



Real People. Real Solutions.

Engineer's Report

Drainage District No. 116

Laterals 12 & 14

Lateral Tile Improvements

Kossuth County, Iowa

Filed: July 28, 2026

Submitted by:

Bolton & Menk, Inc.
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Proj. No. 26X.143153000

Certification

Engineer's Report

for

Drainage District No. 116
Laterals 12 & 14
Lateral Tile Improvements

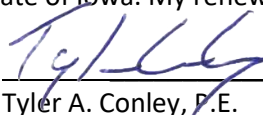
Kossuth County, Iowa

July 28, 2026



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

By:



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

Date:

7/28/2026

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I. INTRODUCTION

A. SCOPE OF WORK

The purpose of this report is to provide information relative to drainage relief requested by landowners of Drainage District No. 116, Kossuth County, Iowa (DD116). The Board of Supervisors, acting as Trustees, appointed Tyler A. Conley, P.E., Bolton & Menk, Inc. to complete the necessary preliminary survey, study, and engineering report.

This report addresses landowner requests for facility improvements associated with Lateral 12 and Lateral 14 of DD116. This report examines the conditions that would be necessary to improve the drainage capacities of the district facilities to a modern drainage coefficient recommendation. A copy of the drainage petition is attached with this report in Appendix A.

B. LOCATION & DISTRICT FACILITIES

The watershed of DD116 lies within Kossuth County, located generally east of Irvington, in Sections 22, 23, 26, 27, 34, & 35 of Irvington Township (T-95-N, R-28-W), Sections 1, 2, 3, 10, 11, 12, 13, & 14 of Sherman Township (T-94-N, R-28-W), and Section 7 of Lu Verne Township (T-94-N, R-27-W).

More specifically to this report the watersheds of Lateral 12 and Lateral 14 are in Sections 1, 2, 11, & 12 of Sherman Township (T-94-N, R-28-W).

Lateral 12 serves as the outlet for Lateral 14. Lateral 12 outlets to the Main Open Ditch of DD116, which outlets to Prairie Creek. Prairie Creek flows to the Boone River, then the Des Moines 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 DD116 and the profiles of the district facilities can be found in Appendix D.

HISTORY SUMMARY

Bolton & Menk investigated DD116 historical records found at the Kossuth County Courthouse and information provided from landowners of recent private developments. This information was gathered in order to better understand the drainage district's history and the existing infrastructure that would need to be considered. A summary of events based on these records is as follows:

Since the district's establishment in 1916, it does not appear that any significant work or changes have occurred to either Lateral 12 or Lateral 14. Lateral 12 is reported as a 20-inch diameter tile at the outlet and a 16-inch diameter tile at the upstream end. Lateral 14 is a 10-inch diameter tile.

More recently, there have been private drainage implementations that have raised questions about district benefits and outlet availability. Private stormwater improvements have been constructed on grounds that are outside of the historical display boundary of the district. The landowner of the ground that has constructed those improvements is interested in gaining an improved outlet for that private system. Despite that ground currently residing outside of the historical display boundary, that ground does appear on the assessment schedule for DD116, and as a result is due an outlet. The existing schedule of benefits does not denote acres nor is it divided into individual facilities. Therefore, an examination of the potentially benefitted area was called for. This review of benefitted acres was conducted using aerial photographs, light

detection and ranging (LiDAR) elevation data, and federal stormwater data. This review determined that a majority of the southern half of Section 1 of Sherman Township naturally surface flows to the upstream end of Lateral 14 despite the knowledge of private tile that predominately drains those acres to the east. All the data utilized in the review of the benefitted watershed can be found in Appendix E.

II. INVESTIGATION

A. SURVEY & INVESTIGATION

A field review and preliminary survey were performed for the Laterals 12 and 14 tile facilities of DD116 as well as the Main Open Ditch at the receiving location of Lateral 12. It was determined that Lateral 12 and Lateral 14 are undersized by today's standards, but that the Main Open Ditch has sufficient elevation and depth to facilitate an increase in tile size. For reference and for visualization of the areas that would benefit most from this potential improvement, below are two high resolution aerial photos that were available through the County. These aerial photos display the preliminary total surface watershed in red and the existing district facilities in black.

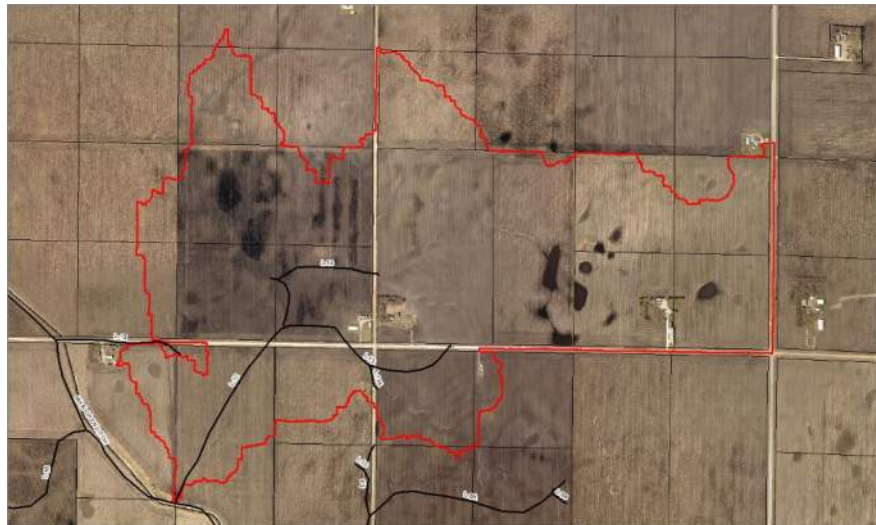


Figure 1-2018 Aerial Photo



Figure 2-2024 Aerial Photo

Additionally, an informational meeting was held with potentially benefited landowners on June 2, 2026. At the informational meeting the history review and watershed analysis were discussed. From the informational meeting the number of opposing landowners was tabulated and used to determine if there was enough opposition to end the project via remonstrance. From that tabulation it was determined that an insufficient amount of opposition was expressed to satisfy the requirements of remonstrance. Remonstrance requires that a majority of landowners, owning seventy percent of the land to be benefited object to end an improvement project. Therefore, this report was completed to satisfy the request of the petitioner that requested an evaluation of an increase in capacity in the form of the $\frac{1}{2}$ ", $\frac{3}{4}$ ", and 1" drainage coefficient, and that landowners should begin the process of obtaining certified wetland determinations.

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 12 and Lateral 14, the capacity of the Facilities could be calculated. By today's standards, Lateral 12 and Lateral 14 would be undersized. Looking at the Lateral 12 Tile, much of the tile is at or below 0.17 inches per day, or approximately 34% of the $\frac{1}{2}$ " drainage coefficient. The capacity of Lateral 14 was calculated at 0.07 inches per day or approximately 14% of the $\frac{1}{2}$ " drainage coefficient.

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 typical minimum drainage design 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 estimated tile capacities for both Lateral 12 and Lateral 14.

Because of the existing tile capacities and landowner interest for an improvement of the system, we included pipe sizing for $\frac{1}{2}$ ", $\frac{3}{4}$ ", and 1" drainage coefficients. It is recommended the landowners consider these options and take action to gain a minimum of a $\frac{1}{2}$ " per day drainage coefficient for the Lateral 12 and Lateral 14 tile systems.

III. PROPOSED IMPROVEMENT

A. LATERALS 12 & 14 IMPROVEMENTS

The Lateral 12 and Lateral 14 tiles are undersized by the design standards of today and consideration should be made for an improvement to increase capacity. The existing tile should be replaced with the appropriately sized pipe at the correct grade to provide at minimum a $\frac{1}{2}$ " drainage coefficient, while also being installed at a depth to provide approximately 3 feet of ground cover.

The improved tile capacity should account for the additional lands that naturally surface drain to Lateral 14 and Lateral 12 via Lateral 14. There should also be consideration of extending Lateral 14 to provide an outlet for all assessed landowners. These considerations would constitute additional project construction expenses that would be distributed amongst the benefited landowners during the reclassification process. The split would be based on the system of overall land benefit that is discussed in the Reclassification Section of this report.

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

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

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

Lastly, if the tile is improved in longer segments that cross public roadways, the cost associated with any tile work 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 tile would be set at approximately 40 to 65 feet on either side of the tile centerline.

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

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

If there are farm program buffer strips in place along the open ditch. There are some manageable drawbacks which must be addressed by the owners of the buffer strips and conservation acres.

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

IV. OPINIONS OF PROBABLE COST

The cost estimates for the improvement options are contained in Appendix C. These estimates represent our best judgment of the probable cost, based upon our experience with similar projects. The quantities and unit costs for construction are believed to be reasonably accurate for use in this report and hearing. Actual costs are subject to the market for the respective components, and to other economic forces. These estimates carry no actual or implied guarantees. Cost Estimates are provided for the ½", ¾" and 1" drainage coefficients.

V. FARM PROGRAM COMPLIANCE

A. FARM PROGRAM WETLAND CONSERVATION RULES

The farm program wetland conservation rules are administered by the USDA Farm Service Agency. The USDA Natural Resources Conservation Service (NRCS) provides technical assistance. This technical assistance includes policing program violations and making certified wetland determinations. At the time of the filing of this report, we 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, any 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/herself in technical violation of the farm program rules and be subject to a USDA claim for the forfeiture and possible 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 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 inexpensive. 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.

VI. WATER QUALITY

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

However, additional steps are required to slow, impound, or infiltrate water in order to receive benefits in water quality. Water quality is a growing topic throughout the nation and more recently throughout Iowa. The particle loads and nutrient levels within drainage water is a concern that is receiving increased scrutiny. Processes and reduction practices are being

developed and incorporated on farms and into projects throughout Iowa, which reduce nitrogen loss and improve water quality. Enhancement of water quality is possible through many different drainage applications that can see both immediate and long-term benefits.

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

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

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

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

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

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

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

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

VII. ANNEXATION

Upon review of the existing watershed and assessment boundary, it was found that lands that would benefit from the proposed project are not currently assessed in DD116. The District plat in Appendix D shows these approximately 128 acres. The Board of Supervisors are able to annex these lands under Section 468.119. of the Iowa Code which states “...if the board becomes convinced that additional lands contiguous to the district, and without regard to

county boundaries, are benefited by the improvement to said district as contemplated in Section 468.126, the board may adopt with or without a petition from owners of the proposed annexed lands, a resolution of necessity for annexation of such addition land.”

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

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

VIII. RECLASSIFICATION

As stated earlier, if 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.”*

Reclassification of benefits is a separate process with a report of commissioners and formal hearing. This reclassification process is most commonly performed near the end of the construction process and is intended to apportion the total project cost to the benefited lands. The schedule of benefits for payment of the project is prepared by the engineer and two disinterested landowners from within the county and it is designed to be a fair and equitable distribution of costs based on technical data and factor calculations. Most often the factors include area, proximity, facility use, land wetness, and land use. At the formal hearing the Board of Supervisors, as Trustees for the district, have the final verdict regarding the apportionment of costs.

IX. SUMMARY & DISCUSSION

Recommendations

Lateral 12 and Lateral 14 Improvement Recommended

This report has confirmed the need for drainage relief for Drainage District No. 116. The Lateral 12 and Lateral 14 tiles of DD116 are aging and undersized. The work described herein can accomplish that relief. At a minimum, we recommend proceeding with the ½” drainage coefficient improvement option. The proposed improvement is considered to be of public benefit and is conducive to public health, convenience or welfare.

Reclassification and Annexation Recommended

There are material inequities in the current Lateral 12 and Lateral 14 assessment schedules used by the District. The Iowa Code Section 468.65 states: *“When, after a drainage or levee district has been established... or when a repair, improvement, or extension has become necessary, the board may consider whether the existing assessments are equitable as a basis*

for payment of the expense of maintaining the district and of making the repair, improvement or extension. If they find the assessments to be generally inequitable, they shall order a reclassification of all property subject to assessment.” Additionally, if these inequities were to be fixed, it is recommended that annexation be considered in order to fairly distribute the costs of future maintenance, as well as any repair or improvements to lands not currently included in the current assessment schedule.

Installment Payments

Iowa drainage law allows 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. 116 take appropriate action, with legal guidance, to accomplish the following:

1. Tentatively approve this engineer’s report and schedule a public hearing to receive and consider the input of the District landowners.
2. Adopt the improvement alternate recommended for construction, modified as deemed appropriate, to satisfy the desires of the District.
3. Direct the engineer to prepare final plans and specifications for the adopted plan and proceed toward a bid letting.
4. Initiate annexation of benefited lands not on the assessment schedule. A separate report on annexation and public hearing on the annexation report would be required.
5. Initiate reclassification of benefits for Drainage District No. 116 Lateral 12 and Lateral 14. A separate commissioners’ report on reclassification and public hearing on the commissioners’ report would be required.

Respectfully submitted,
Bolton & Menk, Inc.

Tyler A. Conley, P.E.
Project Manager

Appendix A: Petition

DRAINAGE PETITION

TO THE BOARD OF SUPERVISORS OF Kossuth COUNTY, IOWA:The undersigned ask that a drainage we would like to use an outlet to
commencing at DD116 that we have been paying for but not usingand running thence Parcel 2 in the SW Quarter of section 1, Township 94
Range 28

and terminating at _____

be _____

Your petitioners further state that the lands situated in Section 1 + going through Section 14
to grab outlet in DD116

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 project.

NAMES

Mark A. Sch

NAMES

Appendix B: Existing Tile Capacities

CAPACITY ANALYSIS

DRAINAGE DISTRICT NO. 116

KOSSUTH COUNTY, IOWA

0.5" DRAINAGE COEFFICIENT

2026

Lateral 12											
Size (in)	Grade (%)	n	S (ft/ft)	A (ft)	P (ft)	R (ft)	Flow Capacity (cfs)	Drainage Area (ac)	Drainage Coefficient (in/day)	% of 1/2" Coefficient	Required Size
20	0.10	0.012	0.0010	2.18	5.24	0.417	4.78	665	0.17	34.2%	30
16	0.10	0.012	0.0010	1.40	4.19	0.333	2.64	467	0.13	26.9%	30

Lateral 14											
Size (in)	Grade (%)	n	S (ft/ft)	A (ft)	P (ft)	R (ft)	Flow Capacity (cfs)	Drainage Area (ac)	Drainage Coefficient (in/day)	% of 1/2" Coefficient	Required Size
10	0.20	0.012	0.0020	0.55	2.62	0.208	1.06	357.9	0.07	14.2%	24
10	0.20	0.012	0.0020	0.55	2.62	0.208	1.06	353	0.07	14.4%	24

CAPACITY ANALYSIS									
DRAINAGE DISTRICT NO. 116									
KOSSUTH COUNTY, IOWA									
0.75" DRAINAGE COEFFICIENT									
2026									

Lateral 12									
Size (in)	Grade (%)	n	S (ft/ft)	A (ft)	P (ft)	R (ft)	Flow Capacity (cfs)	Drainage Area (ac)	Drainage Coefficient (in/day)
20	0.10	0.012	0.0010	2.18	5.24	0.417	4.78	665	0.17
16	0.10	0.012	0.0010	1.40	4.19	0.333	2.64	467	0.13
Lateral 14									
Size (in)	Grade (%)	n	S (ft/ft)	A (ft)	P (ft)	R (ft)	Flow Capacity (cfs)	Drainage Area (ac)	Drainage Coefficient (in/day)
10	0.20	0.012	0.0020	0.55	2.62	0.208	1.06	357.9	0.07
10	0.20	0.012	0.0020	0.55	2.62	0.208	1.06	353	0.07
Lateral 14									
Size (in)	Grade (%)	n	S (ft/ft)	A (ft)	P (ft)	R (ft)	Flow Capacity (cfs)	Drainage Area (ac)	Drainage Coefficient (in/day)
10	0.20	0.012	0.0020	0.55	2.62	0.208	1.06	357.9	0.07
10	0.20	0.012	0.0020	0.55	2.62	0.208	1.06	353	0.07

CAPACITY ANALYSIS

DRAINAGE DISTRICT NO. 116

KOSSUTH COUNTY, IOWA

1.0" DRAINAGE COEFFICIENT

2026

Lateral 12											
Size (in)	Grade (%)	n	S (ft/ft)	A (ft)	P (ft)	R (ft)	Flow Capacity (cfs)	Drainage Area (ac)	Drainage Coefficient (in/day)	% of 1" Coefficient	Required Size
20	0.10	0.012	0.0010	2.18	5.24	0.417	4.78	665	0.17	17.1%	42
16	0.10	0.012	0.0010	1.40	4.19	0.333	2.64	467	0.13	13.4%	42

Lateral 14											
Size (in)	Grade (%)	n	S (ft/ft)	A (ft)	P (ft)	R (ft)	Flow Capacity (cfs)	Drainage Area (ac)	Drainage Coefficient (in/day)	% of 1" Coefficient	Required Size
10	0.20	0.012	0.0020	0.55	2.62	0.208	1.06	357.9	0.07	7.1%	36
10	0.20	0.012	0.0020	0.55	2.62	0.208	1.06	353	0.07	7.2%	36

Appendix C: Opinions of Probable Cost

Engineer's Opinion of Probable Cost
Drainage District No. 116
Lateral Tiles 12 & 14
Kossuth County, Iowa
2026

Division 1 - Lateral 12 - Work On Private Property - 0.5" Drainage Coefficient

Item	Description	Unit	Quantity	Unit Price	Total
101	Drain Tile, Trenched CMP 30" DIA.	LF	20	\$75	\$1,500.00
102	Lateral Tile Connections, 10" Dia. Or Smaller	EA	12	\$450	\$5,400
103	Lateral Tile Connections, 12" Dia. Or Larger	EA	3	\$900	\$2,700
104	30" Dia. HDPE Elbow Section, Fabrication Only	EA	8	\$1,300	\$10,400
105	Spot Tile Exploration	HR	24	\$300	\$7,200
106	Trench Foundation Stone	TN	250	\$30	\$7,500
107	Drain Tile, Trenched, HDPE Dual Wall 30" Dia.	LF	3,300	\$60	\$198,000
108	Crush Pipe in Place, Existing Tile	LF	3,300	\$6	\$19,800
109	Fence Cuts	EA	5	\$500	\$2,500
110	Mobilization	LS	1	\$12,750	\$12,750
111	Construction Contingency	LS	1	\$27,750	\$27,750

Estimated Division 1 Construction Cost \$295,500

Division 2 - Lateral 14 - Work On Private Property - 0.5" Drainage Coefficient

Item	Description	Unit	Quantity	Unit Price	Total
201	Lateral Tile Connections, 10" Dia. Or Smaller	EA	4	\$450	\$1,800
202	Lateral Tile Connections, 12" Dia. Or Larger	EA	2	\$900	\$1,800
203	24" Dia. HDPE Elbow Section, Fabrication Only	EA	3	\$1,200	\$3,600
204	Spot Tile Exploration	HR	8	\$300	\$2,400
205	Trench Foundation Stone	TN	310	\$30	\$9,300
206	Drain Tile, Trenched, HDPE Dual Wall 24" Dia.	LF	4,434	\$50	\$221,700
207	Crush Pipe in Place, Existing Tile	LF	1,400	\$6	\$8,400
208	Fence Cuts	EA	2	\$500	\$1,000
209	Mobilization	LS	1	\$12,500	\$12,500
210	Construction Contingency	LS	1	\$25,500	\$25,500

Estimated Division 2 Construction Cost \$288,000

Division 3 - Lateral 12 - Road Crossing 150th St. - 0.5" Drainage Coefficient

Item	Description	Unit	Quantity	Unit Price	Total
301	Trenchless, Steel Casing 0.469 Min. Wall, 30" Dia.	LF	90	\$1,000	\$90,000
302	Traffic Control	LS	1	\$1,500	\$1,500
303	Mobilization	LS	1	\$9,000	\$9,000

Estimated Division 3 Construction Cost \$100,500

Engineer's Opinion of Probable Cost
Drainage District No. 116
Lateral Tiles 12 & 14
Kossuth County, Iowa
2026

Division 4 - Lateral 33B - Road Crossing 180th Ave - 0.5" Drainage Coefficient					
Item	Description	Unit	Quantity	Unit Price	Total
401	Drain Tile, Trenched, Class III R.C.P., 24" Dia.	LF	66	\$130	\$8,580
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	\$1,420	\$1,420
Estimated Division 4 Construction Cost					\$15,500
Non-Construction Costs					
Construction Related Damages					\$14,000
Basic Engineering Services					
Survey, Study & Report, Meetings & Hearing					\$30,000
Reclassification					\$30,000
Construction Plans, Specifications, & Bid Letting					\$35,000
Construction Engineering Services, Staking, & Inspection					\$50,000
Legal Services, Publications, Mailings, Etc..					\$4,200
Finance, Interest & Contingency					<u>\$35,000</u>
Estimated Total Non-Construction Costs					\$198,200
Estimated Total Project Cost - 0.5" Drainage Coefficient Lateral 12 Improvement					\$395,874
Estimated Average Cost Per Benefited Acre (665)					\$595
Estimated Average Cost Per Acre Per Year (10 years, 5% interest)					\$73.42
Estimated Average Cost Per Acre Per Year (20 years, 5% interest)					\$45.49
Estimated Total Project Cost - 0.5" Drainage Coefficient Lateral 14 Improvement					\$385,826
Estimated Average Cost Per Benefited Acre (358)					\$1,078
Estimated Average Cost Per Acre Per Year (10 years, 5% interest)					\$132.92
Estimated Average Cost Per Acre Per Year (20 years, 5% interest)					\$82.36

Engineer's Opinion of Probable Cost
Drainage District No. 116
Lateral Tiles 12 & 14
Kossuth County, Iowa
2026

Division 1 - Lateral 12 - Work On Private Property - 0.75" Drainage Coefficient

Item	Description	Unit	Quantity	Unit Price	Total
101	Drain Tile, Trenched CMP 36" DIA.	LF	20	\$85	\$1,700
102	Lateral Tile Connections, 10" Dia. Or Smaller	EA	12	\$450	\$5,400
103	Lateral Tile Connections, 12" Dia. Or Larger	EA	3	\$900	\$2,700
104	36" Dia. HDPE Elbow Section, Fabrication Only	EA	8	\$1,650	\$13,200
105	Spot Tile Exploration	HR	24	\$300	\$7,200
106	Trench Foundation Stone	TN	250	\$30	\$7,500
107	Drain Tile, Trenched, HDPE Dual Wall 36" Dia.	LF	3,300	\$80	\$264,000
108	Crush Pipe in Place, Existing Tile	LF	3,300	\$6	\$19,800
109	Fence Cuts	EA	5	\$500	\$2,500
110	Mobilization	LS	1	\$16,200	\$16,200
111	Construction Contingency	LS	1	\$33,800	\$33,800

Estimated Division 1 Construction Cost \$374,000

Division 2 - Lateral 14 - Work On Private Property - 0.75" Drainage Coefficient

Item	Description	Unit	Quantity	Unit Price	Total
201	Lateral Tile Connections, 10" Dia. Or Smaller	EA	4	\$450	\$1,800
202	Lateral Tile Connections, 12" Dia. Or Larger	EA	2	\$900	\$1,800
203	30" Dia. HDPE Elbow Section, Fabrication Only	EA	3	\$1,300	\$3,900
204	Spot Tile Exploration	HR	8	\$300	\$2,400
205	Trench Foundation Stone	TN	310	\$30	\$9,300
206	Drain Tile, Trenched, HDPE Dual Wall 30" Dia.	LF	4,434	\$60	\$266,040
207	Crush Pipe in Place, Existing Tile	LF	1,400	\$6	\$8,400
208	Fence Cuts	EA	2	\$500	\$1,000
209	Mobilization	LS	1	\$14,700	\$14,700
210	Construction Contingency	LS	1	\$31,660	\$31,660

Estimated Division 2 Construction Cost \$341,000

Division 3 - Lateral 12 - Road Crossing 150th St. - 0.75" Drainage Coefficient

Item	Description	Unit	Quantity	Unit Price	Total
301	Trenchless, Steel Casing 0.531 Min. Wall, 36" Dia.	LF	90	\$1,100	\$99,000
302	Traffic Control	LS	1	\$1,500	\$1,500
303	Mobilization	LS	1	\$10,000	\$10,000

Estimated Division 3 Construction Cost \$110,500

Division 4 - Lateral 33B - Road Crossing 180th Ave - 0.75" Drainage Coefficient

Item	Description	Unit	Quantity	Unit Price	Total
401	Drain Tile, Trenched, Class III R.C.P., 30" Dia.	LF	66	\$140	\$9,240
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	\$1,460	\$1,460

Estimated Division 4 Construction Cost \$16,200

Non-Construction Costs

Construction Related Damages	\$14,000
Basic Engineering Services	
Survey, Study & Report, Meetings & Hearing	\$30,000
Reclassification	\$30,000
Construction Plans, Specifications, & Bid Letting	\$35,000
Construction Engineering Services, Staking, & Inspection	\$50,000
Legal Services, Publications, Mailings, Etc..	\$4,200
Finance, Interest & Contingency	<u>\$42,100</u>

Estimated Total Non-Construction Costs \$205,300

Estimated Total Project Cost - 0.75" Drainage Coefficient Lateral 12 Improvement	\$481,388
Estimated Average Cost Per Benefited Acre (665)	\$724
Estimated Average Cost Per Acre Per Year (10 years, 5% interest)	\$89.28
Estimated Average Cost Per Acre Per Year (20 years, 5% interest)	\$55.32
Estimated Total Project Cost - 0.75" Drainage Coefficient Lateral 14 Improvement	\$438,912
Estimated Average Cost Per Benefited Acre (358)	\$1,226
Estimated Average Cost Per Acre Per Year (10 years, 5% interest)	\$151.21
Estimated Average Cost Per Acre Per Year (20 years, 5% interest)	\$93.69

Engineer's Opinion of Probable Cost
Drainage District No. 116
Lateral Tiles 12 & 14
Kossuth County, Iowa
2026

Division 1 - Lateral 12 - Work On Private Property - 1.0" Drainage Coefficient

Item	Description	Unit	Quantity	Unit Price	Total
101	Drain Tile, Trenched CMP 42" DIA.	LF	20	\$100	\$2,000
102	Lateral Tile Connections, 10" Dia. Or Smaller	EA	12	\$450	\$5,400
103	Lateral Tile Connections, 12" Dia. Or Larger	EA	3	\$900	\$2,700
104	42" Dia. HDPE Elbow Section, Fabrication Only	EA	8	\$2,000	\$16,000
105	Spot Tile Exploration	HR	24	\$300	\$7,200
106	Trench Foundation Stone	TN	250	\$30	\$7,500
107	Drain Tile, Trenched, HDPE Dual Wall 42" Dia.	LF	3,300	\$95	\$313,500
108	Crush Pipe in Place, Existing Tile	LF	3,300	\$6	\$19,800
109	Fence Cuts	EA	5	\$500	\$2,500
110	Mobilization	LS	1	\$18,500	\$18,500
111	Construction Contingency	LS	1	\$39,900	\$39,900

Estimated Division 1 Construction Cost \$435,000

Division 2 - Lateral 14 - Work On Private Property - 1.0" Drainage Coefficient

Item	Description	Unit	Quantity	Unit Price	Total
201	Lateral Tile Connections, 10" Dia. Or Smaller	EA	4	\$450	\$1,800
202	Lateral Tile Connections, 12" Dia. Or Larger	EA	2	\$900	\$1,800
203	36" Dia. HDPE Elbow Section, Fabrication Only	EA	3	\$1,650	\$4,950
204	Spot Tile Exploration	HR	8	\$300	\$2,400
205	Trench Foundation Stone	TN	310	\$30	\$9,300
206	Drain Tile, Trenched, HDPE Dual Wall 36" Dia.	LF	4,434	\$80	\$354,720
207	Crush Pipe in Place, Existing Tile	LF	1,400	\$6	\$8,400
208	Fence Cuts	EA	2	\$500	\$1,000
209	Mobilization	LS	1	\$19,200	\$19,200
210	Construction Contingency	LS	1	\$40,430	\$40,430

Estimated Division 2 Construction Cost \$444,000

Division 3 - Lateral 12 - Road Crossing 150th St. - 1.0" Drainage Coefficient

Item	Description	Unit	Quantity	Unit Price	Total
301	Trenchless, Steel Casing 0.625 Min. Wall, 42" Dia.	LF	90	\$1,500	\$135,000
302	Traffic Control	LS	1	\$1,500	\$1,500
303	Mobilization	LS	1	\$13,000	\$13,000

Estimated Division 3 Construction Cost \$149,500

Division 4 - Lateral 33B - Road Crossing 180th Ave - 1.0" Drainage Coefficient

Item	Description	Unit	Quantity	Unit Price	Total
401	Drain Tile, Trenched, Class III R.C.P., 30" Dia.	LF	66	\$140	\$9,240
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	\$1,560	\$1,560

Estimated Division 4 Construction Cost \$16,300

Non-Construction Costs

Construction Related Damages	\$14,000
Basic Engineering Services	
Survey, Study & Report, Meetings & Hearing	\$30,000
Reclassification	\$30,000
Construction Plans, Specifications, & Bid Letting	\$35,000
Construction Engineering Services, Staking, & Inspection	\$50,000
Legal Services, Publications, Mailings, Etc..	\$4,200
Finance, Interest & Contingency	<u>\$52,200</u>

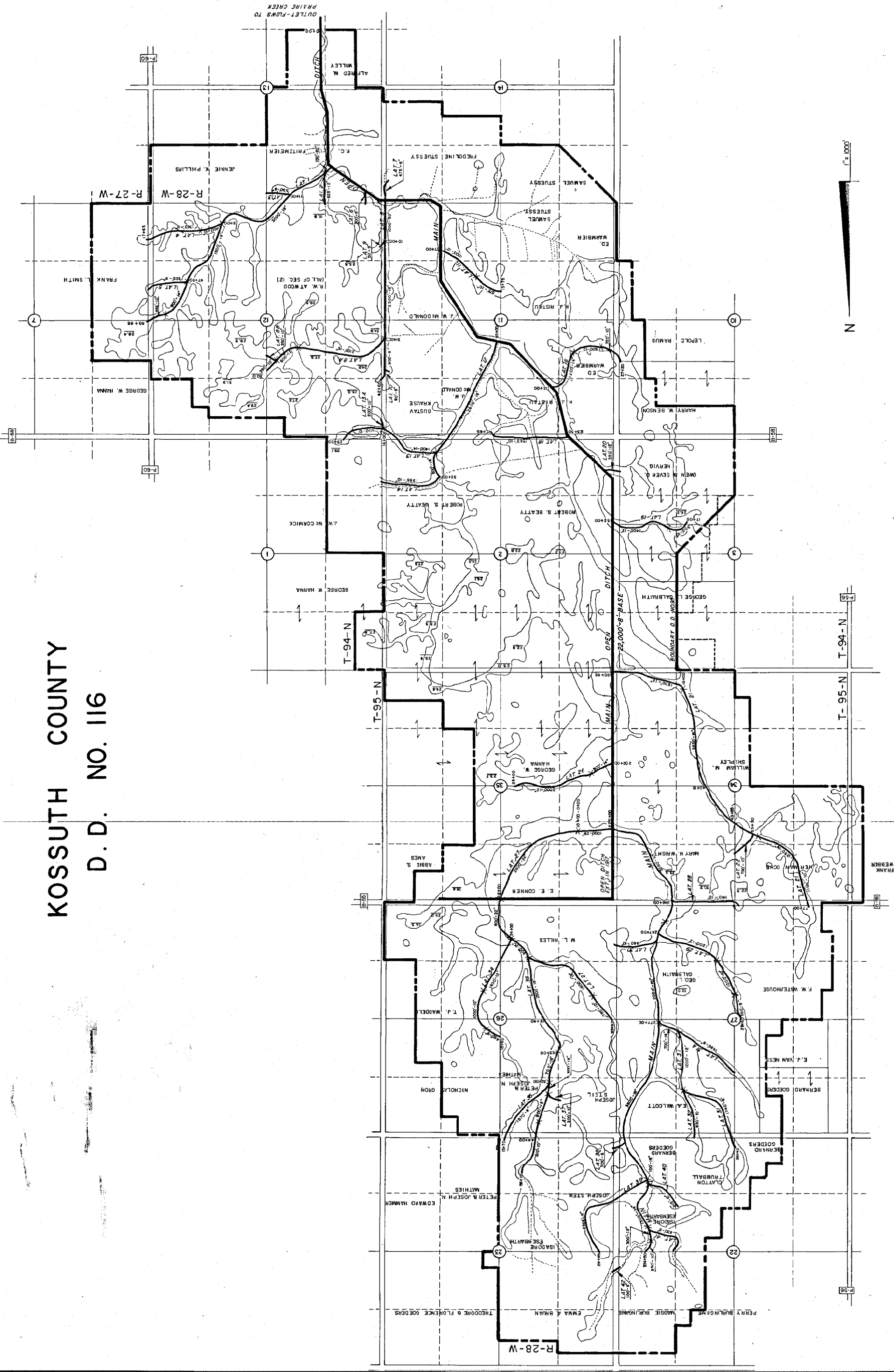
Estimated Total Non-Construction Costs \$215,400

Estimated Total Project Cost - 1.0" Drainage Coefficient Lateral 12 Improvement	\$541,597
Estimated Average Cost Per Benefited Acre (665)	\$814
Estimated Average Cost Per Acre Per Year (10 years, 5% interest)	\$100.45
Estimated Average Cost Per Acre Per Year (20 years, 5% interest)	\$62.24
Estimated Total Project Cost - 1.0" Drainage Coefficient Lateral 14 Improvement	\$552,803
Estimated Average Cost Per Benefited Acre (358)	\$1,544
Estimated Average Cost Per Acre Per Year (10 years, 5% interest)	\$190.45
Estimated Average Cost Per Acre Per Year (20 years, 5% interest)	\$118.01

Appendix D: Original District Documents

D. D. NO. 116

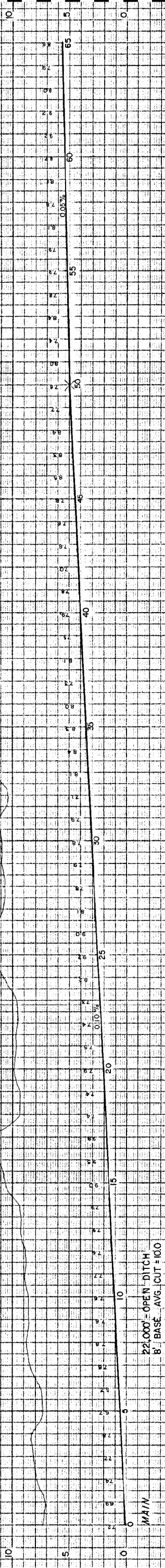
Original plans redrawn with subsequent improvements shown according to available court house records as of 1982.



DESIGNED BY
DATE
CHECKED BY

DESIGNED BY
DATE
CHECKED BY

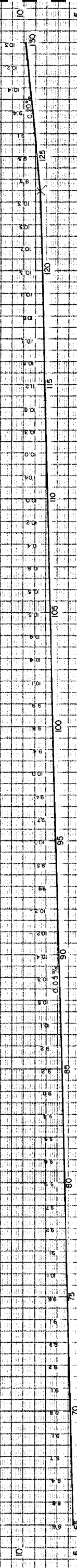
(ORIGINAL PROFILE)



22,000' OPEN DITCH
8' BASE - AVG. CUT = 10.0'

MAIN

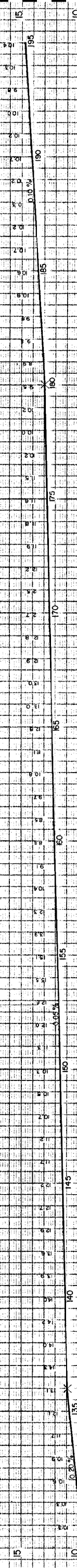
MAIN (CONT.)



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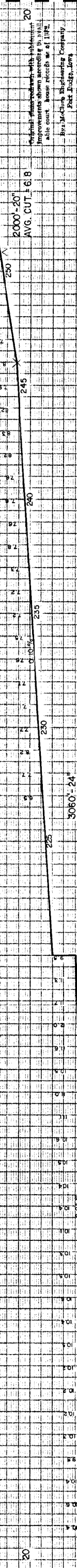
220+00-226+40 MAIN
(SUPPLEMENTARY REPORT)

MAIN (CONT.)



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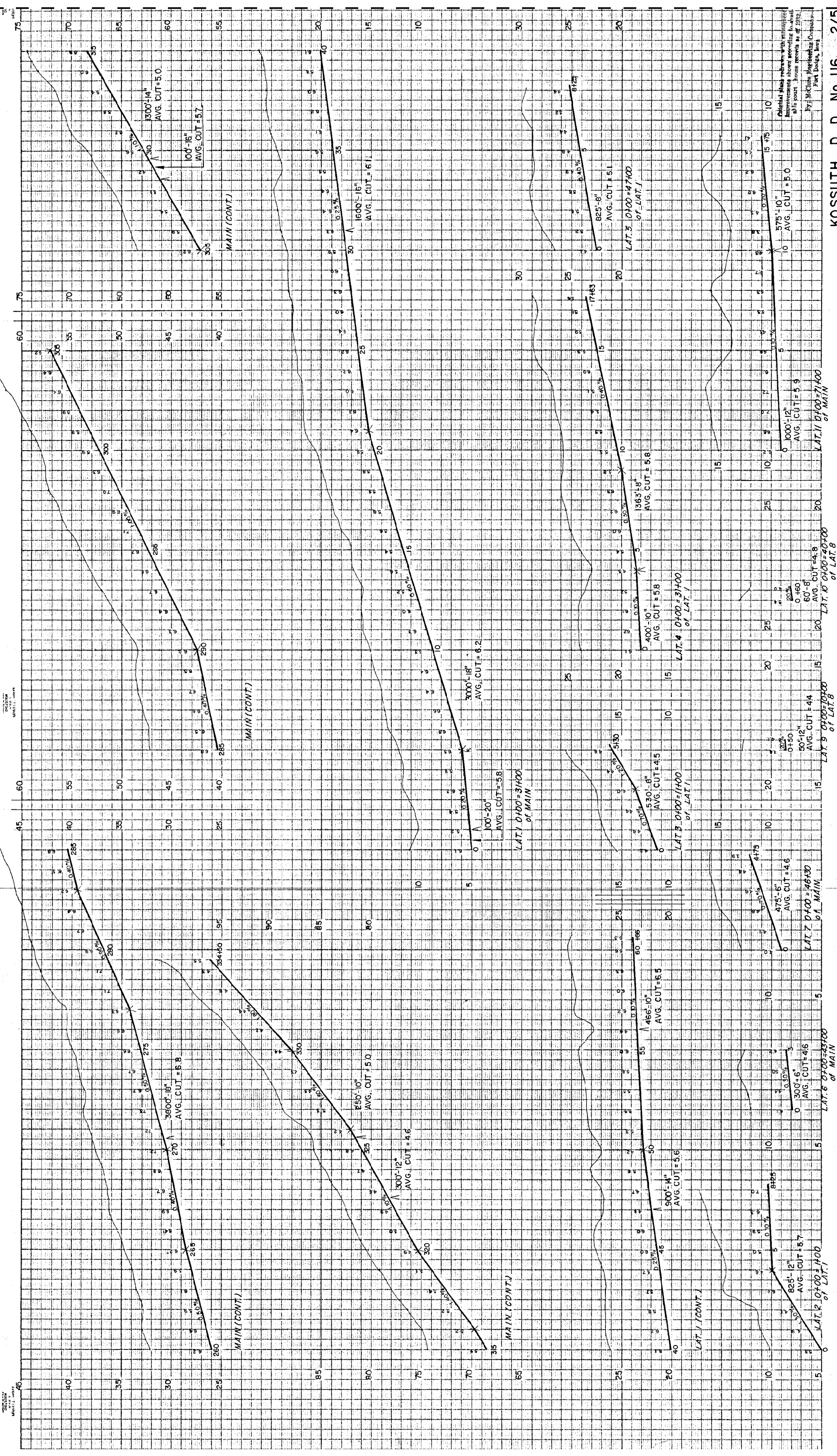
MAIN (CONT.)

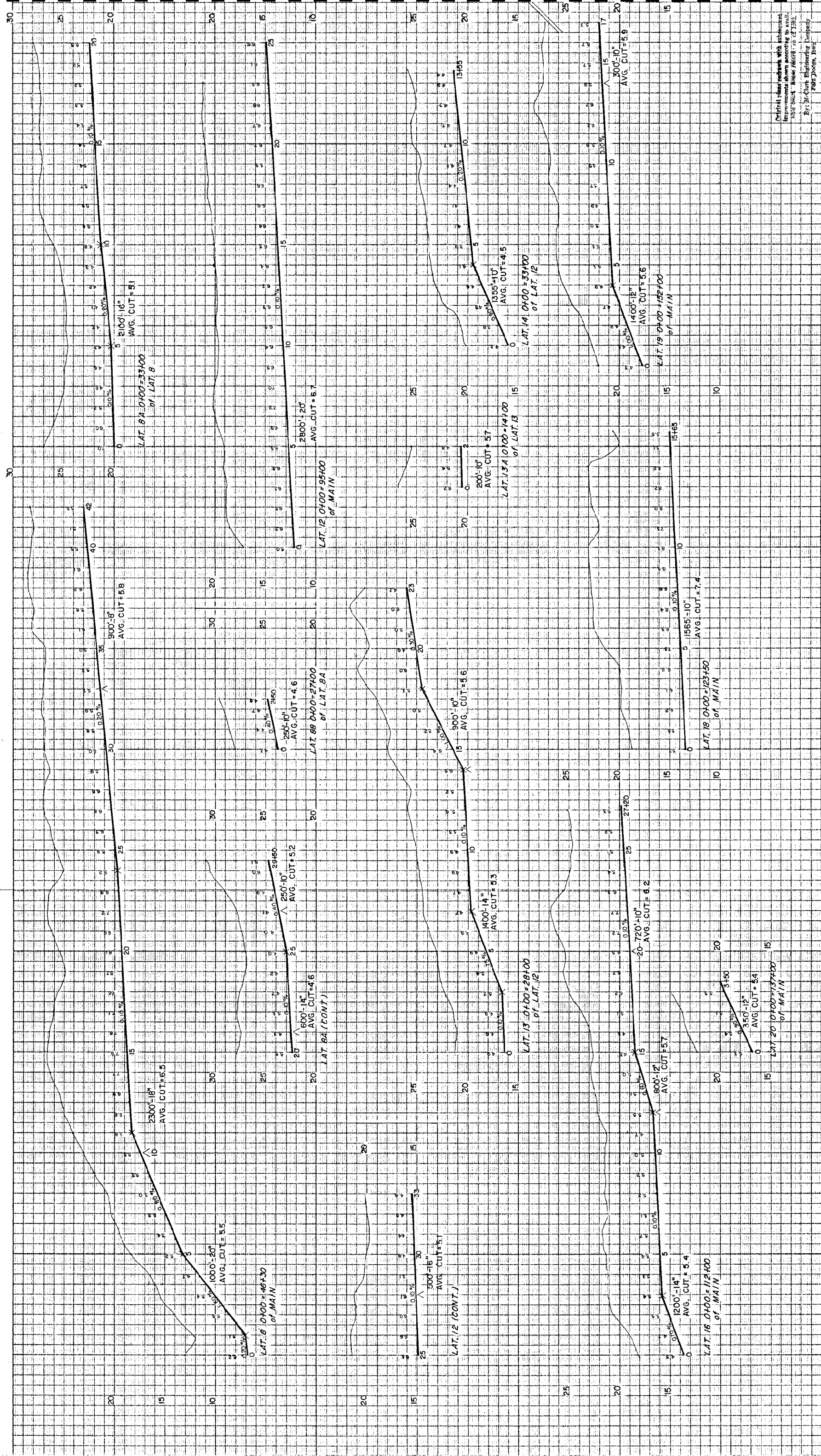


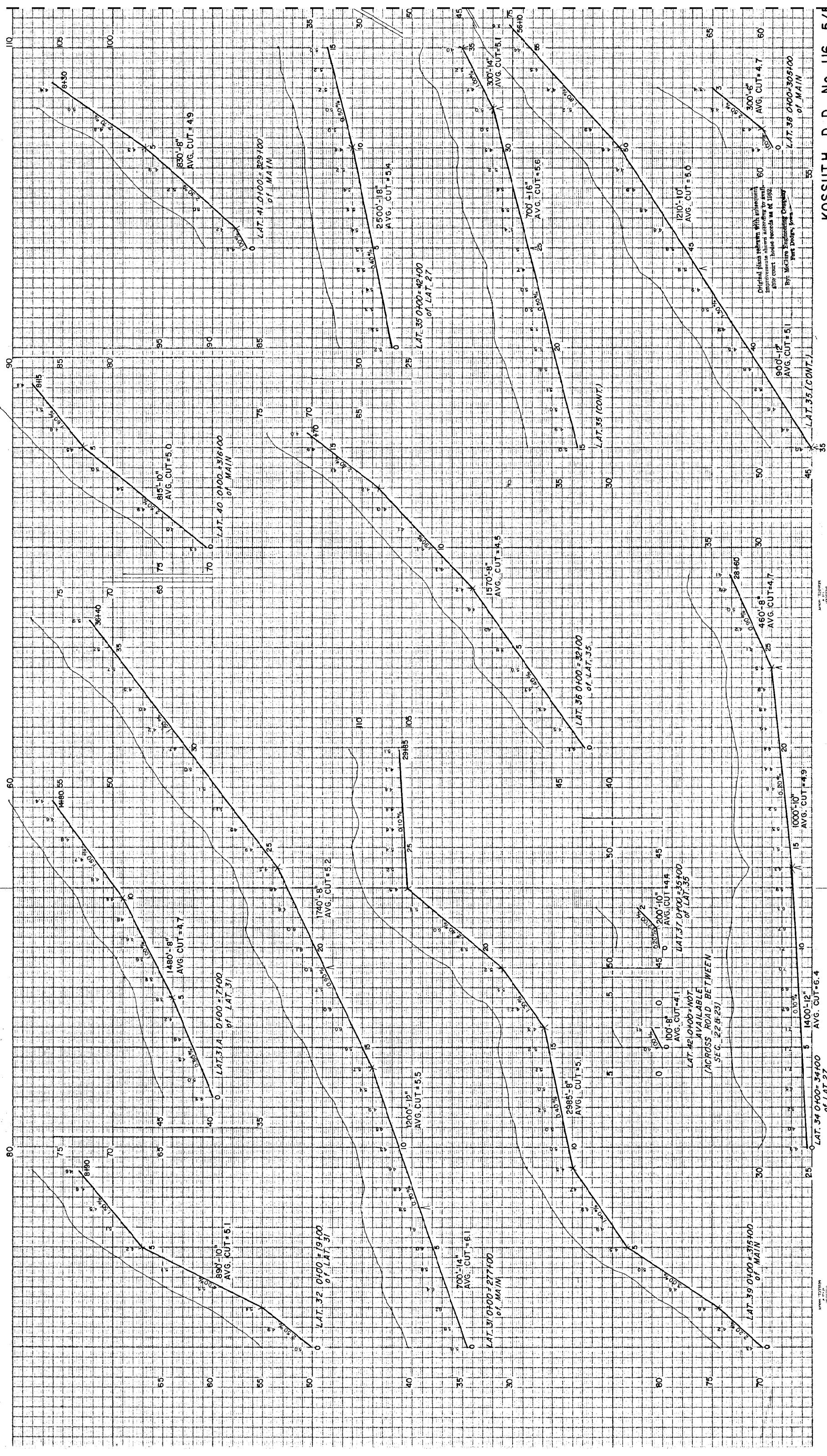
3080'-24" AVG. CUT = 7.7'

2000'-20" AVG. CUT = 6.8'

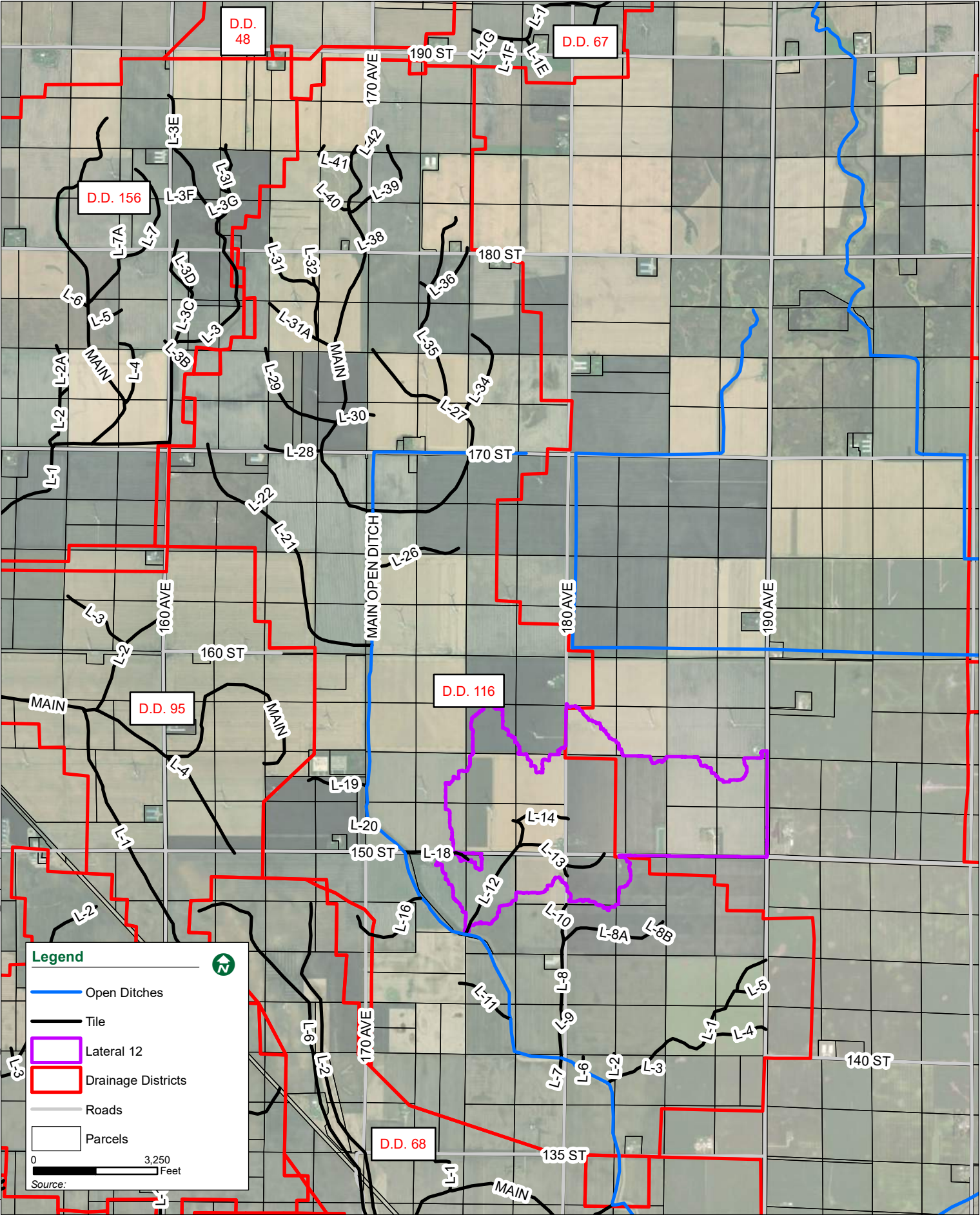
Original manuscript with subsequent
improvements shown according to avail-
able court house records as of 1982.
Des Moines Engineering Company
Des Moines, Iowa

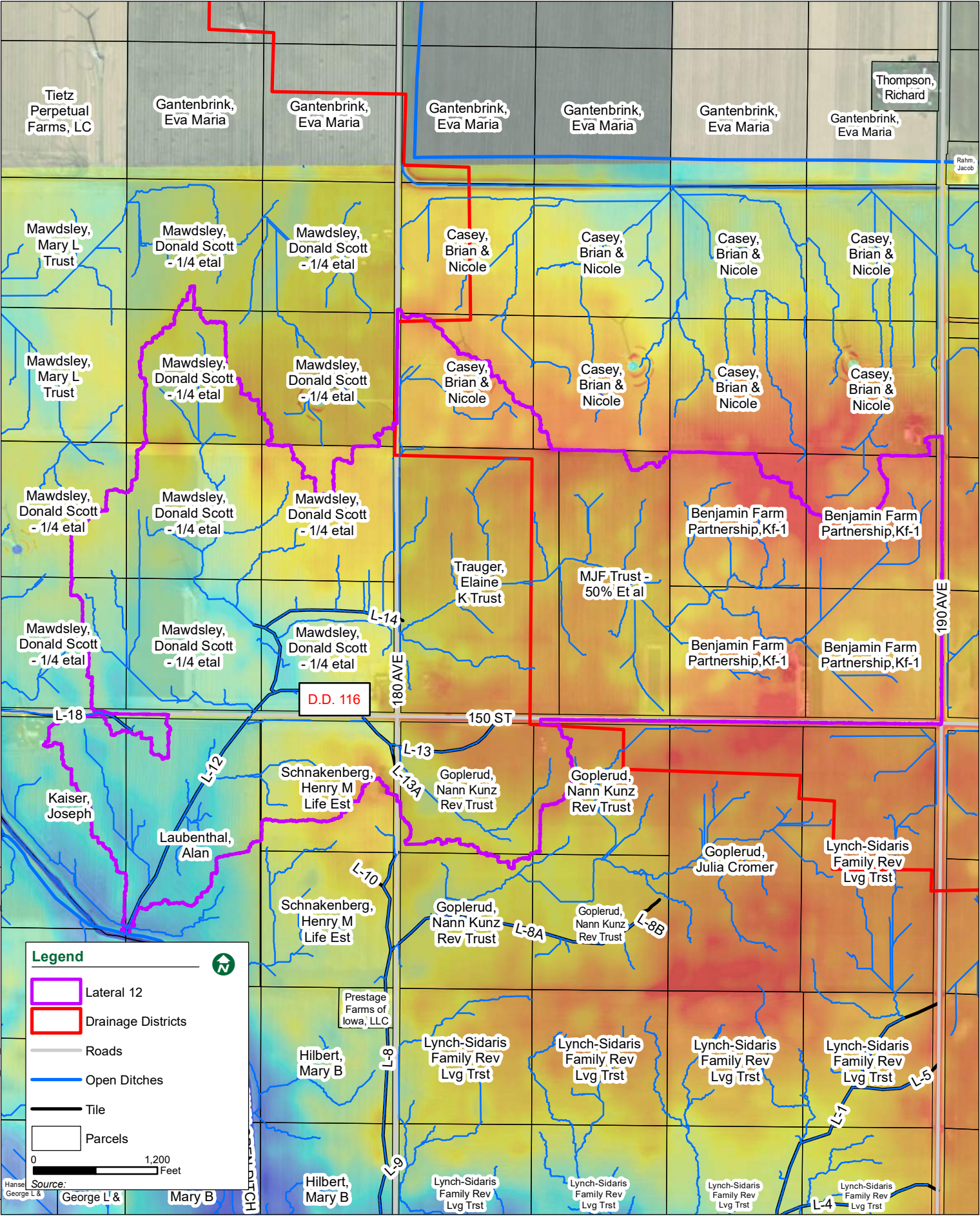






Appendix E: Watershed Determination Information





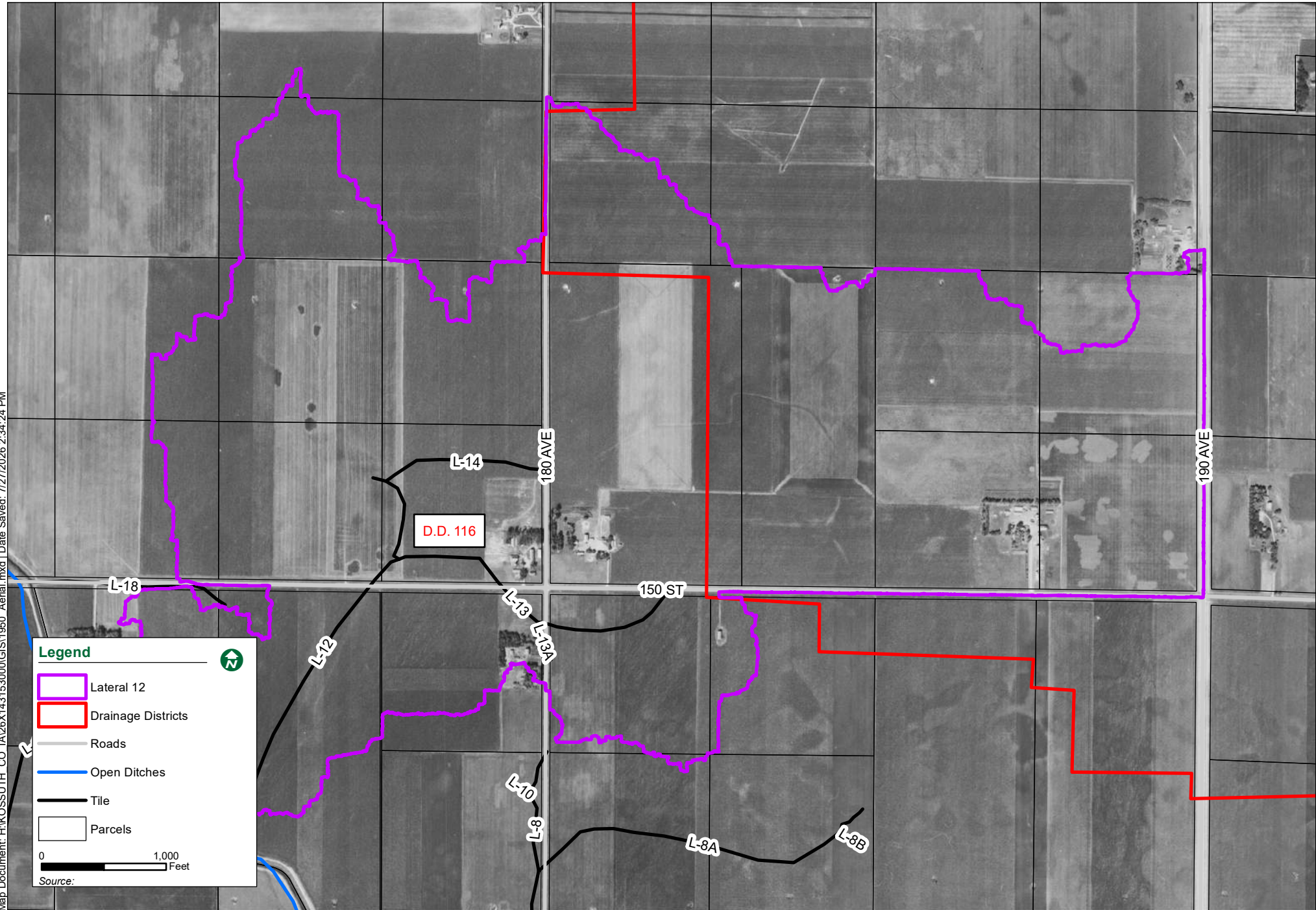
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Lateral 12 & Lateral 14 Tile Improvements

Kossuth County Drainage District No. 116

1950 Aerial Photo

July 2026



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Drainage Real Estate
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		District / Lateral								
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Tract	Taxing Dist	Parcel Sec -Twp -Rng	Entity	Legal	Acres	% Benefit	Units Assessed			
1.0	610 000	23 22 200 003 022 095 028	Erpelding, Timothy J 1606 Hwy 18 E Algona, IA 50511	NE NE			4.190			
2.0	610 000	23 22 200 005 022 095 028	Erpelding, Timothy J 1606 Hwy 18 E Algona, IA 50511	SE NE			30.750			
3.0	610 000	23 22 200 002 022 095 028	Erpelding, Timothy J 1606 Hwy 18 E Algona, IA 50511	NW NE EX 3.78A IN NW COR			2.800			
4.0	610 000	23 22 200 004 022 095 028	Erpelding, Timothy J 1606 Hwy 18 E Algona, IA 50511	SW NE			9.790			
5.0	610 000	23 22 300 002 022 095 028	Capesius, William J Etal , 00000	NE SW			2.800			
6.0	610 000	23 22 300 005 022 095 028	Capesius, William J Etal , 00000	SE SW EX TR CONT 5A SW COR AS RECORDED IN BK 7 PP 405			16.050			
6.5	610 000	23 22 300 006 022 095 028	Capesius, Thomas Capesius, Lillian 1605 180 St LuVerne, IA 50560	TR CONT 5.00A IN SW COR OF SE SW AS RECORDED IN BK 7 PP 405			2.120			
7.0	610 000	23 22 400 003 022 095 028	Eisenbarth, Mark 503 W Keith Algona, IA 50511	NE SE			61.510			
8.0	610 000	23 22 400 001 022 095 028	Taphorn, Wayne 1909 140 Ave Algona, IA 50511	NW SE			29.360			
9.0	610 000	23 22 400 002 022 095 028	Taphorn, Wayne	SW SE			30.750			

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Tract	Taxing Dist	Parcel Sec -Twp -Rng	Entity	Legal	Acres	% Benefit	Units Assessed
			1909 140 Ave Algona, IA 50511				
10.0	610 000	23 22 400 004 022 095 028	Eisenbarth, Mark J	SE SE EX TR 302' X 206' TO SIEMER			71.930
			503 W Keith St Algona, IA 50511				
11.0	610 000	23 22 400 005 022 095 028	Gatton, Ellen Gatton, James 1607 180 St	TR BEG 520.5' W SE COR SE 1/4 TH N 302' W 206' S 302' E TO BEG			6.350
			LuVerne, IA 50560				
12.0	610 000	23 23 200 003 023 095 028	Pfeffer, Henry E	SW NE			2.800
			1807 180 Ave Algona, IA 50511				
13.0	610 000	23 23 100 002 023 095 028	Gerber, David L & Gerber, Kathryn Trust 1807 150 St LuVerne, IA 50560	NE NW			4.190
14.0	610 000	23 23 100 001 023 095 028	Gerber, David L & Gerber, Kathryn Trust 1807 150 St LuVerne, IA 50560	NW NW			5.590
15.0	610 000	23 23 100 003 023 095 028	Gerber, David L & Gerber, Kathryn Trust 1807 150 St LuVerne, IA 50560	SW NW			19.570
16.0	610 000	23 23 100 004 023 095 028	Gerber, David L & Gerber, Kathryn Trust 1807 150 St LuVerne, IA 50560	SE NW			8.390
17.0	610 000	23 23 300 007 023 095 028	Summit Pork II LLP 10640 Co Hwy D20 Alden, IA 50006	PARCEL 2 LOC IN E1/2 OF SW AS DESC BY SU RVEY DOC #2008-3831			6.500
17.5	610 000	23 23 300 008 023 095 028	Galyen Ranch LLC PO Box 790 Atkinson, NE 68713	NE SW EX PART OF PAR CEL 2 AS DESC BY SUR VEY DOC #2008-3831			25.780
18.0	610 000	23 23 300 006	Divis Ag, Inc	PARCEL 1 LOC IN SESW			1.480

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Drainage Real Estate
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Tract	Taxing Dist	Parcel Sec -Twp -Rng	Entity	Legal	Acres	% Benefit	Units Assessed
		023 095 028	1602 170 St LuVerne, IA 50560	AS DESC BY SURVEY DOC 2006-4632			
18.5	610 000	23 23 300 009 023 095 028	Galyen Ranch LLC PO Box 790 Atkinson, NE 68713	SE SW EX PARCEL 1 AS DESC BY SURVEY DOC #2006-4632 & EX PART OF PARCEL 2 AS DESC			26.350
19.0	610 000	23 23 300 001 023 095 028	Blackrock Farms LLC PO Box 790 Atkinson, NE 68713	NW SW			53.120
20.0	610 000	23 23 300 003 023 095 028	Blackrock Farms LLC PO Box 790 Atkinson, NE 68713	SW SW			18.170
21.0	610 000	23 26 200 005 026 095 028	RSR Farmland Holdings LLC 120 N Thorington St Algona, IA 50511	NW NE EX PARCEL 1 DESC BY SURVEY RECRD IN DOC #2000-2715			9.870
21.5	610 000	23 26 200 006 026 095 028	Eischen, David J Eischen, Erin K 1708 180 St LuVerne, IA 50560	PARCEL 1 LOC IN NW NE DESC BY SURVEY RECRD IN DOC#2000- 2715			1.310
22.0	610 000	23 26 200 003 026 095 028	Grimm, Jordon W Grimm, Ann M 407 160 St West Bend, IA 50597	SW NE			78.290
23.0	610 000	23 26 200 004 026 095 028	Grimm, Jordon W Grimm, Ann M 407 160 St West Bend, IA 50597	SE NE			29.360
24.0	610 000	23 26 100 002 026 095 028	Cink, Tony Cink, Jody 2003 230 St Wesley, IA 50483	NE NW			100.650
25.0	610 000	23 26 100 004 026 095 028	Cink, Tony Cink, Jody 2003 230 St	SE NW			83.880

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		District / Lateral						
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Tract	Taxing Dist	Parcel Sec -Twp -Rng	Entity	Legal	Acres	% Benefit	Units Assessed	
			Wesley, IA 50483					
26.0	610 000	23 26 100 001 026 095 028	RSR Farmland Holdings LLC	NW NW			32.150	
			120 N Thorington St Algona, IA 50511					
27.0	610 000	23 26 100 003 026 095 028	RSR Farmland Holdings LLC	SW NW			71.300	
			120 N Thorington St Algona, IA 50511					
28.0	610 000	23 27 200 002 027 095 028	Lickteig, Gary	NE NE			85.280	
			1607 Hwy 18 Algona, IA 50511					
29.0	610 000	23 27 200 001 027 095 028	Popperville Farms LLC	NW NE			55.920	
			2001 25th St S Saint Cloud, MN 56301					
30.0	610 000	23 27 200 003 027 095 028	Popperville Farms LLC	SW NE			57.320	
			2001 25th St S Saint Cloud, MN 56301					
31.0	610 000	23 27 200 004 027 095 028	Lickteig, Gary	SE NE			100.650	
			1607 Hwy 18 Algona, IA 50511					
32.0	610 000	23 27 100 004 027 095 028	Parsons, Randall R & Parsons, Linda A 1/2 Int - Et al	E 20A NE NW			34.000	
			1902 Call Park Dr Algona, IA 50511					
33.0	610 000	23 27 300 002 027 095 028	Schluez, Michele Jayne Cheever Living T	NE SW			72.690	
			,					
34.0	610 000	23 27 300 001 027 095 028	Schluez, Michele Jayne Cheever Living T	NW SW			23.000	
			,					
35.0	610 000	23 27 300 003 027 095 028	Schluez, Michele Jayne Cheever Living T	SW SW			44.350	

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Drainage Real Estate
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Tract	Taxing Dist	Parcel Sec	-Twp -Rng	Entity	Legal	Acres	% Benefit	Units Assessed			
36.0	610 000	23 27 300 004	027 095 028	Schluenz, Michele Jayne Cheever Living T SE SW				65.700			
37.0	610 000	23 34 100 001	034 095 028	Divis, Allen L Divis, Sharon K 1602 170 St LuVerne, IA 50560	TR BEG NW COR SEC 34 TH E 678' S 410' W 678' N 410' TO BEG			10.800			
38.0	610 000	23 34 100 010	034 095 028	Monson, Ronald & Linda Trust - 99.8% int 216 5th St NW Britt, IA 50423	N1/2 NW EX TR 678' X 410' & EX THE S 45A & EX PARCEL 2 AS DESC BY SURVEY DOC			83.960			
38.5	610 000	23 34 100 011	034 095 028	Prestage Farms of Iowa, LLC 236 S Bell Ave Ames, IA 50010	PARCEL 2 LOC IN N1/2 OF NW AS DESC BY SURVEY DOC 2006-4457			16.690			
39.0	610 000	23 34 100 006	034 095 028	Monson, Ronald & Linda Trust - 99.8% int 216 5th St NW Britt, IA 50423	S 45A OF N 1/2 NW 1/4			103.600			
40.0	610 000	23 34 100 004	034 095 028	Monson, Ronald & Linda Trust - 99.8% int 216 5th St NW Britt, IA 50423	SW NW			78.290			
41.0	610 000	23 34 100 005	034 095 028	Monson, Ronald & Linda Trust - 99.8% int 216 5th St NW Britt, IA 50423	SE NW			100.650			
42.0	620 000	23 26 300 002	026 095 028	Trauger, Daryl R Rev Trust - 1/2 int Trauger, Elaine K Rev Trust - 1/2 int 2428 Hamilton Dr Ames, IA 50014	NE SW			110.440			
43.0	620 000	23 26 300 001	026 095 028	Trauger, Daryl R Rev Trust - 1/2 int Trauger, Elaine K Rev Trust - 1/2 int 2428 Hamilton Dr Ames, IA 50014	NW SW			113.230			

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44.0	620 000	23 26 300 005 026 095 028	Trauger, Daryl R Rev Trust - 1/2 int Trauger, Elaine K Rev Trust - 1/2 int 2428 Hamilton Dr Ames, IA 50014	SW SW EX SURVEYED TRACTS RECORDED IN BK 8 PAGES 191 & 192			70.310
44.5	620 000	23 26 300 006 026 095 028	Trauger, Daryl R Rev Trust - 1/2 int Trauger, Elaine K Rev Trust - 1/2 int 2428 Hamilton Dr Ames, IA 50014	SE SW EX TRACT OF LAND SURVEYED & RECORDED IN BK 8 PP 191			73.710
45.0	620 000	23 26 300 007 026 095 028	Witham, Kenneth M PO Box 286 Bancroft, IA 50517-0286	TR OF LAND LOC IN SW SW AS SURVEYED & RECORDED IN BK 8 PP 192			2.200
45.5	620 000	23 26 300 008 026 095 028	Trauger, Daryl R Rev Trust - 1/2 int Trauger, Elaine K Rev Trust - 1/2 int 2428 Hamilton Dr Ames, IA 50014	TRACT OF LAND LOC IN S 1/2 SW 1/4 AS SURVEYED & RECORDED BK 8 PP 191 16 95 28			8.950
46.0	620 000	23 26 400 002 026 095 028	Smith, Clara M Trust 906 Pritchard Place Marietta, GA 30068	NE SE			36.350
47.0	620 000	23 26 400 001 026 095 028	Smith, Clara M Trust 906 Pritchard Place Marietta, GA 30068	NW SE			102.050
48.0	620 000	23 26 400 003 026 095 028	Smith, Clara M Trust 906 Pritchard Place Marietta, GA 30068	SW SE			97.860
49.0	620 000	23 26 400 004 026 095 028	Smith, Clara M Trust 906 Pritchard Place Marietta, GA 30068	SE SE			75.490
50.0	620 000	23 27 400 003 027 095 028	Kahler, Christopher D 918 E Elm St No 4 Algona, IA 50511	NE SE			106.240
51.0	620 000	23 27 400 007	Simpson, Stacy L	E 1/2 OF W 1/2 SE			30.540

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Tract	Taxing Dist	Parcel Sec -Twp -Rng	Entity	Legal	Acres	% Benefit	Units Assessed
		027 095 028		EX E 420.83'			
			1406 170 St LuVerne, IA 50560				
52.0	620 000	23 27 400 008 027 095 028	Kahler, Christopher D	E 420.83' OF W1/2 SE			53.340
			918 E Elm St No 4 Algona, IA 50511				
53.0	620 000	23 27 400 006 027 095 028	Kahler, Christopher D	SE SE			101.670
			918 E Elm St No 4 Algona, IA 50511				
54.0	620 000	23 27 400 001 027 095 028	Simpson, Stacy L	W 1/2 NW SE			47.530
			1406 170 St LuVerne, IA 50560				
55.0	620 000	23 27 400 004 027 095 028	Simpson, Stacy L	W 1/2 SW SE			36.350
			1406 170 St LuVerne, IA 50560				
56.0	620 000	23 34 200 002 034 095 028	Hickey Farm Trust Agmt Wright, Richard W Rev Trust	NE NE			111.840
			,				
57.0	620 000	23 34 200 001 034 095 028	Hickey Farm Trust Agmt Wright, Richard W Rev Trust	NW NE			83.880
			,				
58.0	620 000	23 34 200 003 034 095 028	Hickey Farm Trust Agmt Wright, Richard W Rev Trust	SW NE			93.660
			,				
59.0	620 000	23 34 200 004 034 095 028	Hickey Farm Trust Agmt Wright, Richard W Rev Trust	SE NE			89.470
			,				
60.0	620 000	23 34 400 002 034 095 028	Hickey Farm Trust Agmt Wright, Richard W Rev Trust	NE SE			72.690
			,				
61.0	620 000	23 34 400 004	Hickey Farm Trust Agmt	SE SE			128.610

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Tract	Taxing Dist	Parcel Sec -Twp -Rng	Entity	Legal	Acres	% Benefit	Units Assessed
		034 095 028	Wright, Richard W Rev Trust				
			,				
62.0	620 000	23 34 300 002 034 095 028	Tietz Perpetual Farms, LC	NE SW			18.170
			400 W Tietz St Algona, IA 50511				
63.0	620 000	23 34 300 006 034 095 028	Tietz Perpetual Farms, LC	SE SW EX PARCEL 1 AS SURVEYED DOC #2003- 2739			9.790
			400 W Tietz St Algona, IA 50511				
64.0	620 000	23 34 400 001 034 095 028	Tietz Perpetual Farms, LC	NW SE			82.480
			400 W Tietz St Algona, IA 50511				
65.0	620 000	23 34 400 003 034 095 028	Tietz Perpetual Farms, LC	SW SE			89.470
			400 W Tietz St Algona, IA 50511				
66.0	620 000	23 35 200 002 035 095 028	Monson, Ronald & Linda Trust - 99.8% int	NE NE			18.170
			216 5th St NW Britt, IA 50423				
67.0	620 000	23 35 200 001 035 095 028	Monson, Ronald & Monson, Linda Trust	NW NE			88.070
			216 5th St NW Britt, IA 50423				
68.0	620 000	23 35 200 003 035 095 028	Monson, Ronald & Monson, Linda Trust	SW NE			40.540
			216 5th St NW Britt, IA 50423				
69.0	620 000	23 35 100 003 035 095 028	Monson, Ronald & Monson, Linda Trust	NE NW			88.070
			216 5th St NW Britt, IA 50423				
70.0	620 000	23 35 100 002 035 095 028	Simpson, Barry & Simpson, Stacy - 1/2 Int Et al	TR 220' X 520' IN NE COR NW NW			4.070
			1406 170 St LuVerne, IA 50560				
71.0	620 000	23 35 100 005	Monson, Ronald &	SE NW			97.860

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Tract	Taxing Dist	Parcel Sec -Twp -Rng	Entity	Legal	Acres	% Benefit	Units Assessed
		035 095 028	Monson, Linda Trust 216 5th St NW Britt, IA 50423				
72.0	620 000	23 35 100 004 035 095 028	Simpson, Richard C Lvg Trust - 1/4 Int Simpson, Jeanetta L Family Trust - 1/4 I 901 S Blackford St Algona, IA 50511	SW NW			117.430
73.0	620 000	23 35 100 001 035 095 028	Simpson, Richard C Lvg Trust - 1/4 Int Simpson, Jeanetta L Family Trust - 1/4 I 901 S Blackford St Algona, IA 50511	NW NW EX TR 220' X 520' IN NE COR			58.840
74.0	620 000	23 35 300 002 035 095 028	Tietz Perpetual Farms, LC 400 W Tietz St Algona, IA 50511	NE SW			104.850
75.0	620 000	23 35 300 001 035 095 028	Tietz Perpetual Farms, LC 400 W Tietz St Algona, IA 50511	NW SW			117.430
76.0	620 000	23 35 300 003 035 095 028	Tietz Perpetual Farms, LC 400 W Tietz St Algona, IA 50511	SW SW			85.280
77.0	620 000	23 35 300 004 035 095 028	Tietz Perpetual Farms, LC 400 W Tietz St Algona, IA 50511	SE SW			71.300
78.0	620 000	23 35 400 001 035 095 028	Gantenbrink, Eva Maria , 00000	NW SE			48.930
79.0	620 000	23 35 400 003 035 095 028	Gantenbrink, Eva Maria Gantenbrink, Eva Marie aka 1314 Westridge Road New Ulm, MN 56073	SW SE			65.700
80.0	620 000	23 35 400 004 035 095 028	Gantenbrink, Eva Maria Gantenbrink, Eva Marie aka 1314 Westridge Road New Ulm, MN 56073	SE SE			34.950
81.0	000	23 40 000 000	Kossuth County	ROAD ROW			546.470

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Tract	Taxing Dist	Parcel Sec -Twp -Rng	Entity	Legal	Acres	% Benefit	Units Assessed
		000 000 000		IRVINGTON TWP ROADS			
			Algona, IA 50511				
82.0	740 000	28 07 100 003 007 094 027	Benjamin Farm Partnership,Kf-1	SW NW			19.570
			,				
83.0	740 000	28 07 300 001 007 094 027	Tietz Perpetual Farms, LC	NW SW			64.310
			400 W Tietz St Algona, IA 50511				
84.0	740 000	28 07 300 005 007 094 027	Tietz Perpetual Farms, LC	SW SW EX PART OF PARCEL 1 AS DESC BY SURVEY DOC 2007-1037			34.950
			400 W Tietz St Algona, IA 50511				
85.0	000	28 40 000 000 000 000 000	Kossuth County	ROAD ROW LUVERNE TWP ROADS			38.130
			Algona, IA 50511				
86.0	720 000	27 01 100 001 001 094 028	Casey, Brian & Nicole Casey, Gregory & Sarah 1012 200 St Algona, IA 50511	NW NW			34.950
87.0	720 000	27 01 300 005 001 094 028	Trauger, Elaine K Trust	PARCEL 1 LOC SW1/4 AS DESC BY SURVEY DOC #2017/42			57.460
			2428 Hamilton Dr Ames, IA 50014				
88.0	720 000	27 01 300 006 001 094 028	MJF Trust - 50% Et al	PARCEL 2 LOC SW1/4 AS DESC BY SURVEY DOC #2017/42			39.880
			,				
91.0	720 000	27 02 200 002 002 094 028	Mawdsley, Donald Scott - 1/4 etal	NE NE			68.500
			,				
92.0	720 000	27 02 200 001 002 094 028	Mawdsley, Donald Scott - 1/4 etal	NW NE			68.500
			,				
93.0	720 000	27 02 200 003	Mawdsley, Donald Scott - 1/4 etal	SW NE			74.090

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Tract	Taxing Dist	Parcel Sec -Twp -Rng	Entity	Legal	Acres	% Benefit	Units Assessed
		002 094 028					
			,				
94.0	720 000	27 02 200 004 002 094 028	Mawdsley, Donald Scott - 1/4 etal	SE NE			78.290
			,				
95.0	720 000	27 02 100 002 002 094 028	Mawdsley, Mary L Trust	NE NW			90.870
			15658 Kasota Road Apple Valley, CA 92307				
96.0	720 000	27 02 100 001 002 094 028	Mawdsley, Mary L Trust	NW NW			113.230
			15658 Kasota Road Apple Valley, CA 92307				
97.0	720 000	27 02 100 003 002 094 028	Mawdsley, Mary L Trust	SW NW			62.910
			15658 Kasota Road Apple Valley, CA 92307				
98.0	720 000	27 02 100 004 002 094 028	Mawdsley, Mary L Trust	SE NW			93.660
			15658 Kasota Road Apple Valley, CA 92307				
99.0	720 000	27 02 300 002 002 094 028	Mawdsley, Donald Scott - 1/4 etal	NE SW			61.510
			,				
100.0	720 000	27 02 300 001 002 094 028	Mawdsley, Donald Scott - 1/4 etal	NW SW			57.320
			,				
101.0	720 000	27 02 300 003 002 094 028	Mawdsley, Donald Scott - 1/4 etal	SW SW			92.260
			,				
102.0	720 000	27 02 300 004 002 094 028	Mawdsley, Donald Scott - 1/4 etal	SE SW			53.120
			,				
103.0	720 000	27 02 400 002	Mawdsley, Donald Scott - 1/4 etal	NE SE			20.970

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Tract	Taxing Dist	Parcel Sec -Twp -Rng	Entity	Legal	Acres	% Benefit	Units Assessed
		002 094 028					
			,				
104.0	720 000	27 02 400 001 002 094 028	Mawdsley, Donald Scott - 1/4 etal	NW SE			33.550
			,				
105.0	720 000	27 02 400 003 002 094 028	Mawdsley, Donald Scott - 1/4 etal	SW SE			44.730
			,				
106.0	720 000	27 02 400 004 002 094 028	Mawdsley, Donald Scott - 1/4 etal	SE SE			82.480
			,				
107.0	720 000	27 03 200 007 003 094 028	Tietz Perpetual Farms, LC 400 W Tietz St Algona, IA 50511	PARCEL 1 LOC IN N1/2 OF SEC 3 & S 33' OF SW1/4 OF 34-95-28 AS DESC BY SURVEY			34.340
107.2	720 000	27 03 200 009 003 094 028	Tietz Perpetual Farms, LC 400 W Tietz St Algona, IA 50511	NE NE EX PARCEL 1 AS SURVEYED DOC #2003- 2739			38.350
108.0	720 000	27 03 200 011 003 094 028	Tietz Perpetual Farms, LC 400 W Tietz St Algona, IA 50511	SE NE EX PART OF PARCEL B AS DESC BY SURVEY DOC #2019/540			81.080
109.0	720 000	27 03 400 014 003 094 028	Wisconsin Power and Light Co Attn: Tax Dept 4902 N Biltmore Ln Ste 1000 Madison, WI 53718	PARCEL D LOC IN PAR B AS DESC BY SURVEY DOC #2020/1390			24.980
109.5	720 000	27 03 400 015 003 094 028	MidAmerican Energy Company Attn: Jamie Baker, Right of Way Service PO Box 657 Des Moines, IA 50306-0657	PARCEL E LOC IN SEC 3 AS DESC BY SURVEY DOC #2020/1389			33.730
110.0	720 000	27 03 400 009 003 094 028	Tietz Perpetual Farms, LC	N1/2 NW SE EX PT OF PARCEL B AS DESC BY			13.980

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Tract	Taxing Dist	Parcel Sec -Twp -Rng	Entity	Legal	Acres	% Benefit	Units Assessed
			400 W Tietz St Algona, IA 50511	SURVEY DOC #2019/540			
111.0	720 000	27 03 400 011 003 094 028	Benjamin, Walter W Cr Shltr Trst - 11215 Old Bren Road Hopkins, MN 55343	51.57 S1/2 NE SE EX PART OF PARCEL C AS DESC BY SURVEY DOC #2019/ 2014			30.440
111.5	720 000	27 03 400 013 003 094 028	Wisconsin Power and Light Co Attn: Tax Dept 4902 N Biltmore Ln Ste 1000 Madison, WI 53718	PARCEL C LOC IN S1/2 SE & S1/2 N1/2 SE AS DESC BY SURVEY DOC #2019/2014			22.100
112.0	720 000	27 03 400 002 003 094 028	Benjamin, Walter W Cr Shltr Trst - 11215 Old Bren Road Hopkins, MN 55343	51.57 S1/2 NW SE			29.360
113.0	720 000	27 03 400 003 003 094 028	Benjamin, Walter W Cr Shltr Trst - 11215 Old Bren Road Hopkins, MN 55343	51.57 SW SE			61.510
114.0	720 000	27 03 400 012 003 094 028	Benjamin, Walter W Cr Shltr Trst - 11215 Old Bren Road Hopkins, MN 55343	51.57 SE SE EX PARCEL A AS DESC BY SURVEY LP BK 7 PG 500 & EX PT OF PARCEL C AS			54.250
114.5	720 000	27 03 400 008 003 094 028	Blumer, James D 1609 150 St LuVerne, IA 50560	TRACT "A" IN SE SE AS SURVEYED & RECORDED IN BK 7 PP 500			5.050
115.0	720 000	27 10 200 004 010 094 028	Lickteig, Gary 1607 Hwy 18 Algona, IA 50511	NE NE			27.960
116.0	720 000	27 10 200 001 010 094 028	Lickteig, Gary 1607 Hwy 18 Algona, IA 50511	NW NE			24.190
117.0	720 000	27 10 200 008 010 094 028	Lickteig, Gary	SE NE			17.740

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Tract	Taxing Dist	Parcel Sec -Twp -Rng	Entity	Legal	Acres	% Benefit	Units Assessed
			1607 Hwy 18 Algona, IA 50511				
119.0	720 000	27 11 200 002 011 094 028	Schnakenberg, Henry M Life Est	NE NE			36.350
			1506 190 Ave LuVerne, IA 50560				
120.0	720 000	27 11 200 004 011 094 028	Schnakenberg, Henry M Life Est	SE NE			29.360
			1506 190 Ave LuVerne, IA 50560				
121.0	720 000	27 11 200 005 011 094 028	Laubenthal, Alan Laubenthal, Sandra 1703 50 Ave Whittemore, IA 50598	PARCEL 1 LOC IN W1/2 OF NE AS DESC BY SURVEY DOC 2006-2179			122.920
122.0	720 000	27 11 200 006 011 094 028	Hilbert, Mary B 105 Spring Valley Dr Livermore, IA 50558	SW NE EX PARCEL 1 AS DESC BY SURVEY DOC #2006-2179			7.320
122.5	720 000	27 11 200 006 011 094 028	Hilbert, Mary B 105 Spring Valley Dr Livermore, IA 50558	SW NE EX PARCEL 1 AS DESC BY SURVEY DOC #2006-2179			1.170
123.0	720 000	27 11 400 005 011 094 028	Hilbert, Mary B 105 Spring Valley Dr Livermore, IA 50558	NE SE EX PARCEL A AS DESC BY SURVEY DOC #2006-4234			23.350
123.5	720 000	27 11 400 006 011 094 028	Prestage Farms of Iowa, LLC 236 S Bell Ave Ames, IA 50010	PARCEL A LOC IN NESE AS DESC BY SURVEY DOC #2006-4234			3.210
124.0	720 000	27 11 400 001 011 094 028	Hilbert, Mary B 105 Spring Valley Dr Livermore, IA 50558	NW SE			93.660
125.0	720 000	27 11 400 003 011 094 028	Hilbert, Mary B 105 Spring Valley Dr Livermore, IA 50558	SW SE			82.480
126.0	720 000	27 11 400 004	Hilbert, Mary B	SE SE			26.560

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		011 094 028	105 Spring Valley Dr Livermore, IA 50558				
127.0	720 000	27 11 100 006 011 094 028	Kaiser, Joseph Kaiser, Viola 1704 150 St LuVerne, IA 50560	PARCEL A LOC IN NW/4 AS DESC BY SURVEY DOC #2022/2677 AMD SURVEY DOC #2022			74.940
128.0	720 000	27 11 100 005 011 094 028	Laubenthal, Alan A Laubenthal, Sandra M 1703 50 Ave Whittemore, IA 50598	PARCEL B LOC IN NW/4 AS DESC BY SURVEY DOC #2022/2677 AMD SURVEY DOC #2022			77.320
129.0	720 000	27 11 300 007 011 094 028	Larson, Helen B Trust 405 NE Hayes St Greenfield, IA 50849	PARCEL C LOC IN NW/4 & SW/4 AS DESC BY SURVEY DOC#2022/2677 AMD SURVEY DOC#2022			55.230
130.0	720 000	27 11 300 008 011 094 028	Kaiser, Wayne Kaiser, Beverly 1621 E Linden St Algona, IA 50511	PARCEL D LOC IN SW/4 AS DESC BY SURVEY DOC #2022/2677 AMD SURVEY DOC #2022			52.540
131.0	720 000	27 11 300 009 011 094 028	Hanselman, Jesse George Hanselman, Wendy Louise 1109 Hungry Hollow Rd Algona, IA 50511	N1/2 SW SW			9.090
132.0	720 000	27 11 100 003 011 094 028	Frideres, Dean H & Frideres, Linda J Revocable Trust Agreem 106 Spring Valley Dr Livermore, IA 50558	SW NW			90.870
133.0	720 000	27 11 300 010 011 094 028	Hanselman, George L & Hanselman, Diane R Trust 107 Kossuth Ave LuVerne, IA 50560	S1/2 SW SW			9.080
134.0	720 000	27 11 300 005 011 094 028	Hanselman, George L & Hanselman, Diane R Trust 107 Kossuth Ave LuVerne, IA 50560	W1/2 SE SW			9.090
134.5	720 000	27 11 300 006	Hanselman, George L &	E1/2 SE SW			9.080

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		011 094 028	Hanselman, Diane R Trust 107 Kossuth Ave LuVerne, IA 50560				
135.0	720 000	27 12 200 006 012 094 028	Lynch-Sidaris Family Rev Lvg Trst	PARCEL B LOC IN NE/4 AS DESC BY SURVEY DOC #2018/2367			71.300
			,				
136.0	720 000	27 12 200 005 012 094 028	Goplerud, Julia Cromer 209 East Fiedler Road Ambler, PA 19002	PARCEL A LOC IN NE/4 AS DESC BY SURVEY DOC #2018/2367			116.030
139.0	720 000	27 12 100 002 012 094 028	Goplerud, Nann Kunz Rev Trust 157 Torremolinos Dr Rancho Mirage, CA 92270	NE NW			68.500
140.0	720 000	27 12 100 001 012 094 028	Goplerud, Nann Kunz Rev Trust 157 Torremolinos Dr Rancho Mirage, CA 92270	NW NW			81.080
141.0	720 000	27 12 100 003 012 094 028	Goplerud, Nann Kunz Rev Trust 157 Torremolinos Dr Rancho Mirage, CA 92270	SW NW			123.020
142.0	720 000	27 12 100 004 012 094 028	Goplerud, Nann Kunz Rev Trust 157 Torremolinos Dr Rancho Mirage, CA 92270	SE NW			130.010
143.0	720 000	27 12 300 002 012 094 028	Lynch-Sidaris Family Rev Lvg Trst	NE SW			75.490
			,				
144.0	720 000	27 12 300 001 012 094 028	Lynch-Sidaris Family Rev Lvg Trst	NW SW			79.680
			,				
145.0	720 000	27 12 300 003 012 094 028	Lynch-Sidaris Family Rev Lvg Trst	SW SW			58.710
			,				
146.0	720 000	27 12 300 004	Lynch-Sidaris Family Rev Lvg Trst	SE SW			61.510

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		012 094 028					
			,				
147.0	720 000	27 12 400 002 012 094 028	Lynch-Sidaris Family Rev Lvg Trst	NE SE			100.650
			,				
148.0	720 000	27 12 400 001 012 094 028	Lynch-Sidaris Family Rev Lvg Trst	NW SE			64.310
			,				
149.0	720 000	27 12 400 003 012 094 028	Lynch-Sidaris Family Rev Lvg Trst	SW SE			118.830
			,				
150.0	720 000	27 12 400 004 012 094 028	Lynch-Sidaris Family Rev Lvg Trst	SE SE			75.490
			,				
151.0	720 000	27 13 200 005 013 094 028	Nielson, Carmen E Living Trust - 1/2 Int Nielson, Harold E Jr Family Trust - 1/2 1807 135 St LuVerne, IA 50560	NE NE EX E 1/2			10.850
151.5	720 000	27 13 200 006 013 094 028	Nielson, Carmen E Living Trust - 1/2 Int Nielson, Harold E Jr Family Trust - 1/2 1807 135 St LuVerne, IA 50560	E 1/2 NE NE			10.120
152.0	720 000	27 13 200 001 013 094 028	Nielson, Carmen E Living Trust - 1/2 Int Nielson, Harold E Jr Family Trust - 1/2 1807 135 St LuVerne, IA 50560	NW NE			37.740
153.0	720 000	27 13 100 002 013 094 028	Satre, Sarah - 1/5 Int Et al 683 N Milwaukee Ave Unit 205 Chicago, IL 60642	NE NW			75.490
154.0	720 000	27 13 100 001 013 094 028	Satre, Sarah - 1/5 Int Et al 683 N Milwaukee Ave Unit 205	NW NW			57.820

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-116- - / - -

Tract	Taxing Dist	Parcel Sec -Twp -Rng	Entity	Legal	Acres	% Benefit	Units Assessed
			Chicago, IL 60642				
155.0	720 000	27 13 100 003 013 094 028	Satre, Sarah - 1/5 Int Et al 683 N Milwaukee Ave Unit 205 Chicago, IL 60642	SW NW			37.740
156.0	720 000	27 13 100 005 013 094 028	Satre, Sarah - 1/5 Int Et al 683 N Milwaukee Ave Unit 205 Chicago, IL 60642	SE NW EX PARCEL 1 AS DESC BY SURVEY DOC #2010-1698			17.100
156.5	720 000	27 13 100 006 013 094 028	Kollmorgen, Nate J Kollmorgen, Rebecca L PO Box 134 Runnells, IA 50237	PARCEL 1 LOC IN SENW AS DESC BY SURVEY DOC #2010-1698			2.470
157.0	720 000	27 13 300 002 013 094 028	Oppedahl, Kathryn Oppedahl, Kathryn Jean a/k/a 649 Dolce Court West Des Moines, IA 50266	NE SW			15.380
158.0	720 000	27 13 300 001 013 094 028	Oppedahl, Kathryn Oppedahl, Kathryn Jean a/k/a 649 Dolce Court West Des Moines, IA 50266	NW SW			4.190
159.0	720 000	27 14 200 002 014 094 028	Hanselman, George L & Hanselman, Diane R Trust 107 Kossuth Ave LuVerne, IA 50560	NE NE			40.540
160.0	720 000	27 14 200 004 014 094 028	Hanselman, George L & Hanselman, Diane R Trust 107 Kossuth Ave LuVerne, IA 50560	SE NE			9.790
161.0	720 000	27 14 200 001 014 094 028	Hanselman, George L & Hanselman, Diane R Trust 107 Kossuth Ave LuVerne, IA 50560	NW NE			12.580
162.0	720 000	27 14 200 003 014 094 028	Hanselman, George L & Hanselman, Diane R Trust 107 Kossuth Ave LuVerne, IA 50560	SW NE			8.390
163.0	720 000	27 14 100 005	Hanselman, Jesse G; Jesse George a/k/a	W1/2 E1/2 NW			4.900

Date: 5/19/26
Time: 14:03:44

Drainage Real Estate
Edit Listing

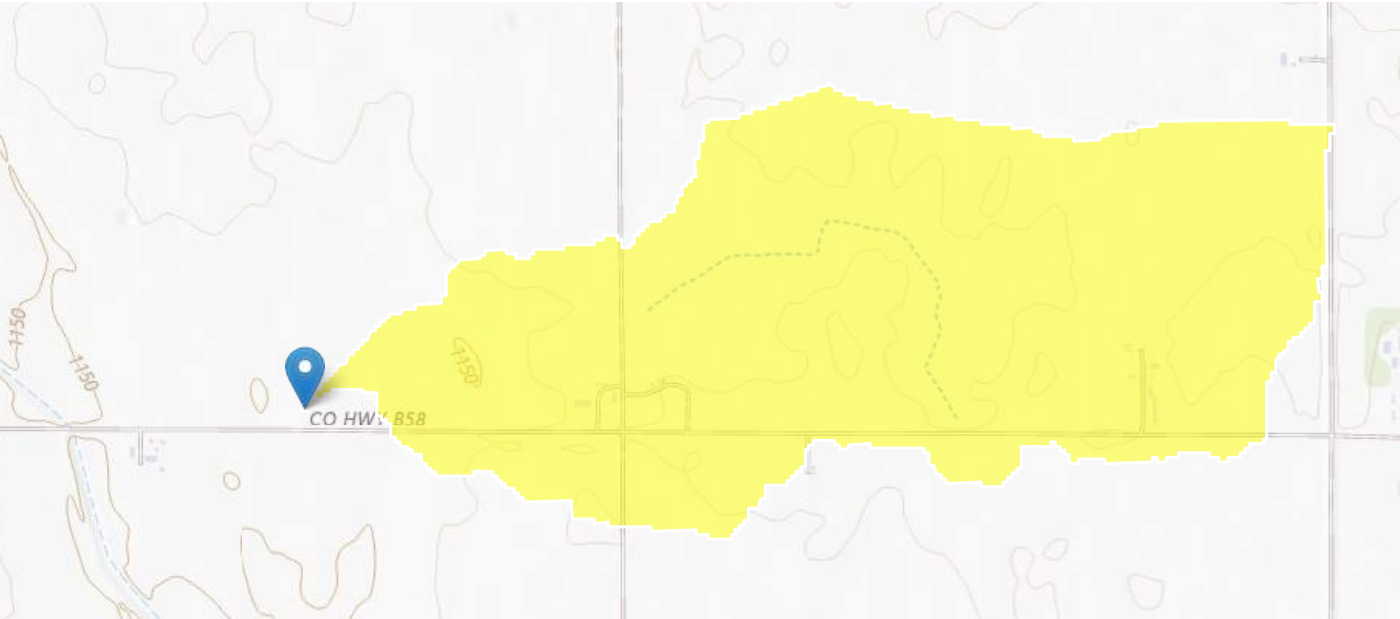
Program: DRL0001
Page: 19

District / Lateral
-116- - / - -

Tract	Taxing Dist	Parcel Sec -Twp -Rng	Entity	Legal	Acres	% Benefit	Units Assessed
		014 094 028	Hanselman, Jesse 1109 Hungry Hollow Rd Algona, IA 50511				
163.5	720 000	27 14 100 006 014 094 028	Hanselman, George L & Hanselman, Diane R Trust 107 Kossuth Ave LuVerne, IA 50560	E1/2 E1/2 NW			4.890
164.0	720 000	27 14 100 001 014 094 028	Heinen, Duane A Heinen, Sharon K 520 S Blackford St - Apt 209 Algona, IA 50511	NW NW			5.590
165.0	000	27 40 000 000 000 000 000	Kossuth County	ROAD ROW SHERMAN TWP ROADS			546.470
		-116- - / - -	Algona, IA 50511				
				Count:	177	Totals:	10,038.910 *
				Count:	177	Grand Totals:	10,038.910

StreamStats Report

Region ID: IA
Clicked Point (Latitude, Longitude): 42.98076, -94.11794
Time: 2026-07-27 14:09:55 -0500



StreamStats Update

Starting with version 4.30.0, the StreamStats application uses services that were redeveloped with open-source software components. Users may observe minor variations in computed results when compared to those from previous versions. These differences are expected and do not reflect errors in the underlying data or analytical methods. Users are advised to consider these potential variations when interpreting or comparing results generated across different versions of StreamStats. Please email streamstats@usgs.gov with any questions or concerns. A full list of changes can be found at <https://www.usgs.gov/streamstats/news/streamstats-data-updates-open-source-code-release> (<https://www.usgs.gov/streamstats/news/streamstats-data-updates-open-source-code-release>).

+ Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
CCM	Constant of channel maintenance computed as drainage area divided by total stream length	-999	square mile per mile
DRNAREA	Area that drains to a point on a stream	0.58	square miles
I24H10Y	Maximum 24-hour precipitation that occurs on average once in 10 years	4.25	inches
STRMTOT	total length of all mapped streams (1:24,000-scale) in the basin	0	miles

➤ Peak-Flow Statistics

Peak_Region_1_2013_5086 equations are not appropriate for this location and have been removed from the final report. This region does not meet the following criteria: $DRNAREA \leq 2.22 * STRMTOT$.

Peak-Flow Statistics Parameters [Peak Region 1 DA only 2015 5055]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.58	square miles	0.06	5464
STRMTOT	Stream Length Total	0	miles		

Peak-Flow Statistics Flow Report [Peak Region 1 DA only 2015 5055]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error, PC: Percent Correct, RMSE: Root Mean Squared Error, PseudoR²: Pseudo R Squared (other -- see report)

Statistic	Value	Unit	PIL	PIU	ASEp
Drainage Area Only 50-percent AEP flood	32.1	ft ³ /s	14	73.8	51.9
Drainage Area Only 20-percent AEP flood	84	ft ³ /s	41.6	170	42.9
Drainage Area Only 10-percent AEP flood	133	ft ³ /s	66.2	267	42.4
Drainage Area Only 4-percent AEP flood	209	ft ³ /s	101	433	44.4
Drainage Area Only 2-percent AEP flood	276	ft ³ /s	129	592	46.6
Drainage Area Only 1-percent AEP flood	347	ft ³ /s	156	771	48.9
Drainage Area Only 0.5-percent AEP flood	426	ft ³ /s	184	987	51.8
Drainage Area Only 0.2-percent AEP flood	537	ft ³ /s	219	1320	55.8

Peak-Flow Statistics Citations

Eash, D.A., 2015, Comparisons of estimates of annual exceedance-probability discharges for small drainage basins in Iowa, based on data through water year 2013: U.S. Geological Survey Scientific Investigations Report 2015–5055, 37 p. (<https://doi.org/10.3133/sir20155055>)

USGS Data Disclaimer: Unless otherwise stated, all data, metadata and related materials are considered to satisfy the quality standards relative to the purpose for which the data were collected. Although these data and associated metadata have been reviewed for accuracy and completeness and approved for release by the U.S. Geological Survey (USGS), no warranty expressed or implied is made regarding the display or utility of the data for other purposes, nor on all computer systems, nor shall the act of distribution constitute any such warranty.

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USGS Product Names Disclaimer: Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Application Version: 4.35.0

SSHidro Services Version: 1.4.0

SSDelineate Services Version: 1.2.0

NSS Services Version: 2.5.0

GageStats Services Version: 1.2.1

Pourpoint Services Version: 1.2.2

Batch Processor Version: 1.6.2

Appendix F: Preliminary Plans

GOVERNING SPECIFICATIONS

THE 2025 EDITION OF THE "IOWA STATEWIDE URBAN SPECIFICATIONS FOR PUBLIC IMPROVEMENTS".

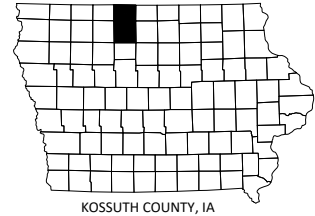
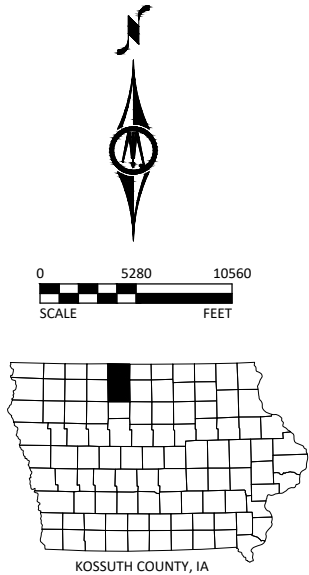
MUTCD 2023 (11th EDITION) AS ADOPTED BY IOWA DEPARTMENT OF TRANSPORTATION.

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



NOTE: EXISTING UTILITY INFORMATION SHOWN ON THIS PLAN HAS BEEN PROVIDED BY THE UTILITY OWNER. THE CONTRACTOR SHALL FIELD VERIFY EXACT LOCATIONS PRIOR TO COMMENCING CONSTRUCTION AS REQUIRED BY STATE LAW. NOTIFY IOWA ONE CALL 1-800-292-8989 OR 811

THE SUBSURFACE UTILITY INFORMATION IN THIS PLAN IS UTILITY QUALITY LEVEL D UNLESS OTHERWISE NOTED. THIS UTILITY LEVEL WAS DETERMINED ACCORDING TO THE GUIDELINES OF CI/ASCE 38-22, ENTITLED "STANDARD GUIDELINE FOR INVESTIGATING AND DOCUMENTING EXISTING UTILITIES".



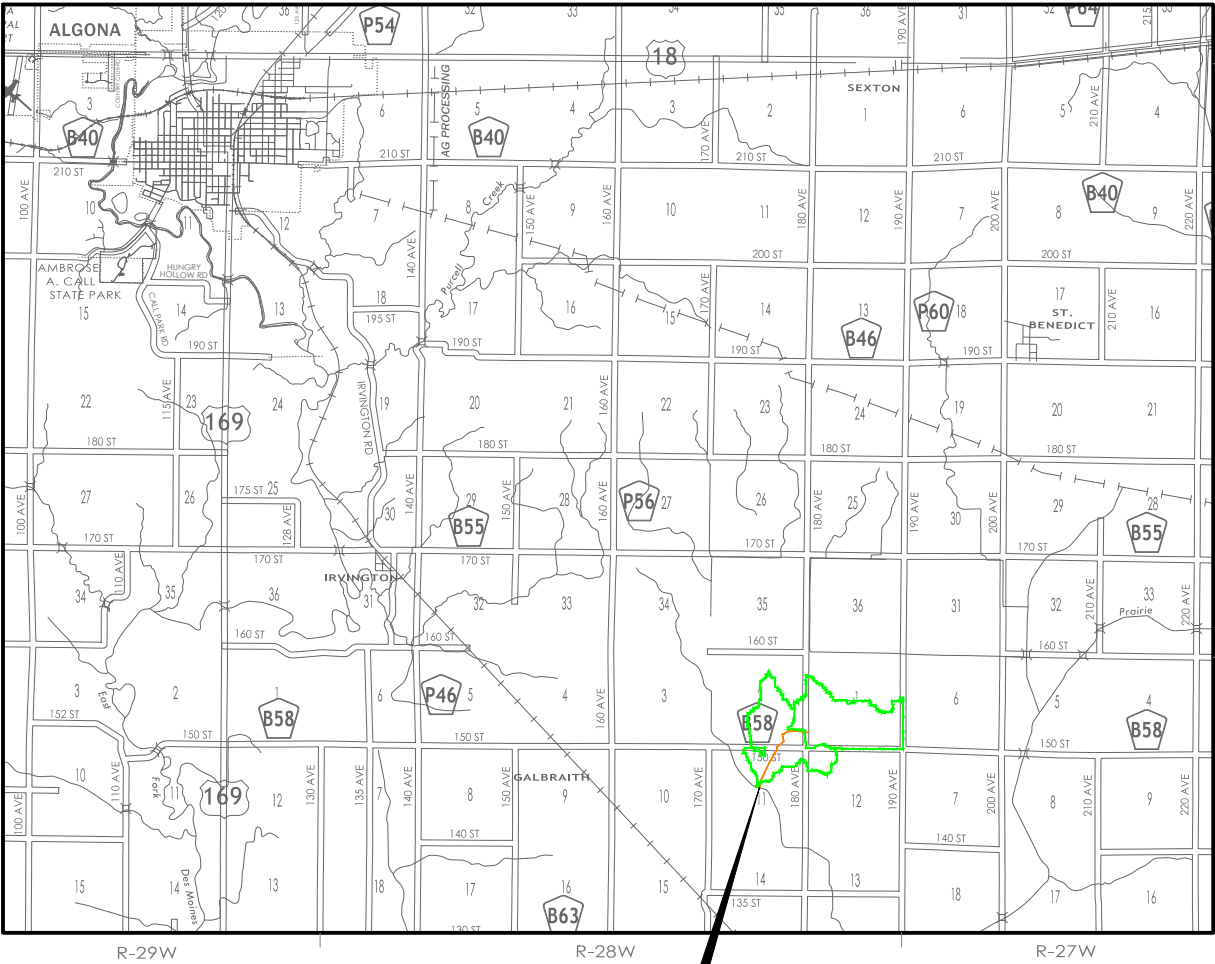
KOSSUTH COUNTY, IA

PRELIMINARY PLANS FOR

DRAINAGE DISTRICT No. 116
LATERAL 12 & 14 TILE IMPROVEMENTS

KOSSUTH COUNTY, IOWA

July, 2026



PROJECT LOCATION

SHEET LIST TABLE	
SHEET NUMBER	SHEET TITLE
A.01	TITLE SHEET
A.02	LEGEND
A.03	LANDOWNERS
B.01	RCP INSTALLATION DETAIL
B.02	CPDT INSTALLATION DETAIL
C.02	CONSTRUCTION NOTES
M.01 - M.02	PLAN & PROFILE - LATERAL 12
M.03	PLAN & PROFILE - LATERAL 14
THIS PLAN SET CONTAINS 9 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 SHEETS

PROJECT DATUM: IRCS1

HORIZONTAL: NAD83

VERTICAL: NAVD88



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

DESIGNED	REV	DESCRIPTION	DATE
TAC			
DRAWN			
CLH			
CHECKED			
TAC			
CLIENT PROJ. NO.			
26X143153000			

DRAINAGE DISTRICT No. 116 - LATERALS 12 & 14
KOSSUTH COUNTY, IOWA
TITLE

SHEET

A.01

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PLAN 26X143153000-CD-UT-13153A01.dwg 7/24/2026 4:06:31 PM Plotted by Anna Ross

EXISTING TOPOGRAPHIC SYMBOLS

	ACCESS GRATE		REGULATION STATION GAS
	AIR CONDITION UNIT		SATELLITE DISH
	ANTENNA		SIGN TRAFFIC
	AUTO SPRINKLER CONNECTION		SIGNAL CONTROL CABINET
	BARRICADE PERMANENT		SOIL BORING
	BASKETBALL POST		SIREN
	BENCH		TELEPHONE BOOTH
	BIRD FEEDER		TILE INLET
	BOLLARD		TILE OUTLET
	BUSH		TILE RISER
	CATCH BASIN RECTANGULAR CASTING		TRANSFORMER-ELECTRIC
	CATCH BASIN CIRCULAR CASTING		TREE-CONIFEROUS
	CURB STOP		TREE-DEAD
	CLEAN OUT		TREE-DECIDUOUS
	CULVERT END		TREE STUMP
	DRINKING FOUNTAIN		TRAFFIC ARM BARRIER
	DOWN SPOUT		TRAFFIC SIGNAL
	ELECTRIC CAR CHARGE STATION		TRASH CAN
	FILL PIPE		UTILITY MARKER
	FIRE HYDRANT		VALVE
	FLAG POLE		VALVE POST INDICATOR
	FLARED END / APRON		VALVE VAULT
	FUEL PUMP		VAULT
	GRILL		VENT PIPE
	GUY WIRE ANCHOR		WATER SPIGOT
	HANDHOLE		WELL
	HANDICAP SPACE		WETLAND DELINEATED MARKER
	IRRIGATION SPRINKLER HEAD		WETLAND
	IRRIGATION VALVE BOX		WET WELL
	LIFT STATION CONTROL PANEL		YARD HYDRANT
	LIFT STATION		
	LIGHT POLE		
	MAILBOX		
	MANHOLE-COMMUNICATION		
	MANHOLE-ELECTRIC		
	MANHOLE-GAS		
	MANHOLE-HEAT		
	MANHOLE-RECLAIMED WATER		
	MANHOLE-SANITARY SEWER		
	MANHOLE-STORM SEWER		
	MANHOLE-UTILITY		
	MANHOLE-WATER		
	METER		
	DRIVE-THRU MICROPHONE		
	PARKING METER		
	PAVEMENT MARKING		
	PEDESTAL-COMMUNICATION		
	PEDESTAL-ELECTRIC		
	PEDESTRIAN PUSH BUTTON		
	PICNIC TABLE		
	POLE-UTILITY		
	POST		
	RAILROAD SIGNAL POLE		

PROPOSED TOPOGRAPHIC SYMBOLS

	CLEANOUT
	MANHOLE
	LIFT STATION
	STORM SEWER CIRCULAR CASTING
	STORM SEWER RECTANGULAR CASTING
	STORM SEWER FLARED END / APRON
	STORM SEWER OUTLET STRUCTURE
	STORM SEWER OVERFLOW STRUCTURE
	CURB BOX
	FIRE HYDRANT
	WATER VALVE
	WATER REDUCER
	WATER BEND
	WATER TEE
	WATER CROSS
	WATER SLEEVE
	WATER CAP / PLUG
	RIP RAP
	DRAINAGE FLOW
	TRAFFIC SIGNS
	LIGHT POLE

SURVEY SYMBOLS

	BENCHMARK LOCATION		CAST IRON MONUMENT
	CONTROL POINT		STONE MONUMENT
	MONUMENT FOUND		

EXISTING TOPOGRAPHIC LINES

	RETAINING WALL
	FENCE
	FENCE-DECORATIVE
	GUARD RAIL
	TREE LINE
	BUSH LINE

SURVEY LINES

	CONTROLLED ACCESS
	BOUNDARY
	CENTERLINE
	EXISTING EASEMENT LINE
	PROPOSED EASEMENT LINE
	EXISTING LOT LINE
	PROPOSED LOT LINE
	EXISTING RIGHT-OF-WAY
	PROPOSED RIGHT-OF-WAY
	SETBACK LINE
	SECTION LINE
	QUARTER LINE
	SIXTEENTH LINE
	TEMPORARY EASEMENT

EXISTING UTILITY LINES

	FORCEMAIN
	SANITARY SEWER
	SANITARY SERVICE
	STORM SEWER
	STORM SEWER DRAIN TILE
	WATERMAIN
	WATER SERVICE
	RECLAIMED WATER

PROPOSED UTILITY LINES

	FORCEMAIN
	SANITARY SEWER
	SANITARY SERVICE
	STORM SEWER
	STORM SEWER DRAIN TILE
	WATERMAIN
	WATER SERVICE
	PIPE CASING
	TRENCHLESS PIPE (PLAN VIEW)
	TRENCHLESS PIPE (PROFILE VIEW)

GRADING INFORMATION

	EXISTING CONTOUR MINOR
	EXISTING CONTOUR MAJOR
	PROPOSED CONTOUR MINOR
	PROPOSED CONTOUR MAJOR
	PROPOSED GRADING LIMITS / SLOPE LIMITS
	PROJECT LIMITS
	PROPOSED SPOT ELEVATION
	RISE:RUN (SLOPE)

HATCH PATTERNS

	HMA PAVEMENT		SIDEWALK		PCC PAVEMENT
	DRIVEWAY		GRAVEL		

EXISTING PRIVATE UTILITY LINES

NOTE:
EXISTING UTILITY INFORMATION SHOWN ON THIS PLAN HAS BEEN PROVIDED BY THE UTILITY OWNER. THE CONTRACTOR SHALL FIELD VERIFY EXACT LOCATIONS PRIOR TO COMMENCING CONSTRUCTION AS REQUIRED BY STATE LAW. NOTIFY IOWA ONE CALL - 1-800-292-8989

THE SUBSURFACE UTILITY INFORMATION IN THIS PLAN IS UTILITY QUALITY LEVEL D UNLESS OTHERWISE NOTED. THIS UTILITY LEVEL WAS DETERMINED ACCORDING TO THE GUIDELINES OF CI/ASCE 38-02, ENTITLED "STANDARD GUIDELINE FOR INVESTIGATING AND DOCUMENTING EXISTING UTILITIES".

	UNDERGROUND FIBER OPTIC
	UNDERGROUND ELECTRIC
	UNDERGROUND GAS
	UNDERGROUND COMMUNICATION
	OVERHEAD ELECTRIC
	OVERHEAD COMMUNICATION
	OVERHEAD UTILITY

UTILITIES IDENTIFIED WITH A QUALITY LEVEL OTHER THAN D:

LINE TYPES FOLLOW THE FORMAT: UTILITY TYPE - QUALITY LEVEL
EXAMPLE: UNDERGROUND GAS, QUALITY LEVEL A
UTILITY QUALITY LEVEL (A,B,C,D) DEFINITIONS CAN BE FOUND IN CI/ASCE 38-22.

UTILITY QUALITY LEVELS:

LEVEL D - INFORMATION COMES SOLELY FROM EXISTING UTILITY RECORDS.

LEVEL C - SURVEYING ABOVE GROUND UTILITY FACILITIES, SUCH AS MANHOLES, VALVE BOXES, ETC; AND CORRELATING THIS INFORMATION WITH EXISTING UTILITY RECORDS.

LEVEL B - THE USE OF SURFACE GEOPHYSICAL TECHNIQUES TO DETERMINE THE EXISTENCE AND HORIZONTAL POSITION OF UNDERGROUND UTILITIES.

LEVEL A - THE USE OF NONDESTRUCTIVE DIGGING EQUIPMENT AT HORIZONTAL AND VERTICAL POSITION OF UNDERGROUND UTILITIES, AS WELL AS THE TYPE, SIZE, CONDITION, MATERIAL, AND OTHER CHARACTERISTICS.

ABBREVIATIONS

A	ALGEBRAIC DIFFERENCE	GV	GATE VALVE	SAN	SANITARY SEWER
ADJ	ADJUST	HDPE	HIGH DENSITY POLYETHYLENE	SCH	SCHEDULE
ALT	ALTERNATE	HH	HANDHOLE	SERV	SERVICE
B-B	BACK TO BACK	HMA	HOT MIX ASPHALT	SHLD	SHOULDER
BLDG	BUILDING	HP	HIGH POINT	STA	STATION
BMP	BEST MANAGEMENT PRACTICE	HWL	HIGH WATER LEVEL	STD	STANDARD
BR	BEGIN RADIUS	HYD	HYDRANT	STM	STORM SEWER
BV	BUTTERFLY VALVE	I	INVERT	TC	TOP OF CURB
CB	CATCH BASIN	K	CURVE COEFFICIENT	TE	TEMPORARY EASEMENT
C&G	CURB AND GUTTER	L	LENGTH	TEMP	TEMPORARY
CIP	CAST IRON PIPE	LO	LOWEST OPENING	TNH	TOP NUT HYDRANT
CIPP	CURED-IN-PLACE PIPE	LP	LOW POINT	TP	TOP OF PIPE
CL	CENTER LINE	LT	LEFT	TYP	TYPICAL
CL	CLASS	MH	MANHOLE	VCP	VITRIFIED CLAY PIPE
CMP	CORRUGATED METAL PIPE	MIN	MINIMUM	VERT	VERTICAL
C.O.	CHANGE ORDER	MR	MID RADIUS	VPC	VERTICAL POINT OF CURVE
COMM	COMMUNICATION	NIC	NOT IN CONTRACT	VPI	VERTICAL POINT OF INTERSECTION
CSP	CORRUGATED STEEL PIPE	NMC	NON-METALLIC CONDUIT	VPT	VERTICAL POINT OF TANGENT
CLVT	CULVERT	NTS	NOT TO SCALE	WM	WATERMAIN
DIA	DIAMETER	NWL	NORMAL WATER LEVEL	WS	WATER SERVICE
DIP	DUCTILE IRON PIPE	OHW	ORDINARY HIGH WATER LEVEL		
DWY	DRIVEWAY	PC	POINT OF CURVE		
E	EXTERNAL CURVE DISTANCE	PCC	PORTLAND CEMENT CONCRETE	AC	ACRES
ESMT	EASEMENT	PE	PERMANENT EASEMENT	CF	CUBIC FEET
ELEC	ELECTRIC	PED	PEDESTRIAN, PEDESTAL	CV	COMPACTED VOLUME
ELEV/EL	ELEVATION	PERF	PERFORATED PIPE	CY	CUBIC YARD
EOF	EMERGENCY OVERFLOW	PERM	PERMANENT	EA	EACH
ER	END RADIUS	PI	POINT OF INTERSECTION	EV	EXCAVATED VOLUME
EX	EXISTING	PL	PROPERTY LINE	LB	POUND
FES	FLARED END SECTION	PRC	POINT OF REVERSE CURVE	LF	LINEAR FEET
F-F	FACE TO FACE	PT	POINT OF TANGENT	LS	LUMP SUM
FF	FINISHED FLOOR	PVC	POLYVINYL CHLORIDE PIPE	LV	LOOSE VOLUME
F&I	FURNISH AND INSTALL	PVMT	PAVEMENT	SF	SQUARE FEET
FM	FORCEMAIN	R	RADIUS	SV	STOCKPILE VOLUME
FO	FIBER OPTIC	RCP	REINFORCED CONCRETE PIPE	SY	SQUARE YARD
F.O.	FIELD ORDER	RET	RETAINING		
GRAN	GRANULAR	R/W	RIGHT-OF-WAY		
GRAV	GRAVEL	RSC	RIGID STEEL CONDUIT		
GU	GUTTER	RT	RIGHT		



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

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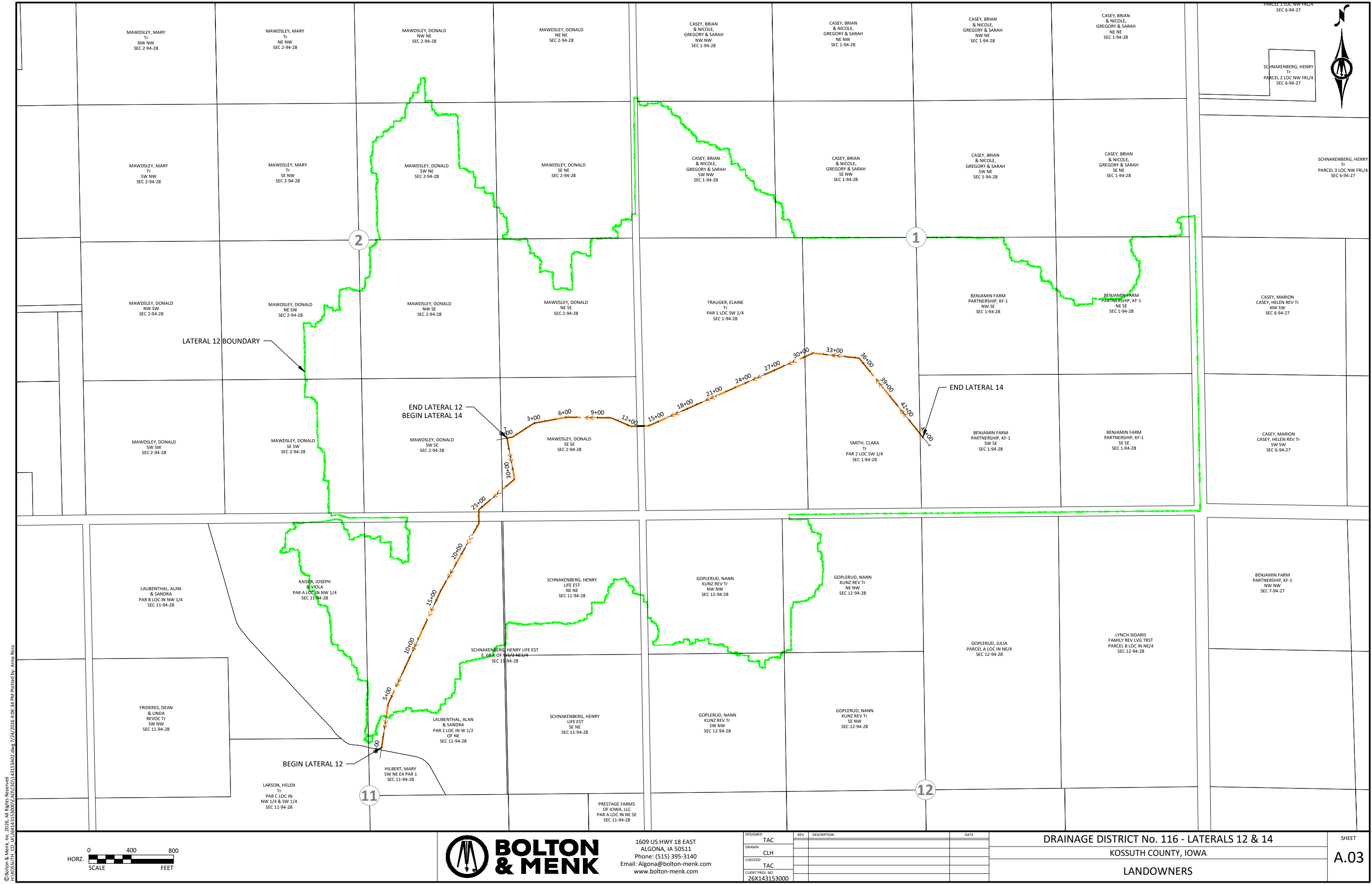
DRAINAGE DISTRICT No. 116 - LATERALS 12 & 14

KOSSUTH COUNTY, IOWA

LEGEND

SHEET

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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.

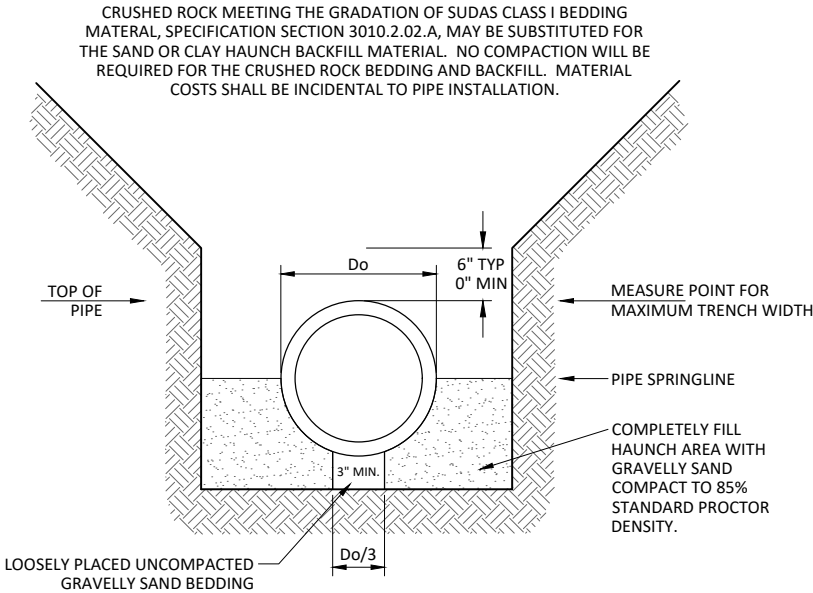
STEP 4A
SOIL OR TRENCH CONDITION CHANGES

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.

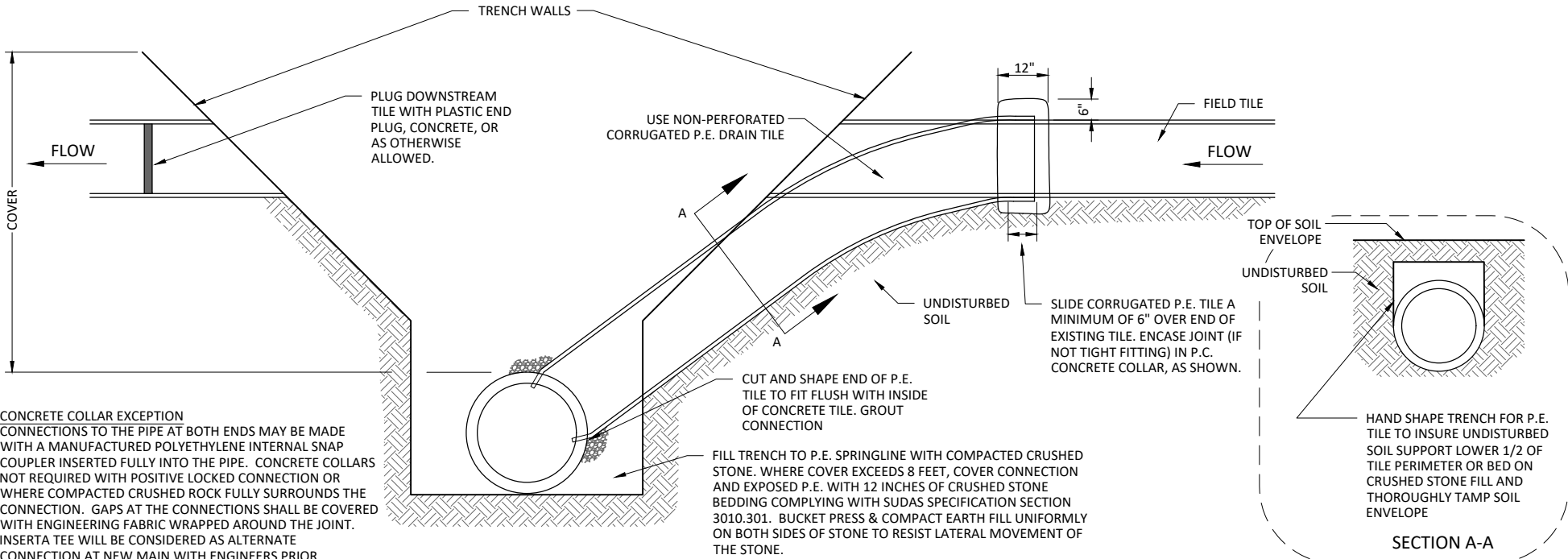
EXCEPTION
IF CONTRACTOR ELECTS TO SHAPE THE TRENCH BOTTOM SUCH THAT A MINIMUM OF 45% OF THE OUTER CIRCUMFERENCE OF THE PIPE IS FIRMLY BEDDED IN AND CONSISTENTLY SUPPORTED BY UNDISTURBED SOIL, PIPE HAUNCH FILL COMPACTION TESTING WILL NOT BE REQUIRED. THE CONTRACTOR IS REQUIRED TO COMPLY WITH A PROPER 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

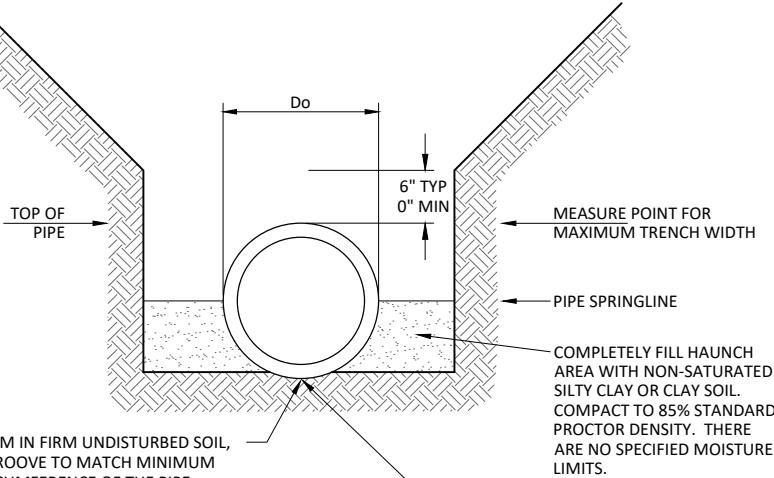
NOT TO SCALE
SOURCE: AMERICAN CONCRETE PIPE ASSOCIATION
CONCRETE PIPE DESIGN MANUAL



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

MINIMUM TRENCH WIDTH SHALL BE OUTSIDE DIAMETER OF PIPE PLUS 12" OR THAT WIDTH WHICH IS REQUIRED FOR COMPACTION, WHICHEVER IS GREATER



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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DRAINAGE DISTRICT No. 116 - LATERALS 12 & 14

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RCP INSTALLATION DETAIL

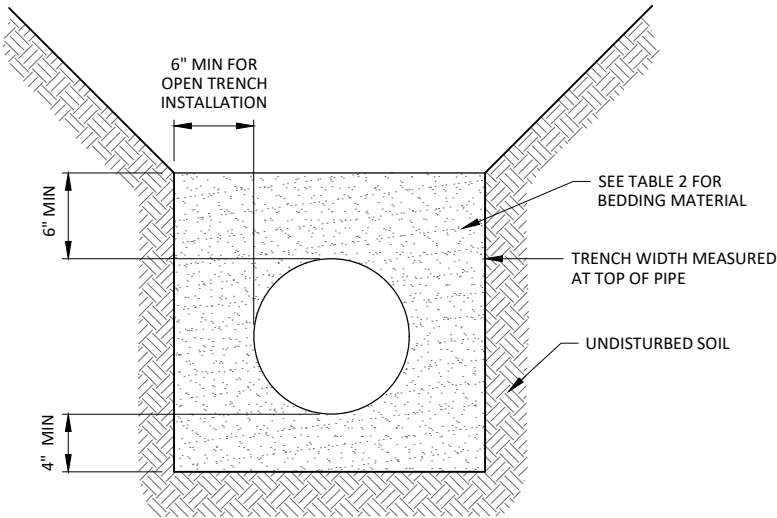
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CORRUGATED POLYETHYLENE DRAINAGE TUBING
MATERIAL & INSTALLATION NOTES

- 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	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					

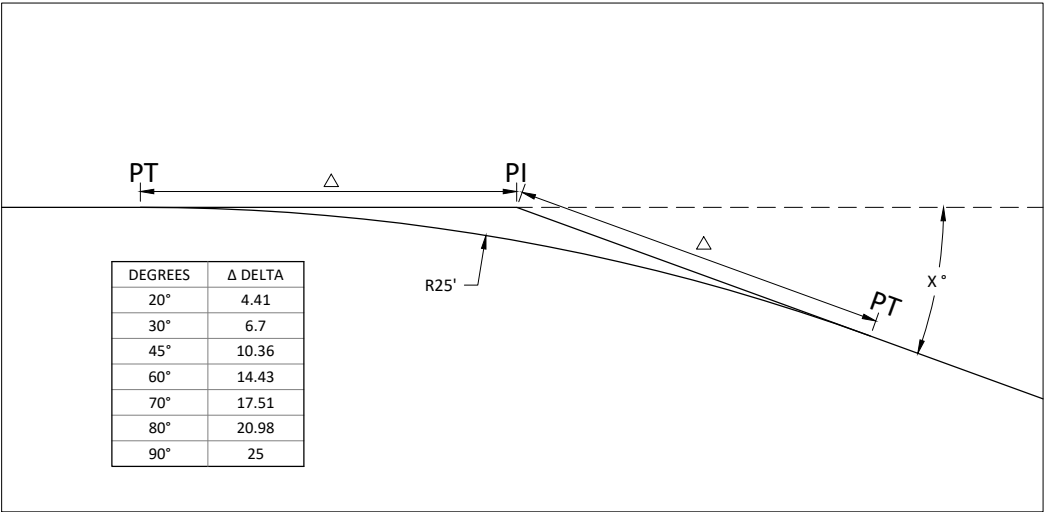


FILL TRENCH TO 6" ABOVE TOP OF PIPE WITH CRUSHED STONE OR GRAVEL MEETING THE REQUIREMENTS IN TABLE 2. BEDDING MATERIAL SHALL BE INCIDENTAL TO THE PIPE INSTALLATION.

FLAT BOTTOM TRENCH INSTALLATION

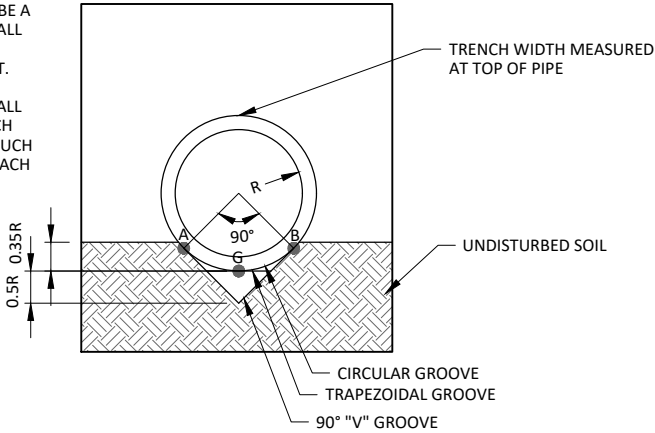
NOT TO SCALE
SOURCE: ASTM F449

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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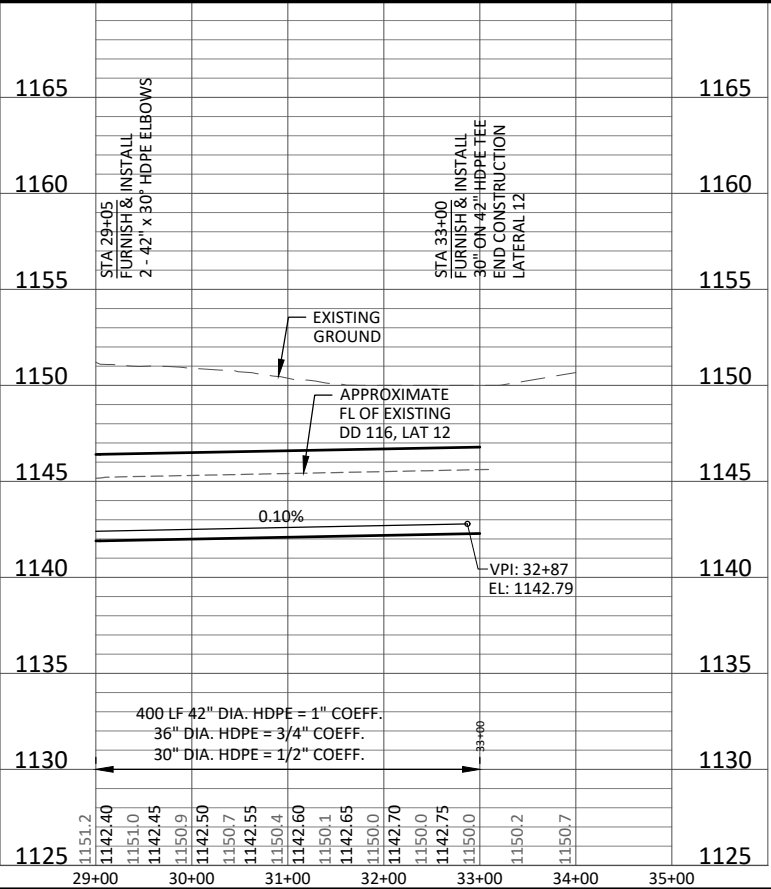
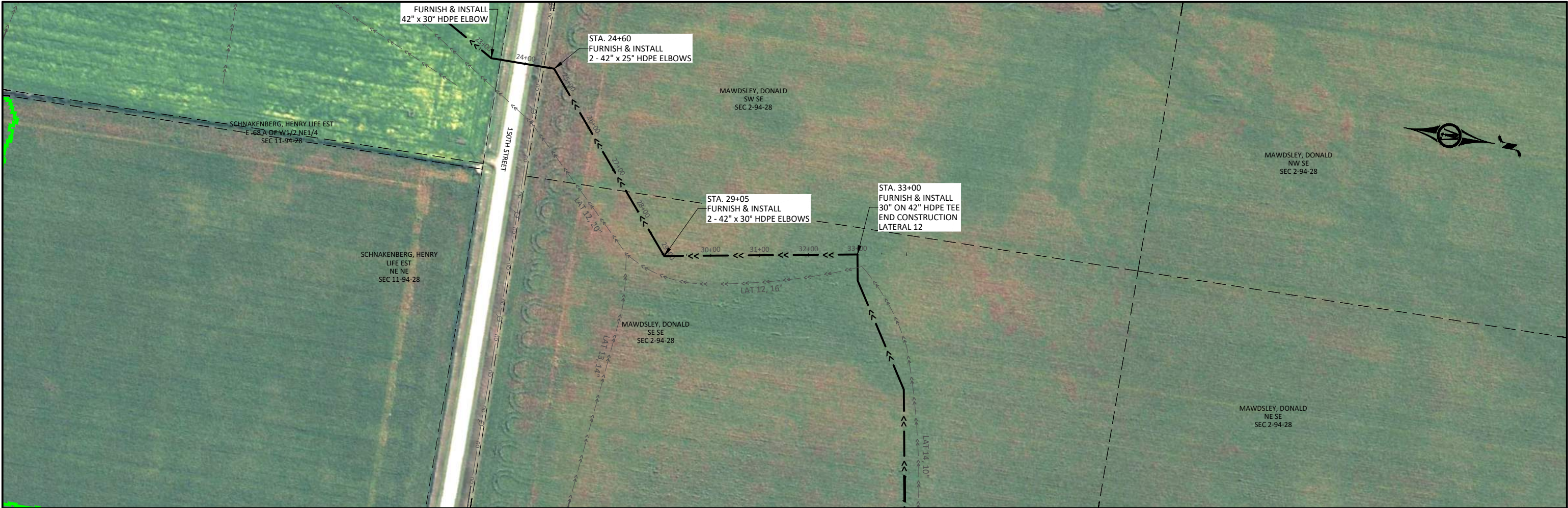
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CPDT INSTALLATION DETAIL

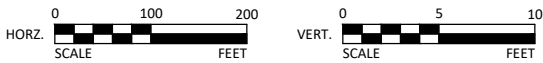
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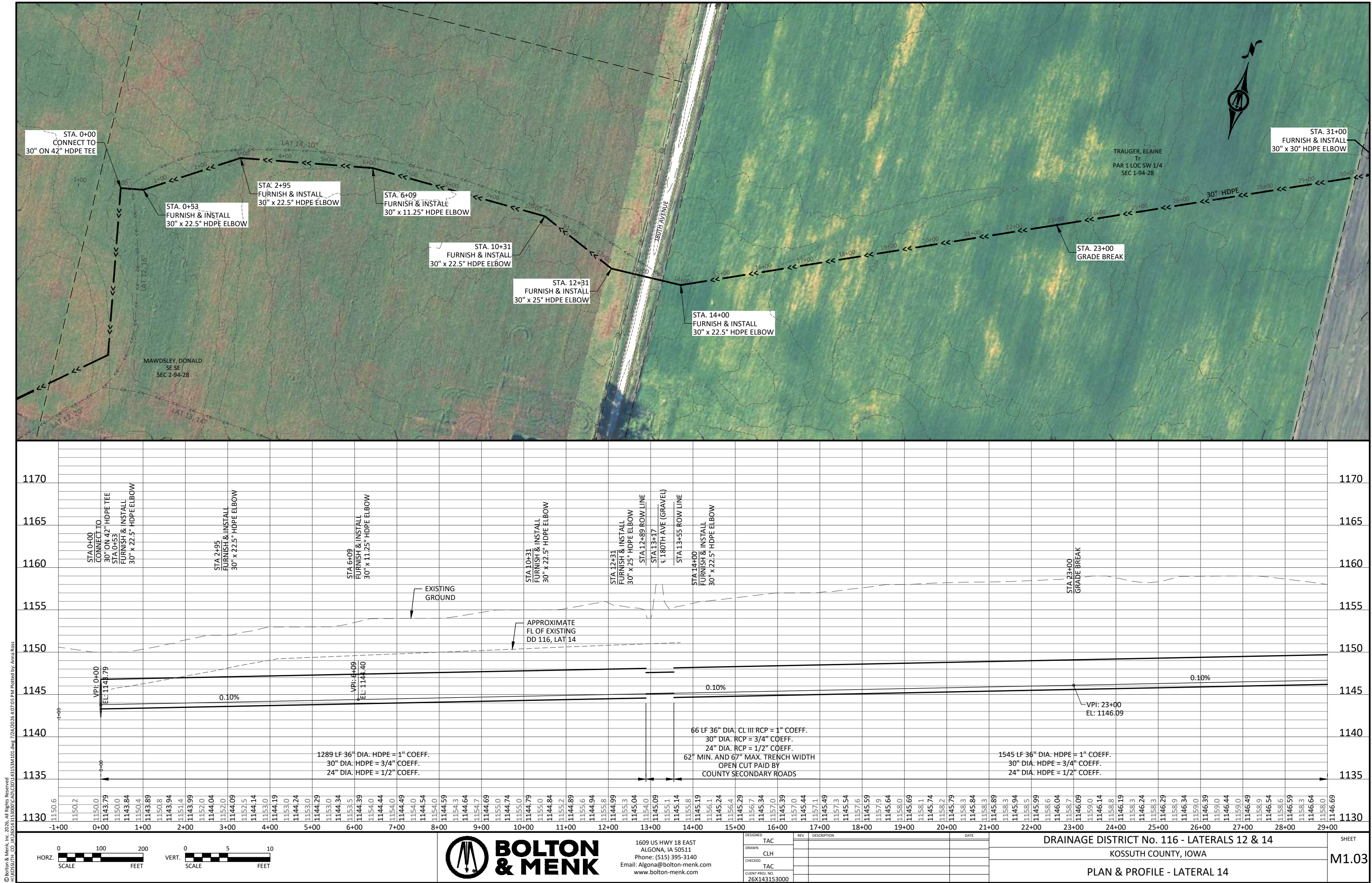
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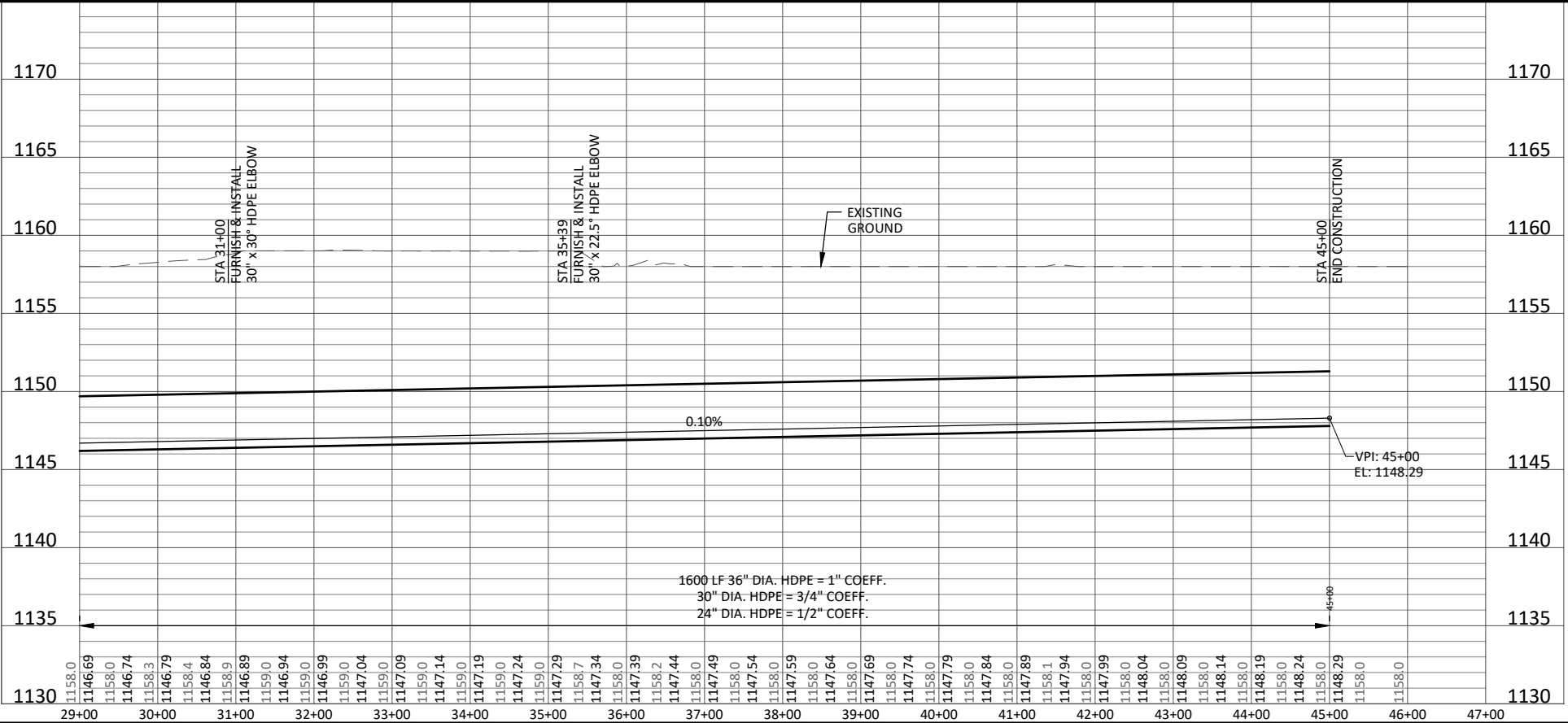
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PLAN & PROFILE - LATERAL 12

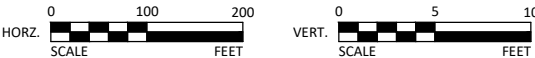
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DRAINAGE DISTRICT No. 116 - LATERALS 12 & 14

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PLAN & PROFILE - LATERAL 14

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