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& MENK**

Real People. Real Solutions.

Engineer's Report

Drainage District No. 82

Lateral 33B

Tile Improvement

Kossuth County, Iowa

Filed: May 19, 2026

Submitted by:

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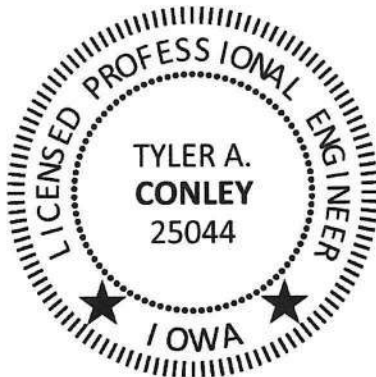
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Certification

Engineer's Report
for
Drainage District No. 82
Lateral 33B
Tile Improvement

Kossuth County, Iowa

May 19, 2026



I hereby certify that this plan, specification or report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Iowa. My renewal date is December 31, 2027.

By: _____

Tyler A. Conley
Tyler A. Conley, P.E.
License No. 25044

Date: _____

5/19/26

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I. INTRODUCTION

A. SCOPE OF WORK

The purpose of this report is to provide information related to drainage improvements requested by landowners of Drainage District No. 82 Lateral 33B (DD82L33B) Kossuth County, Iowa. The Board of Supervisors, acting as Trustees, appointed Tyler A. Conley, P.E., Bolton & Menk, Inc. to complete the necessary preliminary survey, study, and engineering report.

This report examines the conditions that would be necessary to improve the drainage capacities of the district facilities to the modern drainage capacity recommendation. A copy of the drainage petition is attached with this report in Appendix A.

B. LOCATION & DISTRICT FACILITIES

The watershed of DD82 lie within Kossuth County, located generally north and east of Lakota, in Sections 11, 12, 13, 14, 24, & 25 of Springfield Township (T-100-N, R-28-W), Sections 18, 19, 20, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, & 36 of Hebron Township (T-100-N, R-27-W), Sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 22, 23, 24, 25, 26, 35, & 36 of Lincoln Township (T-99-N, R-27-W) and Section 1 of Germain Township (T-98-N, R-27-W).

More specifically to this report the watershed of DD82L33B is in Sections 25, 26, 35, & 36 of Lincoln Township (T-99-N, R-27-W) and Section 1 of Germain Township (T-98-N, R-27-W).

Lateral 33B outlets to Open Ditch of Drainage District No. 7 (DD7) which flows to the Main Open Ditch of DD82 which is also the Middle Branch of the Blue Earth River. The Middle Branch of the Blue Earth River eventually becomes unmaintained natural creek and is a tributary of the West Branch of the Blue Earth River. The West Branch of the Blue Earth River flows to the Blue Earth River, then the Minnesota River, and eventually the Mississippi River.

A map of the facility locations and lateral tile watershed is included in the preliminary plans, found in Appendix F. Additionally, a copy of the original map of DD82 and the profiles of the district facilities in Appendix D.

II. INVESTIGATION

A. SURVEY & INVESTIGATION

A field review was conducted on the outlet of the existing tile facility and the downstream receiving open ditch facility where topographic elevations were obtained in order to verify the geometric viability of a proposed improvement. These elevations were utilized with the existing district profiles to calculate the existing design capacities of the tile network.

Additionally, this information was utilized in an informational meeting held on January 13, 2026, to discuss the landowner's desires. At the informational meeting it was determined to prepare refined cost estimates as well as a preliminary reclassification of benefits that would better represent the potential project costs based on a modern analysis of benefits.

B. CAPACITY ANALYSIS

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

Based on the existing profiles of Lateral 33B the capacity of the Facilities could be calculated. By today's standards, the combined system would be considered undersized. Almost all the

current lateral tile segments are at or below 0.25" per day, or 50% of the minimum modern drainage coefficient standard. The lower 4,600 feet of tile is the most restricting section and since it is the downstream most portion of the tile, it is the limiting factor of the system.

The standard drainage coefficient at the time of construction would have been between $\frac{1}{8}$ " and $\frac{1}{4}$ " per day, however today's drainage standard is $\frac{1}{2}$ " per day with good surface drainage, and up to 1" per day for depressional areas. Additionally, because the theoretical drainage coefficient is calculated using the size, grade, and drainage area, the actual capacity of the tile systems could be considerably less due to factors such as material age, tile damage, tile blockages, sedimentation and joint displacement. Appendix B displays the ideal calculated design capacity of Lateral 33B as well as the design needs for a $\frac{1}{2}$ ", $\frac{3}{4}$ ", or 1" drainage coefficient improvement project.

III. PROPOSED REPAIR

A. PROPOSED IMPROVEMENT OPTIONS

The Lateral 33B is undersized when compared to a modern agricultural drainage standard and consideration should be made for an improvement to increase capacity. The existing tile should be replaced with the appropriately sized pipe at the correct grade to provide at minimum a $\frac{1}{2}$ " drainage coefficient, while also being installed at a depth to provide approximately 3 feet of ground cover. Drainage district improvement projects are very achievable, however these projects do have additional criteria that would need to be considered to make the best decision for the district.

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

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

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

Lastly, it is also worth considering that for either improvement the cost associated with any construction work crossing any Secondary County Roads will be the responsibility of the Kossuth County Secondary Roads Department. Appendix C contains a cost estimate for this improvement option.

B. WORK LIMITS & DAMAGES

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

for the work would be set at approximately 40 to 65 feet on either side of the proposed centerline.

It is anticipated that the work will commence in the fall and/or winter of 2026 and continue into the spring and/or summer of 2027. Crops that are damaged during construction would be paid for by the District, based on crop appraisals. The construction zone would be minimized, and the work scheduled to minimize the loss of crops.

IV. OPINIONS OF PROBABLE COST

The cost estimates for the repair option are contained in Appendix C. These estimates represent our best judgment of the probable cost, based upon our experience with similar projects. The quantities and unit costs for construction are believed to be reasonably accurate for use in this report and hearing. Actual costs are subject to the market for the respective components, and to other economic forces. These estimates carry no actual or implied guarantees.

Additionally, attached in Appendix E is the preliminary reclassification schedule. This schedule is not final and it cannot be implemented unless the formal reclassification process is completed. However, it represents the calculations that would be done for apportionment of benefits in the event that the project was constructed.

V. FARM PROGRAM COMPLIANCE

A. FARM PROGRAM WETLAND CONSERVATION RULES

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

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

- For any improvements constructed by a drainage district, the NRCS will make a rebuttable assumption that every farmed wetland in the drainage district will be converted. This assumption can be appealed by the impacted landowners, but not by the drainage district.
- Mitigation of converted farmed wetland must compensate for all lost wetland functions and must also be made at a minimum acre for acre basis.
- A plan for the mitigation of all converted farmed wetland in the drainage district must be approved by the NRCS prior to the beginning of the construction of the improvements. After all opportunities for appeals are exhausted, the farmed wetland not covered by that mitigation plan would be found converted and the landowner and tenant would be in technical violation of the farm program. Penalties can be avoided when a drainage district

causes the conversion, but only at the price of abandoning farming of the converted farmed wetlands or ceasing to participate in the farm program.

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

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

The Boards of Supervisors in Iowa may approve and authorize construction of the proposed improvements without accruing risk to the drainage district from farm program wetland conservation rules violations. Obviously, the Board will want to know the wetlands status of all landowners and to help to keep them all in farm program compliance, but the Board cannot allow the failure of an individual landowner to share wetland information to influence the very important decisions they are charged to make for all of the benefitted landowners. By the rules, the program penalties will fall solely to the owners of the converted farmed wetlands for which cropping continues and compensatory mitigation is not secured. It is then fully up to each landowner to cooperate with his/her drainage district toward keeping himself/herself in farm program compliance.

B. CONVERTED WETLAND MITIGATION ALTERNATIVES

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

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

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

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

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

C. WETLAND MITIGATION POLICY

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

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

The resolution provides that if an improvement project is authorized, the drainage district will exercise the third mitigation alternative described above. The owners of all farmed wetlands known at the time of the hearing, and which the USDA eventually determines will be converted by the drainage district project, will be credited or paid up to \$7,500 per acre of converted farmed wetland. This is intended to offset a part of the cost of mitigation.

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

VI. WATER QUALITY

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

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

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

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

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

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

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

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

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

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

VII. RECLASSIFICATION

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

VIII. SUMMARY & DISCUSSION

Recommendations

DD82 Lateral 33B & Improvement Recommendation

This report has confirmed the need for drainage relief for Drainage District No. 82. Lateral 33B is aging, damaged, and undersized based on modern drainage recommendations. We recommend proceeding with the proposed $\frac{3}{4}$ " drainage coefficient improvement option. The proposed improvement is considered to be of public benefit and is conducive to public health, convenience or welfare.

Reclassification Recommended

In the event that the improvement is pursued, Chapter 468.131 of the Iowa Code states "When an assessment for improvements...exceeds twenty-five percent of the original assessment and the original or subsequent assessment or report of the benefit commission as confirmed did not designate separately the amount each tract should pay for the main ditch and tile lateral drains then the boards shall order a reclassification."

Installment Payments

Iowa drainage law allows for drainage district costs for large projects to be spread over between ten to twenty years at the discretion of the Board of Supervisors. Typically, the Board would spread assessments of the magnitude contemplated in this report over twenty years. Be reminded that final individual assessments are based upon benefits and that some parcels will likely bear two to three times the average per acre costs.

Recommended Steps

It is recommended that the Board of Supervisors, acting as Trustees, for Drainage District No. 82 take appropriate action, with legal guidance, to accomplish the following:

1. Tentatively approve this engineer's report and schedule a public hearing to receive and consider the input of the District landowners.
2. Adopt the improvement alternate recommended for construction, modified as deemed appropriate, to satisfy the desires of the Districts.
3. Direct the engineer to prepare final plans and specifications for the adopted plan and proceed toward a bid letting.
4. Initiate reclassification of benefits for this subdistrict. A separate commissioners' report on reclassification and public hearing on commissioners' report would be required.

Respectfully submitted,
Bolton & Menk, Inc.

Tyler A. Conley, P.E.
Project Manager

Appendix A: Drainage Petition

DRAINAGE PETITION

TO: Board of Supervisors of Kossuth County, Iowa

RE: Drainage District No. 82, Lateral 33B

The undersigned ask that a tile drainage improvement be investigated by an engineer for Drainage District No. 82, Lateral 33B Tile commencing at the Lateral B Open Ditch in Section 26 of Lincoln Township and running thence southerly to the southernmost part of the district in Section 36 of Lincoln Township. The petitioners further state that the lands situated in and along Lateral 33B of Drainage District 82 are subject to overflow (or are too wet for cultivation or subject to erosion or flood danger), and the public benefit, utility, health, convenience and welfare will be promoted by the above mentioned tile improvement project.

NAMES:

TELEPHONE NO.

N. Renee Campbell Cell - 515-
 Home - 515-

Appendix B: Tile Capacities

DISTRICT FACILITY CAPACITY
3/4" DRAINAGE COEFFICIENT
DRAINAGE DISTRICT NO. 82, LAT 33B
KOSSUTH COUNTY, IOWA

Lateral 338

Segment	Station Start	Station End	Length (ft)	Size (in)	Grade (%)	n	S (ft/ft)	A (ft)	P (ft)	R (ft)	Flow Capacity (cfs)	Drainage Area (Ac)	Drainage Coefficient (in/day)	% of 3/4" Coefficient	Required Size
1	00+00	46+00	4600	22	0.100	0.013	0.0010	2.64	5.76	0.46	5.69	1060.0	0.128	17.0%	42
2	46+00	50+00	400	20	0.300	0.013	0.0030	2.18	5.24	0.42	7.64	750.0	0.242	32.3%	36
3	50+00	52+00	200	20	0.800	0.013	0.0080	2.18	5.24	0.42	12.48	600.0	0.495	66.0%	36
4	52+00	63+00	1100	16	0.100	0.013	0.0010	1.40	4.19	0.33	2.43	590.0	0.098	13.1%	36
5	63+00	70+00	700	16	0.400	0.013	0.0040	1.40	4.19	0.33	4.87	580.0	0.200	26.6%	30
6	70+00	87+00	1700	16	0.100	0.013	0.0010	1.40	4.19	0.33	2.43	440.0	0.132	17.5%	30
7	87+00	90+00	300	14	0.100	0.013	0.0010	1.07	3.67	0.29	1.70	380.0	0.107	14.2%	30
8	90+00	91+00	100	14	0.400	0.013	0.0040	1.07	3.67	0.29	3.41	275.0	0.295	39.3%	21
9	91+00	100+00	900	12	0.400	0.013	0.0040	0.79	3.14	0.25	2.26	272.0	0.198	26.4%	21
10	100+00	115+00	1500	12	0.100	0.013	0.0010	0.79	3.14	0.25	1.13	136	0.198	26.4%	21
11	115+00	128+00	1300	10	0.100	0.013	0.0010	0.55	2.62	0.21	0.69	70	0.236	31.5%	15

Lateral 348

Segment	Station Start	Station End	Length (ft)	Size (in)	Grade (%)	n	S (ft/ft)	A (ft)	P (ft)	R (ft)	Flow Capacity (cfs)	Drainage Area (Ac)	Drainage Coefficient (in/day)	% of 3/4" Coefficient	Required Size
1	00+00	02+00	200	8	1.000	0.013	0.0100	0.35	2.09	0.17	1.21	15.7	1.837	244.9%	8
2	02+00	05+00	300	8	0.500	0.013	0.0050	0.35	2.09	0.17	0.86	15.0	1.360	181.3%	8
3	05+00	10+50	550	8	0.200	0.013	0.0020	0.35	2.09	0.17	0.54	10.6	1.217	162.2%	8

Lateral 358

Segment	Station Start	Station End	Length (ft)	Size (in)	Grade (%)	n	S (ft/ft)	A (ft)	P (ft)	R (ft)	Flow Capacity (cfs)	Drainage Area (Ac)	Drainage Coefficient (in/day)	% of 3/4" Coefficient	Required Size
1	00+00	04+00	400	6	1.000	0.013	0.0100	0.20	1.57	0.13	0.56	1.4	9.565	1275.4%	6
2	04+00	05+00	100	6	0.100	0.013	0.0010	0.20	1.57	0.13	0.18	1.0	4.235	564.6%	6

Lateral 368

Segment	Station Start	Station End	Length (ft)	Size (in)	Grade (%)	n	S (ft/ft)	A (ft)	P (ft)	R (ft)	Flow Capacity (cfs)	Drainage Area (Ac)	Drainage Coefficient (in/day)	% of 3/4" Coefficient	Required Size
1	00+00	08+00	800	7	0.100	0.013	0.0010	0.27	1.83	0.15	0.27	21.3	0.300	40.0%	10

Lateral 378

Segment	Station Start	Station End	Length (ft)	Size (in)	Grade (%)	n	S (ft/ft)	A (ft)	P (ft)	R (ft)	Flow Capacity (cfs)	Drainage Area (Ac)	Drainage Coefficient (in/day)	% of 3/4" Coefficient	Required Size
1	00+00	13+00	1300	12	0.100	0.013	0.0010	0.79	3.14	0.25	1.13	149.8	0.179	23.9%	21
2	13+00	14+00	100	10	1.600	0.013	0.0160	0.55	2.62	0.21	2.78	85.1	0.777	103.6%	10
3	14+00	24+00	1000	10	0.100	0.013	0.0010	0.55	2.62	0.21	0.69	84.9	0.195	26.0%	18
4	24+00	26+00	200	10	1.000	0.013	0.0100	0.55	2.62	0.21	2.20	64.4	0.812	108.3%	10
5	26+00	37+00	1100	10	0.100	0.013	0.0010	0.55	2.62	0.21	0.69	60.3	0.274	36.6%	15
6	37+00	39+00	200	6	0.700	0.013	0.0070	0.20	1.57	0.13	0.47	33.7	0.332	44.3%	8
7	39+00	46+00	700	6	0.100	0.013	0.0010	0.20	1.57	0.13	0.18	31.2	0.136	18.1%	12

Lateral 388

Segment	Station Start	Station End	Length (ft)	Size (in)	Grade (%)	n	S (ft/ft)	A (ft)	P (ft)	R (ft)	Flow Capacity (cfs)	Drainage Area (Ac)	Drainage Coefficient (in/day)	% of 3/4" Coefficient	Required Size
1	00+00	08+00	800	8	0.100	0.013	0.0010	0.35	2.09	0.17	0.38	35.0	0.261	34.7%	12

Lateral 398

Segment	Station Start	Station End	Length (ft)	Size (in)	Grade (%)	n	S (ft/ft)	A (ft)	P (ft)	R (ft)	Flow Capacity (cfs)	Drainage Area (Ac)	Drainage Coefficient (in/day)	% of 3/4" Coefficient	Required Size
1	00+00	14+00	1400	10	0.100	0.013	0.0010	0.55	2.62	0.21	0.69	105.0	0.157	21.0%	18
2	14+00	16+00	200	8	2.000	0.013	0.0200	0.35	2.09	0.17	1.71	63.0	0.647	86.3%	10
3	16+00	23+00	700	8	0.100	0.013	0.0010	0.35	2.09	0.17	0.38	61.0	0.150	19.9%	15

DISTRICT FACILITY CAPACITY
3/4" DRAINAGE COEFFICIENT
DRAINAGE DISTRICT NO. 82, LAT 33B
KOSSUTH COUNTY, IOWA

Lateral 40B															
Segment	Station Start	Station End	Length (ft)	Size (in)	Grade (%)	n	S (ft/ft)	A (ft)	P (ft)	R (ft)	Flow Capacity (cfs)	Drainage Area (Ac)	Drainage Coefficient (in/day)	% of 3/4" Coefficient	Required Size
1	00+00	06+00	600	10	0.100	0.013	0.0010	0.55	2.62	0.21	0.69	127.0	0.130	17.4%	21
2	06+00	07+00	100	10	2.000	0.013	0.0200	0.55	2.62	0.21	3.11	60.0	0.132	164.3%	10
3	07+00	15+00	800	10	0.100	0.013	0.0010	0.55	2.62	0.21	0.69	56.0	0.295	39.4%	15
4	15+00	20+00	500	8	0.100	0.013	0.0010	0.35	2.09	0.17	0.38	42.0	0.217	29.0%	15
Lateral 41B															
Segment	Station Start	Station End	Length (ft)	Size (in)	Grade (%)	n	S (ft/ft)	A (ft)	P (ft)	R (ft)	Flow Capacity (cfs)	Drainage Area (Ac)	Drainage Coefficient (in/day)	% of 3/4" Coefficient	Required Size
1	00+00	07+00	700	8	0.100	0.013	0.0010	0.35	2.09	0.17	0.38	35.0	0.261	34.7%	12
2	07+00	08+00	100	8	0.500	0.013	0.0050	0.35	2.09	0.17	0.86	27.0	0.755	100.7%	10
3	08+00	09+00	100	8	1.400	0.013	0.0140	0.35	2.09	0.17	1.43	26.0	1.312	175.0%	8

Appendix C: Opinions of Probable Cost

Engineer's Opinion of Probable Cost
Drainage District No. 82
Lateral Tile 33B & 40B
Kossuth County, Iowa
2026

Division 1 - Lateral 33B - Work On Private Property - 0.75" Drainage Coefficient

Item	Description	Unit	Quantity	Unit Price	Total
101	Lateral Tile Connections, 10" Dia. Or Smaller	EA	20	\$200	\$4,000
102	Lateral Tile Connections, 12" Dia. Or Larger	EA	7	\$250	\$1,750
103	42" Dia. HDPE Elbow Section, Fabrication Only	EA	6	\$1,750	\$10,500
104	36" Dia. HDPE Elbow Section, Fabrication Only	EA	7	\$1,650	\$11,550
105	30" Dia. HDPE Elbow Section, Fabrication Only	EA	11	\$1,300	\$14,300
106	24" Dia. HDPE Elbow Section, Fabrication Only	EA	7	\$1,200	\$8,400
107	15" Dia. HDPE Elbow Section, Fabrication Only	EA	3	\$750	\$2,250
108	36" ON 42" Dia. HDPE Reducer, Fabrication Only	EA	1	\$1,750	\$1,750
109	30" ON 36" Dia. HDPE Reducer, Fabrication Only	EA	1	\$1,650	\$1,650
110	24" ON 30" Dia. HDPE Reducer, Fabrication Only	EA	1	\$1,300	\$1,300
111	15" ON 24" Dia. HDPE Reducer, Fabrication Only	EA	1	\$1,200	\$1,200
112	24"x24"x24" Dia. HDPE Tee, Fabrication Only	EA	1	\$1,200	\$1,200
113	15" Dia. HDPE End Cap, Fabrication Only	EA	1	\$500	\$500
114	Spot Tile Exploration	HR	24	\$200	\$4,800
115	Trench Foundation Stone	TN	805	\$30	\$24,150
116	Drain Tile, Trenched, HDPE Dual Wall 42" Dia.	LF	4,600	\$68	\$312,800
117	Drain Tile, Trenched, HDPE Dual Wall 36" Dia.	LF	1,585	\$56	\$88,760
118	Drain Tile, Trenched, HDPE Dual Wall 30" Dia.	LF	2,650	\$53	\$140,450
119	Drain Tile, Trenched, HDPE Dual Wall 24" Dia.	LF	2,500	\$45	\$112,500
120	Drain Tile, Trenched, HDPE Dual Wall 15" Dia.	LF	1,301	\$25	\$32,525
121	Crush Pipe in Place, Existing Tile	LF	12,636	\$4	\$50,544
122	Fence Cuts	EA	2	\$500	\$1,000
123	Mobilization	LS	1	\$22,121	\$22,121

Estimated Division 1 Construction Cost \$850,000

Division 2 - Lateral 33B - Road Crossing 410th St. - 0.75" Drainage Coefficient

Item	Description	Unit	Quantity	Unit Price	Total
201	Drain Tile, Trenched, Class III R.C.P., 36" Dia.	LF	66	\$150	\$9,900
202	Traffic Control	LS	1	\$1,500	\$1,500
203	Safety Closure	EA	1	\$1,000	\$1,000
204	Seeding and Fertilization (Rural)	AC	0.1	\$25,000	\$2,500
205	Silt Fence, Installation and Removal	LF	100	\$5	\$500
206	Construction Contingency	LS	1	\$1,500	\$1,500

Estimated Division 2 Construction Cost \$16,900

**Engineer's Opinion of Probable Cost
Drainage District No. 82
Lateral Tile 33B & 40B
Kossuth County, Iowa
2026**

Division 3 - Lateral 33B - Road Crossing 240th Ave - 0.75" Drainage Coefficient

Item	Description	Unit	Quantity	Unit Price	Total
301	Drain Tile, Trenched, Class III R.C.P., 36" Dia.	LF	99	\$150	\$14,850
302	Traffic Control	LS	1	\$1,500	\$1,500
303	Safety Closure	EA	1	\$1,000	\$1,000
304	Seeding and Fertilization (Rural)	AC	0.1	\$25,000	\$2,500
305	Silt Fence, Installation and Removal	LF	100	\$5	\$500
306	Construction Contingency	LS	1	\$1,650	<u>\$1,650</u>

Estimated Construction Cost

\$22,000

Division 4 - Lateral 33B - Road Crossing 400th ST - 0.75" Drainage Coefficient

Item	Description	Unit	Quantity	Unit Price	Total
401	Drain Tile, Trenched, Class III R.C.P., 15" Dia.	LF	66	\$95	\$6,270
402	Traffic Control	LS	1	\$1,500	\$1,500
403	Safety Closure	EA	1	\$1,000	\$1,000
404	Seeding and Fertilization (Rural)	AC	0.1	\$25,000	\$2,500
405	Silt Fence, Installation and Removal	LF	100	\$5	\$500
406	Construction Contingency	LS	1	\$1,230	<u>\$1,230</u>

Estimated Construction Cost

\$13,000

Non-Construction Costs

Construction Related Damages \$23,000

Basic Engineering Services

Survey, Study & Report, Meetings & Hearing	\$35,000
Reclassification	\$35,000
Construction Plans, Specifications, & Bid Letting	\$60,000
Construction Engineering Services, Staking, & Inspection	\$55,000

Legal Services, Publications, Mailings, Etc.. \$4,200

Finance, Interest & Contingency \$44,400

Estimated Total Non-Construction Costs \$256,600

Estimated Total Project Cost - 0.75" Drainage Coefficient Lateral 33B Improvement \$1,106,600

Estimated Average Cost Per Benefited Acre (1060)	\$1,044
Estimated Average Cost Per Acre Per Year (10 years, 5% interest)	\$128.76
Estimated Average Cost Per Acre Per Year (20 years, 5% interest)	\$79.78

Engineer's Opinion of Probable Cost
Drainage District No. 82
Lateral Tile 33B & 40B
Kossuth County, Iowa
2026

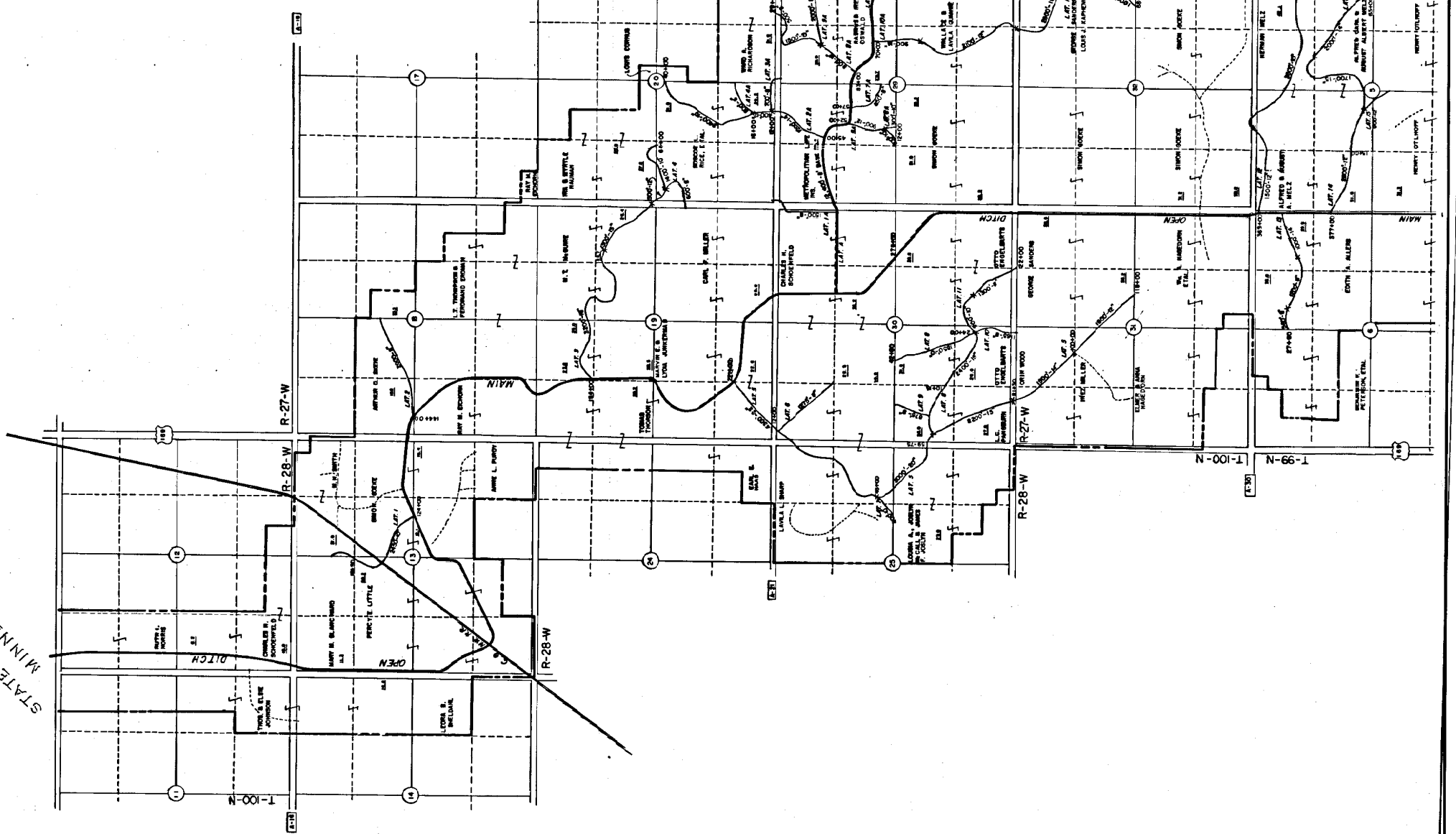
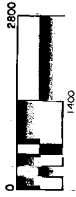
Division 5 - Lateral 40B - Work On Private Property - 0.75" Drainage Coefficient

Item	Description	Unit	Quantity	Unit Price	Total
501	Lateral Tile Connections, 10" Dia. Or Smaller	EA	1	\$200	\$200
502	Lateral Tile Connections, 12" Dia. Or Larger	EA	4	\$250	\$1,000
503	24" Dia. HDPE Elbow Section, Fabrication Only	EA	3	\$1,200	\$3,600
504	15" Dia. HDPE Elbow Section, Fabrication Only	EA	6	\$750	\$4,500
505	15" ON 24" Dia. HDPE Reducer, Fabrication Only	EA	1	\$750	\$750
506	15" Dia. HDPE End Cap, Fabrication Only	EA	1	\$500	\$500
507	Spot Tile Exploration	HR	8	\$200	\$1,600
508	Trench Foundation Stone	TN	50	\$30	\$1,500
509	Drain Tile, Trenched, HDPE Dual Wall 24" Dia.	LF	700	\$45	\$31,500
510	Drain Tile, Trenched, HDPE Dual Wall 15" Dia.	LF	1,430	\$25	\$35,750
511	Crush Pipe in Place, Existing Tile	LF	2,130	\$4	\$8,520
512	Fence Cuts	EA	2	\$500	\$1,000
513	Mobilization	LS	1	\$4,580	\$4,580

Estimated Division 5 Construction Cost \$95,000

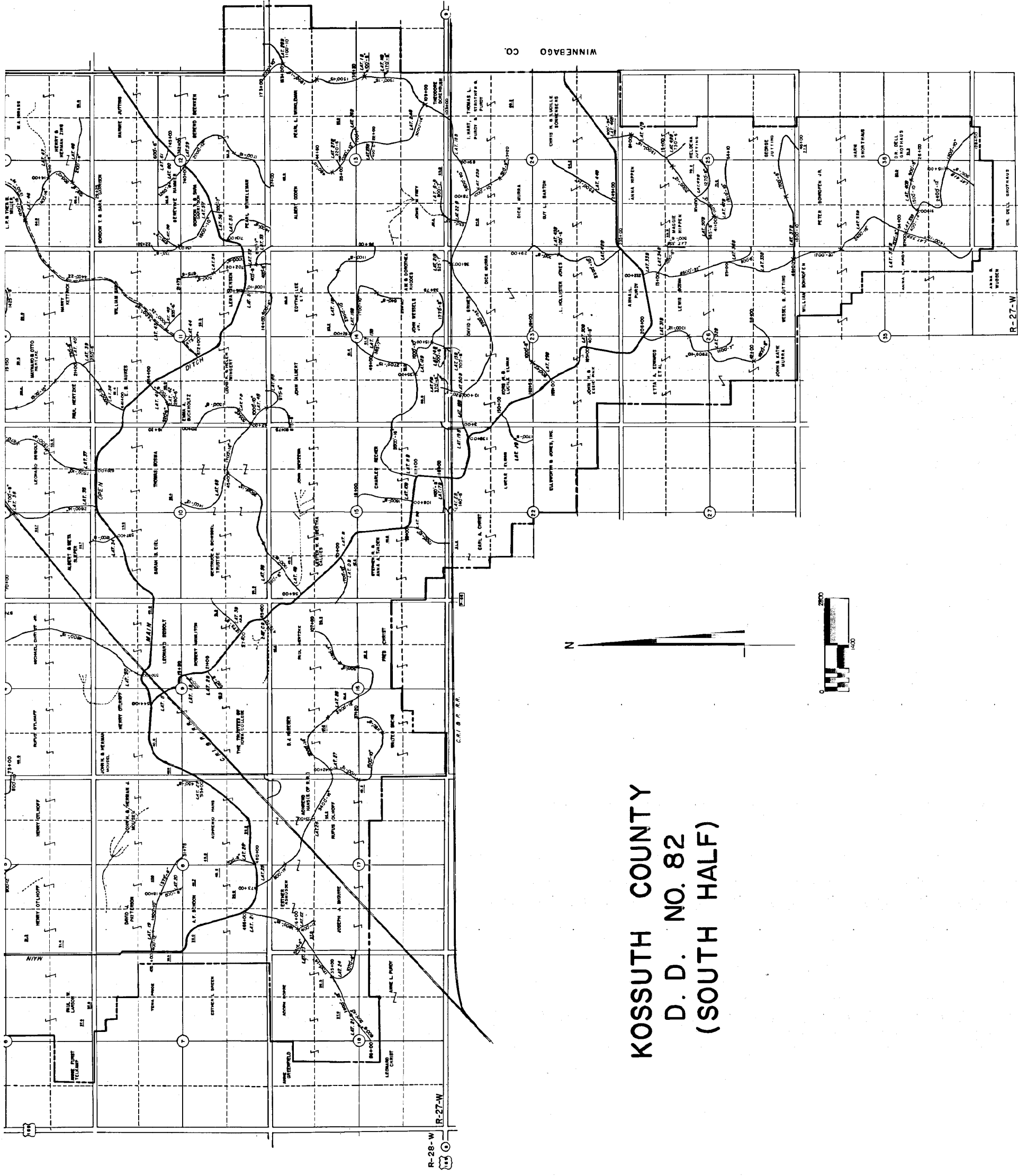
Appendix D: Original Plat and Profiles

KOSSUTH COUNTY
 D.D. NO. 82
 (NORTH HALF)



This plat is subject to the provisions of the act of March 3, 1909, relating to the sale of land in the public domain, and to the act of March 3, 1909, relating to the sale of land in the public domain, and to the act of March 3, 1909, relating to the sale of land in the public domain.

KOSSUTH
 D.D. No. 82
 (NORTH HALF)





Appendix E: Preliminary Reclassification

**RECLASSIFICATION SCHEDULE
DRAINAGE DISTRICT NO. 82 LATERAL 33B
KOSSUTH COUNTY, IOWA**

Lateral 33B Maintenance Assessment Schedule

This schedule is preliminary and should be used as an example. It is not a 2026 levy.

Deedholder(s)	Parcel Number	Sec-Twp -Rng	Legal Description	Benefited Acres	Class. %	Assessment (\$)	Ratio To Total Cost
Aukes, Douglas	1201200001	1 T98N R27W	NW NE	25.49	38.03	\$29,119.65	2.647%
Aukes, Douglas L	1201200002	1 T98N R27W	NE NE	5.50	9.66	\$7,396.68	0.672%
Beverly Land Co	0826400003	26 T99N R27W	SW SE	14.22	8.23	\$6,301.73	0.573%
Beverly Land Co	0826400004	26 T99N R27W	SE SE	37.79	38.67	\$29,609.70	2.692%
Bohrofen, J Dennis	0835200003	35 T99N R27W	SW NE	5.77	5.79	\$4,433.41	0.403%
Bohrofen, J Dennis	0835200004	35 T99N R27W	SE NE	32.35	29.64	\$22,695.41	2.063%
Bohrofen, J Dennis	0835200001	35 T99N R27W	NW NE	27.46	27.06	\$20,719.90	1.884%
Bohrofen, J Dennis	0835200002	35 T99N R27W	NE NE	37.79	52.30	\$40,046.22	3.641%
Bosma, Mary Ann Disclaimer Trust - 1/2 Int	0825300002	25 T99N R27W	SW SW	37.79	35.29	\$27,021.62	2.457%
Bosma, Mary Ann Disclaimer Trust - 1/2 Int	0825300004	25 T99N R27W	SE SW EX TR CONT 4.49A	34.88	25.90	\$19,831.68	1.803%
Carhill, Nancy Renee	0836300003	36 T99N R27W	SW SW	38.00	73.64	\$56,386.30	5.126%
Carhill, Nancy Renee	0836300004	36 T99N R27W	SE SW	39.00	91.47	\$70,038.76	6.367%
Carhill, Nancy Renee	0836300001	36 T99N R27W	NW SW	39.00	100.00	\$76,570.20	6.961%
Carhill, Nancy Renee	0836300002	36 T99N R27W	NE SW	40.00	93.77	\$71,799.88	6.527%
Christ, Michael J	0825300005	25 T99N R27W	TR COMM SE COR SW1/4 W 527' POB N 398' W 492' S 398' E 492' TO POB	4.12	2.81	\$2,151.62	0.196%
Garst, Gary W	0836200005	36 T99N R27W	SE NE	0.01	0.01	\$7.66	0.001%
Gueningsman, Kay E Rev Trust	0836400003	36 T99N R27W	SW SE	39.00	97.99	\$75,031.14	6.821%
Gueningsman, Kay E Rev Trust	0836400001	36 T99N R27W	NW SE	37.56	66.88	\$51,210.15	4.655%
Hammer, William Joseph Jr Trust	0825400007	25 T99N R27W	SW SE EX TRACT AS SURVEYED & RECRD BY DOC #2002-2209	30.15	20.68	\$15,834.72	1.440%
Hammer, William Joseph Jr Trust	0825400005	25 T99N R27W	NW SE EX TRACT AS SURVEYED & RECRD BY DOC #2002-2209	6.08	3.15	\$2,411.96	0.219%
Helgeson, Dana J	0825400009	25 T99N R27W	TRACT IN SE1/4 AS SURVEYED & RECRD BY DOC #2005-4242	5.16	3.35	\$2,565.10	0.233%
Kiewiet Farms, LLLP	1202200002	2 T98N R27W	NE NE	0.40	0.96	\$735.07	0.067%

**RECLASSIFICATION SCHEDULE
DRAINAGE DISTRICT NO. 82 LATERAL 33B
KOSSUTH COUNTY, IOWA**

Lateral 33B Maintenance Assessment Schedule

This schedule is preliminary and should be used as an example. It is not a 2026 levy.

Deedholder(s)	Parcel Number	Sec-Twp -Rng	Legal Description	Benefited Acres	Class. %	Assessment (\$)	Ratio To Total Cost
Ley, David W - LE	1201100004	1 T98N R27W	SE NW	0.51	0.33	\$252.68	0.023%
Ley, David W - LE	1201100003	1 T98N R27W	SW NW	0.92	0.90	\$689.13	0.063%
Ley, David W - LE	1201100001	1 T98N R27W	NW NW	38.21	54.38	\$41,638.88	3.785%
Ley, David W - LE	1201100002	1 T98N R27W	NE NW	32.22	45.82	\$35,084.47	3.189%
McKenney, Stephen N &	0836200004	36 T99N R27W	SW NE	39.32	56.77	\$43,468.90	3.952%
McKenney, Stephen N &	0836200001	36 T99N R27W	NW NE	37.18	40.23	\$30,804.19	2.800%
McKenney, Stephen N &	0836200002	36 T99N R27W	NE NE EX 22'	4.75	2.85	\$2,182.25	0.198%
Purdy, Anne Beeson LLC	0835400004	35 T99N R27W	SE SE	20.62	31.80	\$24,349.32	2.214%
Purdy, Anne Beeson LLC	0835400002	35 T99N R27W	NE SE	13.23	28.41	\$21,753.59	1.978%
Purdy, Anne Beeson LLC	0826200001	26 T99N R27W	NW NE	0.68	0.00	\$0.00	0.000%
Purdy, Anne Beeson LLC	0826200002	26 T99N R27W	NE NE	19.85	0.10	\$76.57	0.007%
Risius K160, LLC	0826400001	26 T99N R27W	NW SE	23.22	0.03	\$22.97	0.002%
Risius K160, LLC	0826400002	26 T99N R27W	NE SE	38.79	24.86	\$19,035.35	1.730%
Risius K160, LLC	0826200003	26 T99N R27W	SW NE	5.92	0.00	\$0.00	0.000%
Risius K160, LLC	0826200004	26 T99N R27W	SE NE	37.26	2.99	\$2,289.45	0.208%
Risius K80, LLC	0825300001	25 T99N R27W	NW SW	11.46	5.82	\$4,456.39	0.405%
Risius K80, LLC	0825300003	25 T99N R27W	NE SW	12.15	9.18	\$7,029.14	0.639%
Risius, Kenneth	0835100002	35 T99N R27W	NE NW	0.07	0.05	\$38.29	0.003%
Thorland, Renae L etal	0836400004	36 T99N R27W	SE SE	4.36	6.14	\$4,701.41	0.427%
Urfer, Jerry L	0836100003	36 T99N R27W	SW NW	39.00	64.33	\$49,257.61	4.478%
Urfer, Jerry L	0836100004	36 T99N R27W	SE NW	40.00	57.76	\$44,226.95	4.021%
Urfer, Jerry L	0836100001	36 T99N R27W	NW NW	38.00	54.71	\$41,891.56	3.808%
Urfer, Jerry L	0836100002	36 T99N R27W	NE NW	39.00	52.83	\$40,452.04	3.677%
Winnko Bison LLC	0825100003	25 T99N R27W	SW NW	6.63	0.06	\$45.94	0.004%
Winnko Bison LLC	0825100001	25 T99N R27W	NW NW	2.89	0.03	\$22.97	0.002%
Kossuth Secondary Roads (Paved)				37.57		\$54,311.39	4.937%
			Total	1081.33 Ac		\$1,100,000.00	100.00%

Appendix F: Preliminary Plans

CONSTRUCTION PLANS FOR

DRAINAGE DISTRICT DD82 LATERAL 33B & 40B

FACILITY IMPROVEMENTS

KOSSUTH COUNTY, IOWA

May 2026

GOVERNING SPECIFICATIONS

THE 2026 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.

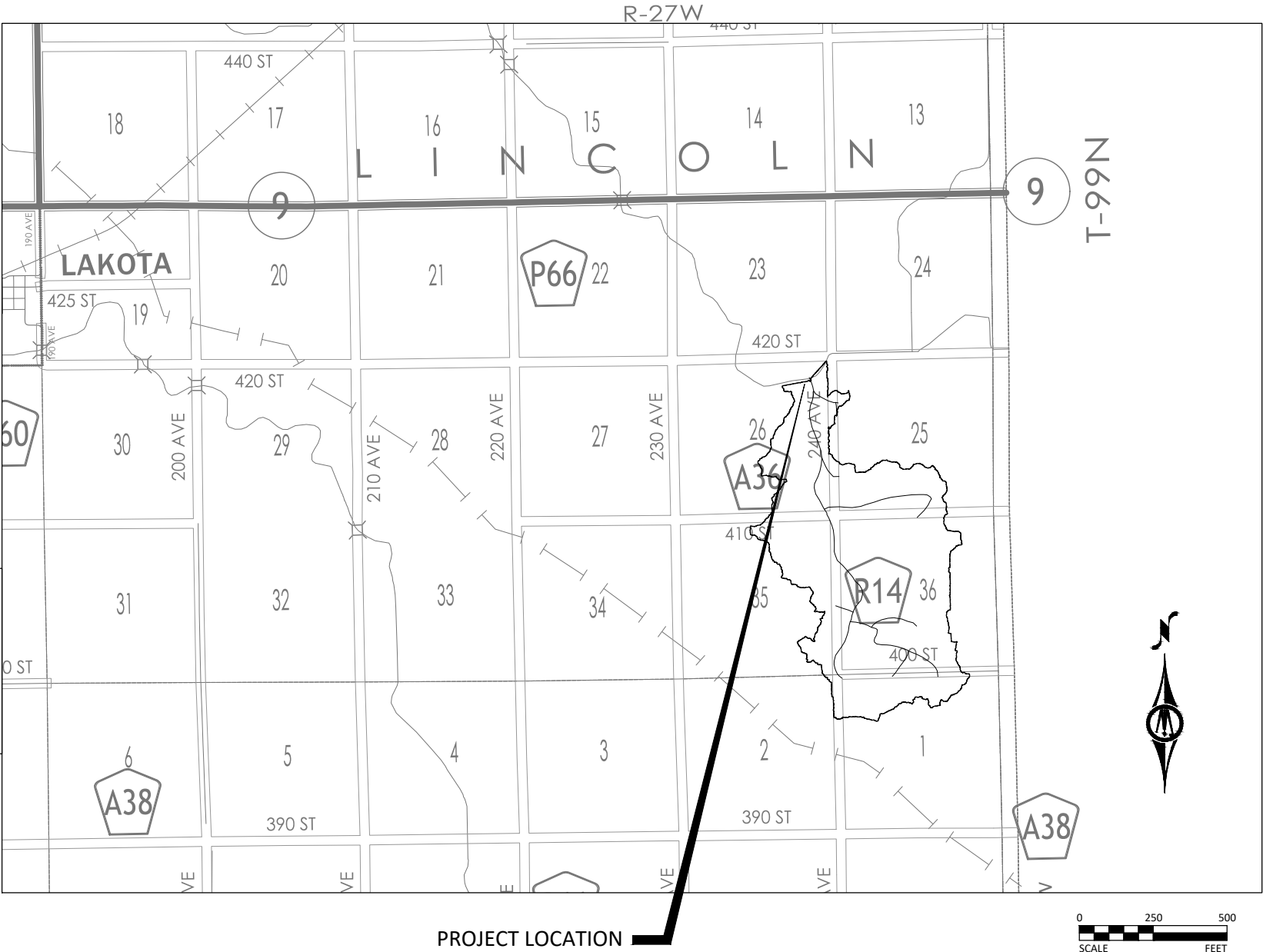
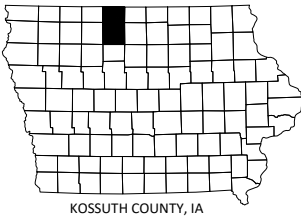


NOTE: THE CONTRACTOR SHALL FIELD VERIFY EXACT LOCATIONS PRIOR TO COMMENCING CONSTRUCTION AS REQUIRED BY STATE LAW. NOTIFY IOWA ONE CALL, 811 OR 1-800-292-8989.

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."

UTILITY CONTACTS

THE FOLLOWING ARE KNOWN, BUT NOT NECESSARILY THE ONLY UTILITY CONTACTS THAT SHOULD BE CONTACTED PRIOR TO BEGINNING OF EXCAVATION.



SHEET LIST TABLE	
SHEET NUMBER	SHEET TITLE
A.01	TITLE SHEET
A.02	SITE OVERVIEW
B.02	RCP INSTALLATION DETAIL
B.03	CPDT INSTALLATION DETAIL
M.01 - M.05	PLAN & PROFILE - LATERAL 33 B
M.06	PLAN & PROFILE - LATERAL 40 B
THIS PLAN SET CONTAINS 10 SHEETS.	

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.

Tyler A. Conley, P.E.

LICENSE NUMBER: 25044 DATE:

MY LICENSE RENEWAL DATE IS DECEMBER 31, 2027

PAGES OR SHEETS COVERED BY THIS SEAL:

ALL SHEET

PROJECT DATUM: IRCS1

HORIZONTAL: NAD83

VERTICAL: NAD88

RECORD DRAWING INFORMATION

OBSERVER:

CONTRACTOR:

DATE:

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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 MINNESOTA.

Tyler Conley

LIC. NO. 25044 DATE:



1609 US Hwy 18 East
Algona, IA 50511
Phone: (515) 395-3140
Email: Algona@bolton-menk.com
www.bolton-menk.com

DESIGNED	NO.	ISSUED FOR	DATE
TAC			
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ALR			
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TAC/NRS			
CLIENT PROJ. NO.			
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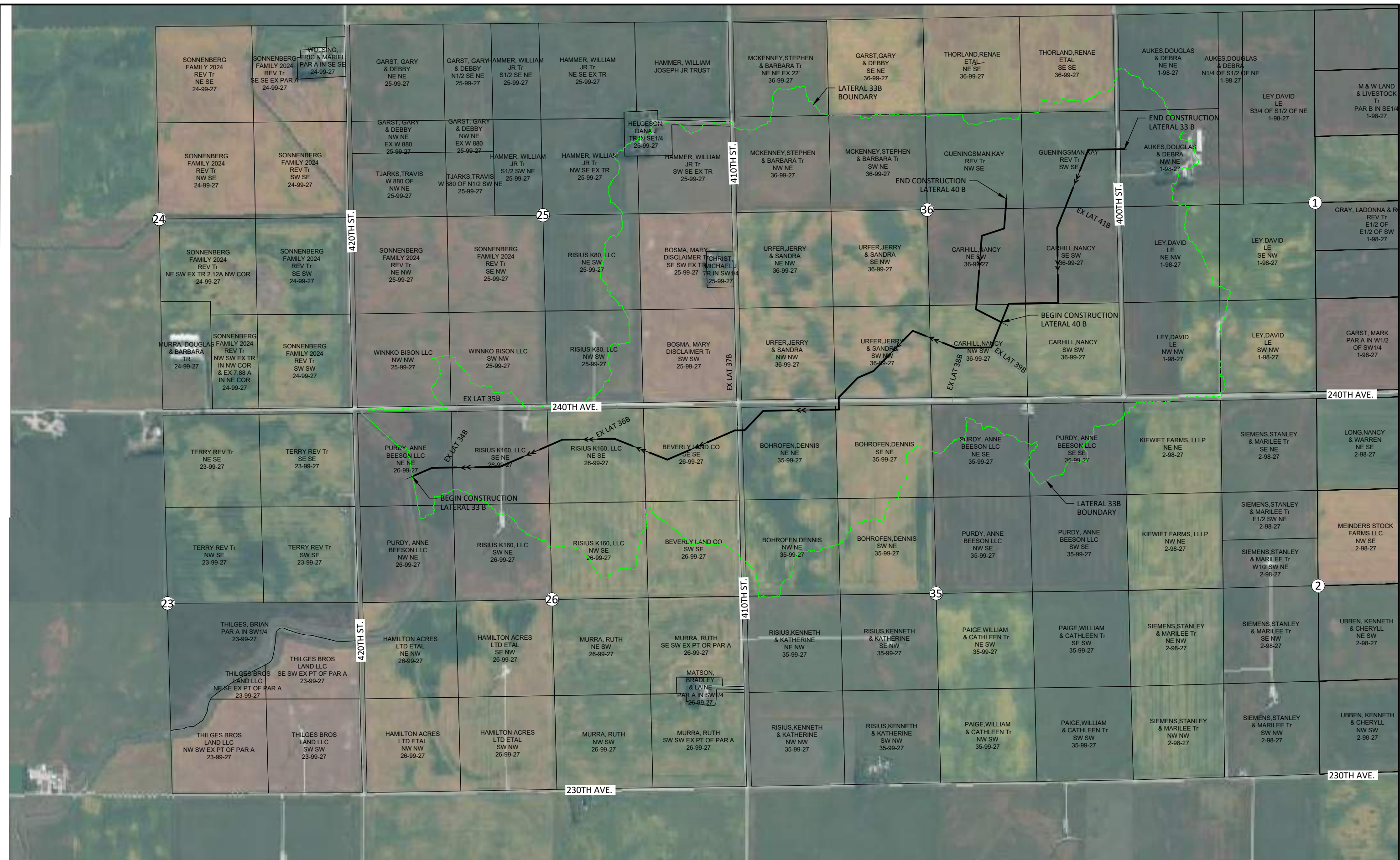
KOSSUTH COUNTY, IOWA

DRAINAGE DISTRICT 82 LATERAL 33B & 40B FACILITY IMPROVEMENTS

TITLE SHEET

SHEET

A.01



DESIGNED	NO.	ISSUED FOR	DATE
TAC			
DRAWN			
ALR			
CHECKED			
TAC/NRS			
CLIENT PROJ. NO.			
25X140946000			

SHEET

PIPE HAUNCH FILL AND COMPACTION METHOD
PLAN REQUIREMENTS COMPLIANCE VERIFICATION

THE CONTRACTOR IS SOLEY RESPONSIBLE FOR THE INSTALLATION OF ALL PIPE ACCORDING TO PLAN REQUIREMENTS. THE CONTRACTOR'S PARTICIPATION IN AND COMPLIANCE WITH THE FOLLOWING PROCEDURE IS REQUIRED AND WILL ALLOW FOR FEWER SOIL DENSITY TESTS TO ENSURE PROPER PIPE INSTALLATION.

STEP 1
BEFORE COMMENCING PIPE INSTALLATION, STANDARD SOIL PROCTOR DENSITY TEST RESULTS OF REPRESENTATIVE SAMPLE(S) OF PIPE HAUNCH FILL SHALL BE PROVIDED BY AN INDEPENDENT QUALIFIED SOILS TESTING LAB. THE SELECTION OF THE SAMPLE(S) WILL BE MADE BY THE ENGINEER AND CONTRACTOR (WHEN SPECIFIED).

STEP 2
CONTRACTOR MAY BEGIN EXCAVATING THE MODIFIED TYPE 4 TRENCH WITH THE REQUIRED SHAPED BOTTOM GROOVE AND PLACE SEVERAL PIPE SECTIONS ONLY WHEN BOTH ENGINEER AND TESTING LAB TECHNICIAN ARE PRESENT

CONTRACTOR SHALL DEMONSTRATE THE INTENDED METHODS FOR COMPACTING THE FILL FOR THE PIPE HAUNCH AREAS. SOIL DENSITY TESTS SHALL BE TAKEN AT LOCATIONS DESIGNATED BY THE ENGINEER TO CONFIRM THAT THE INTEDNED METHODS FOR FILL AND COMPACTION OF THE PIPE HAUNCH AREAS SATIFIES THE PLAN REQUIREMENTS. CONTRACTOR SHALL MODIFY THE INSTALLATION METHODS AND REPEAT STEP 2 UNTIL ACCEPTABLE TESTS RESULTS ARE ACHIEVED.

STEP 3
CONTRACTOR MAY INSTALL THE NEXT SEVERAL HUNDRED FEET OF PIPE. ENGINEER SHALL DESIGNATE SEVERAL LOCATIONS (APPROXIMATELY 10% OF THE INSTALLED LENGTH) WHERE CONTRACTOR SHALL LEAVE THE PIPE UNBLINDED FOR FURTHER DENSITY TESTS OF THE HAUNCH FILL AREA. ALL DENSITY TESTS MUST MEET PLAN REQUIREMENTS BEFORE WORK MAY PROCEED FURTHER.

IF DENSITY TESTING DATA CONFIRMS TO THE SATISFACTION OF THE ENGINEER THAT THE CONTRACTOR'S INSTALLATION METHOD WILL PRODUCE CONSISTENT COMPLIANCE WITH PLAN REQUIREMENTS, CONTRACTOR MAY CONTINUE INSTALLATION OF THE PIPE WITH NO ADDITIONAL TESTING REQUIRED. IF NOT, STEPS 2 AND 3 SHALL BE REPEATED UNTIL A RELIABLE, SUCCESSFUL METHOD OF PIPE INSTALLATION THAT PRODUCES SATISFACTORY RESULTS IS ESTABLISHED.

CONTRACTOR IS REQUIRED TO PROPERLY AND ADEQUATELY INSTRUCT SUBCONTRACTORS AND/OR SUBSEQUENT PIPE INSTALLATION WORKERS ON THE PROPER INSTALLATION METHOD.

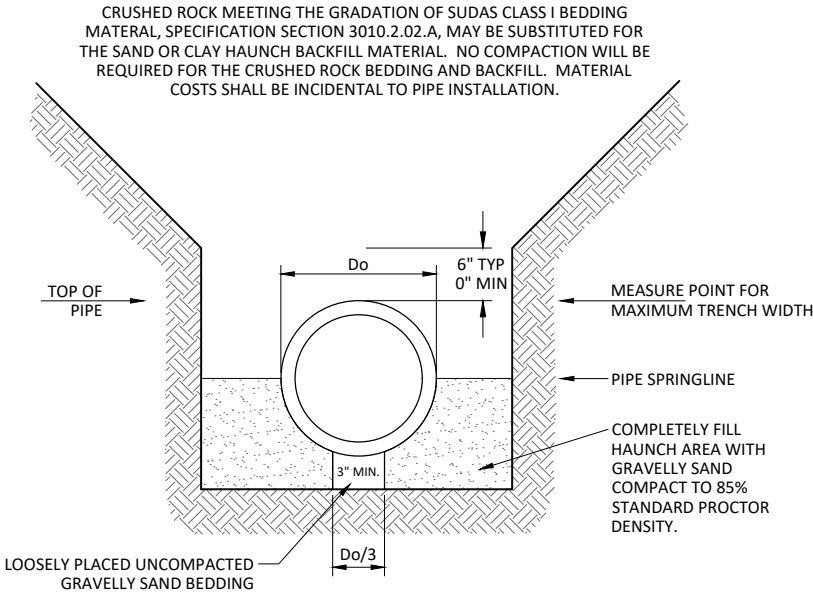
STEP 4A
SOIL OR TRENCH CONDITION CHANGES

TO VERIFY CONTRACTOR'S COMPLIANCE WITH PLAN REQUIREMENTS UNDER THE CHANGED CONDITIONS, ENGINEER MAY STOP WORK AND REQUIRE ADDITIONAL SOIL PROCTOR TESTS AND/OR SOIL DENSITY TESTS SIMILAR TO STEPS 1 THROUGH 3. THE WORK AND COSTS OF THE FIRST TWO REVERIFICATIONS IS SUBSIDIARY TO THE PIPE INSTALLATION. SUBSEQUENT VERIFICATIONS WILL BE CONSIDERED EXTRA WORK.

STEP 4B
CONTRACTOR FAILS TO CONSISTENTLY PERFORM INSTALLATION METHOD OR INSTRUCT OTHER INSTALLERS

IF CONTRACTOR FAILS TO CONSISTENTLY PERFORM OR ADEQUATELY INSTRUCT SUBCONTRACTORS AND/OR SUBSEQUENT PIPE INSTALLATION WORKERS ON THE APPROVED INSTALLATION METHOD, ENGINEER MAY STOP WORK AND REQUIRE ADDITIONAL SOIL PROCTOR TESTS AND/OR SOIL DENSITY TESTS SIMILAR TO STEPS 1 THROUGH 3 TO VERIFY CONTRACTOR'S COMPLIANCE WITH PLAN REQUIREMENTS. THE WORK AND COSTS OF ALL VERIFICATIONS UNDER SUCH CONDITIONS IS SUBSIDIARY TO THE PIPE INSTALLATION.

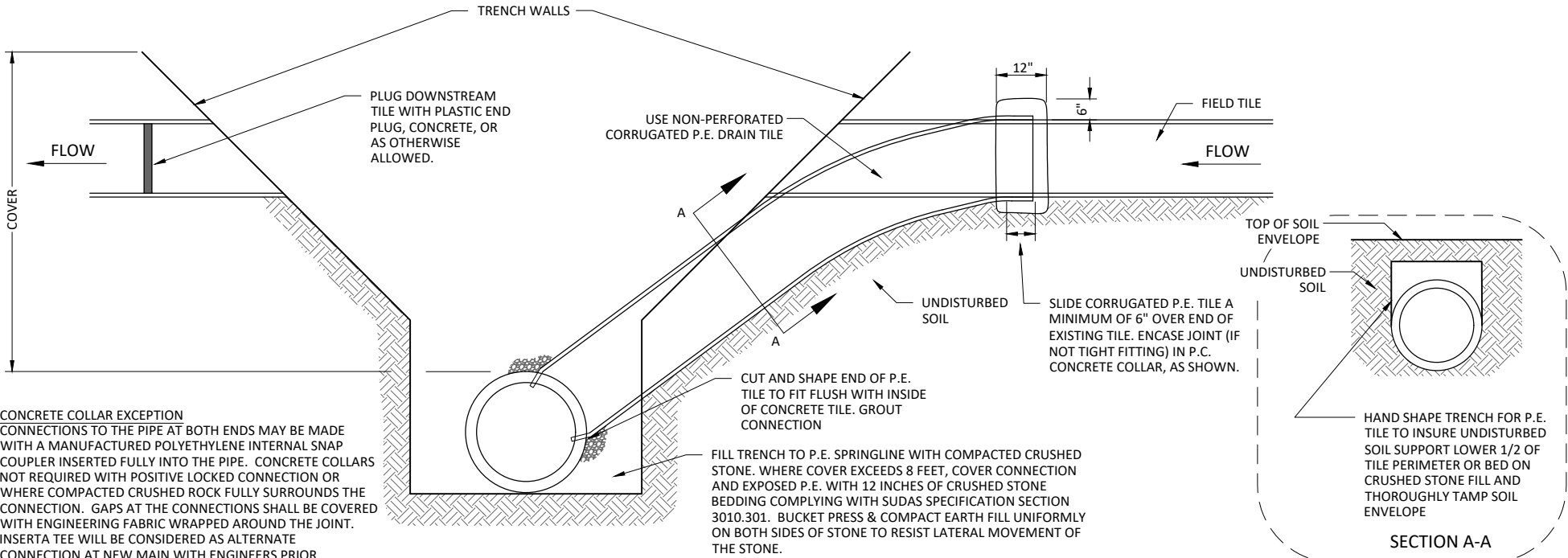
EXCEPTION
IF CONTRACTOR ELECTS TO SHAPE THE TRENCH BOTTOM SUCH THAT A MINIMUM OF 45% OF THE OUTER CIRCUMFERENCE OF THE PIPE IS FIRMLY BEDDED IN AND CONSISTENTLY SUPPORTED BY UNDISTURBED SOIL, PIPE HAUNCH FILL COMPACTION TESTING WILL NOT BE REQUIRED. THE CONTRACTOR IS REQUIRED TO COMPLY WITH A PROPER INSTALLATION METHOD AND TO FULLY COMPLY WITH THE REQUIREMENTS OF THE VERIFICATION OUTLINED ABOVE FOR ALL SITUATIONS WHERE THIS EXCEPTION IS NOT MET.



GRAVELLY SAND BEDDING SHALL BE CONSISTENT WITH THE GRADATION AND OTHER CHARACTERISTICS OF STANDARD AASHTO A1 OR A3 SOIL. A REPRESENTATIVE SAMPLE OF THE MATERIAL AND A GRADATION REPORT OR SUPPLIER'S CERTIFICATION OF COMPLIANCE SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO DELIVERY TO SITE. SEE SOIL DATA IN APPENDIX OF SPECIFICATIONS BOOKLET.

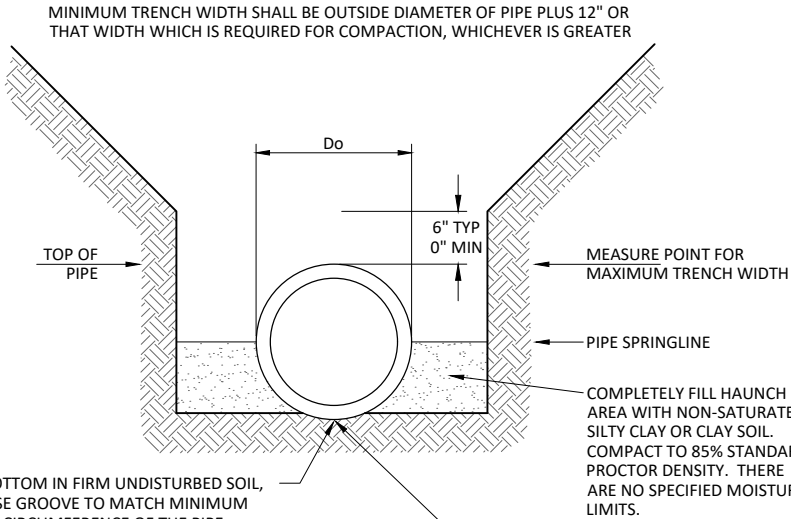
TRENCH INSTALLATION TYPE 3

NOT TO SCALE
SOURCE: AMERICAN CONCRETE PIPE ASSOCIATION
CONCRETE PIPE DESIGN MANUAL



CONCRETE COLLAR EXCEPTION
CONNECTIONS TO THE PIPE AT BOTH ENDS MAY BE MADE WITH A MANUFACTURED POLYETHYLENE INTERNAL SNAP COUPLER INSERTED FULLY INTO THE PIPE. CONCRETE COLLARS NOT REQUIRED WITH POSITIVE LOCKED CONNECTION OR WHERE COMPACTED CRUSHED ROCK FULLY SURROUNDS THE CONNECTION. GAPS AT THE CONNECTIONS SHALL BE COVERED WITH ENGINEERING FABRIC WRAPPED AROUND THE JOINT. INSERTA TEE WILL BE CONSIDERED AS ALTERNATE CONNECTION AT NEW MAIN WITH ENGINEERS PRIOR APPROVAL AND INSTALLATION PER MANUFACTURERS RECOMMENDATION.

TYPICAL FIELD TILE CONNECTION
FOR FIELD TILE UP TO 10" DIAMETER



WHERE TRENCH BOTTOM IN FIRM UNDISTURBED SOIL, SHAPE TRENCH BASE GROOVE TO MATCH MINIMUM 1/6 OF THE OUTER CIRCUMFERENCE OF THE PIPE. WHERE THE SHAPED GROOVE CANNOT BE CONSTRUCTED INTO UNDISTURBED GROUND OR WHERE EXCESS CUT OCCURS OVER EXCAVATE AND PLACE MINIMUM 3-INCH THICK COMPACTED GRAVELLY SAND BEDDING TO RESTORE GRADE SUCH THAT 1/6 OR MORE OF THE OUTER CIRCUMFERENCE OF THE PIPE IS BEDDED. THIS MATERIAL AND WORK IS SUBSIDIARY TO THE INSTALLATION OF THE PIPE. CONTRACTOR MAY SUBSTITUTE PIPE BEDDING ROCK AS THE BEDDING MATERIAL. IT ALSO IS SUBSIDIARY.

WHERE FIRM BASE IS NOT ENCOUNTERED. OVER EXCAVATE AS DIRECTED BY ENGINEER. PLACE CRADLING ROCK AND BED PIPE IN IT SUCH THAT 1/6 OR MORE OF THE OUTER CIRCUMFERENCE OF THE PIPE IS SUPPORTED. THIS ROCK IS PAID FOR UNDER A SEPARATE BID ITEM.

MODIFIED TRENCH INSTALLATION TYPE 4

NOT TO SCALE
SOURCE: AMERICAN CONCRETE PIPE ASSOCIATION
CONCRETE PIPE DESIGN MANUAL

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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 MINNESOTA.

Tyler Conley
LIC. NO. 25044 DATE



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KOSSUTH COUNTY, IOWA
DRAINAGE DISTRICT 82 LATERAL 33B & 40B FACILITY IMPROVEMENTS
RCP INSTALLATION DETAIL

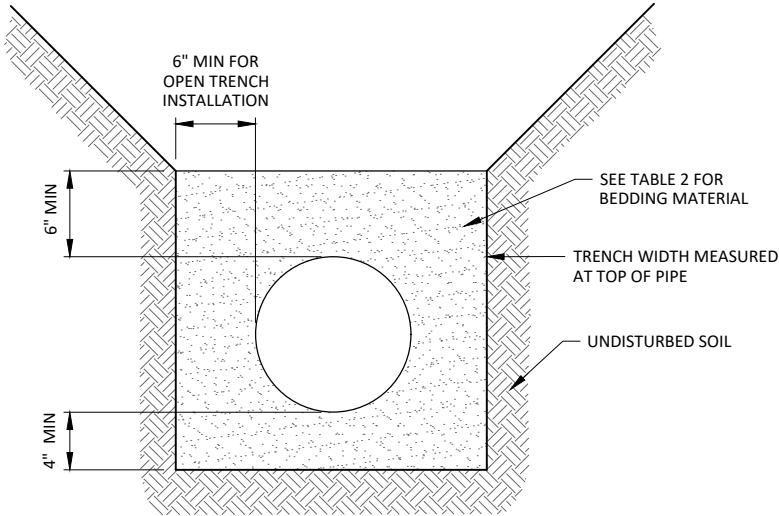
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CORRUGATED POLYETHYLENE DRAINAGE TUBING
MATERIAL & INSTALLATION NOTES

- ALL CPDT AND CONNECTORS FURNISHED SHALL BE IN COMPLIANCE WITH MATERIAL STANDARDS ASTM F405 AND F667, AS APPLICABLE, AND SHALL BE CLASSIFIED AS HEAVY-DUTY UNDER THOSE STANDARDS.
- EXCEPT MODIFIED HEREIN OR OTHERWISE APPROVED BY ENGINEER, ALL CPDT SHALL BE INSTALLED IN COMPLIANCE WITH THE ASTM 449 STANDARD PRACTICE.
- FOR PIPES 6" DIAMETER AND SMALLER A 90° V GROOVE BOTTOM MAY BE USED, FOR ALL LARGER PIPE A TRAPEZOIDAL BOTTOM OR A CIRCULAR BOTTOM CONFORMING TO THE OUTSIDE DIAMETER OF THE PIPE SHALL BE USED. PRIOR TO THE INSTALLATION OF CPDT, CONTRACTOR MUST PROVE TO ENGINEER THAT THE INSTALLATION REQUIREMENTS, INCLUDING THE SHAPE OF THE TRENCH BOTTOM, WILL BE ACCOMPLISHED.
- WHERE TRENCH BOTTOM IS IN FIRM UNDISTURBED SOIL, SHAPE TRENCH BASE GROOVE. WHERE EXCESS CUT OCCURS, OVEREXCAVATE AND PLACE MINIMUM THREE (3) INCH THICK, GRAVELLY SAND BEDDING TO RESTORE GRADE. THIS BEDDING SHALL MEET THAT REQUIRED FOR TRENCH INSTALLATION TYPE 3 ON PLAN SHEET C.02. IF DUE TO CONTRACTOR ERROR THIS MATERIAL AND WORK IS SUBSIDIARY TO THE INSTALLATION OF THE PIPE. CONTRACTOR MAY SUBSTITUTE PIPE BEDDING ROCK AS THE BEDDING MATERIAL.
- NATIVE SOILS MAY BE USED AS BACKFILL MATERIAL UNLESS UNSTABLE TRENCH CONDITIONS PREVENT THE TRENCH BOTTOM HOLDING THE SHAPED GROOVE. IF TRENCH BOTTOM WILL NOT HOLD GROOVE SHAPE CONTRACTOR SHALL NOTIFY ENGINEER IMMEDIATELY. A FLAT BOTTOM TRENCH INSTALLATION WILL THEN BE ASSUMED. THE REQUIRED BEDDING MATERIAL WILL BE PAID UNDER THE TILE TRENCH STABILIZATION AND CRADLING ROCK BID ITEM.
- MINIMUM TRENCH WIDTH IS PIPE OUTSIDE DIAMETER PLUS FOUR (4) INCHES FOR PLOWED INSTALLATION AND PIPE OUTSIDE DIAMETER PLUS TWELVE (12) INCHES FOR OPEN TRENCH INSTALLATION.
- ALL LATERAL CONNECTIONS, ELBOWS, TEES, ALIGNMENT CURVES, START HOLES AND ALL PORTIONS OF THE TRENCH NOT MEETING THE GROOVED TRENCH INSTALLATION REQUIREMENTS SHALL BE FILLED TO A MINIMUM OF SIX (6) INCH COVER OVER THE PIPE WITH GRADED CRUSHED STONE OR GRAVEL AS SHOWN ON TABLE 2 OF THIS SHEET. UNLESS DUE TO CONTRACTOR ERROR THIS BEDDING MATERIAL WILL BE PAID UNDER THE TILE TRENCH STABILIZATION AND CRADLING ROCK BID ITEM.
- MANUFACTURER'S ENDCAPS SHALL BE INSTALLED AT THE TERMINATION OF EACH LINE UNLESS A CONNECTION TO AN EXISTING DRAIN IS MADE.
- WITH THE INSTALLATION OF THE FIRST REACH OF CPDT ON THE PROJECT, CONTRACTOR IS REQUIRED TO WORK WITH THE ENGINEER TO CHECK AND CONFIRM THAT THE PIPE STRETCH, IF ANY, DOES NOT EXCEED 5%.
- ALIGNMENT TURNS MAYBE MADE USING EITHER A MANUFACTURED FITTING OR CURVING THE LINE WITH A 25' MINIMUM RADIUS.

Table 1 Maximum Allowable Buried Depth to Flowline of CPDT					
Nominal Pipe Diameter (IN)	Pipe Quality (ASTM)	Trench Width at Top of the Pipe (FT)			
		12"	18"	24"	30" or Greater
4	Standard	13	7	5.5	5
	Heavy-duty	Any	10	7	6
6	Standard	10	7	5.5	5
	Heavy-duty	Any	9.5	6.5	6
8	Standard	10	7	5.5	5
	Heavy-duty	Any	10	7	6
10	Heavy-duty	...	9	7	6
12	Heavy-duty	...	9	7	6
15	Heavy-duty	...	...	7	6
Table 2 Acceptable Bedding Material and Compaction Requirements					
Description	Percentage Passing Sieve Sizes			Minimum Standard Density (%)	Maximum Compaction Layer Height (IN.)
	1"	3/4"	No. 4		
Crushed Stone Crushed Gravel*	100%	> 95%	< 5%	Dumped	18
* Class 1 Bedding Material Per SUDAS 3010.202A is an Allowable Substitute					

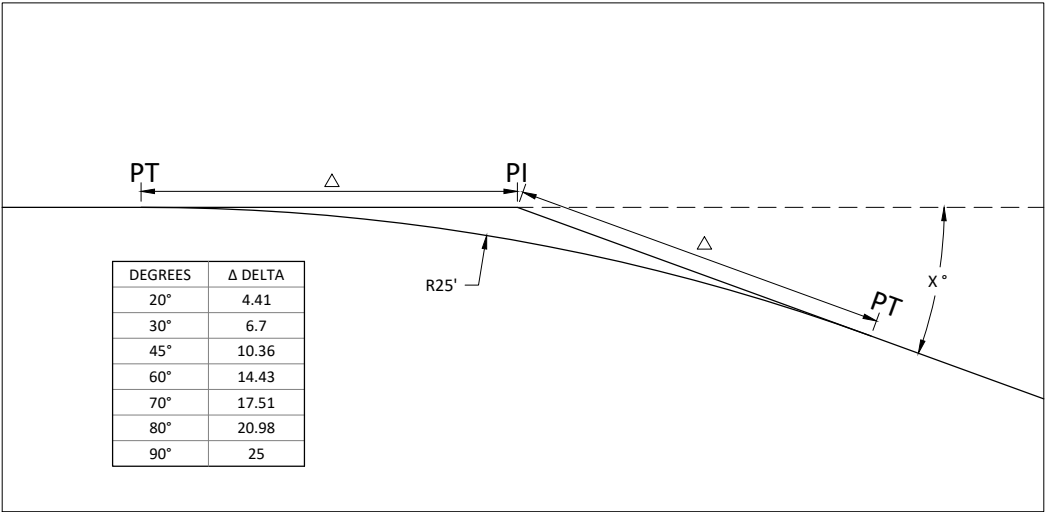


FILL TRENCH TO 6" ABOVE TOP OF PIPE WITH CRUSHED STONE OR GRAVEL MEETING THE REQUIREMENTS IN TABLE 2. BEDDING MATERIAL SHALL BE INCIDENTAL TO THE PIPE INSTALLATION.

FLAT BOTTOM TRENCH INSTALLATION

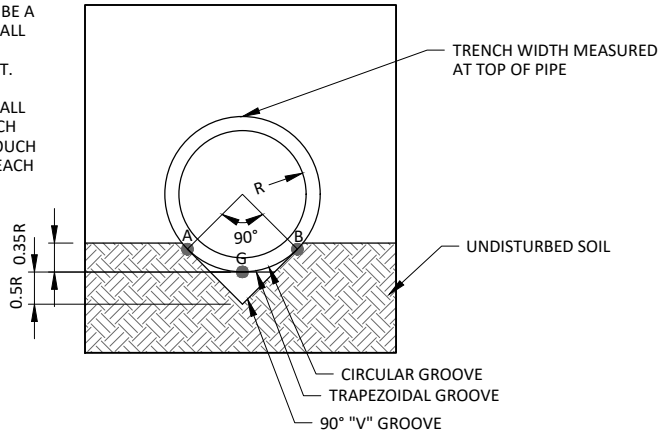
NOT TO SCALE
SOURCE: ASTM F449

NOTE: THIS IS AN ALLOWED ALTERNATIVE INSTALLATION FOR CPDT



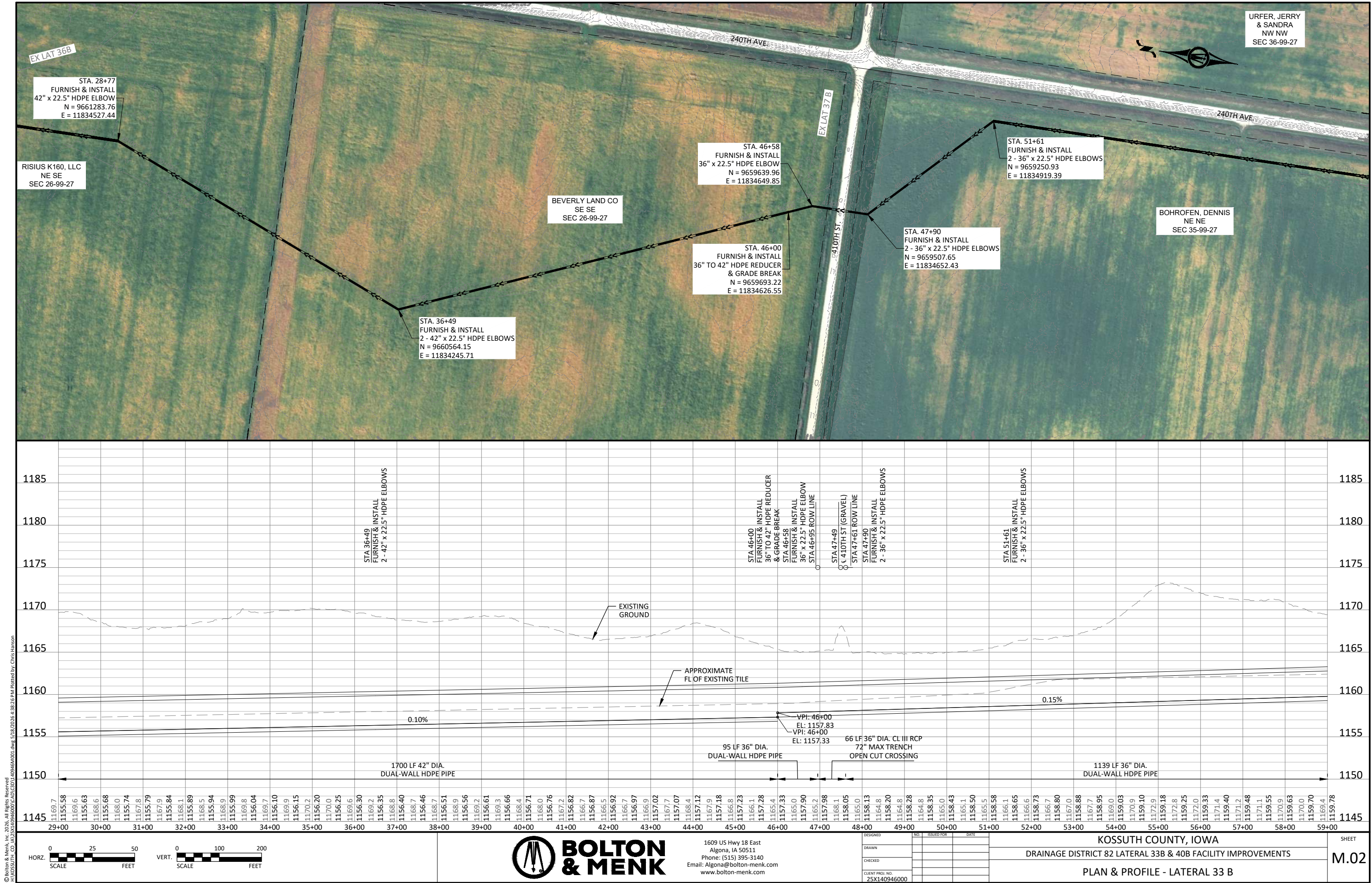
THE CIRCULAR GROOVE SHALL BE A MINIMUM 0.35R DEEP AND SHALL MATCH THE OUTSIDE CURVE SHAPE OF THE DEFLECTED CPDT.

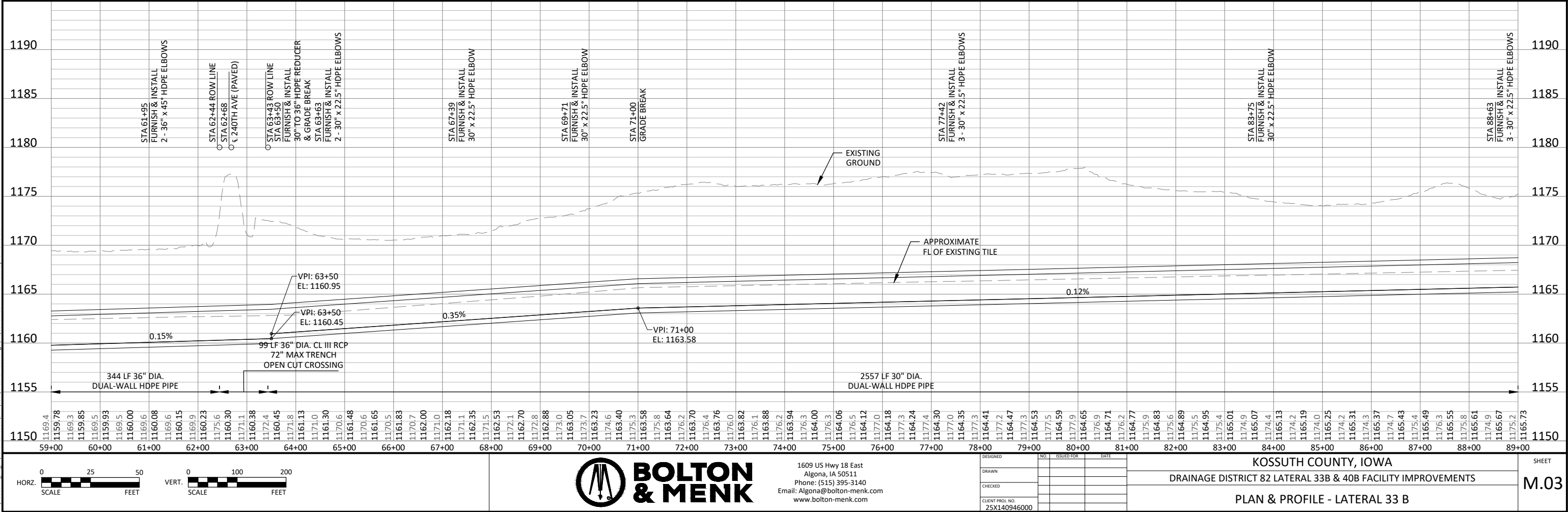
THE TRAPEZOIDAL GROOVE SHALL BE SHAPED AND ADJUSTED SUCH THAT POINTS A, B, & C WILL TOUCH THE UNDEFLECTED CPDT FOR EACH SIZE INSTALLED.

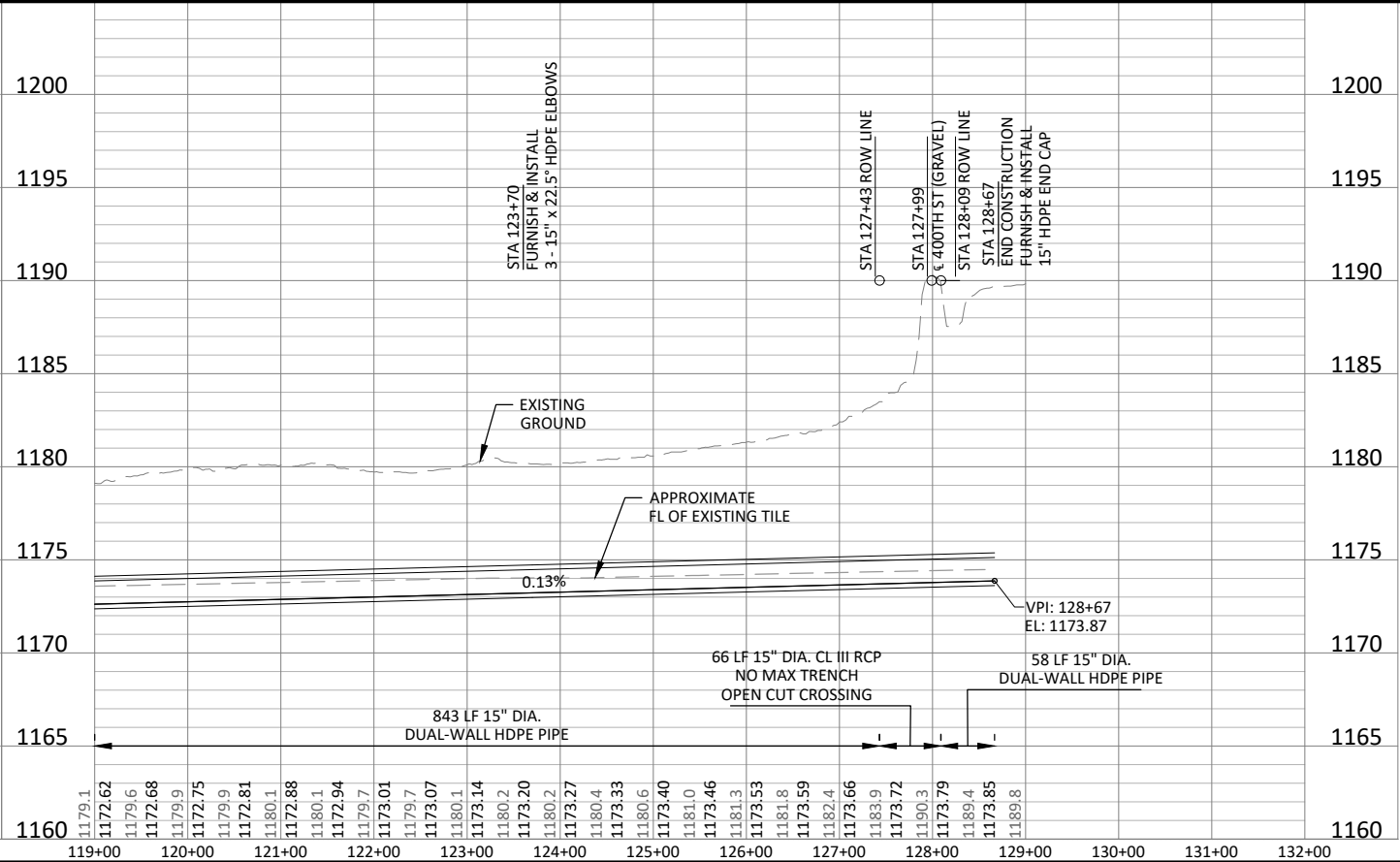
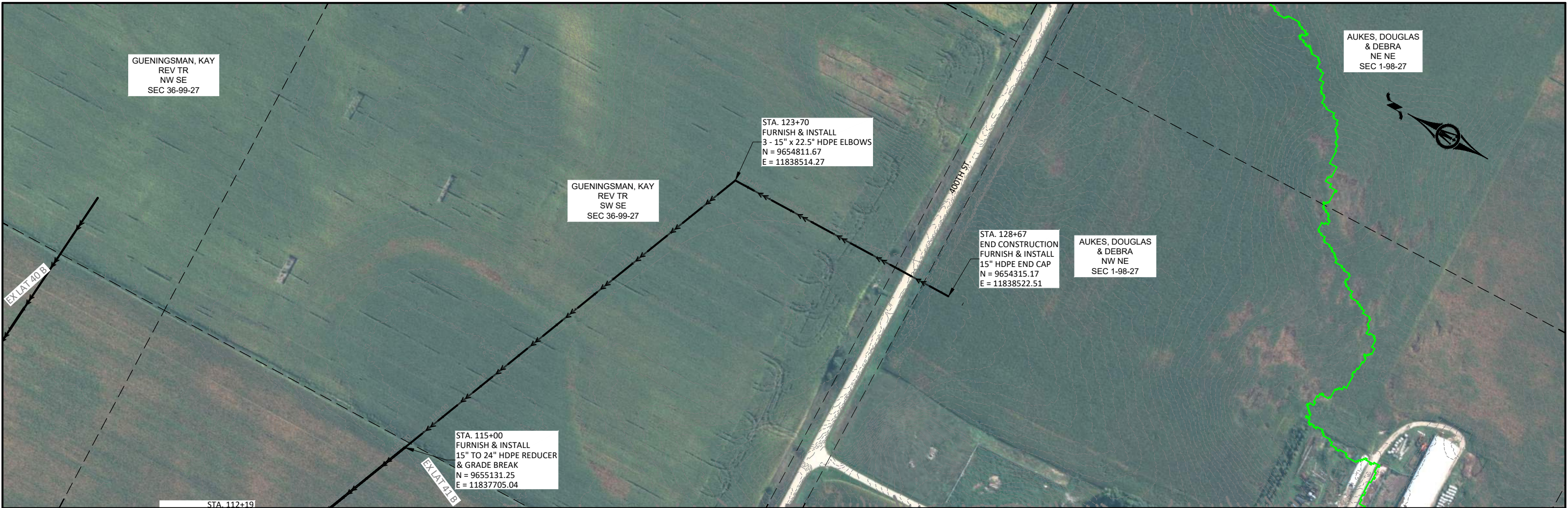


PREFERRED TRENCH INSTALLATION BOTTOM

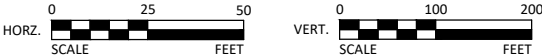
TRAPEZOIDAL GROOVE, "V" GROOVE, & CIRCULAR GROOVE
NOT TO SCALE
SOURCE: ASTM F449







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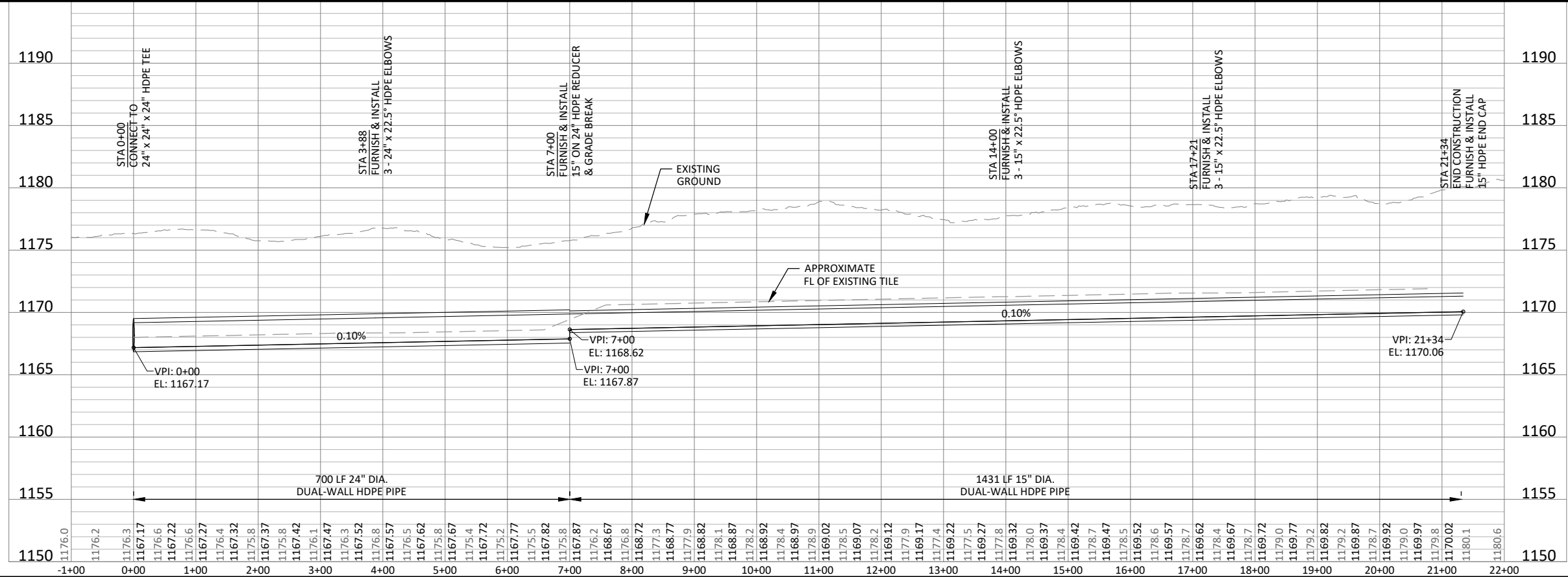
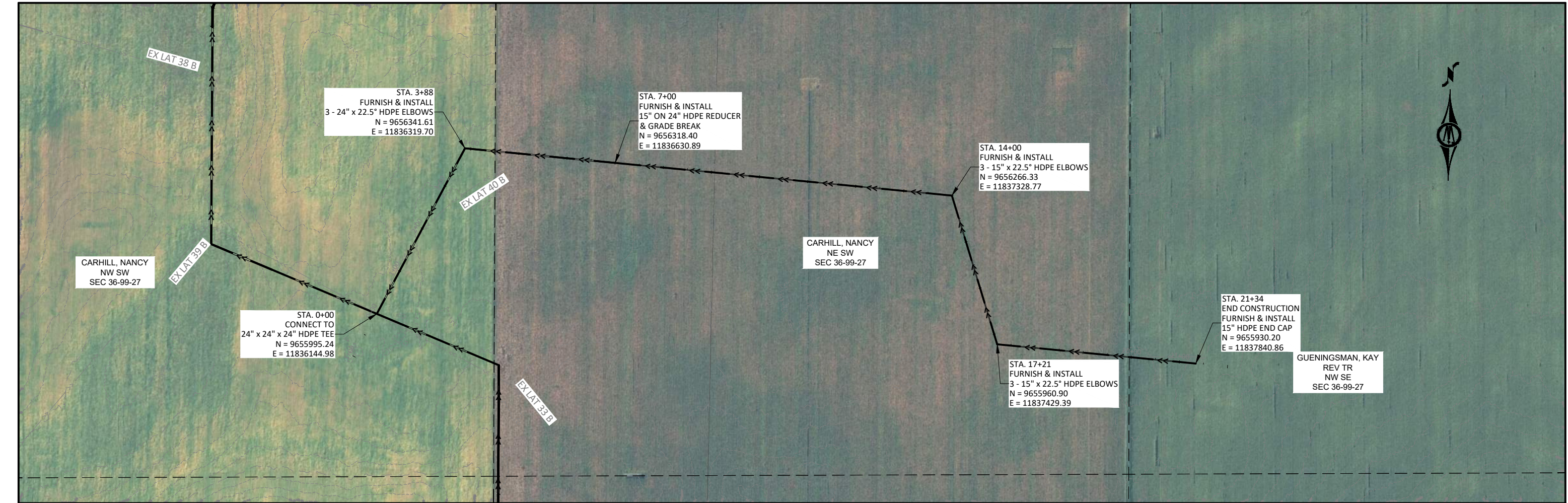
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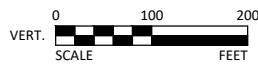
KOSSUTH COUNTY, IOWA
DRAINAGE DISTRICT 82 LATERAL 33B & 40B FACILITY IMPROVEMENTS

PLAN & PROFILE - LATERAL 33 B

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KOSSUTH COUNTY, IOWA
DRAINAGE DISTRICT 82 LATERAL 33B & 40B FACILITY IMPROVEMENTS

PLAN & PROFILE - LATERAL 40 B

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