



**BOLTON
& MENK**

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Engineer's Report

Proposed Open Ditch Repairs

Upper Goose Lake Drain

Drainage District No. 72

Worth County, Iowa

Submitted by:

Bolton & Menk, Inc.

300 W. McKinley Street

Jefferson, Iowa 50129

Phone: 515-386-4101

Certification

Engineer's Report

For

Proposed Open Ditch Repairs
Upper Goose Lake Drain
Drainage District No. 72
Worth County, Iowa

0A1.122658

2022



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.

By: J. Hagan
Jacob L. Hagan, P.E.
License No. 25738

Date: 2/4/22

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I. Introduction

A. Scope of Work

In 2020, the Worth County Board of Supervisors appointed Bolton & Menk, Inc. to investigate whether the Upper Goose Lake Group Drain facility and lands should be annexed into Drainage District No. 72. A survey was conducted in December 2020. In September 2021 it was recommended to the Board to annex the facility and the lands that drain into it, and that the facility would benefit from repairs. On September 20th, 2021, the Worth County Board of Supervisors appointed Bolton & Menk to complete the necessary study, plan and report. This report addresses that appointment and is limited in scope to the Upper Goose Ditch and its outlet, Lateral No. 1-B.

B. Location

The watershed of Drainage District No. 72 encompasses approximately 2,737 acres within Sections 20-22, 26-29, and 33 in Fertile Township, Worth County. The watershed of Drainage District No. 72 fully encompasses Drainage District No. 32. The district facilities include approximately 6.5 miles of open ditches and tiles: Main Open Ditch; Lateral 1; Lateral 1-A; Lateral 1-A1; Lateral 1-A2; Lateral 1-B; Lateral 1-B1; Lateral 1-C; Lateral 1-C1; plus 1.3 miles of open ditch from the Upper Goose Lake Group Drain, which drains into Lateral No. 1-B.

The Drainage District No. 72 Main Open Ditch outlets into the Beaver Creek in the NE quarter of Section 33 in Fertile Township (T-98-N, R-22-W), about one half mile west of Fertile. Beaver Creek joins with the Winnebago River shortly downstream of the outlet of the Drainage District No. 72 Main Open Ditch.

C. History

Drainage District No. 72 was formed from a merger of Drainage District Nos. 70 and 71.

1926-9	Drainage District No. 70 Formed
1928-1	Drainage District No. 71 Formed
1939	Drainage District Nos. 70 and 71 Repaired
1940-12-20	Drainage District Nos. 70 and 71 Merged to Form Drainage District No. 72
1945-5-1	Lateral Nos. 1 and 1-A Cleaned Out
2011-9-12	Repairs to Main Open Ditch
2021-11-8	Upper Goose Lake Group Drain becomes a Facility of Drainage District No. 72

II. Investigation

A full survey of the 1.3 miles of the former Upper Goose Lake Group Drain was conducted in December 2020. Using the survey and profiles, several cross sections were made and all points of water entry, both surface and subsurface, were analyzed. All trees, interfering fences, rock piles, and large debris located near or in the open ditch were measured.

A. Upper Goose Lake Group Drain – Stations 0+00 to 70+06

The ditch appeared visually in fair to poor condition; several trees were growing along the banks, some pipes were broken, and a large sediment bar was found in the lower reach of the ditch where it outlets into the DD 72 Lateral 1-B open ditch. Using our survey information, it appears the cross section of this ditch is a 4’ bottom and 2:1 side slopes. No profiles were found, therefore without grade information, we are relying on our survey information to determine a grade of best fit. Survey elevations were recorded for the hard pan underneath the silt in the ditch. These shots were inconsistent but generally showed about 1’-3’ of silt in the ditch. We used a grade of 0.20% for the lower 1,800 LF, then the ditch flattens to 0.05% for the remaining 5,200 LF to match these hard pan shots. A plan and profile have been enclosed.

B. Lateral No. 1-B (Lateral No. 2) – Stations 0+00 to 25+31

Lateral 1-B serves as the outlet for the Upper Goose Lake Ditch and as such will need to be cleaned out to some degree to allow for an outlet of the Upper Ditch. The ditch appears in similarly fair to poor condition as the ditch upstream of it. There is a 1,300 LF long stretch with large trees growing on the south bank and several bank slides and sediment bars deposited. This lateral was not surveyed and lidar was used for the plan and profile. We recommend a full survey be made this spring before any work is bid to determine an accurate quantity of excavation.

C. Ditch Crossings

There are two private crossings across the surveyed area, and one more at the base of Lateral No. 1-B. Both crossings of the Upper Goose Lake Drain are culverts placed above the design grade of the ditch and are significantly undersized, so are recommended for replacement. Survey of Lateral 1-B would be required before making a recommendation on that crossing. Below is a table of the surveyed crossings.

Interfering Crossings					
Facility	Station	Existing Structure Flowline Elevation	Ditch Design Flowline Elevation	Existing Pipe	Recommended Pipe
UGL	18+65	1192.34	1191.61	48” CMP Culvert	60” CMP
UGL	49+34	1194.44	1193.05	36” CMP Culvert	84” CMP
Lat 1-B	0+25	Unknown	1181.63	Unknown Size CMP Culvert	84” CMP

D. Utilities

Overhead power lines and other utility lines will parallel or cross the ditch at various locations; extra care will need to be taken when working under or near these utility lines. The contractor will be responsible to determine and notify utility companies and to cooperate in locating, marking and protecting their facilities

E. District Right-of-Way

The former Upper Goose Lake Group Drain facility has 100’ of right-of-way, 50’ each side of centerline. Right-of-way for the rest of Drainage District No. 72 would need to be determined if work were to take place in those facilities.

III. Farm Program Compliance

A. CRP Damage Waivers

The destruction of CRP vegetation by construction activities places the landowner in technical violation of farm program conservation rules. The penalties can include loss of the CRP contract, forfeiture of back CRP payments and financial penalties. To avoid these penalties, landowners are advised to request a waiver from the USDA Farm Service Agency County Committee. The county committee will grant waivers for ditch or tile work if CRP vegetation restoration, in compliance with NRCS requirements, is timely done after the work is complete. If the project is authorized, all CRP owners in the path of construction must independently seek the FSA County Committee waivers. This process should be initiated immediately if the project is authorized.

B. Nesting Season Restrictions

The CRP rules also restrict disturbances during the primary nesting season, which covers the period of May 15th to August 1st. Recent relaxations of this rule, although specific to drainage district maintenance of open ditches having CRP buffers, likely would now favor allowing tile installation work without penalty on CRP during the primary nesting season. It makes no sense for a drainage district to wait for up to 3 months during ideal work weather. This is another situation where only the landowner can seek and secure the needed waiver.

IV. Water Quality

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

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

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

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

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

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

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

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

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

V. Proposed Work

A. Proposed Repair

The investigation has confirmed the need for drainage relief within the former Upper Goose Lake Group Drain. To restore the original drainage efficiency, it is necessary to remove accumulated sediment. The entire former Group Drain facility would be excavated to a depth of approximately 1-3'. The trees will be removed, and the banks will be reshaped to remove any sloughing and meanders where necessary. This work will necessitate the removal of much of the bank vegetation, however, this will be limited to only as necessary for the work. The Lateral 1-B open ditch will need to be excavated to provide an outlet for the Upper Goose Lake Group Drain. It would be economical to remove the trees, remove the meanders and reshape the banks of Lateral 1-B at this time. We have included an estimated cost of this work in our engineer's opinion of probable cost.

The three private crossings are the landowner's property, however, the district has the right to ensure that they are not acting as an obstruction to the district. As the two on the Upper Goose Lake Drain are undersized and above the design flowline, we are recommending they be replaced as part of this project and have included this cost in our opinion of probable costs.

To protect the functional life of the restored open ditch, it is recommended that the entire set of drain tile extension pipes and surface drainpipes be individually evaluated and be placed or replaced as found necessary during the ditch restoration work. It is estimated that this pipe work would include seven surface water pipes and 20 tile outlet extensions. It is likely additional pipes will be found during construction which should be replaced.

If any fences are cut or removed during construction, the district is not obligated to pay damages associated with fences within the existing right-of-way. Damages can be claimed for fence damages occurring outside the ditch right-of-way within the work limits. Fence owners are encouraged to remove their own fences where it is necessary to do so, especially where they wish to salvage part of the materials.

It is recommended that the newly exposed open ditch banks be fertilized and seeded. NRCS research indicates that broadcasting the seed and fertilizer at the end of each day's work is the best way to secure good growth and because additional seedbed work isn't needed, the cost is more reasonable than for other methods. Economically successful seeding remains a difficult goal for drainage ditches, it being so dependent upon favorable weather. Typically, the best that is achieved is a sparse growth that supplements and aids the progress of natural re-vegetation.

There are some locations along the open ditch where we may recommend erosion stone be placed to prevent bank scour during and after construction. The actual location and length of riprap placed will be determined in the field at the time of the repair.

The spoil material is recommended to be uniformly leveled and shaped to a typical cross section with a fairly flat top (2% slope) about 16 feet wide, adjacent to the ditch with a 10 to 1 back slope pushed out onto the adjacent land. The leveled spoil will then be deep tilled by the contractor and exposed rocks and debris are to be gathered and disposed of.

1. Buffer Strips & CRP

We note that there are several buffer strips in place along the open ditch where repairs are proposed. There are some manageable drawbacks that must be addressed by the owners of impacted buffer strips and CRP tracts.

The destruction of buffer strip or CRP vegetation by construction activities places the landowner in violation of Farm Program conservation rules. The penalties can include loss of the CRP contract, forfeiture of back CRP payments and penalties. To avoid these, landowners must request a waiver from the USDA Farm Service Agency County Committee. The county committee will grant waivers for ditch maintenance if seeding restoration, in compliance with NRCS requirements, is done. If the project is authorized, all farm program buffer strip and CRP owners in the path of construction must independently seek the FSA County Committee waivers. This process may take two or three months and should be initiated immediately if the project is authorized.

2. Right-of-Way Needs

The right-of-way of the annexed facility is 100', presumed to be 50' of centerline. Right-of-way on the rest of the drainage district would need to be researched further.

Drainage district open ditch right-of-way are exempt from real estate taxes and drainage assessments. Under Iowa law, landowners have the right to the beneficial use of the spoil bank in the right-of-way subject only to the district's use of the right-of-way to protect and maintain the open ditch.

Because landowners may use the right-of-way in this manner, drainage districts may acquire the easement at much below land market values. If right-of-way is to be acquired, an appraisal commission, made up of two landowners from the county and the engineer, are appointed to recommend fair payment. The right-of-way appraisers' report is considered at a public hearing prior to adoption.

3. Work Area

The permanent right-of-way is not intended to be wide enough to accommodate construction activities associated with major repairs or improvements. The district will need a larger area within which to perform the excavation and to dispose of the spoil. The work limits on the open ditch will typically be out to 100 feet from the open ditch centerline on the side or sides in which work will be done. Landowners will also be entitled to compensation for damages in the work area outside the right-of-way both now and in the future. Within the permanent right-of-way, future construction-related damages will not be compensated. It is recommended that whenever possible, a landowner should not crop the work area and instead should request fair rent for the land. Compensation for use of and damages within the temporary work area is normally determined at the project completion hearing.

B. Engineer's Opinion of Probable Cost

The estimated total cost of the proposed repairs is \$191,000, with \$161,000 assessable to the drainage district. A detailed opinion of probable cost for the recommended work is included in Appendix B of this report. A special assessment would be recommended to assess only those who directly benefit from the project.

VI. Assessment Schedule Review

A. Existing Assessment Schedule Review

There are approximately 2,737 acres within the Drainage District No. 72 watershed.

Bolton & Menk has been appointed to report on annexing any lands benefitted by the facilities and reclassifying the lands of the district, which hasn't been done since the district was formed in 1940. Annexation is expected to cost approximately \$5,000. 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 this benefit is small, the assessment will also be relatively small.

B. Recommended Schedules

The Worth County Board of Supervisors have appointed Bolton & Menk to prepare schedules for DD 72 including The Upper Goose Lake Drain and DD 32. Only the lands of the Upper Goose Lake and Lateral 1-B will be assessed for any repair work at this time.

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. We also recommended that the lateral open ditches and tiles be divided into separate maintenance schedules and reclassified at this time, to make the cost of future repairs more equitable. Reclassification for the district is expected to cost \$20,000.

C. General Classification Methodology

The process of reclassification uses several factors to equitably spread project costs based upon benefits received. The three common factors are: Use; Proximity; and Wetness.

The Use Factor considers how much of the facility is required to bring an outlet to a particular location. The more a facility is used by any given property, the higher the Use Factor on that property. A parcel using one mile of a facility should pay less than a parcel using 5 miles of the facility.

The Proximity Factor considers the portion of the outlet provided. Lands nearer to the ditch receive a higher assessment 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 ditch should pay more than a 40-acre tract a mile away which must build a private system to reach the open ditch.

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

Other considerations may be necessary to achieve equitable assessments.

VII. Discussions & Recommendations

The former Upper Goose Lake Group Drain facility has not been significantly cleaned out since its foundation in the 1980's. Typically, in Worth County, repairs to an open ditch occur every 30-40 years. This report confirms the need to repair the drainage efficiency and capacity of the former group drain facility. The work described herein can accomplish that repair.

Repair Recommended. The repairs proposed will restore the original design capacity of the newly annexed open ditch. The estimated assessable cost of the recommended repair is \$191,000. We find that the proposed repairs will be practicable, feasible, and beneficial to the public.

Installment Payments. Iowa drainage district law provides that large repair assessments may be paid in not less than ten nor more than twenty annual installments at the discretion of the Board of Supervisors. Typically, the board would spread assessments of the magnitude contemplated in this report over ten years. If we assume that the board will allow ten annual installments at 6% interest, repair costs for lands now in the district would be about \$19 per acre per year. If a one-time use schedule is used to assess only these lands benefited, the cost would increase to \$144/acre. Be reminded that assessments are based upon benefits received and that some parcels will likely bear two to three times the average assessments.

It is recommended that the Board of Supervisors of Worth County, acting as trustees for Drainage District No. 72, take appropriate action, with legal guidance, to accomplish the following:

- Tentatively approve this Engineer's Report.
- Conduct a public hearing on the proposed repairs.
- Adopt the proposed repair 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 annexation and reclassification procedures.

Respectfully submitted,

Bolton & Menk, Inc.



Jacob L. Hagan, P.E

Appendix A: Petition

October 4, 2021

Fortieth Day

The Worth County Board of Supervisors met pursuant to adjournment with A.J. Stone, Mark Smeby and Enos Loberg present.

Stone led the meeting in the Pledge of Allegiance.

Unless otherwise indicated, all of the following motions offered at this meeting were carried with the following vote: Ayes: Stone, Smeby and Loberg. Nays: none. Abstentions: none. Absent: None.

Motion by Smeby, second by Loberg, carried to approve the October 4, 2021 board agenda.

Motion by Smeby, second by Loberg, carried to approve the September 27, 2021 board minutes.

Motion by Loberg, second by Smeby, carried to approve the County Line Agreement between Worth County, Iowa and Cerro Gordo County, Iowa.

Motion by Smeby, second by Loberg, carried to accept the petition from Mark A. Lovik for DD #72 to request that the open ditch in DD #72 in Section 20, 21 & 28 in Fertile Township be cleaned out. Bolton & Menk Inc. has already been engaged to investigate that district.

Motion by Smeby, second by Loberg, carried to approve claims in the amount of \$42,973.57 as per the following schedule:

Aramark	Service-Gsr	269.44
Axon Enterprise, Inc.	Supplies-Shf	3,263.54
Bmc Aggregates Llc	Rock-Eng	2,575.16
Carquest Auto Parts Inc	Supplies-Shf	18.98
Chelsey Doty	Mileage-Aud	176.40
Com-Tec Land Mobile Radio	Service-Shf	598.32
Dick's Place Body & Tow	Service-Shf	275.00
Falkstone Llc	Rock-Eng	752.95
Francis Lauer Youth Svcs Inc	Service-Juj	2,192.55
Hartland Lubricants & Chemicals	Supplies-Eng	1,199.27
Ia County Engineers Assn	Edu-Eng	1,065.00
Ia Dept Of Natural Resources	Fee-Wat	95.00
Ia Dept Of Revenue	Edu-Asr	30.00
Ia Law Enforcement Academy	Edu-Shf	750.00
Knudtson Automotive Service	Service-Shf	90.18
Lawson Products Inc	Supplies-Eng	1,924.48
Mail Services Llc	Postage-Trs	4,277.17
Matt Parrott/Storey Kenworthy	Supplies-Aud	268.25
Mediacom	Service-Gsr	239.95
Nassco Inc.	Supplies-Gsr	83.81
Northwood Electric Inc	Service-Eng	70.00
Sara Christianson	Reimb-Rec	312.48
Shred Right	Service-Gsr	37.22
Teresa Olson	Reimb-Rec	1,172.75

September 20, 2021

Thirty-eighth Day

The Worth County Board of Supervisors met pursuant to adjournment with A.J. Stone, Mark Smeby and Enos Loberg present.

Stone led the meeting in the Pledge of Allegiance.

Unless otherwise indicated, all of the following motions offered at this meeting were carried with the following vote: Ayes: Stone, Smeby and Loberg. Nays: none. Abstentions: none. Absent: None.

Motion by Loberg, second by Smeby, carried to approve the September 20, 2021 board agenda.

Motion by Loberg, second by Smeby, carried to approve the September 13, 2021 board minutes.

Motion by Smeby, second by Loberg, carried to approve pay request #4 (Final Request) to Cole Excavating, LLC for DD 13/Lat 3.

Motion by Loberg, second by Smeby, carried to approve drainage claims in the amount of \$57,628.81 as per the following schedule:

Bolton & Menk Inc.	DD #2	Prof Services	\$12,030.00
Cole Excavating, LLC	DD #13/Lat 3	Cleanout Project	\$44,766.81
Bolton & Menk Inc.	DD #72	Prof Services	<u>\$ 832.00</u>
		Grand Total	\$57,628.81

Motion by Smeby, second by Loberg, carried to approve the County assumption of a private drain, the Upper Goose Lake Group Drain per the recommendation of Jacob Hagan, P.E., Bolton & Menk, Inc. in a letter dated 09/02/2021. The County agrees to assume maintenance and responsibilities and an easement of 100' wide on the ditch laid out as right of way in the original agreement. The County will not assume responsibility for private crossings/culverts.

Motion by Smeby, second by Loberg, carried to approve the reclassification of DD #72 (which includes the newly assumed Upper Goose Lake Group Drain) & #32 (which is within DD #72) and to engage an engineer to prepare a report as to the repairs/improvements needed for the Upper Goose Lake Drain. Bolton & Menk, Inc. is the firm engaged to complete both the reclassification and the repair/improvement report.

Motion by Smeby, second by Loberg, carried to approve the engagement of Bolton & Menk, Inc. for the reclassification of DD #48 and a study of the main in that district.

Motion by Smeby, second by Loberg, carried to approve claims in the amount of \$37,759.86 as per the following schedule:

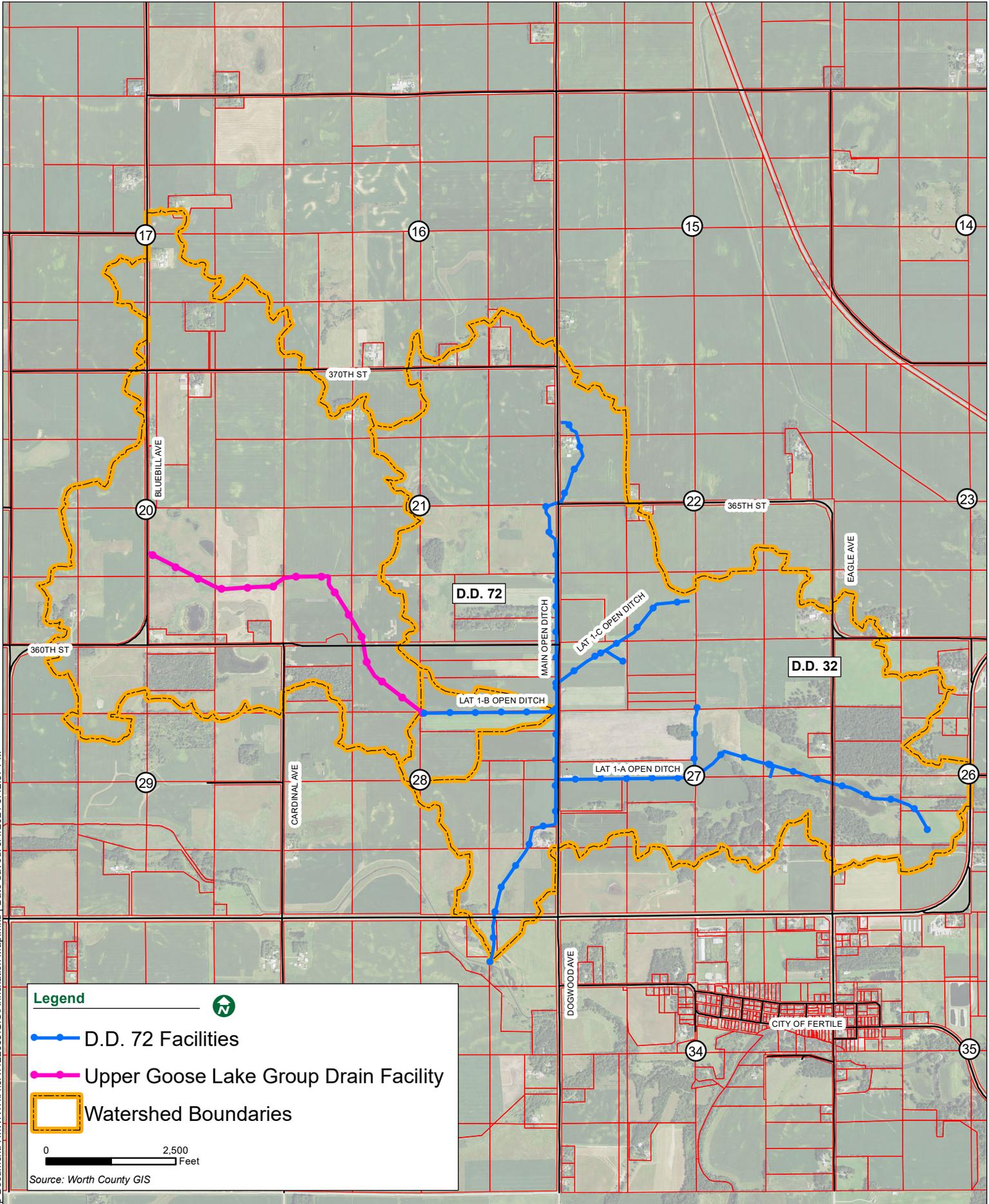
Agvantage Fs Inc	Fuel-Eng	2,418.99
Alliant Energy	Service-Shf	36.71
Aramark	Service-Eng	84.54
Berge Oil Company	Fuel-Eng	6,538.67

Appendix B: Existing Watershed Review

Upper Goose Lake Group Drain - D.D. 72

Worth County, Iowa

February 2022



Legend



- D.D. 72 Facilities
- Upper Goose Lake Group Drain Facility
- Watershed Boundaries

0 2,500 Feet

Source: Worth County GIS

Appendix C: Engineer's Opinion of Probable Cost

**Engineer's Opinion of Probable Cost
Proposed Open Ditch Repairs
Drainage District No. 72
Worth County, Iowa
2022**

Construction Division 1--Work Assessable to District

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
100	Excavation	STA	95	\$175	\$16,625
101	Clearing and Grubbing	LS			\$10,000
102	Spoil Leveling (Both Sides)	STA	95	\$200	\$19,000
103	Seed & Fertilize Banks	STA	95	\$110	\$10,450
104	Tile Extension- 12" CMP Pipe	LF	280	\$30	\$8,400
105	Tile Extension- 15" CMP Pipe	LF	60	\$32	\$1,920
106	Tile Extension- 18" CMP Pipe	LF	20	\$35	\$700
107	Tile Extension- 24" CMP Pipe	LF	20	\$40	\$800
108	Tile Extension- 30" CMP Pipe	LF	20	\$50	\$1,000
109	Surface Drain- 18" CMP Pipe	LF	160	\$40	\$6,400
110	Surface Drain- 24" CMP Pipe	LF	80	\$45	\$3,600
111	Surface Drain- 30" CMP Pipe	LF	40	\$60	\$2,400
112	Erosion Management Plan	LS			\$500
113	Riprap, Class D	TN	100	\$60	\$6,000
114	Mobilization	LS			\$4,600

Estimated Assessable Construction Subtotal \$92,000

Construction Division 2--Work Assessable to Private Lands

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
200	Culvert- 60" CMP Pipe	LF	40	\$250	\$10,000
201	Culvert - 84" CMP Pipe	LF	40	\$500	\$20,000

Estimated Non-Assessable Construction Subtotal \$30,000

Total Estimated Construction Cost \$122,000

**Engineer's Opinion of Probable Cost
Proposed Open Ditch Repairs
Drainage District No. 72
Worth County, Iowa
2022**

Construction Related Damages	
Damages	\$10,000
Basic Engineering Services	
Survey, Study & Report. Meetings & Hearing	\$15,000
Construction Plans, Specifications, & Bid Letting	\$10,000
Construction Engineering Services	\$20,000
Legal Services, Publications, Mailings, Etc..	\$5,000
Finance, Interest & Contingency	<u>\$9,000</u>
Total Estimated Assessable Project Cost	\$161,000
Estimated Average Cost Per Benefited Acre (1,119 ac)	\$144
Estimated Average Cost Per Acre Per Year (10 years)	\$19
Estimated Average Cost Per Acre Per Year (20 years)	\$12

Preliminary Plans

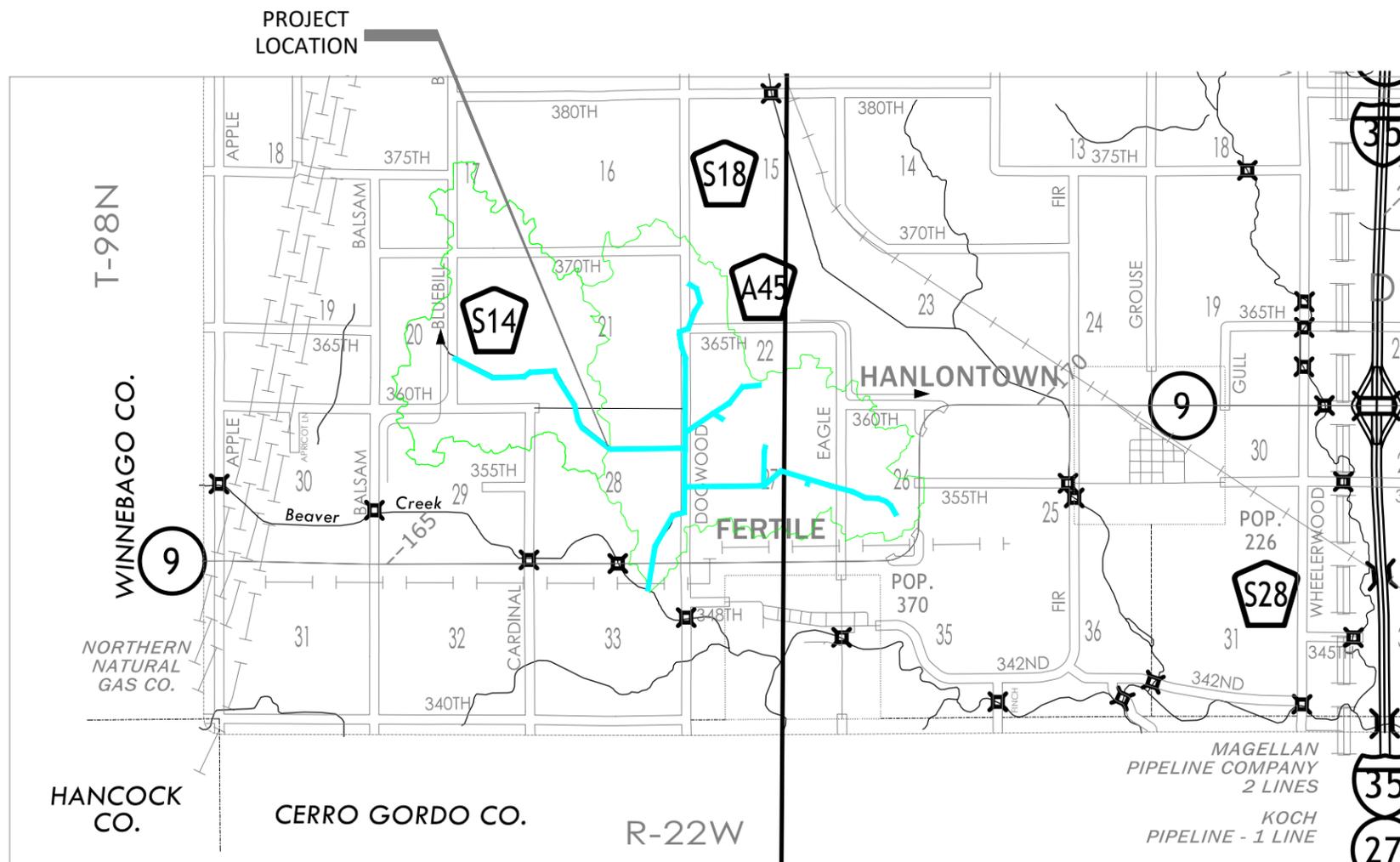
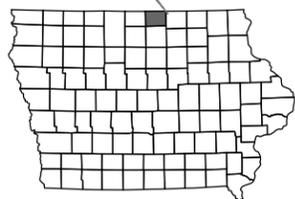
PRELIMINARY PLANS FOR UPPER GOOSE LAKE DRAIN- DRAINAGE DISTRICT No. 72 OPEN DITCH REPAIRS WORTH COUNTY, IOWA 2022



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."



WORTH COUNTY



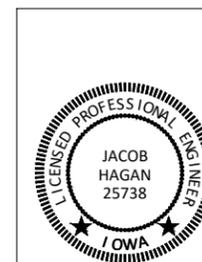
SHEET LIST TABLE	
SHEET NUMBER	SHEET TITLE
A.01	TITLE SHEET
A.02	LANDOWNER PLAT
D.01	PLAN & PROFILE - LATERAL 1-B OPEN DITCH
D.02 - D.04	PLAN & PROFILE - UPPER GOOSE LAKE GROUP DRAIN
X.01	CROSS SECTIONS- OPEN DITCH

GOVERNING SPECIFICATIONS

THE 2022 EDITION OF THE "IOWA STATEWIDE URBAN STANDARD SPECIFICATIONS FOR PUBLIC IMPROVEMENTS" SHALL GOVERN.

IOWA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGE CONSTRUCTION", SERIES 2022 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.

JACOB HAGAN, P.E.

REG. NO. 25738 DATE: _____

MY LICENSE RENEWAL DATE IS 12/31/2022

PAGES OR SHEETS COVERED BY THIS SEAL:

ALL PLAN SHEETS

PROJECT DATUM: STATE PLANE
HORIZONTAL: IOWA NORTH
VERTICAL: NAD 1983

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DRAINAGE DISTRICT No. 72

WORTH COUNTY, IOWA

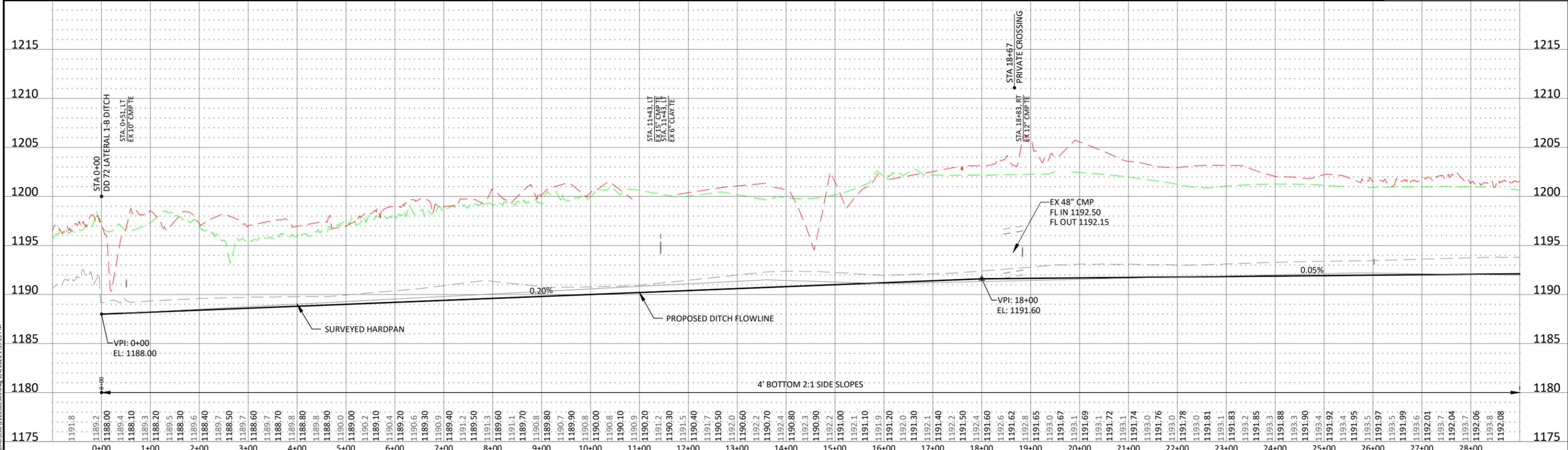
TITLE SHEET

SHEET

A.01



LEGEND	
	RIGHT DITCH BANK
	LEFT DITCH BANK



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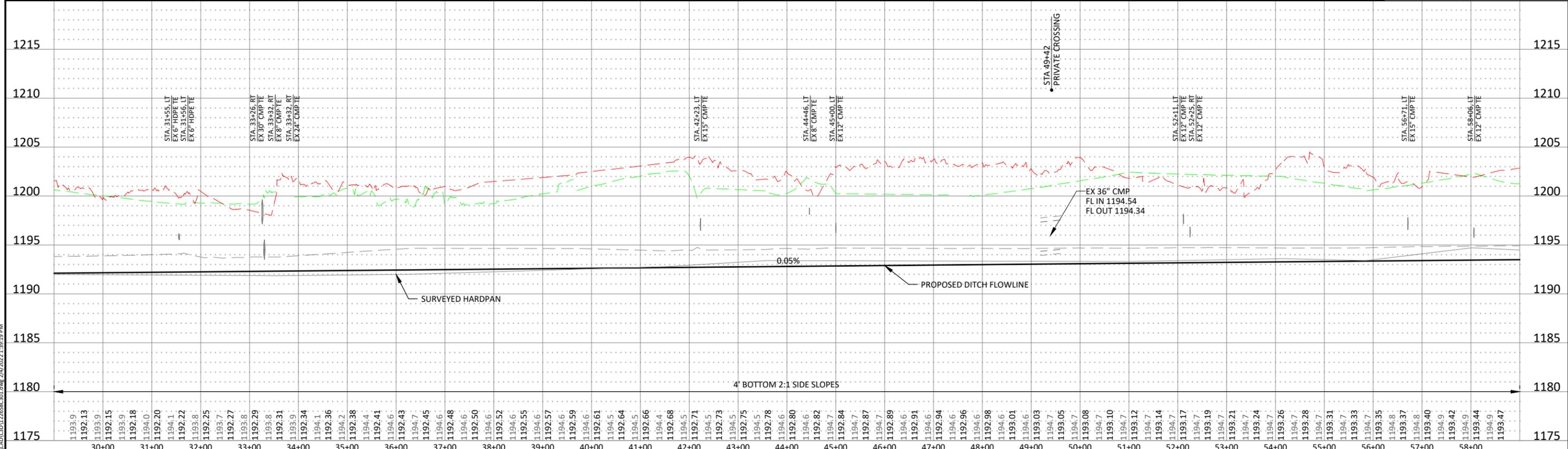
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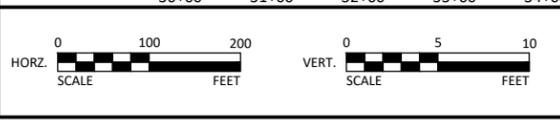
DRAINAGE DISTRICT No. 72		SHEET D.02
WORTH COUNTY, IOWA		
PLAN & PROFILE - UPPER GOOSE LAKE DRAIN		



LEGEND	
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	LEFT DITCH BANK



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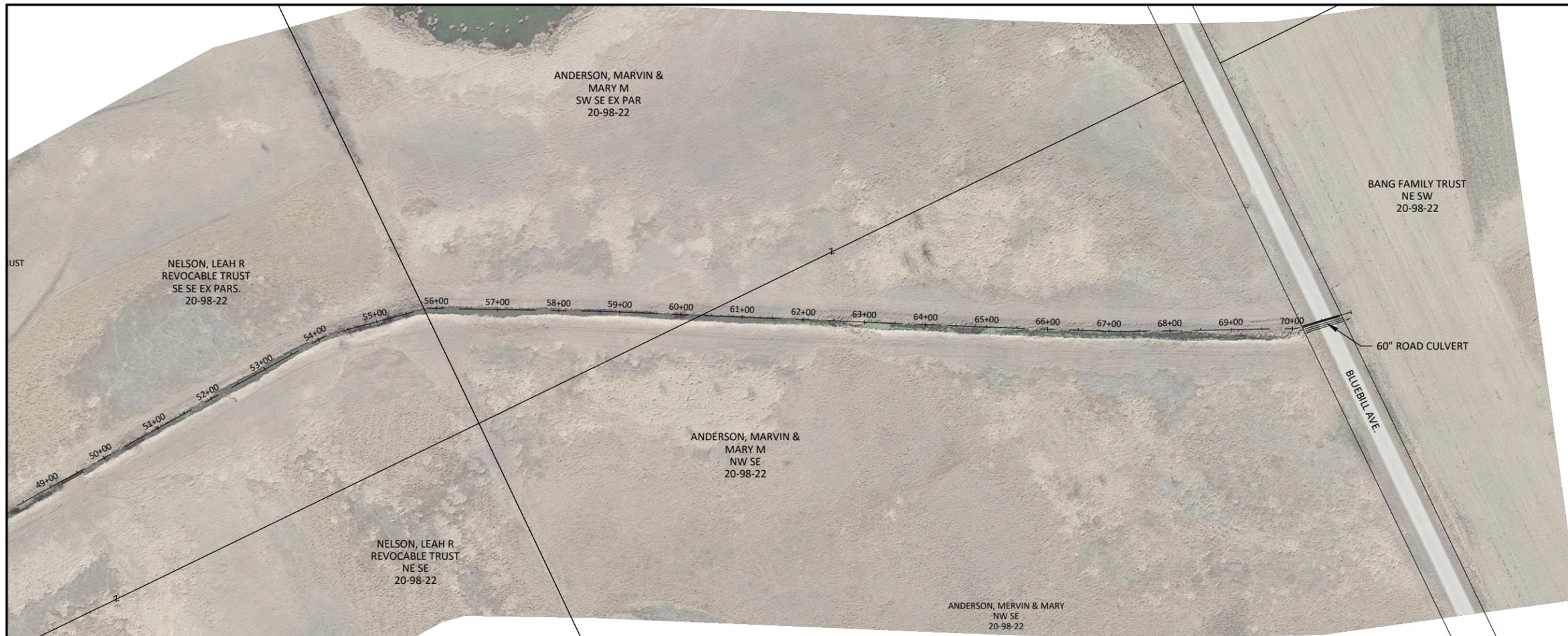
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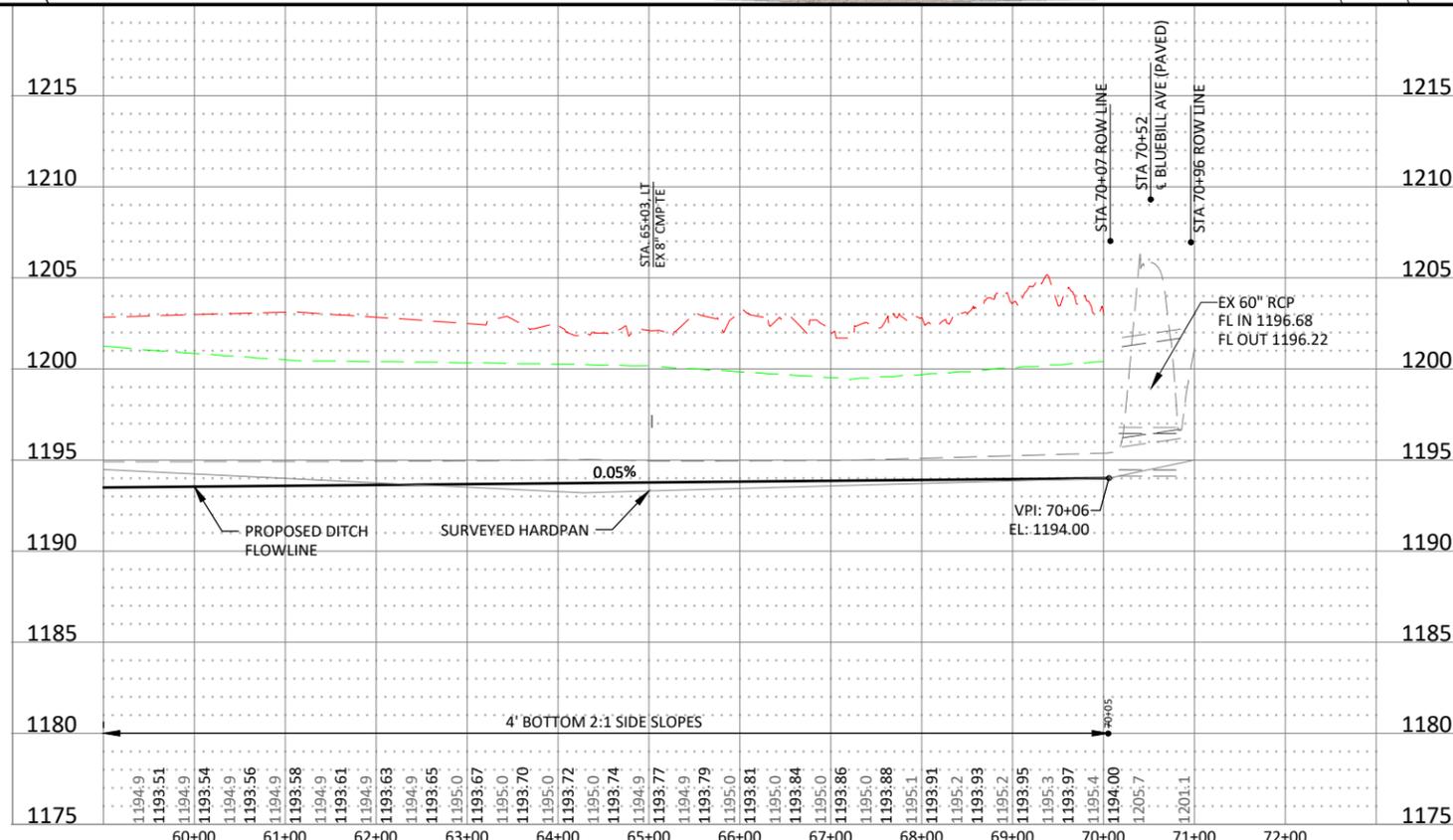
DRAINAGE DISTRICT No. 72
WORTH COUNTY, IOWA

PLAN & PROFILE - UPPER GOOSE LAKE DRAIN

SHEET
D.03



LEGEND	
	RIGHT DITCH BANK
	LEFT DITCH BANK



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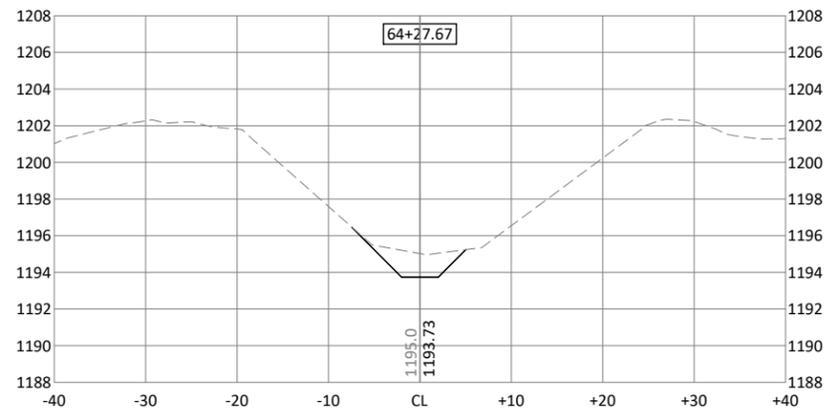
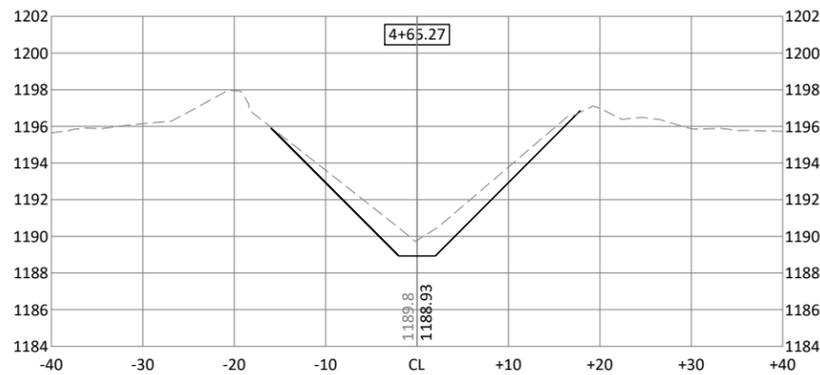
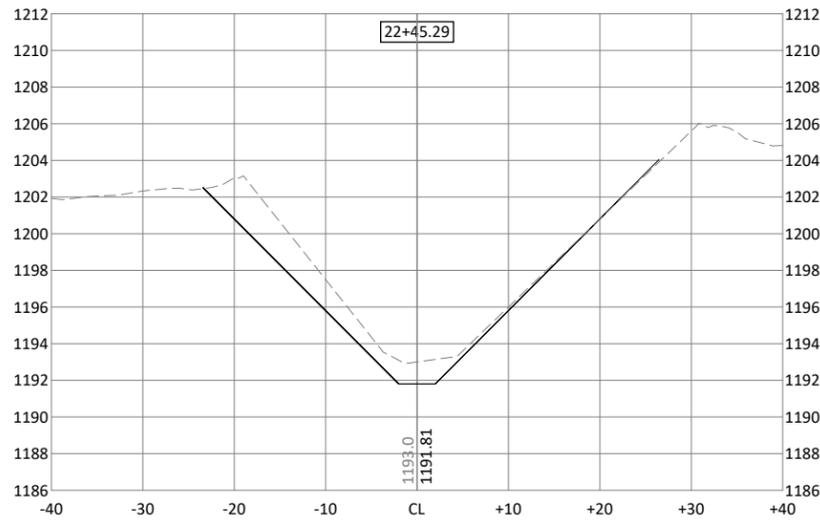
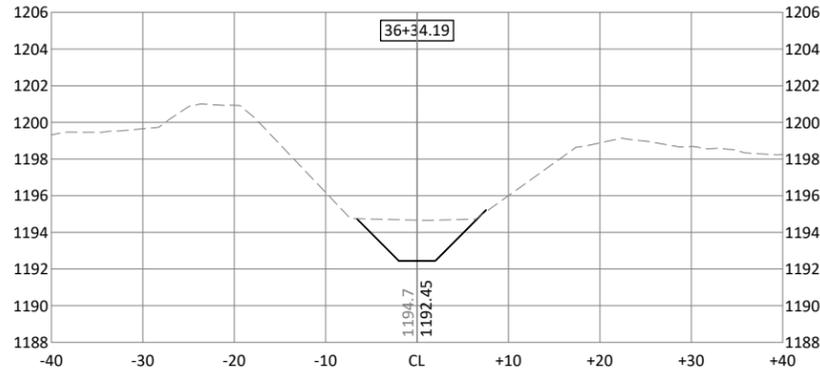
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PLAN & PROFILE - UPPER GOOSE LAKE DRAIN

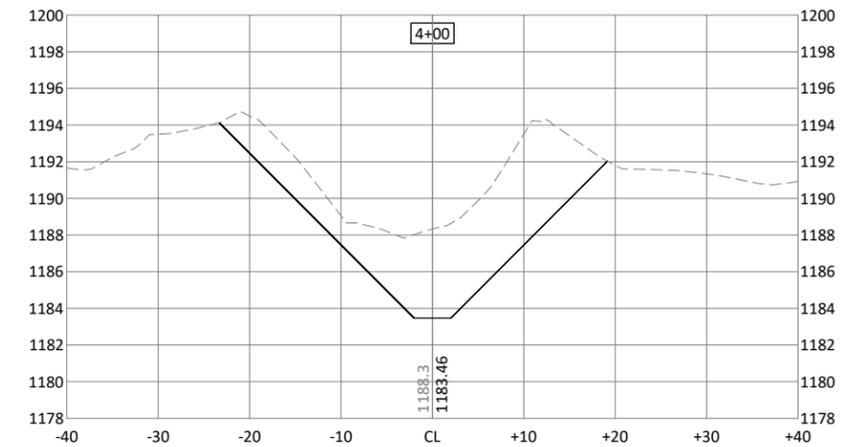
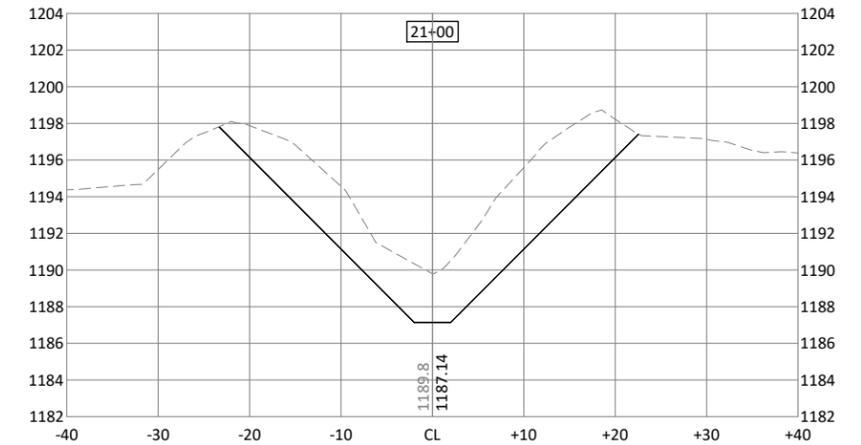
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UPPER GOOSE LAKE DRAIN CROSS SECTIONS



LATERAL 1-B OPEN DITCH CROSS SECTIONS



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WORTH COUNTY, IOWA
CROSS SECTIONS - OPEN DITCH

SHEET
X.01