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Engineer's Report

# Drainage District No. 57 Open Channel Cleanout

Cerro Gordo County, Iowa

Filed: August 28, 2023

**Submitted by:**

Bolton & Menk, Inc.  
1609 U.S. Hwy 18 East  
Algona, IA 50511  
P: 515-395-3140

Proj. No. OP1.126016

# Certification

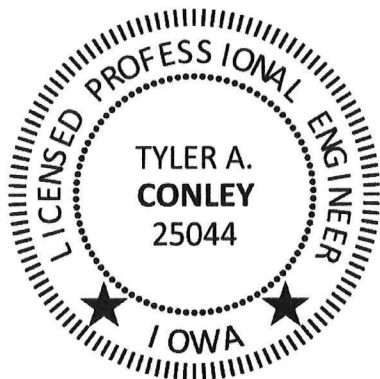
Engineer's Report

for

Open Channel Cleanout  
Drainage District No. 57  
Cerro Gordo County, Iowa

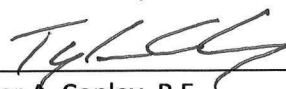
OP1.126016

August 28, 2023



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, 2023.

By:



Tyler A. Conley, P.E.

License No. 25044

Date:

8/28/23

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## **I. INTRODUCTION**

### **A. SCOPE OF WORK**

The purpose of this report is to provide information relative to drainage relief as requested by a landowner of Drainage District No. 57 in Cerro Gordo County, Iowa (DD57). The Board of Supervisors 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 repairs, associated with the channel downstream of DD57 serving as the current Main Tile outlet. This report examines the conditions that would be necessary to restore the drainage efficiency of the existing open channel closer to conditions that would have existed at the time of the District's original construction. A copy of the drainage petition is attached with this report in Appendix A.

### **B. LOCATION & DISTRICT FACILITIES**

The district watershed and facilities are described in the following paragraphs, but it may be helpful to look at the map overview available on page A.02 of the Preliminary Plans in Appendix F. There are also original District plats that show the original DD57 in Appendix B.

The watershed of DD57 lies within Cerro Gordo County located approximately 4.5 miles south of the city of Swaledale. DD57 is located in Sections 16, 17, 20, 21, 22, 27, 28, 29, 33 and 34 of Pleasant Valley Township (T-94-N, R-21-W).

The primary facilities of Drainage District No. 57 consist of a Main Tile, fifteen Lateral Tiles, and ten Branch Tiles. The Main Tile outlets in the Southeast  $\frac{1}{4}$  of the Northwest  $\frac{1}{4}$  of Section 34 Township 94N, Range 21W into an unnamed creek which continues Southeast flowing into Bailey Creek. Bailey Creek is a tributary of the Cedar River watershed that eventually makes its way to the Mississippi River.

### **C. HISTORY SUMMARY**

Bolton & Menk conducted an investigation based on records from the Cerro Gordo County Courthouse. This information was gathered in order to better understand the Drainage District's history. A summary of events based on these records is as follows:

November 19, 1917:	Petition to establish the Drainage District Filed.
December 20, 1917:	Board appoints engineer to examine and survey the lands.
March 25, 1918:	Engineer's Report filed recommending the establishment of DD57.
May 6, 1918:	Board accepts the Engineer's Report and sets date for public hearing.
June 10, 1918:	Final hearing to establishment of DD57. DD57 is established.
July 15, 1918:	Bidding was set for August 5, 1918.
August 5, 1918:	Bid letting failed. The board sets a date for new bid letting and award for September 3, 1918.
September 3, 1918:	Bids are received and are above estimate. As a result all bids are rejected. Bidding is postponed until April 8, 1919.
April 8, 1919:	C. E. Paine assigned as contractor.
August 24, 1920:	Project is completed.
October 9, 2014:	Broken Culvert causing drainage backup – completed May 5, 2015.
December 20, 2021:	Broken Tile – completed January 2, 2022

## **II. INVESTIGATION**

### **A. SURVEY & INVESTIGATION**

A petition was submitted for the review of the drainage system and to evaluate the downstream outlet of the district.

An information meeting was held with landowners on July 12, 2022. The problems stated at the meeting and in the petition included the siltation of the downstream channel that serves as the District's outlet located near the intersection of Jonquil Avenue and 110<sup>th</sup> Street. The concern is that the siltation in the Open Channel is causing reductions in the tile system capacity by backing up water and causing a "forced outlet".

During the fall of 2022, a field review and preliminary survey were performed on the Open Channel serving as the outlet for DD57. Topographic data was gathered along the Open Channel to determine the existing sediment levels. Additionally, topographic data was obtained for inline structures on the Open Channel as well as pipe elevation entering the channel.

### **B. CAPACITY ANALYSIS**

From the information gathered in the field investigation the capacity of the current system could be determined. From a review of the District's history and original documents, it was determined that the outlet Open Channel is not currently considered a facility of DD57. Therefore, there is not an existing plan, alignment, or elevation profile for the Open Channel portion of the system. However, despite the lack of historical documents, it could still be determined that the siltation in the Open Channel is significant and causing drainage issues for the tile system. There are additional considerations that will need to be addressed by the District due to the Open Channel not being a facility in order to resolve the issues of siltation. In addition to making repair recommendations, this report also outlines these additional considerations.

Additionally, for the District's consideration, a review of the existing tile capacities was conducted. 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 the Main Tile, the capacity of the facilities could be calculated. By today's standards, the Main Tile of DD57 would be undersized. Looking at the Main Tile, the majority of the tile is at or below 0.25" per day, or 50% of the modern drainage coefficient standard. The standard drainage coefficient at the time of construction would have been between  $\frac{1}{8}$ " and  $\frac{1}{4}$ " per day, however today's drainage standard is  $\frac{1}{2}$ " per day with good surface drainage and up to 1" per day for depressional areas. Additionally, because the theoretical drainage coefficient is calculated using the size, grade, and drainage area, the actual capacity of the tile systems could be considerably less due to factors such as material age, tile damage, tile blockages, sedimentation and joint displacement. Appendix C displays the estimated tile capacities for the all the District facilities.

### **III. PROPOSED REPAIR**

#### **A. OPEN CHANNEL CLEANOUT**

The investigation has confirmed the need for drainage relief within the district. A clean out of the Open Channel outlet could be performed to restore the drainage capacity of the Open Channel to more closely resemble the original capacity at the time of the District's construction. This cleanout would aim to establish a uniform slope, shape, and capacity by creating the appropriate cross section along the Open Channel. The Open Channel would also have all trees and debris removed within an obtained district right-of-way. Currently, because the Open Channel is not a facility of DD57, the District does not have a right-of-way easement along the Open Channel that would allow for construction and future maintenance. Acquisition of a right-of-way easement would be required in the event that an Open Channel clean out project was approved. The right-of-way acquisition process is outlined in the Right-of-Way section of this report.

Additionally, as part of an Open Channel clean out project, the spoil material would be uniformly leveled and shaped to a typical cross section with a relatively flat top (2% slope) that is 14-18 feet wide, adjacent to the ditch with a 10:1 back-slope onto the adjacent land. These leveled berms would be placed in locations that would minimize disturbance of existing farm buffer zones. Where needed, new CMP tile extensions would be placed on the ends of field tiles entering the Open Channel and new CMP surface drains would be installed at required locations as well as replacing existing surface drains. All tile extensions that are replaced that have animal guards will have the animal guards replaced as well.

#### **B. WORK LIMITS & DAMAGES**

Landowners are entitled to full reimbursement for damages resulting from the work on lands outside of Open Channel 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 ditch to allow for construction activities. The work limits for the Open Channel will be set at approximately 35 to 50 feet outside of the toe of the spoil pile of the ditch.

It is anticipated that the repair work will commence in the Spring and Summer of 2024. 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 very specific for the type of conservation practice which is utilized.

### **IV. OPINIONS OF PROBABLE COST**

The cost estimate for the repair option is contained in Appendix E. These estimates represent the 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.

## V. DISTRICT RIGHT-OF-WAY

If the Open Channel Rehabilitation project is selected, a consistent right-of-way will need to be acquired for the new drainage facility. In order to facilitate maintenance now and into the future, a right-of-way width that is approximately 20 feet outside of the top of bank is typically required to accommodate today's construction equipment. These proposed rights-of-way would need to be acquired following Iowa Code Section 468.24 which states: *"If the board shall find that such improvement will materially benefit said lands, will be conducive to the public health, convenience, welfare, benefit, or utility, and that the law has been complied with as to form and substance of the petition, the service of notice, and the survey and report of the engineer, and that said improvement should be made, then if any claims for damages shall have been filed, further proceedings shall be continued to an adjourned, regular, or special session, the date of which shall be fixed at the time of adjournment, and of which all interested parties shall take notice, and the auditor shall appoint three appraisers to assess damages, one of whom shall be an engineer, and two freeholders of the county who shall not be interested in nor related to any person interested in the proposed improvement, and the said appraisers shall take and subscribe an oath to examine the said premises, ascertain and impartially assess all damages according to their best judgment, skill, and ability."* and Code Section 468.25 which states: *"The appraisers appointed to assess damages shall view the premises and determine and fix the amount of damages to which each claimant is entitled, and shall place a separate valuation upon the acreage of each owner taken for right-of-way for open ditches or for settling basins, as shown by plat of engineer, and shall, at least five days before the date fixed by the board to hear and determine the same, file with the county auditor reports in writing, showing the amount of damage sustained by each claimant. Should the report not be filed in time, or should any good cause for delay exist, the board may postpone the time of final action on the subject, and, if necessary, the auditor may appoint other appraisers."*

Open Channel right-of-way are essential to maintaining District quality and efficiency. These right-of-way purchases include the right of ingress and egress across adjoining land and the right of access for maintenance, repair, improvement and inspection.

Drainage District open ditch right-of-way are exempt from real estate taxes and drainage assessments. Therefore, deductions should be made to the net acres of those affected parcels and the property records for those affected parcels should be adjusted accordingly. Under Iowa law, landowners have the right to the beneficial use of the spoil bank in the right-of-way subject only to the district's use of the right-of-way to protect and maintain the open ditch. Appendix D has a tabulation of the acreage of land required from each forty tract or fraction thereof as right-of-way.

## VI. ANNEXATION & RECLASSIFICATION

A further consideration for the Trustees is the equitability of the existing district schedule. Because the open channel is not currently a district facility, a schedule of benefits does not currently exist for the spread of benefits provided by the open channel. Iowa Code Section 468.65 states *"When, after a drainage or levee district has been established, except districts established by mutual agreement in accordance with section 468.142, and the improvements thereof constructed and put in operation, there has been a material change as to lands occupied by highway or railroad right-of-way or in the character of the lands benefited by the improvement, 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 same to be inequitable in any particular, they shall by resolution express such finding, appoint three commissioners possessing the qualifications prescribed in section 468.38 and order a reclassification...”.*

Reclassification would develop schedules that would be used to allocate project expenses based off benefit received. Benefit is determined by reviewing factors for each 40-acre parcel or subdivide thereof. These factors include but are not limited to property wetness, facility usage, facility proximity, land use, and property area. Additionally, a separate schedule would be developed for each facility so that only those landowners who benefit from a facility would pay for facility installation and maintenance. A separate hearing is held for reclassification which would include separate landowner notifications.

If reclassification of the District is desired to provide a schedule of benefits for the Open Channel, it is likely that lands would be found to be benefiting from the district facilities that are currently outside of the current assessment schedule. In the event that such lands are found, the Board of Supervisors would be 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 any 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. Annexation, much like reclassification, requires a separate report and hearing for final consideration and action can be carried out.

## **VII. BUFFER STRIPS**

It appears there may be some farm program buffer strips in place along the Open Channel. There are some manageable drawbacks which must be addressed by the owners of the buffer strips. If farm program buffer strips do exist, the destruction of buffer strip vegetation by spoil placement or leveling from cleaning the Open Channel places the landowner in violation of farm program conservation rules. The penalties can include loss of the CRP contract, forfeiture of back CRP payments, and penalties. To avoid these, landowners must request a waiver from the USDA Farm Service Agency County Committee. The county committee will grant waivers for ditch maintenance if seeding restoration in compliance with NRCS requirements is completed. If work on the Open Channel is authorized, all farm program buffer strip owners along the ditch must independently seek the FSA County Committee waivers. This process will take two or three months and should be initiated immediately if ditch maintenance is authorized.



## VIII. CLEAN WATER ACT COMPLIANCE

Compliance with the Clean Water Act is vital to having a successful project. Gaining this compliance can be difficult, time consuming, and inconsistent between similar applications. The goal is to limit and/or mitigate for dredging and filling of “Waters of the United States” (WOTUS) which is regulated under Section 404 of the “Clean Water Act” (CWA). In the 1990’s the United States Environmental Protection Agency (USEPA) & United States Army Corp of Engineers (USACE) adopted rules to extend Section 404 jurisdiction to isolated wetlands, including farmed wetlands. For a few years, it became necessary to get CWA Section 404 permits for drainage district improvements where farmed wetland conversions were expected.

As a part of this proposed project already, a joint application has been submitted to the Iowa Department of Natural Resources (IDNR) and the United States Army Corps of Engineers for their determination of jurisdiction and mitigation requirements. This was done to better know the full extent of the project impact and cost before an option was selected. Responses have been obtained from the IDNR and USACE that state that the project will not require a Section 404 permit in the event that it is constructed in the next five years. There was also found to be no environmental impacts that would need to be mitigated. The responses from the IDNR and the USACE are attached as Appendix E.

## IX. WATER QUALITY

The hydrologic impacts to tile drainage entail 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 soils health, all without dramatically changing the current land use of the landscape.

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

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

These practices may be incorporated 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.

## **X. SUMMARY & DISCUSSION**

This report has confirmed the need for drainage relief for Drainage District No. 57. The work described herein can accomplish that relief. We recommend proceeding with the Open Channel Cleanout Option. The proposed cleanout is considered to be of public benefit and is conducive to public health, convenience, or welfare.

### **Recommendations**

#### **Improvement Recommended**

This report has confirmed the need for drainage relief for Drainage District No. 57. The existing Open Channel has siltation that requires removal, and areas of damaged side slopes that need repaired. The proposed cleanout is the most cost effective option and considered to be of public benefit and is conducive to public health, convenience, or welfare.

#### **Right-of-Way Recommended**

Because the Open Channel is not currently considered a facility of DD57, there does not exist a right-of-way along the channel. It is recommended that if work is desired within that channel that right-of-way be obtained at 50 feet each side of centerline in order to facilitate maintenance of the Open Channel now and into the future. Appraisers would need to be appointed to set values of the proposed right-of-way. As part of the right-of-way acquisition

process, a separate report and hearing would be required.

### **Reclassification and Annexation Recommended**

A schedule of benefits for the open channel does not currently exist. A review of the equitability of the existing schedule will need to be considered and Iowa Code 468.65 that states *“When, after a drainage or levee district has been established... or 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.”* will need to be implemented as the Trustees see fit.

Additionally, if reclassification is determined to be necessary, it is recommended that annexation be considered to fairly distribute the costs of future maintenance, as well as any repair or improvements to lands not currently included in the assessment schedule.

### **Installment Payments**

Iowa drainage law allows for Drainage District costs for large projects to be paid 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 ten 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. 57 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 Open Channel cleanout recommended for construction, modified as deemed appropriate, to satisfy the desires of the District.
3. Appoint appraisers to set values upon the proposed acquired District right-of-way. Review and approve a separate report of appraises. Acquire right-of-way along the proposed Open Channel at a separate hearing on right-of-way.
4. Direct the engineer to prepare final plans and specifications for the adopted plan and proceed toward a bid letting.
5. Initiate annexation of benefitted lands not on the assessment schedule. A separate report on annexation and public hearing on the annexation report would be required.
6. Initiate reclassification of benefits for DD57. 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

CERRO GORDO COUNTY  
DRAINAGE WORK ORDER

To: Cerro Gordo County Board of Supervisors

Date: 10-6-2021

It is hereby requested that repairs be made on:

Drainage District: 57

Lateral: \_\_\_\_\_

Assessable District: \_\_\_\_\_

Station: \_\_\_\_\_

Township: Pleasant Valley

Section: 34

¼ - ¼: SE ¼ NW ¼


Requested by:

Name: April Markwardt

☒ Owner ☒ Tenant ☐ Other

Address \_\_\_\_\_

Phone: \_\_\_\_\_

Cell Phone: 641-210-5768

Landowner's name, if not provided above: \_\_\_\_\_

Problem: Someone removed trees & dumped them near water hole  
dumps into the creek.

Rodney, please take pictures

Signature of person reporting the problem: April for Phone call

Chairman's Signature: [Signature]

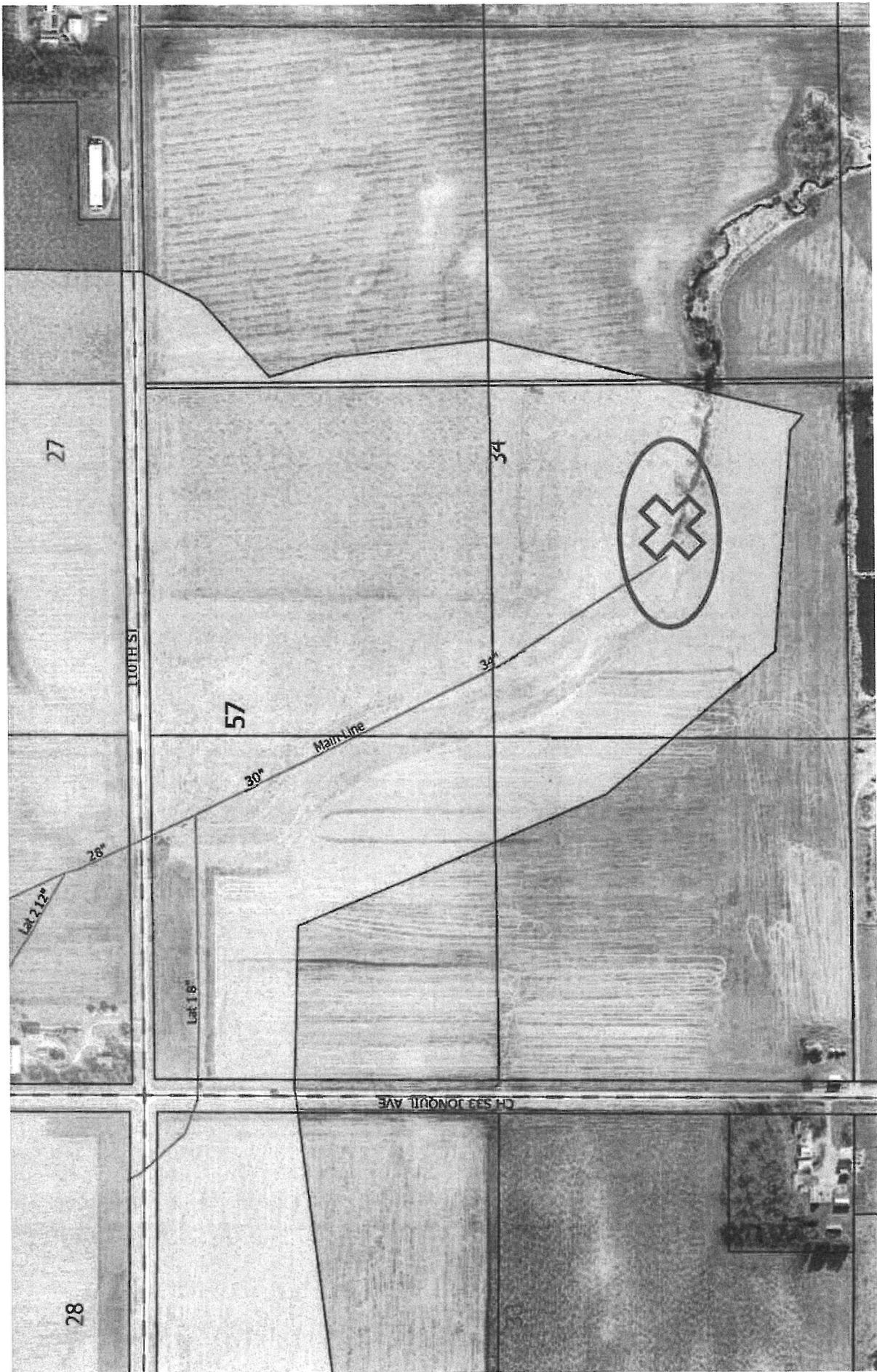
McKinney Field Review: 10/11/2021 - Rodney went out & took pictures, trees have  
been cut due to this is CRP ground but not near file. Rodney will bring in  
Pictures

Contractor Assigned by Rodney McKinney: \_\_\_\_\_

Estimated Completion Date: \_\_\_\_\_

Estimated Cost of Repair: \_\_\_\_\_





October 28, 2021  
Sheffield, Iowa

Mr. Adam Wedmore  
Cerro Gordo Auditor  
Cerro Gordo County Courthouse

Mr. Wedmore,

My name is Dean Markwardt and I live south of Swaledale Iowa in section 27 of Pleasant Valley township. I am writing you to file a petition for improvement to Drainage District 57 in Pleasant Valley township. Specifically from where the tile discharges to Bailey Creek.

Sincerely,



Dean Markwardt  
10048 110<sup>th</sup> Street  
Sheffield, Iowa 50475

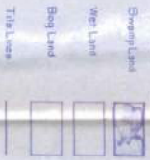
## Appendix B: Archived District Plat



# DRAINAGE DISTRICT NO. 57 CERRO GORDO COUNTY IOWA

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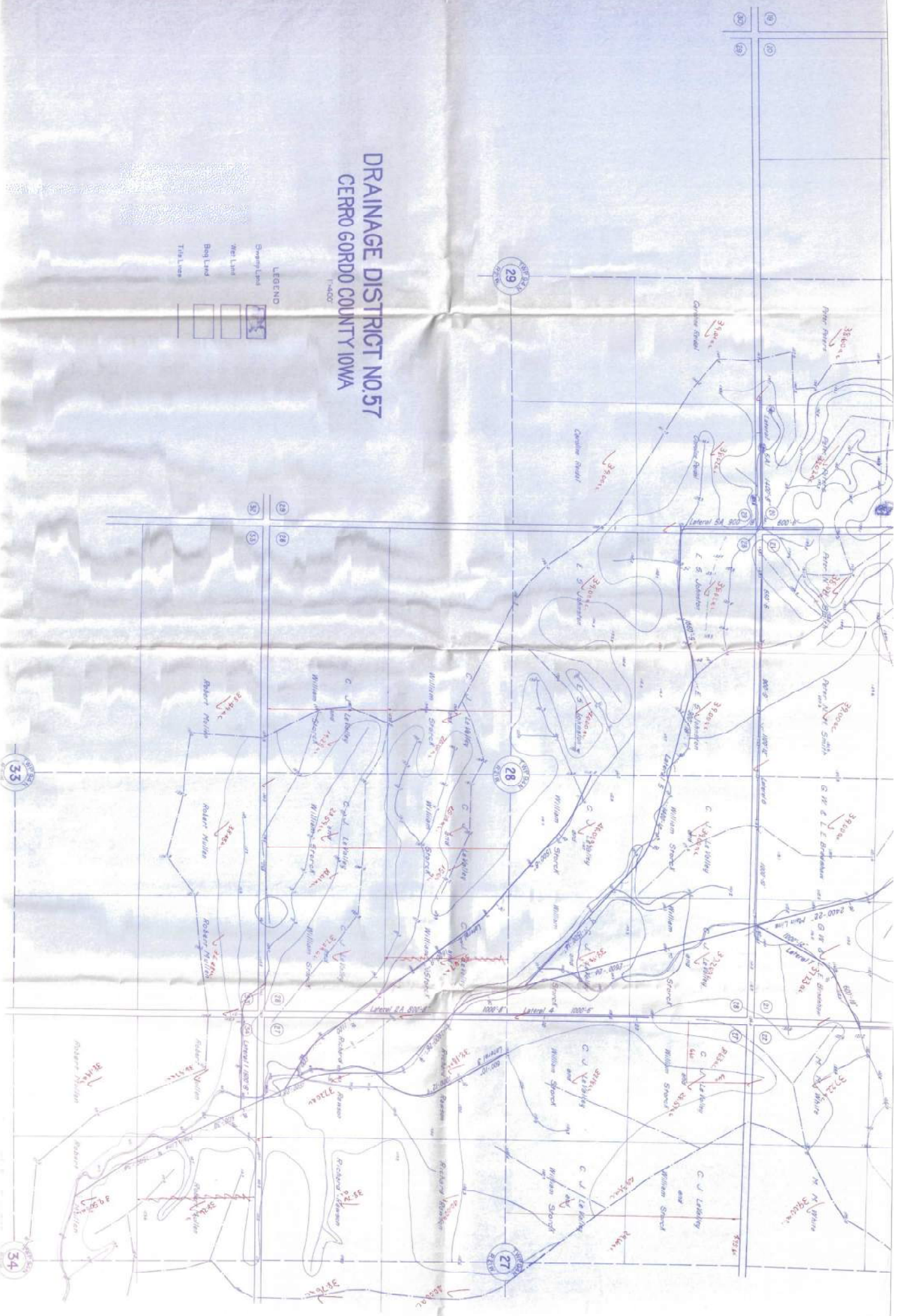
## LEGEND



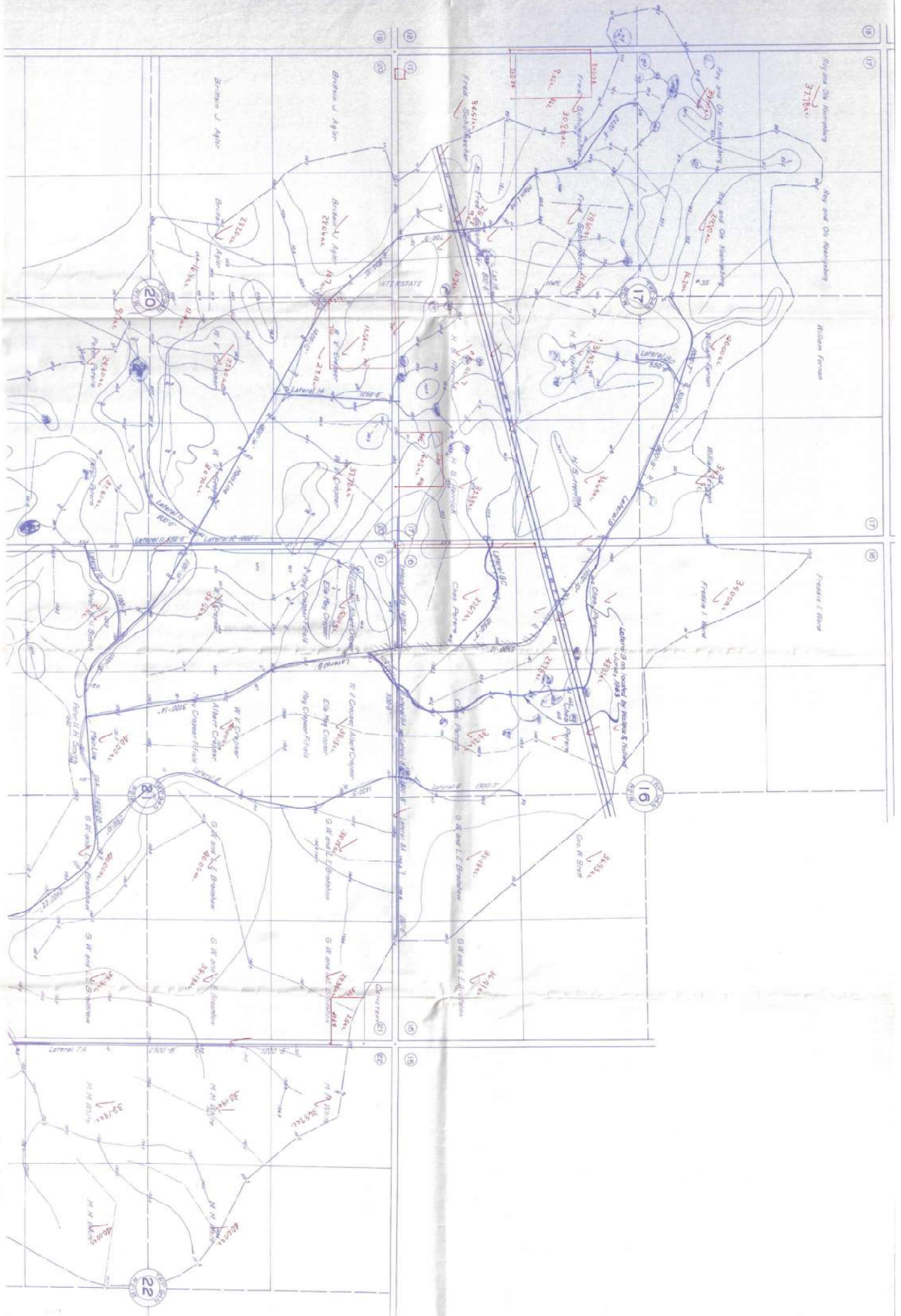
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## Appendix C: Tile Capacities

**DISTRICT FACILITY CAPACITY  
DRAINAGE COEFFICIENT  
DRAINAGE DISTRICT NO. 57  
CERRO GORDO COUNTY, IOWA**

Existing Main Tile															
Segment	Station Start	Station End	Length (ft)	Size (in)	Grade (%)	n	S (ft/ft)	A (ft)	P (ft)	R (ft)	Flow Capacity (cfs)	Drainage Area	Drainage Coefficient (in/day)	% of 1/2" Coefficient	Required Size 1/2"
1	0+00	15+00	1500	34	0.20	0.013	0.0020	6.31	8.90	0.71	25.68	2857	0.214	42.8%	48
2	15+00	20+00	500	30	0.20	0.013	0.0020	4.91	7.85	0.63	18.39	2785	0.157	31.4%	48
3	20+00	23+00	300	28	0.20	0.013	0.0020	4.28	7.33	0.58	15.30	2617	0.139	27.8%	48
4	23+00	30+00	700	28	0.20	0.013	0.0020	4.28	7.33	0.58	15.30	2380	0.153	30.6%	48
5	30+00	35+00	500	28	0.20	0.013	0.0020	4.28	7.33	0.58	15.30	2375	0.153	30.7%	48
6	35+00	39+00	400	26	0.19	0.013	0.0019	3.69	6.81	0.54	12.24	2181	0.134	26.7%	42
7	39+00	54+00	1500	26	0.19	0.013	0.0019	3.69	6.81	0.54	12.24	2151	0.135	27.1%	42
8	54+00	80+00	2600	24	0.32	0.013	0.0032	3.14	6.28	0.50	12.83	1759	0.174	34.7%	36
9	80+00	104+00	2400	22	0.28	0.013	0.0028	2.64	5.76	0.46	9.52	1373	0.165	33.0%	36
10	104+00	112+00	800	20	0.30	0.013	0.0030	2.18	5.24	0.42	7.64	1241	0.147	29.3%	36
11	112+00	118+00	600	20	0.30	0.013	0.0030	2.18	5.24	0.42	7.64	923	0.197	39.4%	30
12	118+00	128+00	1000	18	0.34	0.013	0.0034	1.77	4.71	0.38	6.14	566	0.258	51.7%	30
13	128+00	139+00	1100	16	0.16	0.013	0.0016	1.40	4.19	0.33	3.08	536	0.137	27.3%	30
14	139+00	147+00	800	14	0.43	0.013	0.0043	1.07	3.67	0.29	3.53	482	0.174	34.9%	24
15	147+00	149+00	200	14	0.43	0.013	0.0043	1.07	3.67	0.29	3.53	423	0.199	39.8%	24
16	149+00	157+00	800	14	0.43	0.013	0.0043	1.07	3.67	0.29	3.53	382	0.220	44.0%	24
17	157+00	171+00	1400	12	0.39	0.013	0.0039	0.79	3.14	0.25	2.23	382	0.139	27.8%	24
18	171+00	179+00	800	10	0.38	0.013	0.0038	0.55	2.62	0.21	1.35	270	0.119	23.9%	18
19	179+00	186+00	700	9	0.32	0.013	0.0032	0.44	2.36	0.19	0.94	238	0.094	18.8%	18
20	186+00	190+00	400	8	0.91	0.013	0.0091	0.35	2.09	0.17	1.16	159	0.173	34.6%	12

## Appendix D: Right-of-Way

**Proposed Open Ditch Right-of-Way  
Drainage District No. 57  
Cerro Gordo County, Iowa  
2023**

<b>Landowner</b>	<b>Parcel ID</b>	<b>Section, Township, &amp; Range</b>	<b>Parcel</b>	<b>Total Row Width Required (ft)</b>	<b>Total ROW Required (ac)</b>
M3M, LLC	143100000500	34-94-21	SE NW 39-94-21 EXC E1/2 AC	100	1.50
Washburn David G & Gloria M Irrev Family Trust	143410000600	34-94-21	E 1/2 AC SE NW 34-94-21	100	0.04
	143420000300	34-94-21	SW NE 34-94-21	100	2.74
	143440000100	34-94-21	N 1/3 W1/2 SE1/4 EXC S 170' SE1/4 34-94-21	100	0.60
<b>TOTALS:</b>					<b>4.88</b>

Note: The acres needed to be aquired are close approximations enabled by GPS survey methods.

## Appendix E: Opinions of Probable Cost

**Engineer's Opinion of Probable Cost  
Open Channel Cleanout  
Drainage District No. 57  
Cerro Gordo County, Iowa  
2023**

**Open Channel Excavation, Leveling, and Revetment Work**

<b>Item</b>	<b>Description</b>	<b>Unit</b>	<b>Quantity</b>	<b>Unit Price</b>	<b>Total</b>
1	Open Ditch Excavation	STA	22	\$500	\$11,000
2	Spoil Bank Leveling (Two Sides)	STA	19	\$300	\$5,700
3	Spoil Bank Leveling (One Sides)	STA	3	\$200	\$600
4	Open Ditch Seeding & Fertilizing	STA	22	\$250	\$5,500
5	CMP Tile Extension, 12" Dia.	LF	20	\$35	\$700
6	CMP 24" Dia. Surface Drain	LF	40	\$50	\$2,000
7	CMP 24" Dia. Surface Drain Apron	EA	1	\$400	\$400
8	Animal Guards, 12" Dia.	EA	1	\$50	\$50
9	Geotextile Fabric	SY	25	\$10	\$250
10	Clearing and Grubbing	LS	1	\$8,000	\$8,000
11	Riprap, IDOT Class E	TN	25	\$50	\$1,250
12	Removal of Fence, Field	LF	100	\$5	\$500
13	Fence Cuts	EA	1	\$100	\$100
14	Mobilization	LS	1	\$3,550	\$3,550
15	Construction Contingency	LS	1	\$4,400	\$4,400
<b>Total Estimate Construction Costs</b>					<b>\$44,000</b>

**Non-Construction Costs**

Construction Related Damages	\$3,500
Right-of-Way Acquisition (Approx. \$2,000 / Ac)	\$9,750
Basic Engineering Services	
Survey, Study & Report, Meetings & Hearing	\$45,000
Right-of-Way Report	\$7,500
Annexation	\$5,000
Reclassification	\$30,000
Construction Plans, Specifications & Bid Letting	\$20,000
Construction Engineering Services, Staking, and Inspection	\$15,000
Legal Services, Publications, Mailings, Etc..	\$2,500
Finance, Interest & Contingency	<u>\$2,500</u>
<b>Estimated Total Non-Construction Costs</b>	<b>\$140,750</b>

<b>Estimated Total Project Cost Open Channel Cleanout</b>	<b>\$184,750</b>
Estimated Average Cost Per Benefited Acre (2853)	\$65
Estimated Average Cost Per Acre Per Year (10 years, 5% interest)	\$7.99
Estimated Average Cost Per Acre Per Year (20 years, 5% interest)	\$4.95

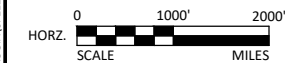


## Appendix F: Preliminary Plans





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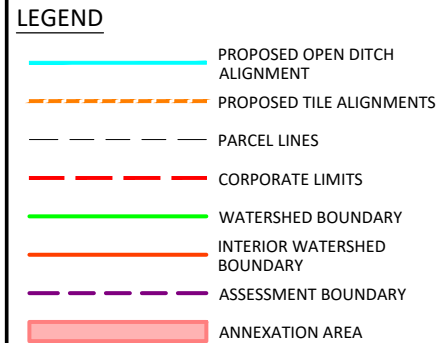
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DRAINAGE DISTRICT NO. 57  
CERRO GORDO COUNTY, IOWA

LANDOWNERS

SHEET

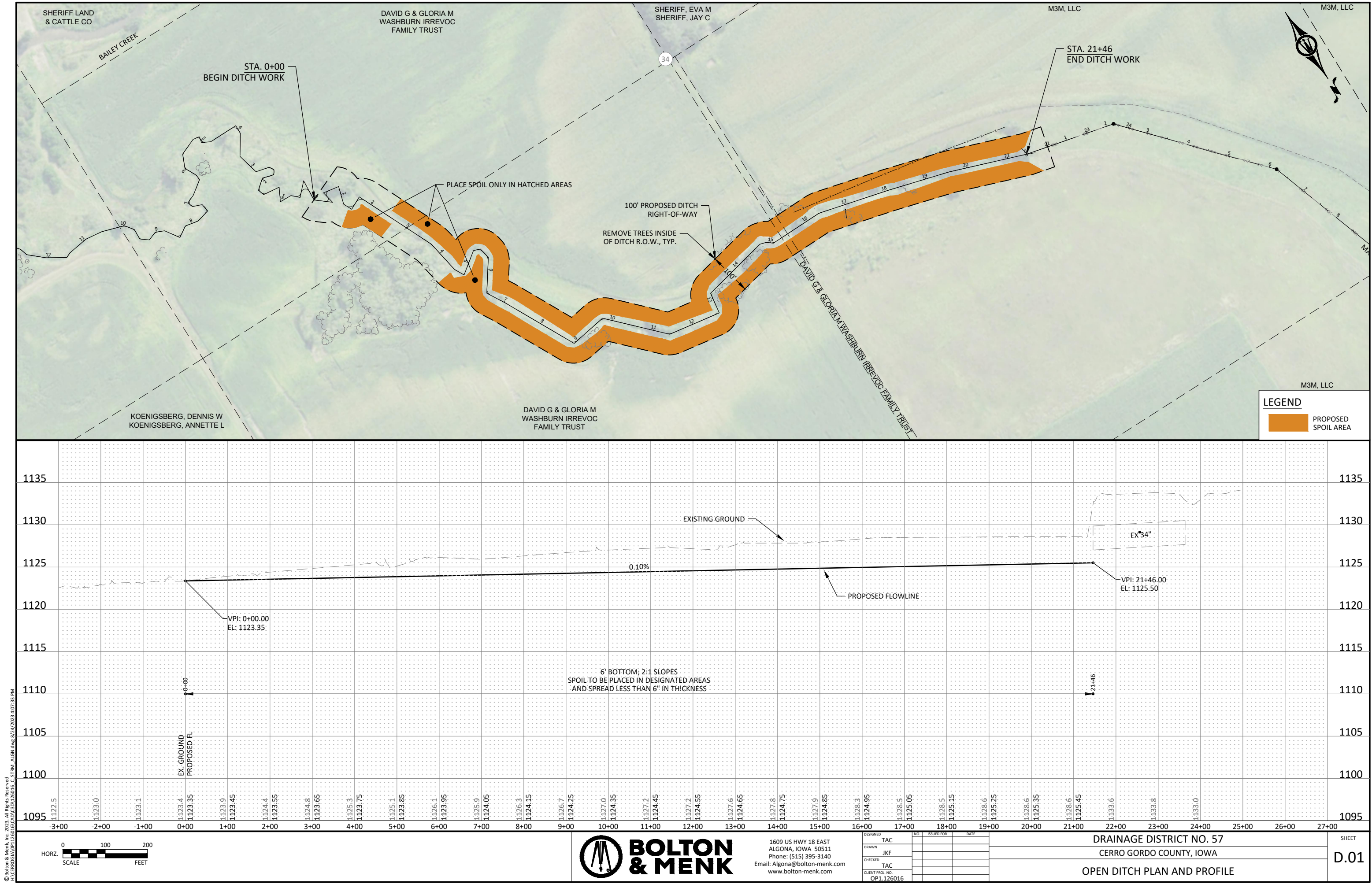
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T-94-N

STA. 21+46  
END CHANNEL CLEANOUT  
STA. 0+00  
BEGIN CHANNEL CLEANOUT





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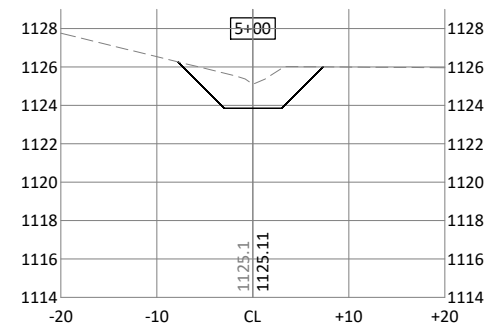
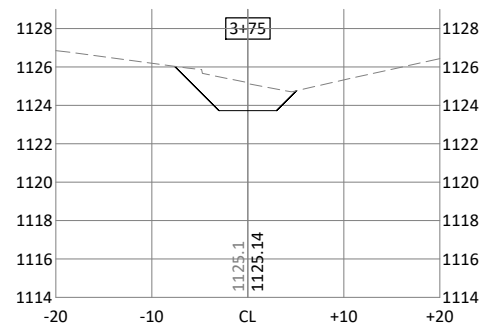
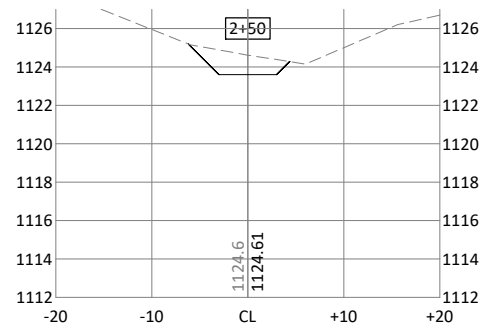
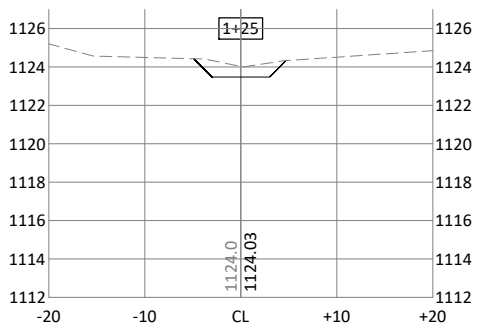
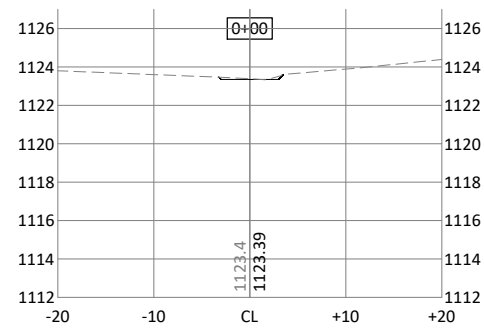
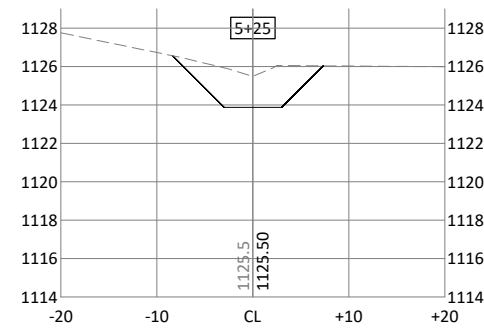
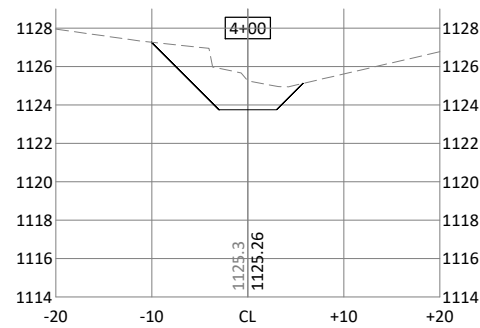
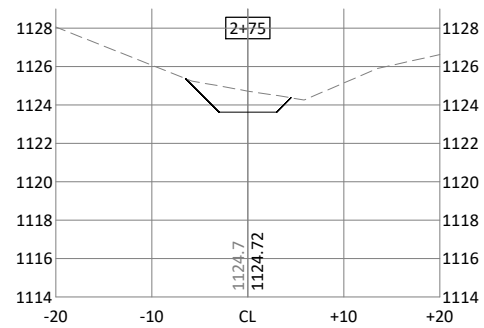
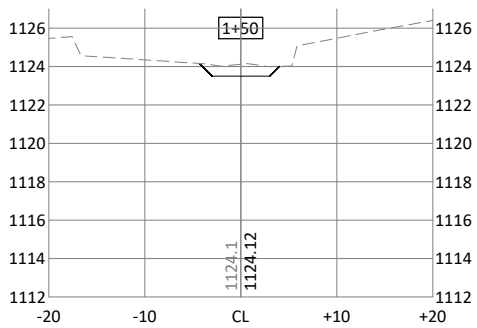
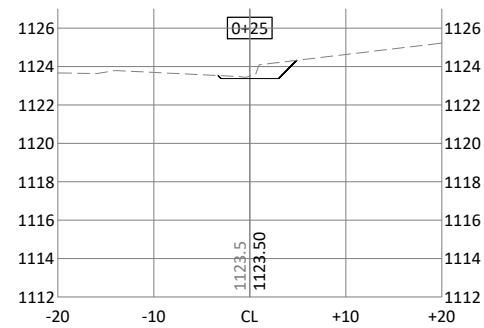
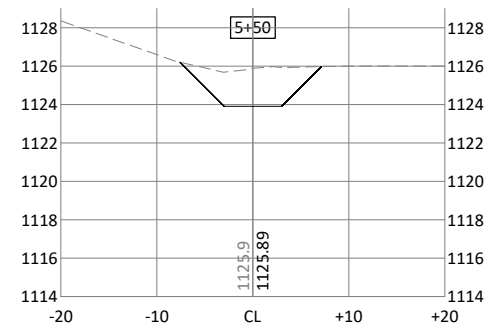
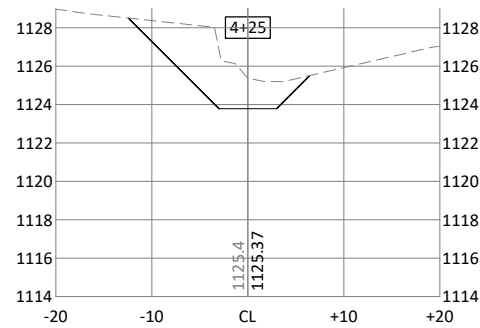
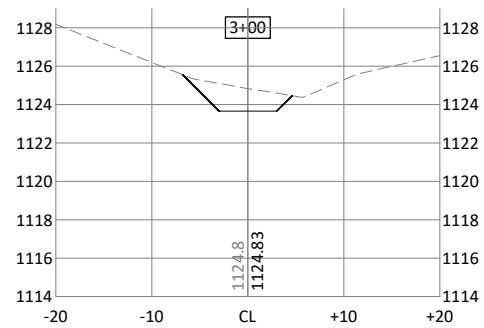
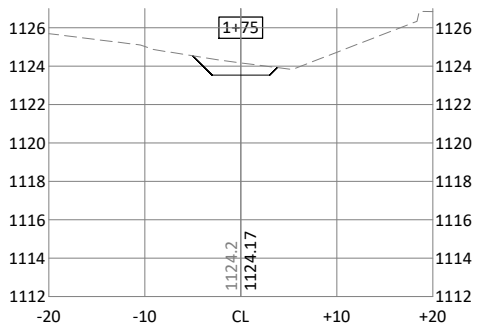
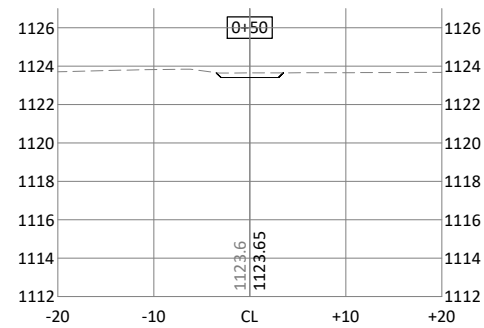
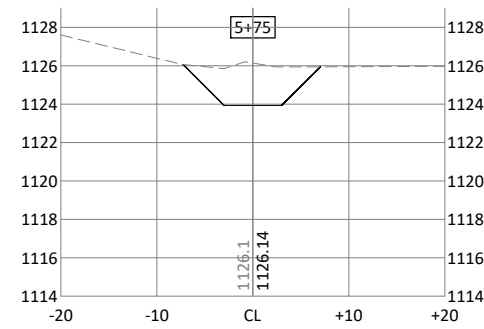
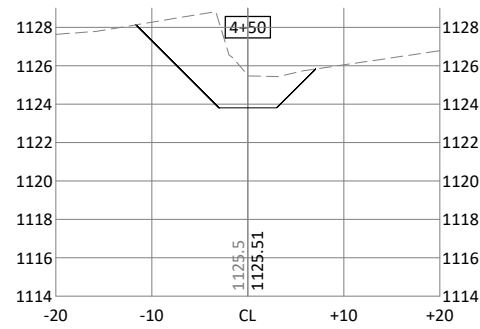
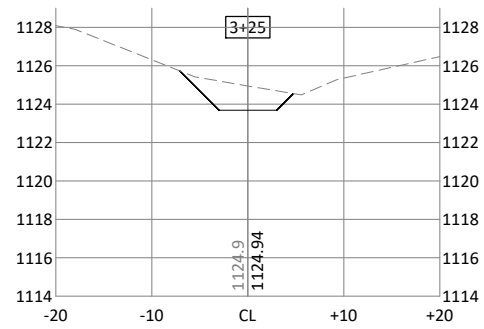
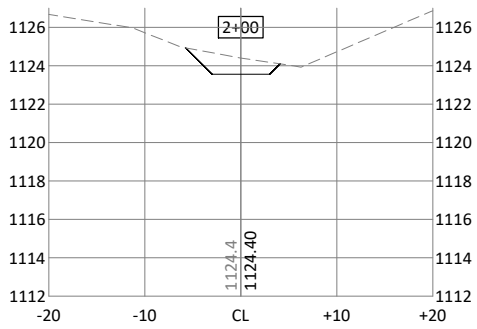
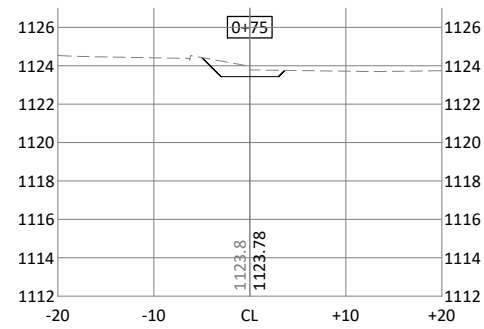
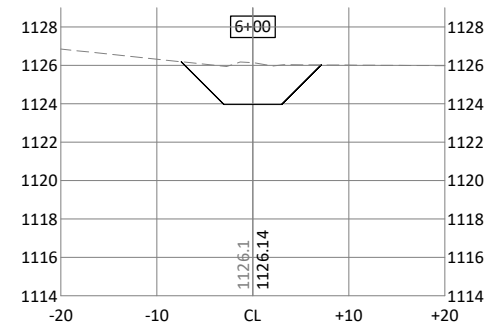
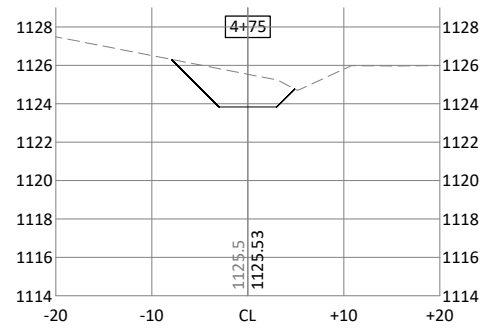
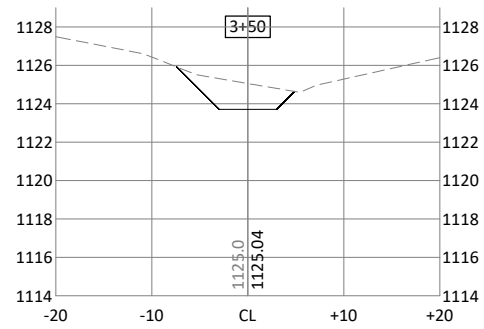
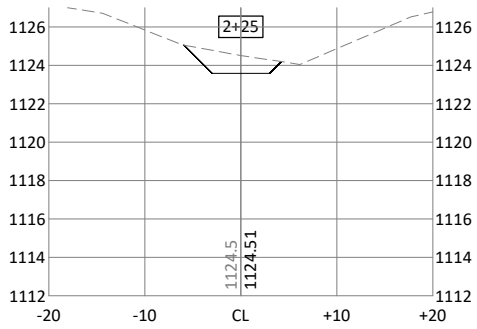
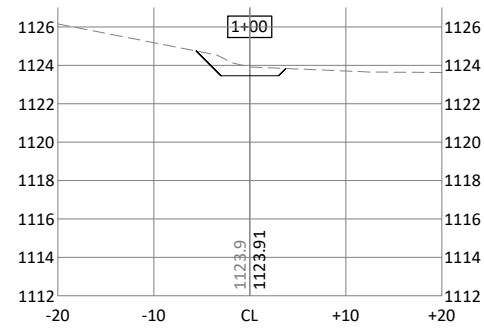
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Phone: (515) 395-3140  
Email: [Algona@bolton-menk.com](mailto:Algona@bolton-menk.com)  
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DRAINAGE DISTRICT NO. 57  
CERRO GORDO COUNTY, IOWA  
OPEN DITCH PLAN AND PROFILE

SHEET  
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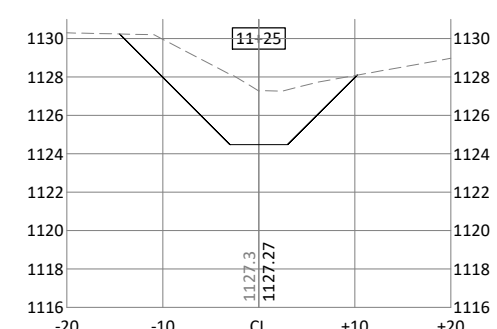
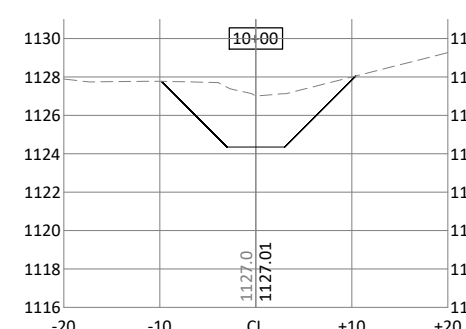
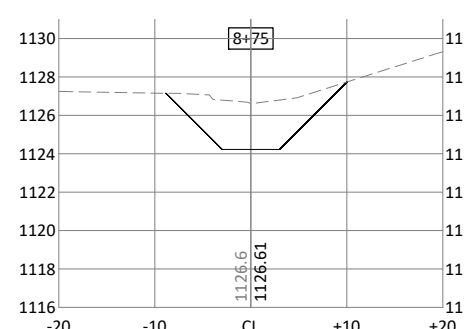
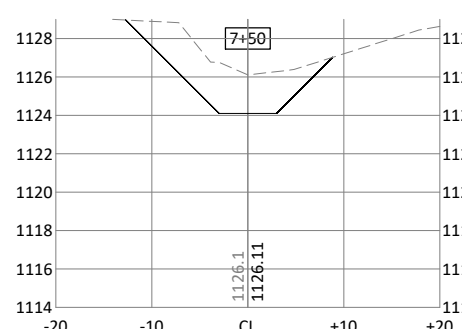
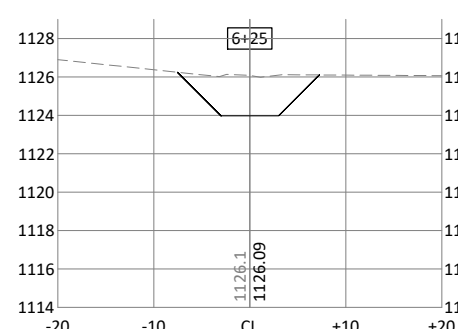
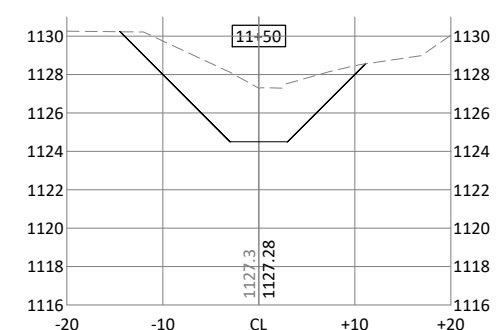
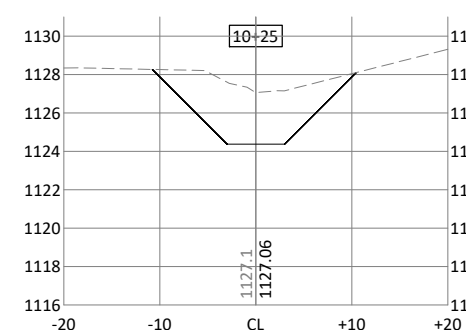
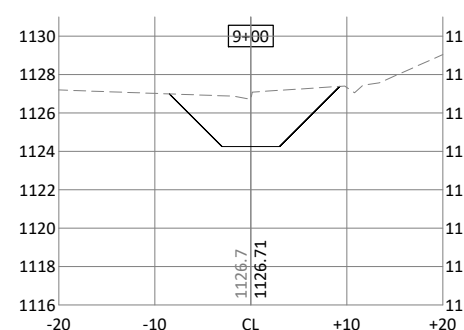
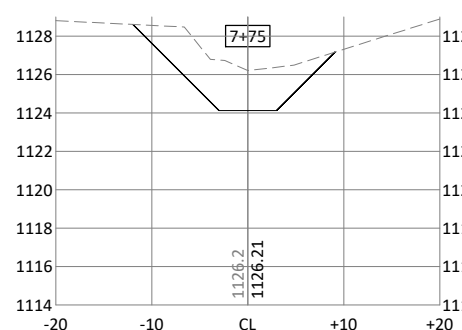
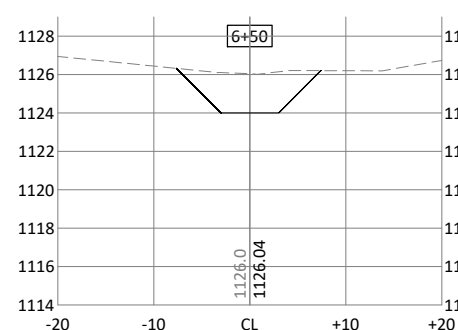
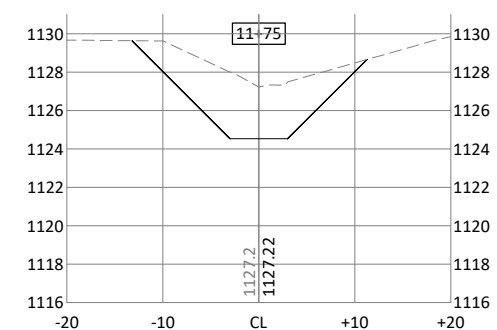
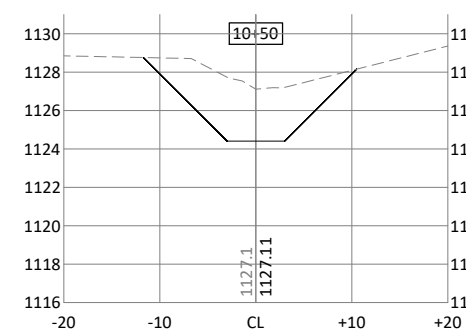
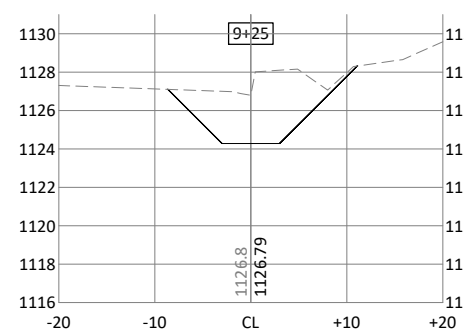
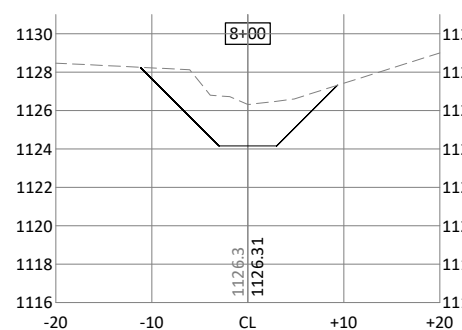
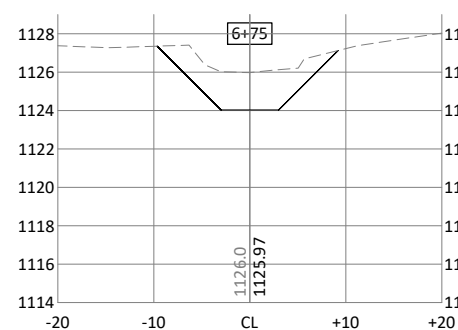
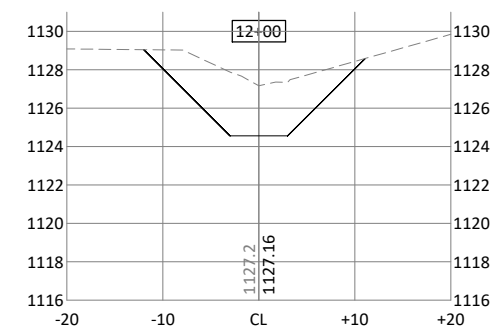
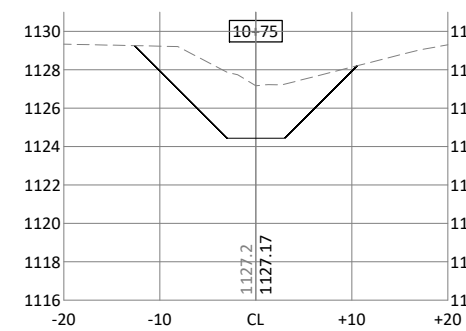
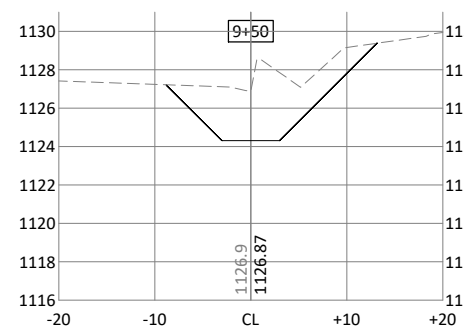
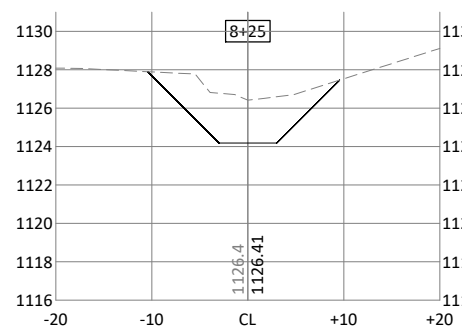
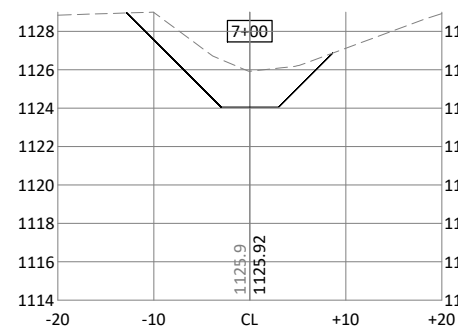
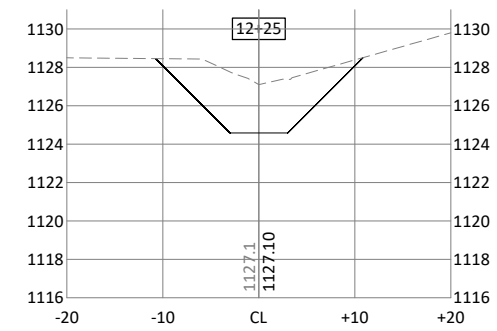
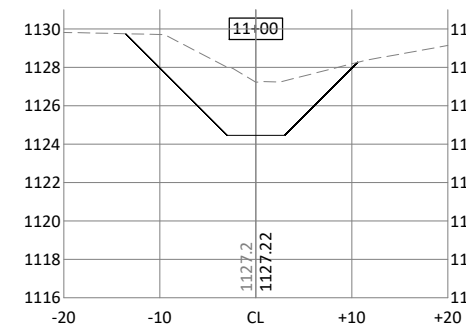
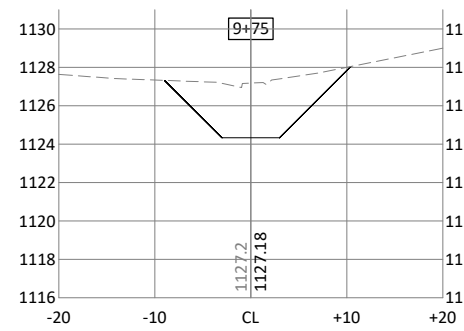
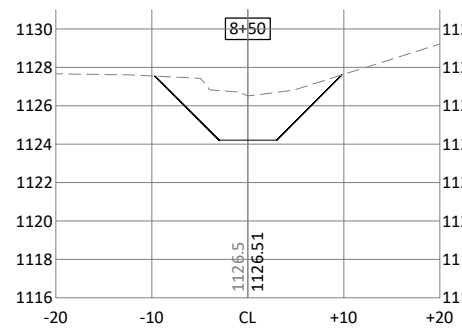
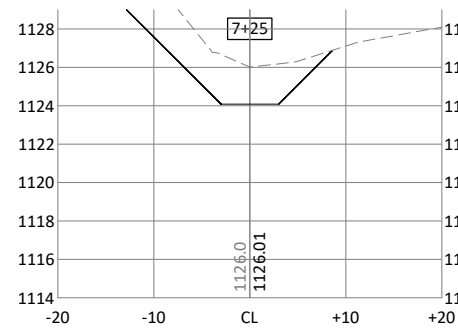
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DRAINAGE DISTRICT NO. 57  
CERRO GORDO COUNTY, IOWA

CROSS SECTIONS

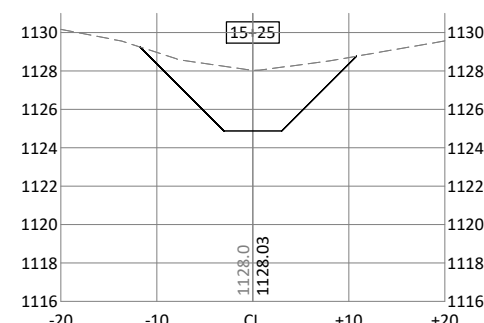
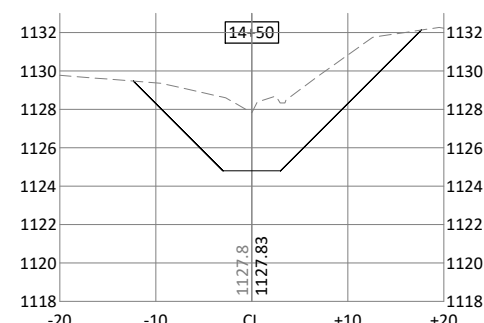
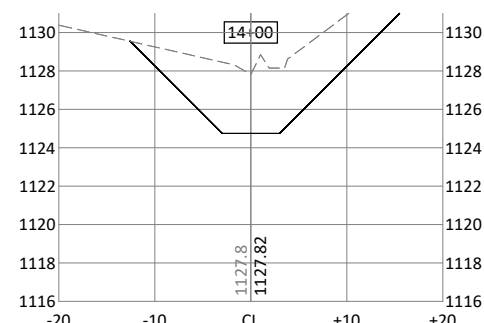
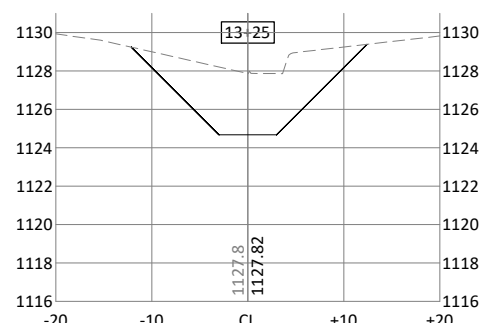
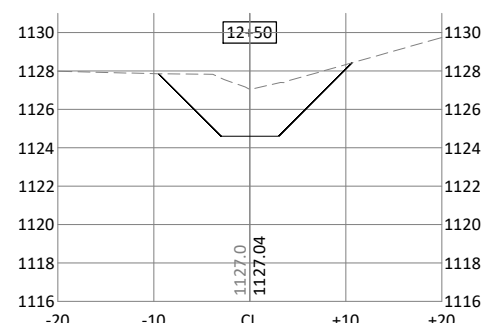
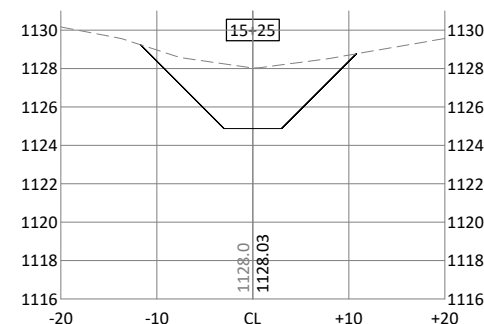
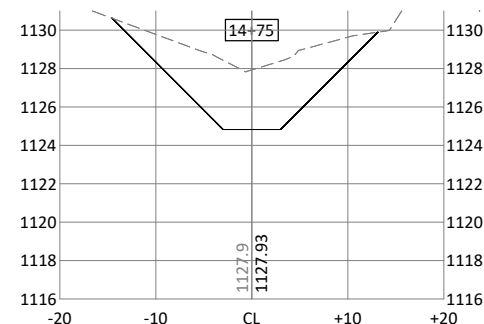
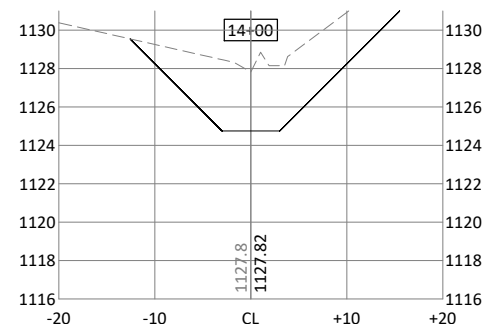
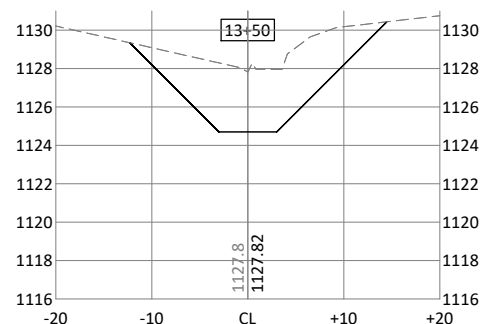
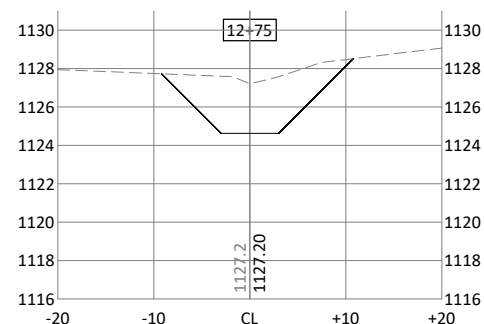
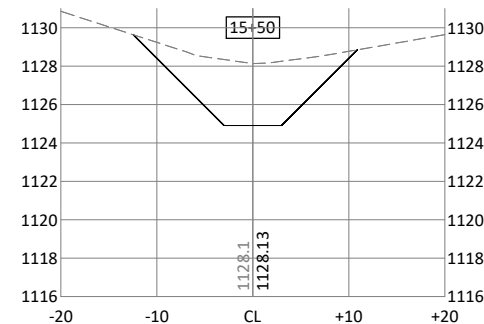
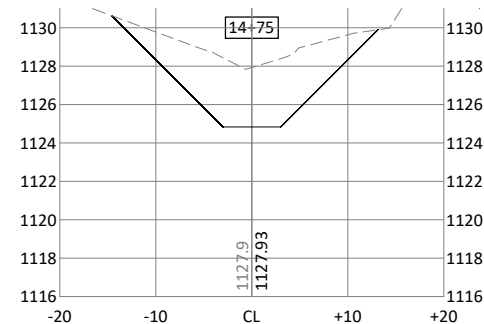
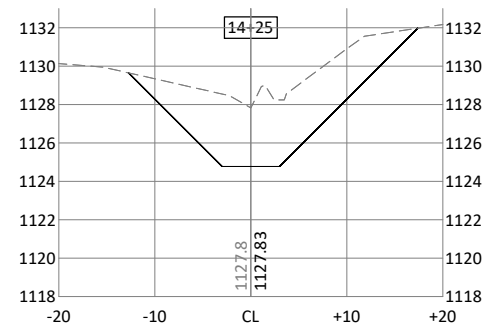
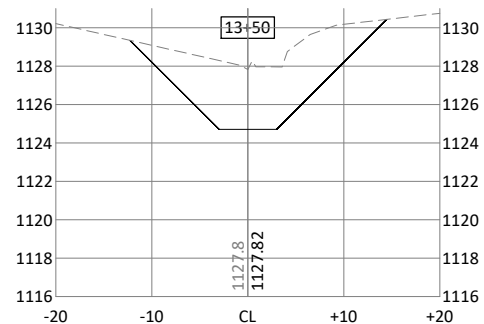
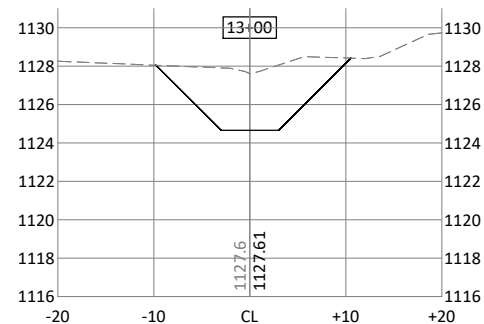
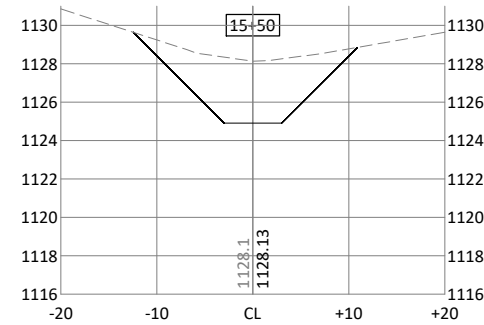
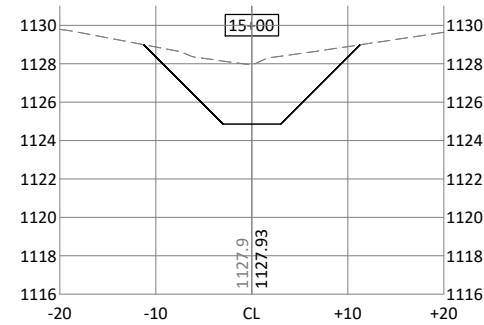
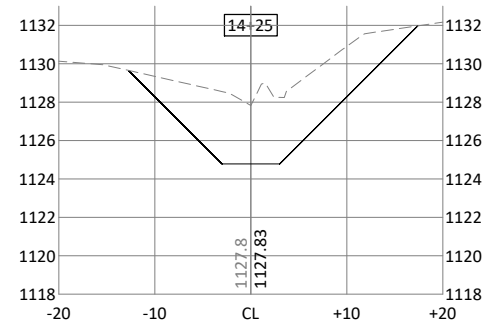
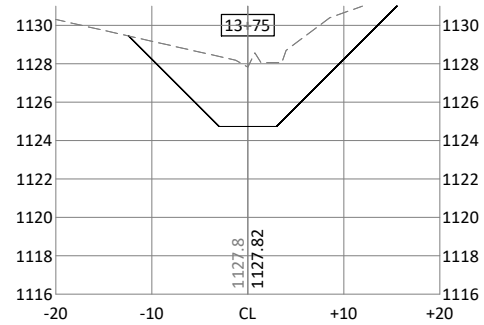
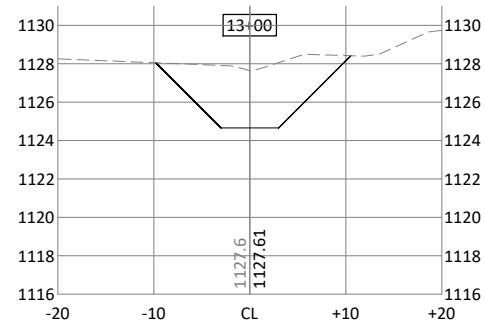
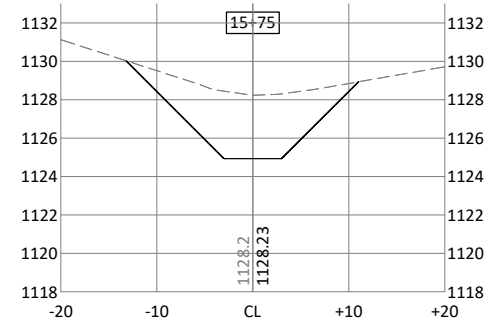
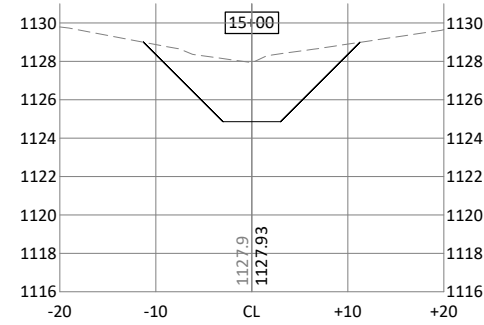
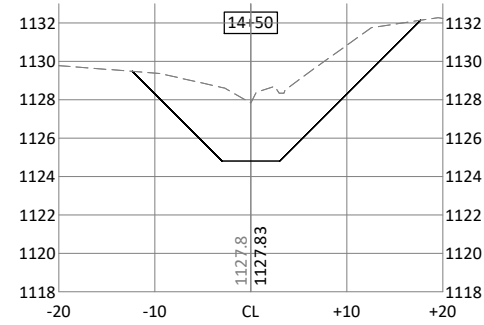
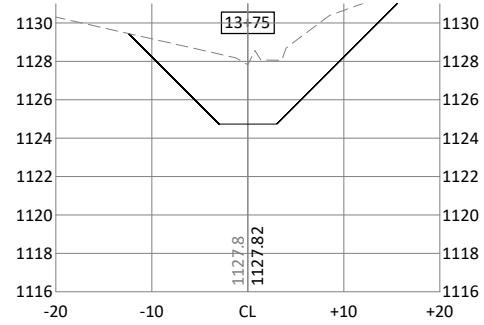
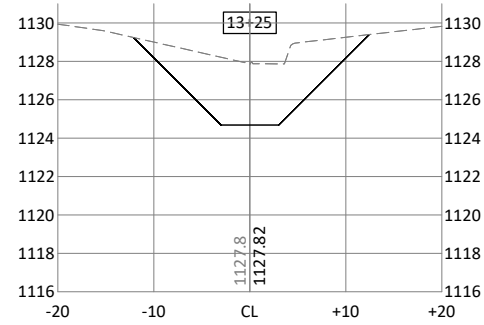
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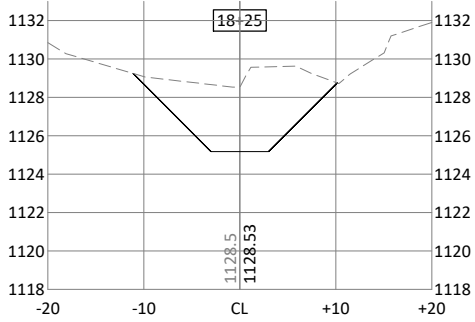
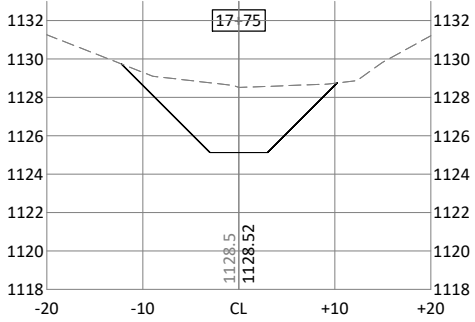
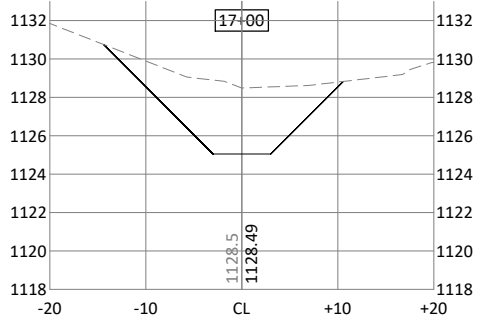
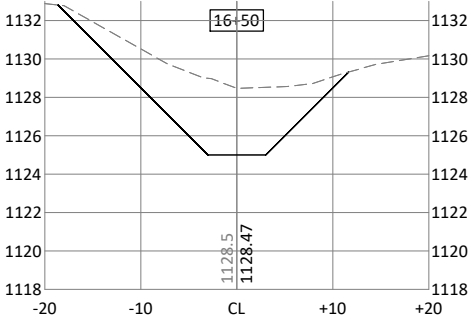
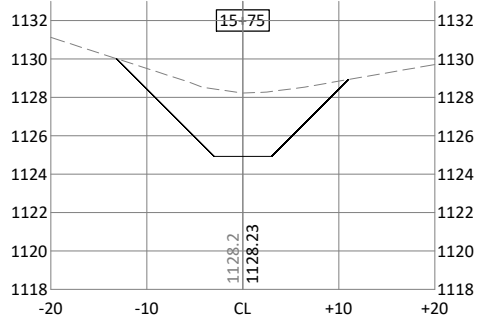
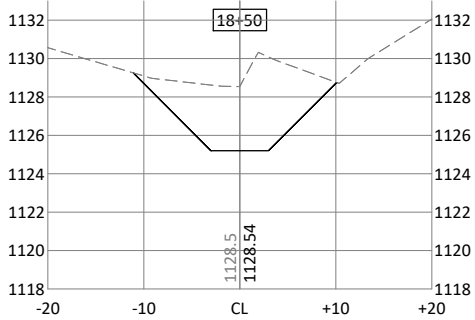
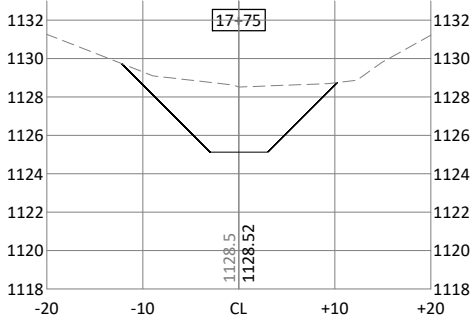
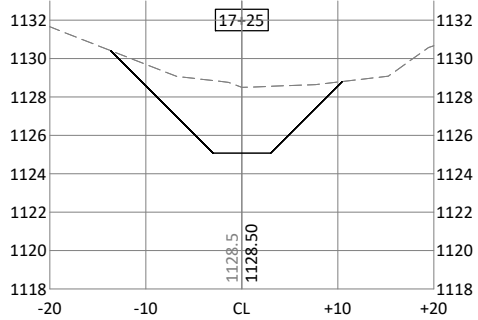
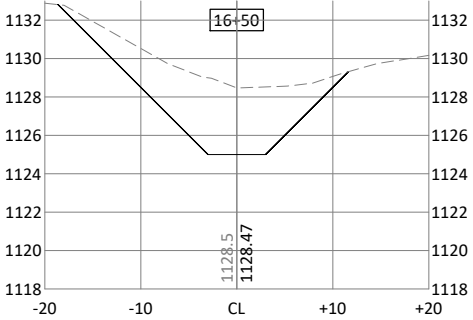
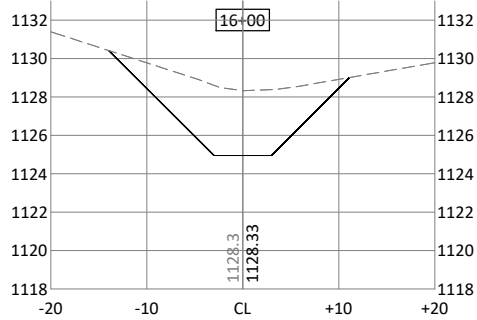
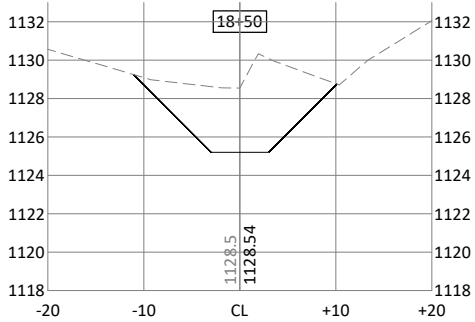
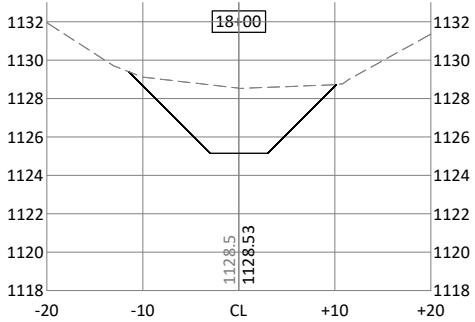
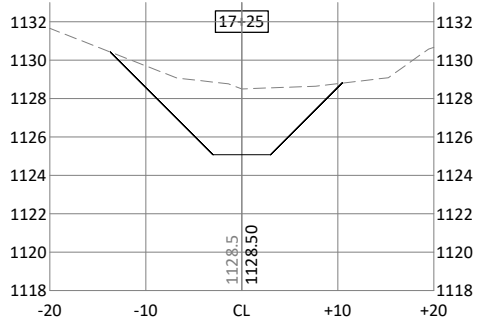
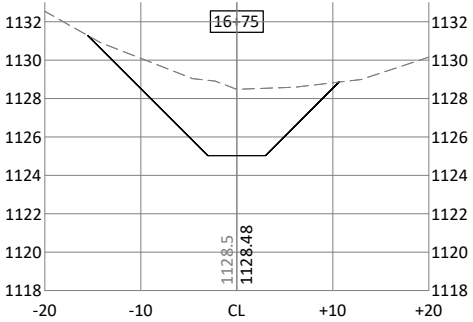
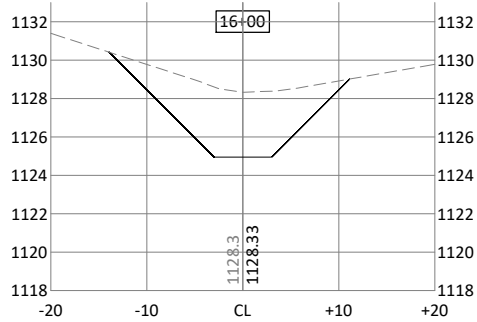
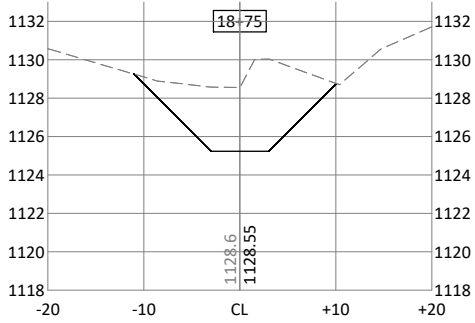
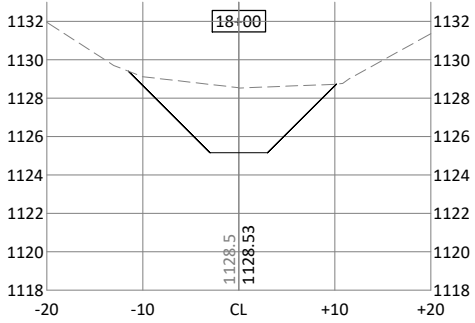
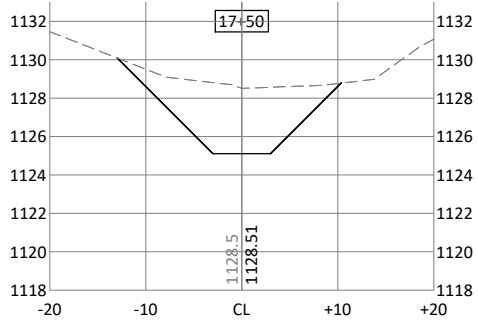
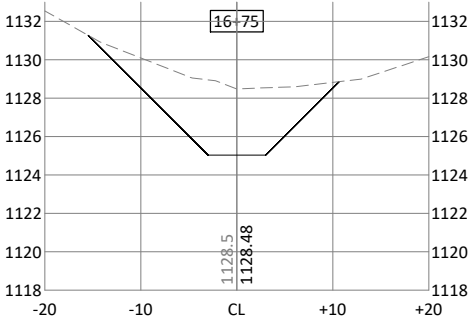
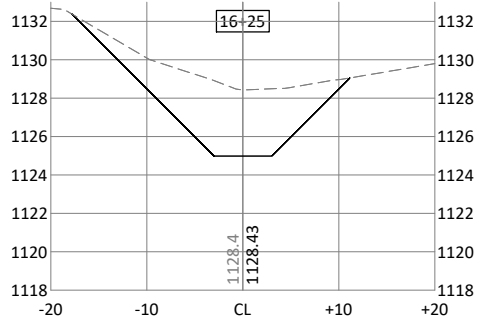
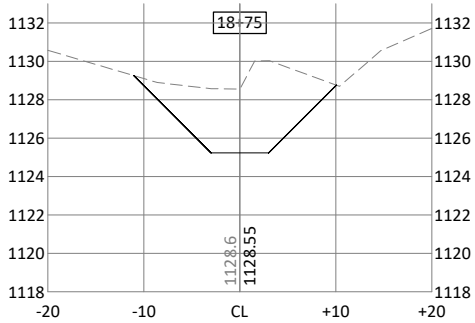
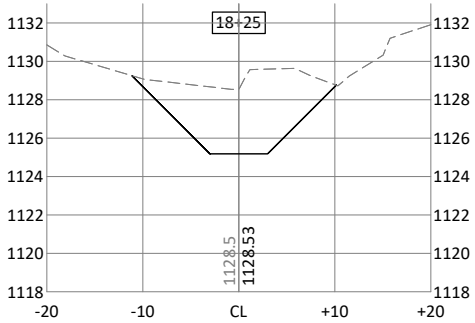
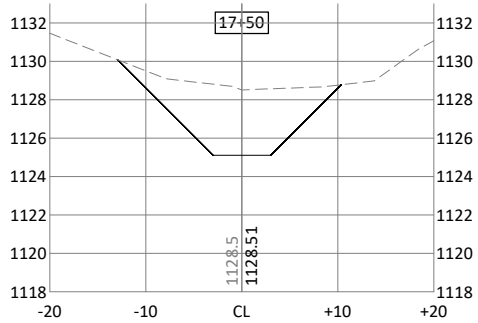
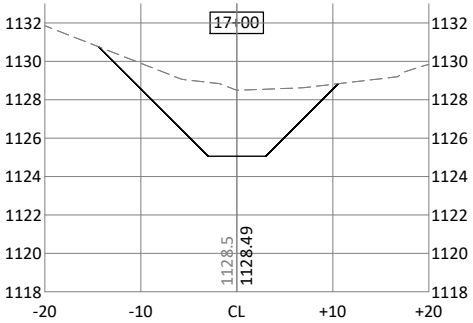
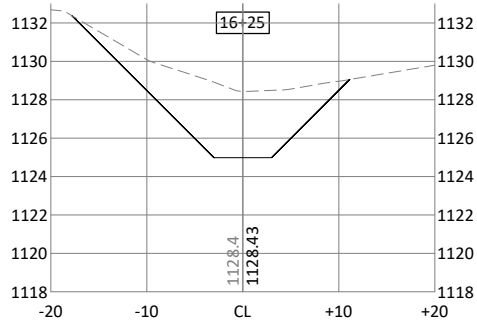
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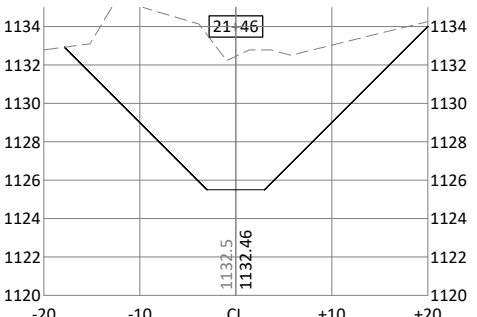
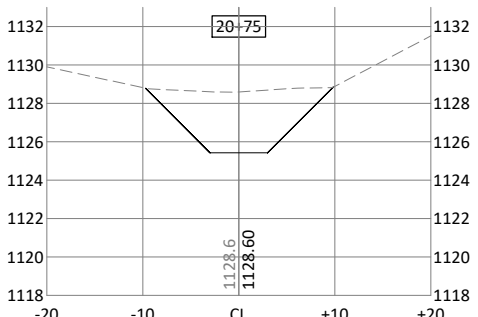
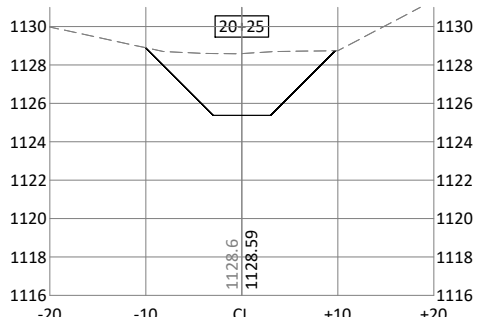
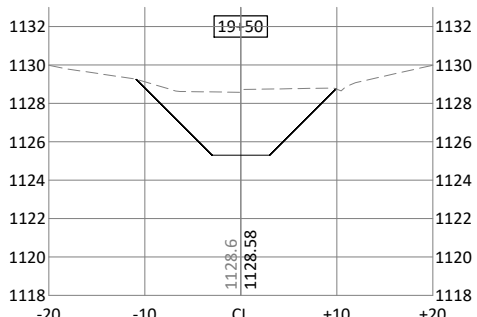
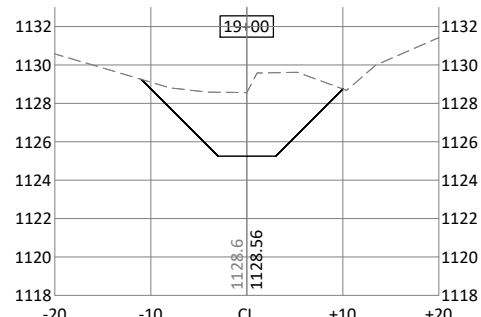
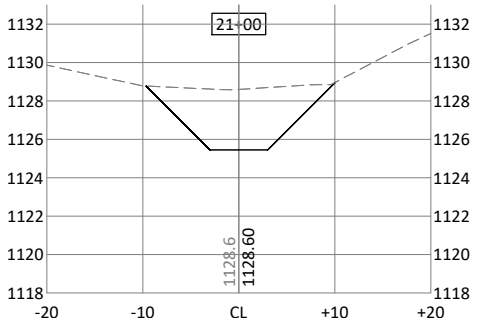
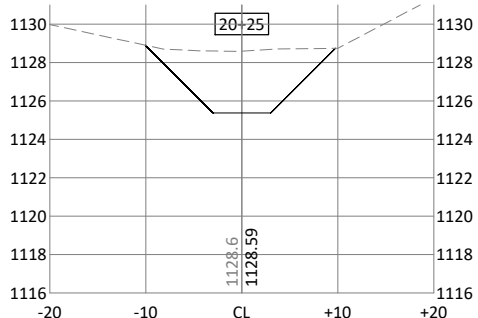
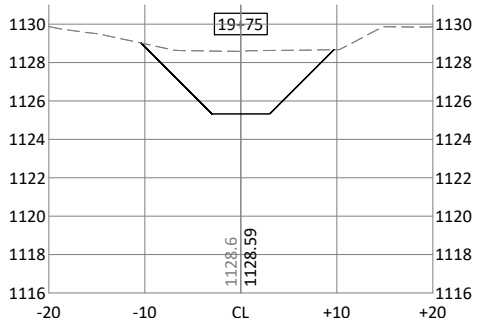
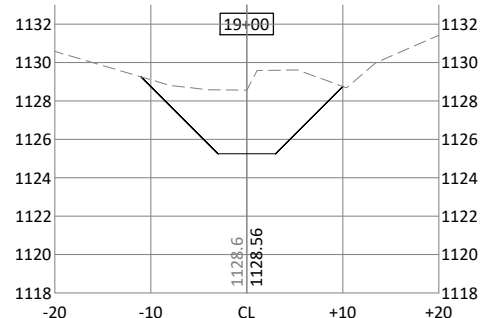
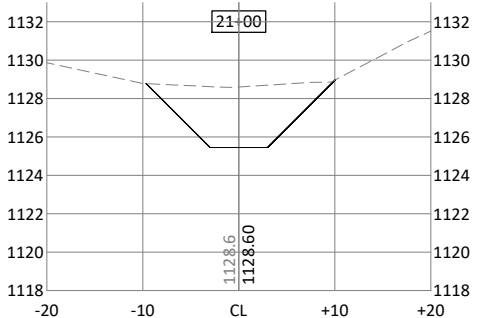
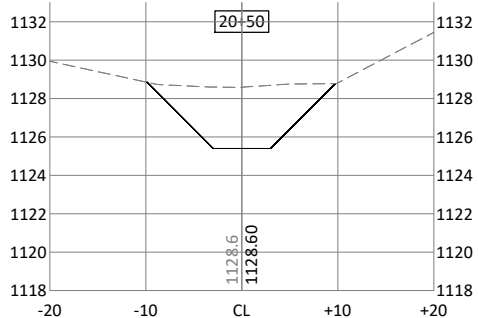
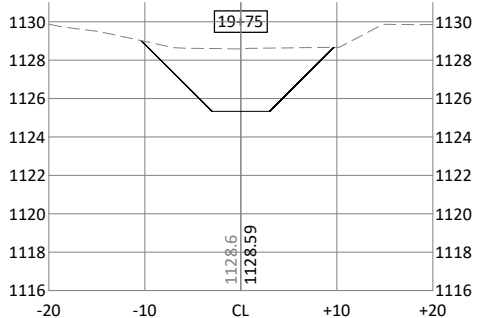
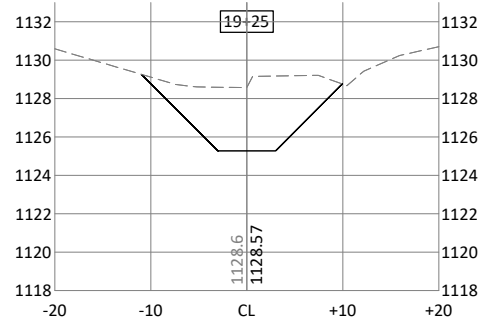
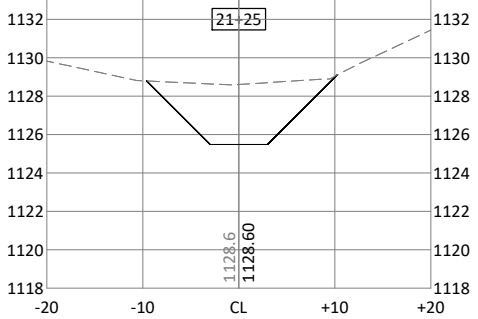
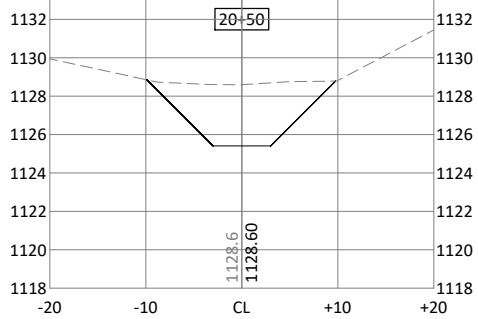
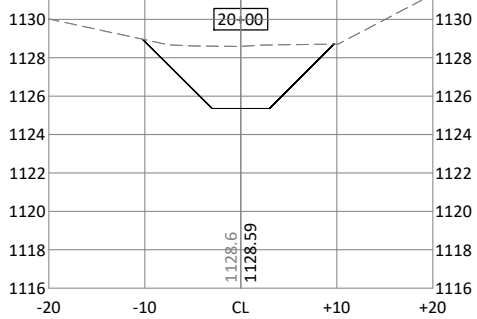
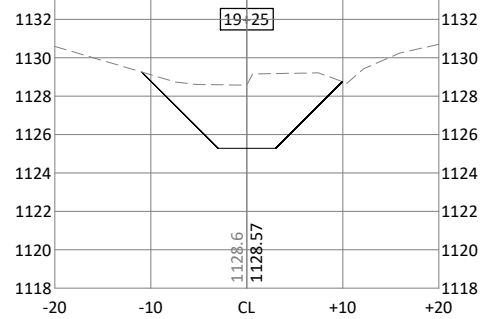
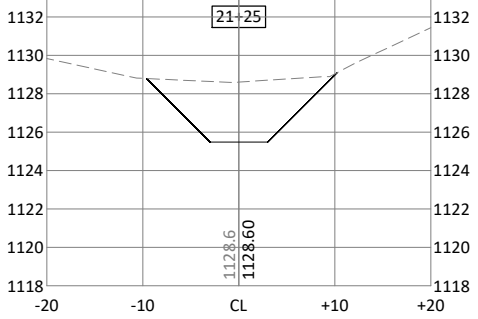
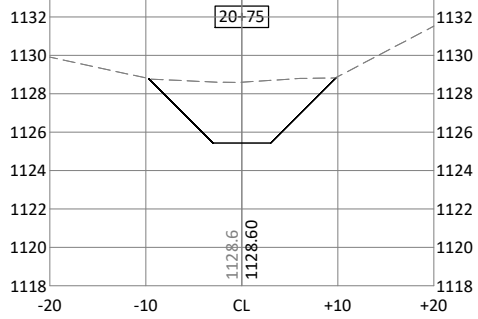
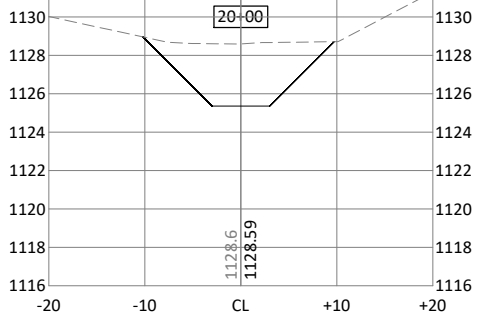
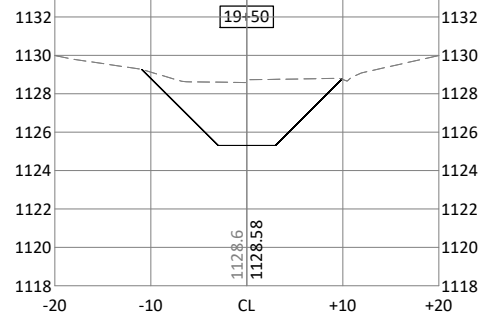
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## Appendix G: Permits