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Algona, IA 50511

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September 30, 2024

Cerro Gordo County Board of Supervisors
Acting as Trustees for Drainage District No. 35
220 N Washington Ave.
Mason City, IA 50401

RE: Review of Downstream Conditions
Drainage District No. 35
Project No.: 24X.134908.000

Dear Trustees of Drainage District No. 35,

A. Introduction

The purpose of this report is to provide information relative to reviewing a petition submitted to the Cerro Gordo County Auditor's Office regarding the condition of the Drainage District No. 35 (DD35) Main Tile, as well as the downstream channel that serves as the outlet for the DD35 Main Tile. The Board of Supervisors, acting as Trustees for DD35 appointed Tyler A. Conley, P.E., Bolton & Menk, Inc. to complete the necessary preliminary survey and review.

The submitted petition specifically requests a review of a downstream channel crossing and the potential impacts that are being applied to the Main Tile. A copy of the petition has been attached to this report.

B. Background

DD35 is primarily a tile district, that is approximately three (3) miles east of Mason City, Iowa. DD35 consists of a Main Tile, seventeen (17) Lateral Tiles, and twenty-three (23) Branch Lateral Tiles. Currently, 2,597.50 acres are assessed for benefit, under the existing assessment schedule. The Main Tile outlets to Little Lime Creek, which flows to the Winnebago River, then to the Shell Rock River, and eventually the Cedar River. Currently, from a review of the original district plats, no portion of Little Lime Creek is considered a district facility. A district map is attached to this report.

C. Investigation

In the summer of 2024, a field survey crew was dispatched to gather in-situ topographic data on the outlet of the Main Tile, the current condition of the Main Tile, upstream of the outlet to approximately the railroad tracks, and the downstream crossing culvert. It was found that there is at least one segment of broken tile that has been exposed to the surface. Additionally, conditions of the downstream crossing pipe are detailed and shown in photos of both the upstream and downstream sides of the crossing pipe as follows:

Figure 1 Upstream Side of Crossing

Figure 2 Downstream Side of Crossing

From the included photos, water on the upstream portion of the crossing is higher than water on the downstream side, and debris is collecting on the upstream face of the crossing. This would imply that water is being impeded by this crossing.

From this field data acquisition, a preliminary set of plans were developed to outline these findings. In summary, the findings from the field were: The outlet of the Main Tile is a 30-inch pipe, at an elevation of 1,071.34 feet. The downstream culvert crossing of the open channel is a 42-inch corrugated metal pipe with an upstream invert elevation of 1,071.41 feet. This means that the outlet of the District Main is below the elevation as the downstream culvert. This translates to a negative ditch grade, while the likely intended open channel grade, based on survived cross-sections is 0.10%. Additionally, though the Drainage District has an assessed area of 2,597.50 acres, the total watershed size that flows through that crossing pipe was found to be approximately 4,350.00 acres. This means that the flow of drainage district waters is not the only responsibility of this crossing culvert. Attached to this report is a set of plans, marked as preliminary, that display these findings geometrically.

D. Calculations

From the Iowa Drainage Guide, utilizing the drainage curves for grain crops in Iowa, the open channel design flow quantity for that size of watershed is 207 cubic feet per second of water. This volume of water was modeled against the current culvert conditions. The existing culvert capacity was found to be inadequate based on that evaluation, and it is estimated that from that volume of water the culvert would be overtopped. This means that under any normal design criteria events (2-year, 48-hour storms) or larger storm, the drainage district outlet becomes submerged, which creates a forced outlet. This forced outlet condition increases the internal pressure on the upstream portions of the tile system, namely the

immediate upstream segments of tile. This increased pressure increases the likelihood of damage, and complete failures of tile segments, similar to those that the District is already experiencing. For comparison, the downstream road crossing, on 250th Street, is a bridge structure. This is no doubt a bridge, as it has been sized for the large amounts of water that can be generated within this watershed.

E. Recommendation

This report has confirmed that steps should be taken to remove or avoid the downstream crossing culvert that is acting as a District obstruction. This could be accomplished in one of three ways. First, the District could follow the right-of-way proceedings, outlined in Iowa Code Chapter 468, including the appointment of appraisers, tasked with submitting an appraisers' report and obtain right-of-way downstream of the District Outlet (potentially to the downstream bridge on 250th Street). After obtaining the right-of-way, the district could then require that the landowner remove that obstruction at the landowner expense. Second, the District could come to an agreement with the downstream crossing owner, for the District's removal of the obstruction. Lastly, the District could reroute the Main Tile approximately 100 feet to the south to outlet downstream of the existing crossing pipe. Regardless of the decision to manage the downstream crossing culvert, the existing Main Tile damage will need to be repaired. Attached to this report is an opinion of probable cost that outlines the potential costs of each option as well as including the repair portion of the main tile.

Under any of the proposed scenarios, it is also recommended that the District seek legal guidance as it proceeds with the desired project orientation.

Sincerely,

Bolton & Menk, Inc.

Tyler A. Conley, P.E.
Project Manager

ATTACHMENTS:
- Petition
- District Map
- Surface Watershed Map
- Culvert Report
- Opinion of Probable Cost
- Preliminary Plans

not yet given to Rodney

CERRO GORDO COUNTY
DRAINAGE WORK ORDER

Work Order No.: 2024051502
Date Filed: 5-15-24

To: Cerro Gordo County Board of Supervisor's
It is hereby requested that changes be made on:

Drainage District: DD35
Lateral: Main line
Assessable District: DD35
Diameter of Tile: _____
Tile Material: _____
Section, Township, Range: 16 96-19
Qtr - Qtr: SW SW Section 16

Requested by: Mark Brom
☐ Owner ☒ Tenant ☐ Other
Address: _____
Phone No.: 420-3422
Landowner Name: _____
(if different from requestor)

Contractor Assigned: _____
Engineer Appointed: _____
Date Engineer Appointed: _____
Attorney Appointed: _____
Date Attorney Appointed: _____
Coordinates:
Latitude _____
Longitude _____
Vendor Paid: _____
Total Amount Paid: _____
Date Paid: _____
Date Completed: _____

Chairman's Signature: _____

Problem: the dam is holding water back; DD35 tile ~~County~~ tile is not draining well; there seems to be an elevation problem w/ respect to the culvert in the dam; if dam/culvert is removed the water will drain better; unsure about repair effects to little lime creek (body of water); it is possible the culvert was installed by property owner to gain access across body of water

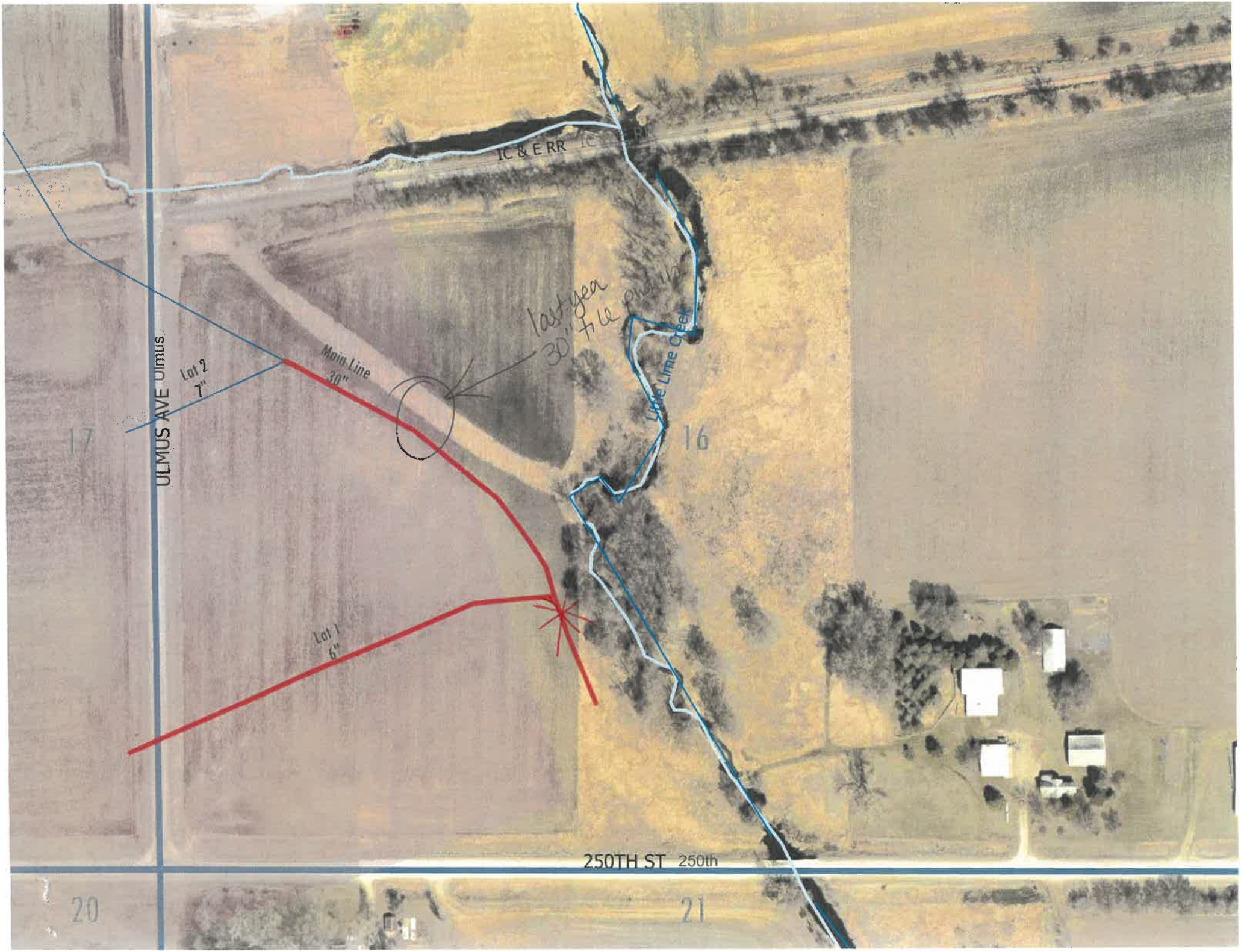
I:\Share\Real estate\FORMS

CERRO GORDO COUNTY
DRAINAGE WORK ORDER

Work Performed: _____

McKinney Field Review: _____

Notes: 38" tile in SW part of that field + dumps into Lime Creek. Was fixed about a year ago + needs fixed again. Rodney thinks they should take that dam out


IC & E RR
ULMUS AVE Ulmus
Lat 2
7"
Main Line
30"
last year
30" Tile end
Little Lime Creek
17
16
Lat 1
6"
250TH ST 250th
20
21

DD35

1) X Johnson Tiling put 30" tile last year. It already broke. → the 30 inch dumping into this creek already

and additional private north of 18 got ~~tiled~~ tied into this main line → so more water

2) if we could remove culvert & dam, it would improve drainage for DD35 greatly! ← Little Lime Creek

3) But ~~there~~ this involves a body of water

Rodney will try to send some photos to Hannah

4) Rodney will take pictures w/ his phone & ~~bring the pictures when he stops in next~~ send them to HJ.

Drainage District No. 35

Cerro Gordo County, Iowa

District Map

September 2024

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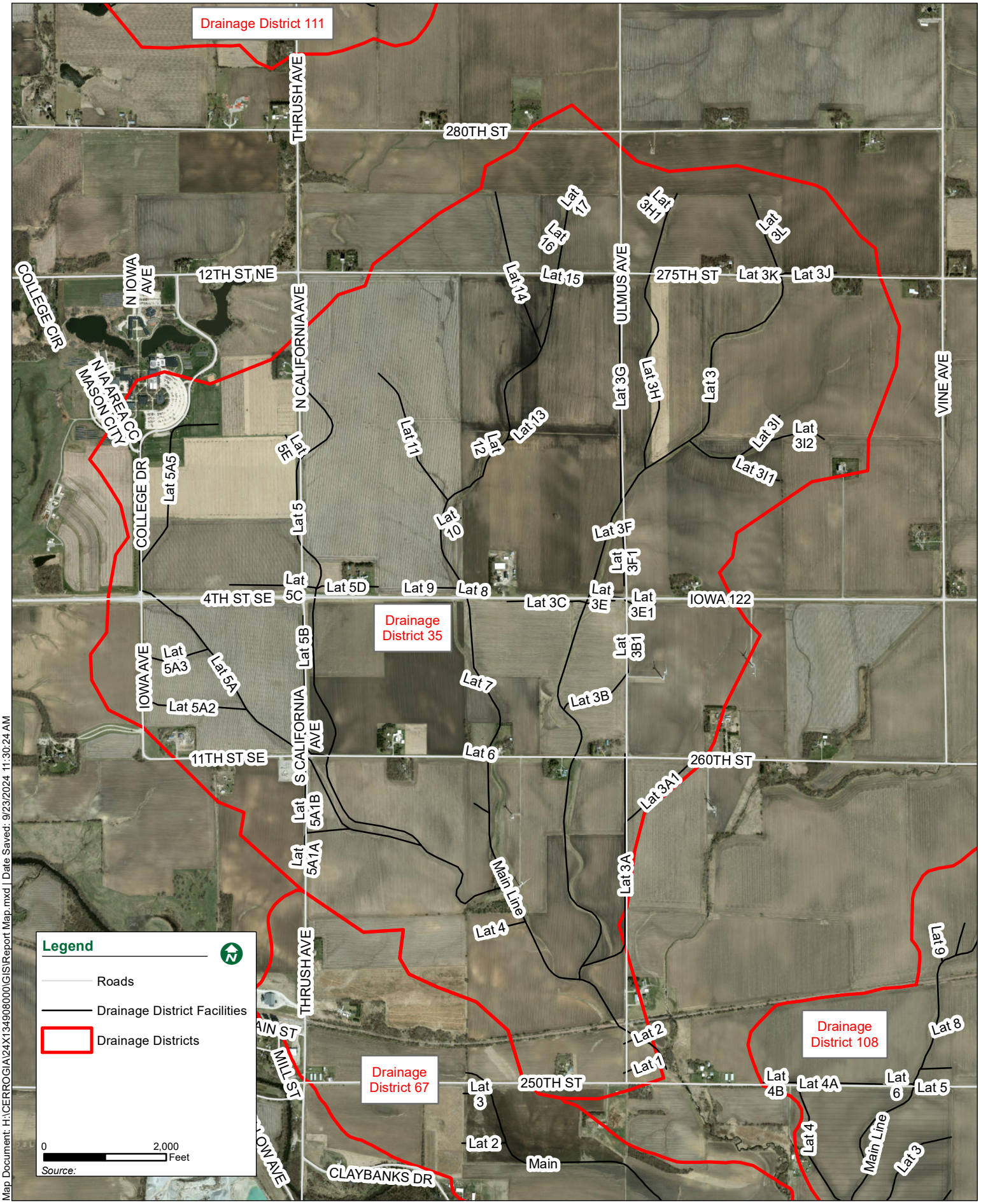

Map Document: H:\CERROGIA\24X134908000\GIS\Report Map.mxd | Date Saved: 9/23/2024 11:30:24 AM

Drainage District No. 35

Cerro Gordo County

Surface Watershed Map

September 2024

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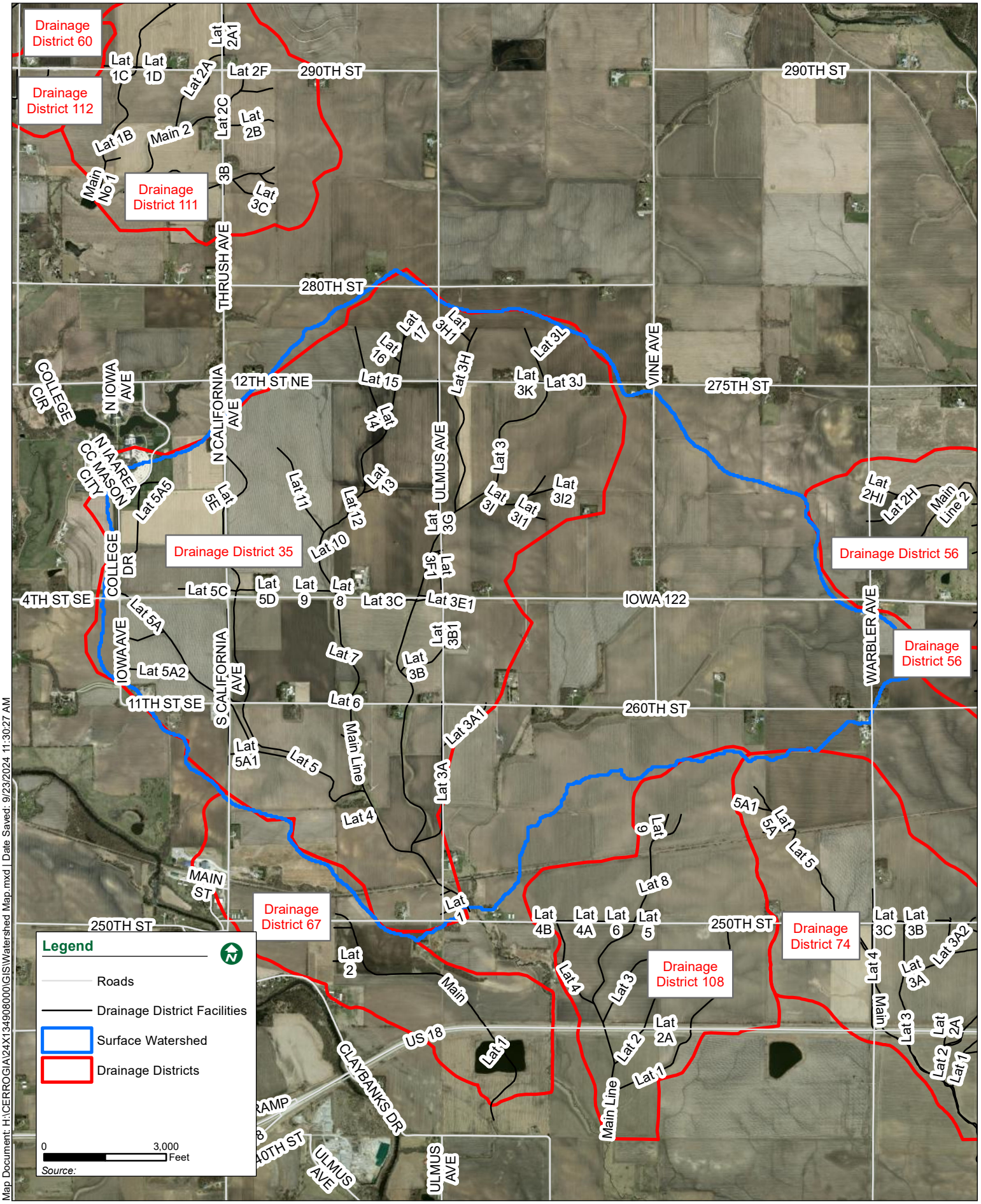

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Culvert Report

Open Channel Design Flow

Invert Elev Dn (ft)	=	1071.08
Pipe Length (ft)	=	16.00
Slope (%)	=	2.06
Invert Elev Up (ft)	=	1071.41
Rise (in)	=	42.0
Shape	=	Circular
Span (in)	=	42.0
No. Barrels	=	1
n-Value	=	0.024
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Headwall
Coeff. K,M,c,Y,k	=	0.0078, 2, 0.0379, 0.69, 0.5

Embankment

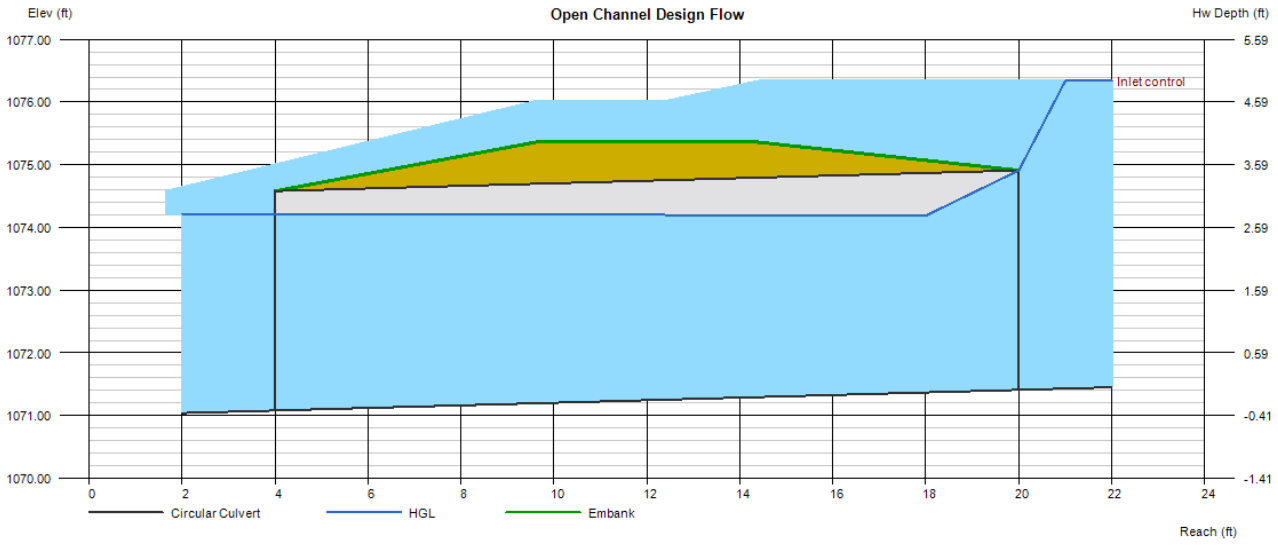
Top Elevation (ft)	=	1075.36
Top Width (ft)	=	4.79
Crest Width (ft)	=	43.00

Calculations

Qmin (cfs)	=	207.00
Qmax (cfs)	=	207.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	207.00
Qpipe (cfs)	=	78.88
Qovertop (cfs)	=	128.12
Veloc Dn (ft/s)	=	8.68
Veloc Up (ft/s)	=	9.65
HGL Dn (ft)	=	1074.22
HGL Up (ft)	=	1074.18
Hw Elev (ft)	=	1076.34
Hw/D (ft)	=	1.41
Flow Regime	=	Inlet Control



Engineer's Opinion of Probable Cost
Proposed Main Tile Repair
Drainage District No. 35
Cerro Gordo County, Iowa
2024

Main Tile Repair

Item	Description	Unit	Quantity	Unit Price	Total
1	Drain Tile, Trenched, Class III R.C.P. 30" Dia.	LF	50	$140	$7,000
2	Trench Foundation Stone	TN	4	$35	$140
3	Spot Tile Exploration	HR	8	$200	$1,600
4	Mobilization	LS	1	$400	$400
5	Construction Contingency	LS	1	$860	$860

Estimated Construction Cost - Main Tile Repair **$10,000**

Option 1 Right-of-Way Acquisition

Item	Description	Unit	Quantity	Unit Price	Total
1	Right-of-Way Land	AC	1.15	$12,300	$14,145
2	Right-of-Way Report	EA	1	$5,000	$5,000

Option 1 - Estimated Right-of-Way Acquisition **$19,145**

Option 2 Crossing Pipe Removal

Item	Description	Unit	Quantity	Unit Price	Total
1	Removal of Existing Structure	EA	1.00	$15,000	$15,000

Option 2 - Estimated Removal of Existing Structure **$15,000**

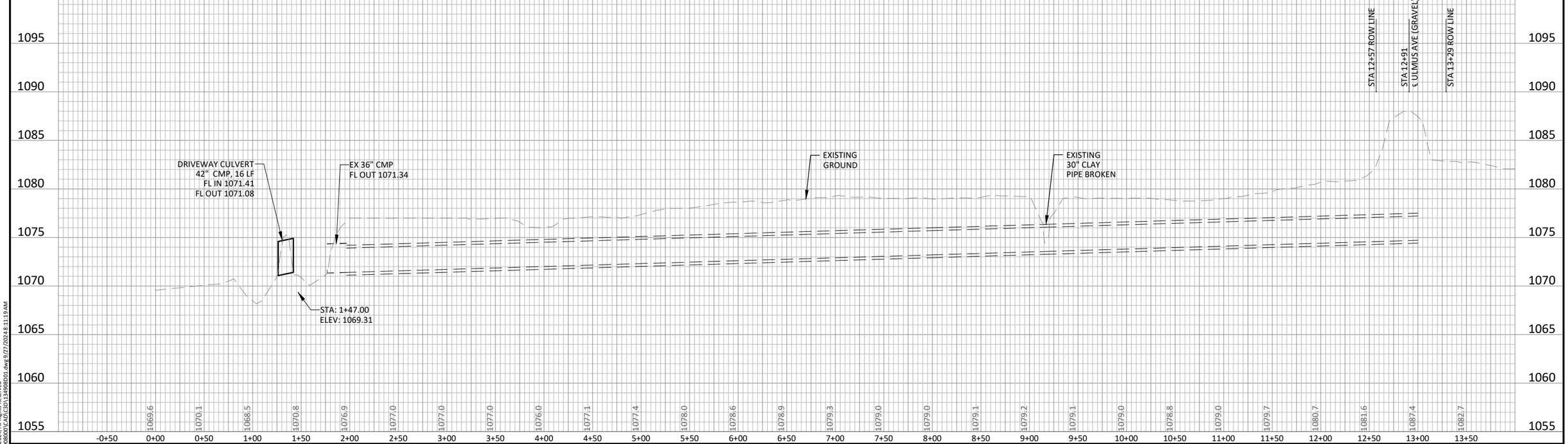
Option 3 Main Tile Reroute

Item	Description	Unit	Quantity	Unit Price	Total
1	Drain Tile, Trenched, Class III R.C.P. 30" Dia.	LF	100	$140	$14,000
2	Trench Foundation Stone	TN	7	$35	$245
3	Spot Tile Exploration	HR	8	$200	$1,600
4	Mobilization	LS	1	$800	$800
5	Construction Contingency	LS	1	$1,355	$1,355

Option 3 - Estimated Constrcution Cost - Main Tile Reroute **$18,000**

Engineer's Opinion of Probable Cost
Proposed Main Tile Repair
Drainage District No. 35
Cerro Gordo County, Iowa
2024
Non-Construction Costs

Construction Related Damages	$2,500
Basic Engineering Services	
Survey, Study & Report. Meetings & Hearing	$20,000
Construction Plans, Specifications, & Bid Letting	$6,600
Construction Engineering Services, Staking, and Inspection	$5,400
Legal Services, Publications, Mailings, Etc..	$5,000
Finance, Interest & Contingency	$3,100
Estimated Total Non-Construction Costs	**$42,600**
Estimated Total Main Tile Repair and Option 1	**$71,745**
Estimated Total Main Tile Repair and Option 2	**$67,600**
Estimated Total Main Tile Repair and Option 3	**$70,600**



HORZ. SCALE 0 50 100 FEET

VERT. SCALE 0 5 10 FEET

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www.bolton-menk.com

DESIGNED	TAC/NRS
DRAWN	ALH
CHECKED	TAC/NRS
CLIENT PROJ. NO.	24X134908000

REV	DESCRIPTION	DATE

CERRO GORDO COUNTY, IOWA
DD 35 MAIN TILE & DITCH REPAIR
PLAN & PROFILE

SHEET
D.01