when the work commences.

The 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.

1. 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 expensive. 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.

2. 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 for Pocahontas County 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.

3. 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 2 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 $15,000.

   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.

4. 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 reestablish 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. 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 2 Tile. The proposed tile would begin in the SW ¼ NW ¼ Section 31-93-31 near the outlet of the existing Main 2 tile. The proposed Main 2 tile would parallel the existing tile for approximately 4,700 feet with 24" diameter tile and end just north of the 450th St. This tile would replace and improve the function of the existing Main 2 tile. We are not recommending to replace the upper approximately 2,600 feet of the Main 2 tile. This upper reach has a higher drainage coefficient than the lower reaches, and the very upper extent drains a small enough area that it is more practical to tile privately. Eliminating the downstream restriction to the Main 2 tile will also improve drainage to the lands served by the upper reach.

We also recommend replacement of Branches 1 & 2. These branches have capacities of 20 – 40% of minimum modern design.

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 existing district tile be abandoned as a district facility. 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 tiles 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.

Branches 1 & 2 could be single wall corrugated HDPE pipe, plowed in. This could be a part of this project, or done privately at a lower cost. There are 4-5 landowners served by each tile. The landowners could then turn the facility over to the district for future maintenance. At the grades shown in the preliminary plans a 15" single wall pipe would be required for Branch 1, and a 12" single wall pipe would be needed for Branch 2.

B. Estimated Construction Costs

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

Estimated Construction Costs			
Facility	**Acres Served**	**Estimated Construction Cost**	**Average Construction Cost per Benefited Acre**
Main 2 Tile	625	$431,000	$690
Branch 1 Tile	147	$45,000	$306
Branch 2 Tile	48	$49,000	$1,021

The estimated project cost for the recommended improvements is $674,000. A detailed opinion of probable cost is included in Appendix C of this report.

It bears noting that in the last year many industries experienced supply chain issues and labor shortages that have led to price increases and volatility. Our cost estimate attempts to reflect the recent price increases, but in the current climate it's hard to predict what construction prices will be a few months from now. Our construction cost estimate is approximately $68,000 higher than it would have been a year ago. If the project proceeds to bid, the Board of Supervisors would still have the option to stop the project if the bids came in inordinately high, however we are hopeful the prices will begin to come down in the near future.

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.

C. Road Crossings

Three gravel county road crossings will be required as a part of the proposed work. 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**	**Station**	**Type**	**Diameter**
450th St	Pocahontas County	Main 2 Tile	46+52	Open Cut	24”
		Branch 1 Tile	9+13	Open Cut	12”
		Branch 2 Tile	6+32	Open Cut	12”

We estimate the total cost to the County Secondary Roads for the recommended improvement to be $17,000.

D. Railroad Crossing

One railroad crossing will be required as a part of the proposed work. The railroad is operated by Union Pacific, and their approval is required. The crossing would be a bored 26” steel casing. There are additional requirements of Union Pacific during construction, such as railroad flagging and daily survey for 7 days to ensure the tracks have not settled. We estimate the total cost for the railroad crossing to be $75,000. Our current understanding of the law is that the cost of the railroad crossing would be borne by the district.

VI. ASSESSMENT SCHEDULE REVIEW

A. Benefited Lands not now Assessed

There are currently 840.99 acres within Drainage District No. 56. It appears as though there are approximately 160 acres within parcels benefited by the district facilities that are not currently on the assessment schedule. 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. Most landowners now in the district would likely support the annexation; those being annexed would likely be opposed. 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

Drainage District No. 56 has never been reclassified, and all facilities are included in a single assessment schedule. Appendix B contains the existing assessment schedule. It has become common practice with reclassification to separate all facilities within a district into individual schedules to prevent landowners who receive no benefit from a particular named facility from having to pay to maintain that facility.

The Board has directed the Engineer to develop a pre-classification similar to what the Benefit Commission would consider at the end of the project. It is included in a separate report. 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.

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. Reclassification should be done regardless of whether the improvement project proceeds.

C. 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 Main 2 Tile system and its branches. 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 $674,000. 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 160 acres of the lands now served by the facilities of Drainage District No. 56 appear to benefit from district facilities, but have not been assessed for costs of the facilities. In order for these lands to now be assessed to help pay for future maintenance it is necessary to annex them into Drainage District No. 56. The benefited lands listed in Appendix B include these lands.

Annexation is expected to cost approximately $5,000. 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 Drainage District No. 56 which benefit from district facilities be initiated.

Reclassification Recommended. The existing assessment schedule is inequitable and the district should be reclassified, separating the several district facilities into separate maintenance schedules at the same time. This should include the Main 1 Tile system and be done regardless of whether the proposed improvements are constructed. Reclassification is expected to cost approximately $3-4 per acre for each schedule developed.

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 $83 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 twenty years. If corn average $5.00/bushel the estimated pay-back period is twelve 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 Board of Supervisors Pocahontas County, acting as trustees for DD56, 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

DRAINAGE PETITION

TO: THE BOARD OF SUPERVISORS OF POCAHONTAS COUNTY, IOWA, ACTING ON BEHALF OF DRAINAGE DISTRICT NO. 56 MAIN TILE NUMBER 2 WHICH BENEFITS LANDS SOLEY IN POCAHONTAS COUNTY, IOWA.

COMES NOW, the undersigned Petitioners, being owners of the real estate in this established branch of the drainage district and in making this petition for drainage relief for the drainage of said lands respectfully state to the Board of Supervisors of Pocahontas County, Iowa:

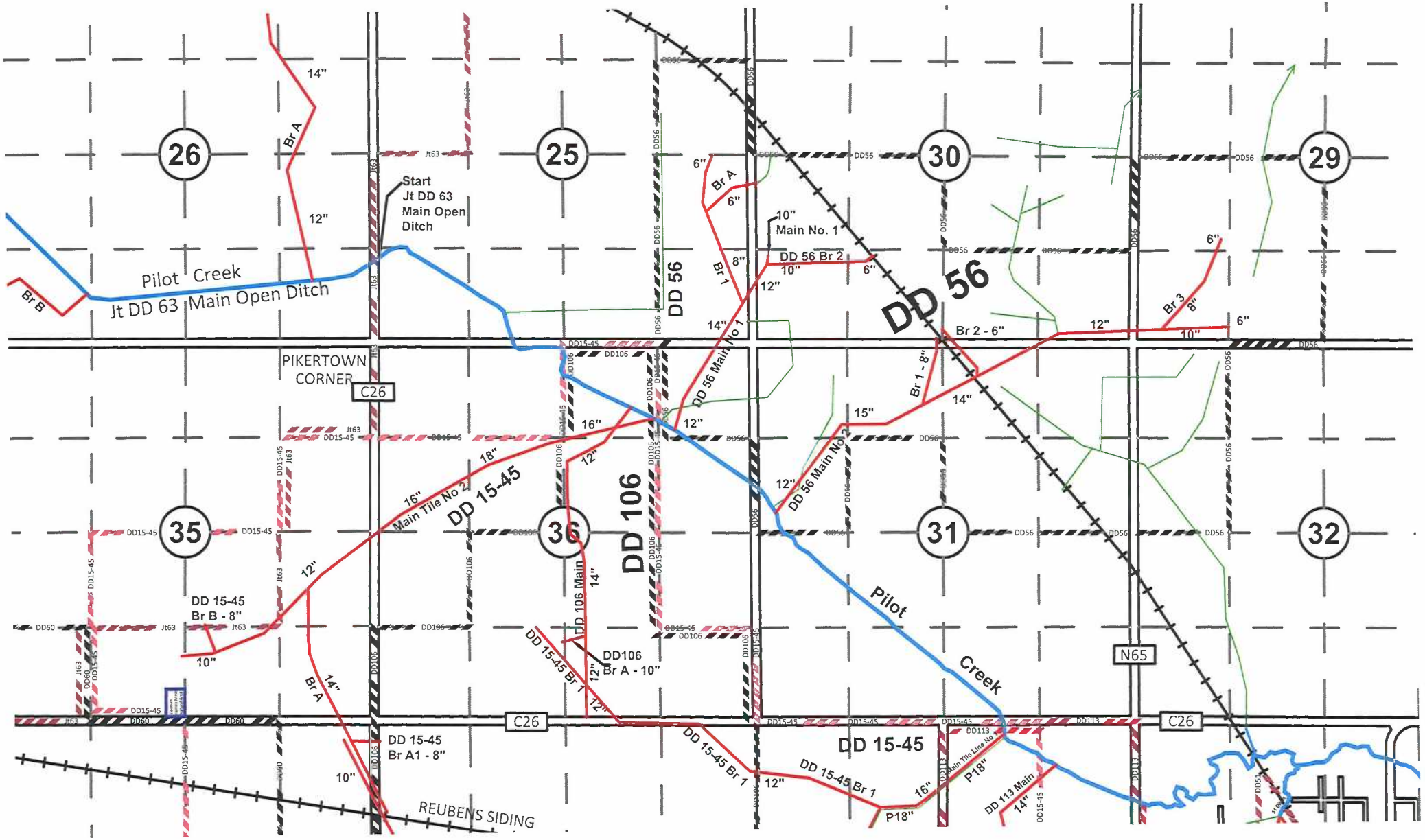
1. That the lands of these petitioners are a part of and are included in Drainage District No. 56 Main Tile Number 2 in Pocahontas County, Iowa, and that said lands are assessed for drainage tax by virtue of the improvements in said branch of the district.
2. That the drainage facilities of Drainage District Number 56 Main Tile Number 2 in their present condition in section 29, 30, 31, & 32-93-31 are not sufficient to properly drain the water from the lands of these petitioners as well as other lands; that such lands are too wet for timely cultivation, too wet to support good crop production, and are subject to erosion and flood danger; that if the original improvements in said drainage district were properly improved to correct the current situation, the public benefit, utility, health and welfare would be promoted.
3. That these petitioners do not have exact knowledge or information as to the exact nature of the work to be done to correct the situation, but that these petitioners are of the belief that an investigation of the situation by a qualified engineer would determine the exact nature of the work required to provide adequate drainage for the lands of these petitioners and adjoining lands.
4. That these petitioners, being the owners of lands which are part of the benefited area of Drainage District No. 56 Main Tile Number 2, are entitled to adequate drainage from improvements of the drainage district.
5. That these petitioners are signing this petition pursuant to Section 468.126 of the Code of Iowa.

WHEREFORE, these petitioners respectfully request that the Board of Supervisors of Pocahontas County, Iowa, acting on behalf of the owners of lands benefited by Drainage District No. 56 appoint a qualified engineer to investigate the drainage situation herein referred to with respect to petitioners land and other lands; and that the board order that district facilities be improved, to provide adequate drainage relief for the lands of these petitioners and adjoining lands as described above.

Dated this 1 day of Dec., 2020

LANDOWNERS	DESCRIPTION OF LAND

APPROVED BY BOARD OF SUPERVISORS POCAHONTAS COUNTY 2020 Chrm


26
25
30
29
35
36
31
32
Br A
14"
12"
Start
Jt DD 63
Main Open
Ditch
Pilot Creek
Jt DD 63 Main Open Ditch
Br B
DD 56
6"
Br A
6"
10"
Main No. 1
Br 1
8"
12"
14"
DD 56 Main No 1
DD 56 Br 2
10"
6"
DD 56
Br 2 - 6"
12"
Br 3
8"
10"
6"
Br 1 - 8"
15"
14"
DD 56 Main No 2
12"
PIKERTOWN
CORNER
C26
16"
18"
12"
16"
Main Tile No 2
DD 15-45
DD 106
DD 106 Main
14"
DD106
Br A - 10"
DD 15-45
Br B - 8"
10"
12"
Br A
14"
DD 15-45
Br A1 - 8"
10"
REUBENS SIDING
DD 15-45 Br 1
12"
12"
DD 15-45 Br 1
12"
DD 15-45
DD 15-45 Br 1
16"
P18"
Pilot
Creek
N65
C26
C26
DD 113 Main
14"
P18"

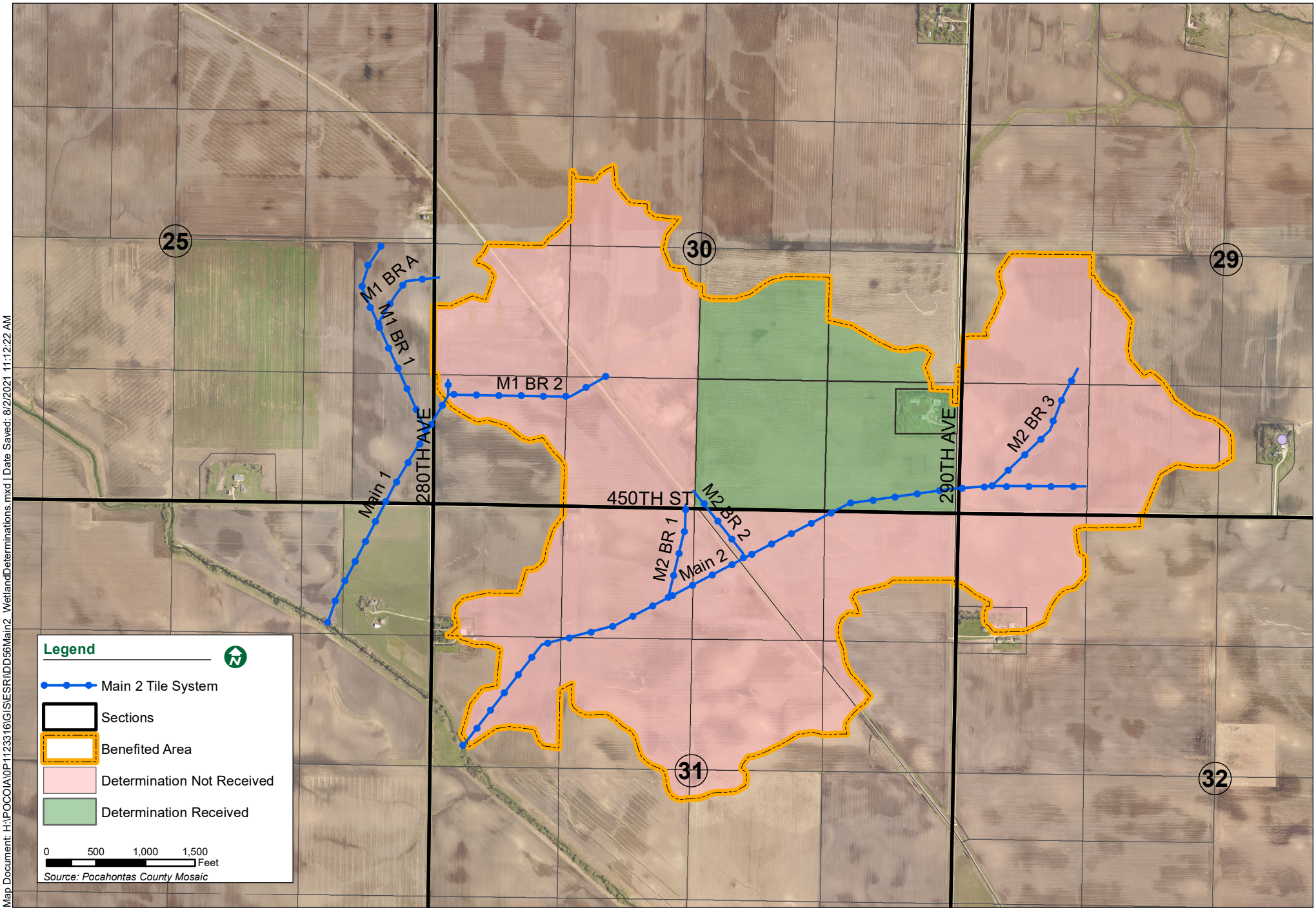
Drainage District No. 56 Main 2

Pocahontas County, Iowa

Wetland Determination Status

September 2021

BOLTON & MENK
Real People. Real Solutions.



Map Document: H:\POCOIA\0P1123316\GIS\ESRI\DD56Main2_WetlandDeterminations.mxd | Date Saved: 8/2/2021 11:12:22 AM

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

Vincent L. Triggs, Chairman
Board of Supervisors
Pocahontas County

ATTEST:

Margene A. Bunda

Margene A. Bunda, County Auditor

Appendix B: Existing Assessment Schedule

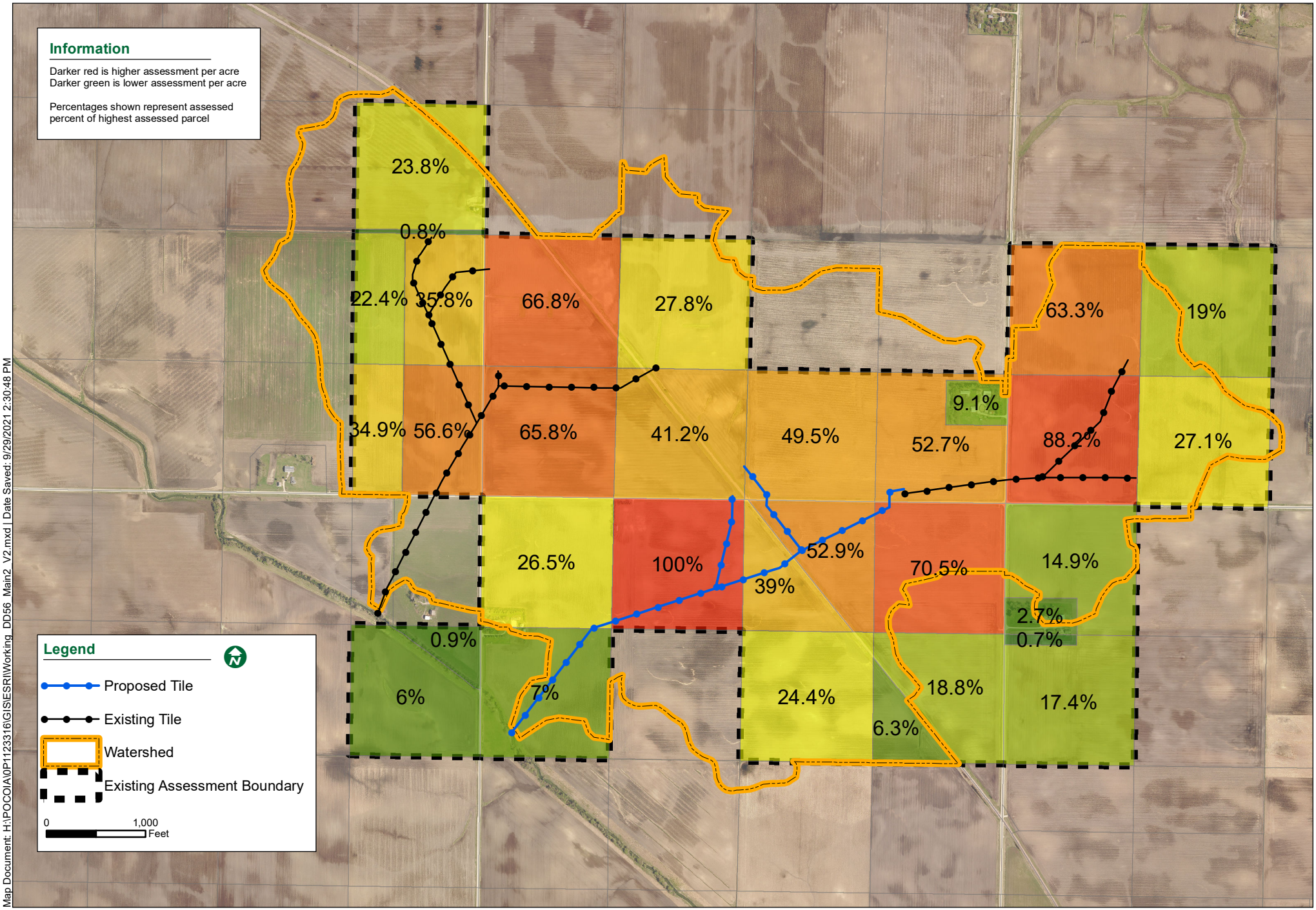
Drainage District No. 56

Pocahontas County, Iowa

Existing Assessment Schedule

September 2021

BOLTON & MENK
Real People. Real Solutions.



Map Document: H:\POCOIA\0P1123316\GIS\ESRI\Working_DD56_Main2_V2.mxd | Date Saved: 9/29/2021 2:30:48 PM

District / Lateral
150- - - / - -

Tract	Taxing Dist	Parcel Sec -Twp -Rng	Entity	Legal	Acres	% Benefit	Units Assessed
.6	60 000	03 25 200 007 025 093 032	AMDJ LLC % Jim DeWolf 245 North Blvd Saddle Brook, NJ 07663-	SE NE EXC S 40' RD .97 RR 2.50	25.650	19.3600	125.170
.7	60 000	03 25 200 008 025 093 032	Hollenbeck Trust, Carole L PO Box 548 Manteno, IL 60950-	S 40' SE NE RD .03	.850	.6400	4.150
1.0	60 000	03 25 400 002 025 093 032	Fehr, Darren M 24242 410th St Mallard, IA 50562	W 15 AC NE SE 25-93-32	15.000	40.0000	117.550
1.5	60 000	03 25 400 003 025 093 032	Fehr, Darren M 24242 410th St Mallard, IA 50562	E 25 AC NE SE 25-93-32	24.000	40.0000	188.090
2.0	60 000	03 25 400 005 025 093 032	Fehr, Darren M 24242 410th St Mallard, IA 50562	W 15 AC SE SE 25-93-32	14.500	60.0000	183.660
2.5	60 000	03 25 400 006 025 093 032	Fehr, Darren M 24242 410th St Mallard, IA 50562	E 25 AC SE SE 25-93-32	23.500	60.0000	297.660
3.1	60 000	03 36 200 006 036 093 032	Fehr, Ashton James 25415 410th St Mallard, IA 50562	SE NE N OF DD RD .43 DD 1.21	4.040	.6700	4.930
3.2	60 000	03 36 200 007 036 093 032	Kerns, Clairyss J 712 Kenyon Rd Apt #203 Fort Dodge, IA 50501	SE NE S OF DD RD .50 DD 1.25	25.960	4.3300	31.670
3.5	100 000	04 29 300 001 029 093 031	Rittgers, Donald E 28150 420th St Rolfe, IA 50581	NW SW 29-93-31	39.000	35.0000	333.060
4.0	100 000	04 29 300 002 029 093 031	Zaugg Farms LLC, Martin & Doris 308 8th St SW #17	NE SW 29-93-31	40.000	15.0000	100.000

District / Lateral
150- - - / - -

Tract	Taxing Dist	Parcel Sec -Twp -Rng	Entity	Legal	Acres	% Benefit	Units Assessed
			West Bend, IA 50597				
4.5	100 000	04 29 300 003 029 093 031	Rittgers, Donald E 28150 420th St Rolfe, IA 50581	SW SW 29-93-31	38.000	50.0000	463.600
5.0	100 000	04 29 300 004 029 093 031	Zaugg Farms LLC, Martin & Doris 308 8th St SW #17 West Bend, IA 50597	SE SW 29-93-31	39.000	15.0000	142.740
5.5	100 000	04 30 300 001 030 093 031	Marine, Betty L 301 4th St NW Apt 203 West Bend, IA 50597	NW SW 30-93-31	36.000	40.0000	351.360
6.0	100 000	04 30 300 002 030 093 031	Rittgers, Donald 28150 420th St Rolfe, IA 50581	NE SW 30-93-31	40.000	15.0000	146.400
6.5	100 000	04 30 300 003 030 093 031	Munson, Sarah Marie 29733 460th St Rolfe, IA 50581	SW SW 30-93-31	38.000	35.0000	345.920
7.0	100 000	04 30 300 004 030 093 031	Munson, Sarah Marie 29733 460th St Rolfe, IA 50581	SE SW 30-93-31	35.500	25.0000	216.550
7.5	100 000	04 30 400 002 030 093 031	Charlton, James H Farm Trust ,	SW SE 30-93-31	39.000	30.0000	260.480
8.0	100 000	04 30 400 004 030 093 031	Charlton, James H Farm Trust ,	LOT IN NE PT SE SE 30-93-31	5.000	35.0000	47.600
8.5	100 000	04 30 400 005 030 093 031	Charlton, James H Farm Trust ,	BAL SE SE 30-93-31	33.000	35.0000	276.920
9.0	100 000	04 31 100 001	Munson, Sarah Marie	NW NW	38.000	15.0000	139.080

District / Lateral
150- - - / - -

Tract	Taxing Dist	Parcel Sec -Twp -Rng	Entity	Legal	Acres	% Benefit	Units Assessed
		031 093 031		31-93-31			
			29733 460th St Rolfe, IA 50581				
9.5	100 000	04 31 100 002 031 093 031	Martin, Gwendolyn M	NE NW 31-93-31	39.000	50.0000	525.800
			320 S 16th St Apt 2 Sac City, IA 50583				
10.0	100 000	04 31 100 003 031 093 031	Munson, Sarah Marie	SW NW 31-93-31	30.000	5.0000	36.600
			29733 460th St Rolfe, IA 50581				
10.5	100 000	04 31 200 001 031 093 031	Martin, Gwendolyn M	NW NE W OF RY 31-93-31	14.000	60.0000	204.960
			320 S 16th St Apt 2 Sac City, IA 50583				
11.0	100 000	04 31 200 002 031 093 031	Marine, Betty L	NW NE E OF RY 31-93-31	19.000	60.0000	278.160
			301 4th St NW Apt 203 West Bend, IA 50597				
11.5	100 000	04 31 200 003 031 093 031	Marine, Betty L	NE NE 31-93-31	38.000	40.0000	370.880
			301 4th St NW Apt 203 West Bend, IA 50597				
12.0	100 000	04 31 200 004 031 093 031	Martin, Gwendolyn M	SW NE 31-93-31	35.000	15.0000	128.100
			320 S 16th St Apt 2 Sac City, IA 50583				
12.5	100 000	04 31 200 005 031 093 031	Martin, Gwendolyn M	SE NE W OF RY 31-93-31	9.000	15.0000	32.940
			320 S 16th St Apt 2 Sac City, IA 50583				
13.0	100 000	04 31 200 006 031 093 031	Marine, Betty L	SE NE E OF RY 31-93-31	27.000	15.0000	98.820
			301 4th St NW Apt 203 West Bend, IA 50597				
13.6	100 000	04 32 100 005 032 093 031	Marine, Betty L	NW NW(EXC 6.25 AC TR SW COR)	31.680	8.4500	78.330

District / Lateral
150- - - / - -

Tract	Taxing Dist	Parcel Sec -Twp -Rng	Entity	Legal	Acres	% Benefit	Units Assessed
			301 4th St NW Apt 203 West Bend, IA 50597	RD 2.07			
13.7	100 000	04 32 100 006 032 093 031	Marine, Betty L 301 4th St NW Apt 203 West Bend, IA 50597	6.25 AC TR SW COR NW NW RD .43	5.820	1.5500	14.390
14.1	100 000	04 32 100 007 032 093 031	Marine, Betty L 301 4th St NW Apt 203 West Bend, IA 50597	SW NW(EXC 1.71 AC TR NW COR) RD 1.39	36.900	9.5900	91.230
14.2	100 000	04 32 100 008 032 093 031	Marine, Betty L 301 4th St NW Apt 203 West Bend, IA 50597	1.71 AC TR NW COR SW NW RD .12	1.590	.4100	3.930
9,006.1	000	00 00 000 001 000 000 000	Chicago & NW Transportation Co 165 N Canal St Chicago, IL 00000-				300.000
9,094.5	000	00 00 000 034 000 000 000	Pocahontas County Secondary Roads Pocahontas, IA 50574-	ROADS			455.000
	150- - - / - -			Count: 34 Totals:	840.990		6,395.730 *
				Count: 34 Grand Totals:	840.990		6,395.730

Appendix C: Engineer's Opinion of Probable Costs
Economic Analysis

Engineer's Opinion of Probable Cost
Proposed Tile Improvements
Drainage District No. 56 Main 2
Pocahontas County, Iowa
2021

Construction Division 1--Tile Work on Private Lands

Item	Description	Unit	Quantity	Unit Price	Total
101	1500D R.C.P., 24'' Dia.	LF	1,734	$54	$93,636
102	2000D R.C.P., 24'' Dia.	LF	1,300	$55	$71,500
103	3000D R.C.P., 24'' Dia.	LF	1,700	$59	$100,300
104	1500D R.C.P., 12'' Dia.	LF	1,383	$34	$47,022
105	2000D R.C.P., 12'' Dia.	LF	878	$36	$31,608
106	12'' on XX'' Dia. R.C.P. Tee, Fabrication Only	EA	21	$403	$8,463
107	24'' Dia., R.C.P. Elbow Section, Fabrication Only	EA	10	$605	$6,050
108	12'' Dia., R.C.P. Elbow Section, Fabrication Only	EA	8	$370	$2,960
109	24" Dia., R.C.P. Endcap	EA	1	$250	$250
110	15" Dia., R.C.P. Endcap	EA	4	$140	$560
111	12" Dia., R.C.P. Endcap	EA	16	$120	$1,920
112	Lateral Tile Connections, 10" Dia. or Smaller	EA	25	$400	$10,000
113	Lateral Tile Connections, 12" Dia. or Larger	EA	3	$500	$1,500
114	Tile Trench Stabilization and Cradling Rock	TN	140	$35	$4,900
115	Topsoil Strip, Stockpile and Respread	CY	2,746	$3	$8,238
116	Administration of Erosion Management Plan	LS	1	$3,000	$3,201
117	Old to New Tile Connections	EA	9	$1,000	$9,000
118	Silt Fence Install and Review	LF	330	$3	$825
119	Spot Tile Exploration	HR	10	$200	$2,000
120	Fence Cuts	EA	3	$100	$300
121	Mobilization	LS	1	$20,200	$20,200

Estimated Division 2 Subtotal **$424,000**

Construction Division 2--Open Cut County Secondary Roads

Item	Description	Unit	Quantity	Unit Price	Total
201	2000D R.C.P., 24'' Dia.	LF	66	$60	$3,960
202	2000D R.C.P., 12'' Dia.	LF	132	$40	$5,280
203	12'' on XX'' Dia. R.C.P. Tee, Fabrication Only	EA	1	$403	$403
204	Hickenbottom intake, 12" Dia.	EA	1	$400	$400
205	Tile Trench Stabilization and Cradling Rock	TN	30	$40	$1,200
206	Seeding and Fertilizing (Rural)	LS	1	$1,000	$1,000
207	Traffic Control	LS	1	$2,000	$2,000
208	Silt Fence-Install and Remove	LF	180	$3	$540
209	Exploratory Excavation	HR	6	$200	$1,200
210	Mobilization	LS	1	$1,000	$1,000

Estimated Division 3 Subtotal **$17,000**

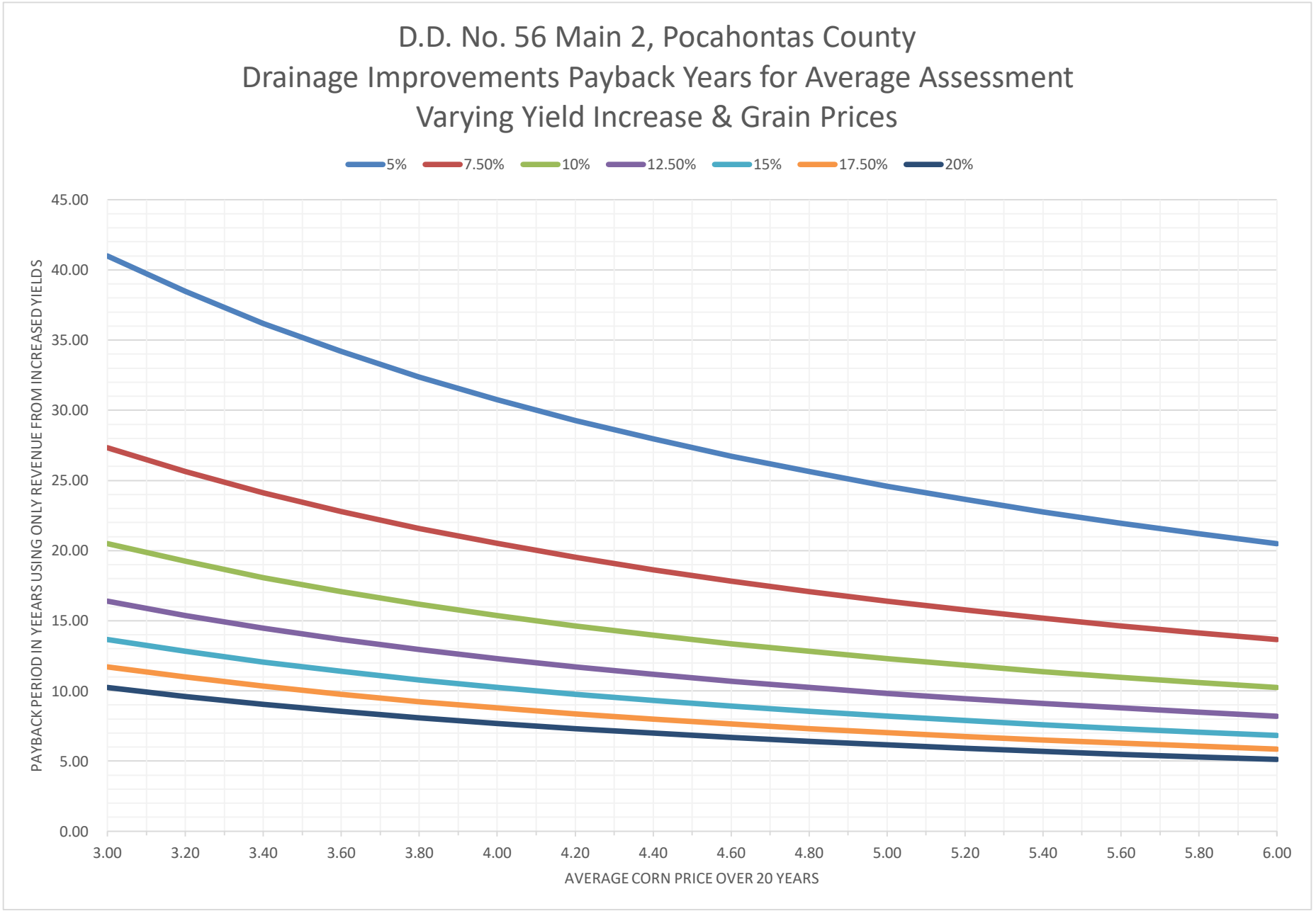
Engineer's Opinion of Probable Cost
Proposed Tile Improvements
Drainage District No. 56 Main 2
Pocahontas County, Iowa
2021
Construction Division 3--Bored Railroad Crossings

Item	Description	Unit	Quantity	Unit Price	Total
301	Steel Casing, 0.40625'' Wall, Jacked and Bored, 26'' Diameter	LF	100	$600	$60,000
302	Tile Trench Stabilization and Cradling Rock	TN	30	$35	$1,050
303	Track Monitoring and Observation	LS	1	$10,000	$10,000
304	Mobilization	LS	1	$3,600	$3,600

Estimated Division 3 Subtotal	**$75,000**
Subtotal of Construction Divisions 1 through 3	$516,000
Construction Contingency	$25,800
Total Estimated Construction Cost	**$541,800**
Less Estimated Secondary Roads Construction Costs Paid by Others	$17,000
Total Estimated Assessable Construction Cost	**$524,800**
Estimated Increase in Construction Cost from One Year Ago	**$68,000**
Percent Increase	**14.89%**

Construction Related Damages	
Work Area Rental (15.5 ac)	$6,200
Other Damages	$15,000
Basic Engineering Services	
Survey, Study & Report. Meetings & Hearing	$30,000
Wetland Regulations Administration	$3,000
Construction Plans, Specifications, & Bid Letting	$15,000
Construction Engineering Services	$30,000
Legal Services, Publications, Mailings, Etc.	$3,000
Farmed Wetland Mitigation Assistance (2 ac X $7,500/ac)	$15,000
Finance, Interest & Contingency	$32,100
Total Estimated Assessable Project Cost	**$674,000**
Estimated Average Cost Per Currently Assessed Acre (625 ac)	$1,078
Estimated Average Cost Per Acre Per Year (10 years)	$140
Estimated Average Cost Per Acre Per Year (20 years)	$83
Total Estimated Assessable Project Cost Without Branches 1 & 2	$553,000
Estimated Average Cost Per Currently Assessed Acre (625 ac)	$885

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:	DD56 Main 2

ACRES IN DD	Enter>	625	ac
% Corn Acreage	Enter>	63	%
% Soybeans Acreage	Enter>	33	%
% Other (Roads, Etc)		4	%
Base Corn Yield	Enter>	174	bu/a
Base Soybeans Yield	Enter>	49	bu/a

			Average Yield Improvement Due to Better Drainage Outlet, %						
			2.5	5	7.5	10	12.5	15	17.5	20
Total Increase in Yield, Corn		bu	1,713	3,426	5,138	6,851	8,564	10,277	11,990	13,703
Total Increase in Yield, Soybeans		bu	253	505	758	1,011	1,263	1,516	1,769	2,021

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	$ 6.07	
Avg Price of Soybeans Next 20 Years	$ 14.14	

	Annual Increase in Revenue							
From Corn	$10,397	$ 20,794	$ 31,190	$ 41,587	$ 51,984	$ 62,381	$ 72,777	$ 83,174
From Soybean	$ 3,573	$ 7,145	$ 10,718	$ 14,290	$ 17,863	$ 21,435	$ 25,008	$ 28,580
Total	$13,969	$ 27,939	$ 41,908	$ 55,877	$ 69,847	$ 83,816	$ 97,785	#######
Increased Revenue/acre	$ 22	$ 45	$ 67	$ 89	$ 112	$ 134	$ 156	$ 179
Increased Revenue/acre over the anticipated life of the facility (100 years)	$ 2,235	$ 4,470	$ 6,705	$ 8,940	$ 11,175	$ 13,411	$ 15,646	$ 17,881

				Payback Period For Revenues From Only Yield Increase (Years)						
Very High Assessment									
$2,735	per ac	250% of Avg	122.4	61.2	40.8	30.6	24.5	20.4	17.5	15.3
High Assessment									
$2,188	per ac	200% of Avg	97.9	49.0	32.6	24.5	19.6	16.3	14.0	12.2
Above Average Assessment									
$1,641	per ac	150% of Avg	73.4	36.7	24.5	18.4	14.7	12.2	10.5	9.2
Average Assessment									
$1,094	per ac	100% of Avg	49.0	24.5	16.3	12.2	9.8	8.2	7.0	6.1
Low Assessment									
$547	per ac	50% of Avg	24.5	12.2	8.2	6.1	4.9	4.1	3.5	3.1
Very Low Assessment									
$274	per ac	25% of Avg	12.2	6.1	4.1	3.1	2.4	2.0	1.7	1.5
			2.5	5	7.5	10	12.5	15	17.5	20
			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 $5.17 and soybeans at $12.05

A **very high** cost assessment (250% of average) would be be paid off in	20.4	years on a 15% average yield increase.
A **high cost** assessment (200% of average) would be paid off in	19.6	years on a 12.5% average yield increase.
An **above avg** cost assessment (150% of average) would be paid off in	18.4	years on a 10% average yield increase.
An **average** cost assessment (100% of average) would be paid off in	16.3	years on a 7.5% average yield increase.
A **low** cost assessment (50% of average) would be paid off in	12.2	years on a 5% average yield increase.
A **very low** cost assessment (25% of average) would be paid off in	12.2	years on a 2.5% average yield increase.

Future Prices to Reflect Annual Yield Change Trend

Corn Today	$5.17	Date
Beans Today	$12.05	9/30/2021

Average Annual Yield Change	Price Adj. for Yield Change CORN 20-Year Avg. Price	SOYBEANS 20-Year Avg Price
0.0%	$5.17	$12.05
0.5%	$5.44	$12.68
1.0%	$5.74	$13.38
1.5%	$6.07	$14.14
2.0%	$6.43	$14.98
2.5%	$6.82	$15.90
3.0%	$7.25	$16.91
3.5%	$7.73	$18.01

Yield Improvements on 40 acres if Drowned Areas

Percent Increase over Current Conditions

Drowned Area ac	Percent of Average Yield Achieved by Improvements 50%	60%	70%	80%	90%	100%
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

Existing Farm Yield vs. Potential Farm Yield

Average Field Yield with Improvement bu/ac	Current Average Corn Yield over Entire Field bu/ac 90	110	130	150	170	190
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

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

Payback Years for Average Yield Improvements for Range of Average Grain Prices
Proposed Drainage Improvements in Cerro Gordo County Drainage District No. 49

Assumptions
Long-term Soybean/Corn price ratio is 2.6
Average assessment of $1,094/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	40.99	27.33	20.50	16.40	13.66	11.71	10.25
3.20	8.32	38.47	25.64	19.23	15.39	12.82	10.99	9.62
3.40	8.84	36.17	24.11	18.08	14.47	12.06	10.33	9.04
3.60	9.36	34.18	22.79	17.09	13.67	11.39	9.77	8.55
3.80	9.88	32.36	21.57	16.18	12.94	10.79	9.24	8.09
4.00	10.40	30.76	20.51	15.38	12.30	10.25	8.79	7.69
4.20	10.92	29.27	19.52	14.64	11.71	9.76	8.36	7.32
4.40	11.44	27.96	18.64	13.98	11.18	9.32	7.99	6.99
4.60	11.96	26.73	17.82	13.36	10.69	8.91	7.64	6.68
4.80	12.48	25.63	17.09	12.81	10.25	8.54	7.32	6.41
5.00	13.00	24.59	16.39	12.29	9.83	8.20	7.02	6.15
5.20	13.52	23.65	15.77	11.83	9.46	7.88	6.76	5.91
5.40	14.04	22.76	15.18	11.38	9.11	7.59	6.50	5.69
5.60	14.56	21.96	14.64	10.98	8.78	7.32	6.27	5.49
5.80	15.08	21.19	14.13	10.59	8.48	7.06	6.05	5.30
6.00	15.60	20.49	13.66	10.25	8.20	6.83	5.86	5.12

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. 56 MAIN NO. 2
PROPOSED DRAINAGE IMPROVEMENTS
POCAHONTAS COUNTY, IOWA
2021

PLAN REVISIONS		
REV	ISSUED FOR	DATE
-	-	-

GOVERNING SPECIFICATIONS

THE 2021 EDITION OF THE "SUDAS SPECIFICATIONS FOR PUBLIC IMPROVEMENTS" SHALL GOVERN.

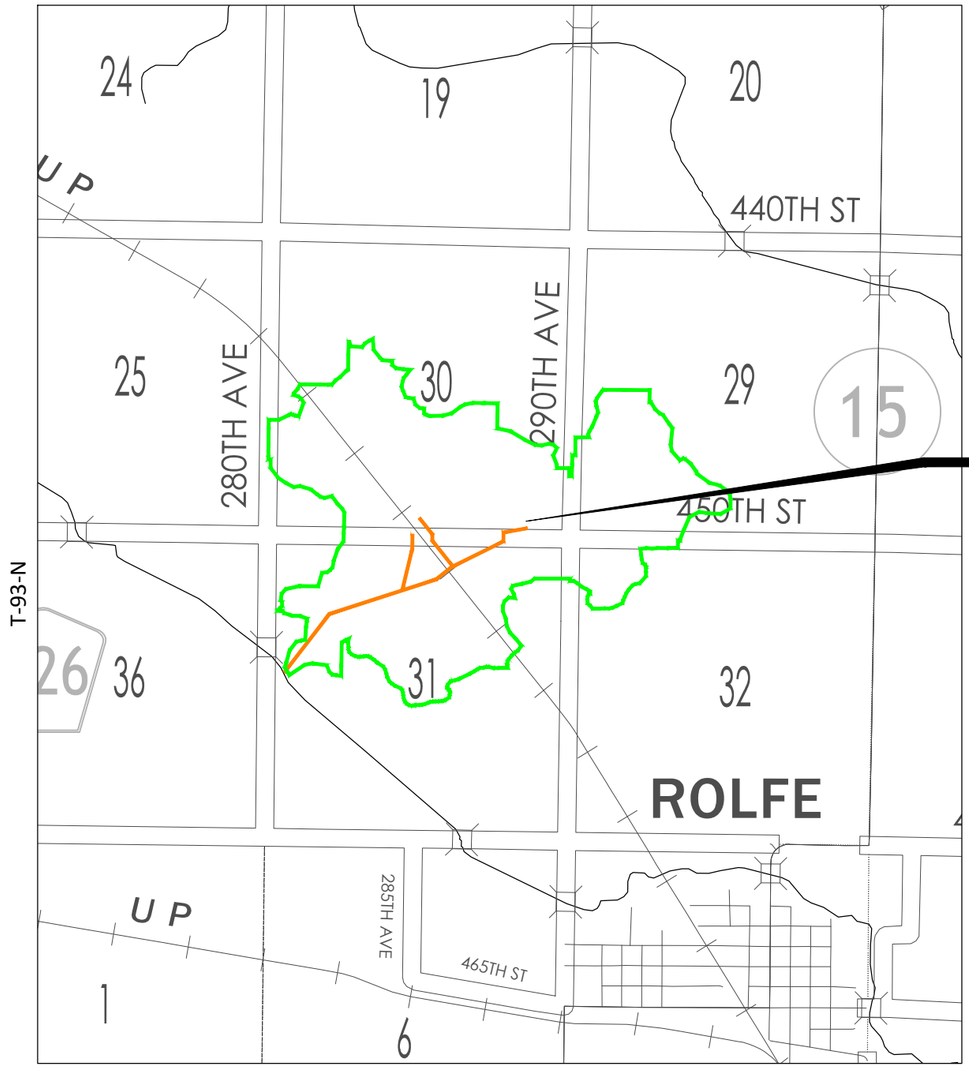
IOWA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGE CONSTRUCTION",
SERIES 2015 AND ALL CURRENT GENERAL SUPPLEMENTAL SPECIFICATIONS AND MATERIALS INSTRUCTIONAL MEMORANDUM
SHALL GOVERN AS REFERENCED.

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

IOWA ONE CALL
1-800-292-8989
www.iowaonecall.com
811

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
G.01	ALIGNMENT GEOMETRY
M.01 - M.02	PLAN & PROFILE - PROPOSED MAIN NO. 2
M.03	PLAN & PROFILE - PROPOSED BRANCH 1 & 2
V.01	BORING DETAIL - UNION PACIFIC RAILROAD

LICENSED PROFESSIONAL ENGINEER
COLLIN J., KLINGBEIL, 24741
IOWA

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 SHEET

PROJECT DATUM: IOWA STATE PLANE - NORTH - US FEET
HORIZONTAL: NAD 83
VERTICAL: NAVD 1988

HORZ. SCALE 0 1320 2640 FEET

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
DRAWN	CLH
CHECKED	CJK
CLIENT PROJ. NO.	

REV	DESCRIPTION	DATE

DRAINAGE DISTRICT No. 56 MAIN NO. 2 IMPROVEMENTS
POCAHONTAS COUNTY, IOWA
TITLE SHEET

SHEET A.01

LEGEND

- PROPOSED TILE ALIGNMENTS
- PARCEL LINES
- WATERSHED BOUNDARY
- ASSESSMENT BOUNDARY

N

30

29

31

32

RITTGERS, DONALD
RITTGERS, BEATRICE
RITTGERS, DONALD
BURNS TR, JOAN
RITTGERS, MARK
BURNS, TANYA
McCORKLE, TIFFANY
COVARRUBIAS,
STEPHANIE
RITTGERS, AMANDA
SE NW
SEC. 30-93-31

MARINE, BETTY
SW NW
SEC. 30-93-31

RITTGERS, DONALD
RITTGERS, BEATRICE
RITTGERS, DONALD
BURNS TR, JOAN
RITTGERS, MARK
BURNS, TANYA
McCORKLE, TIFFANY
COVARRUBIAS,
STEPHANIE
RITTGERS, AMANDA
NE SW
SEC. 30-93-31

MARINE, BETTY
NW SW
SEC. 30-93-31

DUITSCHER, DANIEL
DUITSCHER, DAVID
DUITSCHER, DEAN
INTER VIVOS TR
NW SE
SEC. 30-93-31

DUITSCHER, DANIEL
DUITSCHER, DAVID
DUITSCHER, DEAN
INTER VIVOS TR
NE SE
SEC. 30-93-31

DUITSCHER, DANIEL
DUITSCHER, DAVID
DUITSCHER, DEAN
INTER VIVOS TR
TR 436.9' x 581.42'
- 789.5' N SE COR
SEC. 30-93-31

DUITSCHER, DANIEL
DUITSCHER, DAVID
DUITSCHER, DEAN
INTER VIVOS TR
SW SE
SEC. 30-93-31

DUITSCHER, DANIEL
DUITSCHER, DAVID
DUITSCHER, DEAN
INTER VIVOS TR
SE SE
(EXC TR 436.9' x
581.42' - 789.5' N SE
COR SE SE)
SEC. 30-93-31

RITTGERS, DONALD
RITTGERS, BEATRICE
NW SW
SEC. 29-93-31

RITTGERS, DONALD
SW SW
SEC. 29-93-31

ZAUGG FARMS LLC,
MARTIN & DORIS
PARCEL B NE SW
SEC. 29-93-31

ZAUGG FARMS LLC,
MARTIN & DORIS
PARCEL B SE SW
SEC. 29-93-31

ZAUGG FARMS LLC,
MARTIN & DORIS
PARCEL B SW SE
(EXC 4.61 AC TR - 541'
E-SW COR)
SEC. 29-93-31

MUNSON, SARAH
SW SW
SEC. 30-93-31

MUNSON, SARAH
SE SW
SEC. 30-93-31

END
BR 1 MAIN NO. 2

END
BR 2 MAIN NO. 2

END
MAIN NO. 2

BEGIN
BR 1 MAIN NO. 2

BEGIN
BR 2 MAIN NO. 2

BEGIN
MAIN NO. 2

10+00
5+00
0+00
15+00
20+00
25+00
30+00
35+00
40+00
45+00

FEHR, ASHTON
& ELIZABETH
W 11.25 AC
NE NE N OF DD
SEC. 36-93-32

FEHR, ASHTON
& ELIZABETH
NE NE N OF DD
(EXC W 11.25 AC)
SEC. 36-93-32

FEHR, ASHTON
& ELIZABETH
SE NE N OF DD
SEC. 36-93-32

KERNS, CLAIRYSS
NE NE S OF DD
SEC. 36-93-32

KERNS, CLAIRYSS
SE NE S OF DD
SEC. 36-93-32

MUNSON, SARAH
NW NW
SEC. 31-93-31

MUNSON, SARAH
S-SW NW
SEC. 31-93-31

MARTIN, GWENDOLYN
NE NW
SEC. 31-93-31

MARTIN, GWENDOLYN
NW NE W OF RR
SEC. 31-93-31

MARTIN, GWENDOLYN
SE NW
SEC. 31-93-31

MARTIN, GWENDOLYN
SW NE
SEC. 31-93-31

MARTIN, GWENDOLYN
SE NE W OF RR
SEC. 31-93-31

MARINE, BETTY
NW NE E OF RR
SEC. 31-93-31

MARINE, BETTY
NE NE
SEC. 31-93-31

MARINE, BETTY
SE NE E OF RR
SEC. 31-93-31

MARINE, BETTY
NW NW
(EXC 6.25 AC TR SW
COR)
SEC. 32-93-31

MARINE, BETTY
6.25 AC TR SW COR
NW NW
SEC. 32-93-31

MARINE, BETTY
NE NW
SEC. 32-93-31

WAGNER FAMILY
FARMS LLC
NW SW
SEC. 31-93-31

WAGNER FAMILY
FARMS LLC
NE SW
SEC. 31-93-31

OLERICH, JON
& HELEN
NW SE

0 400 800
HORZ.
SCALE FEET

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
DRAWN	CLH
CHECKED	CJK
CLIENT PROJ. NO.	

REV	DESCRIPTION	DATE

DRAINAGE DISTRICT No. 56 MAIN NO. 2 IMPROVEMENTS
POCAHONTAS COUNTY, IOWA
LANDOWNER PLAT

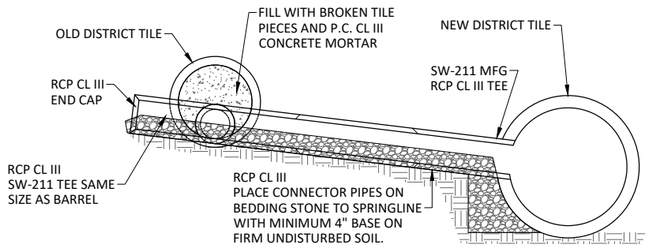
SHEET
A.02

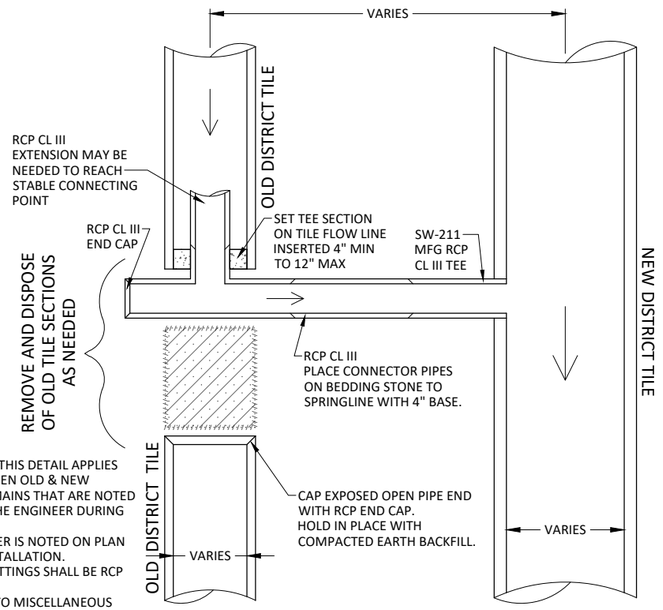
H:\POCOIA\PI\123316\CAD\C3D\123316201.dwg 9/30/2021 6:49:52 AM

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.

DATA TABLE FOR OLD TO NEW MAIN DRAIN CONNECTIONS

NEW DRAIN	STA.	NEW DRAIN DIA.	OLD DRAIN DIA.	CROSS CONNECT DIA.
MAIN NO 2	10+00	24	15	12
MAIN NO 2	16+00	24	15	12
MAIN NO 2	28+50	24	14	12
MAIN NO 2	37+00	24	14	12
MAIN NO 2	47+00	24	14	12
BRANCH 1	0+50	12	8	12
BRANCH 1	9+50	12	8	12
BRANCH 2	1+00	12	6	12
BRANCH 2	9+30	12	6	12

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

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

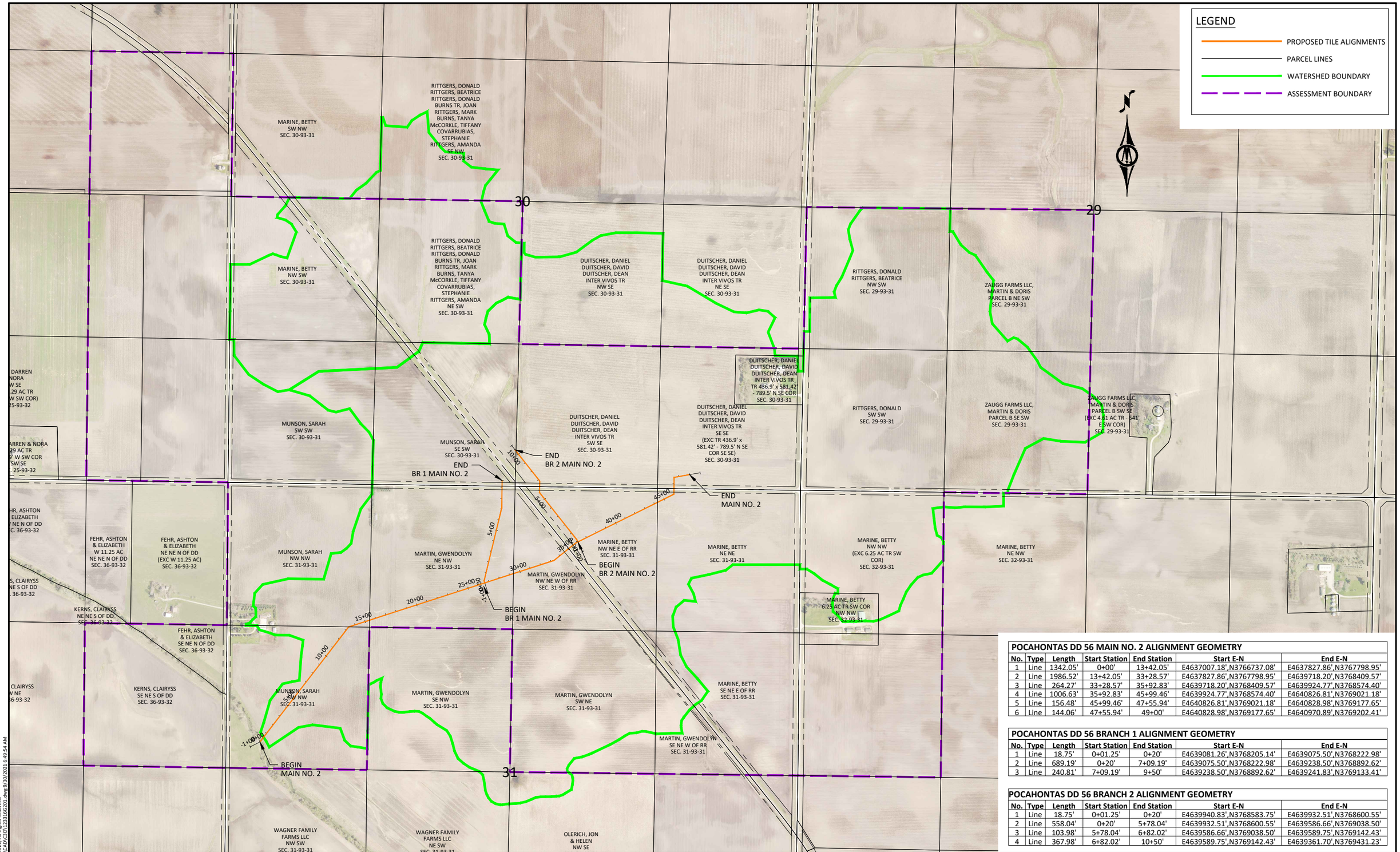
DESIGNED	REV	DESCRIPTION	DATE
CJK			
DRAWN			
CLH			
CHECKED			
CJK			
CLIENT PROJ. NO.			

DRAINAGE DISTRICT No. 56 MAIN NO. 2 IMPROVEMENTS

POCAHONTAS COUNTY, IOWA

OLD TO NEW TILE CONNECTIONS

SHEET B.01



POCAHONTAS DD 56 MAIN NO. 2 ALIGNMENT GEOMETRY

No.	Type	Length	Start Station	End Station	Start E-N	End E-N
1	Line	1342.05'	0+00'	13+42.05'	E4637007.18',N3766737.08'	E4637827.86',N3767798.95'
2	Line	1986.52'	13+42.05'	33+28.57'	E4637827.86',N3767798.95'	E4639718.20',N3768409.57'
3	Line	264.27'	33+28.57'	35+92.83'	E4639718.20',N3768409.57'	E4639924.77',N3768574.40'
4	Line	1006.63'	35+92.83'	45+99.46'	E4639924.77',N3768574.40'	E4640826.81',N3769021.18'
5	Line	156.48'	45+99.46'	47+55.94'	E4640826.81',N3769021.18'	E4640828.98',N3769177.65'
6	Line	144.06'	47+55.94'	49+00'	E4640828.98',N3769177.65'	E4640970.89',N3769202.41'

POCAHONTAS DD 56 BRANCH 1 ALIGNMENT GEOMETRY

No.	Type	Length	Start Station	End Station	Start E-N	End E-N
1	Line	18.75'	0+01.25'	0+20'	E4639081.26',N3768205.14'	E4639075.50',N3768222.98'
2	Line	689.19'	0+20'	7+09.19'	E4639075.50',N3768222.98'	E4639238.50',N3768892.62'
3	Line	240.81'	7+09.19'	9+50'	E4639238.50',N3768892.62'	E4639241.83',N3769133.41'

POCAHONTAS DD 56 BRANCH 2 ALIGNMENT GEOMETRY

No.	Type	Length	Start Station	End Station	Start E-N	End E-N
1	Line	18.75'	0+01.25'	0+20'	E4639940.83',N3768583.75'	E4639932.51',N3768600.55'
2	Line	558.04'	0+20'	5+78.04'	E4639932.51',N3768600.55'	E4639586.66',N3769038.50'
3	Line	103.98'	5+78.04'	6+82.02'	E4639586.66',N3769038.50'	E4639589.75',N3769142.43'
4	Line	367.98'	6+82.02'	10+50'	E4639589.75',N3769142.43'	E4639361.70',N3769431.23'

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
DRAWN CLH
CHECKED CJK
CLIENT PROJ. NO.

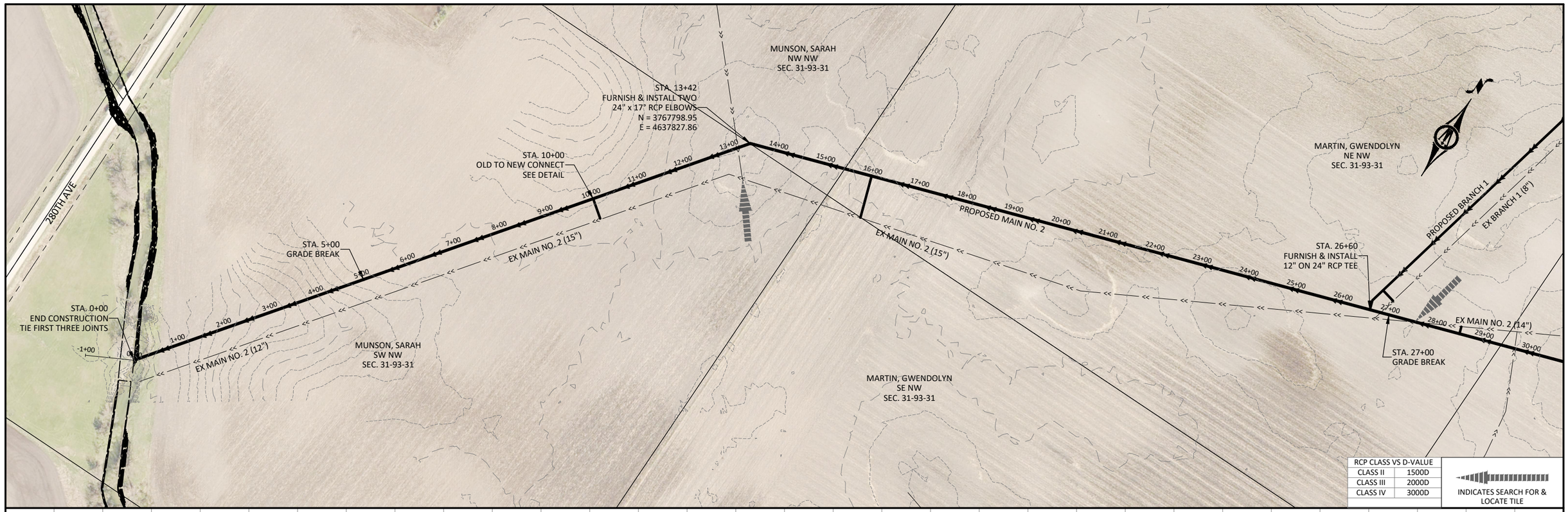
REV	DESCRIPTION	DATE

DRAINAGE DISTRICT No. 56 MAIN NO. 2 IMPROVEMENTS

POCAHONTAS COUNTY, IOWA

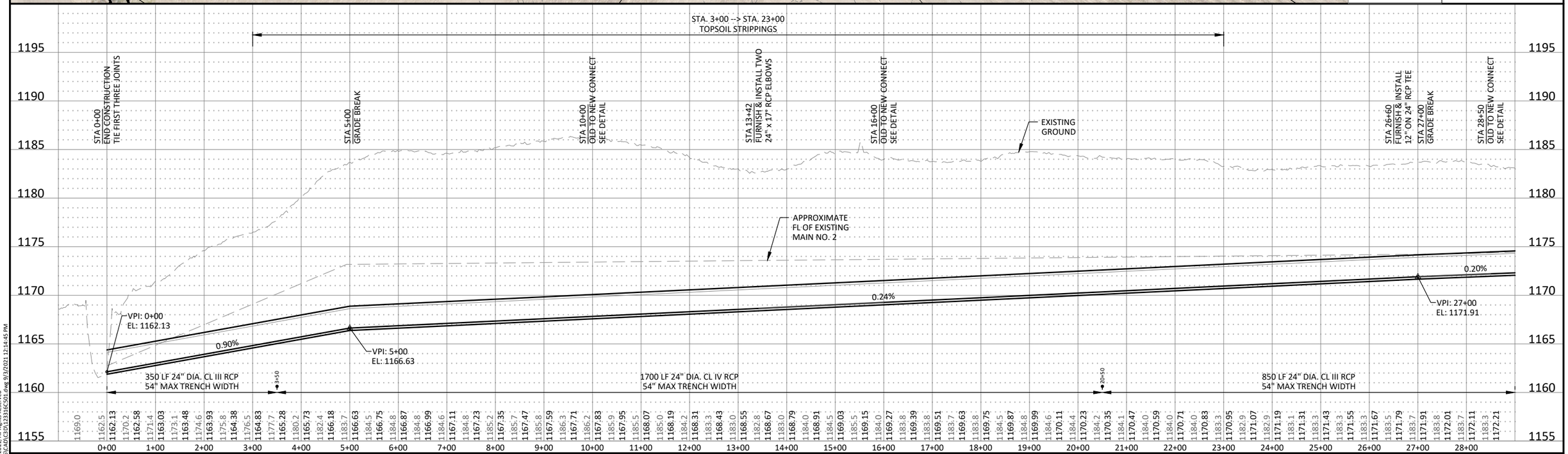
ALIGNMENT GEOMETRY

SHEET G.01



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

INDICATES SEARCH FOR & LOCATE TILE



HORZ. SCALE 0 100 200 FEET

VERT. SCALE 0 5 10 FEET

H:\POCOIA\DP\123316\CAD\C3D\123316C501.dwg 9/3/2021 12:14:45 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
DRAWN CLH
CHECKED CJK
CLIENT PROJ. NO.

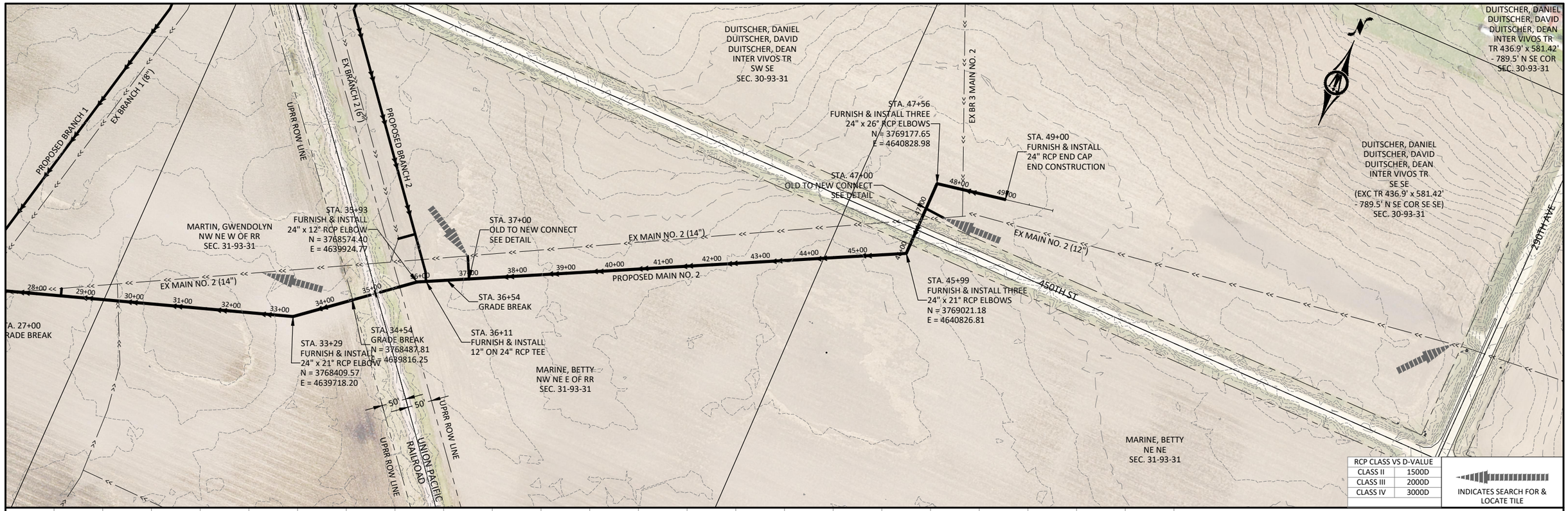
REV	DESCRIPTION	DATE

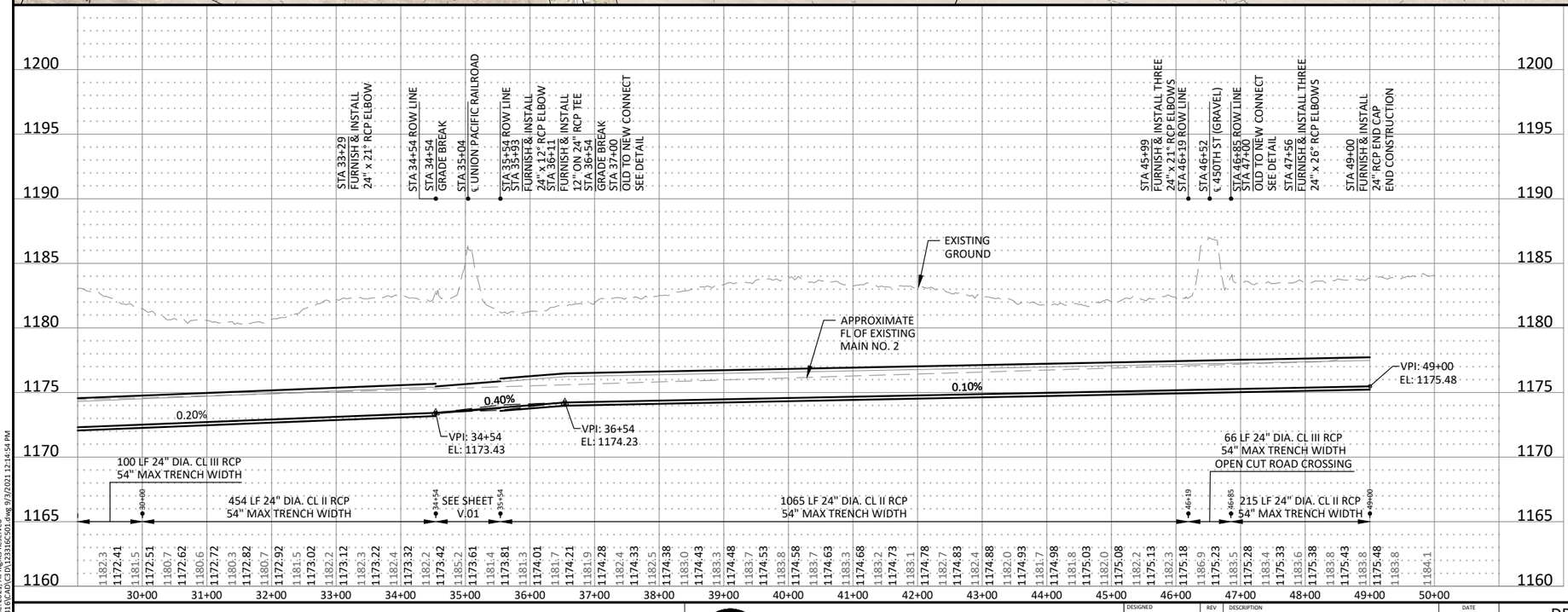
DRAINAGE DISTRICT No. 56 MAIN NO. 2 IMPROVEMENTS

POCAHONTAS COUNTY, IOWA

PLAN & PROFILE - PROPOSED MAIN NO. 2

SHEET M.01





HORZ. SCALE 0 100 200 FEET
VERT. SCALE 0 5 10 FEET

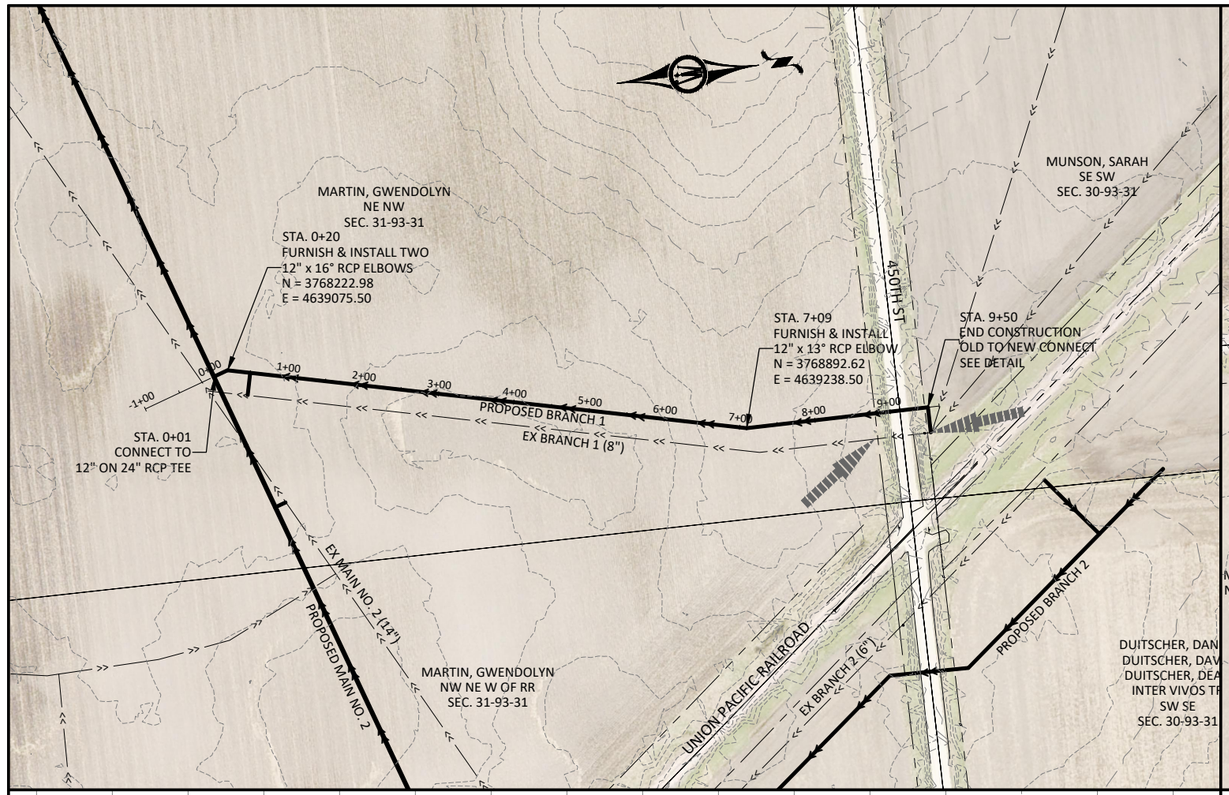
BOLTON & MENK
218 11TH STREET SW PLAZA
SPENCER, IOWA 51301
Phone: (712) 580-5075
Email: Spencer@bolton-menk.com
www.bolton-menk.com

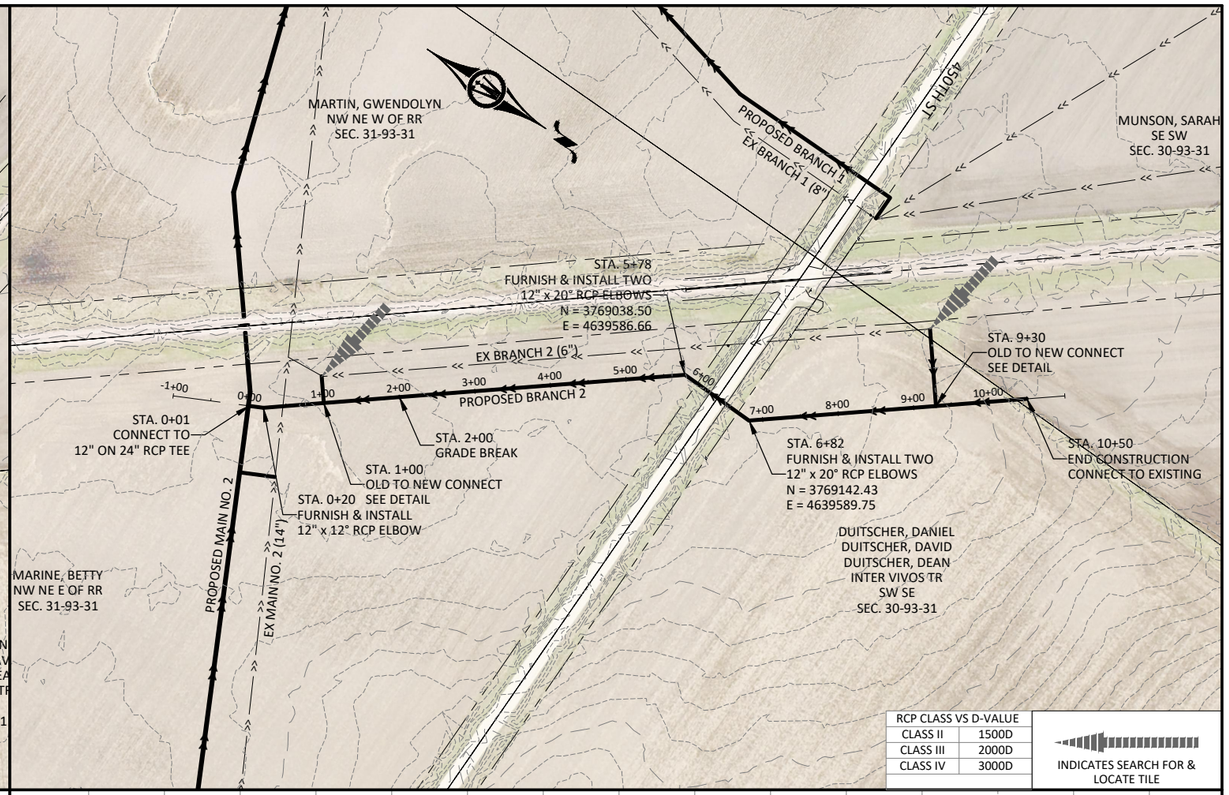
DESIGNED	CJK
DRAWN	CLH
CHECKED	CJK
CLIENT PROJ. NO.	

REV	DESCRIPTION	DATE

DRAINAGE DISTRICT No. 56 MAIN NO. 2 IMPROVEMENTS
POCAHONTAS COUNTY, IOWA
PLAN & PROFILE - PROPOSED MAIN NO. 2

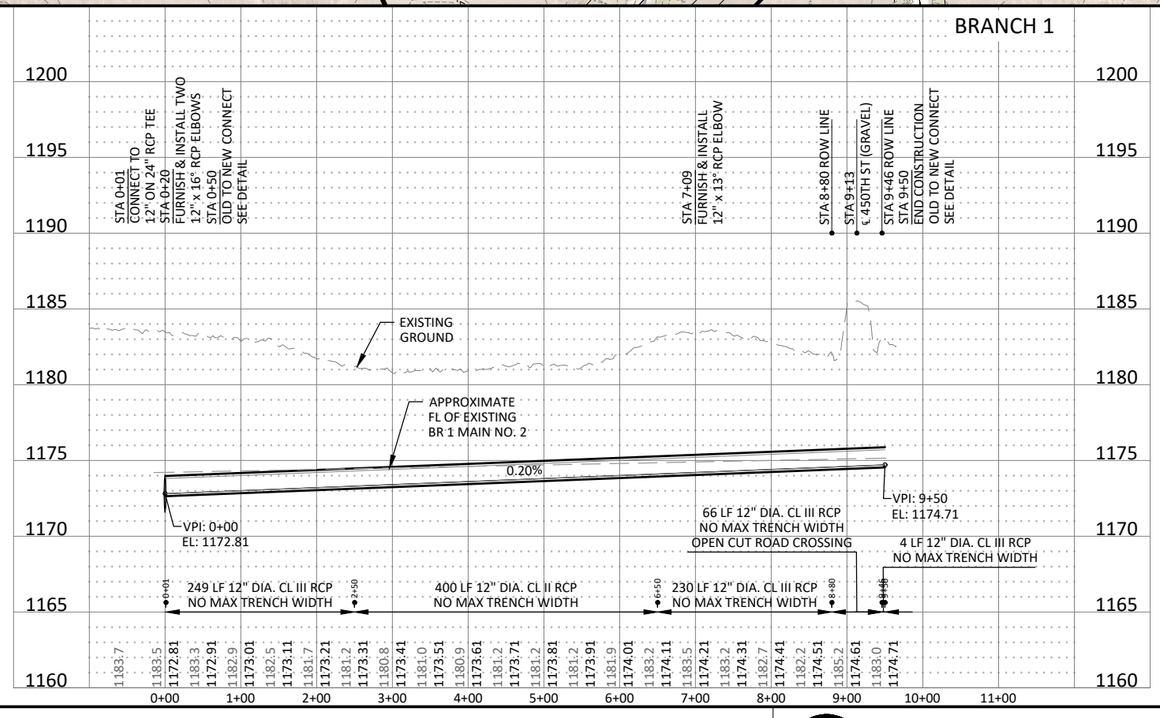
SHEET M.02

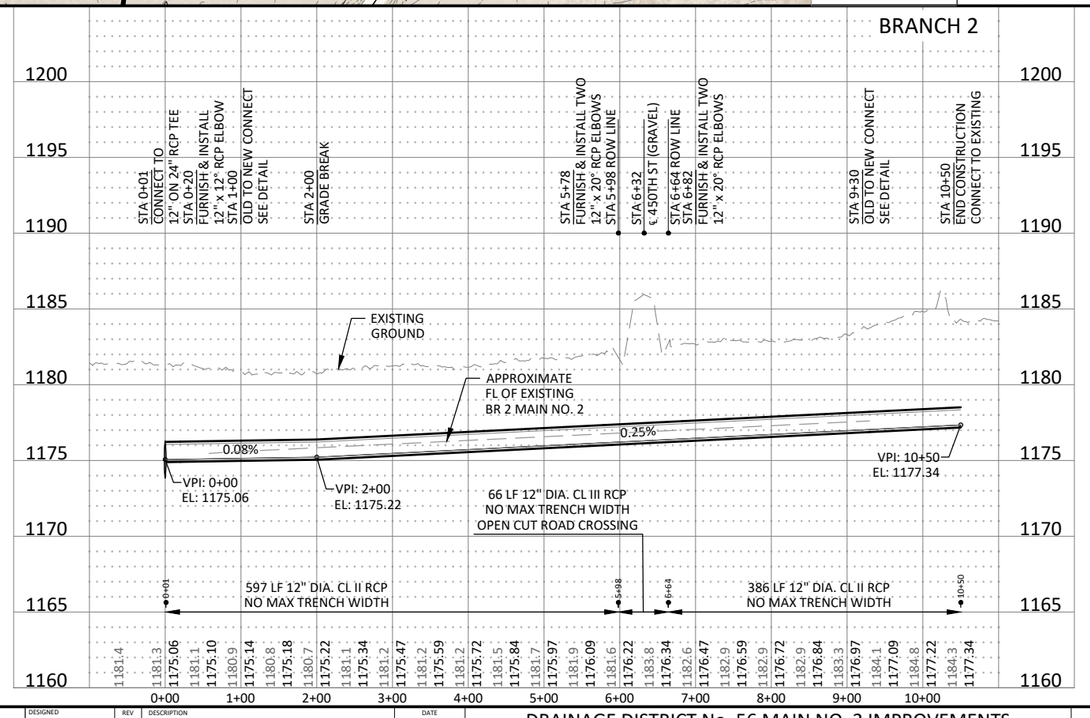




RCP CLASS VS D-VALUE	
CLASS II	1500D
CLASS III	2000D
CLASS IV	3000D

INDICATES SEARCH FOR & LOCATE TILE





HORZ. SCALE 0 100 200 FEET
VERT. SCALE 0 5 10 FEET

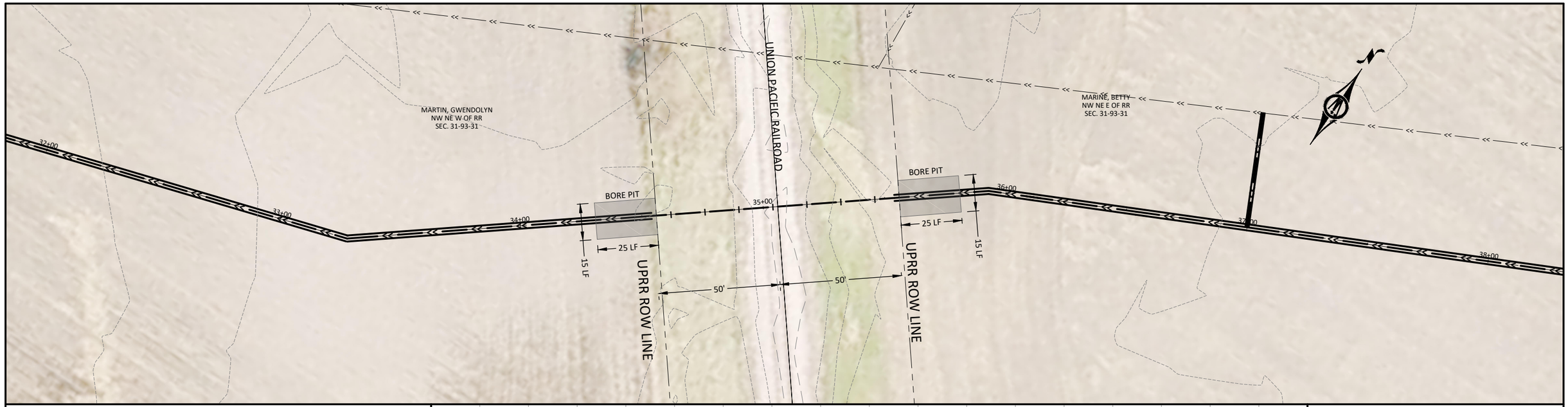
BOLTON & MENK
218 11TH STREET SW PLAZA
SPENCER, IOWA 51301
Phone: (712) 580-5075
Email: Spencer@bolton-menk.com
www.bolton-menk.com

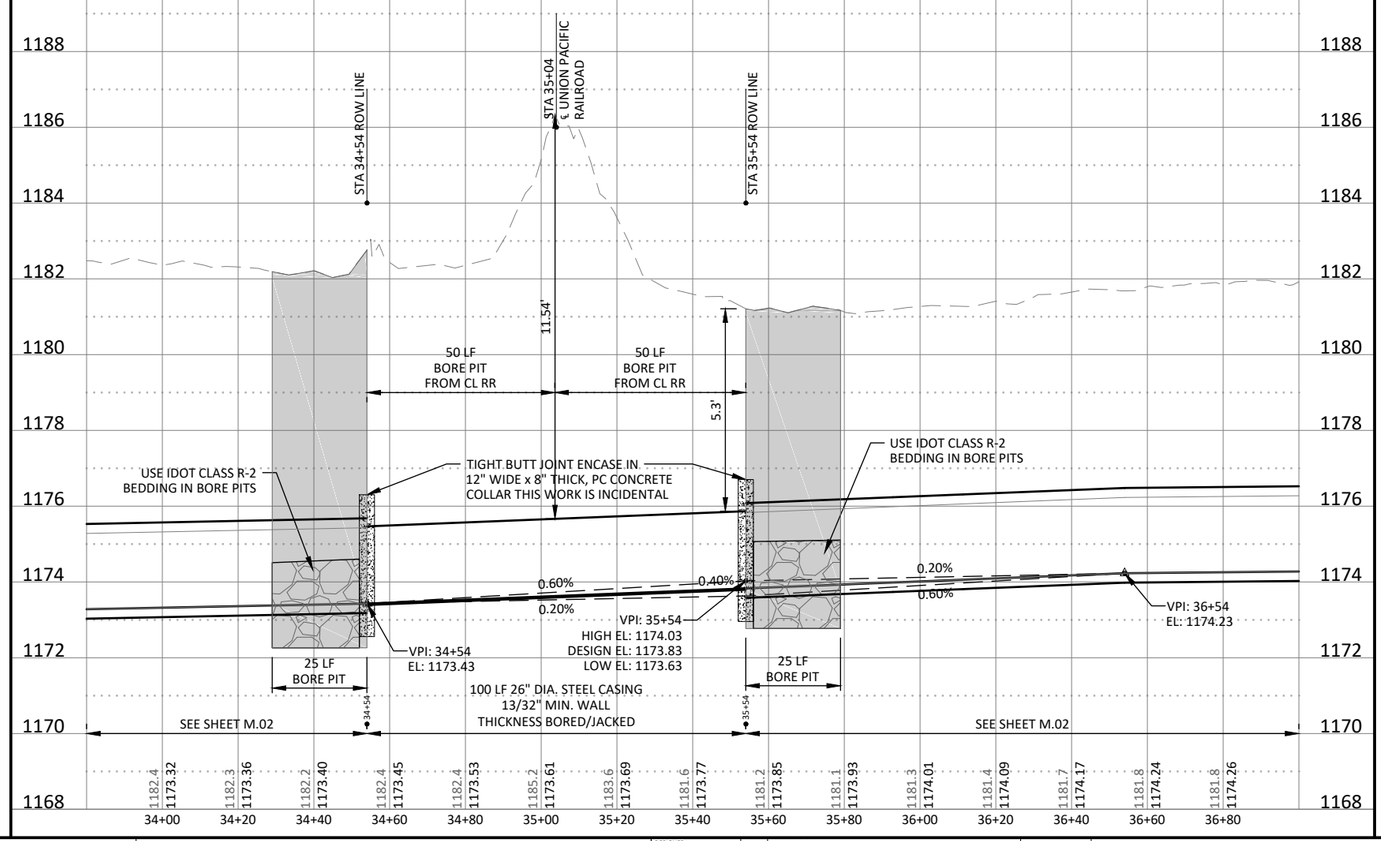
DESIGNED	CJK
DRAWN	CLH
CHECKED	CJK
CLIENT PROJ. NO.	

REV	DESCRIPTION	DATE

DRAINAGE DISTRICT No. 56 MAIN NO. 2 IMPROVEMENTS
POCAHONTAS COUNTY, IOWA
PLAN & PROFILE - PROPOSED BRANCH 1 & 2

SHEET M.03





HORZ. 0 20 40 SCALE FEET

VERT. 0 2 4 SCALE FEET

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
DRAWN	CLH
CHECKED	CJK
CLIENT PROJ. NO.	

REV	DESCRIPTION	DATE

DRAINAGE DISTRICT No. 56 MAIN NO. 2 IMPROVEMENTS

POCAHONTAS COUNTY, IOWA

BORING DETAIL - UNION PACIFIC RAILROAD

SHEET V.01