



# *Executive Summary*

## **Introduction**

Following a petition submitted by landowners on January 6, 2026, a comprehensive engineering study was conducted to evaluate the open ditch system of Lateral No. 7 of Drainage District No. 4-263 in Webster and Hamilton Counties. This report presents findings and recommendations to address long-standing maintenance needs and infrastructure deficiencies to ensure the continued productivity of the district's 4,606-acre watershed.

## **Problem Assessment**

The investigation identified significant performance issues within the district's century-old infrastructure. While portions of the Open Ditch remain functional, several sections are hindered by significant silt accumulation, and aging outlet pipes. Notably, the upper section has accumulated silt throughout its entire length, reducing its effectiveness as a primary outlet.

## **Proposed Solution**

The recommended solution is a targeted restoration removing siltation on the bottom and reshaping side slopes. The proposed work includes the replacement of deteriorated surface drains and tile extensions. The plan also facilitates the inclusion of voluntary water quality conservation practices.

## **Project Cost and Economic Benefits**

The total estimated cost for the proposed project is \$622,000, averaging approximately \$135 per acre. This repair cost is consistent with historical maintenance benchmarks for the district and is necessary to protect the land's agricultural value and prevent crop loss from inadequate drainage.

## **Implementation and Landowner Considerations**

If approved, the project will be publicly bid, with construction potentially beginning in 2026 and concluding by March 2027. Costs will be shared among landowners according to the district's assessment schedule. Affected landowners will be compensated for crop damages and soil disturbance. The district will maintain a one-year warranty on all construction-related work.

## **Recommendation**

The existing infrastructure is currently operating below its original design capacity. We recommend that the Board of Trustees accept this report and schedule a public hearing. Pending landowner support, we advise proceeding with final plans and competitive bidding to restore the system to its full functional capacity.

Prior to the public hearing, we recommend that the Joint Board initiate annexation and reclassification proceedings for JDD 4-263 Lateral No. 7. Completing the annexation and reclassification process beforehand would help ensure that the assessment schedule more accurately reflects the lands directly benefiting from the facility and would limit the public hearing to the landowners affected by the proposed repairs.

# Table of Contents

<b>Introduction</b>	<b>3</b>
Overview	3
Location	3
<b>Historical Considerations</b>	<b>3</b>
Prehistoric and Geologic Background	3
State-wide Drainage System Overview	3
County-Wide Drainage System Overview	4
Joint Drainage District No. 4-263 Historical Overview	4
Historical Agricultural Demands	5
<b>Environmental Considerations</b>	<b>6</b>
Flooding and Subsurface Drainage	6
Nutrient Loading and Subsurface Drainage	6
Climate and Weather Patterns	6
<b>Watershed Characteristics</b>	<b>6</b>
District Landscape	6
Soils	7
Subsurface and Surface Water Flow Behavior	8
Private Drainage	9
<b>Existing Infrastructure and Conditions</b>	<b>9</b>
Field Survey	9
Existing Facilities	9
Downstream Outlet	11
<b>Proposed Project</b>	<b>11</b>
Project Design	11
Proposed Repairs	11
Preliminary Plans	12
<b>Construction Considerations</b>	<b>12</b>
Ditch Construction Methods	12
Road Crossings	13
Utility Conflicts and Coordination	14
Construction Timeline	14
<b>Estimated Costs and Analysis</b>	<b>14</b>
Cost Estimate	14
Historical Cost Comparison	14
Assessment Schedule Review	15
Installment Payment Options	15
Taxes	15
<b>Permitting</b>	<b>15</b>
US Army Corps of Engineers (USACE)	15
Iowa Department of Natural Resources (DNR)	16
USDA Wetland Conservation Compliance (Swampbuster)	16
<b>Water Quality Recommendations</b>	<b>16</b>
Conservation Practices	16
Iowa Nutrient Reduction Strategy	16
Edge-of-Field Practices	17
In-Field Practices	17
<b>Maintenance and Long-Term Management</b>	<b>18</b>
Warranty Period	18
Work Orders	19
<b>Landowner Considerations</b>	<b>19</b>
Public Input	19
Public Hearing on Report	19
Objections	19
Landowner Construction Considerations	19
Right-of-Way and Work Limits	20
Construction Damages	20
Completion Hearing	21

<b>Conclusion and Recommendations .....</b>	<b>21</b>
Conclusion.....	21
Recommendations .....	21
Appendix A – Petition Filed .....	22
Appendix B – Area of Study Map.....	23
Appendix C – Rainfall Chart: 1895-Present .....	24
Appendix D – Palmer Drought Severity Index: 1895- Present.....	25
Appendix E – Elevation Map .....	26
Appendix F – Soil Types.....	27
Appendix G – Soil Drainage Class .....	29
Appendix H – Soil Ksat .....	30
Appendix I – Depth to Water Table.....	31
Appendix J – Survey Photos .....	32
Appendix K – Itemized Cost Estimate .....	35
Appendix L – Current Assessment Schedule Map .....	36
Appendix M – Twenty Benefits of Drainage (Ohio State Extension) .....	37
Appendix N – Nutrient Reduction Strategy Example.....	39
Appendix O – Landowner Engagement Letter .....	40
Appendix P – Existing Right-of-Way .....	41
Appendix Q – Private Farm Crossings.....	42
<b>Preliminary Plans</b>	

## *Introduction*

### **Overview**

Drainage infrastructure plays a major role across Iowa, with legally established drainage districts responsible for constructing, repairing, and maintaining tile systems and open ditches that manage excess surface and subsurface water to support productive land use and protect nearby infrastructure.

Joint Drainage District No. 4-263 in Webster and Hamilton Counties, like many early 20th-century districts, was established to improve drainage in a wetter, less-developed landscape. The Webster and Hamilton County Boards of Supervisors serve as trustees, overseeing maintenance and ensuring that improvements benefit all landowners within the district. Under Iowa Code Chapter 468, landowners have the right to petition for repairs or improvements. On January 6, 2026, landowners submitted such a petition requesting an evaluation of the existing Lateral No. 7 Open Ditch system (Appendix A).

Once a valid petition is received, the Board hires a licensed engineer to conduct a preliminary survey and study and prepare a report outlining possible repairs or improvements and associated costs. This report presents the findings and recommendations resulting from that study and survey. The process is deliberate and transparent, with all landowners entitled to receive notice, review findings, attend hearings, and raise questions before any project proceeds.

### **Location**

JDD 4-263 Lateral No. 7 watershed spans lands in sections 13, 24-25, 35-36 of Colfax Township, section 4 of Washington Township in Webster County, and 7-8, 17-20, 29-31 of Fremont Township in Hamilton County. The watershed lies north of Duncombe. A map of the area of study is included in Appendix B.

## *Historical Considerations*

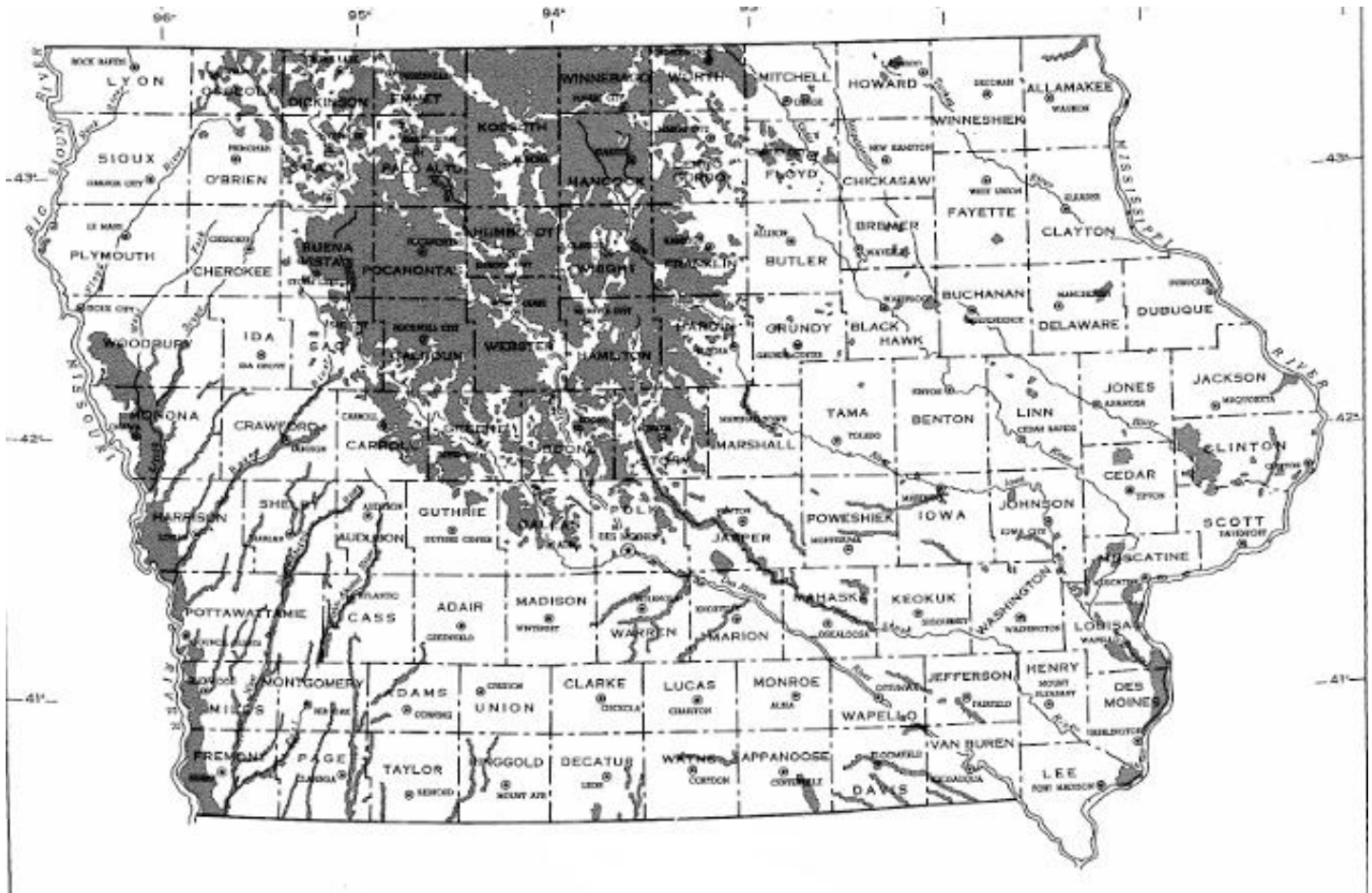
### **Prehistoric and Geologic Background**

Webster and Hamilton Counties, Iowa, lie within the Des Moines Lobe, shaped by the last glaciation 12,000–15,000 years ago. Glaciers deposited clay-rich till, a dense mix of clay, silt, sand, and boulders, over older bedrock. This till forms the foundation of the region's soils and strongly affects drainage.

The glacial landscape is mostly flat, featuring end moraines, kames, eskers, and knob-and-kettle terrain with prairie potholes (shallow depressions that collect water). Combined with the low permeability of the till and limited natural drainage, these features cause frequent surface ponding and high-water tables.

### **State-wide Drainage System Overview**

Artificial drainage in Iowa began in the late 1800s as settlers converted wetlands into farmland. Steam- and later gasoline-powered machinery accelerated these efforts. A 1904 constitutional amendment enabled the creation of drainage districts, allowing landowners to fund and manage large-scale drainage projects. By 1930, more than nine million acres of wetlands had been converted to farmland.



Source: Iowa Drainage Districts (1950 US Census of Agriculture)

The scale of Iowa’s drainage efforts is striking. By 1912, investments in drainage likely exceeded U.S. spending on the Panama Canal, highlighting the significant labor and engineering required to reshape the landscape. Today, approximately 3,800 drainage districts maintain networks of ditches and tiles statewide.

### County-Wide Drainage System Overview

Webster and Hamilton Counties are each served by over three hundred drainage districts, each county crossed by thousands of miles of district tiles and ditches, serving hundreds of thousands of acres of farmland. Most districts were established before 1930 and are undersized to meet the needs of modern farming practices or require regular upkeep.

Many historical accounts and photographs can be found illustrating the history and importance of drainage in Webster County.

### Joint Drainage District No. 4-263 Historical Overview

JDD 4-263 in Webster-Hamilton Counties was established to address persistent flooding and wetland conditions that limited agricultural productivity. Key events in the district’s development include:

- October 28, 1904      Petition filed for additional lateral ditch in DD No. 4. Estimated cost of \$7,147.43
- November 18, 1904      C. A. Snook appointed Engineer
- January 17, 1905      Lateral No. 7 of Drainage District No. 4 established
- 1907–1912      Original construction by Ward Bros. (not completed per specifications)
- April 28, 1911      Drainage District No. 263 (Hamilton County) established; joint district formed

- 1940 Major cleanout of open ditch – \$3,492.60 Assessed.
- January 16, 1967 Engineer's Investigation Report filed (Glen H. Miller); cleanout recommended
- March 10, 1967 Hearing held; engineer's report approved; benefit commissioners appointed
- May 2, 1968 Cleanout/repair contract awarded to Giese Construction Co. (\$47,936.40)
- December 18, 1968 Final change order issued; project completed
- January 9, 1970 Final “as-constructed” plans delivered to Joint Boards
- January 22, 1976 Levied 3% of original assessment
- July 25, 2005 Levied 15% of original (\$7,717.66)
- August 3, 2005 B & W Control Specialists contracted for spray maintenance (\$1,500)
- February 13, 2007 Levied 25% of original (\$10,895.50)
- 2010 Minor cleanout by Ingraham Construction for approximately \$60,000

### Historical Agricultural Demands

In the early 20th century, farms in Webster and Hamilton Counties were smaller and more diversified. They included a mix of row crops, small grains, hay, pasture, and livestock. Early smaller scale drainage systems helped convert poorly drained land into pasture and drier upland areas into more productive cropland.

Since then, agriculture in the county has changed dramatically. Most farms today span several hundred acres and operate in a corn–soybean rotation, which now accounts for over 90% of row-cropped land.



**Figure 12. A drainage ditch through an area of Canisteo silty clay loam, 0 to 2 percent slopes. Drainage ditches provide outlets for subsurface tile.**

## ***Environmental Considerations***

### **Flooding and Subsurface Drainage**

Subsurface drainage, while primarily installed to improve agronomic performance and soil workability, also plays a role in broader hydrological outcomes. A 2014 study conducted by the University of Iowa's IIHR – Hydroscience & Engineering Institute concluded that modern subsurface tile drainage systems can reduce peak flow rates during storm events. By gradually drawing down the water table and drying out soils, tile systems allow the soil to soak in more rainfall and delay the timing of runoff compared to surface flow, thereby attenuating flood peaks in receiving streams. This contradicts the common theory that tile drainage always increases flood risk.

### **Nutrient Loading and Subsurface Drainage**

JDD 4-263 lies in the Brushy Creek sub watershed of the Des Moines River basin, where tile drainage supports row crops on heavy, poorly drained soils by removing excess water. However, tiles create direct paths for soluble nutrients, especially nitrate-nitrogen ( $\text{NO}_3^-$ -N), to reach streams. Long-term monitoring by the Iowa DNR and USGS shows elevated nitrate levels in the Des Moines River during high tile flow periods. Tile drainage does not create nutrients but accelerates their movement, making nutrient management and conservation practices essential alongside drainage improvements to reduce nutrient loading and protect water quality.

### **Climate and Weather Patterns**

Long-term weather records dating back to 1895 provide insight into shifting precipitation patterns, temperature trends, and drought cycles, all of which affect how water moves through fields and drainage systems.

Historically, Webster County has received between from 20 to 50 inches of precipitation per year, averaging around 32 inches (Appendix C). The trend from 1895 to 2024 shows increasing annual precipitation, with three years exceeding 45 inches (1993, 2010, and 2018). In addition to rising totals, rainfall has become more intense and unevenly distributed. Short, high-intensity storms delivering 2 to 4 inches in a single day are increasingly common, especially in spring and early summer.

The Palmer Drought Severity Index (PDSI) reflects this variability. While Webster County experienced major droughts in the 1930s, 1950s, early 1970s, and late 1980s, recent decades show more frequent wet periods and positive PDSI values (Appendix D), indicating above-normal soil moisture. At the same time, temperature records show moderate warming, especially in winter and early spring, leading to earlier snowmelt, altered freeze-thaw cycles, and longer growing seasons.

## ***Watershed Characteristics***

### **District Landscape**

Joint Drainage District No. 4-263 Lateral No. 7 serves a relatively flat watershed without strongly defined drainage paths. The general flow of water in the district is towards the open ditch via shallow depressions without defined water paths. There are few hills or knobs in the district. Most of the district is straight row crop farmed.

In 2019, a petition was filed to improve the JDD 87-95 tile system that originally outlet into the JDD 4-272 Lat 1 Open Ditch. As part of the improvement, the tile was laid to outlet into the JDD 4-263 Lat 7 Open Ditch. This brought additional lands' tile drainage into the open ditch.

We used LiDAR (Light Detection and Ranging) to map the surface topography of the district. This technology uses laser pulses from aircraft to create highly accurate elevation maps of the ground surface. These maps help us identify where water naturally collects and how it moves across the land. An elevation map is included in Appendix E.

The watershed covers approximately 4,606 acres that naturally drain to the district via surface flow, plus pothole areas tile drained to the ditch. There may be some acres tile-drained out of the district, while others outside the surface watershed are tile-drained into it.

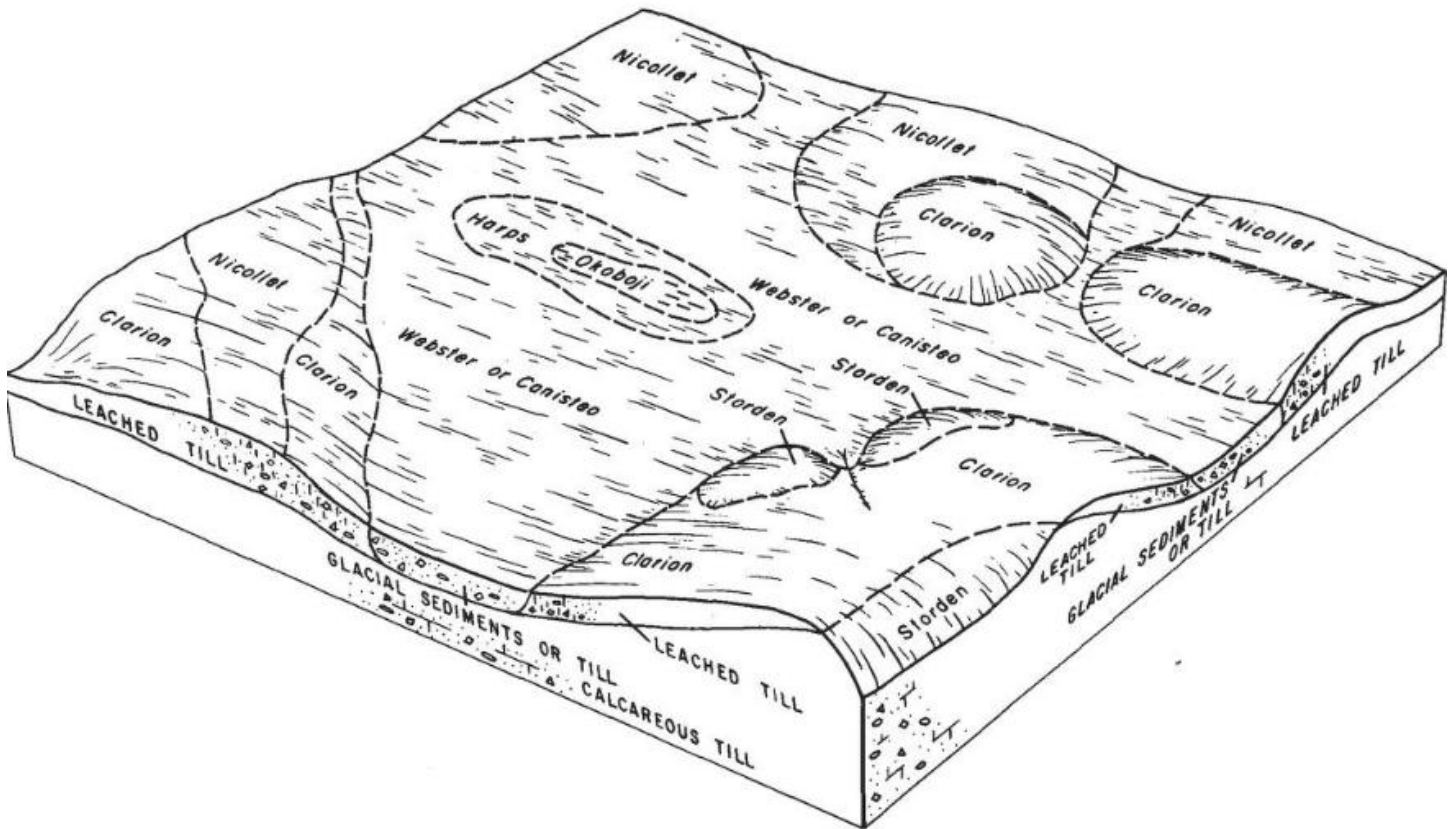
A detailed topographic analysis using 6-inch LiDAR contour data identified 286 depressional features within the watershed, covering approximately 474 acres (10% of watershed). These low-lying areas collect water and lack natural surface outlets, significantly impacting drainage. They contribute to surface ponding during rain events, alter runoff patterns, and increase reliance on subsurface tile or surface inlets for effective water management. These depressions are mapped in Appendix E.

Historical aerial photos provide valuable insight into long-term drainage patterns and problem areas within the district. By examining past images, we can identify recurring issues such as drown-out spots, standing water, or poor crop growth, all of which are indicators of inadequate drainage.

### **Soils**

Most of the soils within JDD 4-263 are classified as clay loam, which tend to retain water and present natural drainage limitations. The four dominant soil types, Canisteo clay loam, Clarion clay loam, Nicollet clay loam, and Webster clay loam, cover roughly 88% of the district. Although these soils are highly fertile, their fine texture and landscape position often result in poor natural drainage.

According to the USDA, Canisteo soils are poorly drained and typically occur on flats and in swales. They are characterized by a high-water table, frequently requiring subsurface tile and surface ditches for adequate drainage. Clarion soils are moderately well drained and commonly found on knolls and side slopes with gentle to moderate gradients. Nicollet soils are also moderately well drained, generally occurring on low rises or gently sloping convex side slopes, with a moderately high seasonal water table. Webster soils are poorly drained, formed in glacial till. All these soils exhibit significantly improved productivity when supplemented with artificial drainage systems.



**Figure 5.—Relationship of slope and parent material to soils of the Webster-Clarion-Nicollet soil association.**

Source U.S. Department of Agriculture, Soil Conservation Service. (1975). *Soil survey of Webster County, Iowa* [Map/image]. U.S. Government Printing Office.

A detailed soil drainage class table is included below and supporting soil type and soil drainage class maps are provided in Appendices F and G. Overall, nearly 90% of the soils in the watershed fall into the very poorly drained, poorly drained, or somewhat poorly drained categories. This highlights the critical need for artificial drainage to maintain productivity.

Soil Drainage Class		
Drain Class	Acres	Percentage of Watershed
Very Poorly Drained	378	8%
Poorly Drained	2,727	59%
Somewhat Poorly Drained	1,009	22%
Moderately Well Drained	432	9%
Well Drained	24	1%
Somewhat Excessively Well Drained	0	0%
Excessively Well Drained	0	0%
Disturbed	38	1%

### Subsurface and Surface Water Flow Behavior

Subsurface drainage works by collecting water through perforated pipes or the gaps between clay tiles installed below ground. As the soil becomes saturated, water moves laterally through the soil's pore spaces until it reaches the tile line, then enters through small openings and is conveyed to the district main. This process lowers the water table, improves soil aeration, and reduces surface runoff.

A key factor in drainage design is saturated hydraulic conductivity (Ksat)—a measure of how quickly water moves through saturated soil. Sandy soils have high Ksat values and drain quickly; clay soils, like those in JDD 4-263, have lower Ksat values and drain more slowly. Most soils in the district are clay loams with moderate to low Ksat values (Appendix H). These values are used to determine necessary drainage coefficients and guide tile spacing and depth for effective system design.

Surface water flow occurs when rainfall or snowmelt exceeds the soil's infiltration capacity, causing water to move downslope into channels or depressions. To model this, we use Curve Numbers (CN)—a standard method for estimating runoff based on land use, soil type, and moisture conditions. In District No. 4-263, CN values typically range from 75 to 90, which is high for cultivated agricultural land with moderately and poorly drained soils. These values help in designing surface inlets, sizing ditches, and evaluating erosion control needs.

A map of seasonal high-water tables (Appendix I), based on USDA NRCS data, provides a general overview of how close groundwater may rise to the surface during wet periods.

### **Private Drainage**

The primary purpose of a drainage district is to provide a legal and reliable outlet for both surface and subsurface drainage, enabling coordinated water management across multiple properties. While the district maintains the shared infrastructure, such as main tile lines and open ditches, individual landowners are responsible for installing and maintaining private tile systems that connect their land to the district outlet. Over the more than one hundred years since the district was established, it is likely that over a million feet of tile has been installed within its boundaries. We have included “Twenty Benefits of Drainage” prepared by the Ohio State Extension highlighting yield and non-yield benefits of drainage in Appendix M.

As part of this ditch repair project, every known tile and surface drain outlet along the open ditch was located and surveyed. Defective or collapsed pipes will be replaced as part of the work. Damaged outlets do not function properly and can contribute to ditch bank failure through seepage and erosion.

## ***Existing Infrastructure and Conditions***

### **Field Survey**

The initial field survey of JDD 4-263 was completed in April of 2026. As part of this effort, we collected photographs and drone video of all major components and areas of interest throughout the Lateral No. 7 Open Ditch. Using high-accuracy GPS equipment, we measured the flowline elevations of the ditch at regular intervals. These elevation measurements help us compare existing conditions with the original engineering plans and serve as reliable reference points moving forward.

We also documented the condition of major features including bridges, culverts, private crossings, private tile outlets, surface drains, and concrete bulkheads. Photos taken during the field visit are included in Appendix J. The drone video can be found by searching AgriVia on YouTube, or via the following link: [https://www.youtube.com/watch?v=21T5NZ5\\_YeM](https://www.youtube.com/watch?v=21T5NZ5_YeM)

### **Existing Facilities**

The Lateral No. 7 Open Ditch outlets into the JDD 4-272 Lateral 1 Open Ditch north of Highway 20. The Main Open Ditch is the headwaters for Brushy Creek, which flows south. Lateral No. 7 is approximately 18,500 feet long and serves over 4,000 acres of predominantly farmland. The ditch functions as the outlet for five other drainage districts, DD 373, JDD 99-88, JDD 374-207, JDD 117-108, and JDD 87-95.

The ditch conditions can be divided into three sections each defined by the road culverts.

- **Downstream of D20:** This reach consists of relatively steep channel side slopes and a well-defined channel with minimal meandering. Minor sediment accumulation was observed in the lower portion near the outlet. Vegetation within the channel includes scattered small willow growth along the side slopes and a greater presence of reed canary grass (“snake grass”) compared to upstream reaches.
- **D20 to 210<sup>th</sup> Street:** The channel bottom through this reach generally appears to be at or slightly below the average grade established between the adjacent culverts, with only isolated sediment deposits and small islands requiring removal. Increased vegetative growth was observed within the channel bottom, and the channel has developed into a defined two-stage condition. The east bank contains a greater concentration of reed canary grass.
- **Upstream of 210<sup>th</sup> Street:** This reach exhibits the most significant sediment accumulation within the project corridor, particularly near the upstream end. Side slopes are flatter and generally well vegetated with established grass cover. A pronounced two-stage channel condition has developed, consisting of a narrower low-flow channel with vegetated benches along both sides. Several localized bank sloughing areas were also observed within this reach.

### Original Ditch Design

Original construction plans from the initial 1905 establishment are unavailable. However, design plans from the 1940 cleanout project were obtained and reviewed to evaluate historical parameters. The 1940 plans specify a uniform four-foot channel bottom width and a longitudinal grade that flattens progressively moving upstream (ranging from 0.18% near the outlet to 0.04% upstream of Station 30+00).

Subsequent cleanout plans from 1968 introduced a modified profile. Relative to the 1940 design, the 1968 profile was established deeper downstream and shallower upstream. It utilized a 0.08% grade from the outlet to Station 152+75, transitioning to a 0.06% grade upstream of that point. The most recent cleanout plans from 2010 generally mirror this 1968 design.

Ultimately, historical records indicate that the channel profile has been modified during successive cleanout events. Therefore, no single, consistent design template or official grade has been maintained throughout the life of the facility.

### Other Drainage Districts’ Existing Tile Capacity

The existing tile system performance depends upon the hydraulic characteristics of each section, including pipe diameter, drainage coefficient, and the percentage relative to the modern standard drainage coefficient of 0.5 inches per day. These parameters determine the system’s capacity to convey water. The table below summarizes these key attributes for the five other drainage districts relying on JDD 4-263 Lateral 7 as an outlet.

Other Drainage Districts’ Existing Tile Capacity				
Drainage District	Outlet Diameter (inches)	Grade (%)	Drainage Coefficient (in/day)	Percentage of Modern Minimum Standard
DD No. 373	Unk.	Unk.	Unk.	Unk.
JDD No. 99-88	20	0.07	0.30	60%
JDD No. 374-207	12	Unk.	Unk.	Unk.
JDD No. 117-108*	26	0.11	0.16	32%
JDD No. 87-95	36	0.15	0.50	100%

\*It appears a large private main was installed recently effectively replacing this district tile.

## Downstream Outlet

Joint Drainage District No. 4-263 Lateral No. 7 outlets into the JDD No. 4-272 Lateral No. 1 Open Ditch, and eventually the waters will reach Brushy Creek. The JDD 4-272 Lateral No. 1 Open Ditch was cleaned out in 2024.

## Proposed Project

### Project Design

As the engineers responsible for overseeing the repairs to the ditch system, we have followed established design and construction standards developed by the American Society of Agricultural and Biological Engineers (ASABE), the Natural Resources Conservation Service (NRCS), and Iowa State University Extension and Outreach.

Under the authority of Iowa Code Chapter 468, the district holds both the legal right and the obligation to maintain drainage facilities to their original design capacity. Existing ditch plans were reviewed to verify the original flowline elevation and channel cross-sections. This project will restore those design dimensions and grades to ensure the system performs as originally intended.

### Proposed Repairs

The open channel facility consists of three distinct reaches, with existing roadway culverts acting as hydraulic controls between each segment. Given the lack of a historically consistent design grade, the proposed cleanout profile was developed utilizing a best-fit methodology. This approach establishes the new grade based on existing physical control points; specifically, the controlling culvert inverts and the downstream outlet elevation as illustrated below.

Lateral No. 7 Best Fit Design			
Section Name	Bottom Width (ft)	Grade (%)	Side Slopes (h:v)
Stations 0-71	4	0.10	2:1
Stations 71-125	4	0.07	2:1
Stations 125-185	6	0.04	2:1

The two downstream reaches are well suited to the proposed profile and are expected to function satisfactorily under the recommended design. The upstream reach, however, warrants additional consideration, as the proposed channel grade of 0.04% is flatter than generally preferred for open drainage channels. At this slope, the estimated average flow velocity is near the minimum recommended self-cleaning velocity of approximately 1.5 ft/s. As a result, this reach will likely require more frequent routine maintenance to manage sediment deposition and vegetative growth than would typically be expected for an open ditch system. The channel is wider here to accommodate flow with the reduced grade.

Channel cleanout operations are proposed from both sides of the ditch in order to generally balance spoil placement along the corridor. However, between Stations 20+00 and 45+00, excavation activities will be restricted to the north side of the channel to avoid disturbance to the Duncombe wastewater lagoons adjacent to the south side of the ditch.

### Pipes and Obstructions

Most pipes along the system are old, failing, and need to be replaced, except those within roadway rights-of-way, which remain the responsibility of road authorities. Additional work includes removal of various islands, sloughs, meanders, debris, abandoned bridges, and other blockages. The private culvert will be lowered and trees will be removed or cleared where necessary.

## **Preliminary Plans**

The proposed preliminary plans are enclosed with this report. These plans serve as a guide for the contractor and outline the expectations and standards for construction. Included in the plans are the proposed work limits and specific work expected to take place on each landowner's property. The plans also contain profile and cross section views showing the proposed depth of the existing and repair ditch flowline. These plans are preliminary and may be refined prior to final bidding.

## **Construction Considerations**

### **Ditch Construction Methods**

- **Excavation**

The ditch will be repaired using established methods commonly employed throughout Iowa. Construction will begin at the downstream end and proceed upstream, allowing standing water in upstream sections to drain and helping to flush sediment and debris through the newly cleaned downstream channel. Tracked excavators will be utilized, operating from both sides of the ditch where conditions allow. This approach provides more effective cleaning of the ditch bottom and banks while allowing even spoil placement.

- **Clearing and Grubbing**

All trees located within the right-of-way of the open ditch will be removed as a maintenance measure. Tree growth within the right-of-way shades out grass, increases erosion potential, drops debris into the channel, obstructs maintenance access, and provides material for beaver dam construction. Trees and stumps will be removed to ground level. All woody debris will be burned, and the resulting ashes and remnants will be buried within the ditch right-of-way. Landowners wishing to retain wood from trees marked for removal are encouraged to do so prior to the start of construction.

- **Seeding and Fertilizing of Banks**

All ditch banks disturbed during construction will be re-seeded by the contractor to minimize erosion and promote the establishment of desirable vegetation. According to NRCS guidance, the most cost-effective method for stabilizing exposed banks without additional seedbed preparation is to broadcast seed and fertilizer daily as work progresses. The plans specify that banks are to be scraped with an approved harrow to create ridges, and that a summer cover crop mixture is to be seeded with fertilizer. After completion of the project, the banks will be seeded with a permanent seed mixture via hydroseeding.

However, vegetation establishment is highly weather-dependent and often inconsistent. Some areas may experience weed growth or poor vegetative cover that will require additional maintenance or time to fully stabilize.

- **Spoil Seeding**

The 100-foot-wide work area will be seeded with a cover crop after construction to reduce erosion, improve soil health, and break up compaction. Landowners may terminate the cover crop at their discretion.

- **Spoil Leveling, Tillage and Debris Pick-up**

Spoil generated from ditch excavation will be placed along the top of the ditch bank. After allowing the material to dry, the contractor will spread it into a uniform layer approximately thirty feet wide, providing a smooth, equipment-accessible transition back to the adjacent field. The spoil area will then be tilled, and all debris and rocks larger than softball size will be collected and removed. A temporary weed-control seed mix will be applied to establish initial cover. Final restoration of this area will be completed by the landowner according to their preference.

- **Surface Drains**

Surface drain pipes were identified during the field survey and are shown on the plans. The project cost estimate includes replacement of any pipes requiring repair. Additional pipes are expected to be discovered during construction, as some may currently be buried, broken, or obscured by vegetation. Any damaged or deteriorated pipes will be replaced with new pipes and marked with a flag at the top of the bank. All pipes will be installed so that their discharge ends are positioned above the ditch bottom, ensuring unrestricted flow under normal conditions.

- **Tile Outlets**

Tile outlet pipes will be treated the same as surface drain pipes and will be replaced if in poor condition. All will be marked with a PVC marker at the top of the bank.

- **Riprap**

Existing riprap found in the ditch will be left in place if possible. Additional riprap may be installed in select areas to protect against bank scour during and after construction. Riprap is typically used in locations with sandy soils that are unstable, as well as at sharp bends or downstream of large tile outlets. The exact location and quantity of riprap will be determined in the field during construction. Where suitable, existing field stones found along the ditch may be utilized as riprap.

- **Pollution and Erosion Control**

The contractor will be responsible for minimizing pollution and erosion during construction, under the engineer's direction.

Excavation, removing vegetation, and placing spoil material along the banks temporarily increases erosion potential. To minimize the risk, a silt curtain will be installed at the beginning of the cleanout to allow sediment to settle before flowing downstream. The contractor will also perform daily seeding of exposed ditch banks and apply a temporary seed mix to the top of the banks upon completion. Some erosion is still expected; therefore, the ditch bottom will be over-excavated by six inches to ensure that minor sediment deposition does not reduce the designed capacity of the open ditch.

- **Removal of Fence**

Fences crossed during repair works along the ditch will not be replaced. The fence will be removed and buried within the work limits.

- **Driveway Restoration**

Once the project is complete, any driveways that were damaged will be restored to their original condition. Photos will be taken before and after to document the work.

- **Mobilization**

Mobilization includes transporting equipment and materials to the site, setting up access, and preparing staging areas. After work is complete, all equipment will be removed and the site cleaned up.

## **Road Crossings**

The ditch has four crossings: two owned by private landowners, and two owned by Webster County Secondary Roads. The county road culverts are at grade without silt on the bottom.

The 96" CMP private culvert at Station 18+30 will need to be lowered approximately two feet as part of this project. Lowering this culvert will allow for an improved straight-line grade from D20 to the outlet. We recommend that the district pay the cost to lower the culvert, since it is a relaying of an existing structure.

We have included in Appendix Q photos of every private bridge and culvert. A table of all crossings is provided below.

Road Crossings					
Station	Control Entity	Road	Structure	Size	Work
18+30	Private Landowner	Farm Crossing	CMP	96"	Relay 2' Lower
70+65	Webster County	D20	RCB	8' x 8'	None
98+28	Private Landowner	Farm Crossing	Steel Bridge		None
124+24	Webster County	200 <sup>th</sup> St	RCB	8' x 8'	None

### Utility Conflicts and Coordination

A Design One Call was completed on May 5, 2026, identifying utilities within the project area. Two petroleum lines were identified crossing the project corridor.

Under Iowa Code §468.186, utilities within a drainage district’s right-of-way must accommodate drainage work. The district’s drainage system predates the utilities, so any necessary utility relocation must be done at the utility’s expense.

Before construction begins, the contractor will complete an 811 Iowa One Call to ensure all utilities are properly located and marked, helping prevent conflicts and maintain a safe worksite.

### Construction Timeline

If approved, we anticipate the work to bid summer 2026 with a completion date of March 2027. While contractors must finish all work by this deadline, they are free to choose their own construction schedule. The timeline is intentionally flexible to attract more qualified contractors and encourage competitive bidding, which can lower project costs.

## Estimated Costs and Analysis

### Cost Estimate

The total estimated cost for all proposed work is \$622,000. This figure includes all anticipated construction activities, damages, engineering services, and administrative expenses. The breakdown is as follows:

Activity	Cost
Lateral No. 7 Open Ditch Repairs	\$476,000
Engineering, Reclassification, and Annexation	\$80,000
Construction Damages	\$16,000
Other Expenses (Legal, Administrative, and Interest)	\$50,000

This is a preliminary engineer’s estimate, prepared for planning purposes. Costs are based on recent bid tab data from comparable projects and include allowances for contingency and administrative expenses. Final construction costs will depend on market conditions at the time of bidding and may vary from this estimate.

A detailed itemization of costs is provided in Appendix K.

### Historical Cost Comparison

The all-inclusive estimated cost to landowners for the Lateral No. 7 Open Ditch repairs is \$622,000 or approximately \$135 per acre assuming the district is reclassified.

<b>Lateral No. 7 Historical Comparison</b>					
<b>Year</b>	<b>Avg. Assessment Per Acre</b>	<b>Avg Land Value Per Acre</b>	<b>Assessment Relative to Land Value</b>	<b>Avg. Revenue Per Acre for Corn Crop</b>	<b>Assessment Relative to Yearly Corn Revenue</b>
1905	\$2	\$42	4.8%	\$18	11.1%
1940	\$1	\$104	1.0%	\$21	4.7%
1968	\$19	\$571	3.3%	\$94	20.2%
2010*		\$6,438		\$649	
2025	\$135	\$13,130	1.0%	\$907	14.9%

1970 land value used for 1968

\*2010 assessments were unavailable. Cleanout was for only the lower 2/3 of ditch.

### **Assessment Schedule Review**

Costs incurred by the district are assessed to benefited landowners in proportion to the benefits received by each property. To ensure an equitable distribution of costs, the district maintains an assessment schedule that allocates expenses based on the relative benefit each parcel derives from the drainage improvements and associated facilities.

Our review of the current assessment schedule for JDD 4-263 Lateral No. 7 indicates that its area exceeds the lands that directly drain to and are served by the lateral. The schedule also appears to include a significant portion of land within JDD 4-272 Lateral No. 1. Therefore, it is recommended that JDD 4-263 Lateral No. 7 be reclassified to include only those lands that drain to and receive a direct benefit from the district’s facilities. A map showing the existing assessment schedule for JDD 4-263 Lateral No. 7 is provided in Appendix L.

As part of the reclassification process, the district should also evaluate the annexation of additional lands that benefit from the existing facilities but are not currently included in the assessment schedule. A more detailed analysis will be required to confirm the extent to which unassessed lands that drain into the district receive benefit from its improvements.

### **Installment Payment Options**

Under Iowa drainage law, landowners who are assessed for substantial repairs and improvements may be eligible to pay their assessment over time. The Board of Trustees may authorize an installment payment plan with interest, allowing landowners to repay the assessment annually over a period of up to 20 years.

To take advantage of this option, a formal waiver request must be submitted. There is no penalty for early repayment, and landowners who wish to avoid interest may pay the full amount up front or consider private financing alternatives.

### **Taxes**

While the district is not authorized to provide tax advice, landowners are encouraged to consult with their accountant or tax advisor to determine whether drainage assessments or related improvements may be deductible or eligible for depreciation under current tax laws.

## **Permitting**

### **US Army Corps of Engineers (USACE)**

This being a standard repair, and due to the size of the watershed, no permit is required from the USACE for the work.

## Iowa Department of Natural Resources (DNR)

No permit is required for standard maintenance repair work from the Iowa DNR.

## USDA Wetland Conservation Compliance (Swampbuster)

As part of federal conservation compliance requirements under the Food Security Act of 1985, any landowner participating in USDA programs including crop insurance, commodity payments, or CRP must obtain a valid Certified Wetland Determination from the Natural Resources Conservation Service (NRCS) before undertaking drainage improvements that may affect wetland areas. These determinations identify areas that meet federal criteria for wetland protection based on hydric soils, vegetation, and hydrology.

However, because this project is only a repair of an existing system and not an improvement, the Swampbuster rules do not apply. No determinations are necessary for this project.

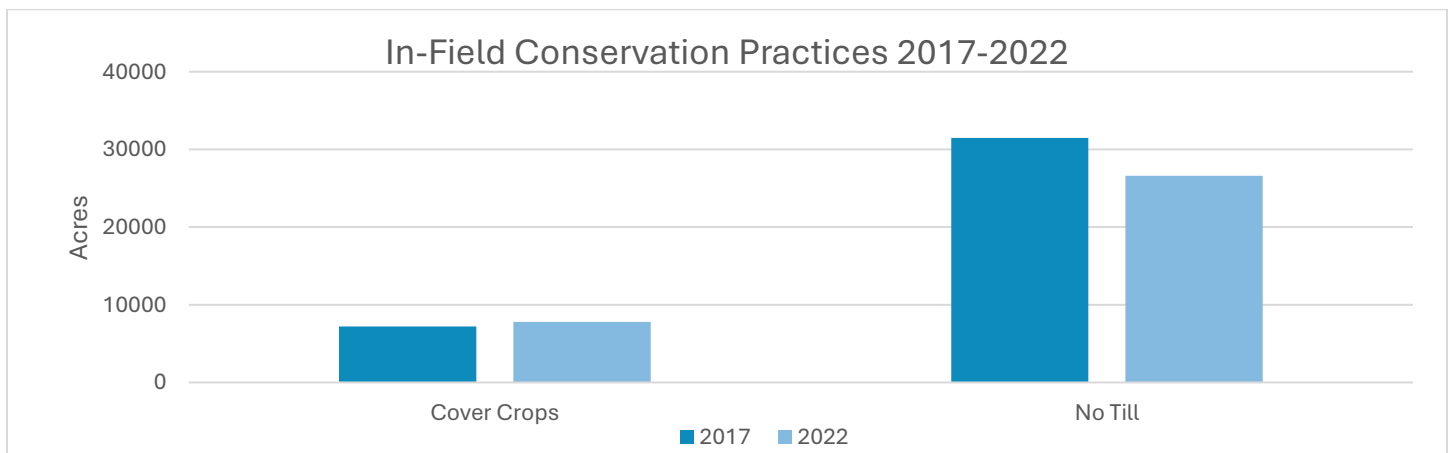
## Water Quality Recommendations

### Conservation Practices

Farmers in Webster County have made steady progress in adopting conservation practices that protect soil health and improve water quality. While most conservation measures aim to reduce in-field erosion, they also provide well-documented benefits to downstream water systems.

As of January 2024, about 17,738 acres are enrolled in the Conservation Reserve Program (CRP). These areas are planted with perennial vegetation to reduce erosion, slow runoff, and filter nutrients before they reach nearby waterways. Many include riparian buffers, filter strips, or wetland restorations, which help protect drainage outlets and reduce the movement of sediment and nutrients downstream. Buffer strips exist along the entire length of this ditch with the exception of one ¼ mile tract.

Between 2017 and 2022, no-till acres decreased from 31,000 to 27,000, while cover crop use grew from 7,200 to 7,700 acres. These practices improve water infiltration, limit erosion, and help retain nutrients in the soil, particularly during snowmelt and heavy rains.



### Iowa Nutrient Reduction Strategy

Iowa's Nutrient Reduction Strategy (NRS) aims to reduce nitrogen and phosphorus runoff from farmland using a combination of in-field practices (cover crops, nutrient management, reduced tillage) and edge-of-field practices (wetlands, bioreactors, controlled drainage).

Effectively designed drainage works with the NRS by moving water efficiently while allowing nutrient-reducing practices to function effectively. For example, drainage paired with controlled outlets or bioreactors can capture and treat nutrients before they leave the field. Appendix N includes a table of potential practices that can be used, showing options to meet nutrient reduction goals while maintaining productivity and soil health. If any landowner is interested, we can provide a copy of the spreadsheet for use on their farm.

## Edge-of-Field Practices

- **Buffer Strips**

Grass buffer strips along streambanks and ditches are one of the most effective ways to intercept runoff. These vegetated zones filter sediment, absorb nutrients like nitrogen and phosphorus, and reduce pesticide transport. They also stabilize stream banks, minimize erosion, and provide habitat for pollinators and wildlife.

- **Grassed Waterways**

For fields with concentrated flow paths, grassed waterways help prevent gully formation and safely carry runoff away from cropland. Their dense vegetation reduces water velocity, limits soil loss, and improves downstream water quality. University of Illinois research (2018) showed that grassed waterways decreased gully erosion by up to 75%.

- **Constructed Wetlands**

Constructed wetlands are engineered systems designed to intercept surface or subsurface drainage before it enters ditches or streams. By slowing water flow, they promote the natural removal of nitrates through microbial activity in the soil. In addition to improving downstream water quality, these systems provide valuable habitat for aquatic life, waterfowl, and other wildlife.

- **Saturated Buffers and Bioreactors**

Saturated buffers and woodchip bioreactors are designed to treat water from subsurface tile outlets before it reaches open water. Saturated buffers route tile water through vegetated riparian areas where soil microbes and plants naturally reduce nitrate levels. Bioreactors use buried woodchips to create an anaerobic zone that encourages denitrification.

Research from Iowa State University (2016–2020) found that saturated buffers reduced nitrate concentrations in drainage water by 40–80%, while bioreactors achieved 20–40% nitrate reduction. Both options are effective tools for addressing nitrogen loss from tile-drained fields.

## In-Field Practices

- **Cover Crops**

Cover crops, such as cereal rye, clover, or radish, are planted after harvest to protect the soil during the off-season. Their root systems reduce erosion, improve soil structure, promote microbial activity, and capture residual nutrients, particularly nitrogen, before they leach into tile systems.

A 2017–2021 University of Minnesota study found that cover crops reduced nitrate leaching by 30–60% in tile-drained fields and increased soil organic matter by 0.5–1% over five years, supporting both environmental and agronomic benefits.

- **Conservation Tillage or No-Till**

Reducing tillage helps maintain soil structure, increase organic matter, and reduce erosion and runoff. Better soil structure improves water infiltration, and crop residue left on the surface protects the soil during rainfall events.

An Ohio State University study examining conventional tillage, no-till, and strip-till systems found that conservation tillage performed best when paired with subsurface drainage. No-till and strip-till fields retained higher soil structure and moisture balance, reduced erosion, and improved crop trafficability. In drained fields, corn-soybean rotations under no-till produced the highest yield benefit, while continuous corn also showed consistent improvements. The study concluded that subsurface drainage not only improved yields directly but also enhanced the effectiveness of conservation tillage systems by improving field conditions.

- **Precision Nutrient Management**

Precision agriculture tools like soil sampling, yield mapping, and variable rate technology (VRT) allow targeted application of fertilizers and pesticides. This approach reduces the risk of nutrient runoff, improves fertilizer use efficiency, and increases profit margins by applying inputs only where they are needed.

- **Diversified Crop Rotations**

Rotating corn and soybeans with small grains (e.g., oats or wheat) or forage crops can improve soil health, break pest and disease cycles, and reduce nitrogen imbalances. These rotations increase biological diversity in the field and may open fresh marketing opportunities or enhance farm resilience. A 2019 Kansas State University study reported that diversified rotations reduced nitrogen leaching by 20–30% and improved soil health metrics by 15–25%.

- **Split Nitrogen Applications and Stabilizers**

Applying nitrogen in multiple smaller doses throughout the growing season, instead of a single application, reduces the chance of leaching. Using nitrogen stabilizers or inhibitors further minimizes loss by keeping nutrients in forms more available for plant uptake.

Cost-share funding is often available to help implement these practices. The Iowa Agriculture Water Alliance hosts an online tool- <https://costsharecompare.com/> where landowners can search for financial assistance by ZIP code, compare multiple programs, and identify opportunities to stack funding sources for greater return on investment.

Well-maintained drainage systems improve field conditions for conservation by reducing compaction and allowing timely planting, while conservation practices help drainage systems by limiting sediment buildup and nutrient loading. Although the drainage district cannot require conservation measures, we strongly encourage landowners to work with their local NRCS office to explore available options. In-field and edge-of-field practices can reduce erosion, improve water quality, lower input costs, and support long-term soil health. They are backed by research and may qualify for financial assistance through programs like EQIP, CSP, and the Iowa Water Quality Initiative.

## ***Maintenance and Long-Term Management***

### **Warranty Period**

It is common for tiles to be missed or for other issues to arise during or shortly after construction. To address this, the drainage district will maintain a one-year warranty with the contractor to cover construction-related errors or

unforeseen problems. If a landowner observes an issue during this period, they should contact the county Drainage Clerk so the district can investigate and coordinate any necessary repairs.

### **Work Orders**

After the one-year warranty period expires, any repairs must be initiated through a formal work order. A landowner may submit a work order to the county Drainage Admin to request repairs to the district system. Common issues include tile blowouts, collapsed outlets, bank erosion, or obstructions such as beaver dams.

Once a work order is reviewed and approved, a contractor will be assigned to complete the repair. The drainage district will pay the contractor's invoice, and the cost will be shared among landowners based on the existing assessment schedule. This process ensures that maintenance is managed in a timely, fair, and consistent manner.

## *Landowner Considerations*

### **Public Input**

On January 6, 2026, a letter was mailed to landowners adjacent to the ditch, notifying them that a petition had been filed and requesting any information relevant to drainage conditions within the district. The letter is included in Appendix O.

### **Public Hearing on Report**

A public hearing will be scheduled to review this engineer's report and the proposed repairs. Per Iowa Code § 468.14, all landowners in the district will be notified by mail, and notice will also be published in a local newspaper. At the hearing, we will present our findings, proposed plans, and cost estimates, and will be available to answer questions and address concerns. Topics such as construction impacts and crop damages may also be discussed.

The Board of Trustees will conduct the hearing and may continue it to a later date if more discussion or information is needed. No decision can be made until the hearing is held and all landowner input is considered. This report may be amended as needed in response to feedback received during the hearing, ensuring transparency and meaningful participation.

### **Objections**

Landowners with concerns about the proposed project are encouraged to submit written objections before or during the hearing. Written submissions become part of the official record and help guide any revisions to the report.

### **Landowner Construction Considerations**

If the project is approved, construction will proceed through the standard public bidding process. A bid letting will be held to obtain competitive proposals, and the lowest responsible bid will be submitted to the Board of Trustees for consideration and approval. Prior to construction, all affected landowners will be notified of the expected schedule and scope of work. Construction limits will be staked in the field and shown on the plans. Landowner cooperation (including preserving survey stakes and providing necessary access) will be critical to ensuring efficient completion of the project.

Throughout construction, we will coordinate directly with the contractor and function as the primary point of contact for all landowners. To ensure clear and consistent communication, landowners will be asked to direct any questions or concerns to us rather than contacting the contractor directly.

## **Right-of-Way and Work Limits**

Drainage districts have the legal authority to enter private lands to construct, maintain, or improve drainage systems, including both open ditches and subsurface tile.

Open ditches require a right-of-way to allow for construction, future maintenance, and spoil placement. The existing right-of-way for each parcel is shown in Appendix P and is illustrated on the plans. We determined the right-of-way by looking at the spoil piles visible in the 1930s aerial photo, showing a fairly consistent 100-foot corridor (50 feet each side). Landowners retain the beneficial use of the right-of-way, which includes the right to row crop or enroll the land in a conservation program; however, these activities may not impede the drainage district's ability to perform maintenance. Activities that would impede maintenance — such as constructing permanent structures or planting trees — are not permitted.

When Lateral No. 7 was originally constructed in 1905, no damages were paid for the land taken or the construction of the ditch, and there is no recorded deed or easement for the right-of-way. The right-of-way exists by order of the Webster County Board of Supervisors and includes the ditch, its side slopes, and the spoil banks needed to maintain it. The limits shown on the plans for this district are based on the constructed ditch and the original 1905 engineer's plat. When the ditch was cleaned out in 1940, 1968, and 2010, the Joint Boards of Webster and Hamilton Counties confirmed that no damage claims had been filed, and the work proceeded on the same authority.

Temporary construction limits are shown on the plans covering approximately forty acres across twenty-nine parcels. These work limits are shown on the engineering plans and intended as a boundary for the contractor. The actual area affected will be surveyed and documented during or after construction.

## **Construction Damages**

In accordance with Iowa Code § 468.103, landowners are entitled to compensation for damages resulting from construction activities outside the drainage district right-of-way, including crop loss, soil disturbance, and impacts to land use.

The following are recommendations regarding crop damage compensation:

- **Yield and Price Calculation**

For crops damaged during the growing season, we recommend using 110% of the five-year average county yield for the affected crop, multiplied by the average price received over the past 12 months. Both the yield data and average price are to be sourced from the Iowa State University Extension and Outreach and USDA-NASS databases.

- **Field Repair Work Compensation**

In addition to crop losses during the growing season, we recommend payment for the following field work at rates consistent with the most recent Iowa State University Custom Rate Survey (per acre):

- One pass of rock pickup
- Two passes of tillage: one deep tillage and one shallow tillage

- **Other Damages**

Landowners may submit claims for any additional damages not accounted for in this recommendation prior to the completion hearing.

Crop damages and other construction-related compensation will be paid by the drainage district and funded through the assessment schedule. As a result, all landowners within the district including those who incur damages will share in the cost of these payments through their proportionate assessments. The Board of Trustees retains

the authority to amend, approve, or deny any such claims. Final decisions regarding crop damages will be made at the completion hearing.

### **Completion Hearing**

Upon completion of construction, a Completion Hearing will be held in accordance with Iowa Code § 468.101. This hearing gives landowners the opportunity to review the finished work, raise concerns about field conditions or project compliance, and submit any remaining claims for damages not previously addressed.

At the hearing, the Board of Trustees will consider all landowner input, evaluate whether the work has been completed in substantial compliance with the approved plans and specifications, and determine final compensation for any valid damage claims. The Board also has the authority to amend, approve, or deny claims based on the evidence presented.

All landowners within the district will be notified of the hearing in advance, as required by law, and are encouraged to attend, to ensure their concerns are heard and properly documented before the project is closed out.

## ***Conclusion and Recommendations***

### **Conclusion**

Based on our investigation, we have determined that the JDD 4-263 Lateral No. 7 Open Ditch is in need of repair. To address these deficiencies, we have developed a proposed repair plan with an estimated total project cost of \$622,000. The proposed repairs are intended to restore the design functionality and drainage capacity of the ditch system in accordance with the petition.

In addition, our review of the current assessment schedule indicates that it is not equitable, as acres that do not utilize or benefit from the facility are presently included in the assessment schedule.

### **Recommendations**

We recommend that the Joint Board accept the filing of this report and schedule a public hearing to present the findings, proposed repairs, and estimated costs to the affected landowners. The hearing will provide landowners an opportunity to ask questions, raise objections, and provide comments regarding the proposed work.

Prior to the public hearing, we recommend that the Joint Board initiate reclassification proceedings for JDD 4-263 Lateral No. 7. Completing the reclassification process beforehand would help ensure that the assessment schedule more accurately reflects the lands directly benefiting from the facility and would limit the public hearing to the landowners affected by the proposed repairs.

Provided there are no substantial objections at the public hearing, we further recommend that the Joint Board proceed with appointing an engineer to prepare detailed plans, specifications, and construction documents for the proposed repairs.

Should the Board of Trustees or any affected landowners have questions regarding this report or the proposed repairs, please contact AgriVia using the phone numbers or email addresses provided.

Sincerely,



Jacob L. Hagan, P.E.  
712-250-4318  
jacob.agrivia@gmail.com



Tyler J. Buman  
712-579-5296  
tyler.agrivia@gmail.com

Appendix A – Petition Filed

DRAINAGE PETITION AND BOND

MATT PARROTT & SONS CO., WATERLOO, IOWA FORM B5AA P75-717

Iowa Official Form No. 393 Sections 455.9, 455.10, Code

DRAINAGE PETITION

TO THE BOARD OF SUPERVISORS OF Webster COUNTY, IOWA:
The undersigned ask that a drainage ditch cleanup for DD 4-272 Lateral 7 commencing at NW 1/4 corner of Section 25 in Colfax Township

and running thence South thru Section 25 and approx. 1/2 mile into Section 36 before heading West thru rest of Section 36 and all of Section 35

and terminating at the West line of Section 35

be
Your petitioners further state that the lands situated in

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.

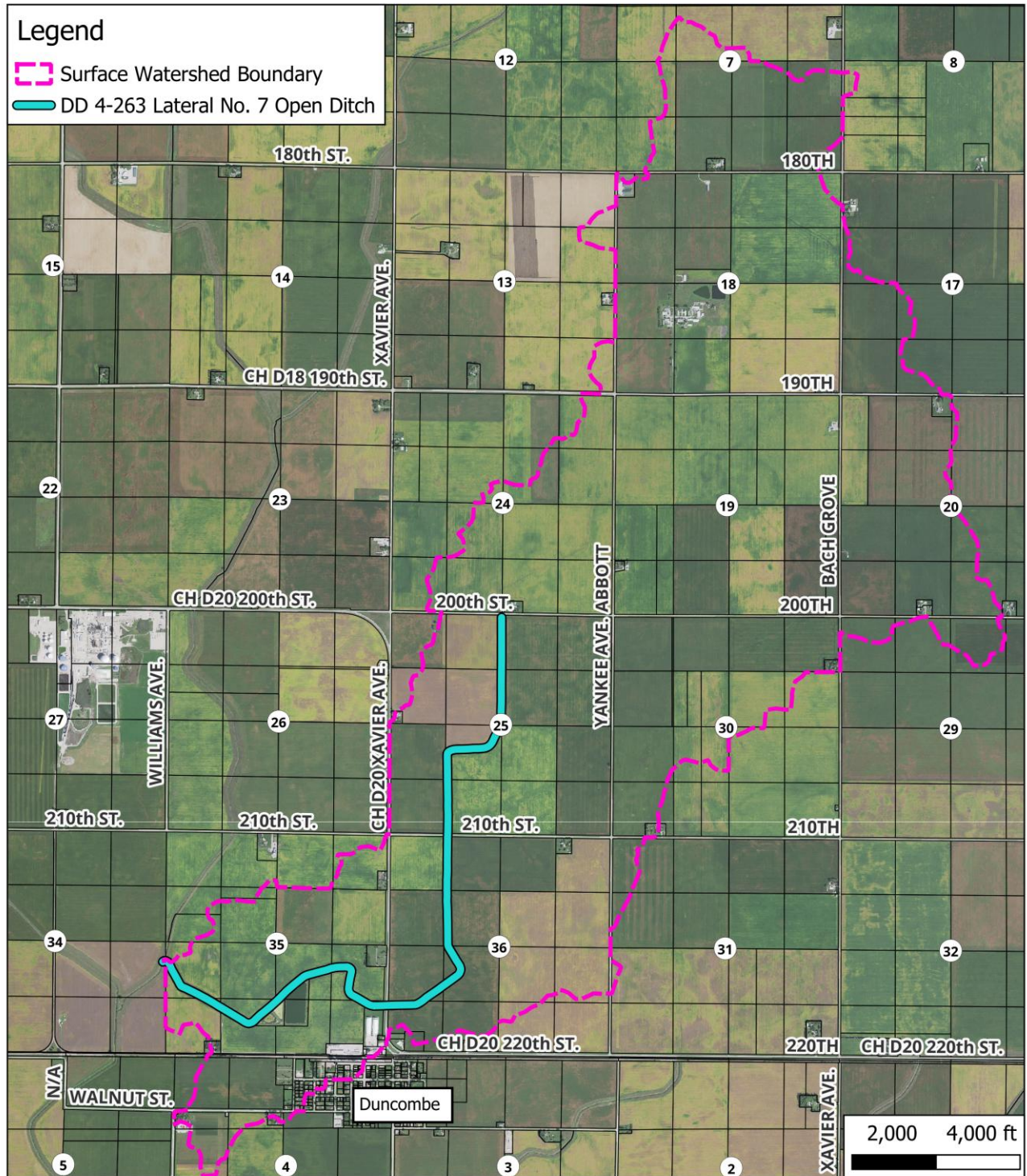
Table with two columns labeled 'NAMES' for listing petitioners. The first column contains handwritten names: Roger D. Snell and VAN Dist Family LLC Robert...

Appendix B – Area of Study Map



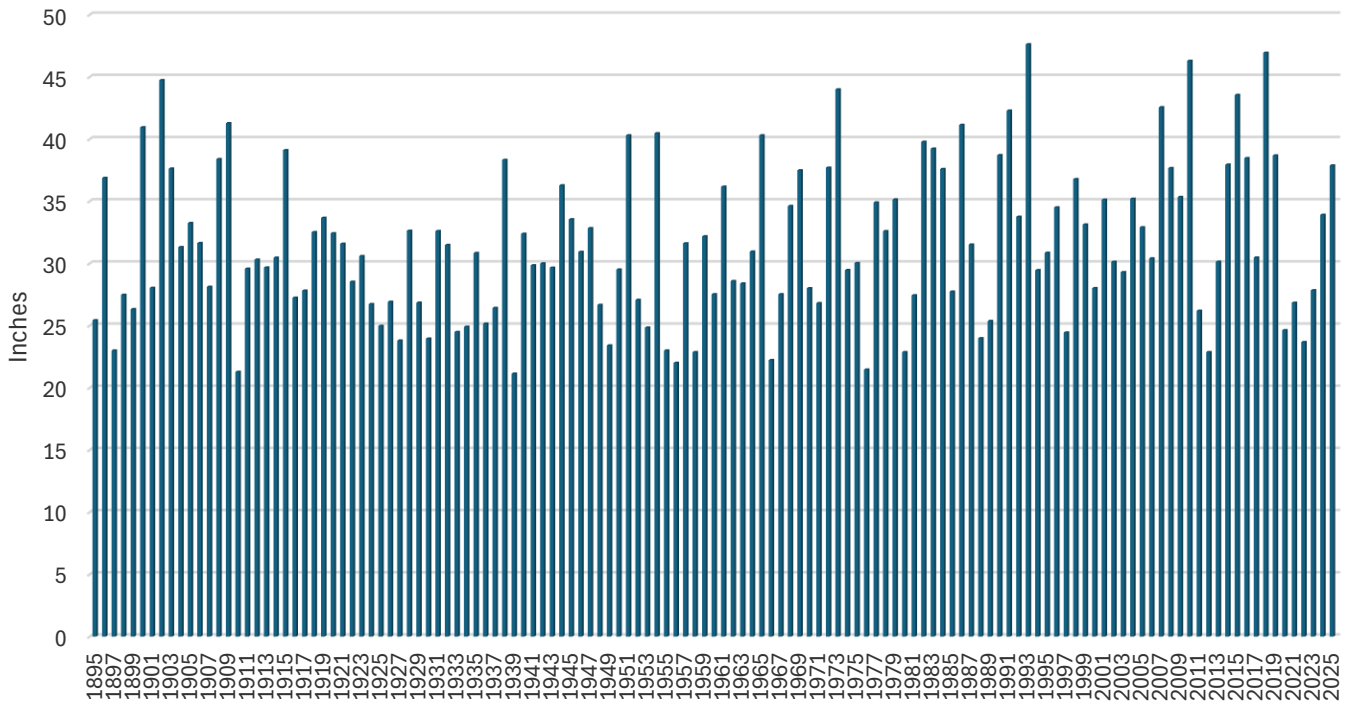
Joint Drainage District No.  
4-263 Lateral 7  
Webster- Hamilton County

Area of Study  
May 2026

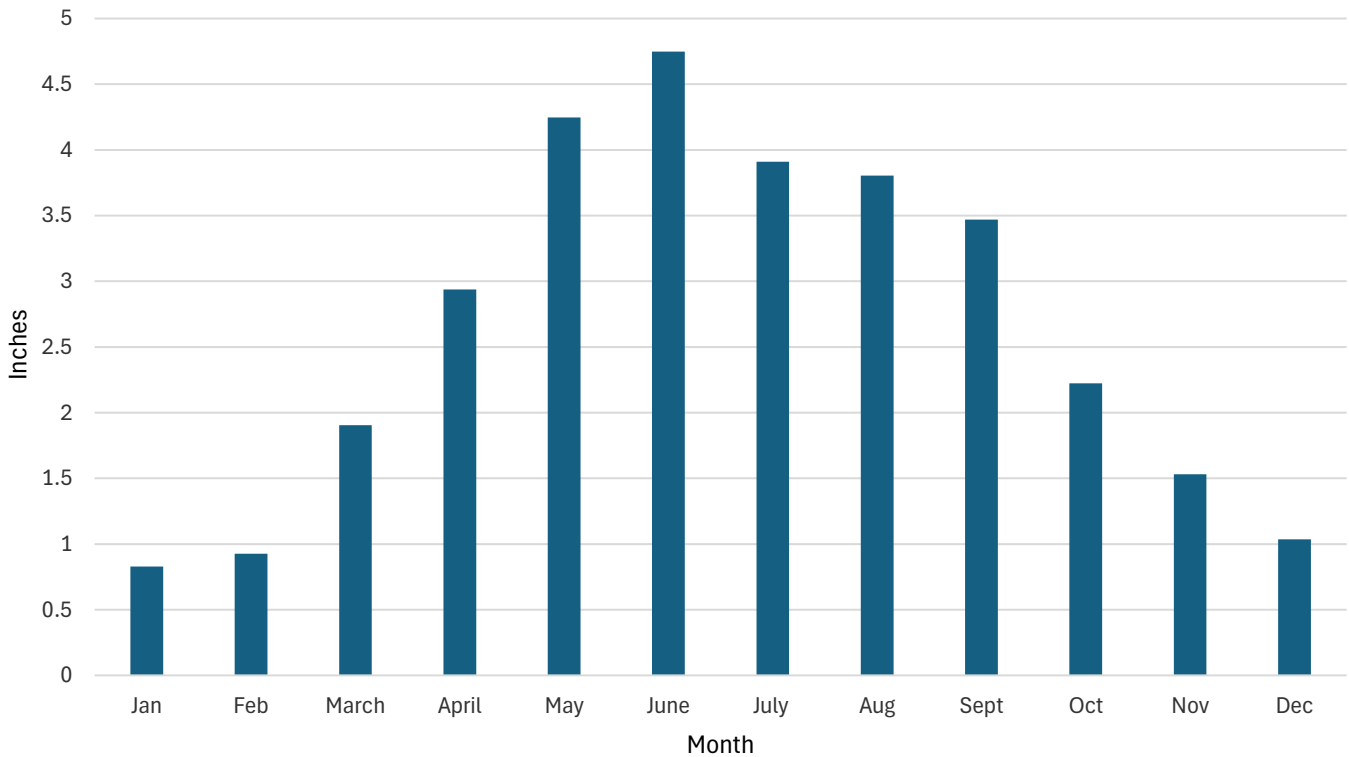


### Appendix C – Rainfall Chart: 1895-Present

Webster County, IA Rainfall 1895-2025



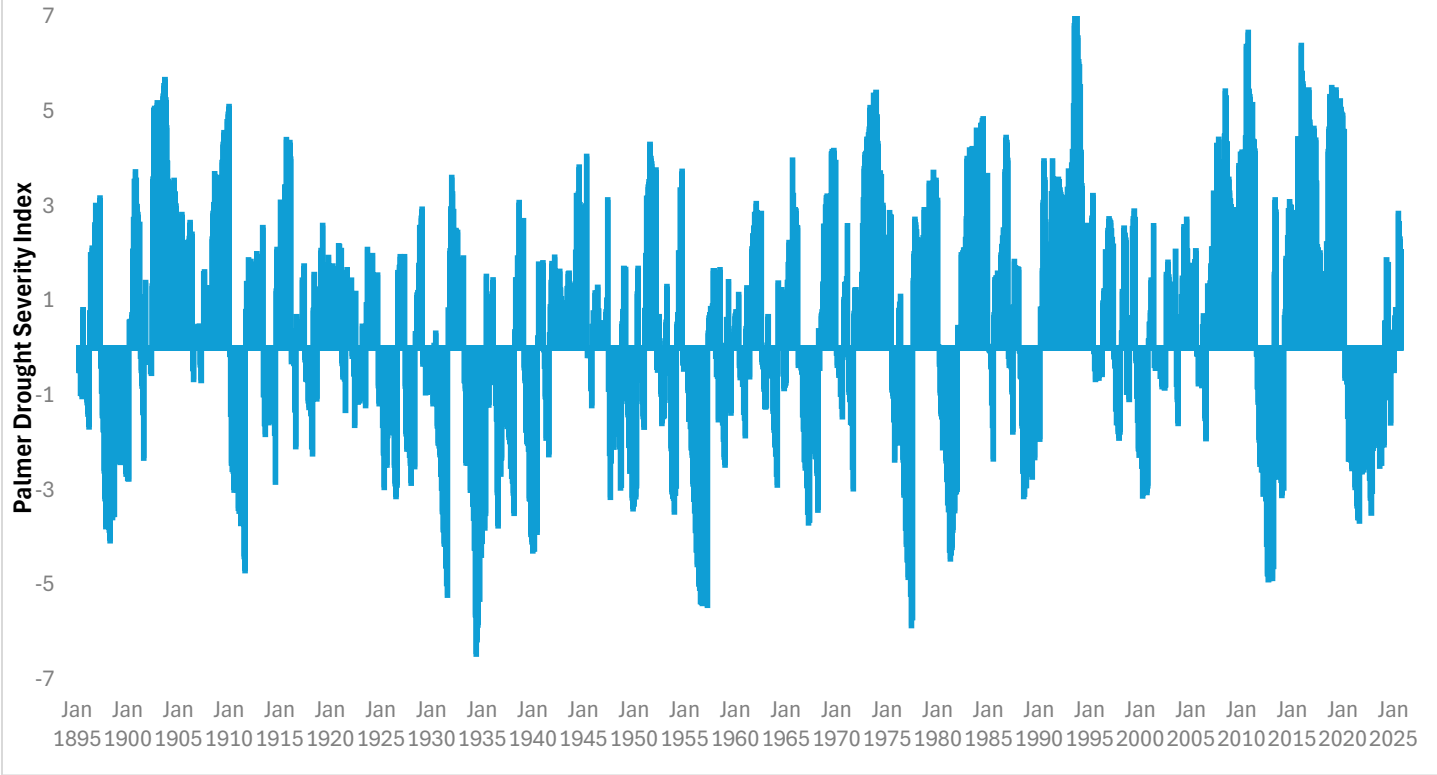
Webster County, IA- Average Precipitation Per Month



<https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/county/time-series/IA-187/pcp/1/0/1895-2026>

**Appendix D – Palmer Drought Severity Index: 1895- Present**

**Webster County, IA Palmer Drought Severity Index (PDSI)**



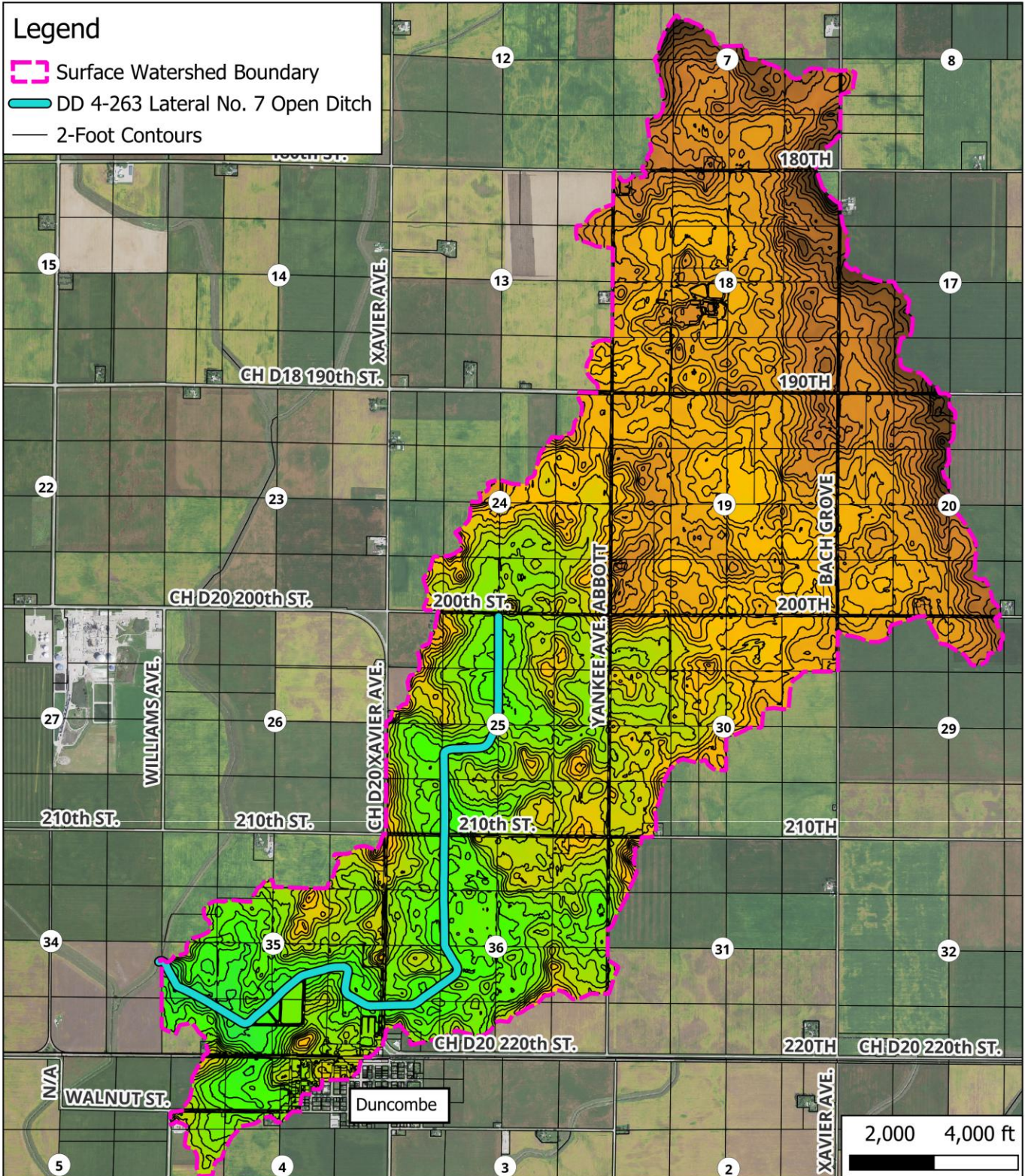
<https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/county/time-series/IA-187/pdsi/1/0/1895-2026>

Appendix E – Elevation Map



Joint Drainage District No.  
4-263 Lateral No. 7  
Webster- Hamilton County

Elevation  
May 2026

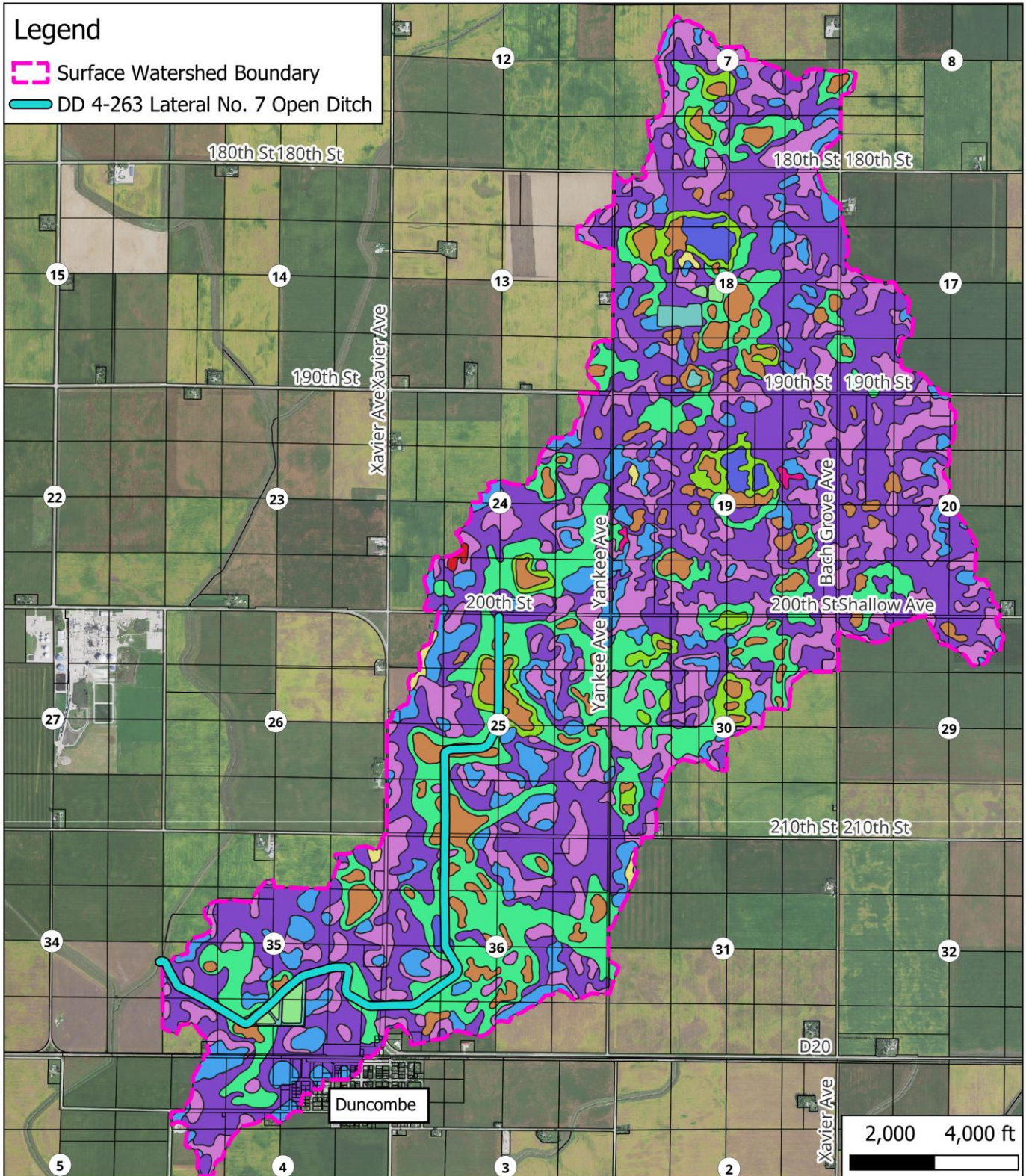


Appendix F – Soil Types



Joint Drainage District No.  
4-263 Lateral No. 7  
Webster- Hamilton County













Soil Types  
May 2026

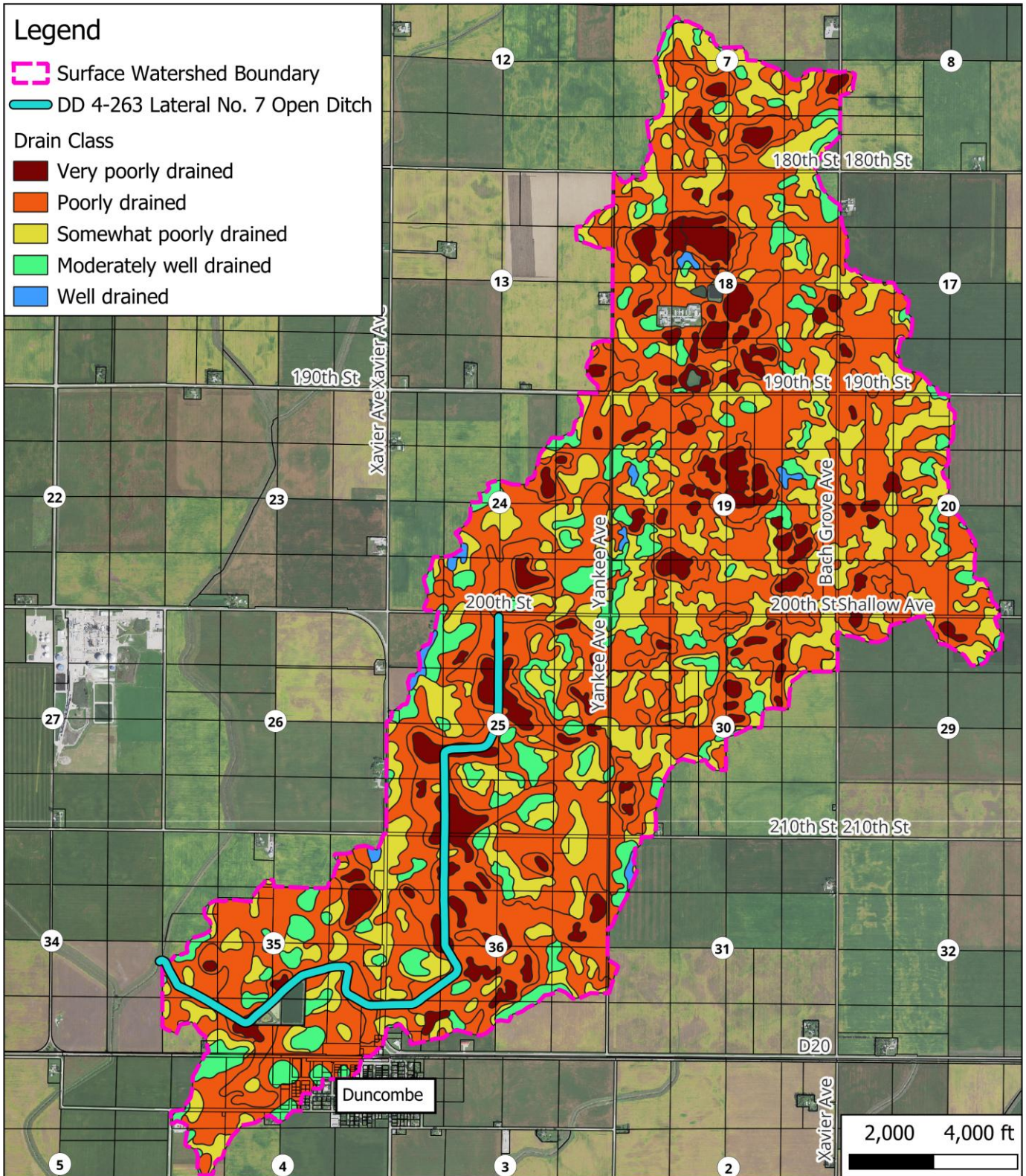


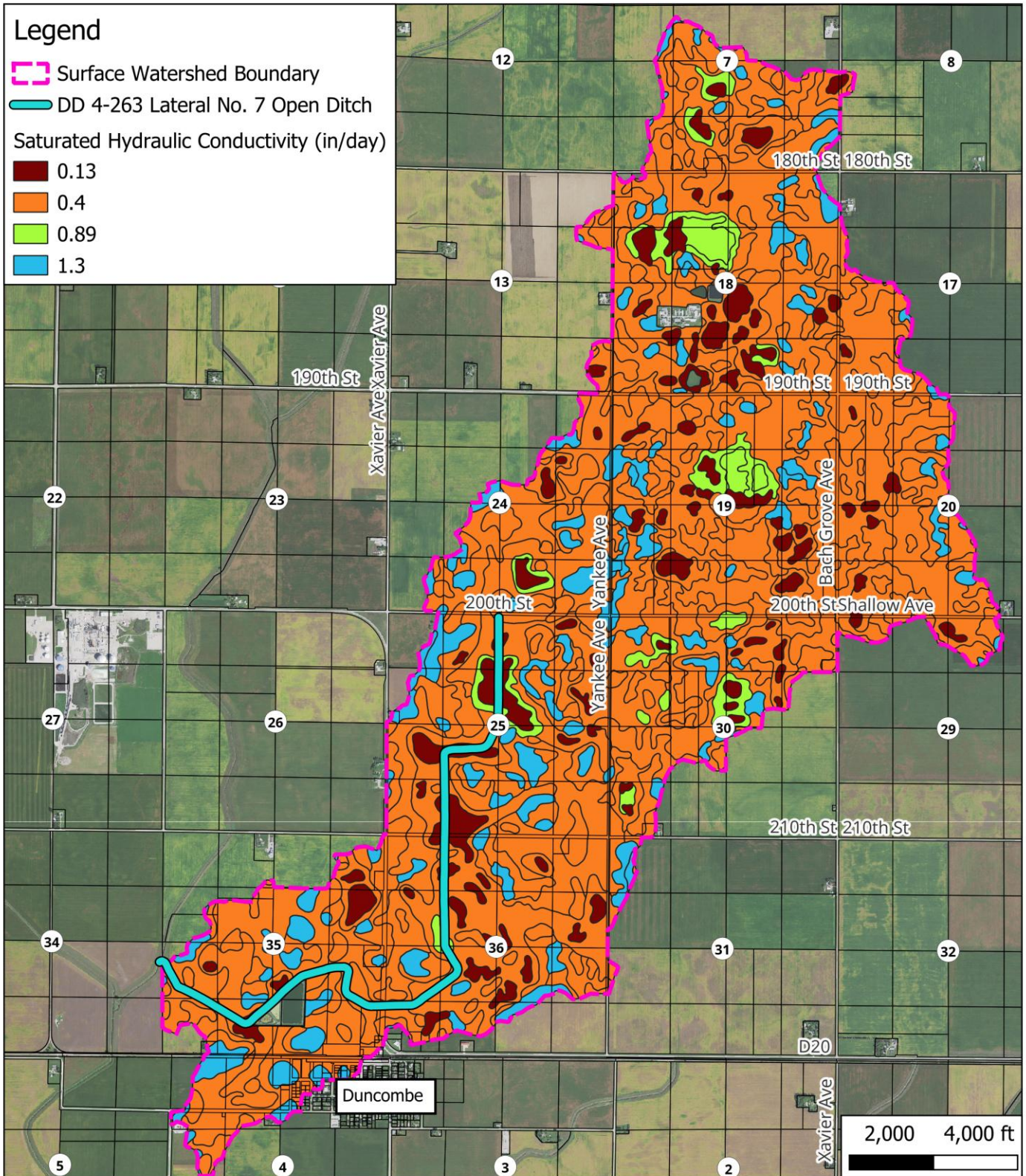


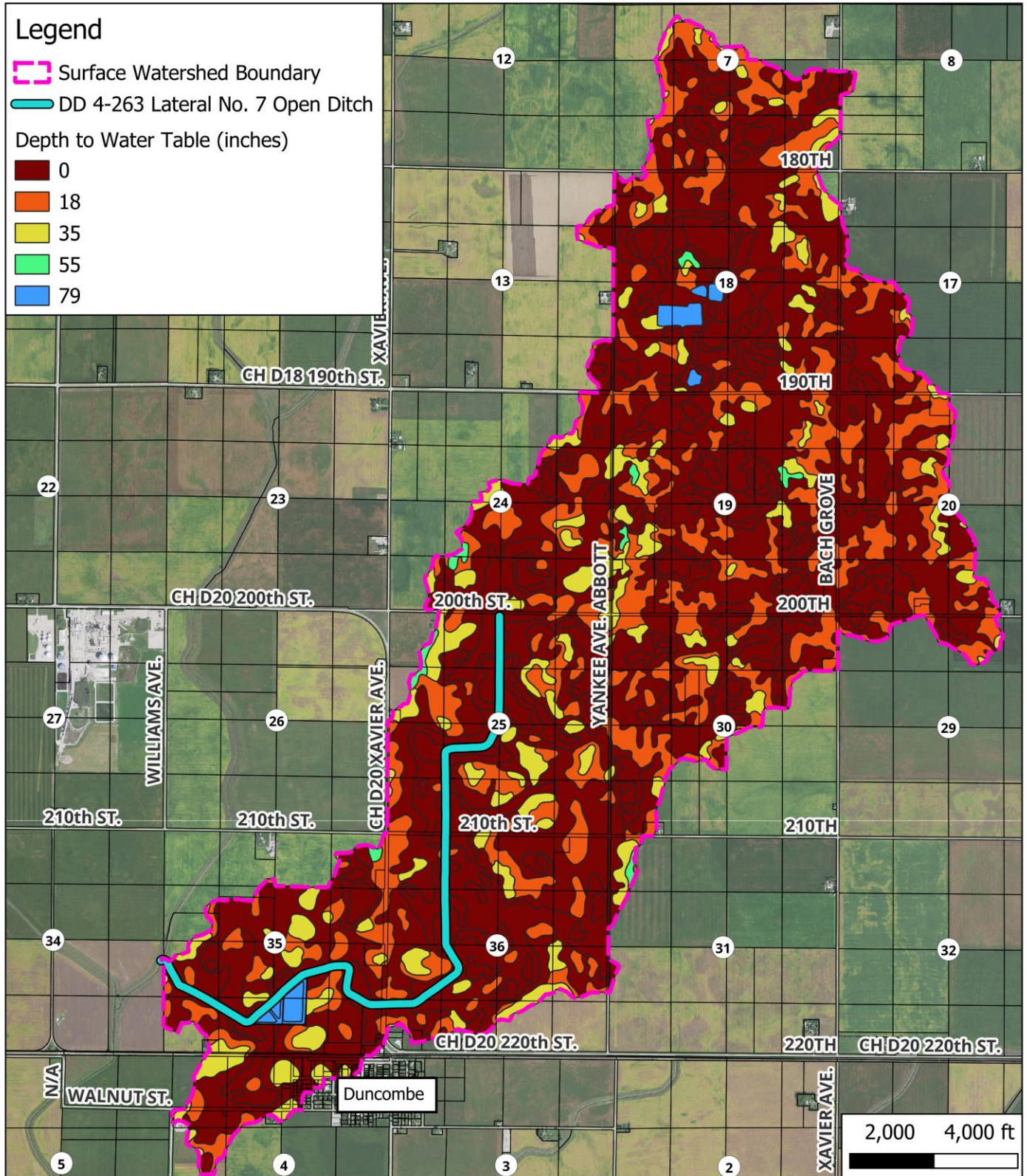
### Legend

#### Soil Types

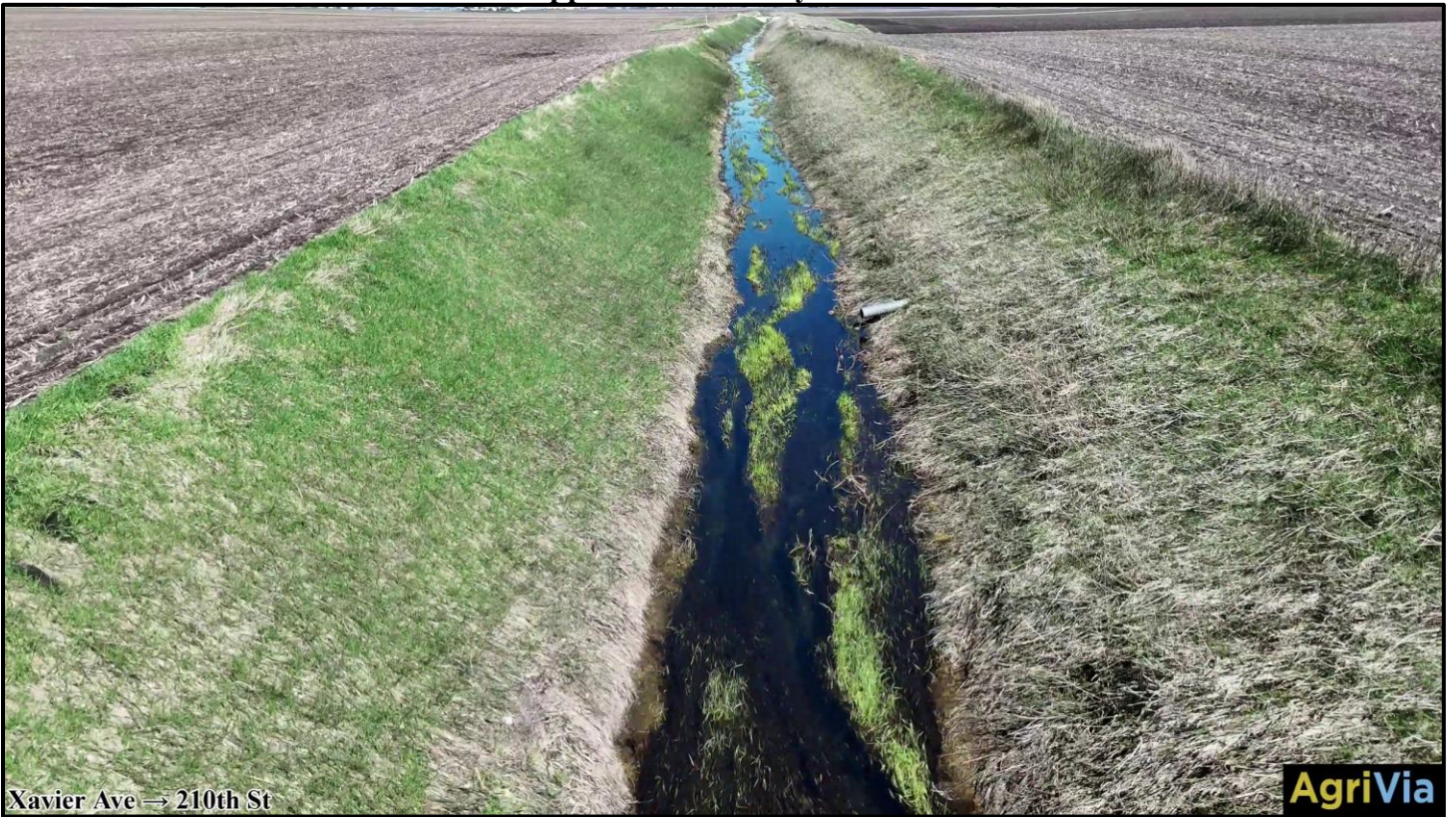
-  Canisteo clay loam, 0 to 2 percent slopes
-  Clarion loam, 2 to 6 percent slopes
-  Clarion loam, 6 to 10 percent slopes
-  Clarion loam, 6 to 10 percent slopes, moderately eroded
-  Clarion-Storden complex, 6 to 10 percent slopes, moderately eroded
-  Harps clay loam, 0 to 2 percent slopes
-  Nicollet clay loam, 1 to 3 percent slopes
-  Okoboji silty clay loam, 0 to 1 percent slopes
-  Orthents, loamy
-  Sewage lagoon
-  Wacousta silty clay loam, 0 to 1 percent slopes
-  Webster clay loam, 0 to 2 percent slopes







Appendix J – Survey Photos



Xavier Ave → 210th St

AgriVia

*Ditch near Sta. 102+00.*



210th St → 200th St

AgriVia

*Ditch near Sta. 143+00.*



210th St → 200th St

**AgriVia**

*Large private tile near Sta. 175+00.*



Outlet into JDD 4-272 Lateral 1 → Xavier Ave

**AgriVia**

*Ditch near Sta. 1+00.*



Date & Time: Tue, Apr 21, 2026 at 08:44:28 CDT  
Position: +042.500540° / -093.981333° (±12.8ft)  
Altitude: 1109ft (±9.8ft)  
Datum: WGS-84  
Azimuth/Bearing: 337° N23W, 5991mils True (±12°)  
Elevation Angle: -16.6°  
Horizon Angle: +01.7°  
Zoom: 0.5X

*Outlet of JDD 87-95 (Hamilton DD 87 / Webster DD 95) near head of ditch.*



Date & Time: Tue, Apr 21, 2026 at 09:20:53 CDT  
Position: +042.495379° / -093.981329° (±28.7ft)  
Altitude: 1099ft (±9.8ft)  
Datum: WGS-84  
Azimuth/Bearing: 324° N36W, 5760mils True (±12°)  
Elevation Angle: -30.3°  
Horizon Angle: +01.1°  
Zoom: 0.5X

*Broken and submerged tile outlets.*

## Appendix K – Itemized Cost Estimate

**Estimated Costs**

**Open Ditch Repairs**

**Joint Drainage District No. 4-263 Lateral No. 7**

**Webster- Hamilton County, IA**



Lateral No. 7 Open Ditch Construction Cost					
Item No.	Bid Item	Est. Units	Unit	Est. Unit Price	Est. Amount
101	EXCAVATION	48,000	CY	\$3.10	\$ 148,800
102	SPOIL LEVELING (BOTH SIDES)	185	STA	\$176.00	\$ 32,560
103	DAILY SEED & FERTILIZE BANKS	185	STA	\$102.00	\$ 18,870
104	HYDROSEEDING	185	STA	\$198.00	\$ 36,630
105	SPOIL TILLAGE AND ROCK PICK UP	185	STA	\$46.00	\$ 8,510
106	SPOIL TEMPORARY SEEDING	185	STA	\$110.00	\$ 20,350
107	TILE OUTLET, 8"	700	LF	\$27.00	\$ 18,900
108	TILE OUTLET, 12"	580	LF	\$33.00	\$ 19,140
109	TILE OUTLET, 15"	240	LF	\$40.00	\$ 9,600
110	TILE OUTLET, 18"	100	LF	\$45.00	\$ 4,500
111	TILE OUTLET, 24"	80	LF	\$58.00	\$ 4,640
112	TILE OUTLET, 30"	20	LF	\$75.00	\$ 1,500
113	TILE OUTLET, 36"	40	LF	\$89.00	\$ 3,560
114	TILE OUTLET, 48"	20	LF	\$140.00	\$ 2,800
115	SURFACE DRAIN, 18"	1530	LF	\$45.00	\$ 68,850
116	SURFACE DRAIN, 24"	130	LF	\$58.00	\$ 7,540
117	CLEARING AND GRUBBING	1	LS	\$500.00	\$ 500
118	LOWER 96" CMP CULVERT	1	EA	\$2,000.00	\$ 2,000
119	RIPRAP, CLASS E	50	TN	\$77.00	\$ 3,850
120	SEDIMENT BAFFLE	1	LS	\$1,430.00	\$ 1,430
121	MOBILIZATION	1	LS	\$23,500.00	\$ 23,500
5% Construction Contingency					\$ 23,500
10% Extra Pipe Contingency					\$ 14,100
<b>Subtotal Construction Cost</b>					<b>\$ 476,000.00</b>

Additional Non-Construction Project Costs	
Expense	Est. Amount
Survey, Permitting, Engineer's Report, and Preliminary Plans	\$ 35,000
Specifications and Construction Engineering	\$ 35,000
Annexation and Reclassification	\$ 10,000
Legal and Administrative	\$ 5,000
Construction Damages	\$ 16,000
Interest	\$ 45,000
<b>Subtotal Non-Construction Cost</b>	
<b>\$ 146,000.00</b>	

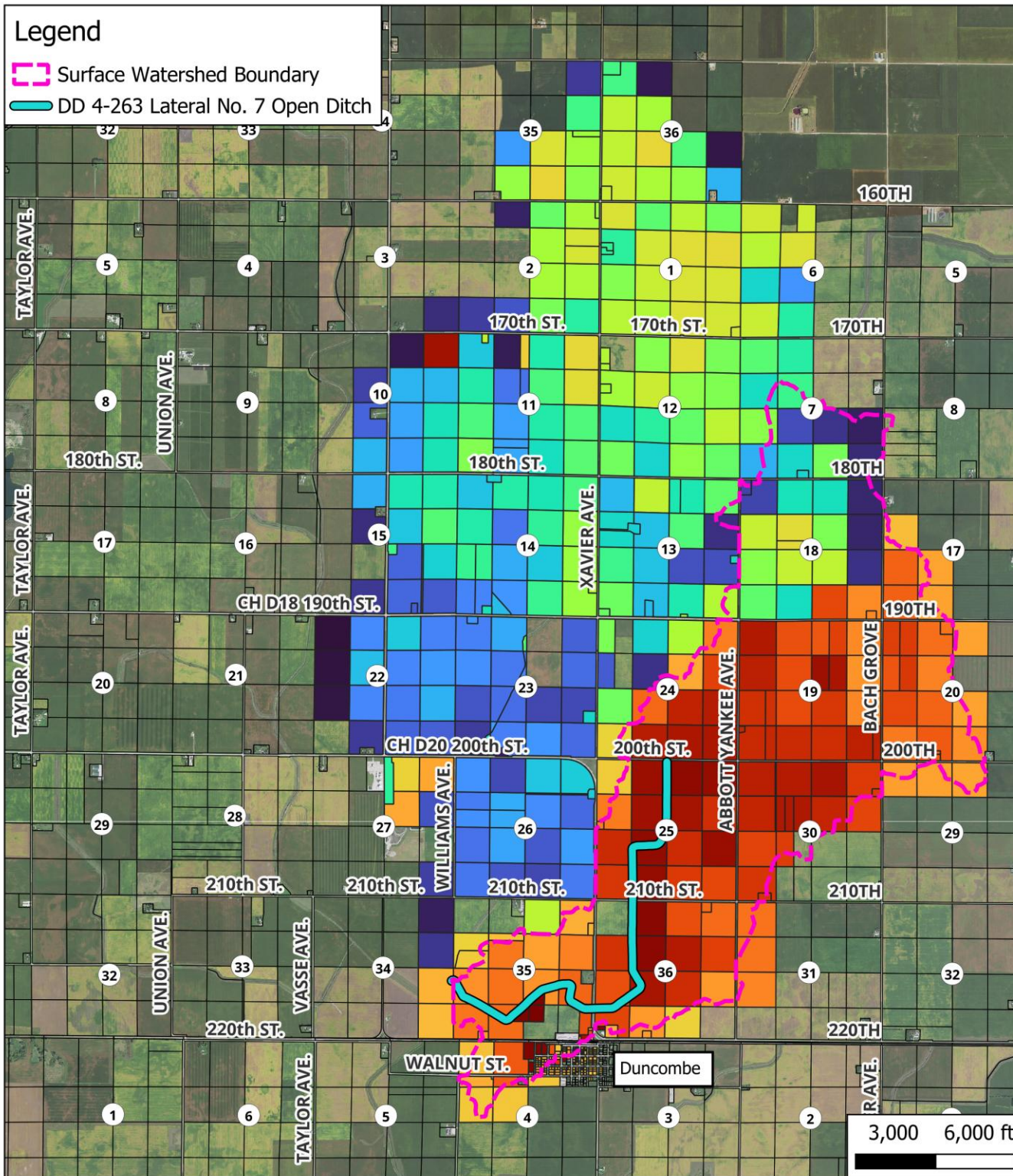
Total Project Costs	
Expense	Est. Amount
Lateral No. 7 Open Ditch Repairs Construction	\$ 476,000
Additional Non-Construction Project Costs	\$ 146,000
<b>Total Repairs Cost to Joint Drainage District No. 4-263 Lateral No. 7</b>	
<b>\$ 622,000</b>	
<b>Average Cost per Acre Benefitted (4606 Acres)</b>	
<b>\$ 135</b>	

Appendix L – Current Assessment Schedule Map



Joint Drainage District No.  
**4-263 Lateral 7**  
 Webster- Hamilton County

Current Assessment  
**Schedule**  
 May 2026



## Appendix M – Twenty Benefits of Drainage (Ohio State Extension)



SOIL AND WATER NO. 31

JULY 1982

### TWENTY BENEFITS OF DRAINAGE

Many of the best soils in the United States and throughout the world have drainage problems that need to be solved before efficient agricultural production can be achieved. This discussion of drainage benefits is based on an earlier paper by the author entitled "Ten Benefits of Drainage" and several reports from other agricultural engineers in the United States, Canada, and England. Some of these drainage benefits are difficult to measure precisely, and many are interrelated, but their combined effect has been observed in numerous drainage studies.

1. Better soil aeration results from good drainage (surface water and free water in the root zone removed within 24 hours after heavy rainfall). This permits more extensive root development and a more favorable environment for beneficial soil microorganisms and earthworms. When soil aeration is reduced, the severity of soil-borne root diseases is increased.
2. Better soil moisture conditions with good drainage permit more efficient operation of tillage, planting, and harvesting equipment.
3. Better soil structure can be developed and maintained with good drainage, since there is less chance of destroying soil tilth due to compaction when working soil that is too wet.
4. Soils warm up more quickly in the spring when free water is removed by a drainage system. This results in better seed germination and an increased rate of plant growth.
5. An increased supply of nitrogen can be obtained from the soil when drainage lowers the water table in the root zone. Denitrification often occurs in soils with poor drainage.
6. Longer growing seasons can be achieved with good drainage due to earlier possible planting dates. This also permits the use of higher-yielding crop varieties or extended grazing periods for livestock.
7. Certain toxic substances and disease organisms are removed from the soil due to better drainage and soil aeration. In wet soil, roots can be injured by toxic substances produced in the reduction of iron and manganese salts and the reduction of nitrates to nitrites.
8. Winds are less liable to uproot plants growing in soils that have been properly drained, since root systems are deeper.
9. Soil erosion and sediment loss can be reduced by subsurface drainage, since drained soils have a greater capacity to absorb rainfall and the soil filters out suspended sediment.
10. Good drainage saves fuel that would be used in working around wet areas in fields

(over)

College of Agriculture and Home Economics of The Ohio State University and The United States Department of Agriculture Cooperating

that are not properly drained. Also, since drained land is easier to work, there is less need for dual wheels or four-wheel drive tractors.

11. Good drainage reduces winter crop damage such as frost heaving of alfalfa and smothering of wheat under patches of ice.
12. Good drainage promotes earlier crop maturity and earlier fall harvests when climatic conditions are better for natural drying of grain in the field, thereby saving artificial drying costs.
13. A greater variety of crops can be grown on a farm that has good drainage. Alfalfa and sweet corn are examples of those that a farmer may choose.
14. Weed control is easier with good drainage since shallow-rooted weeds and undesirable grasses often thrive in wet soil, crowding out the planted crop.
15. Well-drained grazing land supports more livestock, with less compaction damage to vegetation and soil from animal traffic.
16. Good drainage reduces diseases that thrive on wet land. These include foot rot and liver fluke that infect livestock, and diseases carried by mosquitoes to both livestock and people.
17. Valuable livestock water supplies can be obtained by draining hillside seeps and piping the water to stock water tanks.
18. Plants are better able to withstand summer droughts with good drainage, since lower water tables in the spring permit deeper root development for extraction of soil moisture and nutrients.
19. Drainage is essential for salinity control in drier regions where irrigation is needed for permanent agricultural production.
20. Overall, good drainage results in higher crop yields, improved crop quality, and reduced risk of crop loss due to waterlogged soil. Also, fewer acres are required to produce our needed food supplies.

Several years of drainage research in Ohio has compared corn and soybean yields from undrained, surface drained only, tile drained only, and combined tile plus surface drained plots. Annual benefit/cost ratios were also calculated for these alternative drainage systems. It was shown that the average annual return per \$100 invested in drainage ranged from \$120 to \$210 for soybeans, and from \$170 to \$220 for corn. Further details on this research are reported in Soil and Water No. 23 (DRAINAGE--What is it Worth on CORN Land?" and Soil and Water No. 24 (DRAINAGE--What is it Worth for SOYBEAN Land?"). These leaflets are available from Extension Agricultural Engineers, 2073 Neil Avenue, Columbus, OH 43210.

Actual returns on a drainage investment for a particular farm will vary with factors such as soil type, weather conditions, cost of the drainage system, crops grown, and management. Drainage improvements may involve surface drainage, subsurface drainage, outlet ditches, or a combination of practices. Changes in soil and crop management techniques may also be desirable to improve soil structure and water movement in the soil. Almost 60 percent of Ohio's cropland and 25 percent of all U. S. cropland is in need of drainage.

*Melville L. Palmer*

Melville L. Palmer  
Extension Agricultural Engineer

All educational programs and activities conducted by the Ohio Cooperative Extension Service are available to all potential clientele on a non-discriminatory basis without regard to race, color, national origin, sex, handicap or religious affiliation.

## Appendix N – Nutrient Reduction Strategy Example

Nutrient Reduction Calculator						
Practice	Nitrogen Reduction	Phosphorus Reduction	Acres	Avg. Annual Cost (\$/Acre)	Total Annual Cost (\$)	Practice Type
Wetlands	52%	0%	1261	\$15.00	\$ 18,915.00	Edge-of-Field
Bioreactors	43%	0%	1843	\$10.00	\$ 18,430.00	Edge-of-Field
Saturated Buffers	91%	58%	0	\$231.00	\$ -	Edge-of-Field
Drainage Water Mgt.	33%	0%	0	\$10.00	\$ -	Edge-of-Field
Terraces	0	77%	0		\$ -	Edge-of-Field
Sediment Control	0	85%	0		\$ -	Edge-of-Field
Reduce N Rate to MRTN	10%	0%	1843	-\$2.00	\$ (3,686.00)	In-Field
Nitrification Inhibitor	9%	0%	921	-\$3.00	\$ (2,763.00)	In-Field
Move Fall N to Spring	6%	0%	1843	-\$20.00	\$ (36,860.00)	In-Field
Sidedress N Application	7%	0%	1843	\$0.00	\$ -	In-Field
Cover Crops	31%	29%	381	\$49.00	\$ 18,669.00	In-Field
No-Till	0%	90%	1843	\$12.00	\$ 22,116.00	In-Field
Conservation Tillage	0%	33%	921	-\$1.00	\$ (921.00)	In-Field
Extended Rotations	42%	0%	0	\$30.00	\$ -	Land Use
Land Retirement (ORP)	85%	75%	0	\$192.00	\$ -	Land Use
<b>This Example Reduction</b>					<b>\$ 33,900.00</b>	
<b>Nitrogen Reduction</b>					<b>45%</b>	
<b>Phosphorus Reduction</b>					<b>45%</b>	

Spreadsheet Created by: AgriVia  
 "This spreadsheet is for illustrative purposes only. All acreage figures are examples and not intended to reflect actual values."

## Appendix O – Landowner Engagement Letter



PO Box 44  
1124 Willis Ave  
Perry, IA 50220

January 6, 2026

Dear Landowners of Webster-Hamilton Joint Drainage District No. 4-263 Lateral 7,

This letter is to inform you that a petition has been filed requesting a study for repairs to the Lateral 7 Open Ditch in JDD 4-263.

In response, the Webster County Board of Supervisors has appointed Jacob Hagan, P.E. and Tyler Buman of AgriVia to investigate and prepare an engineer's report concerning the requested work.

As part of our preliminary investigation, we are gathering information about the existing open ditch and associated crossings. If you have any records, tile maps, or other documentation related to the drainage along the ditch, we would appreciate receiving a copy. Likewise, if you have any observations or concerns about the ditch or other drainage facilities, please reach out to us directly.

We will be conducting survey work along the open ditch as weather permits this winter or spring. This work will include field measurements, mapping, and documentation of existing conditions such as culverts, intakes, and outlet features. We will also be operating a drone to capture aerial imagery of the ditch to assist with our study. All survey work will be performed with care to minimize disturbance.

This letter is being sent only to landowners who own property adjacent to the open ditch. Please forward it to any tenants, neighbors, or other interested parties. Your cooperation and local knowledge are important in helping us complete an accurate assessment of the system's condition. A map is attached for reference.

Sincerely,

A handwritten signature in black ink that reads "Jacob Hagan".

Jacob Hagan, P.E.  
712-250-4318  
jacob.agrivia@gmail.com

A handwritten signature in black ink that reads "Tyler Buman".

Tyler Buman  
712-579-5296  
tyler.agrivia@gmail.com

AgriVia PLLC

## Appendix P – Existing Right-of-Way

Existing Right-of-Way  
Open Ditch Repairs  
Drainage District No. 4-272 Lateral No. 7  
Webster- Hamilton County, IA



Lateral No. 7 Open Ditch Right-of-Way			
Deedholder	S-T-R	Legal	Acres
DUNCOMBE CITY OF	35-89-27	WC DUNCOMBE INC SE/SW & SW/SE IRR TR S OF DD	0.2
VAN DIEST FAMILY LLC	35-89-27	WC DUNCOMBE INC AG LANDS INSIDE NE SE EX E 511.5' N 511.5'	3.2
VAN DIEST FAMILY LLC	35-89-27	WC DUNCOMBE AG LANDS LANDS INSIDE NW SE	3.4
VAN DIEST FAMILY LLC	35-89-27	WC DUNCOMBE INC AG LANDS INSIDE NE SW	0
MOENCK FARMS LLC	35-89-27	WC DUNCOMBE INC AG LANDS INSIDE NW SW	3.1
VAN DIEST FAMILY LLC	34-89-27	WC COLFAX TWP NE SE	0.1
VAN DIEST FAMILY LLC	35-85-27	WC DUNCOMBE INC AG LANDS INSIDE SW SE TR NW COR & EX S 265.07' E 86'	0.2
VAN DIEST FAMILY LLC	35-89-27	WC DUNCOMBE INC AG LANDS INSIDE SE SW EX TR	3.5
DUNCOMBE CITY OF		WC DUNCOMBE INC AG LANDS INSIDE NW SE TR SW PT	0
NEW COOPERATIVE INC	35-89-27	WC DUNCOMBE INC AG LANDS INSIDE NORTHEAST DUNCOMBE E 450' S 1016' LOT 1	0.1
MOENCK FARMS LLC	35-89-27	WC DUNCOMBE AG LANDS LANDS INSIDE SW SW (EX E 387' S 320')	1
VAN DIEST FAMILY LLC	35-89-27	WC DUNCOMBE AG LANDS INSIDE NORTHEAST DUNCOMBE LOT 1 EX E 450' S 1016' & EX S 117.55'	1.1
RADAR ENTERPRISES LLC	25-89-27	FD COLFAX TWP NW NE	1.1
HANSON MARILYN K 5/8 LF EST 3/8	25-89-27	FD COLFAX TWP NE NW	1.8
RADAR ENTERPRISES LLC	25-89-27	FD COLFAX TWP SW NE	1.1
VAN DIEST FAMILY LLC	25-89-27	FD COLFAX TWP SE SW	2.9
RADAR ENTERPRISES LLC	25-89-27	FD COLFAX TWP SW SW	0
VAN DIEST FAMILY LLC	25-89-27	FD COLFAX TWP SE NW	1.9
VAN DIEST FAMILY LLC	25-89-27	FD COLFAX TWP NW SE	0
VAN DIEST FAMILY LLC	25-89-27	FD COLFAX TWP NE SW SOUTH OF DD	2.6
VAN DIEST FAMILY LLC	25-89-27	FD COLFAX TWP NE SW NORTH OF DD	2.5
RADAR ENTERPRISES LLC	25-89-27	FD COLFAX TWP NW SW	0
	36-89-27	FD COLFAX TWP NW NW	0
VAN DIEST FAMILY LLC	36-89-27	WC COLFAX TWP NE SW	2.8
VAN DIEST FAMILY LLC	36-89-27	WC COLFAX TWP NW SW	1.4
VAN DIEST FAMILY LLC	36-89-27	WC COLFAX TWP SW SW EX TRACTS	1.9
VAN DIEST FAMILY LLC	36-89-27	FD COLFAX TWP NE NW EX 1 ACRE WEST OF DD	1.5
VAN DIEST FAMILY LLC	36-89-27	FD COLFAX TWP NE NW W OF DD	1.5
MOELLER GARY M	36-89-27	WC COLFAX TWP SE NW	3
MOELLER GARY M	36-89-27	WC COLFAX TWP SW NW	0
<b>Total Acres</b>			<b>41.9</b>

## Appendix Q – Private Farm Crossings



Outlet into JDD 4-272 Lateral 1 → Xavier Ave

*Culvert near Sta. 18+30 to be lowered as part of project.*



Xavier Ave → 210th St

*No work is proposed on the bridge.*

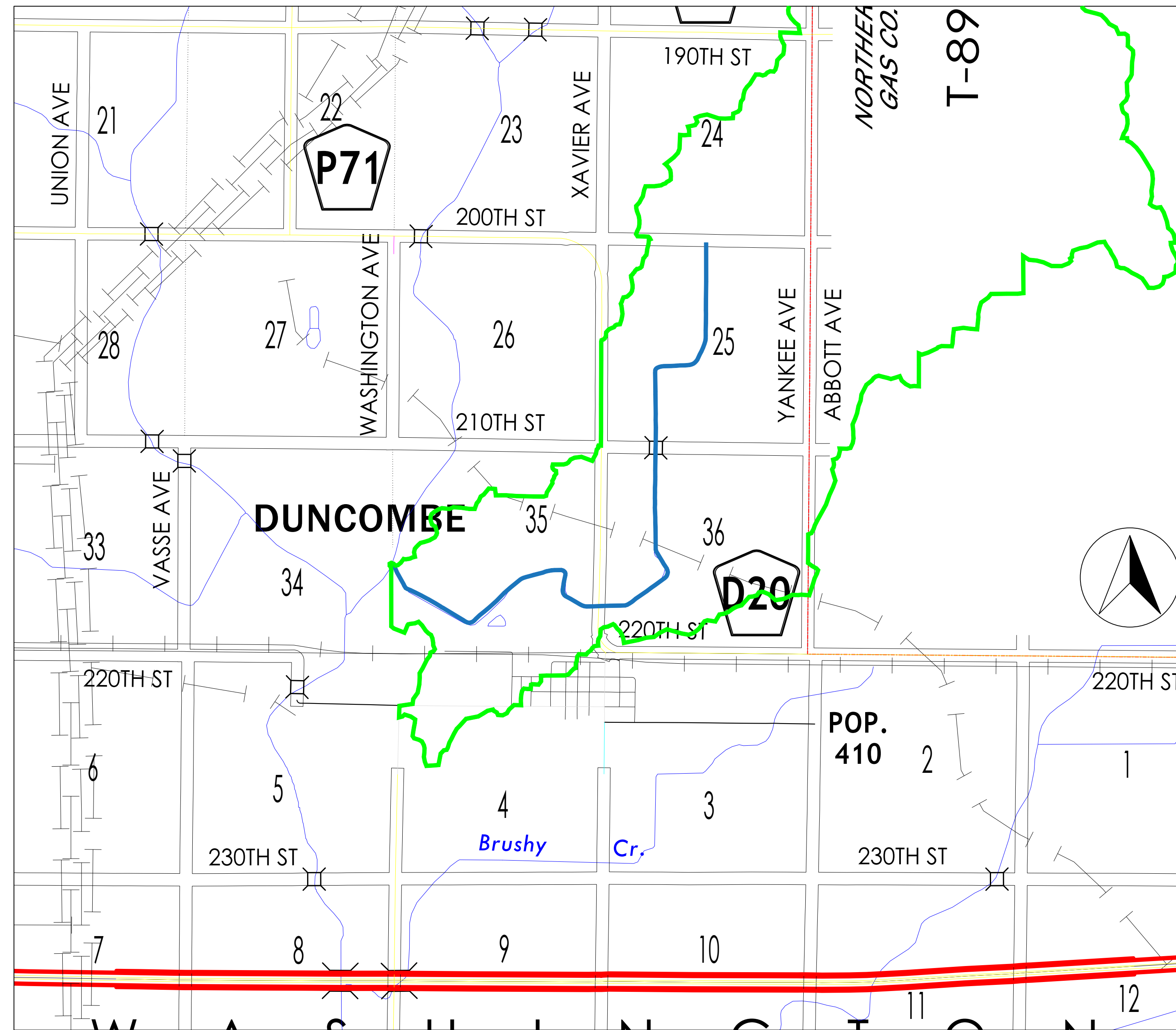
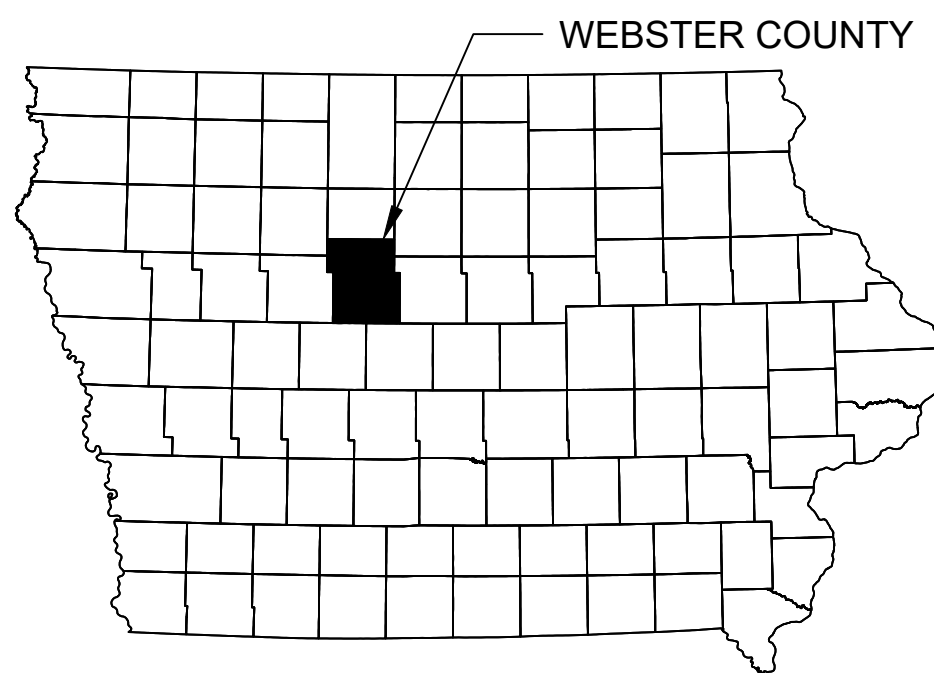
# PROPOSED PLANS FOR JOINT DRAINAGE DISTRICT NO. 4-263 LATERAL NO. 7 OPEN DITCH REPAIRS WEBSTER COUNTY, IA 2026



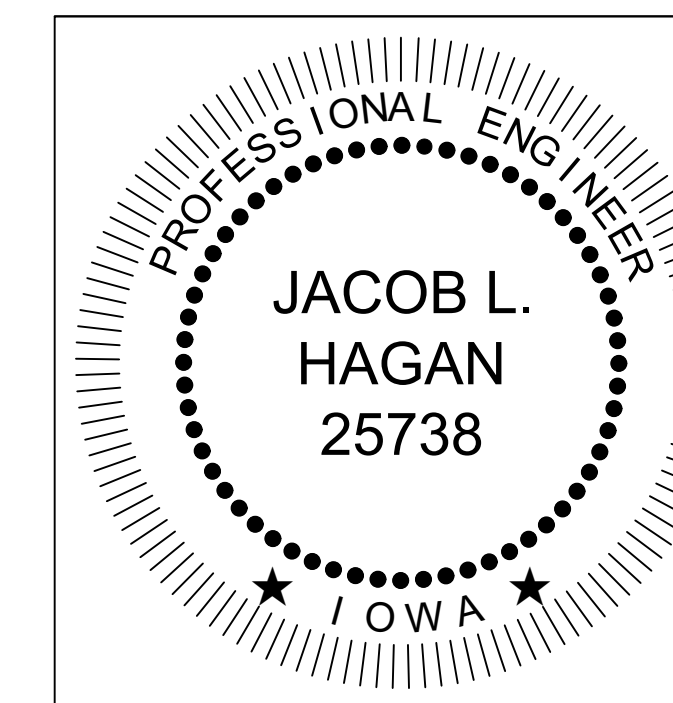
The contractor shall field verify exact locations prior to commencing construction as required by state law. Notify Iowa One Call, 811 or 1-800-292-8989.

**Specifications**  
Unless otherwise noted, the governing standards for this project shall be the 2026 edition of the Iowa Statewide Urban Design and Specifications (SUDAS) for Public Improvements, supplemented where referenced by the Iowa Department of Transportation's Standard Specifications for Highway and Bridge Construction, Series 2023, along with all active general supplemental specifications, materials, instructional memoranda, and relevant special provisions.

Where conflicts arise, the stricter requirement shall take precedence. Complete compliance with all applicable federal, state, and local laws, ordinances, and regulations is mandatory throughout the project's execution.



Sheet List	
Number	Title
A.01	Title Sheet
A.02	District Plat
B.01	General & Pipe Details
B.02	Excavation Details
C.01	Pipe Table
C.02	Volume Table
D.01	Plan & Profile - Lat. 7 Open Ditch STA 0+00 → 20+00
D.02	Plan & Profile - Lat. 7 Open Ditch STA 20+00 → 40+00
D.03	Plan & Profile - Lat. 7 Open Ditch STA 40+00 → 60+00
D.04	Plan & Profile - Lat. 7 Open Ditch STA 60+00 → 80+00
D.05	Plan & Profile - Lat. 7 Open Ditch STA 80+00 → 100+00
D.06	Plan & Profile - Lat. 7 Open Ditch STA 100+00 → 120+00
D.07	Plan & Profile - Lat. 7 Open Ditch STA 120+00 → 140+00
D.08	Plan & Profile - Lat. 7 Open Ditch STA 140+00 → 160+00
D.09	Plan & Profile - Lat. 7 Open Ditch STA 160+00 → 180+00
D.10	Plan & Profile - Lat. 7 Open Ditch STA 180+00 → 185+31



I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

Jacob L. Hagan, P.E. \_\_\_\_\_ (date)  
License No. 25738  
My license renewal date is December 31, 2026.  
Pages or sheets covered by this seal:

All



Company Information  
**AgriVia PLLC**  
PO Box 44  
1124 Willis Ave  
Perry, IA 50220

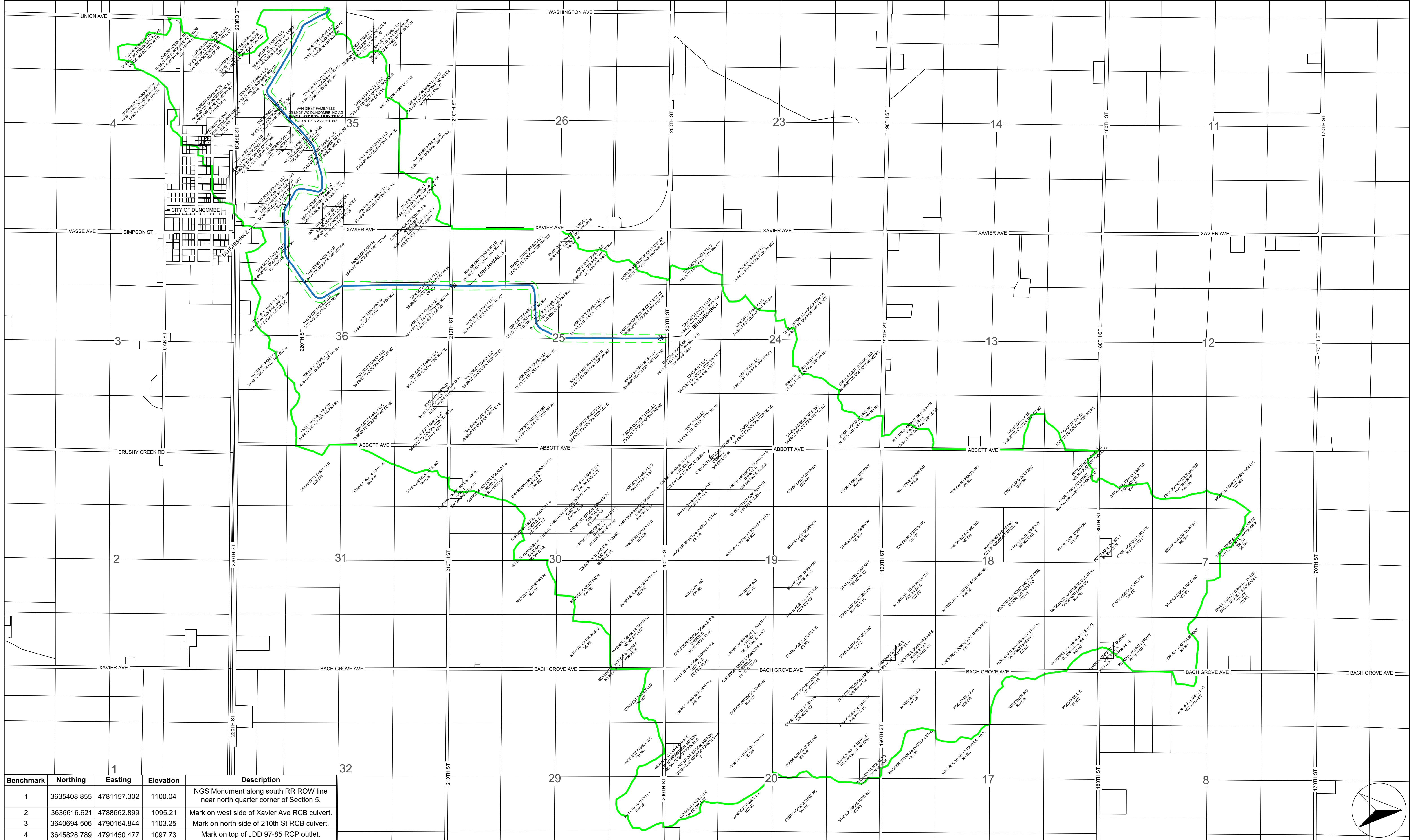
Designer  
**JLH**  
Drafter  
**TJB**  
Checker  
**JLH**

No.	Revision/Issue	Date

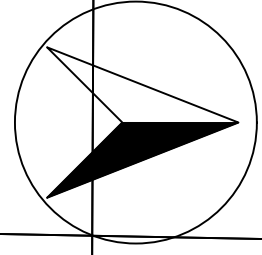
Sheet Name	
Title Sheet	

Project Name, Client, and Address  
**Open Ditch Repairs**  
Joint Drainage District No. 4-263 Lat. 7  
Webster County, IA  
Xavier Ave & 210th St, Duncombe, IA 50532

Project	Sheet
2602-94	A.01
Date 2026-05-20	
Plan Scale 1" = 4000'	



Benchmark	Northing	Eastng	Elevation	Description
1	3635408.855	4781157.302	1100.04	NGS Monument along south RR ROW line near north quarter corner of Section 5.
2	3636616.621	4788662.899	1095.21	Mark on west side of Xavier Ave RCB culvert.
3	3640694.506	4790164.844	1103.25	Mark on north side of 210th St RCB culvert.
4	3645828.789	4791450.477	1097.73	Mark on top of JDD 97-85 RCP outlet.



Company Information  
**AgriVia PLLC**  
 PO Box 44  
 1124 Willis Ave  
 Perry, IA 50220

Designer  
**JLH**  
 Drafter  
**TJB**  
 Checker  
**JLH**

**PLAN LEGEND**

Open Ditch Facilities	
Benefitted Area	
Parcel Lines	
Work Area	

No.	Revision/Issue	Date

Sheet Name  
**District Plat**

Project Name, Client, and Address  
**Open Ditch Repairs**  
**Joint Drainage District No. 4-263 Lat. 7**  
**Webster County, IA**  
**Xavier Ave & 210th St, Duncombe, IA 50532**

Project <b>2602-94</b>	Sheet
Date <b>2026-05-20</b>	<b>A.02</b>
Plan Scale <b>1" = 2100'</b>	

### GENERAL PROVISIONS & PRE-CONSTRUCTION

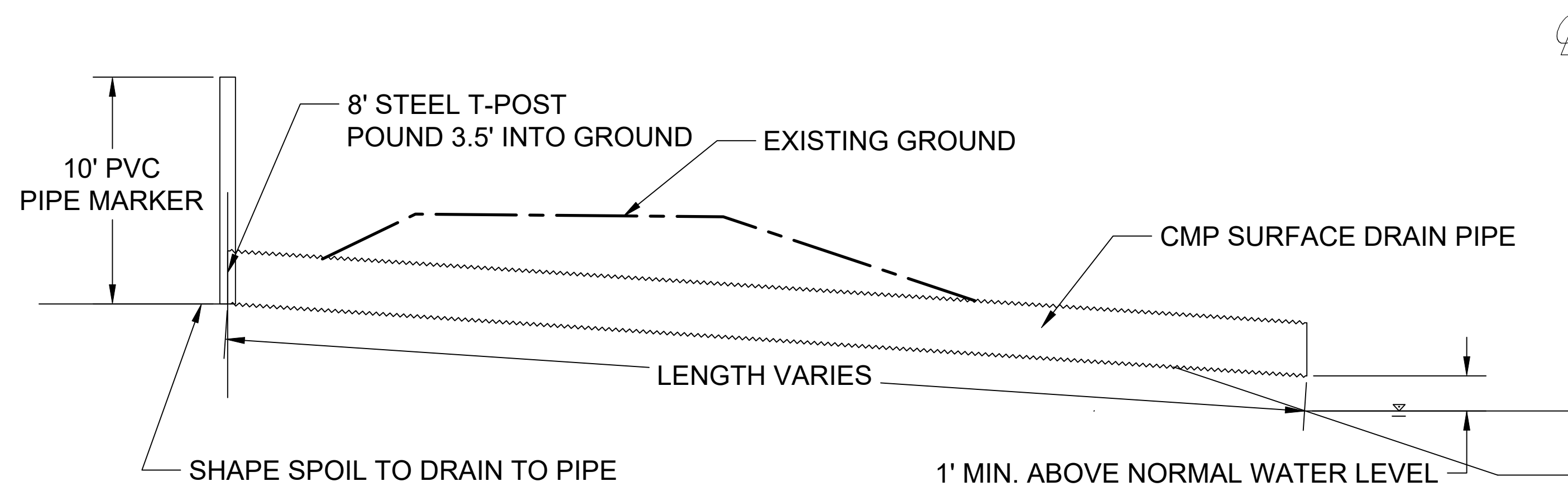
- WORK AREA:** THE PLANS SHOW THE WORK AREA. STANDARD WORK AREA IS 100 FEET FROM THE CENTERLINE OF THE OPEN DITCH UNLESS OTHERWISE NOTED. THE CONTRACTOR MUST STAY WITHIN THIS AREA. ANY DAMAGE OUTSIDE THE WORK AREA WILL BE DEDUCTED FROM FINAL PAYMENT. ALL STAGING AND STORAGE SHALL BE WITHIN THE WORK AREA. NO STORAGE OR STAGING SHALL TAKE PLACE ON ROADWAYS.
- ACCESS:** ACCESS TO THE WORK AREA IS LIMITED TO PUBLIC ROAD INTERSECTIONS AND DRIVEWAYS CALLED OUT ON THE PLANS. THE CONTRACTOR IS RESPONSIBLE FOR SECURING ANY ADDITIONAL TEMPORARY ACCESS AGREEMENTS WITH LANDOWNERS OR THE COUNTY ENGINEER FOR ROAD ROW ENTRY. LOCATIONS OF CONSTRUCTION ENTRANCES ARE MARKED ON THE PLANS. OBTAIN APPROVAL FROM THE ENGINEER PRIOR TO USING ANY OTHER ENTRANCES
- UTILITIES & LOCATES:** THE CONTRACTOR SHALL NOTIFY IOWA ONE CALL (811) PRIOR TO EXCAVATION. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROTECTING ALL MARKED AND UNMARKED UTILITIES.
- TILE OUTLET AND SURFACE DRAIN PIPE EXPLORATION:** EXISTING TILE AND SURFACE DRAIN PIPES IS APPROXIMATELY LOCATED ON THE PLANS. THERE LIKELY ARE ADDITIONAL TILE OUTLETS MISSED DURING THE SURVEY ALONG WITH LOCATIONS THAT WILL NEED SURFACE DRAIN PIPES. CONTRACTOR SHALL NOTE ALL MISSED PIPES AND ENGINEER MAY DIRECT THOSE PIPES TO BE REPAIRED OR INSTALLED.
- AS-BUILT DOCUMENTATION:** THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH A COMPLETE SET OF DRAWINGS SUITABLY MARKED TO SHOW ANY DEVIATIONS FROM THE ORIGINAL PLANS, INCLUDING BUT NOT LIMITED TO ACTUAL PIPE ALIGNMENTS, DEPTHS, CONNECTION LOCATIONS, AND ANY FIELD MODIFICATIONS. THIS DOCUMENTATION SHALL BE PROVIDED PRIOR TO FINAL ACCEPTANCE.
- THE LANDOWNERS** WHERE THE OPEN DITCH BEING REPAIRED ARE PAYING FOR THIS PROJECT. AT COMPLETION OF THE PROJECT, THOSE LANDOWNERS ARE INVITED TO A PUBLIC HEARING AND CAN FILE CLAIMS FOR DAMAGES. THESE SPECIFICATIONS AND PLANS EXIST AS MUCH TO GUIDE AND PROTECT THE CONTRACTOR AS TO PROTECT THE LANDOWNERS. REGULAR DOCUMENTATION ALONG WITH OPEN COMMUNICATION WITH THE ENGINEER IS ESSENTIAL TO A SMOOTH PROJECT FOR ALL PARTIES.

### ROADWAY CULVERT CLEANING

- PERMITS & NOTIFICATIONS:** THE CONTRACTOR SHALL OBTAIN ALL NECESSARY OCCUPANCY PERMITS FROM THE COUNTY ENGINEER OR IOWA DOT. NOTIFY THE RESPECTIVE AGENCY AND THE PROJECT ENGINEER AT LEAST 48 HOURS PRIOR TO COMMENCING ANY WORK WITHIN THE ROW.
- TRAFFIC CONTROL:** THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC CONTROL, INCLUDING SIGNAGE, BARRICADES, AND FLAGGERS. ALL SETUPS MUST STRICTLY ADHERE TO THE LATEST MUTCD (MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES) STANDARDS AND ANY SPECIFIC REQUIREMENTS SET BY THE COUNTY OR DOT PERMIT.
- UTILITY VERIFICATION:** ALL UTILITIES WITHIN THE ROW (FIBER OPTIC, GAS, WATER) MUST BE DAYLIGHTED VIA POTHOLING PRIOR TO THE ARRIVAL OF THE BORING OR TRENCHING EQUIPMENT.
- STORAGE AND PARKING:** NO STORAGE OR PARKING OF EQUIPMENT IN PUBLIC RIGHT-OF-WAY. NO CROSSING PAVED ROADS WITH TRACKED EQUIPMENT.
- CULVERT CLEANING:** CONTRACTOR SHALL REMOVE SILT AND DEBRIS FROM THE CULVERT VIA ANY METHOD THE CONTRACTOR CHOOSES SUBJECT TO APPROVAL BY THE ENGINEER TO NOT DAMAGE THE CULVERT, DITCH OR ROAD WAY.
- SHOULDER REPAIR:** ANY DAMAGE TO THE ROAD SHOULDERS OR SIDE SLOPES SHALL BE RESHAPED TO MATCH THE ORIGINAL PROFILE AND IMMEDIATELY SEEDED/MULCHED.
- ROAD CLOSURE:** IF THE ROAD NEEDS TO BE CLOSED. THE ROAD SHALL ONLY BE CLOSED FROM SUN RISE TO SUN SET. BY SUN SET THE ROAD SHALL BE OPEN TO TRAFFIC.

### SURFACE DRAIN PIPE DETAIL

ALL ITEMS AND NOTES SHOWN IN THIS DETAIL ARE INCIDENTAL UNLESS OTHERWISE NOTED



**GENERAL NOTES:**

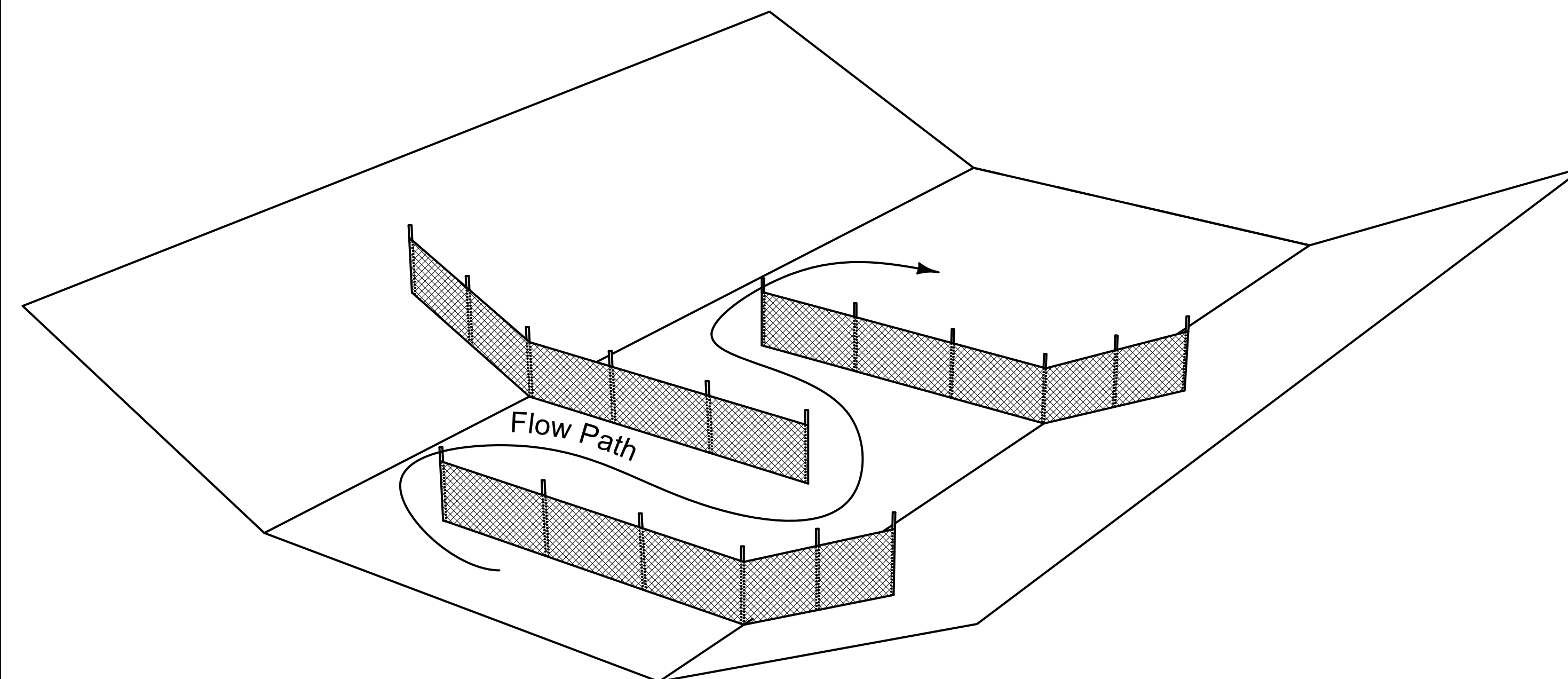
- PLACE SURFACE DRAIN PIPE TO ANGLE SLIGHTLY DOWNSTREAM
- OUTLET SURFACE DRAIN PIPE SO WATER FLOWS INTO WATER IN DITCH AND NOT ON DITCH BANK.
- SHAPE TO DRAIN TO INLET. THIS WORK IS INCIDENTAL TO SURFACE DRAIN PIPE INSTALLATION.

### SEDIMENT BAFFLE DETAIL

ALL ITEMS AND NOTES SHOWN IN THIS DETAIL ARE INCIDENTAL UNLESS OTHERWISE NOTED

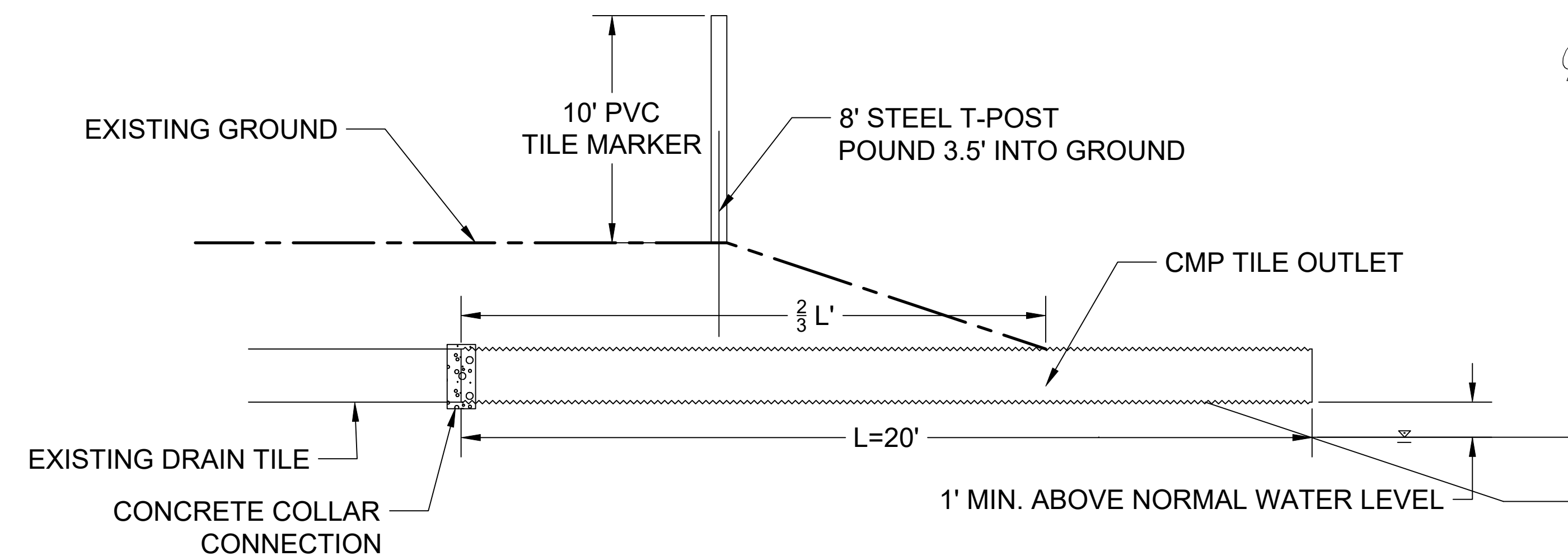
**GENERAL NOTES:**

- CONSTRUCT SEDIMENT BAFFLE BY INSTALLING THREE ROWS OF SILT FENCE ACROSS THE BOTTOM OF THE OPEN DITCH AT THE OUTLET LEAVING AN OPENING EQUAL TO 25% OF THE BOTTOM WIDTH ON ALTERNATING SIDES.
- SPACE EACH SILT FENCE 4' FROM EACH OTHER.
- REMOVAL OF THE SILT FENCES AT THE END OF THE PROJECT IS INCIDENTAL TO INSTALLATION.



### TILE OUTLET DETAIL

ALL ITEMS AND NOTES SHOWN IN THIS DETAIL ARE INCIDENTAL UNLESS OTHERWISE NOTED



**GENERAL NOTES:**

- PLACE SURFACE DRAIN PIPE TO ANGLE SLIGHTLY DOWNSTREAM
- OUTLET SURFACE DRAIN PIPE SO WATER FLOWS INTO WATER IN DITCH AND NOT ON DITCH BANK.



Company Information  
**AgriVia PLLC**  
 PO Box 44  
 1124 Willis Ave  
 Perry, IA 50220

Designer  
**JLH**  
 Drafter  
**TJB**  
 Checker  
**JLH**

No.	Revision/Issue	Date

Sheet Name		
General & Pipe Details		

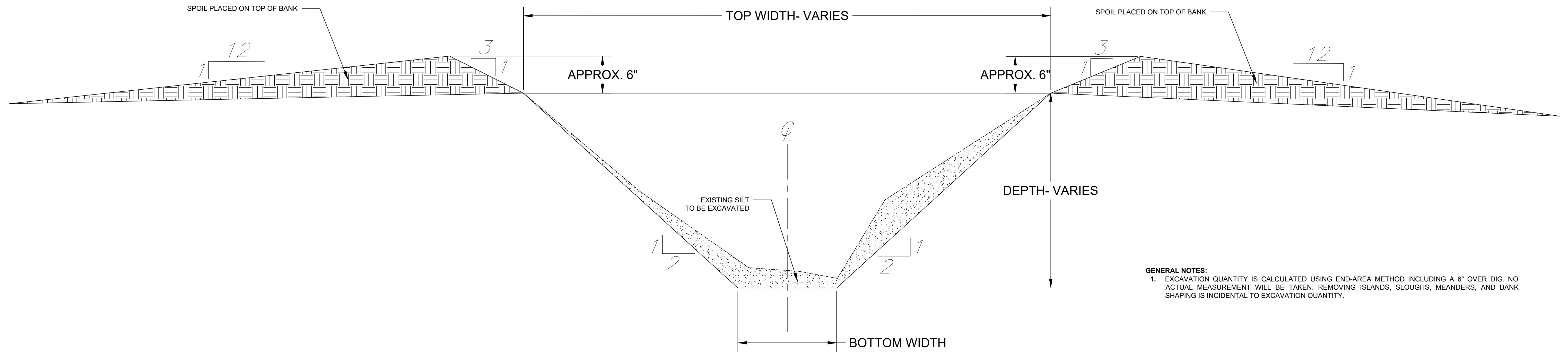
Project Name, Client, and Address  
**Open Ditch Repairs**  
 Joint Drainage District No. 4-263 Lat. 7  
 Webster County, IA  
 Xavier Ave & 210th St, Duncombe, IA 50532

Project	2602-94
Date	2026-05-20
Plan Scale	

Sheet  
**B.01**

### TYPICAL OPEN DITCH EXCAVATION AND SPOIL LEVELING DETAIL

ALL ITEMS AND NOTES SHOWN IN THIS DETAIL ARE INCIDENTAL UNLESS OTHERWISE NOTED

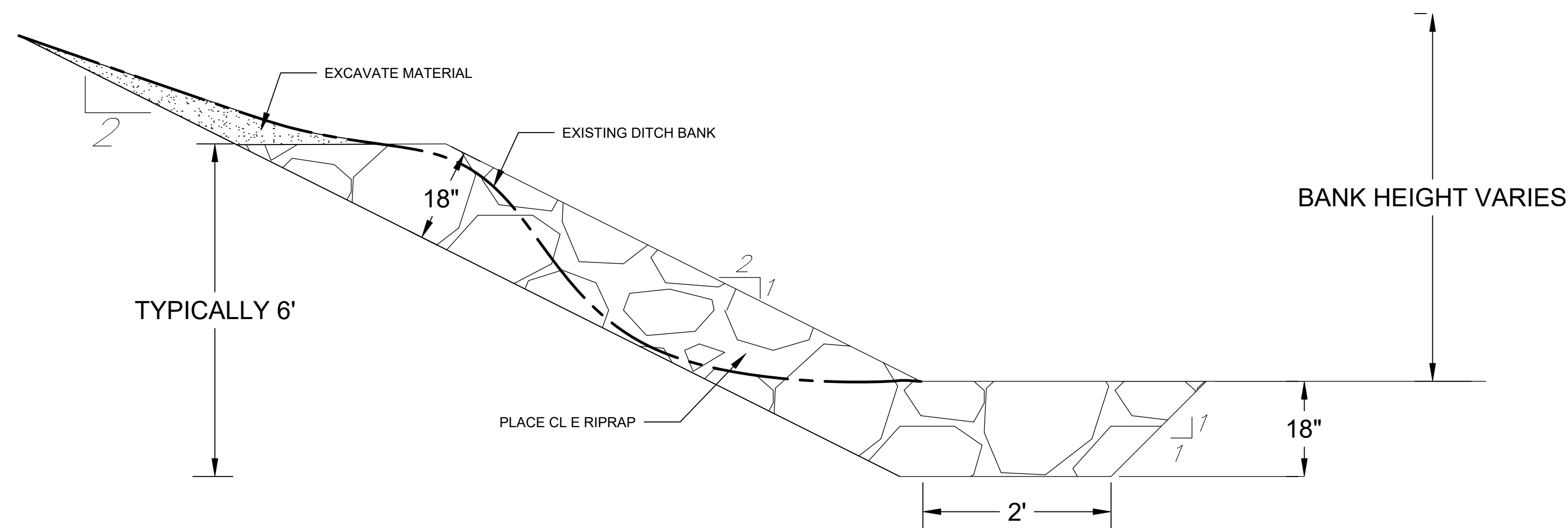


**GENERAL NOTES:**

- EXCAVATION QUANTITY IS CALCULATED USING END-AREA METHOD INCLUDING A 6" OVER DIG. NO ACTUAL MEASUREMENT WILL BE TAKEN. REMOVING ISLANDS, SLOUGHS, MEANDERS, AND BANK SHAPING IS INCIDENTAL TO EXCAVATION QUANTITY.

### RIPRAP BANK ARMORING DETAIL

ALL ITEMS AND NOTES SHOWN IN THIS DETAIL ARE INCIDENTAL UNLESS OTHERWISE NOTED

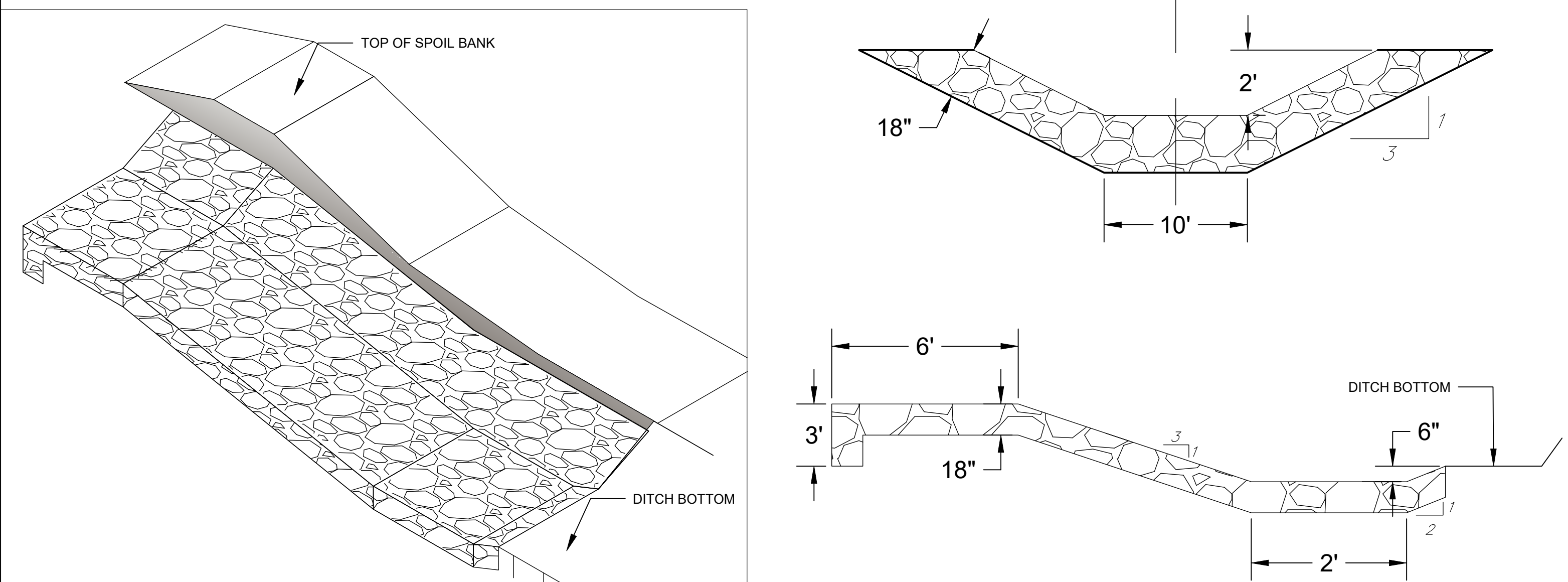


**GENERAL NOTES:**

- RIPRAP WILL BE PAID UNDER RIPRAP, CL E BID ITEM. ALL EXCAVATION, AND SHAPING WILL BE PAID UNDER RIPRAP BID ITEM. FIELD STONE MAY BE USED PER APPROVAL OF ENGINEER.
- GEOTEXTILE FABRIC IS NOT REQUIRED.

### ROCK CHUTE DETAIL

ALL ITEMS AND NOTES SHOWN IN THIS DETAIL ARE INCIDENTAL UNLESS OTHERWISE NOTED



**GENERAL NOTES:**

- RIPRAP WILL BE PAID UNDER RIPRAP, CL E BID ITEM. ALL EXCAVATION, AND SHAPING WILL BE PAID UNDER ROCK CHUTE BID ITEM. FIELD STONE MAY BE USED PER APPROVAL OF ENGINEER.
- ROCK CHUTE SHALL BE CONSTRUCTED TO ALLOW FOR SURFACE WATER FLOW TO ENTER THE OPEN DITCH. ROCK CHUTE SHALL BE CONSTRUCTED LOW ENOUGH AND SHAPED TO ALLOW WATER TO FLOW THROUGH IT.
- GEOTEXTILE FABRIC IS NOT REQUIRED.



Company Information  
**AgriVia PLLC**  
 PO Box 44  
 1124 Willis Ave  
 Perry, IA 50220

Designer  
**JLH**  
 Drafter  
**TJB**  
 Checker  
**JLH**

No.	Revision/Issue	Date

Sheet Name  
**Excavation Details**

Project Name, Client, and Address  
**Open Ditch Repairs**  
 Joint Drainage District No. 4-263 Lat. 7  
 Webster County, IA  
 Xavier Ave & 210th St, Duncombe, IA 50532

Project  
**2602-94**  
 Date  
**2026-05-20**  
 Plan Scale

Sheet  
**B.02**

Lateral No. 7 Open Ditch					
Station	Existing Size	Length	Type	Side	Notes
287	12	20	TO	LT	
449	15	50	SD	RT	Replace with 18" CMP SD.
481	18	50	SD	LT	
832	8	20	TO	RT	
833	12	20	TO	RT	
1154	8	20	TO	RT	
1215	15	50	SD	LT	Replace with 18" CMP SD.
1242	8	20	TO	LT	
1353	15	60	SD	RT	Replace with 18" CMP SD.
1498	6	20	TO	RT	
1868	12	20	TO	LT	
1895	18	50	SD	RT	
2044	18		SD	LT	Existing-to-remain.
2103	12	20	TO	LT	
2165	15	50	SD	RT	Replace with 18" CMP SD.
2515	8	20	TO	RT	
2560	15	60	SD	LT	Replace with 18" CMP SD.
2685	12	20	TO	RT	
2703	24	20	TO	RT	
2707	36	20	TO	RT	
2725	15	20	TO	RT	
2758	12	20	TO	RT	
3254	18		TO	RT	Existing-to-remain.
3726	12	20	TO	LT	
3861	12	20	TO	LT	
3892	18	80	SD	LT	
3966	12	20	TO	LT	
4310	15		SD	RT	Existing-to-remain.
4487	15	20	TO	RT	
4509	12	20	TO	RT	
4527	8		TO	RT	Existing-to-remain.
4613	24	50	SD	RT	
4895	8	20	TO	LT	
5057	Unk.	20	TO	LT	Search for tile.
5365	15	60	SD	RT	Replace with 18" CMP SD.
5469	12	20	TO	LT	

Lateral No. 7 Open Ditch					
Station	Existing Size	Length	Type	Side	Notes
5472	15	20	TO	LT	
5492	15	50	SD	LT	Replace with 18" CMP SD.
5540	12	20	TO	LT	
5947	24		SD	RT	Existing-to-remain.
6170	12	20	TO	RT	
6692	6	20	TO	RT	
6765	15	20	TO	RT	
6775	15	20	TO	RT	
6810	18	60	SD	RT	
7004			TO	RT	Existing-to-remain.
7013			SD	LT	Existing-to-remain.
7013			SD	RT	Existing-to-remain.
7130			SD	LT	Existing-to-remain.
7137	6		TO	LT	Existing-to-remain.
7140	6		TO	RT	Existing-to-remain.
7160	8	20	TO	RT	
7249	18	70	SD	RT	
7269	15	20	TO	LT	
7598	12	20	TO	RT	
7845	18	20	TO	LT	
7886	12	20	TO	RT	
8117	15	20	TO	LT	
8130	15	20	TO	LT	
8273	15	20	TO	RT	
8320	12	20	TO	RT	
8542	18	20	TO	LT	
8918	12	20	TO	RT	
9017	12	20	TO	RT	
9120	24	20	TO	RT	
9133	18	50	SD	RT	
9151	8	20	TO	LT	
9189	30	20	TO	RT	
9407	15	20	TO	RT	
9744	8	20	TO	LT	
9781	12	60	SD	RT	Replace with 18" CMP SD.
9795	15	50	SD	LT	Replace with 18" CMP SD.
9799	8	20	TO	RT	

Lateral No. 7 Open Ditch					
Station	Existing Size	Length	Type	Side	Notes
9812	8	20	TO	LT	
9965	15	50	SD	LT	Replace with 18" CMP SD.
10306	12	20	TO	RT	
10731	6	20	TO	LT	
10743	6	20	TO	LT	
10761	18	40	SD	LT	
10805	12	20	TO	RT	
11127	15	60	SD	RT	Replace with 18" CMP SD.
11383	12	20	TO	RT	
11402	Unk.	20	TO	LT	Search for tile.
11490	6	20	TO	LT	
11527	15	20	TO	LT	
11533	15	50	SD	LT	Replace with 18" CMP SD.
11544	6	20	TO	LT	
11552	8	20	TO	RT	
12329	12	20	TO	RT	
12349	8	20	TO	RT	
12383	6		TO	LT	Existing-to-remain.
12384			SD	RT	Existing-to-remain.
12385			SD	LT	Existing-to-remain.
12386			SD	RT	Existing-to-remain.
12462			SD	LT	Existing-to-remain.
12463			SD	RT	Existing-to-remain.
12557	6	20	TO	LT	
12618	15	50	SD	RT	Replace with 18" CMP SD.
12832	18		TO	RT	Existing-to-remain.
13033	12	20	TO	LT	
13156	8		TO	LT	Existing-to-remain.
13162	18	50	SD	RT	
13262	15	50	SD	LT	Replace with 18" CMP SD.
13289	6	20	TO	RT	
13728	8	20	TO	LT	
14058	4	20	TO	RT	
14305	12	20	TO	LT	
14339	15	20	TO	LT	
14372	12	20	TO	LT	

Lateral No. 7 Open Ditch					
Station	Existing Size	Length	Type	Side	Notes
14374	12	20	TO	LT	
14400	12	20	TO	LT	
14429	6	20	TO	RT	
14777	15	50	SD	RT	Replace with 18" CMP SD.
15392	18	50	SD	RT	
15463	6	20	TO	RT	
15476	6	20	TO	RT	
15804	6	20	TO	LT	
15904	6		TO	RT	Existing-to-remain.
16014	6	20	TO	RT	
16141	18	50	SD	LT	
16191	18	20	TO	RT	
16533	24	80	SD	RT	
16569	18	60	SD	RT	
16644	12	20	TO	LT	
16662	8	20	TO	LT	
17316	6	20	TO	LT	
17341	15	60	SD	LT	Replace with 18" CMP SD.
17461	8	20	TO	LT	
17515	12	20	TO	LT	
17556	48	20	TO	RT	
17755	6	20	TO	LT	
17894	8	20	TO	LT	
17920	18	20	TO	RT	
17930	36	20	TO	RT	
18092	18	60	SD	LT	
18101	18	20	TO	RT	
18428	8	20	TO	RT	
18492	24	20	TO	LT	
18511	36		TO	LT	Existing-to-remain.
18530	24	20	TO	RT	
18532	30		SD	LT	Existing-to-remain.
18532	30		SD	RT	Existing-to-remain.



Company Information  
**AgriVia PLLC**  
 PO Box 44  
 1124 Willis Ave  
 Perry, IA 50220

Designer  
**JLH**  
 Drafter  
**TJB**  
 Checker  
**JLH**

No.	Revision/Issue	Date

Sheet Name  
**Pipe Table**

Project Name, Client, and Address  
**Open Ditch Repairs**  
 Joint Drainage District No. 4-263 Lat. 7  
 Webster County, IA  
 Xavier Ave & 210th St, Duncombe, IA 50532

Project  
**2602-94**  
 Date  
**2026-05-20**  
 Plan Scale

Sheet  
**C.01**

Lateral No. 7 Open Ditch						
Station	End Area (ft²)	Avg. End Area (ft²)	Distance (ft)	Volume (ft³)	Volume (CY)	Cumulative Volume (CY)
70	79	91	415	37906	1404	
485	104	90	350	31644	1172	1404
835	77	85	389	32886	1218	2576
1224	92	90	273	24607	911	3794
1497	88	119	287	34114	1263	4705
1784	150	112	381	42598	1578	5969
2165	74	77	328	25094	929	7546
2493	79	84	360	30115	1115	8476
2853	88	90	355	32085	1188	9591
3208	92	87	328	28639	1061	10780
3536	82	88	337	29764	1102	11840
3873	94	83	322	26836	994	12943
4195	72	64	299	19238	713	13937
4494	56	62	393	24508	908	14649
4887	68	68	298	20273	751	15557
5185	68	64	351	22479	833	16308
5536	60	48	266	12900	478	17140
5802	37	42	371	15600	578	17618
6173	47	52	286	14880	551	18196
6459	57	44	336	14889	551	18747
6795	32	28	389	10732	397	19298
7184	23	17	327	5521	204	19696
7511	11	25	368	9028	334	19900
7879	38	35	351	12411	460	20235
8230	32	43	315	13634	505	20694
8545	54	54	559	30378	1125	21199
9104	54	57	315	18051	669	22324
9419	60	44	372	16287	603	22993
9791	27	28	361	10287	381	23596
10152	30	42	339	14084	522	23977
10491	53	39	320	12505	463	24499
10811	25	34	312	10618	393	24962
11123	43	49	355	17325	642	25355
11478	54	60	341	20499	759	25997
11819	66	55	315	17280	640	26756
12134	44	53	366	19269	714	27396
12500	62	58	268	15458	573	28110
12768	54	51	329	16665	617	28682
13097	48	51	310	15761	584	29299
13407	54	67	327	21974	814	29883
13734	80	84	319	26641	987	30697
14053	87	72	354	25583	948	31684
14407	58	67	341	23001	852	32631
14748	77	84	308	25836	957	33483
15056	91	89	326	29012	1075	34440
15382	87	88	305	26706	989	35515
15687	88	128	319	40675	1506	36504
16006	167	144	303	43622	1616	38010
16309	121	94	328	30899	1144	39626
16637	68	80	300	23904	885	40770
16937	92	98	318	31218	1156	41655
17255	105	104	316	32846	1217	42812
17571	103	117	304	35419	1312	44028
17875	130	128	325	41695	1544	45340
18200	127	153	326	49944	1850	46884
18526	180	—	—	—	—	48734



Company Information  
**AgriVia PLLC**  
 PO Box 44  
 1124 Willis Ave  
 Perry, IA 50220

Designer  
**JLH**  
 Drafter  
**TJB**  
 Checker  
**JLH**

--	--

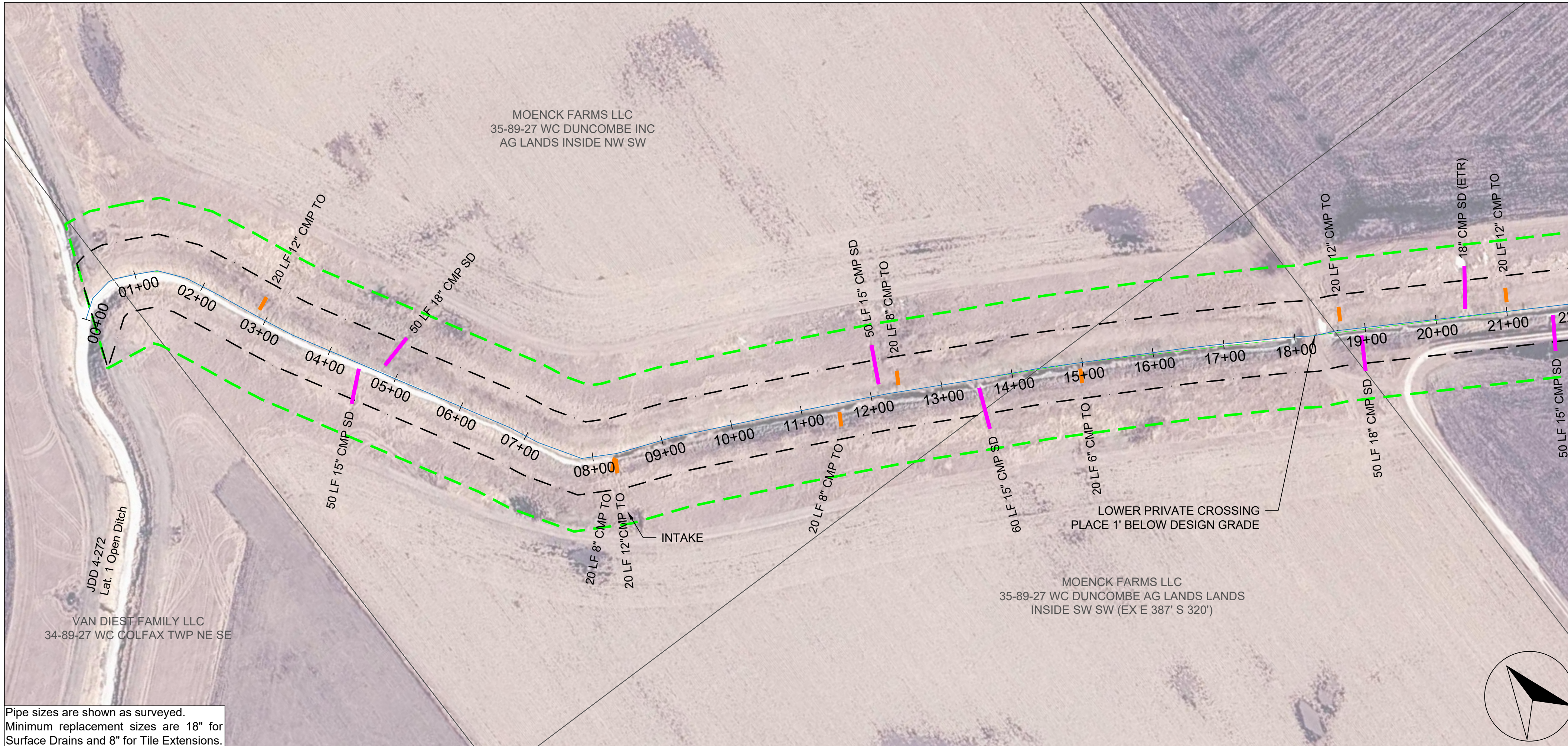
No.	Revision/Issue	Date

Sheet Name  
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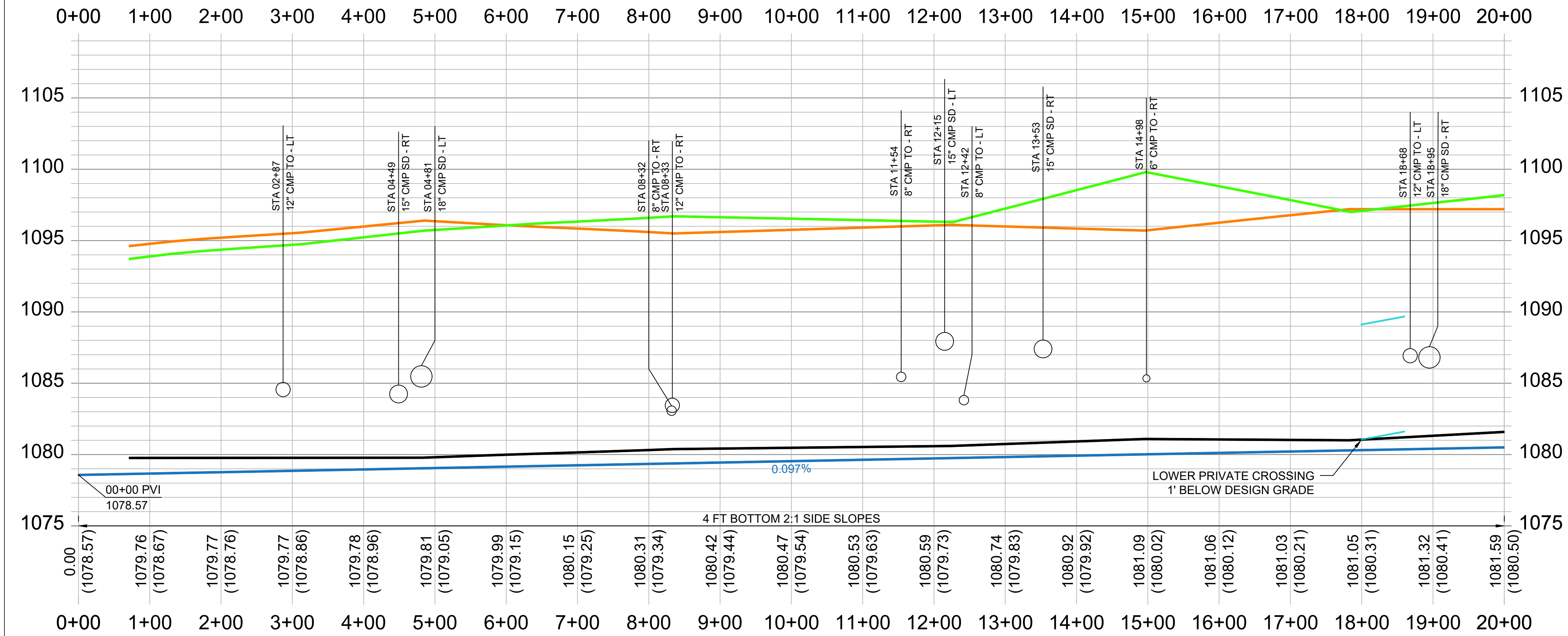
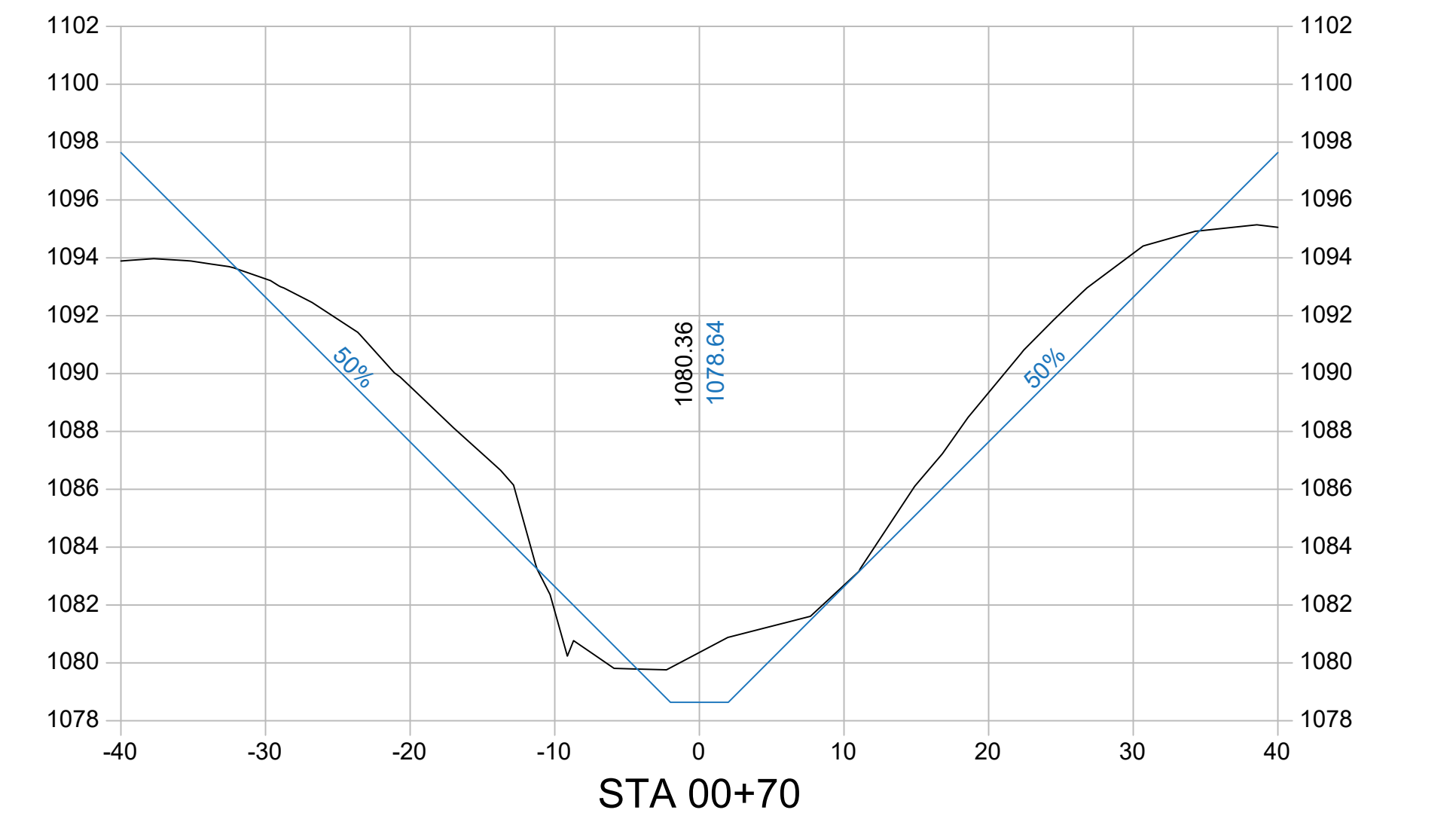
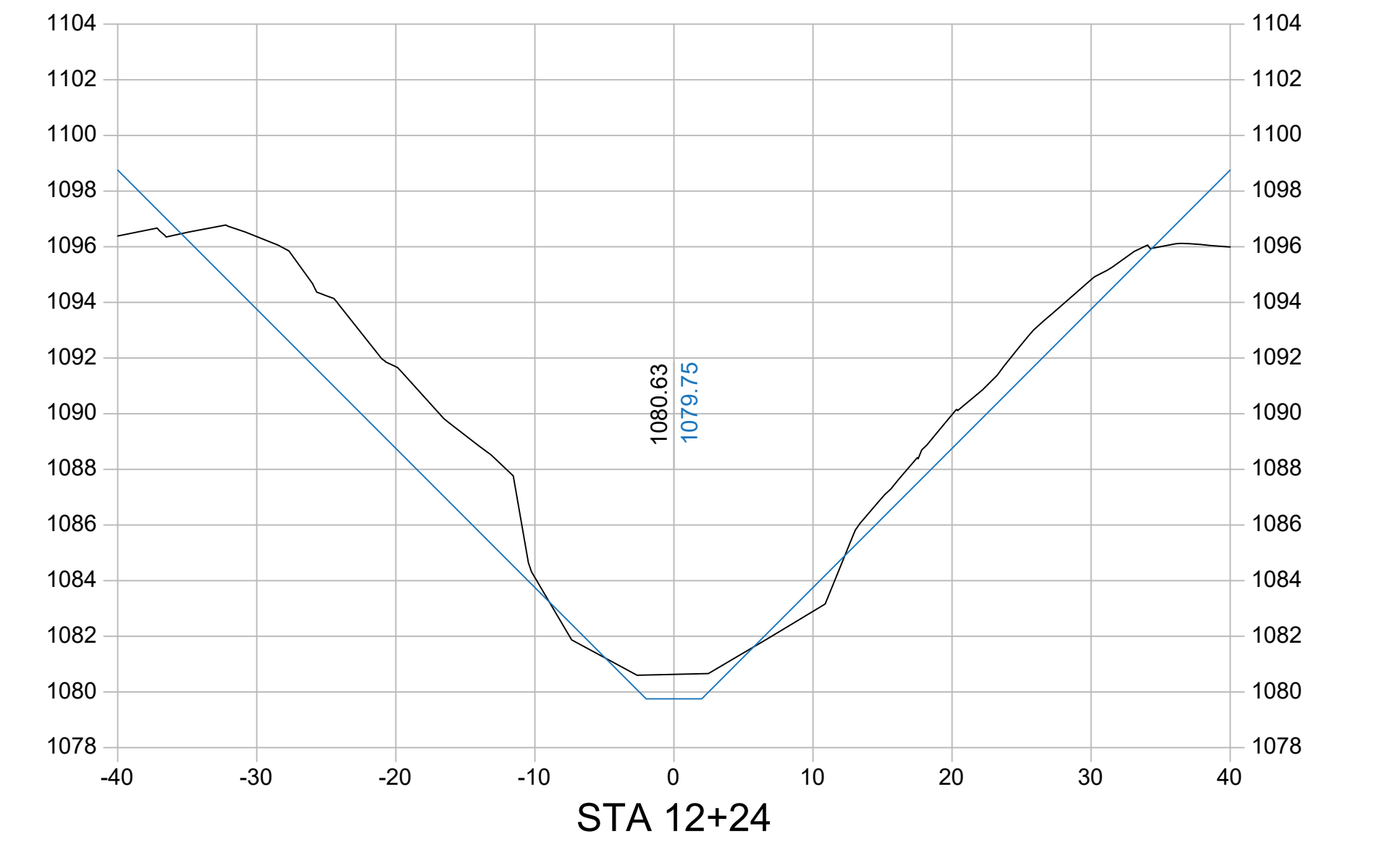
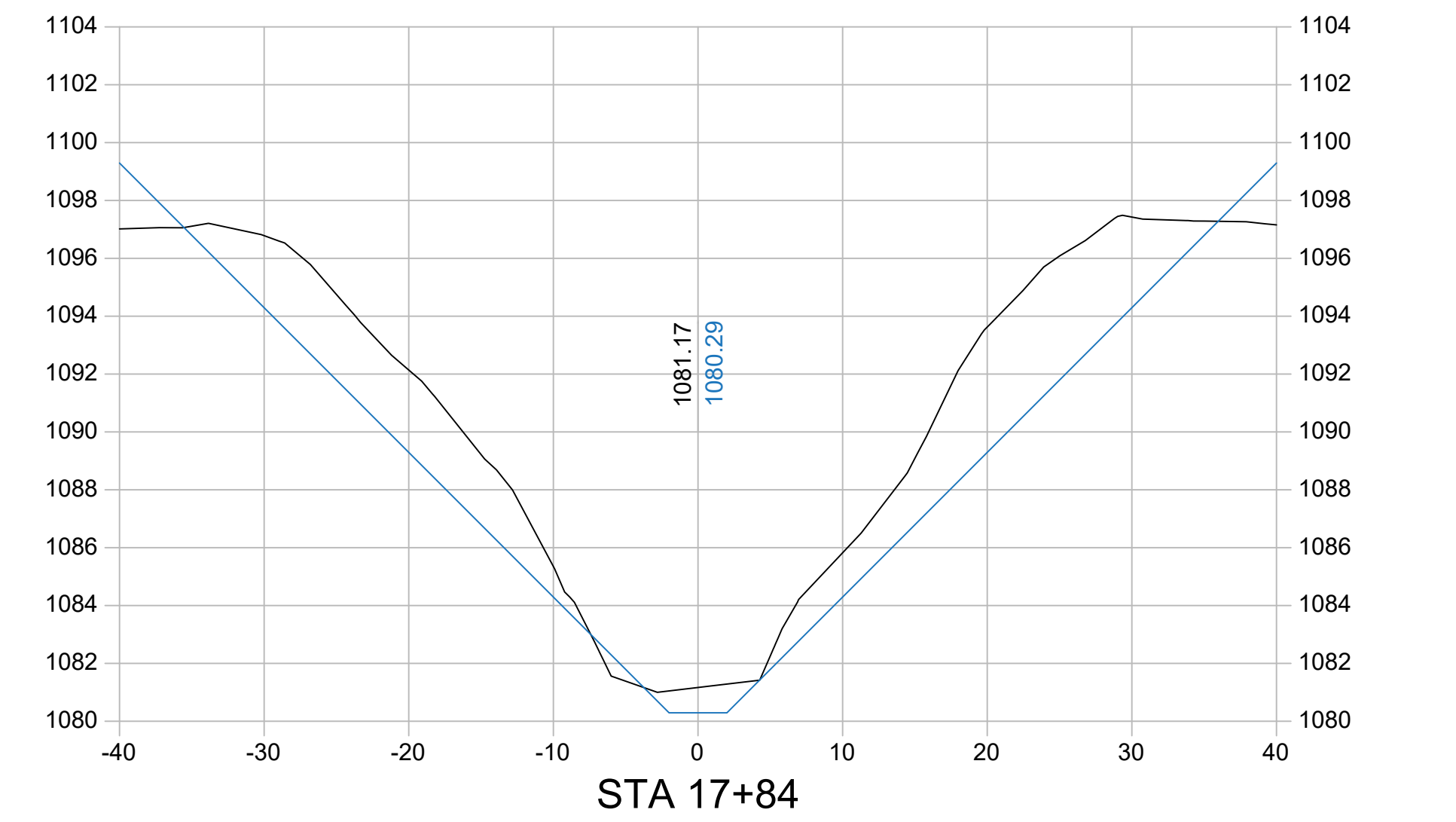
Project Name, Client, and Address  
**Open Ditch Repairs**  
 Joint Drainage District No. 4-263 Lat. 7  
 Webster County, IA  
 Xavier Ave & 210th St, Duncombe, IA 50532

Project  
**2602-94**  
 Date  
**2026-05-20**  
 Plan Scale

Sheet  
**C.02**



Pipe sizes are shown as surveyed.  
Minimum replacement sizes are 18" for  
Surface Drains and 8" for Tile Extensions.



Company Information  
**AgriVia PLLC**  
PO Box 44  
1124 Willis Ave  
Perry, IA 50220

Designer  
**JLH**  
Drafter  
**TJB**  
Checker  
**JLH**

**PLAN LEGEND**  
Parcel Lines  
Work Area (100' each side)  
Ditch ROW (50' each side)  
Surface Drains  
Tile Outlets  
Utilities (in red)  
Power Poles

**PROFILE LEGEND**  
Design Ditch Grade  
Surveyed Ditch Bottom  
Left Top of Bank  
Right Top of Bank

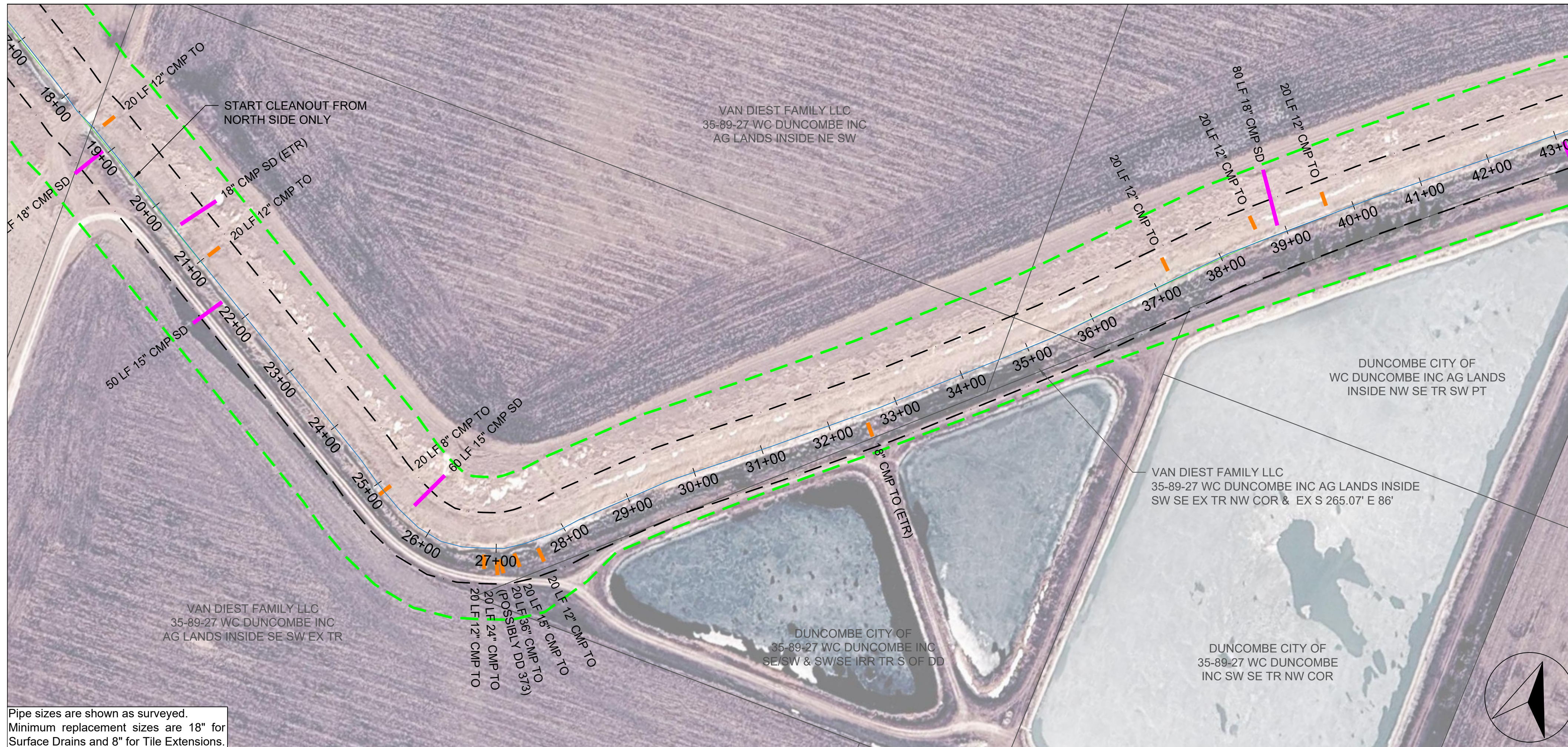
No.	Revision/Issue	Date

Sheet Name  
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Open Ditch STA 0+00  
→ 20+00**

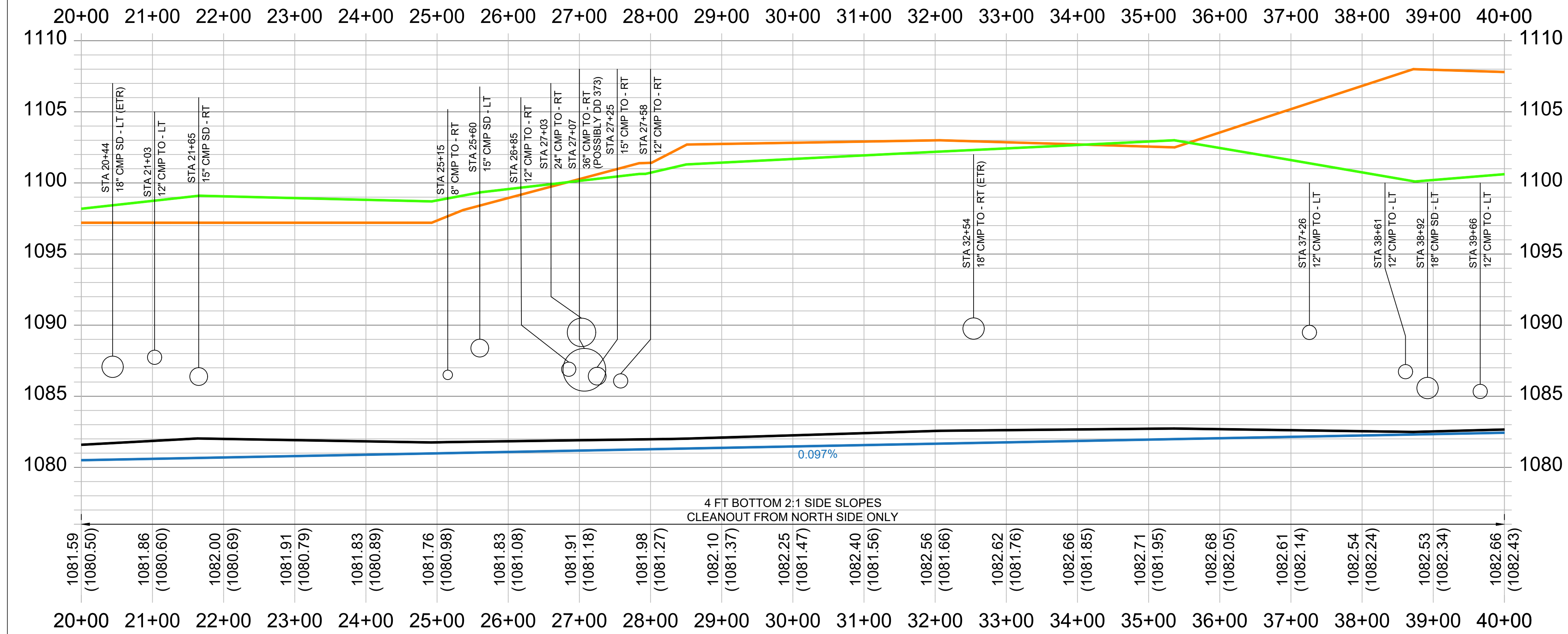
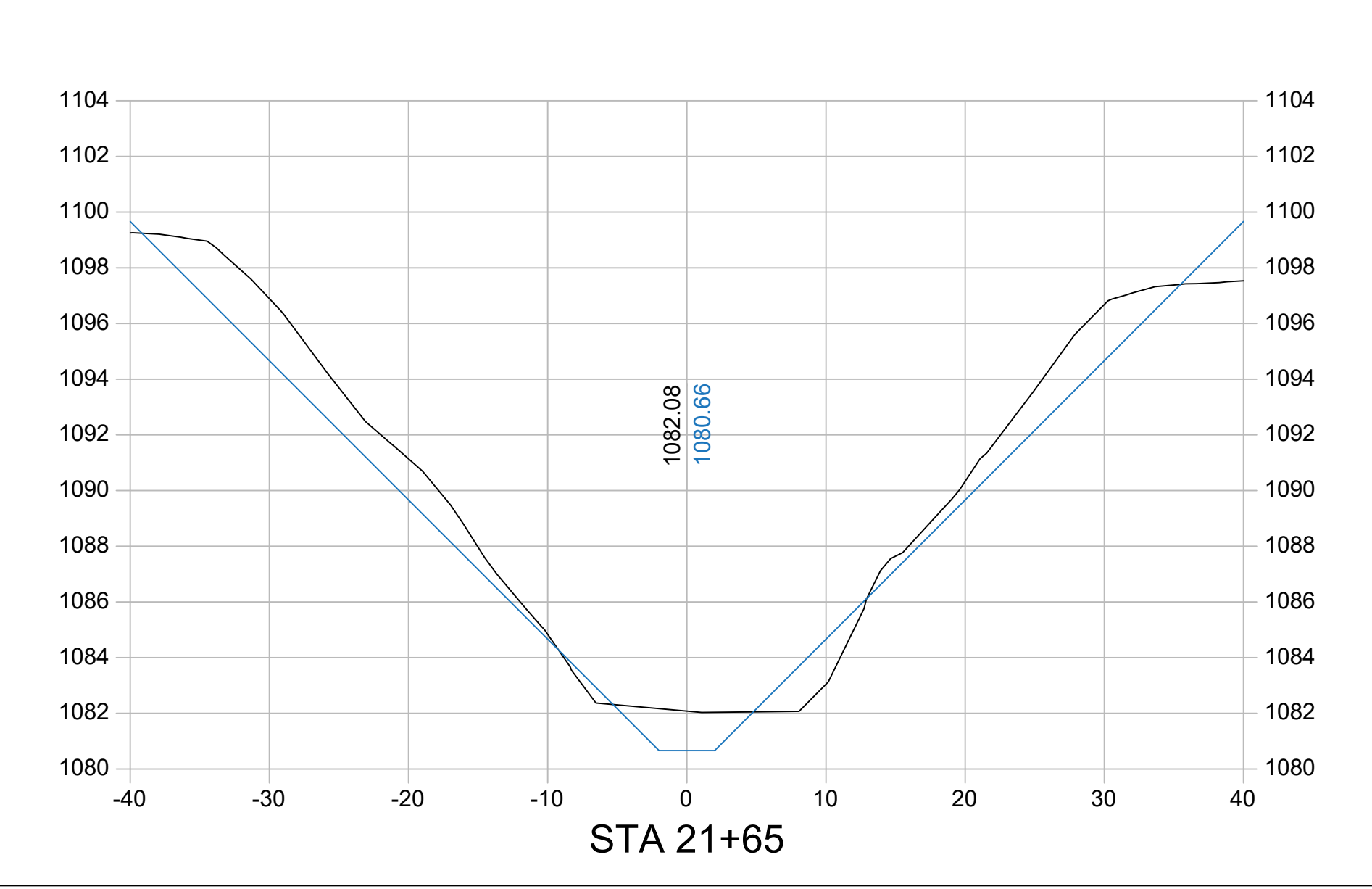
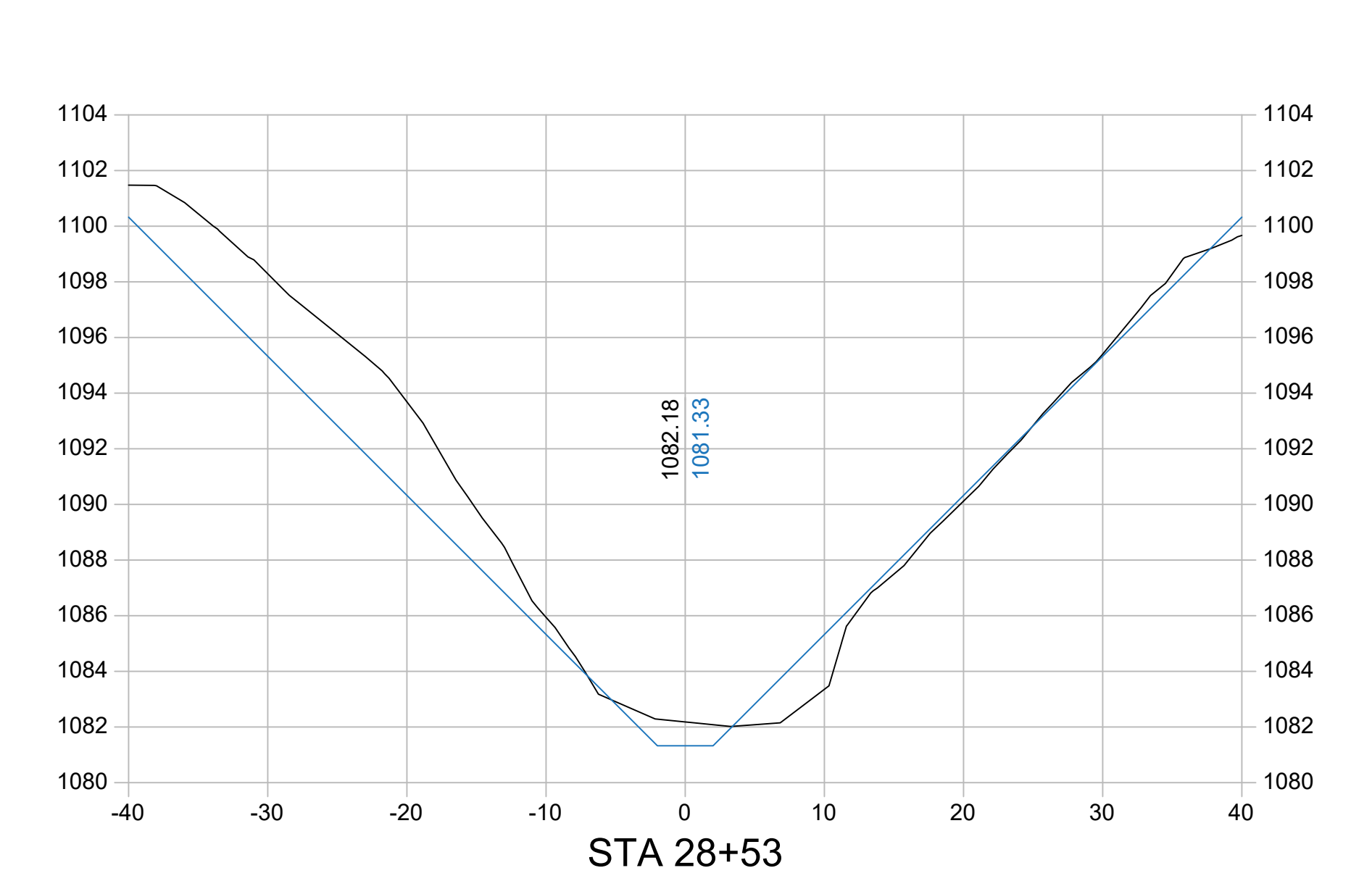
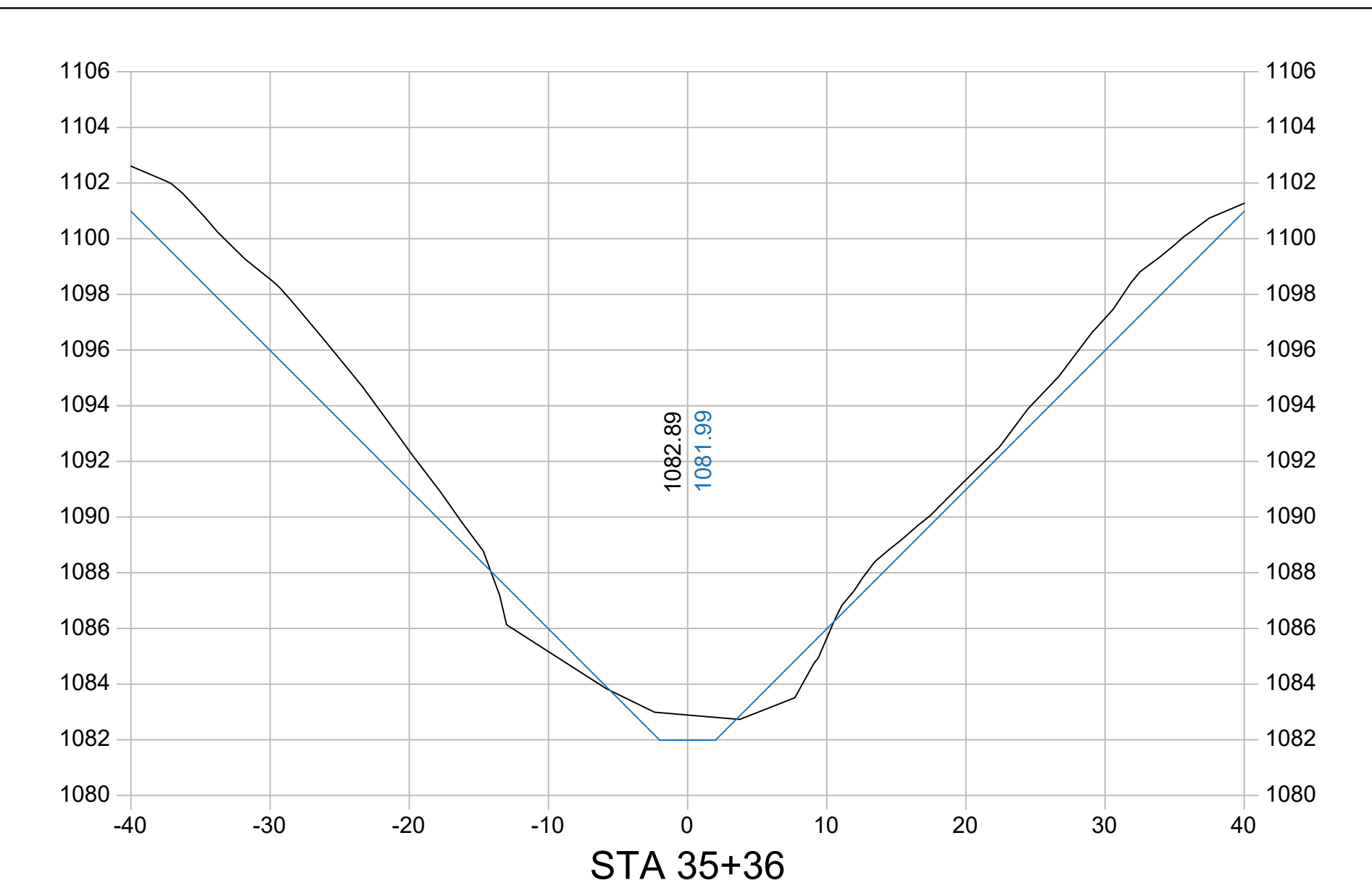
Project Name, Client, and Address  
**Open Ditch Repairs  
Joint Drainage District No. 4-263 Lat. 7  
Webster County, IA  
Xavier Ave & 210th St, Duncombe, IA 50532**

Project  
**2602-94**  
Date  
**2026-05-20**  
Plan Scale  
**1" = 200'**

Sheet  
**D.01**



Pipe sizes are shown as surveyed.  
 Minimum replacement sizes are 18" for  
 Surface Drains and 8" for  
 Tile Extensions.



Company Information  
**AgriVia PLLC**  
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 1124 Willis Ave  
 Perry, IA 50220

Designer  
**JLH**  
 Drafter  
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 Checker  
**JLH**

**PLAN LEGEND**

Parcel Lines	—
Work Area (100' each side)	- - - - -
Ditch ROW (50' each side)	— · — · — ·
Surface Drains	— · — · — ·
Tile Outlets	○
Utilities (in red)	- - - - -
Power Poles	●

**PROFILE LEGEND**

Design Ditch Grade	—
Surveyed Ditch Bottom	- - - - -
Left Top of Bank	—
Right Top of Bank	—

No.	Revision/Issue	Date

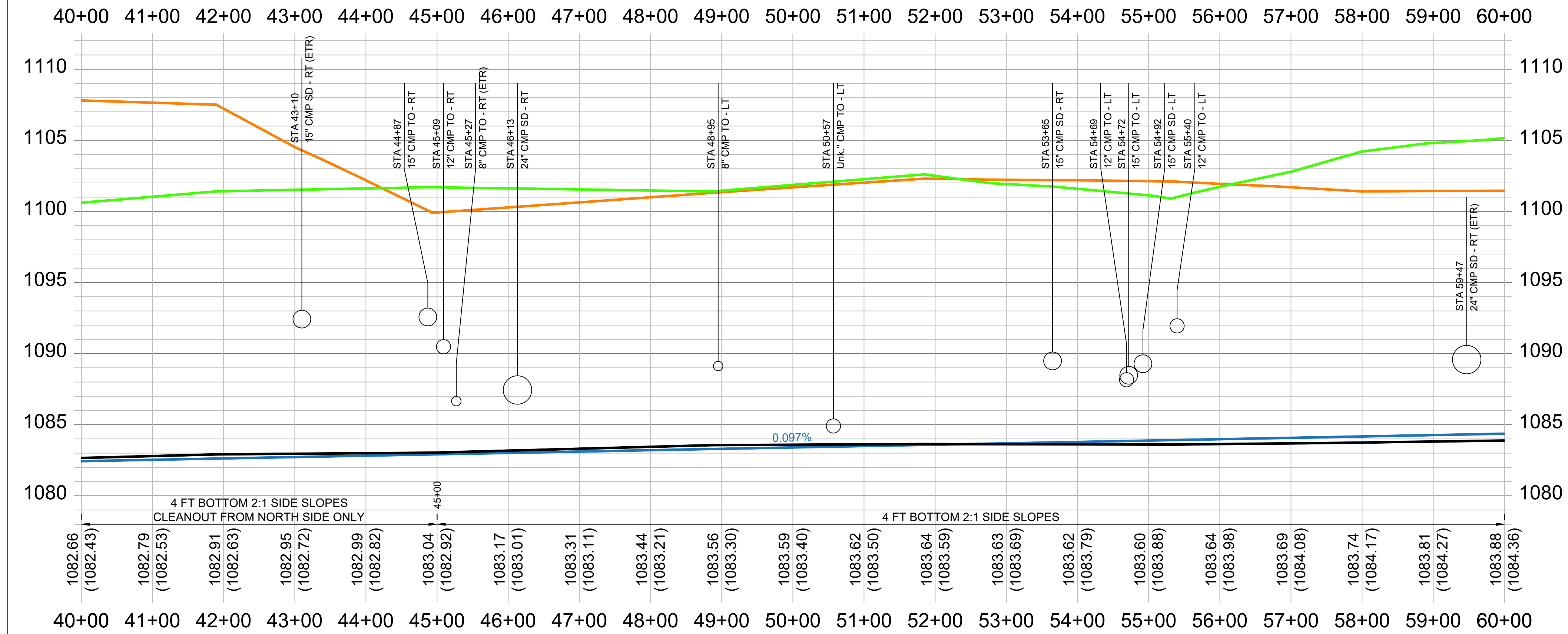
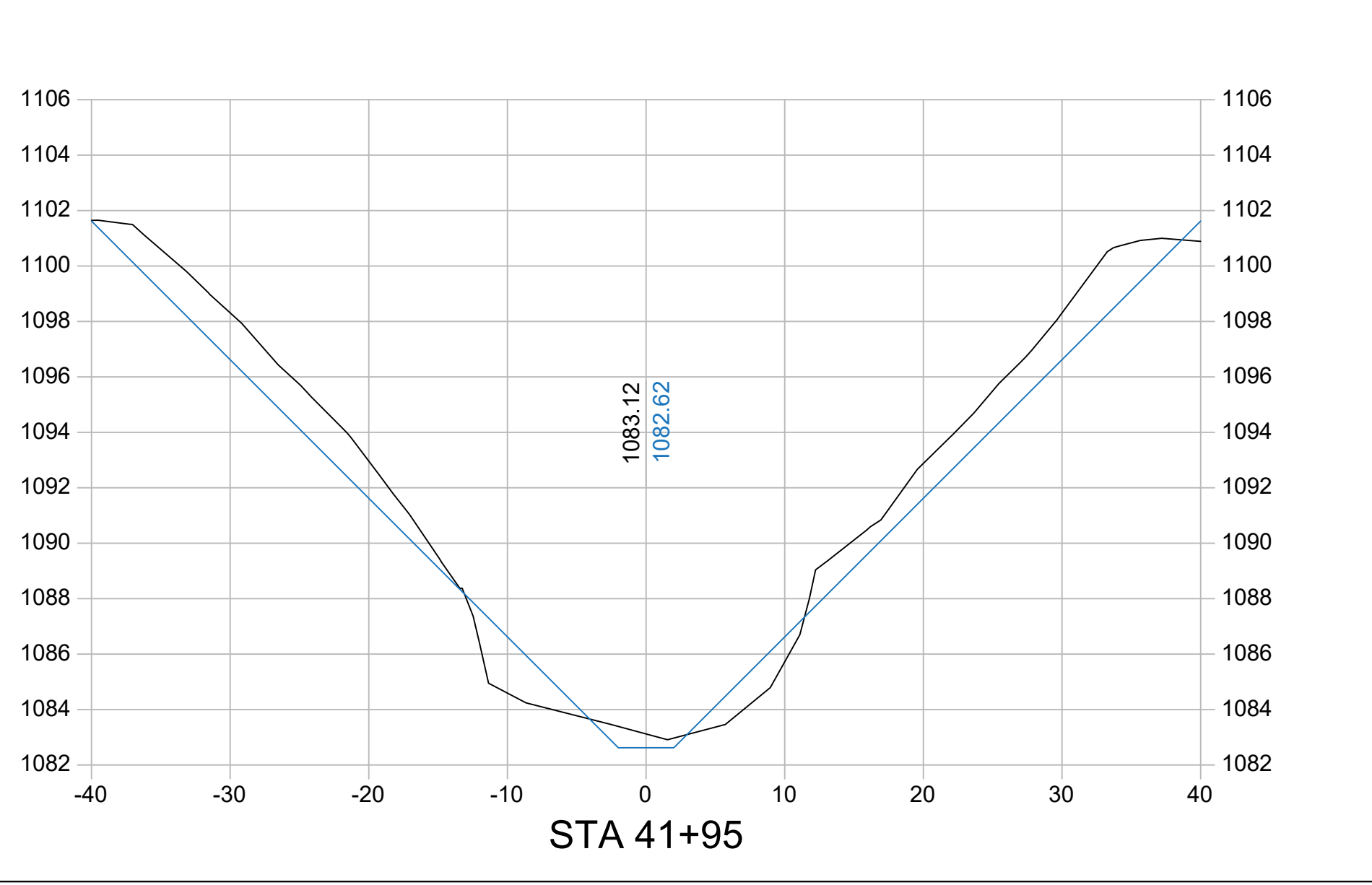
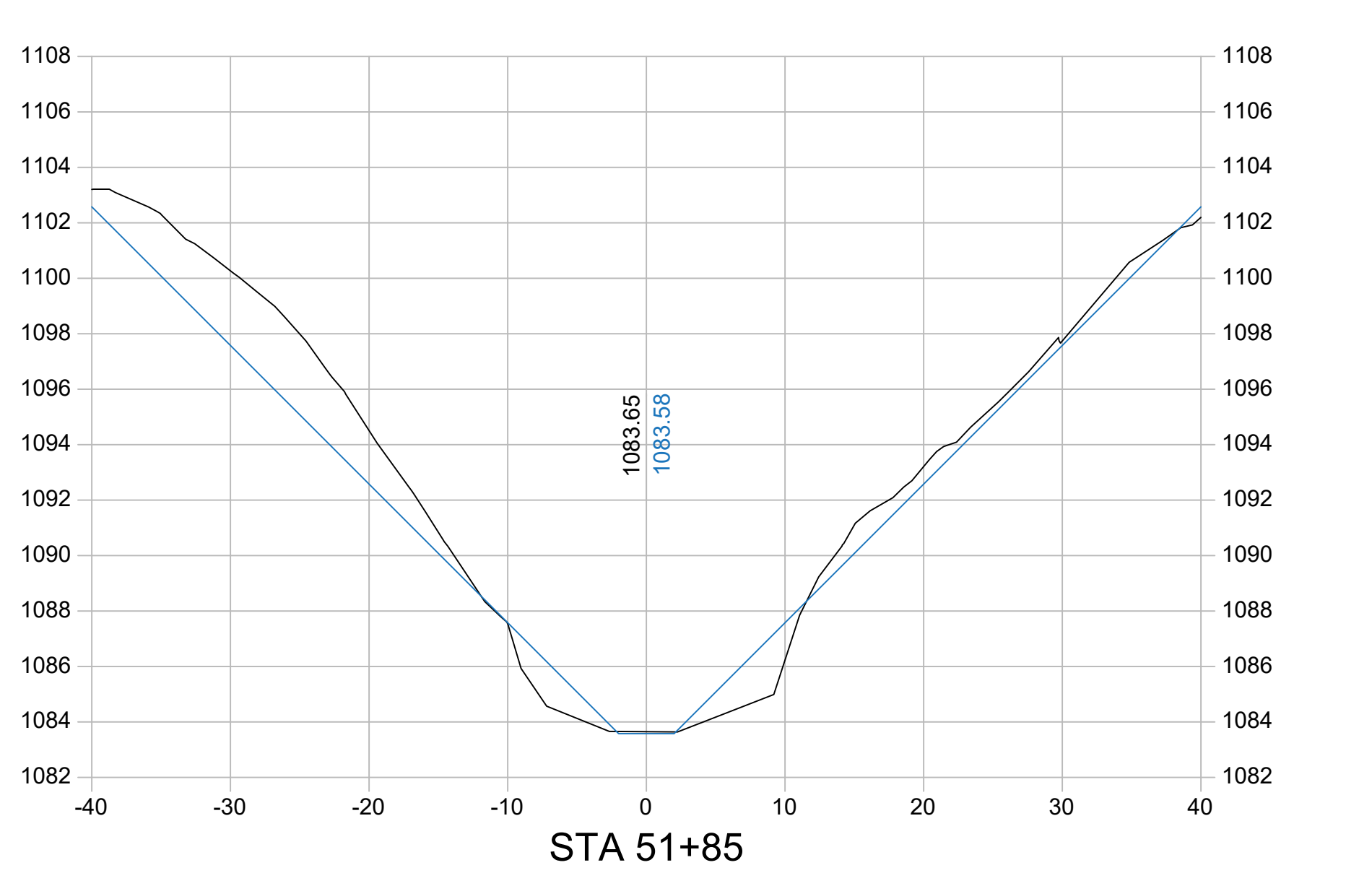
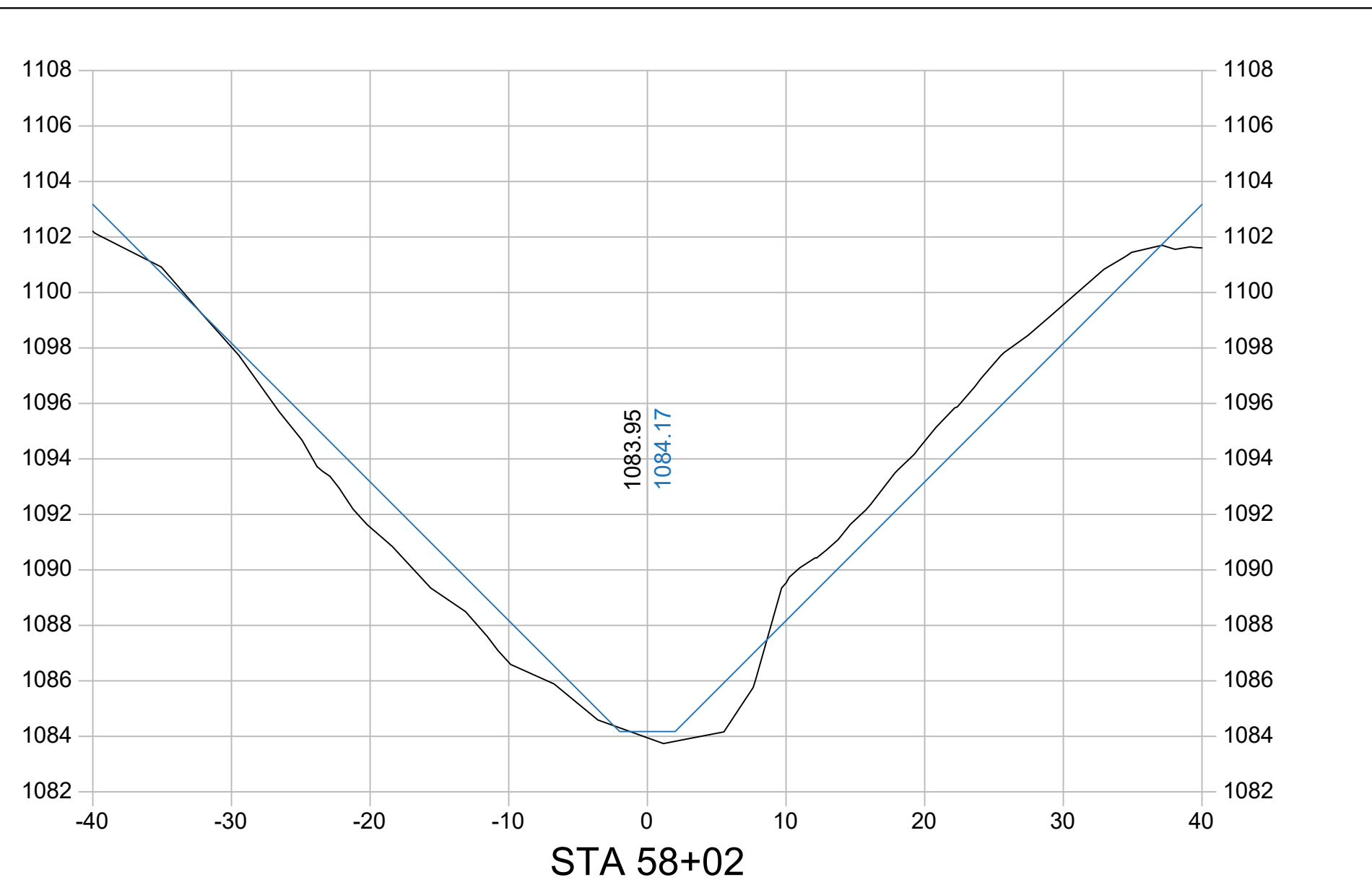
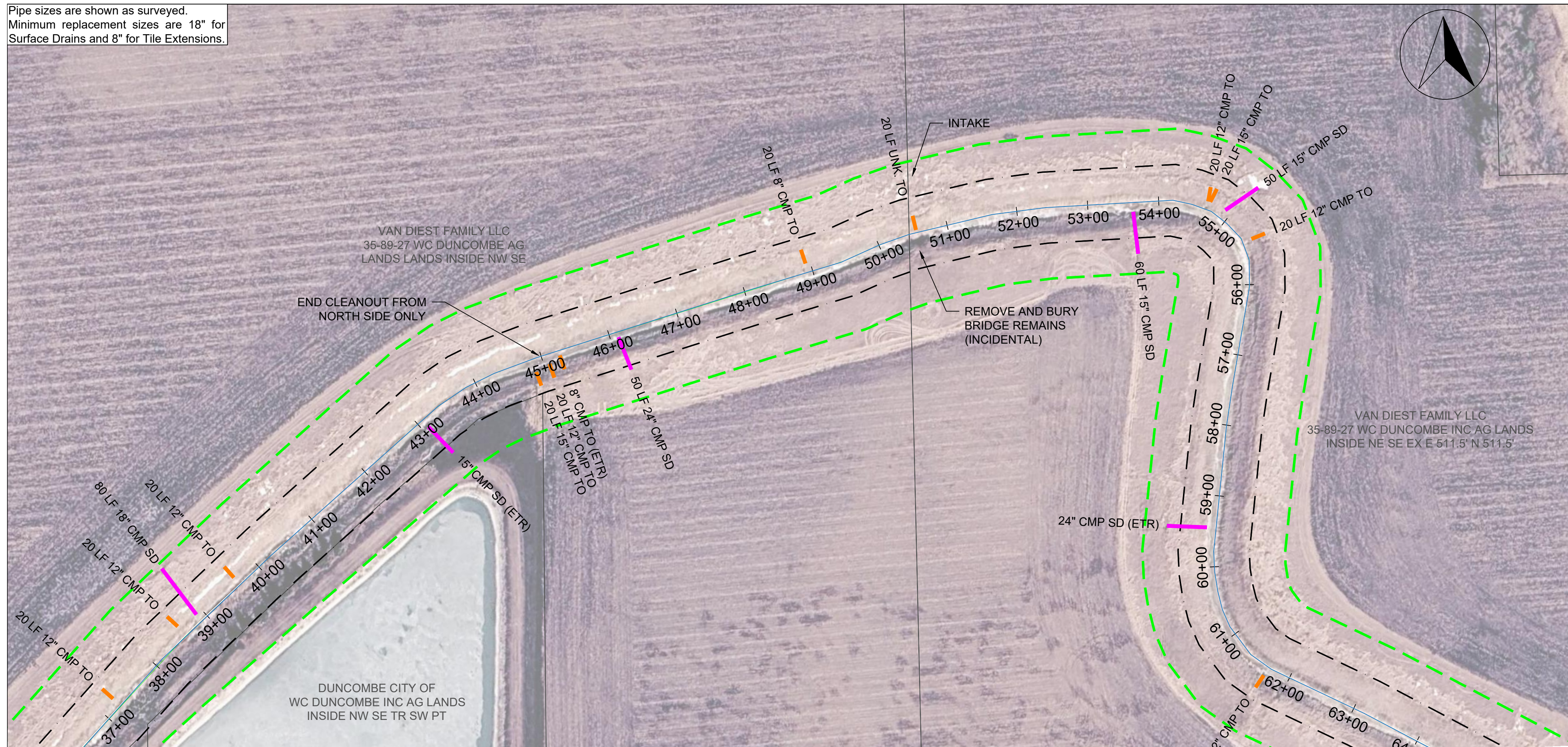
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 Open Ditch STA  
 20+00 → 40+00

Project Name, Client, and Address  
**Open Ditch Repairs**  
 Joint Drainage District No. 4-263 Lat. 7  
 Webster County, IA  
 Xavier Ave & 210th St, Duncombe, IA 50532

Project  
**2602-94**  
 Date  
**2026-05-20**  
 Plan Scale  
**1" = 200'**

D.02

Pipe sizes are shown as surveyed.  
Minimum replacement sizes are 18" for Surface Drains and 8" for Tile Extensions.



Company Information  
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Designer  
**JLH**  
Drafter  
**TJB**  
Checker  
**JLH**

**PLAN LEGEND**  
Parcel Lines  
Work Area (100' each side)  
Ditch ROW (50' each side)  
Surface Drains  
Tile Outlets  
Utilities (in red)  
Power Poles

**PROFILE LEGEND**  
Design Ditch Grade  
Surveyed Ditch Bottom  
Left Top of Bank  
Right Top of Bank

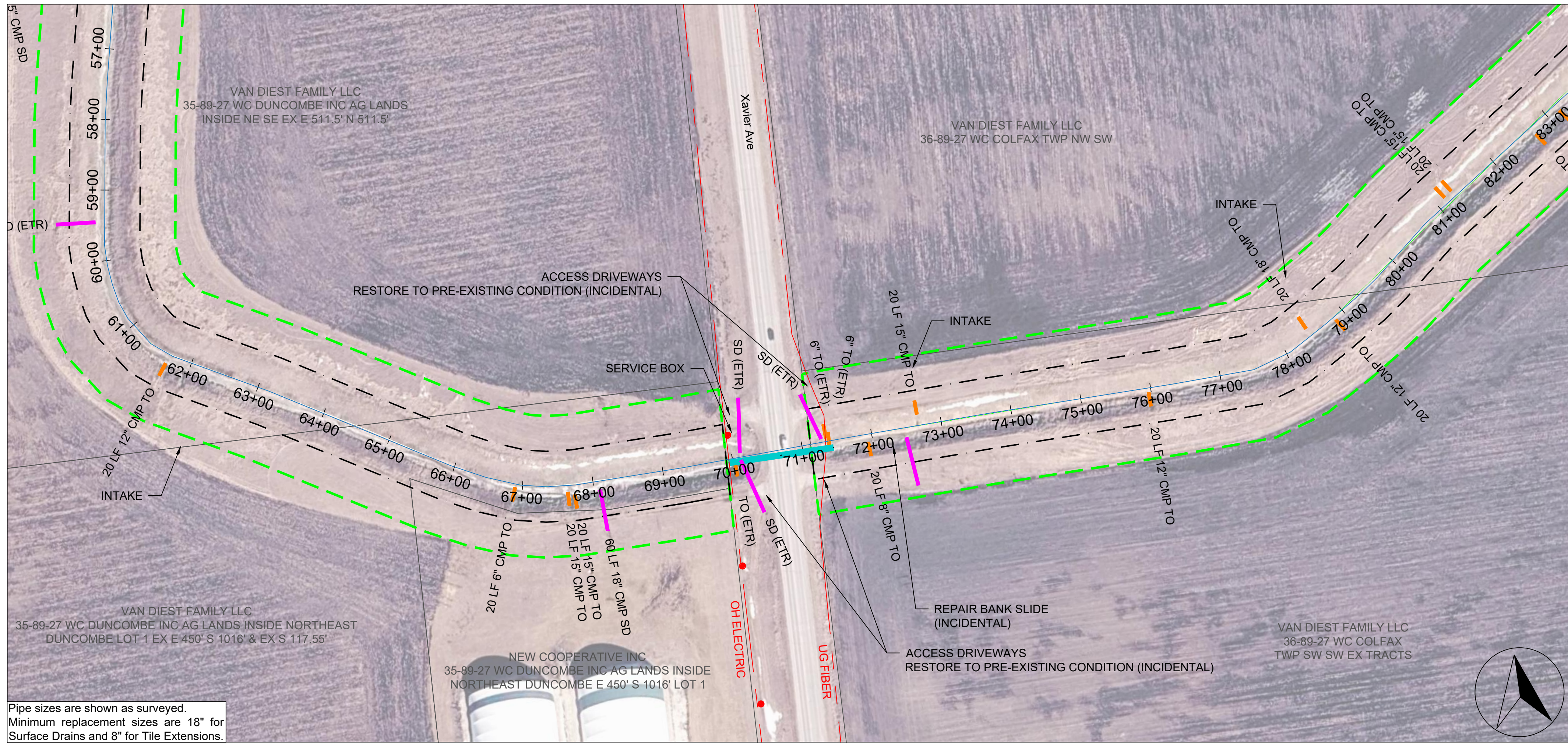
No.	Revision/Issue	Date

Sheet Name  
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**Open Ditch STA**  
**40+00 → 60+00**

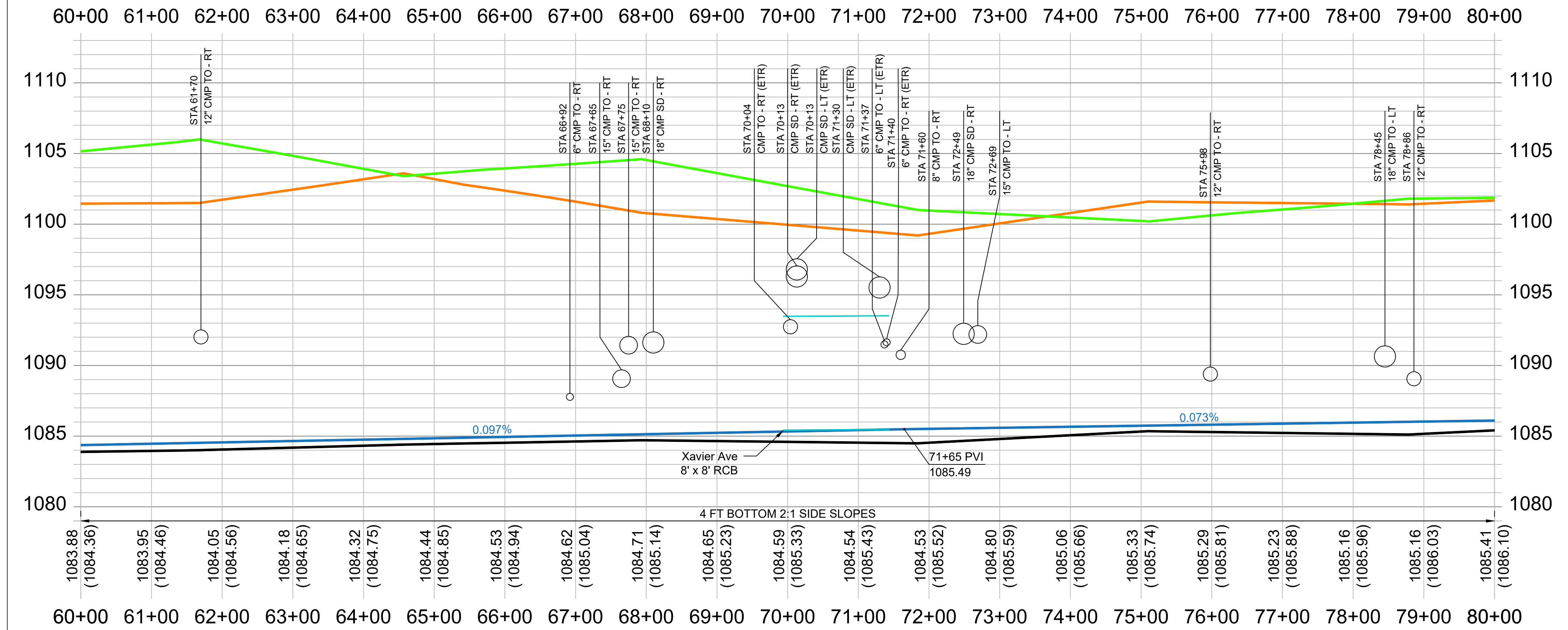
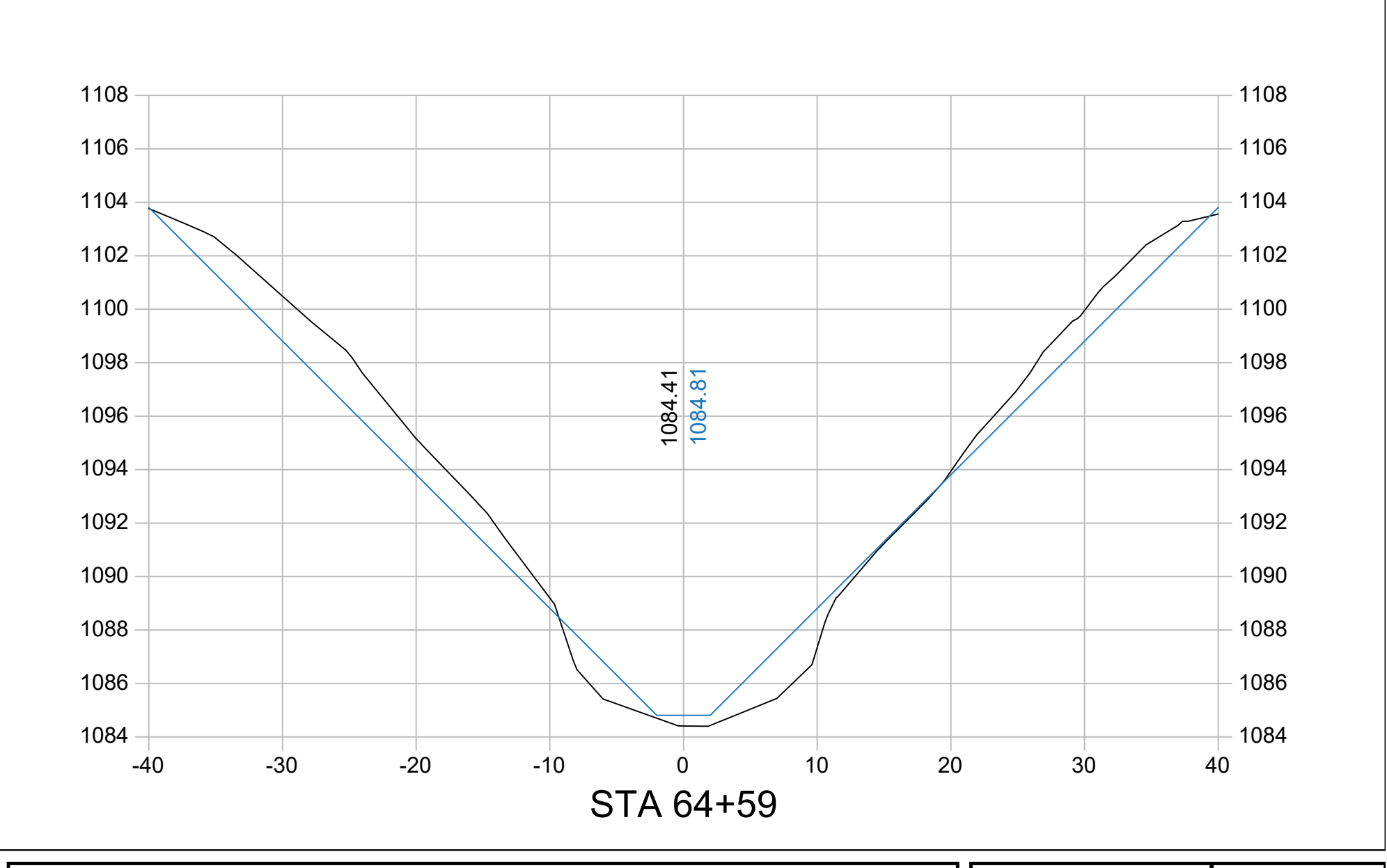
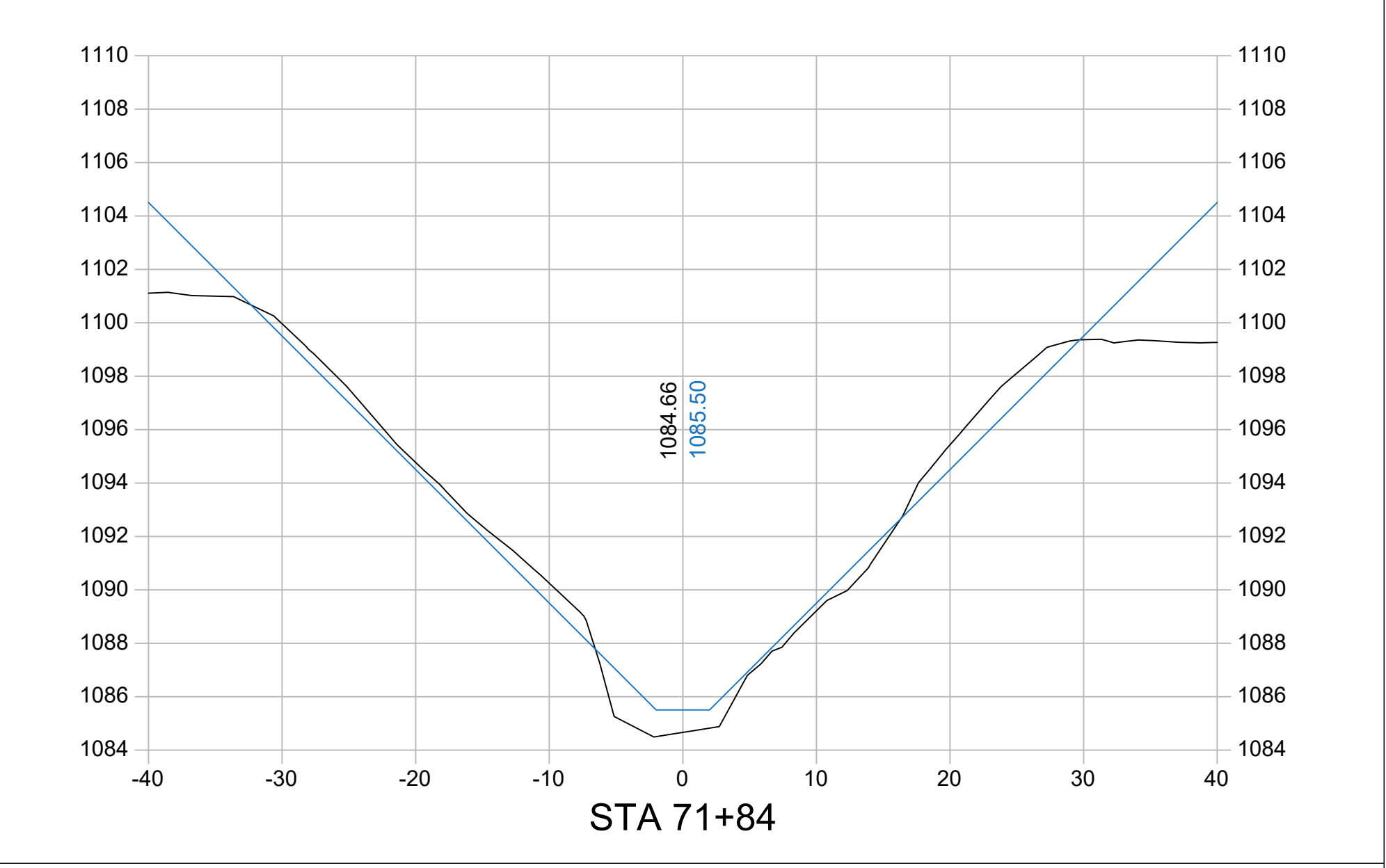
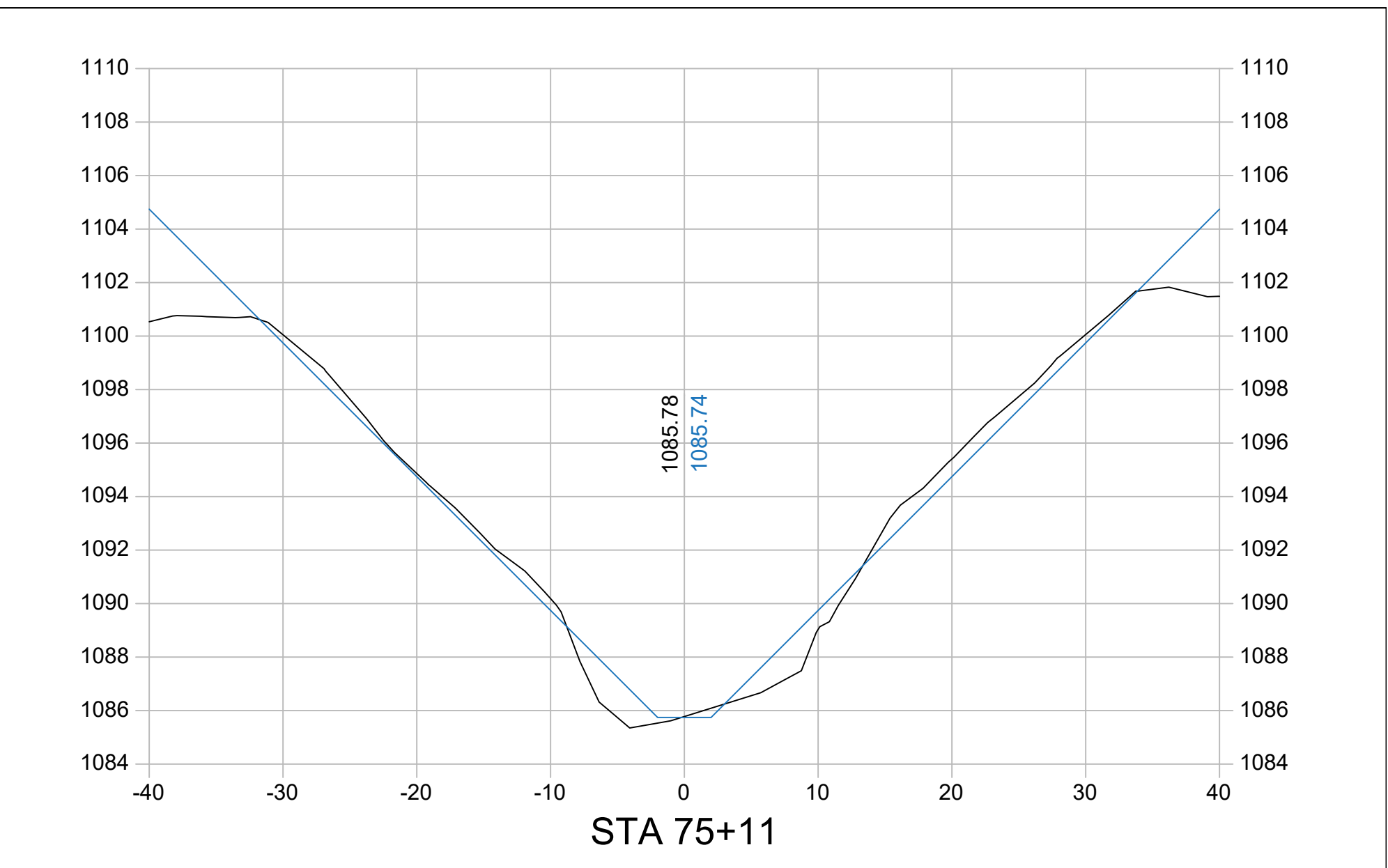
Project Name, Client, and Address  
**Open Ditch Repairs**  
**Joint Drainage District No. 4-263 Lat. 7**  
**Webster County, IA**  
**Xavier Ave & 210th St, Duncombe, IA 50532**

Project  
**2602-94**  
Date  
**2026-05-20**  
Plan Scale  
**1" = 200'**

D.03



Pipe sizes are shown as surveyed.  
Minimum replacement sizes are 18" for  
Surface Drains and 8" for Tile Extensions.



Company Information  
**AgriVia PLLC**  
PO Box 44  
1124 Willis Ave  
Perry, IA 50220

Designer  
**JLH**  
Drafter  
**TJB**  
Checker  
**JLH**

**PLAN LEGEND**  
Parcel Lines  
Work Area (100' each side)  
Ditch ROW (50' each side)  
Surface Drains  
Tile Outlets  
Utilities (in red)  
Power Poles

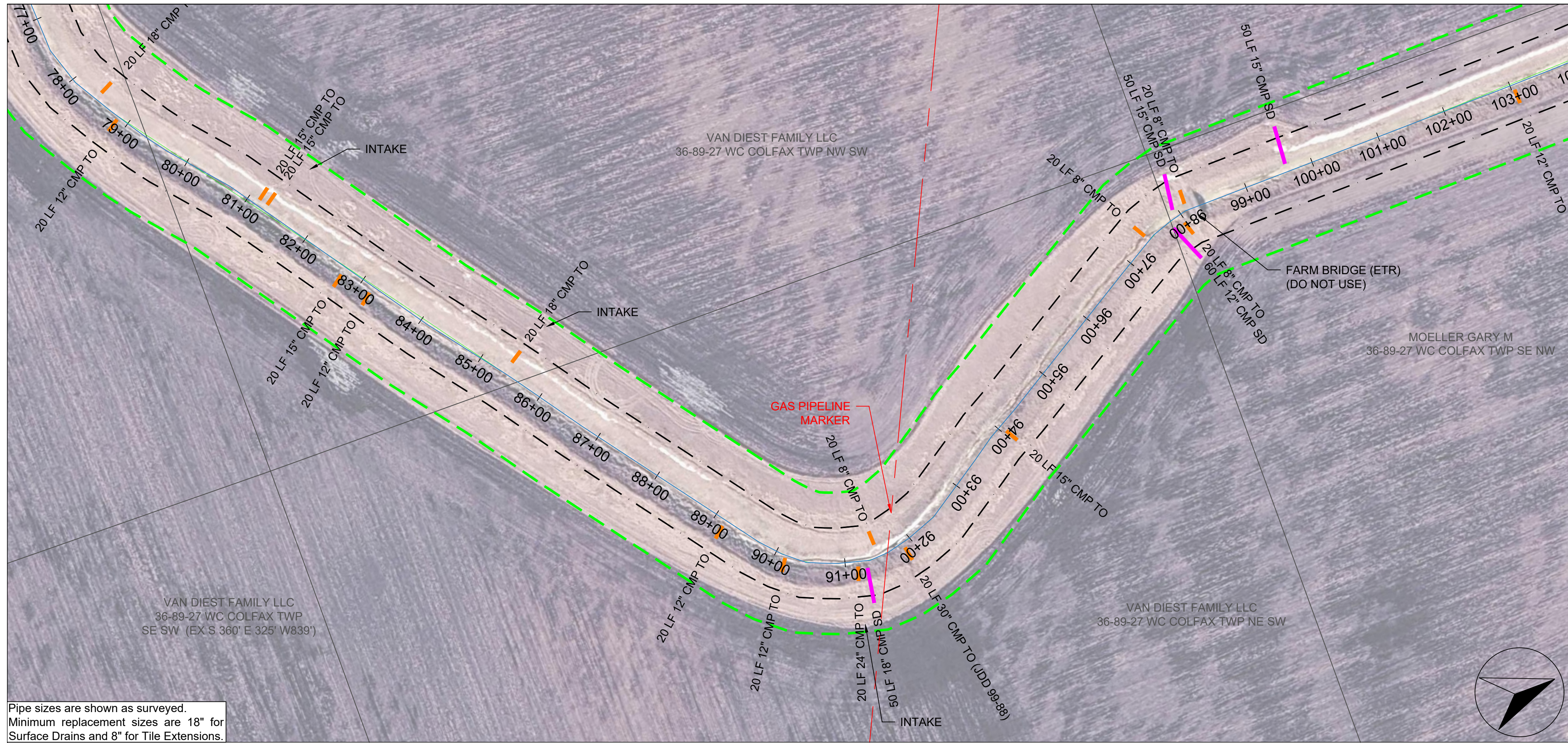
**PROFILE LEGEND**  
Design Ditch Grade  
Surveyed Ditch Bottom  
Left Top of Bank  
Right Top of Bank

No.	Revision/Issue	Date

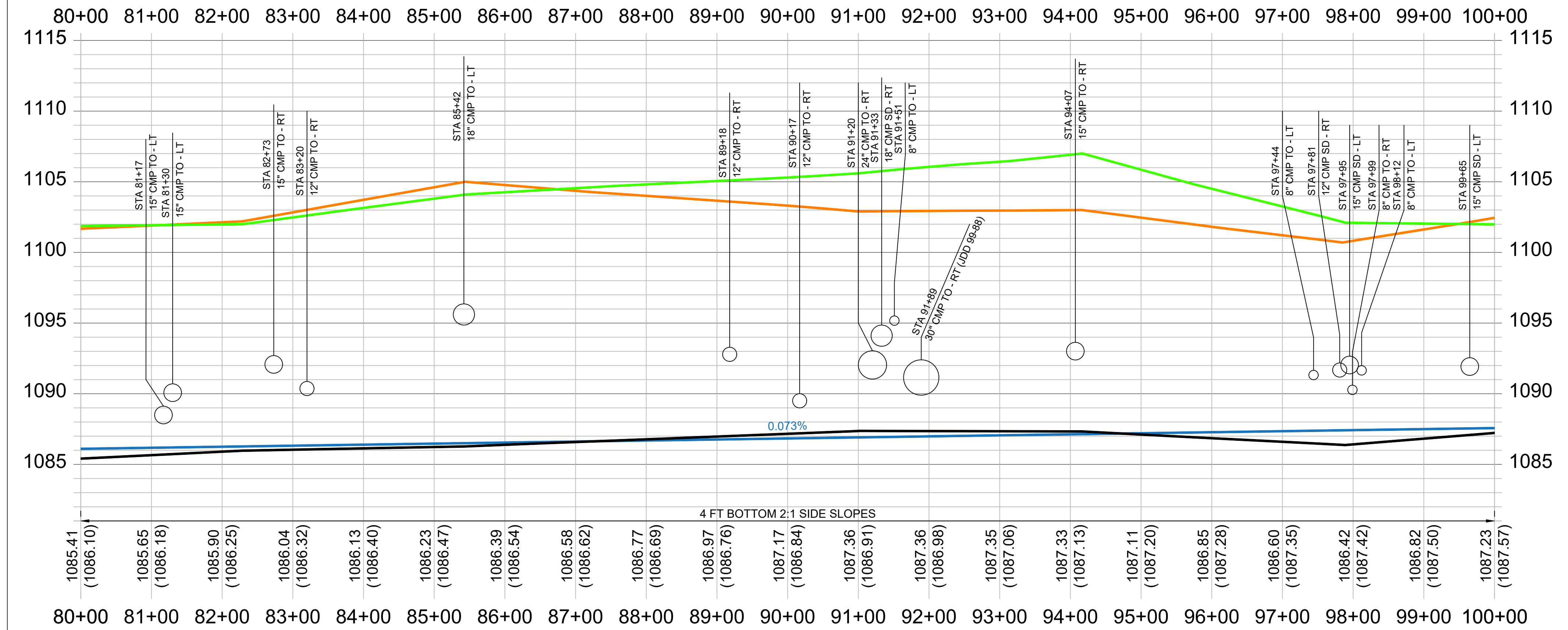
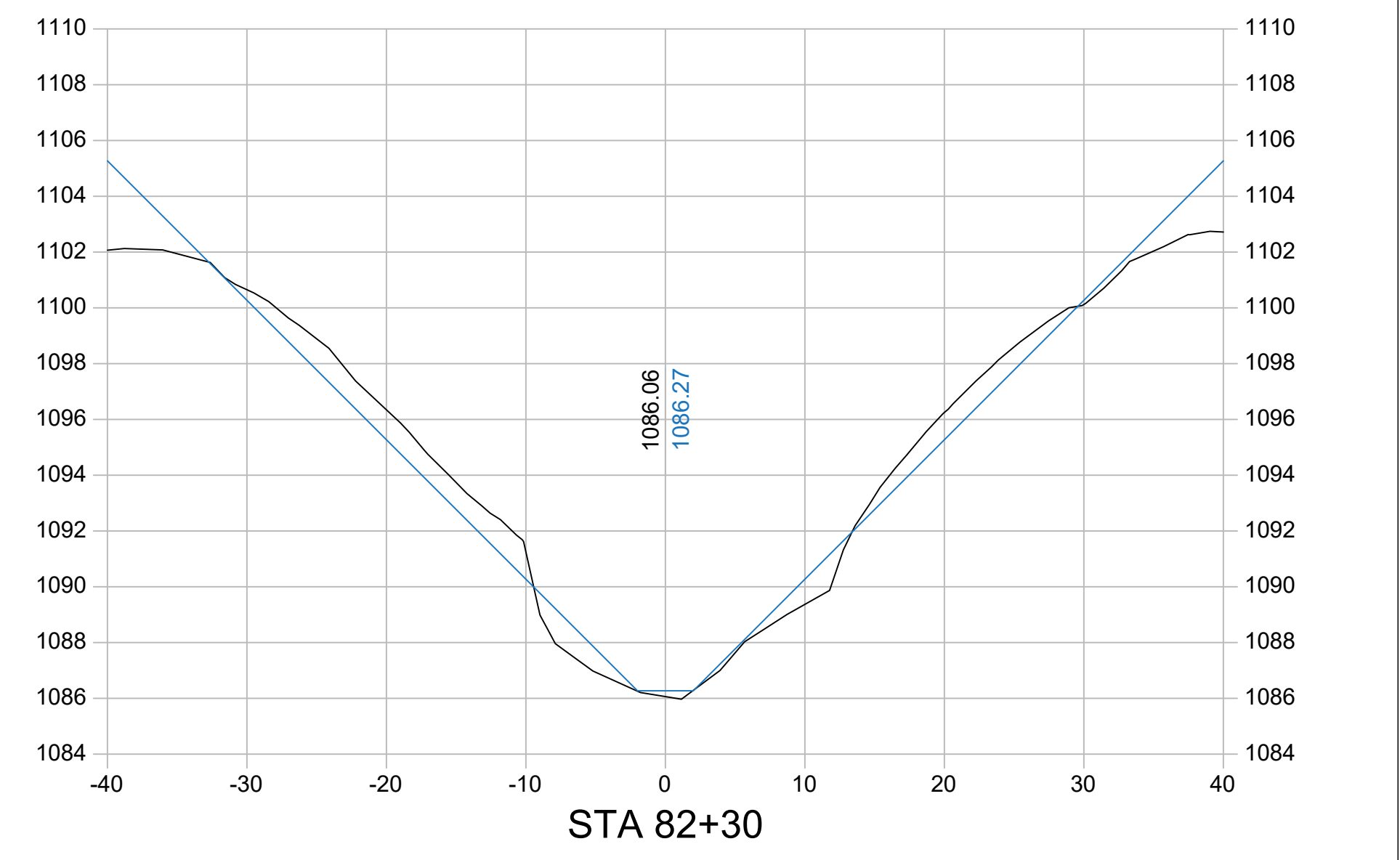
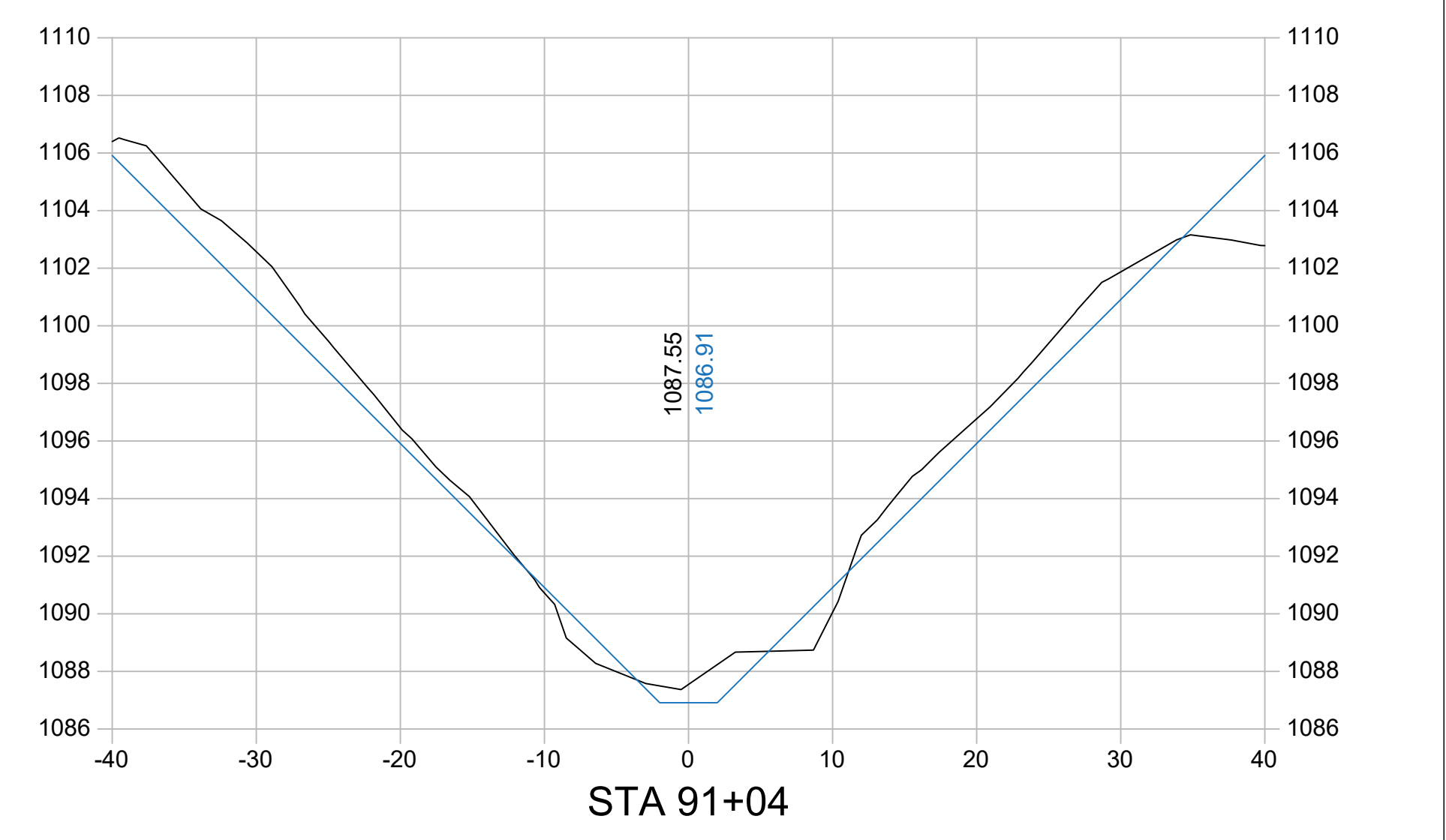
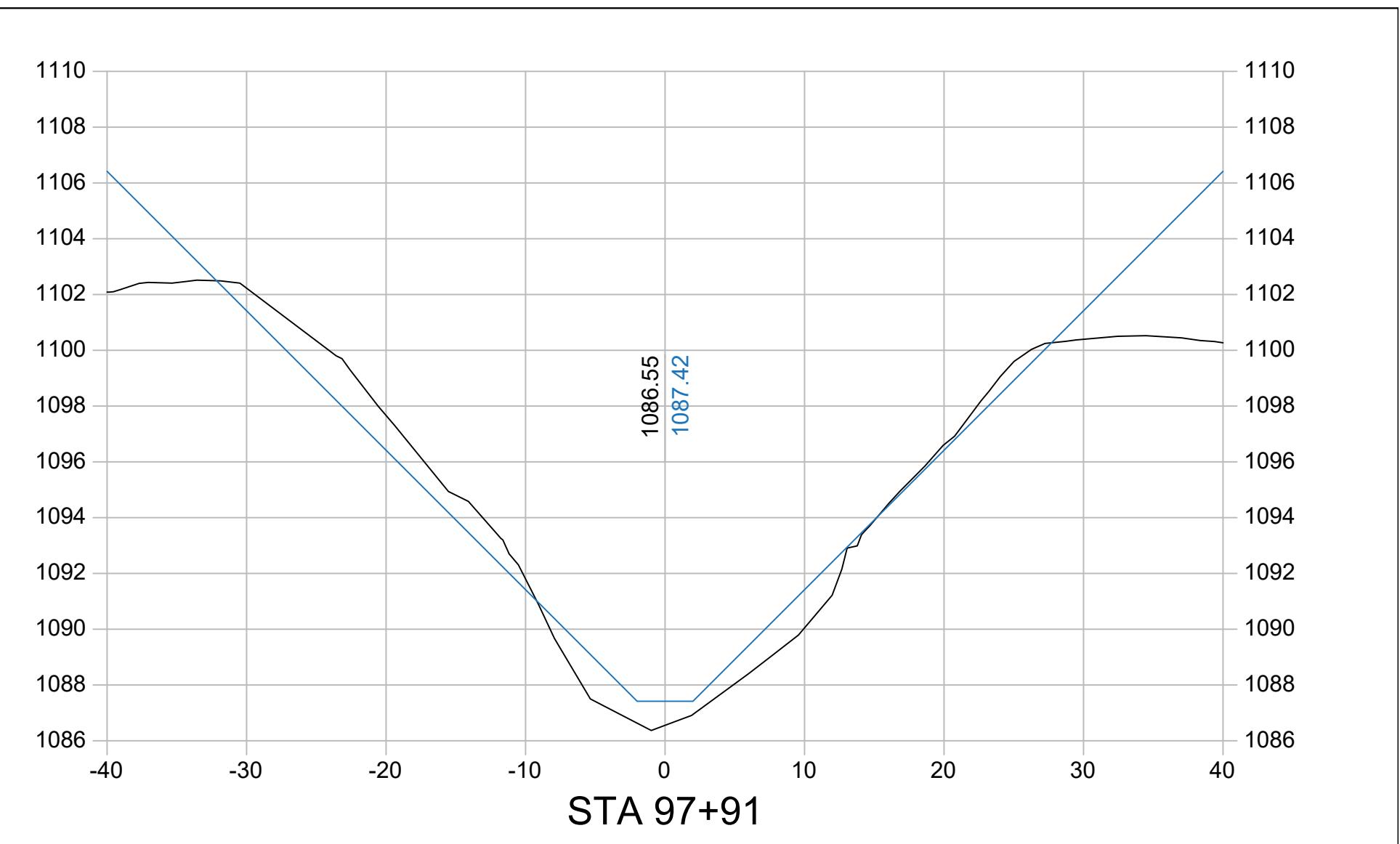
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Open Ditch STA  
60+00 → 80+00

Project Name, Client, and Address  
**Open Ditch Repairs**  
Joint Drainage District No. 4-263 Lat. 7  
Webster County, IA  
Xavier Ave & 210th St, Duncombe, IA 50532

Project  
**2602-94**  
Date  
**2026-05-20**  
Sheet  
**D.04**  
Plan Scale  
**1" = 200'**



Pipe sizes are shown as surveyed.  
 Minimum replacement sizes are 18" for Surface Drains and 8" for Tile Extensions.



Company Information  
**AgriVia PLLC**  
 PO Box 44  
 1124 Willis Ave  
 Perry, IA 50220

Designer  
**JLH**  
 Drafter  
**TJB**  
 Checker  
**JLH**

**PLAN LEGEND**  
 Parcel Lines  
 Work Area (100' each side)  
 Ditch ROW (50' each side)  
 Surface Drains  
 Tile Outlets  
 Utilities (in red)  
 Power Poles

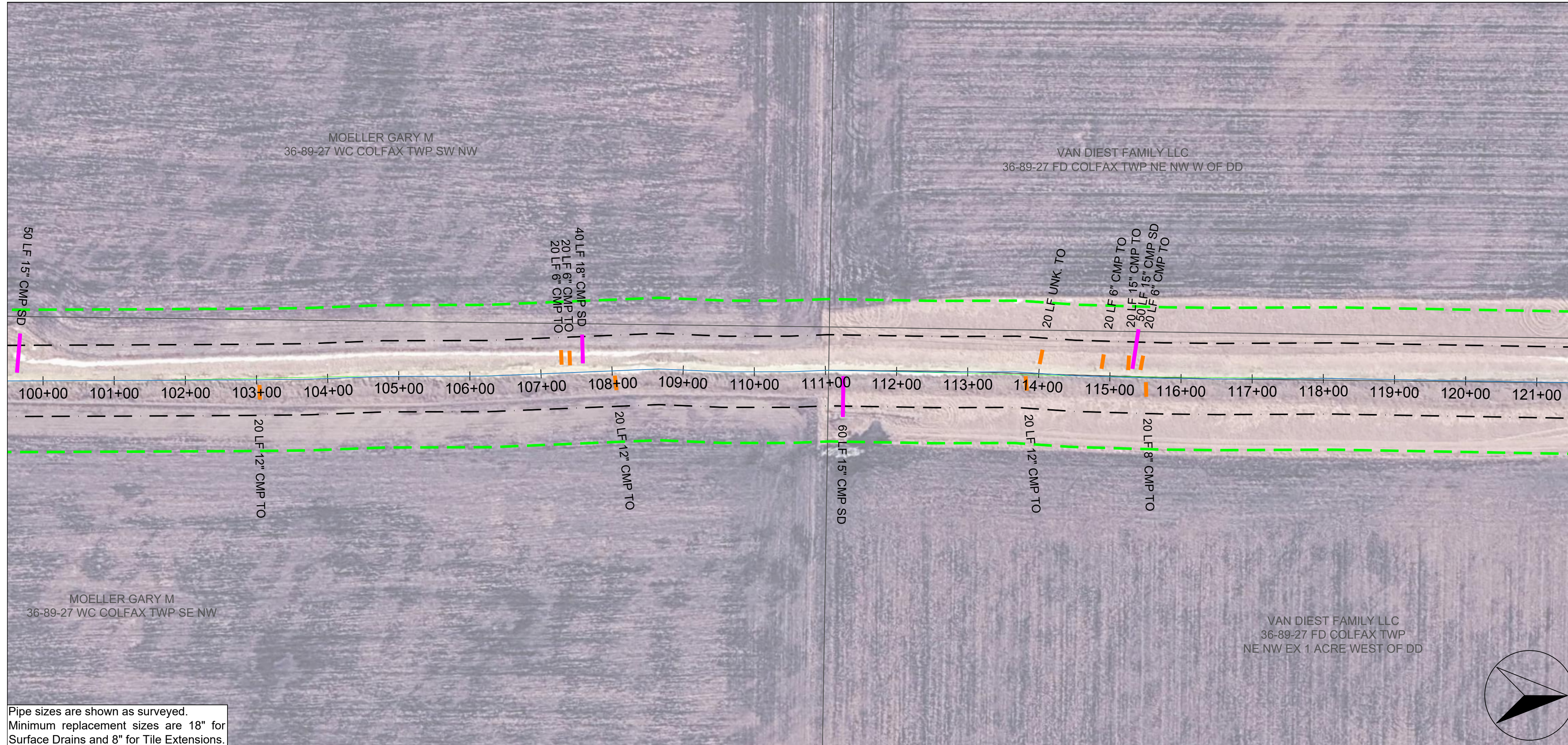
**PROFILE LEGEND**  
 Design Ditch Grade  
 Surveyed Ditch Bottom  
 Left Top of Bank  
 Right Top of Bank

No.	Revision/Issue	Date

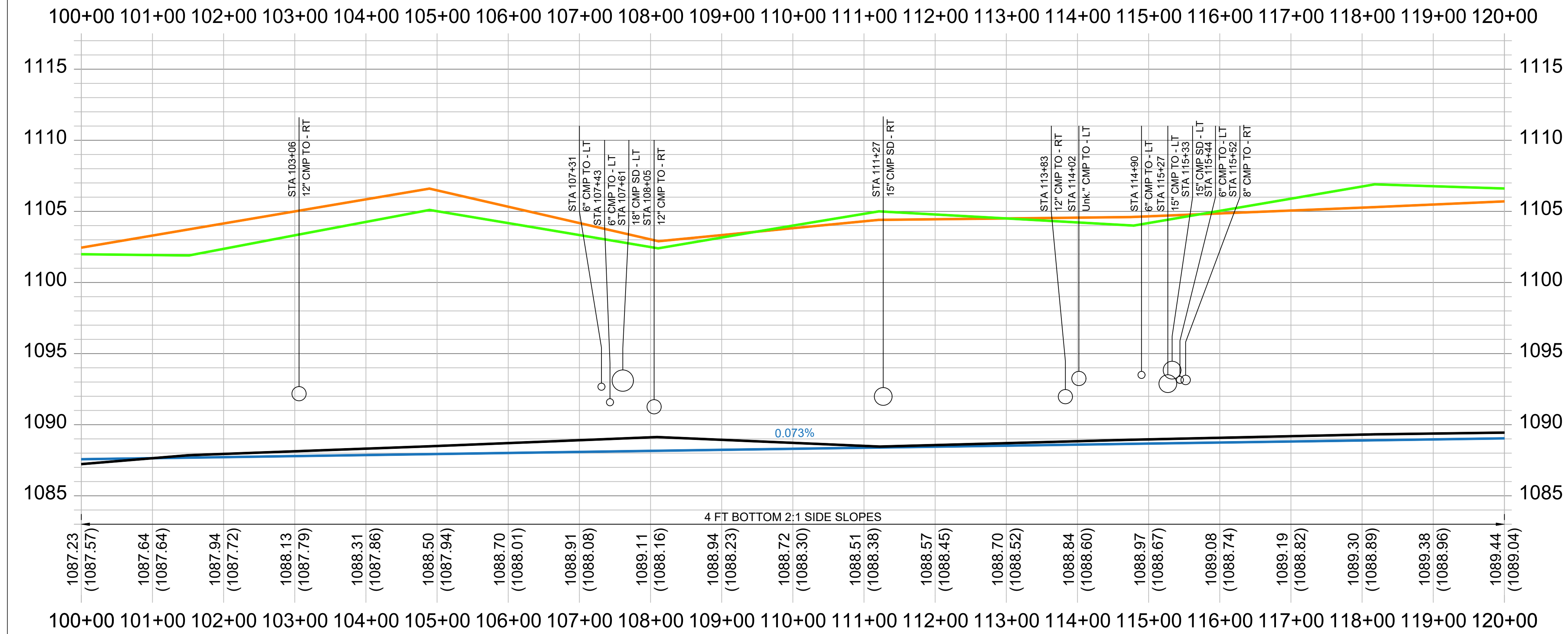
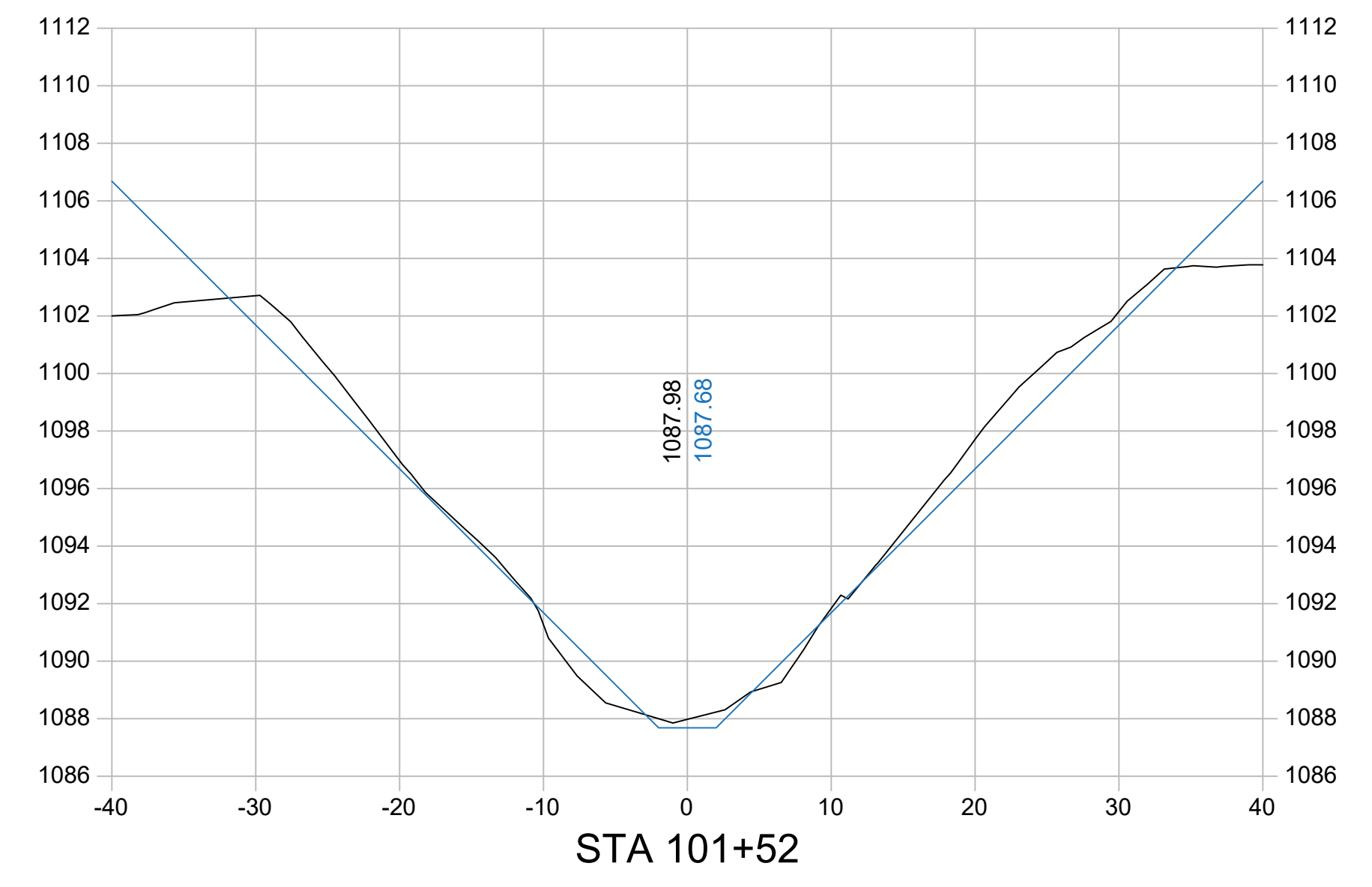
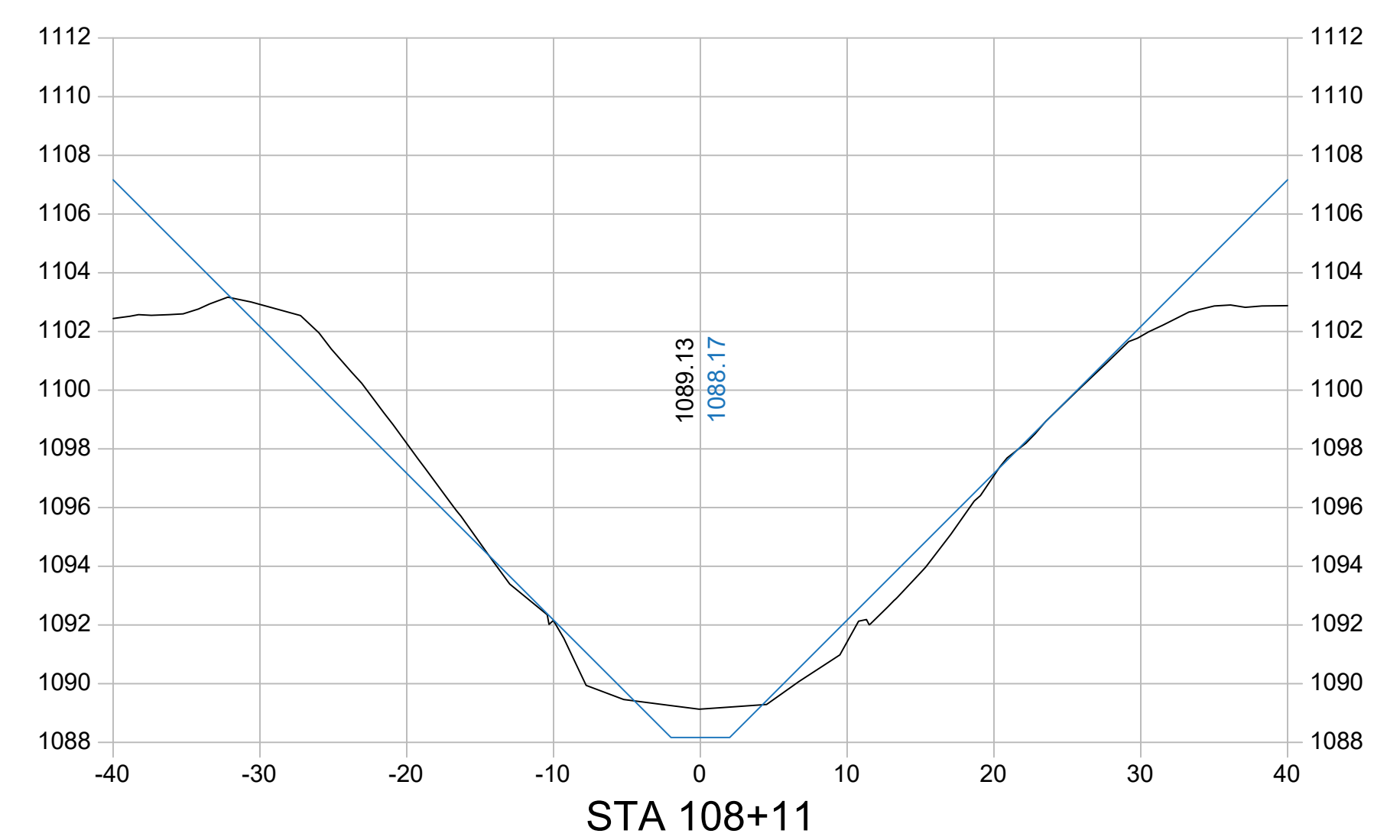
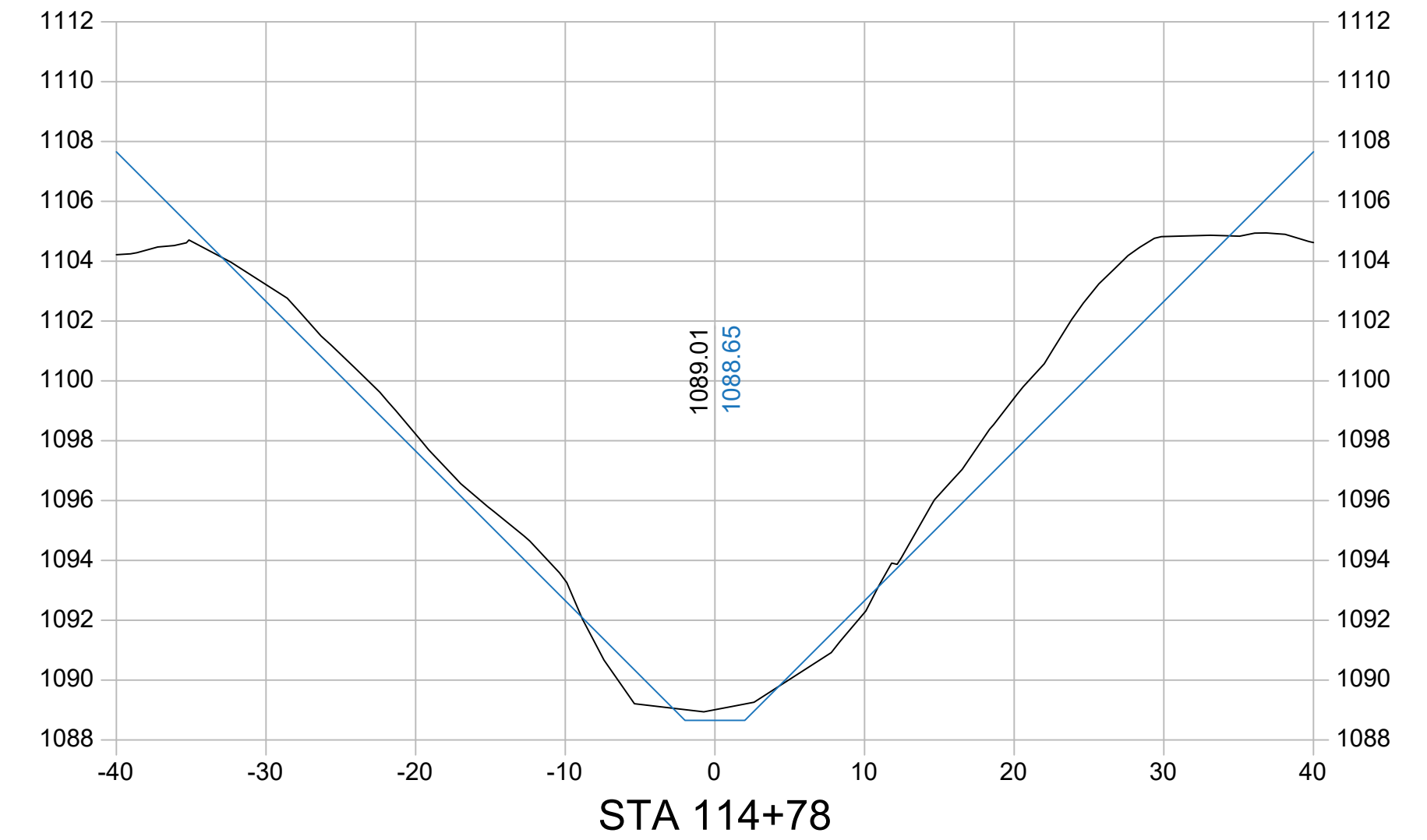
Sheet Name  
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**Open Ditch STA**  
**80+00 → 100+00**

Project Name, Client, and Address  
**Open Ditch Repairs**  
**Joint Drainage District No. 4-263 Lat. 7**  
**Webster County, IA**  
**Xavier Ave & 210th St, Duncombe, IA 50532**

Project  
**2602-94**  
 Date  
**2026-05-20**  
 Sheet  
**D.05**  
 Plan Scale  
**1" = 200'**



Pipe sizes are shown as surveyed.  
Minimum replacement sizes are 18" for Surface Drains and 8" for Tile Extensions.



Company Information  
**AgriVia PLLC**  
PO Box 44  
1124 Willis Ave  
Perry, IA 50220

Designer  
**JLH**  
Drafter  
**TJB**  
Checker  
**JLH**

**PLAN LEGEND**

- Parcel Lines
- Work Area (100' each side)
- Ditch ROW (50' each side)
- Surface Drains
- Tile Outlets
- Utilities (in red)
- Power Poles

**PROFILE LEGEND**

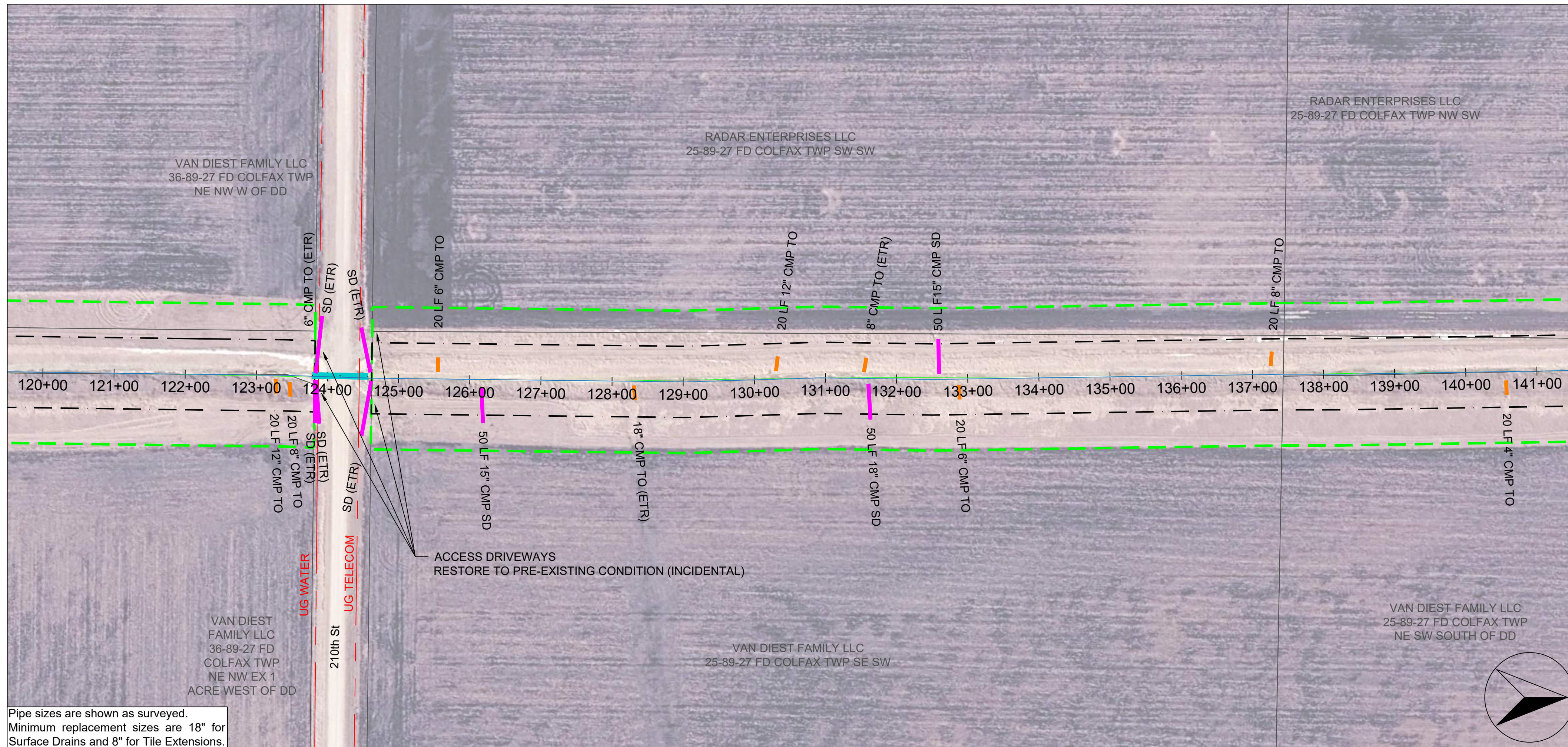
- Design Ditch Grade
- Surveyed Ditch Bottom
- Left Top of Bank
- Right Top of Bank

No.	Revision/Issue	Date

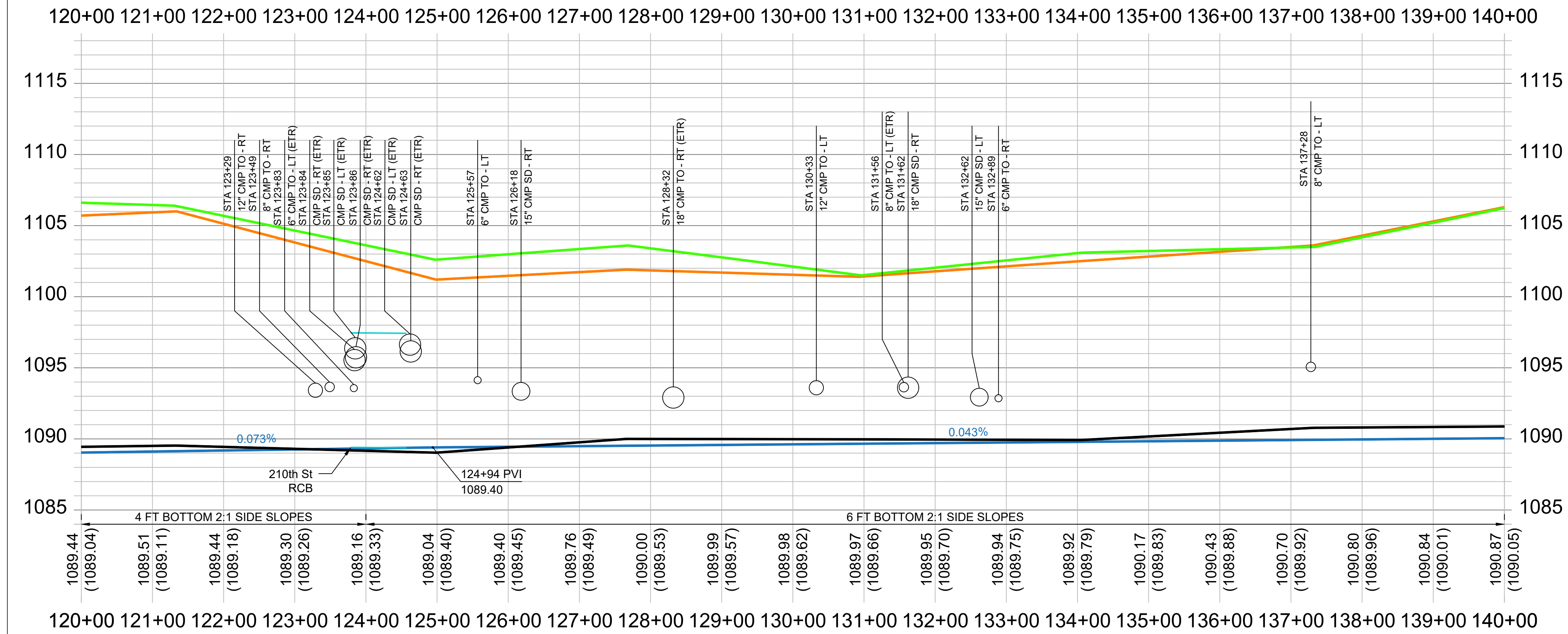
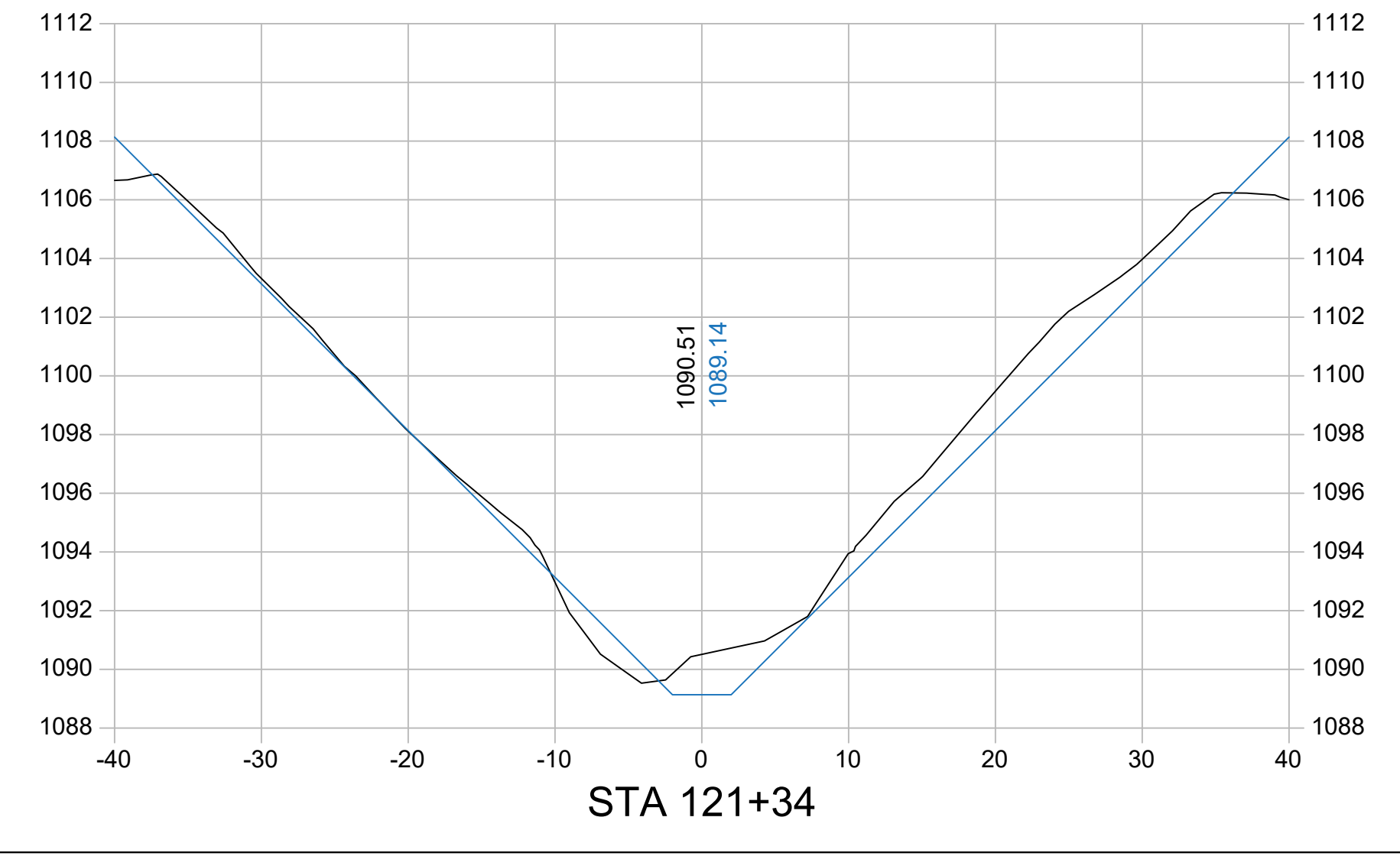
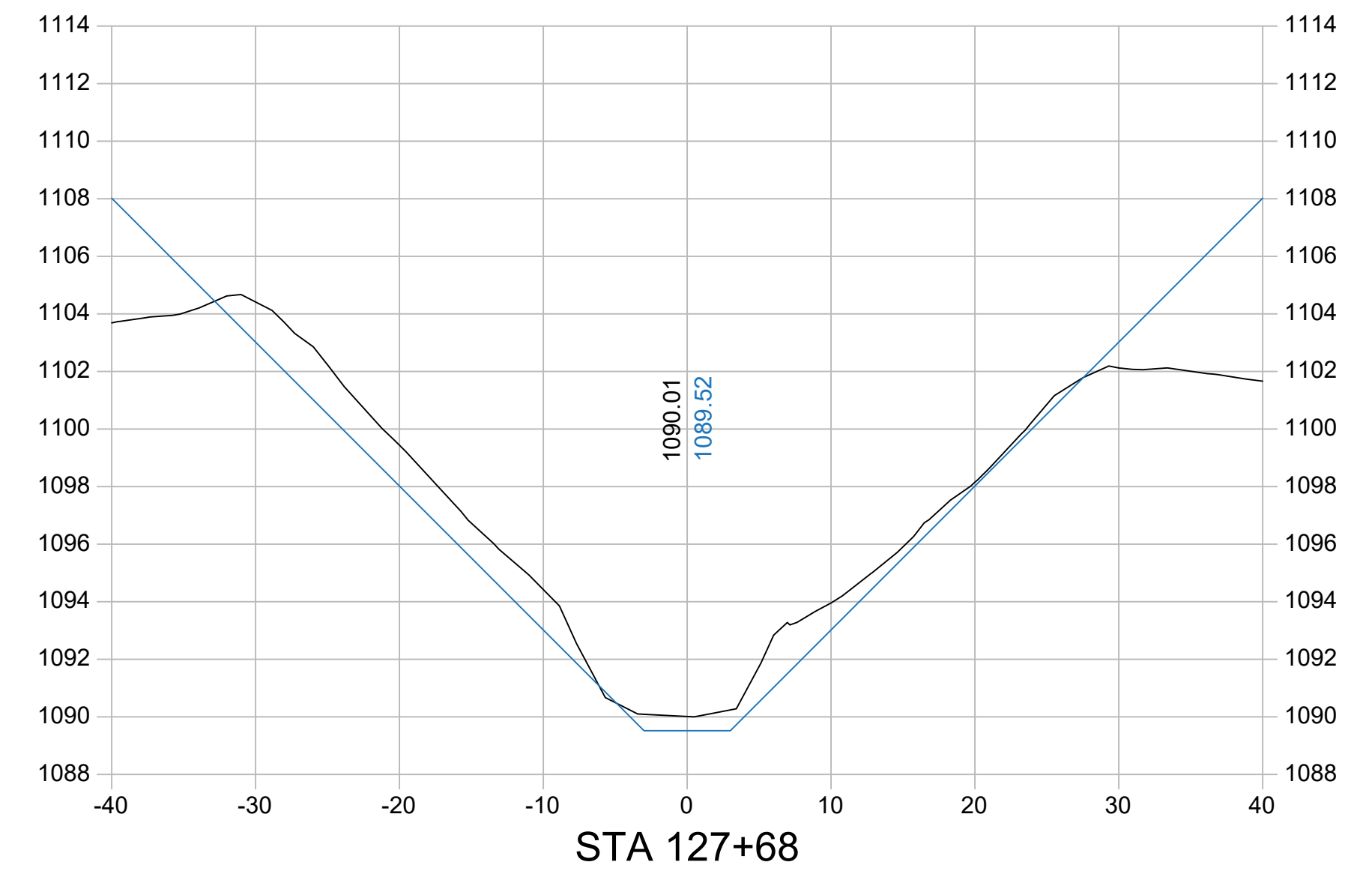
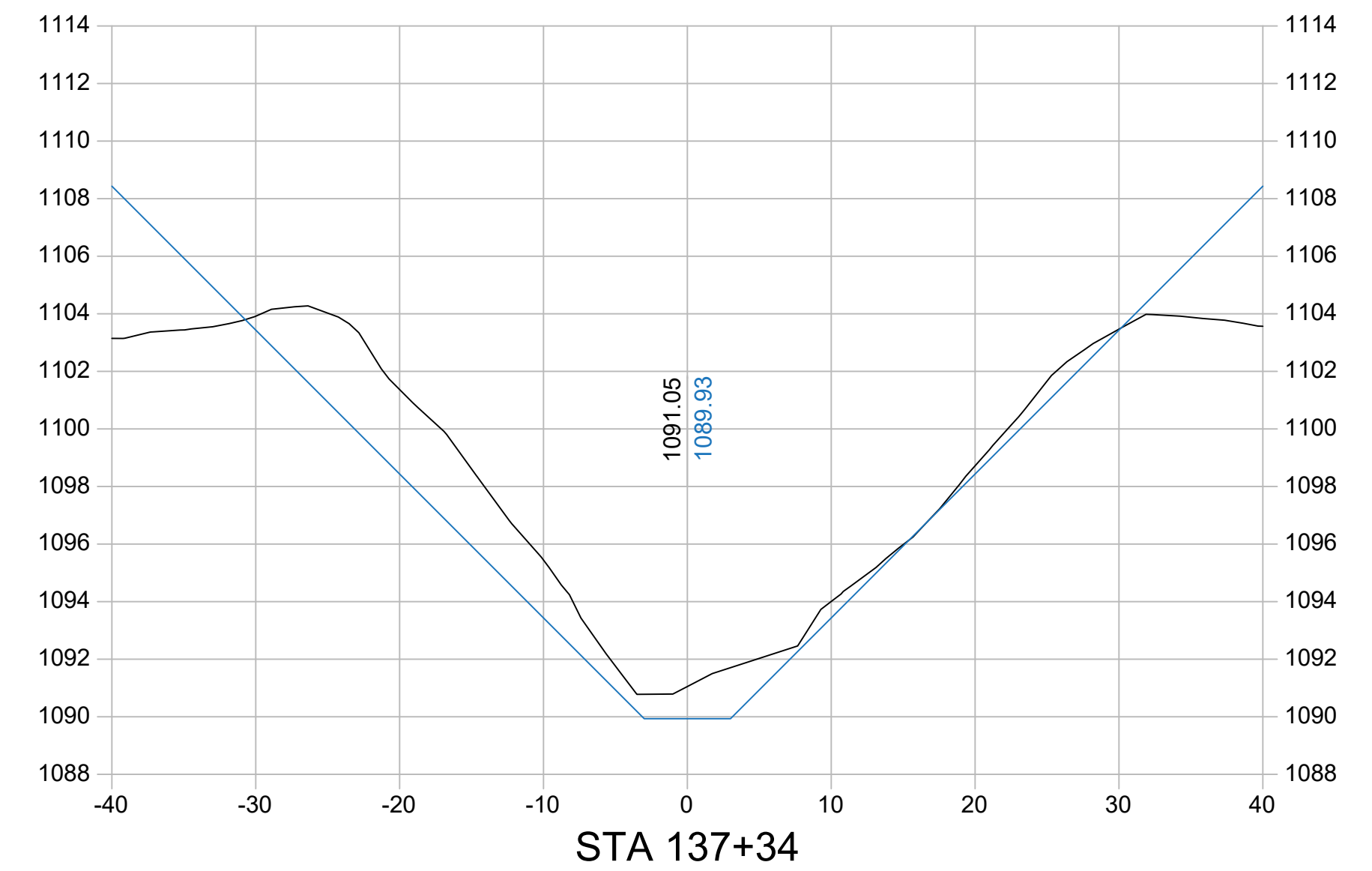
Sheet Name  
**Plan & Profile - Lat. 7**  
**Open Ditch STA**  
**100+00 → 120+00**

Project Name, Client, and Address  
**Open Ditch Repairs**  
**Joint Drainage District No. 4-263 Lat. 7**  
**Webster County, IA**  
**Xavier Ave & 210th St, Duncombe, IA 50532**

Project <b>2602-94</b>	Sheet
Date <b>2026-05-20</b>	<b>D.06</b>
Plan Scale <b>1" = 200'</b>	



Pipe sizes are shown as surveyed.  
Minimum replacement sizes are 18" for Surface Drains and 8" for Tile Extensions.



Company Information  
**AgriVia PLLC**  
 PO Box 44  
 1124 Willis Ave  
 Perry, IA 50220

Designer  
**JLH**  
 Drafter  
**TJB**  
 Checker  
**JLH**

**PLAN LEGEND**  
 Parcel Lines  
 Work Area (100' each side)  
 Ditch ROW (50' each side)  
 Surface Drains  
 Tile Outlets  
 Utilities (in red)  
 Power Poles

**PROFILE LEGEND**  
 Design Ditch Grade  
 Surveyed Ditch Bottom  
 Left Top of Bank  
 Right Top of Bank

No.	Revision/Issue	Date

Sheet Name  
**Plan & Profile - Lat. 7**  
**Open Ditch STA**  
**120+00 → 140+00**

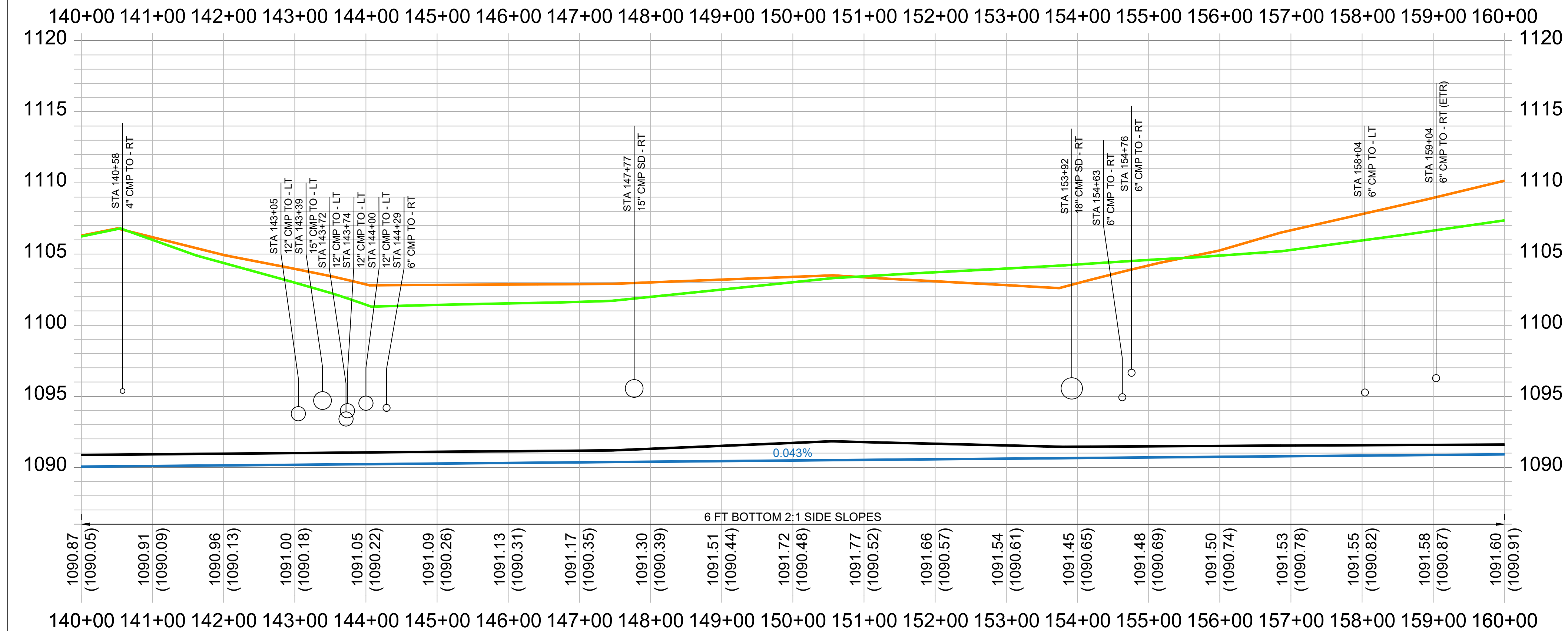
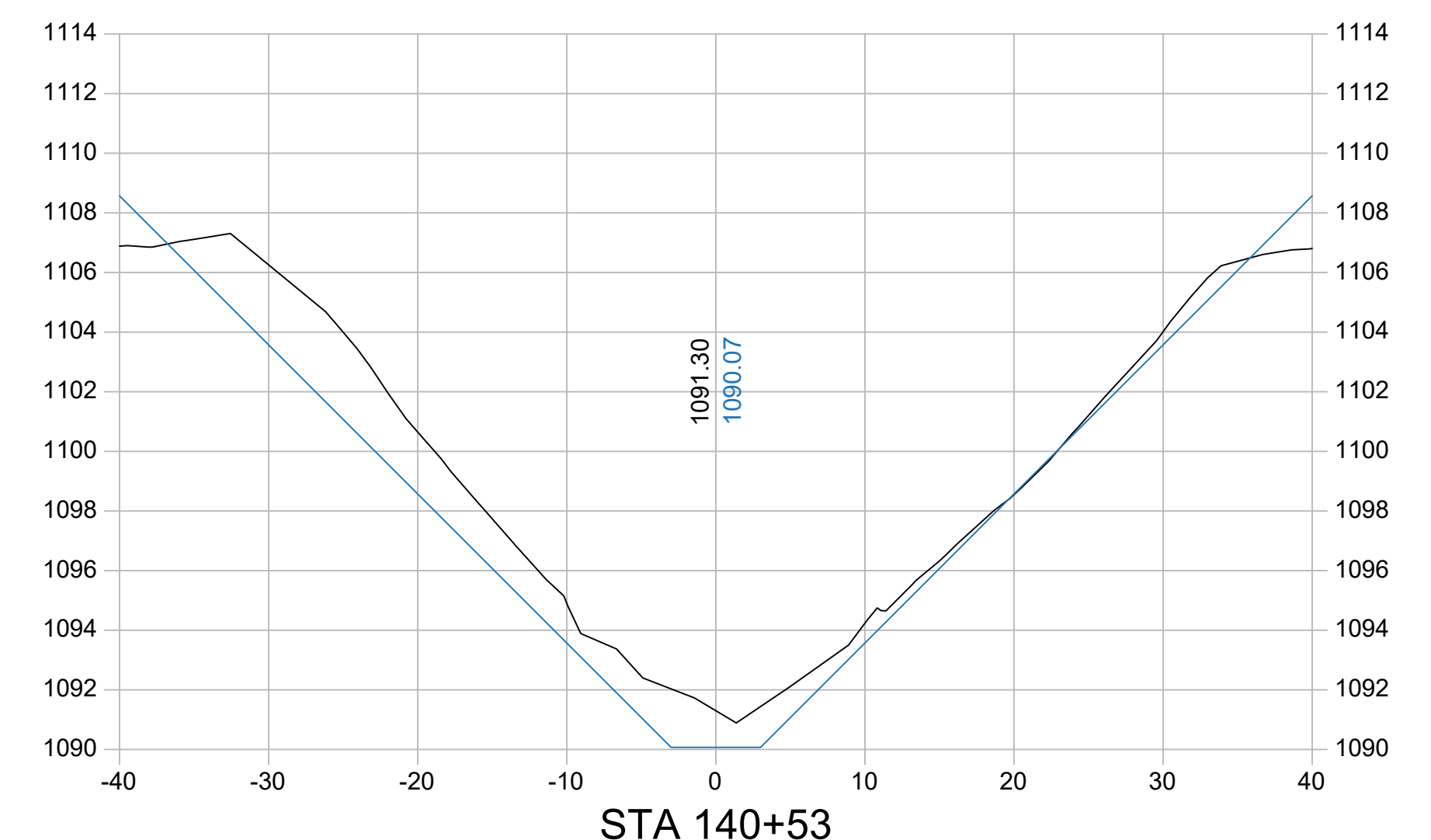
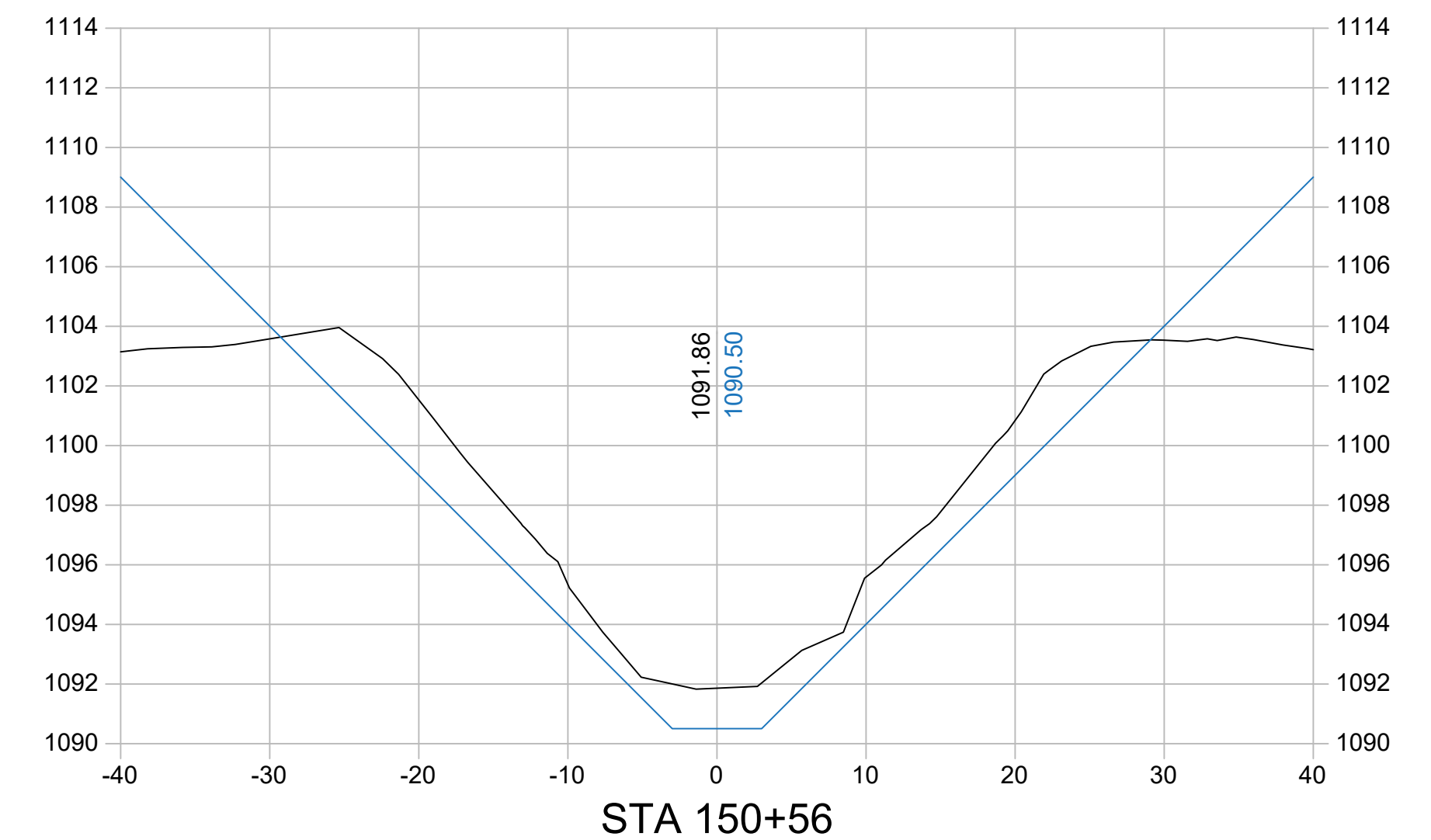
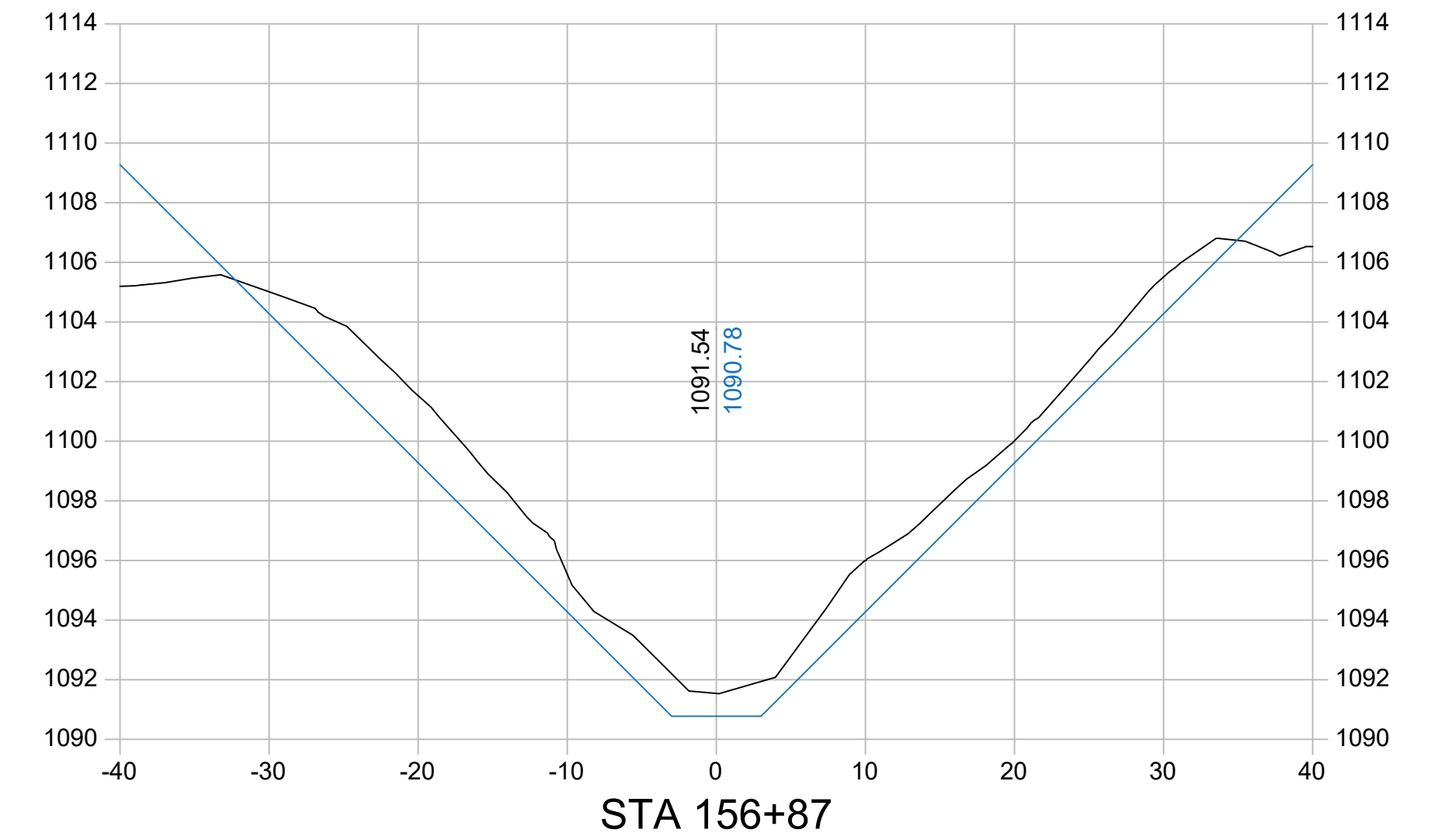
Project Name, Client, and Address  
**Open Ditch Repairs**  
**Joint Drainage District No. 4-263 Lat. 7**  
**Webster County, IA**  
**Xavier Ave & 210th St, Duncombe, IA 50532**

Project  
**2602-94**  
 Date  
**2026-05-20**  
 Plan Scale  
**1" = 200'**

Sheet  
**D.07**



Pipe sizes are shown as surveyed.  
 Minimum replacement sizes are 18" for  
 Surface Drains and 8" for  
 Tile Extensions.



Company Information  
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 Perry, IA 50220

Designer  
**JLH**  
 Drafter  
**TJB**  
 Checker  
**JLH**

**PLAN LEGEND**

Parcel Lines	—
Work Area (100' each side)	- - - - -
Ditch ROW (50' each side)	— · — · — · — · —
Surface Drains	— · — · — · — · —
Tile Outlets	— · — · — · — · —
Utilities (in red)	— · — · — · — · —
Power Poles	●

**PROFILE LEGEND**

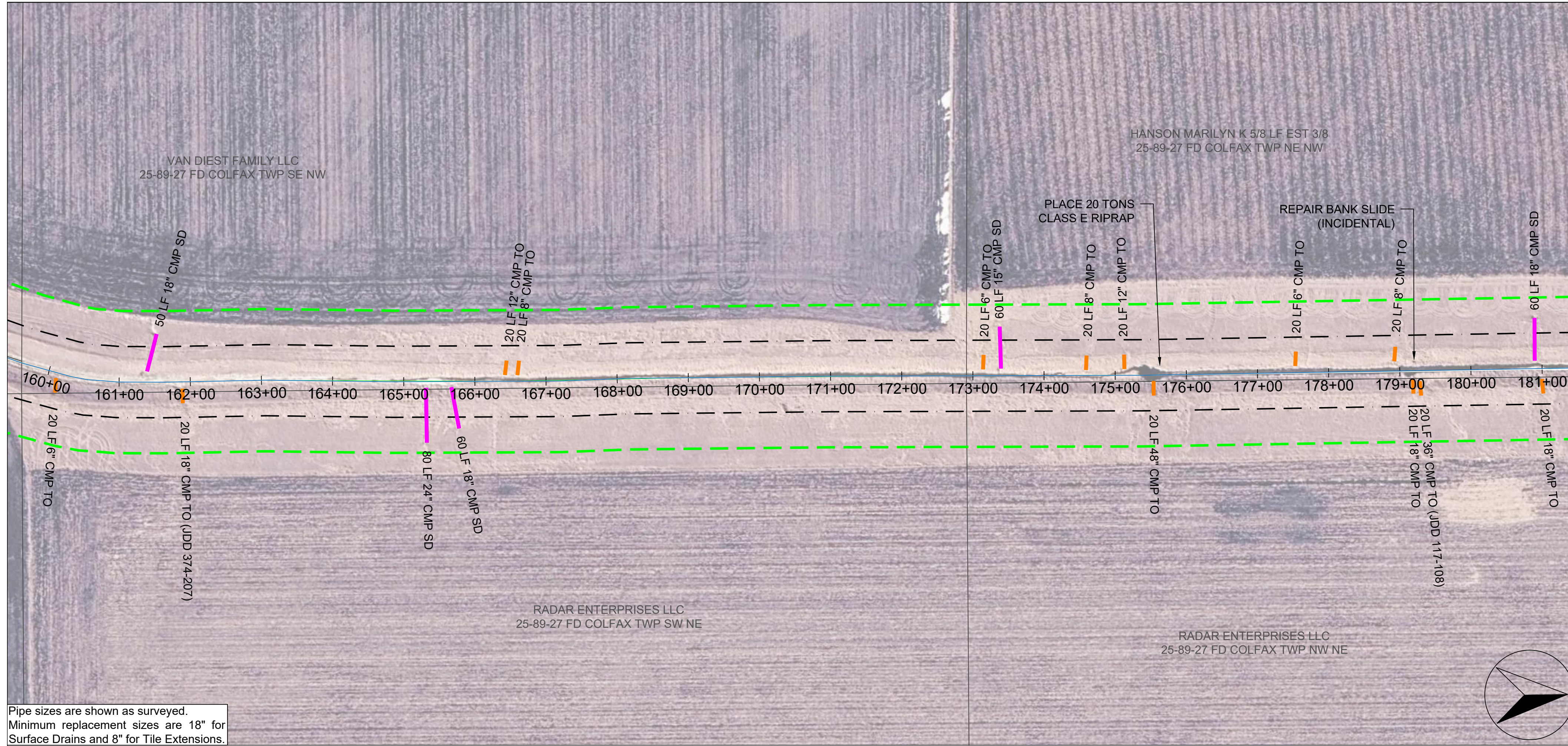
Design Ditch Grade	—
Surveyed Ditch Bottom	—
Left Top of Bank	—
Right Top of Bank	—

No.	Revision/Issue	Date

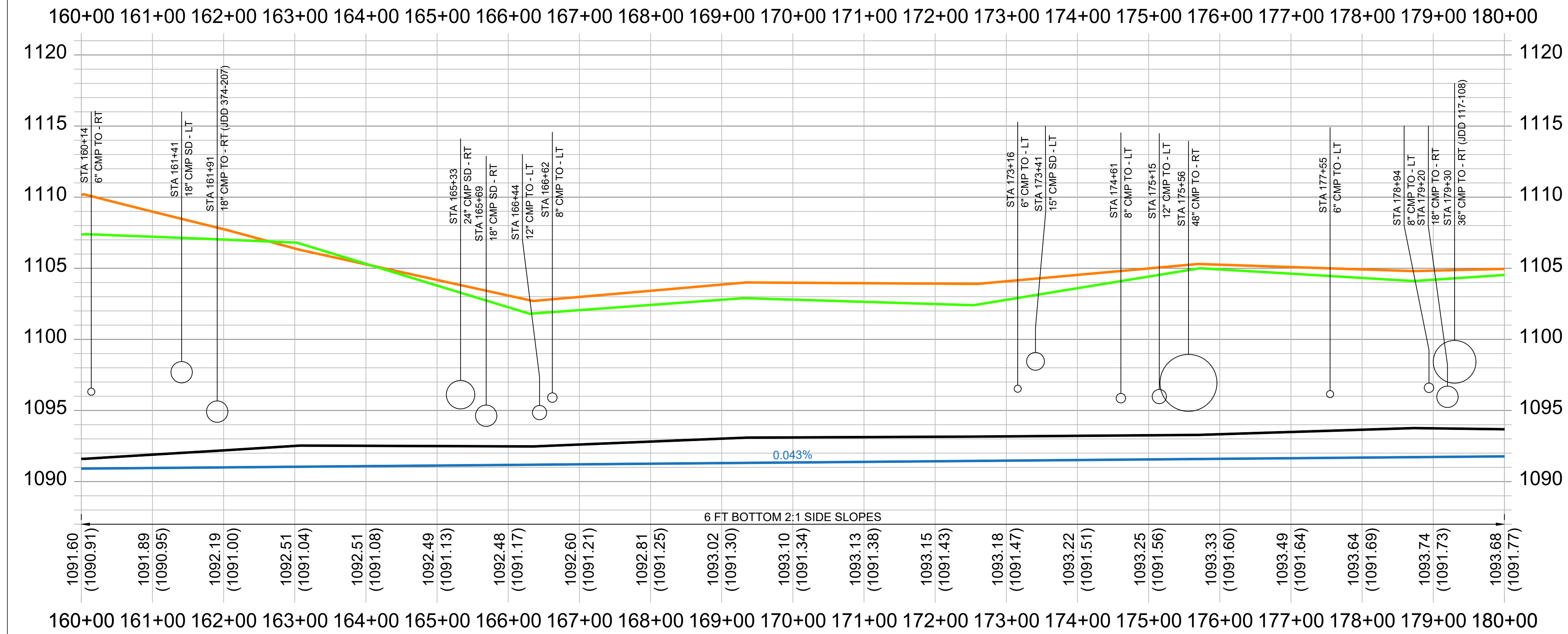
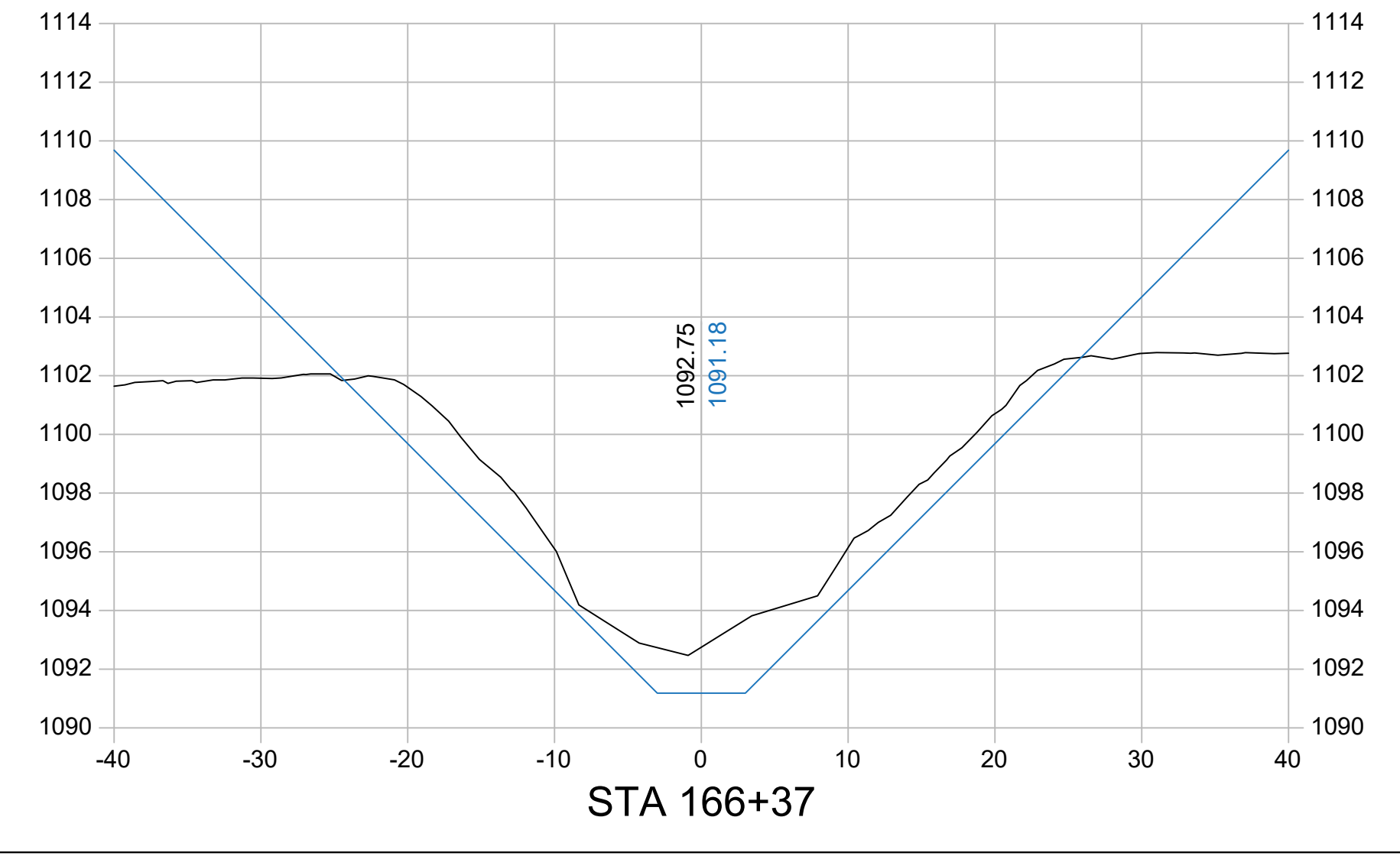
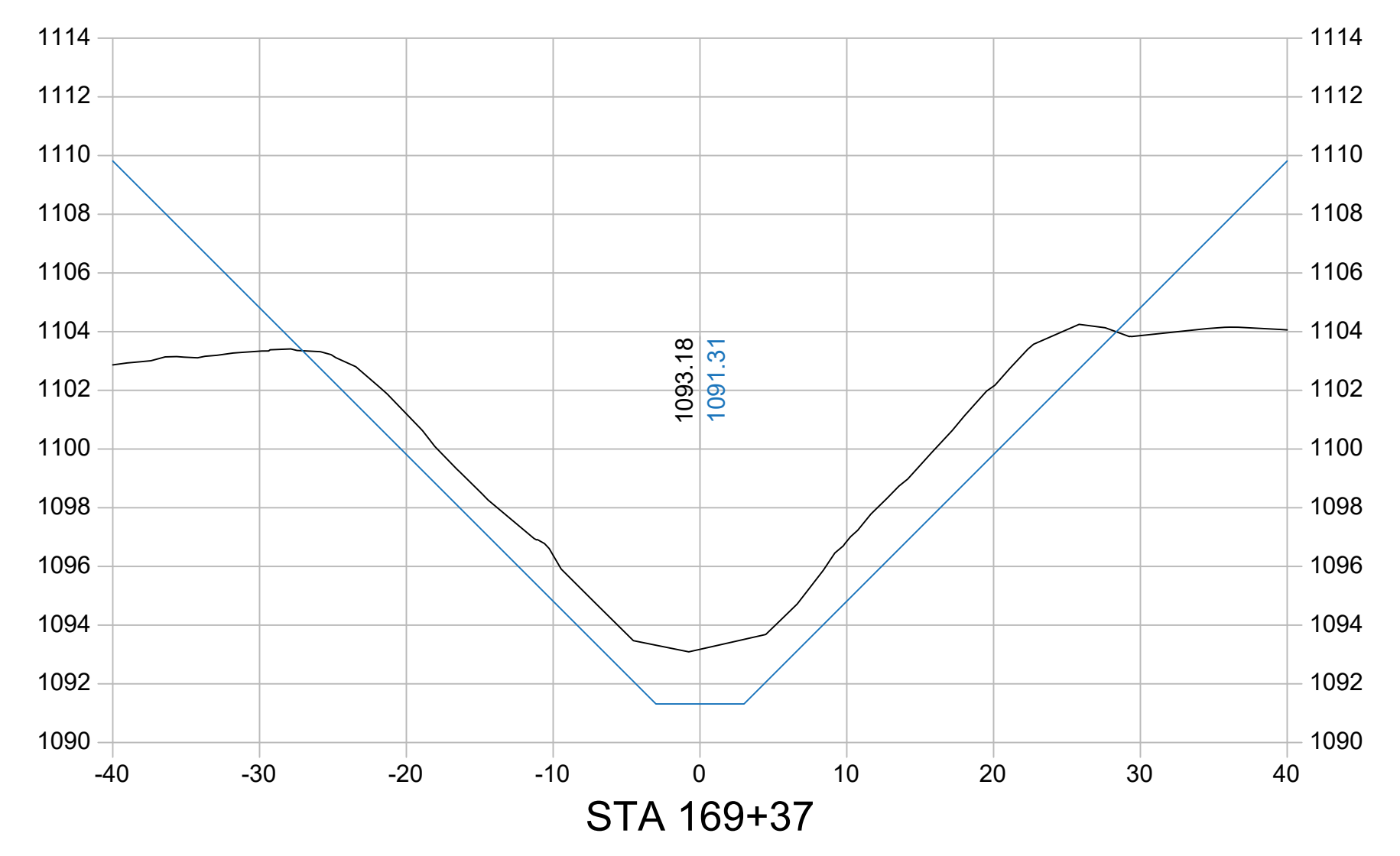
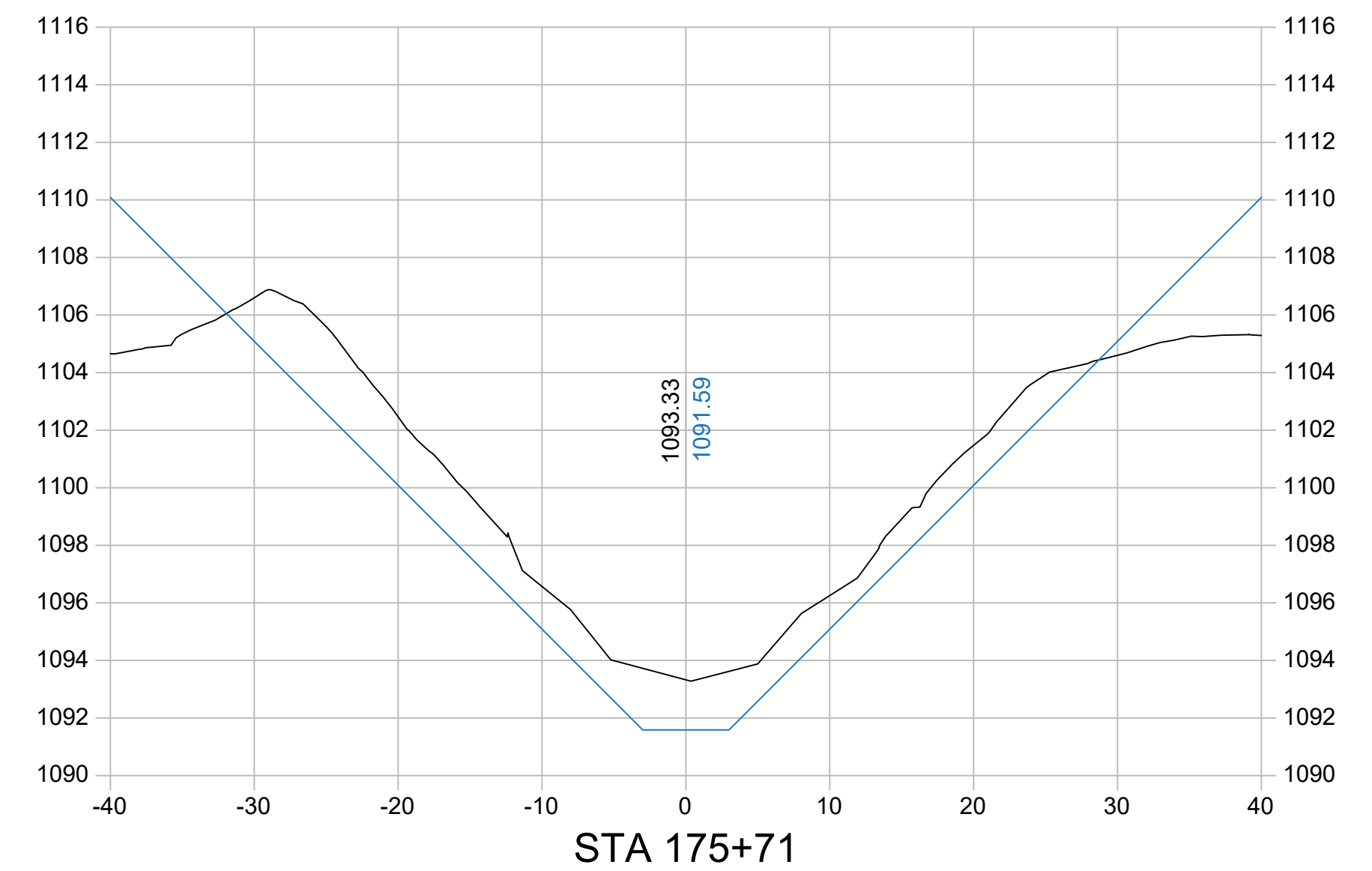
Sheet Name  
**Plan & Profile - Lat. 7**  
**Open Ditch STA**  
**140+00 → 160+00**

Project Name, Client, and Address  
**Open Ditch Repairs**  
**Joint Drainage District No. 4-263 Lat. 7**  
**Webster County, IA**  
**Xavier Ave & 210th St, Duncombe, IA 50532**

Project <b>2602-94</b>	Sheet <b>D.08</b>
Date <b>2026-05-20</b>	
Plan Scale <b>1" = 200'</b>	



Pipe sizes are shown as surveyed.  
Minimum replacement sizes are 18" for Surface Drains and 8" for Tile Extensions.



Company Information  
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Designer  
**JLH**  
 Drafter  
**TJB**  
 Checker  
**JLH**

**PLAN LEGEND**

- Parcel Lines
- Work Area (100' each side)
- Ditch ROW (50' each side)
- Surface Drains
- Tile Outlets
- Utilities (in red)
- Power Poles

**PROFILE LEGEND**

- Design Ditch Grade
- Surveyed Ditch Bottom
- Left Top of Bank
- Right Top of Bank

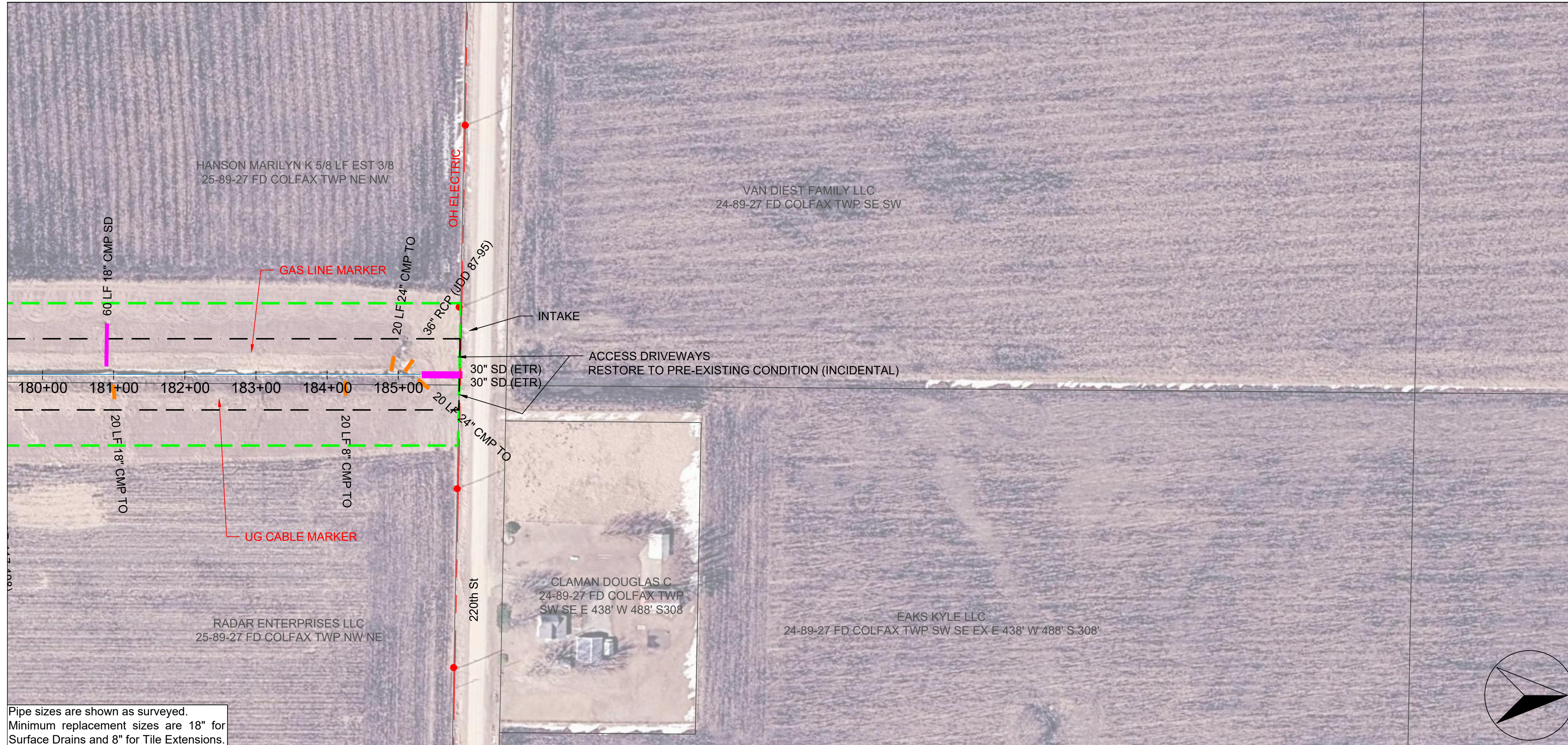
No.	Revision/Issue	Date

Sheet Name  
**Plan & Profile - Lat. 7**  
**Open Ditch STA**  
**160+00 → 180+00**

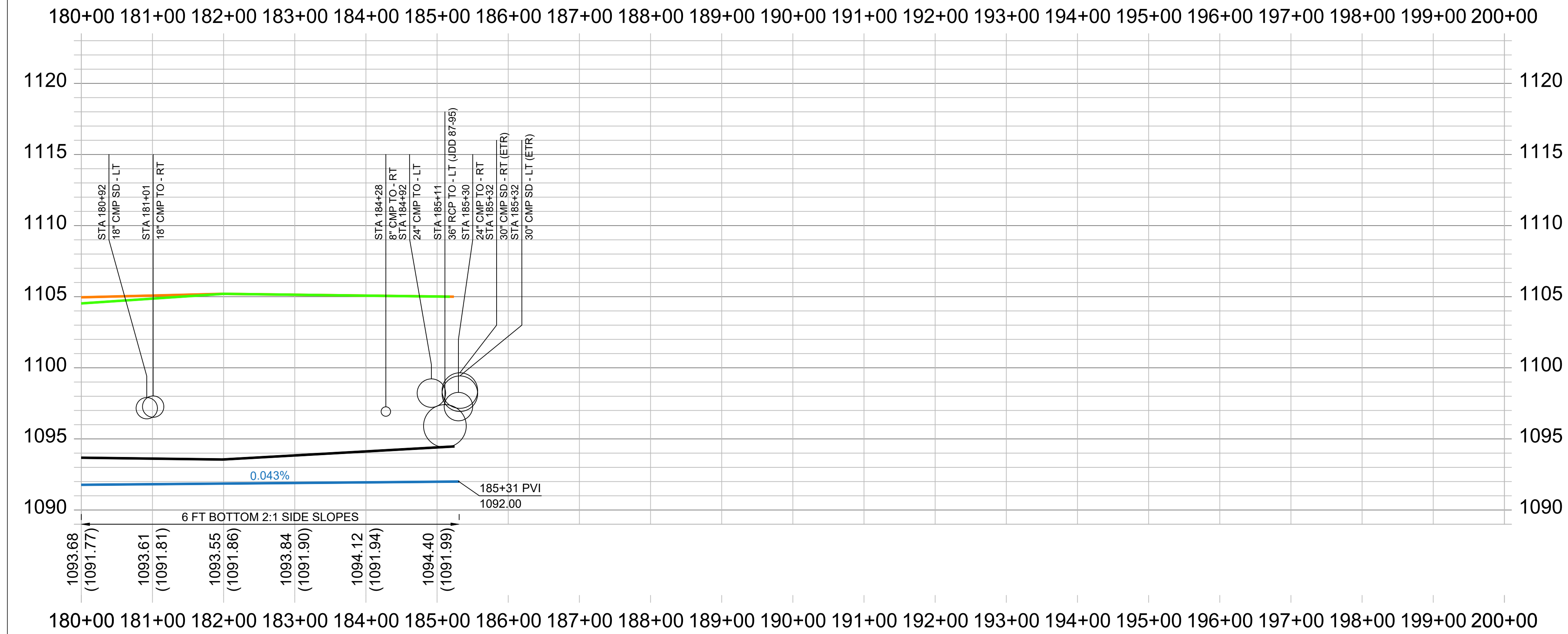
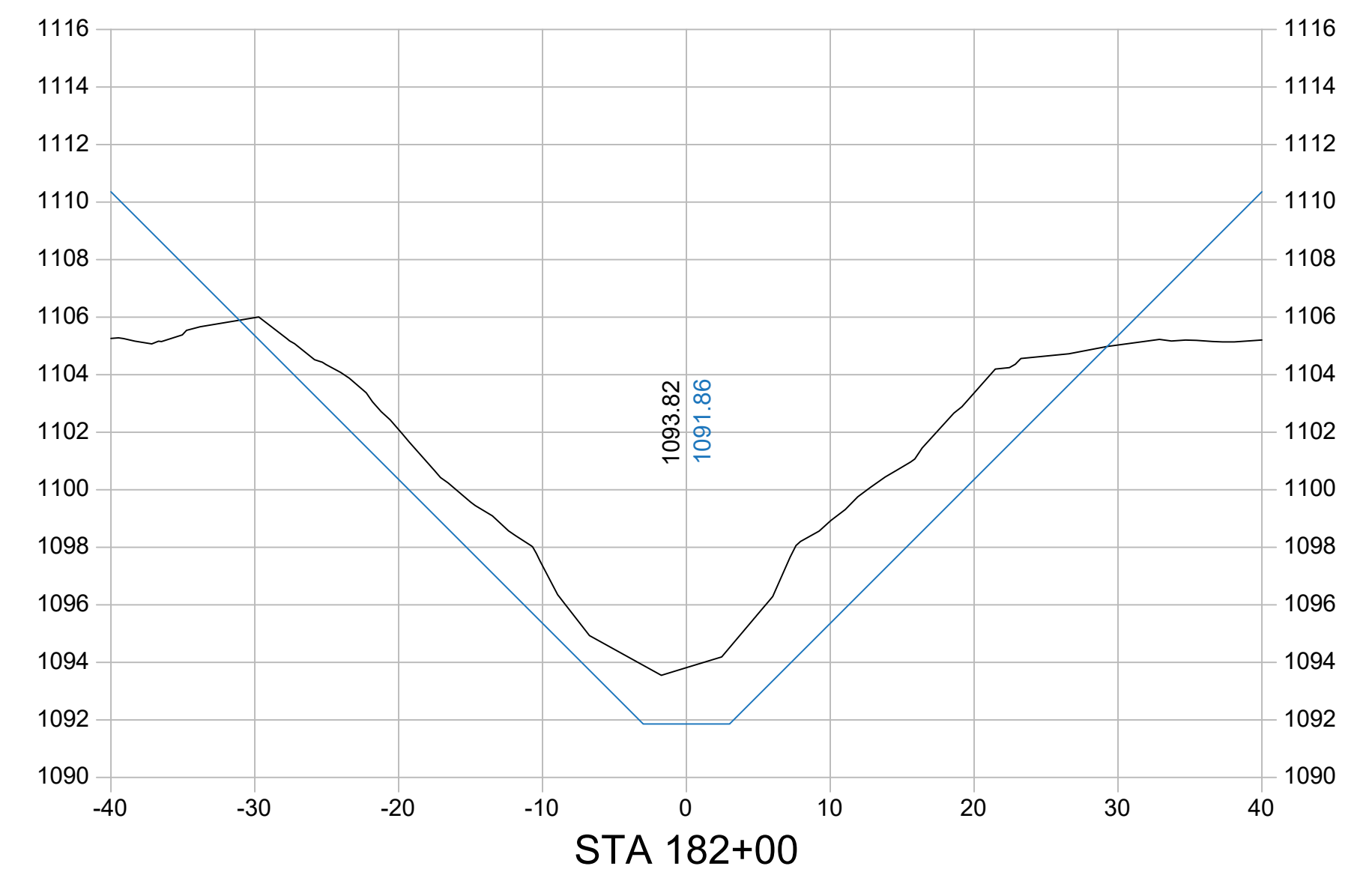
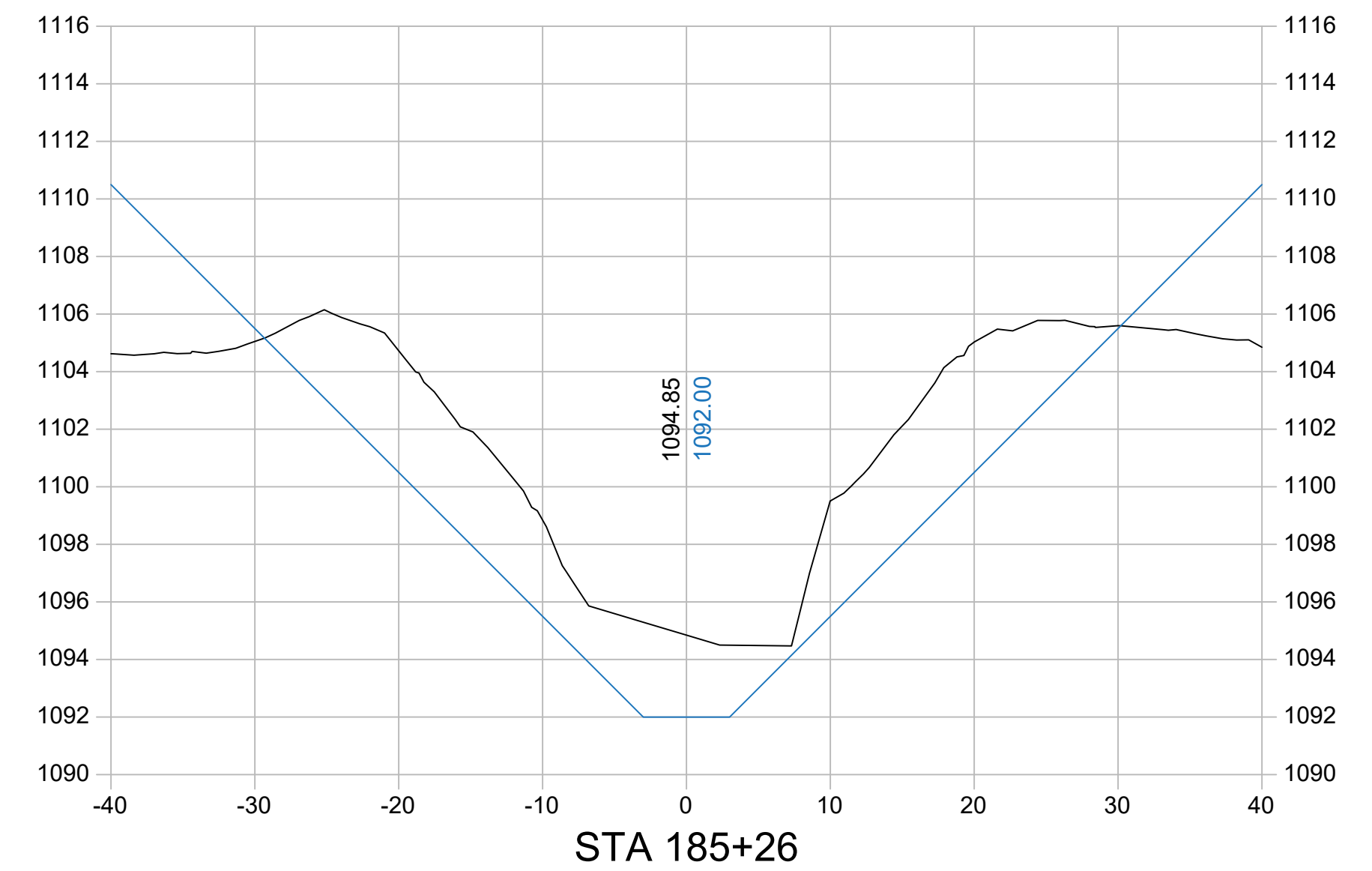
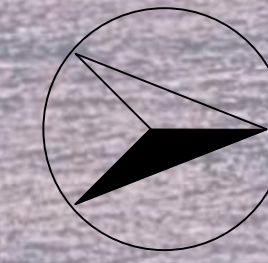
Project Name, Client, and Address  
**Open Ditch Repairs**  
**Joint Drainage District No. 4-263 Lat. 7**  
**Webster County, IA**  
**Xavier Ave & 210th St, Duncombe, IA 50532**

Project  
**2602-94**  
 Date  
**2026-05-20**  
 Plan Scale  
**1" = 200'**

Sheet  
**D.09**



Pipe sizes are shown as surveyed.  
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Company Information  
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Perry, IA 50220

Designer  
**JLH**  
Drafter  
**TJB**  
Checker  
**JLH**

**PLAN LEGEND**  
Parcel Lines ———  
Work Area (100' each side) - - - - -  
Ditch ROW (50' each side) ———  
Surface Drains ———  
Tile Outlets ———  
Utilities (in red) - - - - -  
Power Poles ●

**PROFILE LEGEND**  
Design Ditch Grade ———  
Surveyed Ditch Bottom ———  
Left Top of Bank ———  
Right Top of Bank ———

No.	Revision/Issue	Date

Sheet Name  
**Plan & Profile - Lat. 7**  
**Open Ditch STA**  
**180+00 → 185+31**

Project Name, Client, and Address  
**Open Ditch Repairs**  
**Joint Drainage District No. 4-263 Lat. 7**  
**Webster County, IA**  
**Xavier Ave & 210th St, Duncombe, IA 50532**

Project  
**2602-94**  
Date  
**2026-05-20**  
Plan Scale  
**1" = 200'**

Sheet  
**D.10**