

Engineer's Report

Drainage District No. 4

Open Ditch Repairs

Hamilton County, Iowa
2026

 A circular professional engineer seal for Jacob L. Hagan. The outer ring contains the text "PROFESSIONAL ENGINEER" at the top and "IOWA" at the bottom, separated by two stars. The inner circle contains the name "JACOB L. HAGAN" and the license number "25738".	<p>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.</p> <p>_____ 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</p>
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Executive Summary

Introduction

Following a petition submitted by landowners on July 25, 2025, a comprehensive engineering study was conducted to evaluate the open ditch system of Drainage District No. 4 in Hamilton County. This report presents findings and recommendations to address long-standing maintenance needs and infrastructure deficiencies to ensure the continued productivity of the district's 10,850-acre watershed.

Problem Assessment

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

Proposed Solution

The recommended solution is a targeted restoration involving reshaping side slopes on the lower reach and a full cleanout of the upper ditch segments. The proposed work includes the removal of obsolete bridge obstructions, cleaning of existing culverts, and 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 \$799,900, averaging approximately \$77 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.

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Introduction

Overview

Many Iowa landowners benefit from drainage infrastructure without day-to-day consideration of its operation. These systems, managed through legally established drainage districts, construct, repair, and maintain improvements such as tile lines and open ditches, allowing farmland to remain productive by controlling excess surface and subsurface water.

Drainage District No. 4 in Hamilton County, like many early 20th-century districts, was established to improve drainage in a wetter, less-developed landscape. The Hamilton County Board of Supervisors serves 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 July 25, 2025, four landowners submitted such a petition requesting an evaluation of the existing 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

Drainage District No. 4 spans lands in sections 24, 25, 35, and 36 of Blairsburg Township, sections 19, 20, 21, 28, 29, 30, 31, 32, and 33 of Williams Township, sections 1, 2, 3, 4, 9, 10, 11, 12, 13, 14, 15, 16, 22, and 23 of Liberty Township, and section 7 of Rose Township. The district lies east and southeast of Blairsburg, and west and southwest of Williams. A map of the area of study is included in Appendix B.

Historical Considerations

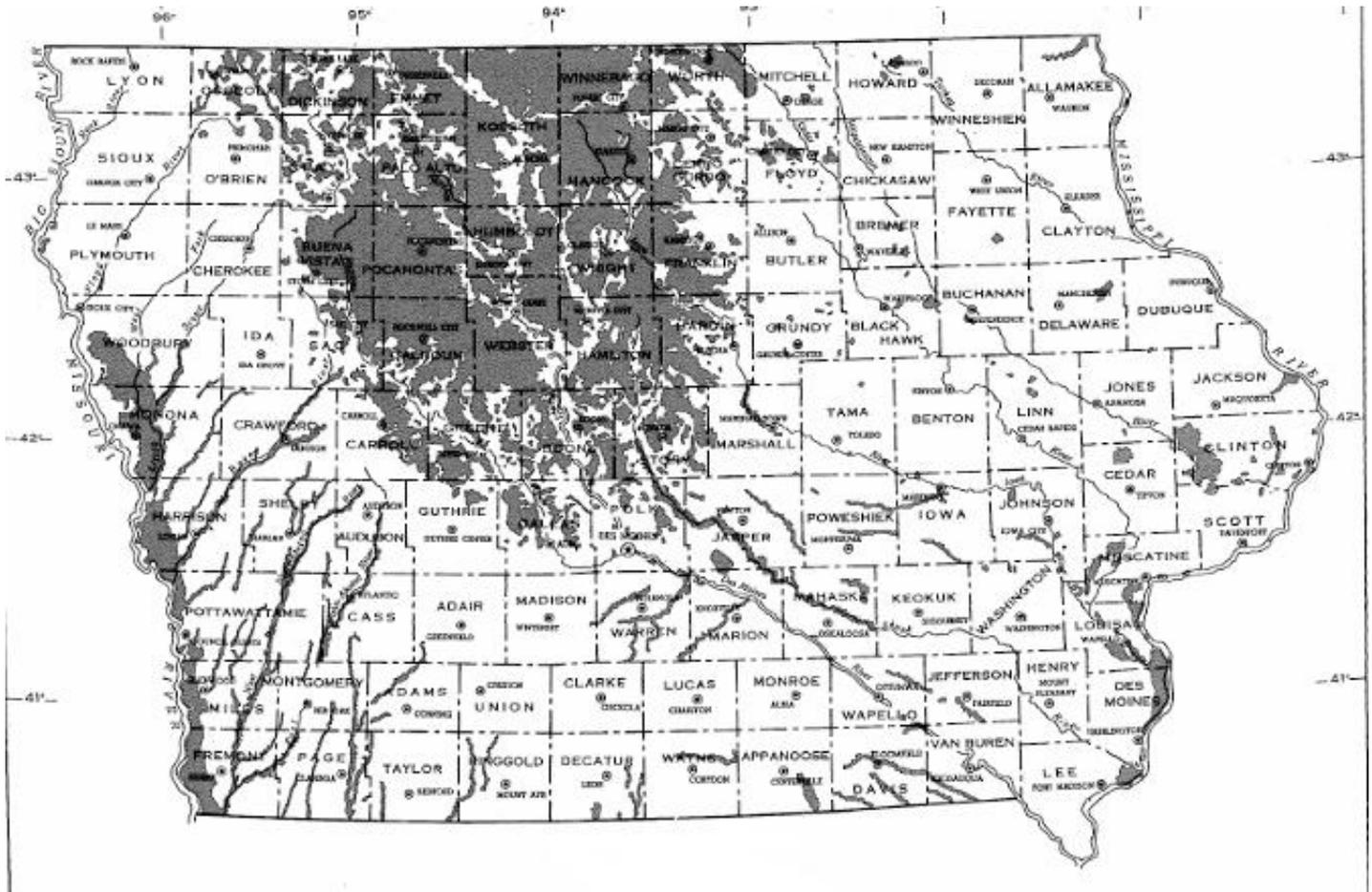
Prehistoric and Geologic Background

Hamilton County, Iowa, lies 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

Hamilton County is served by over three hundred drainage districts, encompassing over 7,000 miles of district tile and ditches, and covering roughly 300,000 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 Hamilton County. The Hamilton County Courthouse has several of these displayed in the central atrium.

Drainage District No. 4 Historical Overview

Drainage District No. 4 in Hamilton County was established to address persistent flooding and wetland conditions that limited agricultural productivity. Key events in the district’s development include:

- **Establishment and Original Construction (1904–1907)**

In 1904, a petition was filed to establish the district, an engineer was appointed, and right-of-way was obtained. The district was formally established in December 1904, re-established in October 1905 after design changes, and plans were advanced. In January 1906, the engineer’s estimate calculated 307,919 cubic yards of excavation for the open ditch. A bid letting in February 1906 awarded Northern Construction the contract at \$0.0895 per cubic yard. In March 1906, the total project cost was estimated at \$32,000. Construction was completed in August 1907 by Burkey Brothers at a cost of \$27,334.45.

- **Expansion and Reconstruction (1915–1918)**

In 1915, an engineer’s report was filed for repair and cleanout. Mulgrew-Boyce Company completed widening and deepening of the open ditch for \$23,263.60. In 1916, the Castner Branch was reconstructed into a tile system. That same year, an engineer’s report estimated reconstruction costs on the Williams and Askland Branches at \$26,132, with contracts let for Williams Branch work. In 1917, a petition for ditch cleaning was filed. At a bid letting, R. L. Cox’s low bid of \$0.20 per cubic yard was accepted. Cox was later paid \$12,985.82 for construction. In November 1918, the district was reclassified.

- **Maintenance and Highway Coordination (1924–1965)**

Benefit Appraisers were appointed in 1924. In the 1940s–1950s, landowners filled portions of the Castner Branch surface ditch. Levies of 4% were made in 1949 and 1953, the latter totaling \$2,206.04. In 1962, a petition was filed to restore efficiency. Currie Engineering reported in 1963 an estimated cost of \$111,250. A June 1963 bid letting awarded Cooper Construction Company the open ditch contract for \$73,577.20. From 1963 to 1965, coordination occurred with the Iowa State Highway Commission regarding the relocation of U.S. Highway 20. Culvert elevations were addressed, and new ditch plans with design elevations were completed.

- **Modernization and Tile Repairs (1970s–1980s)**

In the 1970s, reports were prepared on Williams Branch improvements. It was decided not to extend the ditch at this time. In 1975, repairs to Williams Main Tile blowouts were completed by Jerry Johnson for \$9,971.24. Levies were made as follows: 8% (1981), branch assessment (1982), 10% (1985), and 7% main / 5% branch (1986).

- **Late 20th Century Improvements (1990s)**

A 2% levy (\$1,571.64) was made in 1994. An engineer’s report was filed in 1995, and the district was reclassified in 1996. In 1999, the Williams Branch Open Ditch was extended by LeRoy and Sons for \$123,369, and a survey was conducted over the Castner Branch tile. That year, the Iowa DOT also cleaned out a ditch near U.S. 69. A petition was filed to investigate a shallow open ditch over the Castner Branch tile.

- **Castner Branch Waterway Project (2000–2001)**

In 2000, M.H.F. Engineering submitted an engineer’s report and plans for Castner Branch repair. Hearings considered alternate routes, which were surveyed and rejected. In 2001, right-of-way easements were signed by landowners, and the Iowa DOT reviewed the project’s impact on roads. Construction was scheduled in 2001.

- **Recent Activity (2015–2023)**

In 2015, Ingraham Construction conducted maintenance of the Castner waterway, hampered by winter weather. In 2016, the Board of Supervisors advised resuming maintenance in fall to avoid spring conditions. Several deteriorating county road bridges have been replaced with box culverts. In 2023, Bolton & Menk recommended replacing a deteriorated private bridge with a 126-inch vented ford culvert.

Historical Agricultural Demands

In the early 20th century, farms in Hamilton County 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 dryer 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.

Source U.S. Department of Agriculture, Soil Conservation Service. (1986). Soil survey of Hamilton County, Iowa [Map/image]. U.S. Government Printing Office.

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

DD 4 lies in the South Skunk River watershed, 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 (NO_3^- -N), to reach streams. Long-term monitoring by the Iowa DNR and USGS shows elevated nitrate levels in the Shunk 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 affects how water moves through fields and drainage systems.

Historically, Hamilton County has received anywhere 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 more years exceeding 40 inches and several such as 1993, 2007, 2010, and 2018 surpassing 45 inches. 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 Hamilton 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

Drainage District No. 4 encompasses a watershed defined by a shallow central valley in the southern portion, where the main ditch originates and extends northward to Highway 20. Beyond the highway, the ditch meanders through an extremely flat, poorly drained landscape marked by numerous potholes. Near the center of Section 32, it turns northwest, following a natural drainage swale through a ridge and onto the next terrace of flat, potholed land across the railroad. From this point, the Williams and Askland Branch tiles extend outward, collecting subsurface drainage from the surrounding poorly drained fields.

Further south, the Castner Branch follows natural swales upward through the first landform terrace and onto the second, where the town of Blairsburg is situated. Before the district's formation, it is estimated that more than 1,000 acres of land were untillable wet grassland or swamp. Today, nearly all land within the district is considered tillable, a testament to the effectiveness of the installed drainage improvements.

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 10,850 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.

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 Drainage District No. 4 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 Harps clay loam, cover roughly three-fourths of the district. Although these soils are highly fertile, their fine texture and landscape position often results 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. Harps soils are poorly drained, calcareous soils located on plains or in upland depressions, where the water table is often near or above the surface during wet periods. All these soils exhibit significantly improved productivity when supplemented with artificial drainage systems.

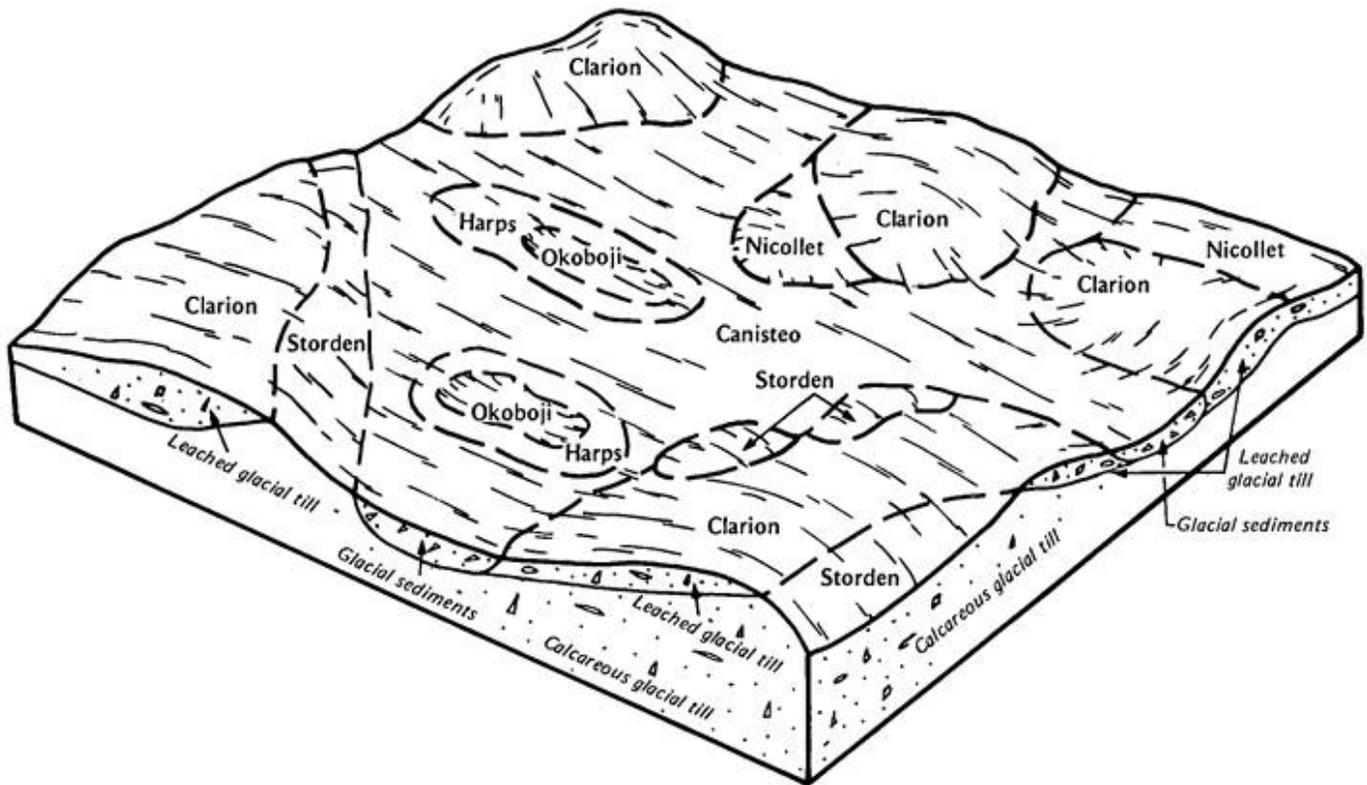


Figure 3. Typical pattern of soils and parent material in the Clarion-Canisteo-Storden association.

Source U.S. Department of Agriculture, Soil Conservation Service. (1986). Soil survey of Hamilton 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, over 70% 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	581	5.5%
Poorly Drained	6,007	56.0%
Somewhat Poorly Drained	1,108	10.2%
Moderately Well Drained	1588	14.8%
Well Drained	954	8.9%
Somewhat Excessively Well Drained	494	4.6%
Excessively Well Drained	0	0%

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 District No. 4, 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, 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 more than a million feet of tile have 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. A pipe table of all pipes surveyed is included in Appendix T and are shown on the preliminary plans.

Existing Infrastructure and Conditions

Field Survey

The initial field survey of Drainage District No. 4 was completed in November of 2025. As part of this effort, we collected photographs and drone video of all major components and areas of interest throughout the Main Open

Ditch and Williams 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=i_zcwiTL_5A

Existing Facilities

Main Open Ditch

The district's open ditch outlets into and is the headwaters for the South Skunk River. It is approximately 40,200 long and serves nearly 11,000 acres of predominantly farmland. The ditch functions as the outlet for twelve other drainage districts, Nos. 247, 19, 44, 209, 234, 50, 52, 38, 13, 39, 175, and 176.

The outlet terminus is into the natural course of the South Skunk River near the center of the northeast quarter of section 23 of Liberty Township. From here it runs northwest along a defined valley crossed by 250th St, Saratoga Ave, and 240th St. From here it runs north, crossed by State Hwy 20 before turning east and then back south, crossed by State Hwy 20 again. Here the valley becomes much less defined and the ditch parallels 240th St along the boundary between sections 11 and 14 for 1,600 feet. It turns north again crossed by State Hwy 20 before turning northeast and being crossed by 230th St and Tollman Ave near the four corners of sections 1 and 2 of Williams Township and sections 11 and 12 of Liberty Township. Here it follows a shallow valley northeast, crossed by the intersection of Tucker Ave and 230th St. It then turns north for 2,500 feet before turning west again, crossed by Tucker Ave, and terminating near the SW NW of section 32 in Williams Township. The ditch continues from this point as the William Branch Open Ditch.

Most of the Main Open Ditch is in fair condition. The side slopes are mostly stable, well vegetated, and much of the channel is running below the design bottom elevation.

- The lower reach requires corrective work; there are a few trees to remove and the banks are too steep, risking sloughs. Those banks will need to be reshaped.
- The center reach exhibits some meandering; however, it is relatively minor and most of it is not detrimental to the overall hydraulic function. The proposed work focuses on selectively removing only the most problematic bends to protect the banks. Removing all meanders would create an oversized bottom width beyond the original design, slow the flow, and increase siltation. Under those conditions the channel would quickly re-meander and form silt bars, negating the effort.
- The upper reach is in most need of repair. The side slopes are stable, with no major structural concerns noted. The primary issue is approximately 1 to 2 feet of siltation along the channel bottom, which will need to be removed.

Williams Branch Open Ditch

The Williams Branch Open Ditch is a continuation upstream of the Main Open Ditch. It was constructed in the 1990s to replace the lower 3,700' section of the 39" Williams Branch Tile up to its connection with the Askland Branch Tile and Williams Branch Tile near the center of the southwest quarter of section 29 in Williams Township. It is crossed by a railroad and 210th St. The slopes of the ditch are in good condition, however some of the pipes are in poor condition and the entire branch has 1 to 3 feet of siltation accumulated on the bottom that will need to be removed.

Williams Branch Tile

The Williams Branch Tile originates at Station 37 of the Williams Branch Open Ditch. From this point, it extends east approximately 1,800 feet near the property line before turning north for another 2,600 feet, terminating at the property line between the NW $\frac{1}{4}$ NE $\frac{1}{4}$ and SW $\frac{1}{4}$ NE $\frac{1}{4}$ of Section 29.

This branch drains an estimated 1,050 acres, primarily consisting of highly potholed, poorly drained land with extensive private tile systems. The line was originally constructed as an open ditch and was converted to the present tile system in 1916.

The Williams Branch Tile also serves as the outlet for Drainage Districts Nos. 247 and 19. The outlet currently consists of a 109-year-old, 30-inch tile operating at a drainage coefficient of approximately 0.21 inches per day, less than half the modern minimum design recommendation for landscapes typical of DD 4. Upgrading this undersized and aging tile to meet current drainage standards should be considered in future improvements.

Askland Branch Tile

The Askland Branch Tile begins at Station 37 of the Williams Branch Open Ditch. It runs due north along the property line, then turns west and continues northwest to 200th Street. From there, it proceeds north to the center of the southeast quarter of Section 19.

This branch provides drainage for approximately 1,000 acres of predominantly poorly drained, potholed land containing extensive tile systems. The western portion of the area includes several large hills and a defined valley.

The branch was originally constructed as an open ditch and was converted to a tile line in 1916, forming the present system. The outlet currently consists of a 109-year-old 26-inch tile operating at a drainage coefficient of approximately 0.24 inches per day, less than half of the modern recommended minimum for landscapes typical of DD 4.

Upgrading this aging and undersized tile to meet modern drainage standards should be considered in future improvements.

Castner Branch Tile

The Castner Branch was originally constructed as an open ditch and was converted to a tile system in 1916. It currently consists of a 32-inch tile at its outlet, terminating at Station 291 of the Main Open Ditch.

From its outlet, the branch runs northwest along the valley, crossing 220th Street near the midpoint of the north line of the northeast quarter of Section 3, Liberty Township. It then parallels the road west for approximately 1,800 linear feet before turning northwest and then north, cutting through two large depressions. The tile crosses 212th Street and terminates near the center of the large depression located between 212th Street and Little Wall Lake Road, east of Blairsburg.

The branch drains approximately 1,950 acres characterized by numerous large depressions and narrow ridges. It also serves as the outlet for Drainage Districts Nos. 50, 52, 13, and 38.

The tile, now 109 years old, operates at a drainage coefficient of approximately 0.24 inches per day, about half of the modern recommended minimum for landscapes typical of Drainage District No. 4. Upgrading this aging and undersized tile to meet modern drainage standards should be considered in future improvements.

Castner Branch Waterway

In 2000, improvements were proposed for the Castner Branch. Rather than upgrading the existing tile, it was decided to construct a grassed waterway along the alignment of the original open ditch, effectively reestablishing portions of its historic open ditch. This modification was intended to accelerate surface runoff drainage in the

northwest portion of Drainage District No. 4. The grassed waterway extends approximately 15,000 feet and requires regular and careful maintenance to ensure continued proper function.

Existing Sizes and Capacities

Drainage District No. 4 1916 Reconstruction

Approximately ten years after the district’s establishment, a decision was made to enlarge the Main Open Ditch and convert the branches from shallow ditches to tile drains. Partial records of this construction were located, and the design dimensions are summarized below.

Drainage District No. 4 1916 Reconstruction Ditch Capacity					
Section Name	Bottom Width (ft)	Grade (%)	Side Slopes (h:v)	Approx. Capacity (cfs)	Percentage of Recommendation
Main Open Ditch (Stations 0-98)	11	0.10	1.5:1	220	88%
Main Open Ditch (Stations 98-147)	10	0.10	1.5:1	205	91%
Main Open Ditch (Stations 147 – 200)	9	0.074	1.5:1	165	79%
Main Open Ditch (Stations 200 – 210)	8	0.074	1.5:1	155	78%
Main Open Ditch (Stations 210-225)	7	0.074	1.5:1	145	73%
Main Open Ditch (Stations 225-375)	6	0.074	1.5:1	135	73%

Drainage District No. 4 1963 Repair

In 1963, a major restoration project was undertaken to recover the original ditch capacity. Several feet of silt had accumulated along the channel bottom, and many tile lines were no longer functioning. As part of the repairs, the ditch side slopes were flattened to a 2:1 grade to improve long-term stability, which also increased the overall conveyance capacity of the ditch.

Drainage District No. 4 1963 Repair Ditch Capacity					
Section Name	Bottom Width (ft)	Grade (%)	Side Slopes (h:v)	Approx. Capacity (cfs)	Percentage of Recommendation
Main Open Ditch (Stations 0-98)	11	0.10	2:1	255	102%
Main Open Ditch (Stations 98-147)	10	0.10	2:1	240	107%
Main Open Ditch (Stations 147 – 200)	9	0.074	2:1	200	95%
Main Open Ditch (Stations 200 – 210)	8	0.074	2:1	190	95%
Main Open Ditch (Stations 210-225)	7	0.074	2:1	180	90%
Main Open Ditch (Stations 225-375)	6	0.074	2:1	170	92%

Drainage District No. 4 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 each tile section. All these tiles are well below minimum modern standards and have far exceeded their intended useful life.

Drainage District No. 4 Existing Tile Capacity				
Section Name	Outlet Diameter (inches)	Grade (%)	Drainage Coefficient (in/day)	Percentage of Modern Minimum Standard
Castner Branch Tile	32	0.16	0.24	48%
Askland Branch Tile	26	0.12	0.24	48%
Williams Branch Tile	30	0.05	0.21	42%

Other Drainage District's Existing Tile Capacity

The table below summarizes the same information for the twelve other drainage districts relying on DD 4 as an outlet. All these tiles are well below minimum modern standards and have far exceeded their intended useful life.

Other Drainage District's Existing Tile Capacity				
Section Name	Outlet Diameter (inches)	Grade (%)	Drainage Coefficient (in/day)	Percentage of Modern Minimum Standard
DD No. 39 - Todnem	15	0.45	0.12	24%
DD No. 175 - Ackley	12	0.90	0.35	70%
DD No. 176 - Telkamp	10	0.80	0.17	34%
DD No. 234 - Alford	22	0.10	0.38	76%
DD No. 209 - Ferguson	15	Unknown	Unknown	Unknown
DD No. 19 - Duffy	18	Unknown	Unknown	Unknown
DD No. 247 - Vandie	22	0.08	0.32	64%
DD No. 44 - Hale	14	0.35	0.10	20%
DD No. 50 - Pelz	16	Unknown	Unknown	Unknown
DD No. 52 - Smith	14	0.10	0.21	42%
DD No. 38 - Trotter	12	0.10	0.14	28%
DD No. 13 - Wilke	14	Unknown	Unknown	Unknown

Downstream Outlet

Drainage District No. 4 outlets into the South Skunk River, located in Section 23 of Liberty Township. The South Skunk River is a significant tributary, stretching approximately 185 miles in length and draining a watershed area of about 1,850 square miles. It flows southeast, joining the North Skunk River near Richland, Iowa.

Proposed Project

Project Design

As the engineer 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

Main Open Ditch

Most of the system is in adequate condition. Major earthwork is limited to the upper and lower sections.

- **Lower two miles:** High flows have undermined and eroded banks in many locations. Slopes will be reshaped to the designed 2:1 ratio for stability.
- **Upper 2.5 miles:** Significant silt accumulation on the bottom has reduced hydraulic capacity. Excavation will focus on the channel bottom; side slope work will be limited.

Williams Branch Open Ditch

The entire 3,700-foot reach has a flatter grade and lower velocity, limiting self-cleaning and resulting in higher siltation. Material needs to be removed from the bottom along the entire ditch; side slope work will be minimal.

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. Culverts will be cleaned, and trees will be removed or cleaned where necessary.

The major zones of work on the ditch system are tabulated below:

Main Open Ditch Repair Sections				
Section Name	Bottom Width (ft)	Side Slopes (h:v)	Grade (%)	Proposed Work
Sta. (0+00 → 40+00)	11	2:1	0.1	Reshape side slopes. No flowline excavation.
Sta. (98+00 → 110+00)	10	2:1	0.1	Reshape side slopes. No flowline excavation.
Sta. (135+00 → 140+00)	10	2:1	0.1	Reshape side slopes. No flowline excavation.
Sta. (168+00 → 180+00)	9	2:1	0.074	Reshape side slopes. No flowline excavation.
Sta. (288+00 → 402+56)	6	2:1	0.074	Minimal work on side slopes. Excavate flowline.

Williams Branch Open Ditch Repair Sections				
Section Name	Bottom Width (ft)	Side Slopes (h:v)	Grade (%)	Proposed Work
Sta. (0+00 → 37+39)	6	2:1	0.06	Minimal work on side slopes. Excavate flowline.

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 existing right-of-way, 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 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 remove the tree 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. We call out that banks are to be scraped with some kind of approved harrow to create ridges and a summer cover crop mixture 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 drainpipes 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 corrugated metal pipes (CMP) 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 drainpipes and will be replaced if in poor condition. All will be marked with a flag 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 driveway that were damaged will be restored to its 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.

Proposed Road Crossings

Road culverts will be cleaned out to ensure they are not impeding the function of the ditch. The ditch is crossed by eighteen crossings, including five owned by private landowners, eight owned the Hamilton County Secondary Roads, three owned by the Iowa Department of Transportation and one owned by the Chicago Central and Pacific Railroad.

We have included in Appendix R photos of every private bridge and culvert. **We are planning to remove three old, abandoned bridges. If the landowner wishes to salvage materials from these bridges, they need to do so before the contractor arrives.** The contractor will burn and bury or haul away the bridge as part of the project.

Under Iowa Code §468, the cost of cleaning out the road crossings is the responsibility of the entity that controls the road. A table of all crossings is provided below.

Road Crossings					
Station	Control Entity	Road	Structure	Size	Work
27+90	Hamilton County	250 th St	Double RCB	Twin 14’ x 9’	None
53+25	Hamilton County	Saratoga Ave	Double RCB	Twin 12’ x 10’	None

Road Crossings					
Station	Control Entity	Road	Structure	Size	Work
70+80	Private Landowner	Farm Crossing	Steel Bridge		Remove
91+40	Hamilton County	240 th St	Double RCB	Twin 10' x 10'	None
114+50	Private Landowner	Farm Crossing	Wooden Bridge		Remove
121+90	Iowa DOT	Highway 20	Double RCB	Twin 12' x 14'	None
146+60	Private Landowner	Farm Crossing	Concrete Bridge		None
159+80	Iowa DOT	Highway 20	Double RCB	Twin 12' x 14'	None
178+50	Private Landowner	Farm Crossing	Concrete Bridge		None
225+25	Private Landowner	Vented Farm Crossing	Steel Pipe	10' Dia.	Remove blockage
237+90	Iowa DOT	Highway 20	Double RCB	Twin 12' x 14'	None
262+25	Hamilton County	Tollman Ave	Steel CMP Arch	15' Dia.	None
269+90	Hamilton County	230 th St	Single RCB	12' x 12'	None
326+00	Private Landowner	Farm Crossing	Wooden Bridge		Remove
339+50	Hamilton County	220 th St	Single RCB	10' x 10'	Cleanout
382+10	Hamilton County	Tucker Ave	Single RCB	10' x 10'	Cleanout
Williams Branch 24+50	Chicago Central and Pacific Railroad	Railroad	Old Tile	39" Dia.	Cleanout
Williams Branch 25+50	Hamilton County	210 th St	Old Tile	39" Dia.	Cleanout
Williams Branch 24+50	Chicago Central and Pacific Railroad	Railroad	RCP	60" Dia.	Cleanout
Williams Branch 25+50	Hamilton County	210 th St	RCP	60" Dia.	Cleanout
Williams Branch 25+50	Hamilton County	210 th St	Concrete Bridge	8' x 8'	Cleanout

Utility Conflicts and Coordination

A Design One Call was completed on October 6, 2025, identifying communications and electrical utilities within the project area. All are located within existing public road rights-of-way.

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 a Construction 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 spring 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 this proposed project is \$799,900. The breakdown of related expenses is as follows:

Activity	Cost	Percent of Total Cost
Main Open Ditch Repairs	\$523,400	65.8%
Williams Open Ditch Repairs	\$101,500	12.8%
Engineering, Legal, and Administrative	\$80,000	10%
Construction Damages	\$36,000	4.5%
Interest	\$59,000	8%

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 Main Open Ditch and Williams Branch Open Ditch repairs is \$799,900 or approximately \$77 per acre. As shown in the table below, this cost is in line with previous open ditch repairs.

Drainage District No. 4 Historical Comparison					
Year	Avg. Assessment Per Acre	Avg Land Value Per Acre	Assessment Relative to Land Value	Avg. Revenue Per Acre for Corn Crop	Assessment Relative to Yearly Corn Revenue
1916	\$4.66	\$137	3.4%	\$30	15.5%
1963	\$7.07	\$500	1.4%	\$92	7.7%
2025	\$77	\$13,130	0.6%	\$922*	8.4%

*2024 Corn Revenue Shown

Assessment Schedule Review

Any costs to the district are shared by landowners based on the benefit their property receives. To ensure fairness, an assessment schedule is maintained so all expenses are allocated proportionally to the level of benefit each parcel gains from the drainage system. The current schedule is on file at the Hamilton County Auditor’s Office.

The current assessment schedules are broken up by major facility and were completed with the reclassification in 1996. Upon review, while modern techniques will allow a more detailed assessment of benefits, we find no need

to reclassify at this time as the current schedule is sufficient for maintenance purposes. A map of the Main Open Ditch schedule is included in Appendix L.

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)

Because the drainage area of District No. 4 exceeds 10,000 acres, a permit for work in the Waters of the United States is required from the USACE. We have filed a permit prior to submitting this report to prevent delays.

Iowa Department of Natural Resources (DNR)

The ditch is the upper end of the South Skunk River; thus, construction work will be done within the 100-year floodplain. All work on the ditch, including bank stabilization, must follow Iowa DNR floodplain regulations. The DNR Floodplain permit application has been submitted in advance to avoid delays.

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.

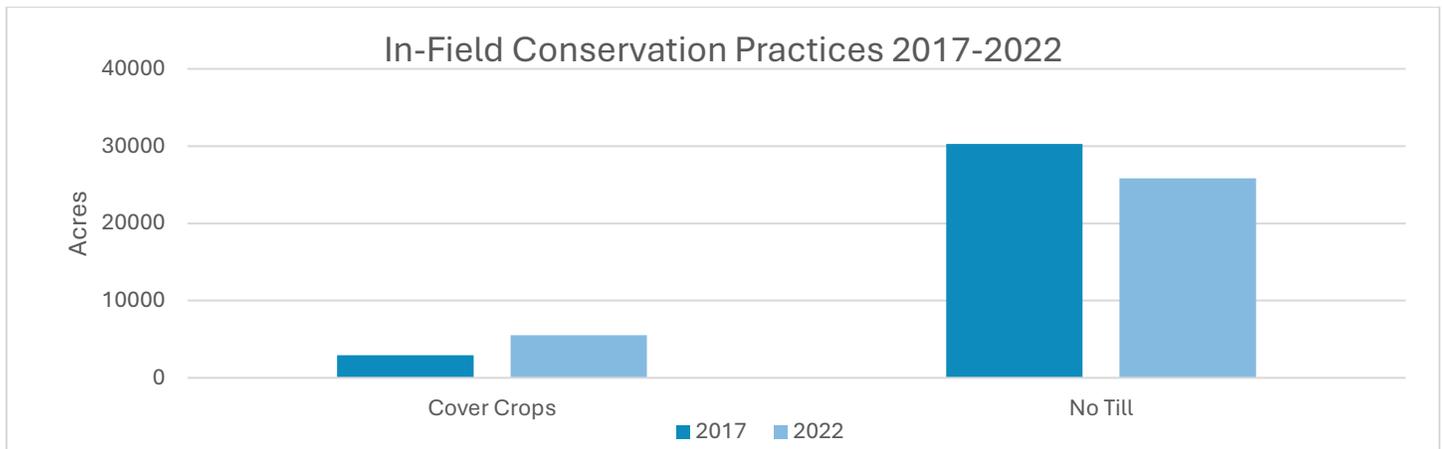
Water Quality Recommendations

Conservation Practices

Farmers in Hamilton 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 September 2025, about 12,441 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.

Between 2017 and 2022, no-till acres decreased from 30,000 to 26,000, while cover crop use grew from 3,000 to 5,500 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 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 Drainage Clerk 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 October 6, 2025, 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. This 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 formal 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. 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. This includes constructing permanent structures, or planting trees for example.

We have included photos of farm equipment parked within the right-of-way that will need to be moved prior to construction in Appendix Q. Any old equipment left will be hauled away and scrapped by the contractor.

Temporary construction limits beyond the existing right-of-way are shown on the plans covering approximately 91 acres across forty-four 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

We have found the Drainage District No. 4 Main Open Ditch and Williams Branch Open Ditch in need of repairs. To address this, we have developed a plan to repair these facilities at an estimated total cost of \$799,900. This plan is designed to meet the petition to restore the design functionality of the ditch system.

Recommendations

We recommend that the Board accept the filing of this report and schedule a public hearing to formally present the findings and proposed improvements to all affected landowners. The hearing will provide an opportunity for landowners to raise objections, ask questions, and express concerns.

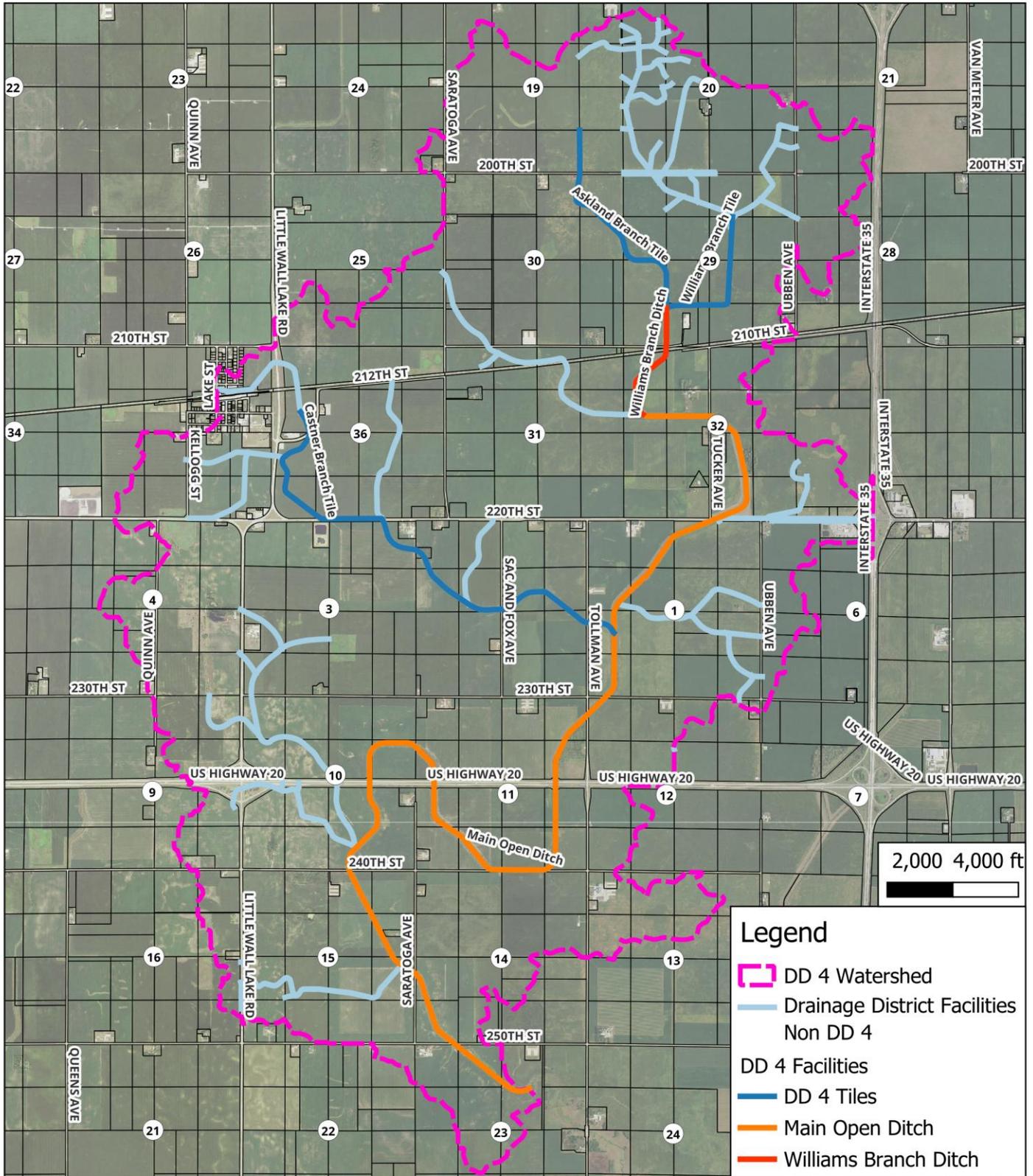
If there are no substantial objections from the landowners at the hearing, we further recommend that the Board proceed with appointing an engineer to prepare detailed plans and specifications for the construction work.

If the Board of Trustees or landowners have any questions or concerns, please contact AgriVia at the phone numbers or emails listed.

Sincerely,

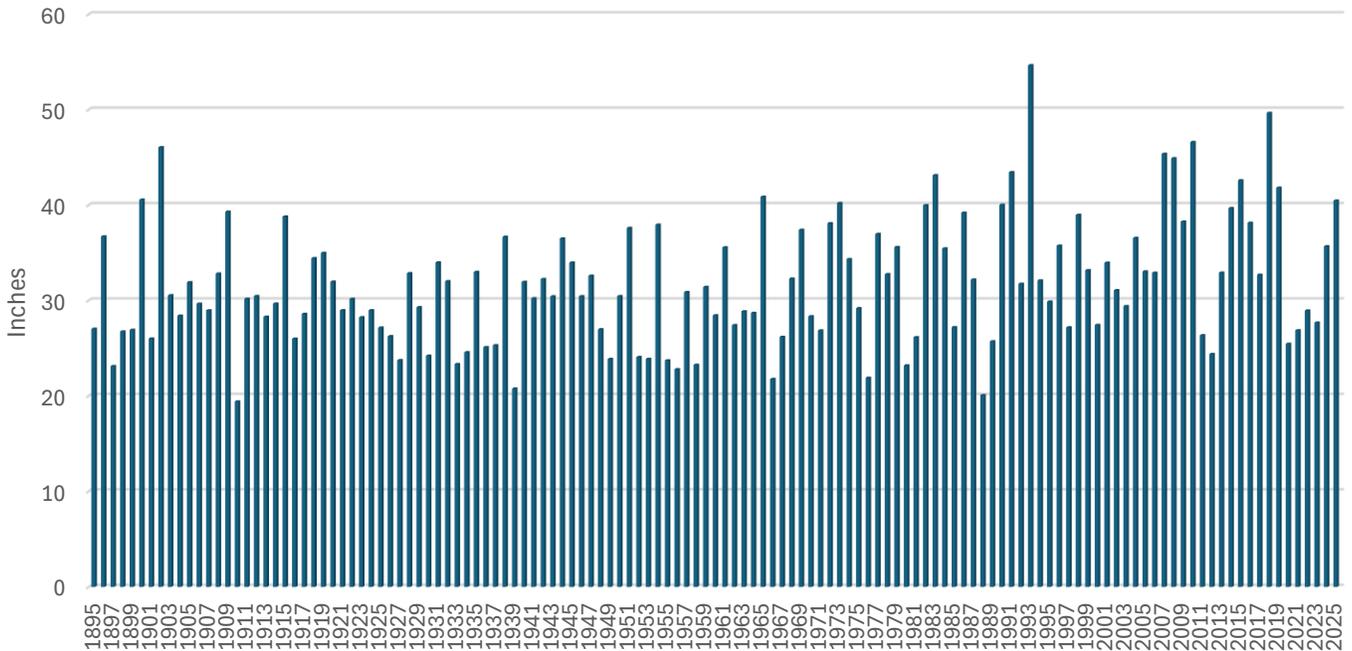
Jacob Hagan, P.E.
712-250-4318
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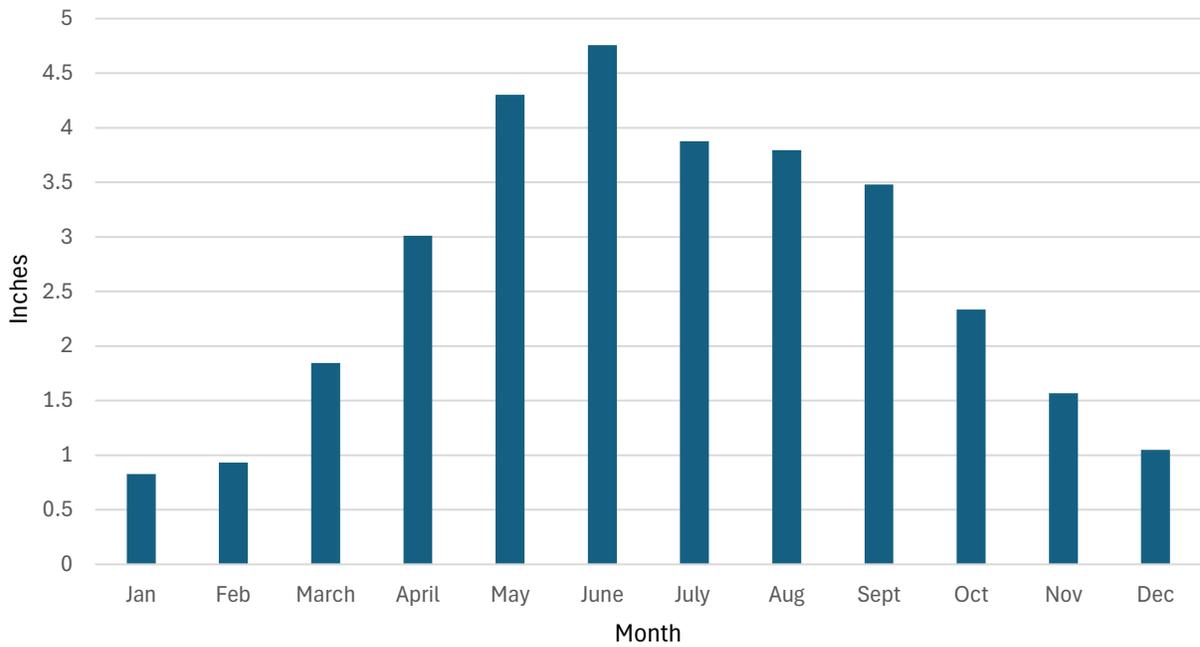


Appendix C - Rainfall Chart: 1895-Present

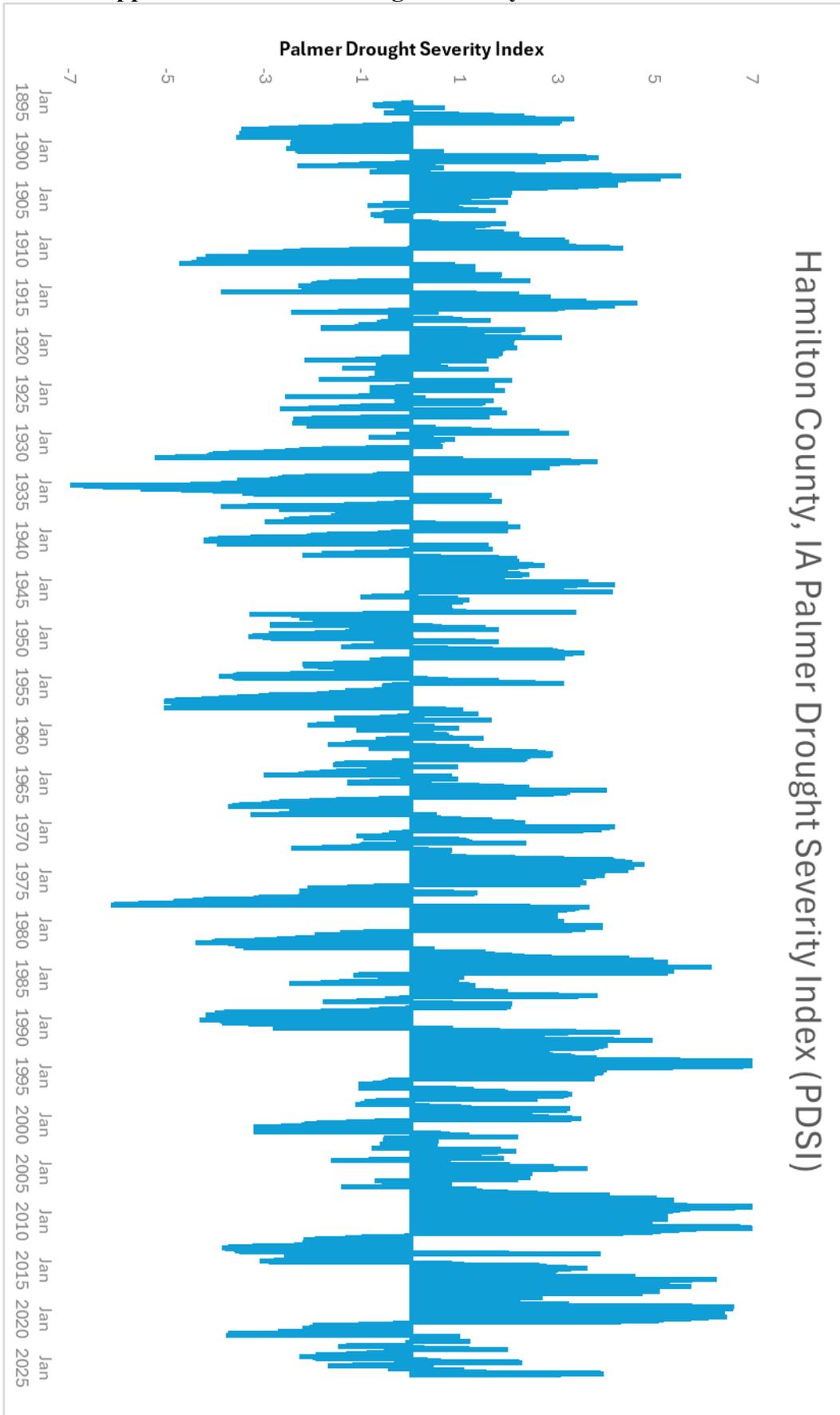
Hamilton County, IA Rainfall 1895-2024

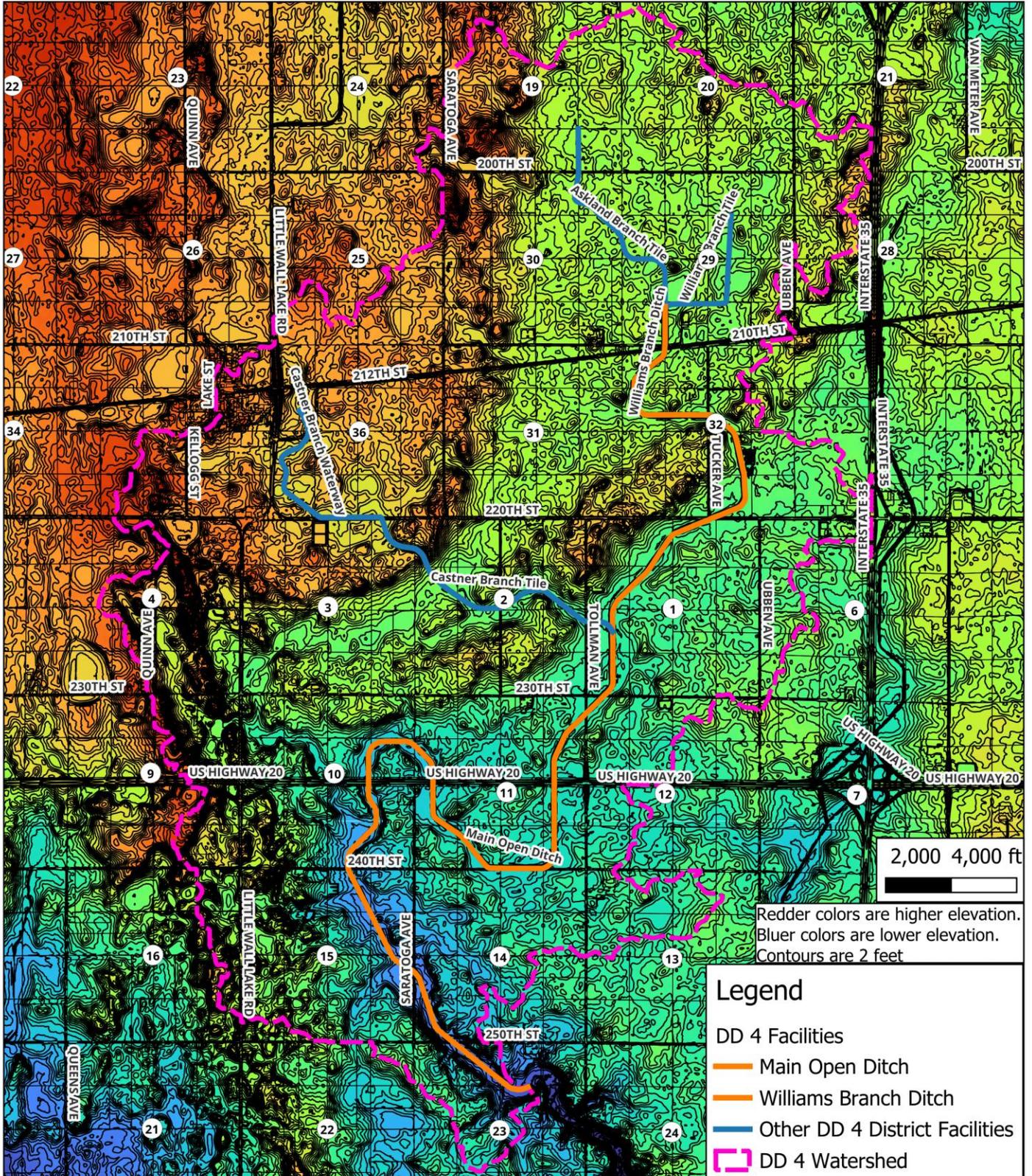


Hamilton County, IA- Average Precipitation Per Month



Appendix D - Palmer Drought Severity Index: 1895- Present



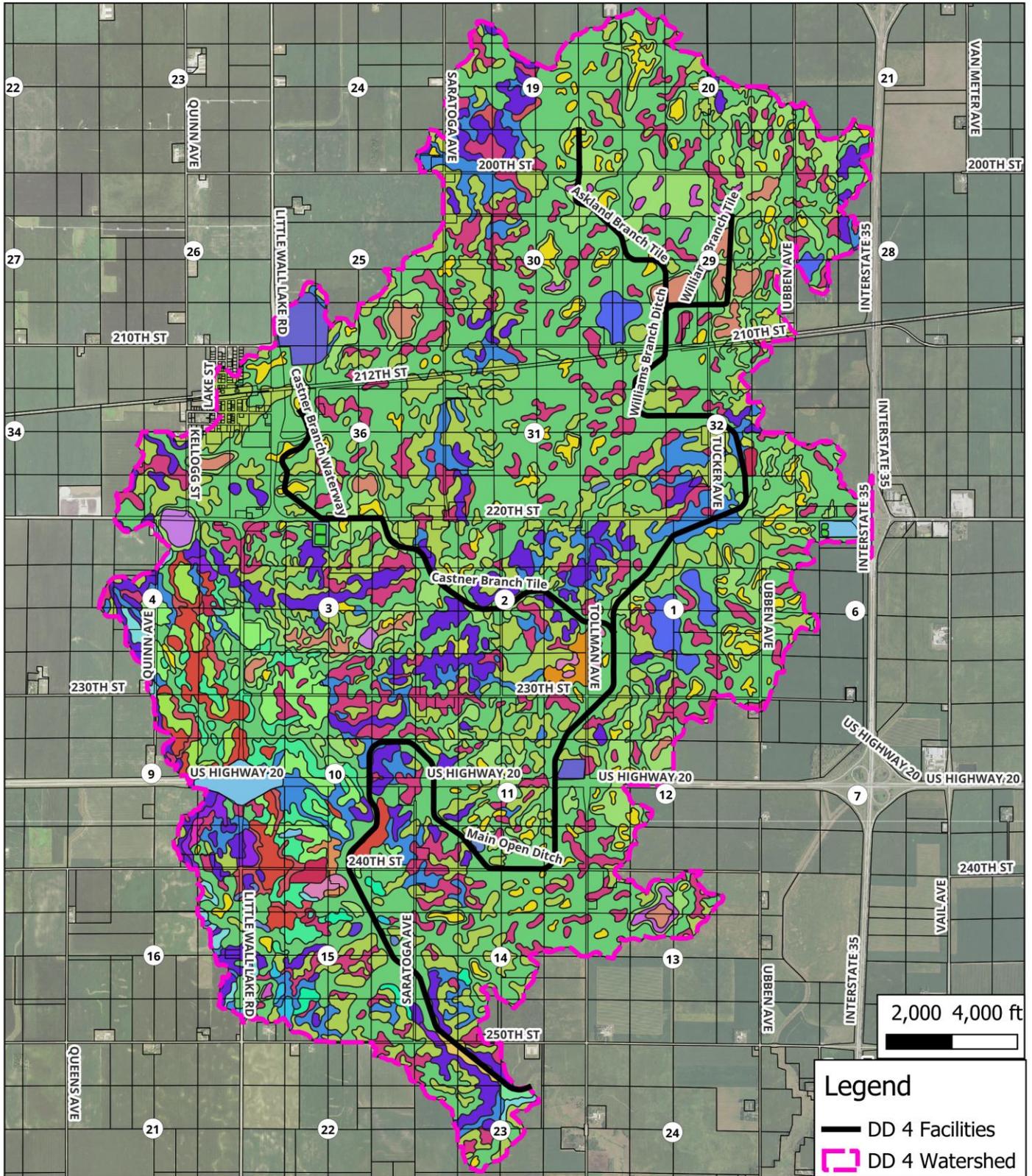


Appendix F - Soil Types



Drainage District No. 4
Hamilton County, IA

Soil Types Map
December 2025

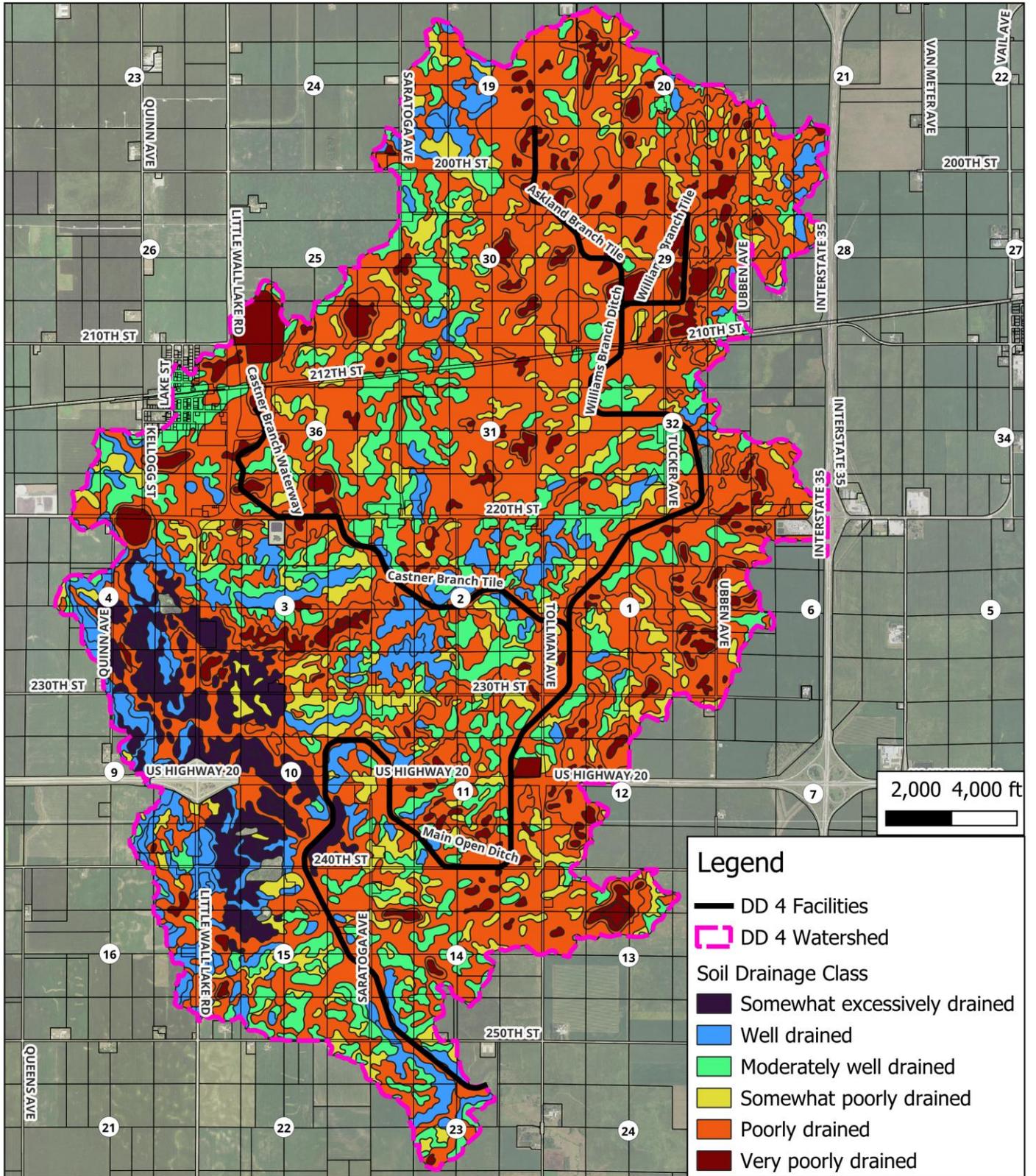


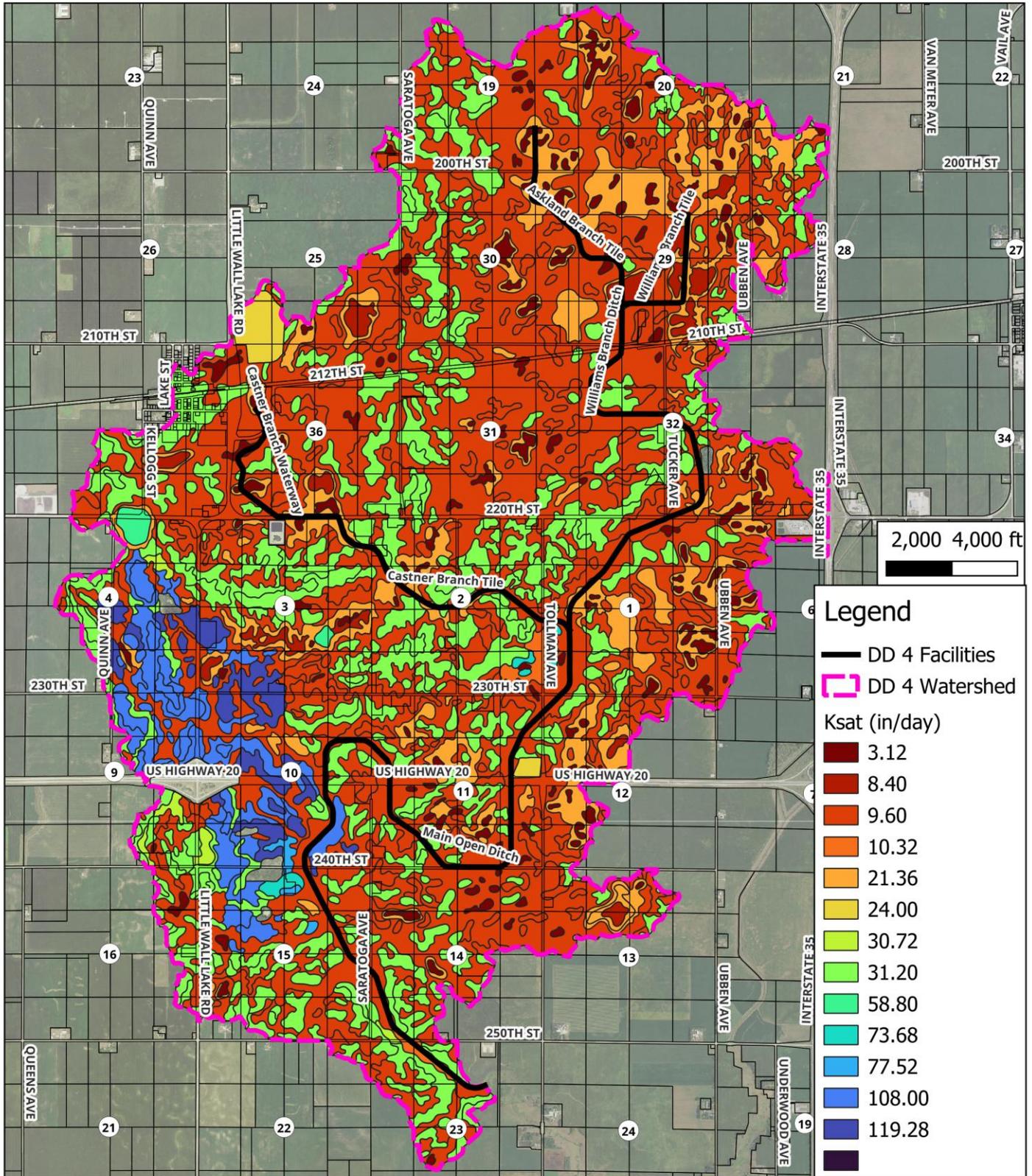


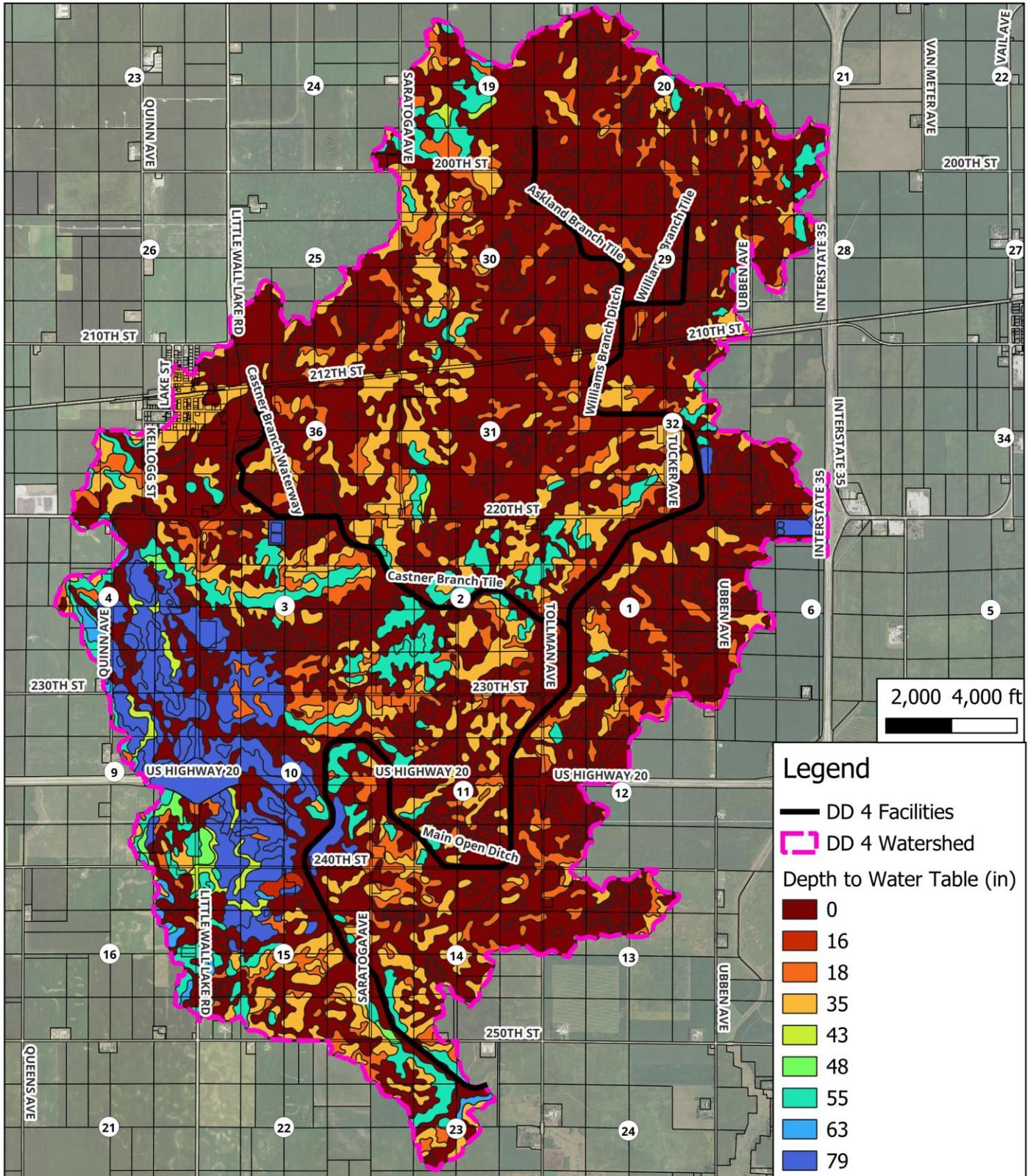
Legend

Soil Type

-  Aquents loamy, reclaimed, 0 to 2 percent slopes
-  Canisteo clay loam, 0 to 2 percent slopes
-  Clarion loam, 2 to 6 percent slopes
-  Clarion loam, 2 to 6 percent slopes, moderately eroded
-  Clarion loam, 6 to 10 percent slopes
-  Clarion loam, 6 to 10 percent slopes, moderately eroded
-  Clarion loam, 9 to 14 percent slopes, moderately eroded
-  Clarion-Storden complex, 6 to 10 percent slopes, moderately eroded
-  Coland clay loam, 0 to 2 percent slopes, occasionally flooded
-  Coland-Terril complex, 1 to 5 percent slopes
-  Cylinder loam, 0 to 2 percent slopes
-  Harps clay loam, 0 to 2 percent slopes
-  Harps-Okoboji complex, 0 to 2 percent slopes
-  Klossner muck, 0 to 1 percent slopes
-  Knoke silty clay loam, 0 to 1 percent slopes
-  Nicollet clay loam, 1 to 3 percent slopes
-  Okoboji mucky silty clay loam, 0 to 1 percent slopes
-  Okoboji silty clay loam, 0 to 1 percent slopes
-  Orthents, loamy
-  Pits, sand and gravel
-  Sewage lagoon
-  Storden loam, 10 to 16 percent slopes, moderately eroded
-  Storden loam, 10 to 22 percent slopes, moderately eroded
-  Storden loam, 6 to 10 percent slopes, moderately eroded
-  Talcot silty clay loam, 32 to 40 inches to sand and gravel, 0 to 2 percent slopes
-  Terril loam, 2 to 6 percent slopes
-  Wacousta silty clay loam, 0 to 1 percent slopes
-  Wadena loam, 0 to 2 percent slopes
-  Wadena loam, 2 to 6 percent slopes
-  Water
-  Webster clay loam, 0 to 2 percent slopes
-  Zenor sandy loam, 2 to 5 percent slopes
-  Zenor sandy loam, 5 to 9 percent slopes, moderately eroded
-  Zenor-Storden complex, 14 to 18 percent slopes, moderately eroded
-  Zenor-Storden complex, 9 to 14 percent slopes, moderately erode







Appendix J - Survey Photos



Outlet of 26" Askland Branch Tile and Private 36" Tile.



Outlet of 39" Williams Branch Tile.



Facing south towards 210th St. 60" RCP completely submerged to the center-right of the picture.



Surface drain lacking adequate erosion protection.

Appendix K - Itemized Cost Estimate

Estimated Costs
Open Ditch Repairs
Drainage District No. 4
Hamilton County, IA



Main Open Ditch Construction Cost					
Item No.	Bid Item	Est. Units	Unit	Est. Unit Price	Est. Amount
101	EXCAVATION	34,200	CY	\$3.25	\$ 111,150
102	SPOIL LEVELING (BOTH SIDES)	207	STA	\$150.00	\$ 31,050
103	DAILY SEED & FERTILIZE BANKS	207	STA	\$110.00	\$ 22,770
104	HYDROSEEDING	207	STA	\$300.00	\$ 62,100
105	SPOIL TILLAGE AND ROCK PICK UP	207	STA	\$30.00	\$ 6,210
106	SPOIL TEMPORARY SEEDING	207	STA	\$110.00	\$ 22,770
107	TILE EXTENSION, 8" CMP	440	LF	\$30.00	\$ 13,200
108	TILE EXTENSION, 12" CMP	540	LF	\$35.00	\$ 18,900
109	TILE EXTENSION, 15" CMP	520	LF	\$40.00	\$ 20,800
110	TILE EXTENSION, 18" CMP	240	LF	\$45.00	\$ 10,800
111	TILE EXTENSION, 24" CMP	40	LF	\$55.00	\$ 2,200
112	TILE EXTENSION, 36" CMP	20	LF	\$90.00	\$ 1,800
113	SURFACE DRAIN, 18" CMP	1720	LF	\$45.00	\$ 77,400
114	SURFACE DRAIN, 24" CMP	360	LF	\$55.00	\$ 19,800
115	SURFACE DRAIN, 30" CMP	90	LF	\$75.00	\$ 6,750
116	CLEARING AND GRUBBING	1	LS	\$2,000.00	\$ 2,000
117	FENCE REMOVAL	1900	LF	\$3.00	\$ 5,700
118	BRIDGE REMOVAL	3	EA	\$1,000.00	\$ 3,000
119	ROCK CHUTE	1	EA	\$500.00	\$ 500
120	RIPRAP, CLASS E	200	TN	\$70.00	\$ 14,000
121	EROSION CONTROL PLAN	1	LS	\$500.00	\$ 500
122	CONSTRUCTION ACCESS DRIVEWAY	1	EA	\$1,500.00	\$ 1,500
123	TRAFFIC CONTROL	1	LS	\$500.00	\$ 500
124	MOBILIZATION	1	LS	\$26,000.00	\$ 26,000
5% Construction Contingency					\$ 26,000
10% Extra Pipe Contingency					\$ 16,000
Subtotal Construction Cost					\$ 523,400.00

Estimated Costs
 Open Ditch Repairs
 Drainage District No. 4
 Hamilton County, IA



Williams Branch Open Ditch Construction Cost					
Item No.	Bid Item	Est. Units	Unit	Est. Unit Price	Est. Amount
201	EXCAVATION	13,800	CY	\$3.25	\$ 44,850
202	SPOIL LEVELING (BOTH SIDES)	37	STA	\$150.00	\$ 5,550
203	DAILY SEED & FERTILIZE BANKS	37	STA	\$110.00	\$ 4,070
204	HYDROSEEDING	37	STA	\$300.00	\$ 11,100
205	SPOIL TILLAGE AND ROCK PICK UP	37	STA	\$30.00	\$ 1,110
206	SPOIL TEMPORARY SEEDING	37	STA	\$110.00	\$ 4,070
207	TILE EXTENSION, 12" CMP	100	LF	\$35.00	\$ 3,500
208	TILE EXTENSION, 36" CMP	40	LF	\$90.00	\$ 3,600
209	TILE EXTENSION, 42" CMP	60	LF	\$100.00	\$ 6,000
210	SURFACE DRAIN, 18" CMP	70	LF	\$45.00	\$ 3,150
211	REPAIR TILE BLOWOUT	1	EA	\$500.00	\$ 500
212	RIPRAP, CLASS E	20	TN	\$70.00	\$ 1,400
213	EROSION CONTROL PLAN	1	LS	\$500.00	\$ 500
214	TRAFFIC CONTROL	1	LS	\$500.00	\$ 500
215	MOBILIZATION	1	LS	\$5,000.00	\$ 5,000
5% Construction Contingency					\$ 5,000
10% Extra Pipe Contingency					\$ 1,600
Subtotal Construction Cost					\$ 101,500.00

Additional Non-Construction Project Costs	
Expense	Est. Amount
Survey, Permitting, Engineer's Report, and Preliminary Plans	\$ 40,000
Specifications and Construction Engineering	\$ 35,000
Legal and Administrative	\$ 5,000
Construction Damages	\$ 36,000
Interest	\$ 59,000
Subtotal Non-Construction Cost	\$ 175,000.00

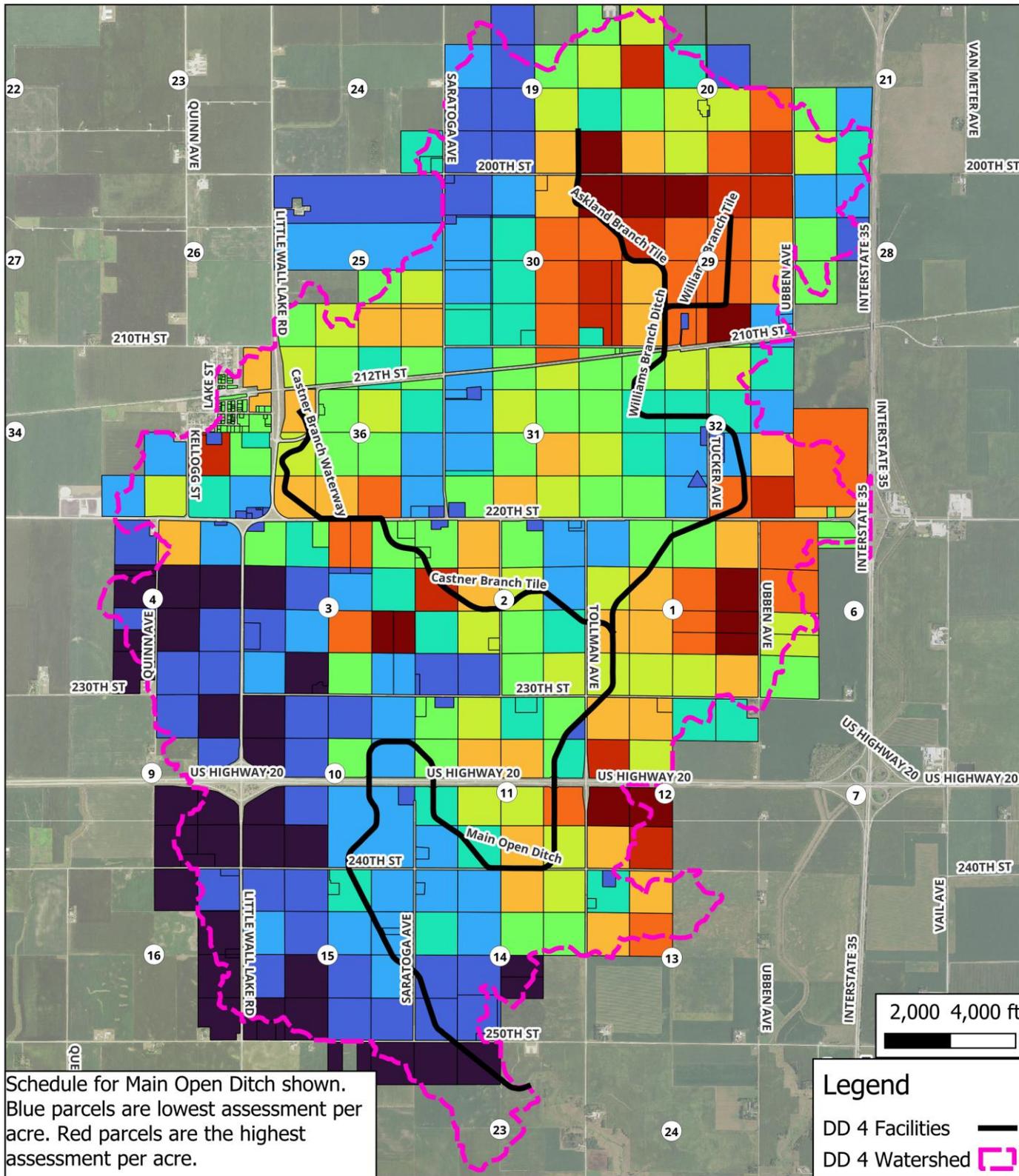
Total Project Costs	
Expense	Est. Amount
Main Open Ditch Repairs Construction	\$ 523,400
Williams Branch Open Ditch Repairs Construction	\$ 101,500
Additional Non-Construction Project Costs	\$ 175,000
Total Open Ditch Repairs Cost to Drainage District No. 4	\$ 799,900
Average Cost per Acre Benefitted (10,402 Acres)	\$ 77

Appendix L – Current Assessment Schedule Map



Drainage District No. 4
Hamilton County, IA

Current Assessment
Schedule
December 2025



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	Notes
Wetlands	52%	0%	1085	\$15.00	\$ 16,275.00	Edge-of-Field	Highly effective for nitrate removal from tile drainage. P reduction varies.
Bioreactors	43%	0%	1085	\$10.00	\$ 10,850.00	Edge-of-Field	Trenches with woodchips that treat tile drainage water.
Saturated Buffers	91%	58%	1085	\$231.00	\$ 250,635.00	Edge-of-Field	This high N reduction only applies to water that interacts with the buffer's active root zone.
Drainage Water Mgt.	33%	0%	1085	\$10.00	\$ 10,850.00	Edge-of-Field	Load reduction achieved by reducing flow volume, not concentration.
Terraces	0	77%			\$ -	Edge-of-Field	An erosion control practice highly effective at reducing sediment and P loss.
Sediment Control	0	85%			\$ -	Edge-of-Field	Includes practices like sedimentation basins or ponds.
Reduce N Rate to MRTN	10%	0%	7052	-\$2.00	\$ (14,104.00)	In-Field	MRTN is the Maximum Return to Nitrogen rate, an economically optimal amount.
Nitrification Inhibitor	9%	0%	2712	-\$3.00	\$ (8,136.00)	In-Field	Used with fall-applied anhydrous ammonia.
Move Fall N to Spring	6%	0%	7052	-\$20.00	\$ (141,040.00)	In-Field	Moves fall fertilizer application to pre-plant in the spring.
Sidedress N Application	7%	0%	7052	\$0.00	\$ -	In-Field	Compares sidedress application to a single pre-plant application.
Cover Crops	31%	29%	1085	\$49.00	\$ 53,165.00	In-Field	One of the most effective in-field practices for reducing both N and P.
No-Till	0%	90%	1850	\$12.00	\$ 22,200.00	In-Field	Compares no-till to a chisel plow system. Very effective for P reduction.
Conservation Tillage	0%	33%	7052	-\$1.00	\$ (7,052.00)	In-Field	Compares chisel plowing to more intensive moldboard plowing.
Extended Rotations	42%	0%	1085	\$30.00	\$ 32,550.00	Land Use	Involves a 4- or 5-year rotation with at least two years of alfalfa.
Land Retirement (CRP)	85%	75%	0	\$192.00	\$ -	Land Use	Converts cropland to perennial vegetation.
This Example Reduction					\$226,193.00		
Nitrogen Reduction					46%		
Phosphorus Reduction					45%		

This spreadsheet is for illustrative purposes only. All average figures are examples and not intended to reflect actual values.

Spreadsheet Created by: AgriVia

Appendix O - Landowner Engagement Letters



PO Box 44
1124 Willis Ave
Perry, IA 50220

October 6, 2025

Dear Landowners of C.W.A. Drainage District No. 4,

This letter is to inform you that a petition has been filed requesting a study for repairs to the open ditch in C.W.A. Drainage District No. 4.

In response, the Hamilton 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, 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 this fall. 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 corridor to assist with our study. All survey work will be performed with care to minimize disturbance, and no vehicles or UTVs will be used within farm fields.

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

Survey Notice

AgriVia

Page 1 of 1

Appendix P - Existing Right-of-Way

Main Open Ditch Right-of-Way				
Deedholder	S-T-R	Legal	Width (ft)	Acres
O'Connor, Larry	23-88-24	AUDITOR PARCEL A EXC LT	100 (50 each side)	0.09
Nees, Candace LE	23-88-24	NE NW	100 (50 each side)	3.88
Nees, Candace LE	23-88-24	NW NW	100 (50 each side)	0.21
O'Connor, Larry Roth IRA	14-88-24	SW SW	100 (50 each side)	3.62
Doolittle Enterprises LLC	14-88-24	NW SW	100 (50 each side)	1.99
Doolittle, Eric Donald & Doolittle, Grant Dennis	15-88-24	NE SE	100 (50 each side)	1.87
Ose Family Farms LLC	15-88-24	SE NE EXC LT	100 (50 each side)	3.23
Ose Family Farms LLC	15-88-24	SW NE	100 (50 each side)	0.17
Ose Family Farms LLC	15-88-24	NE NE	100 (50 each side)	0.02
Ose Family Farms LLC	15-88-24	NW NE EXC LT	100 (50 each side)	3.32
Doolittle, Eric D & Krystal L Etal	10-88-24	SE AUDITOR PARCEL C	100 (50 each side)	3.34
Grove, Jerald L	10-88-24	SE AUDITOR PARCEL B	100 (50 each side)	3.28
Ose Family Farms LLC	10-88-24	SW NE	100 (50 each side)	1.94
Ose Family Farms LLC	10-88-24	SE NE	100 (50 each side)	3.28
Ose Family Farms LLC	10-88-24	SW NW	100 (50 each side)	2.62
Doolittle, Eric D & Krystal L Etal	11-88-24	NW SW	100 (50 each side)	3.1
Doolittle, Eric D & Krystal L Etal	11-88-24	SW SW AUDITOR PARCEL C	100 (50 each side)	0.94
Doolittle, Eric D & Krystal L Etal	11-88-24	SE SW	100 (50 each side)	3.71
Scallon, Judith A & Lett, Patricia M	11-88-24	SW SE	100 (50 each side)	1.53
Scallon, Judith A & Lett, Patricia M	11-88-24	SE SE	100 (50 each side)	3.27
Scallon, Judith A & Lett, Patricia M	11-88-24	NE SE	100 (50 each side)	2.64
Ose Family Farms LLC	11-88-24	SE NE EXC LTS	100 (50 each side)	1.16
Hamilton County Conservation Bd	11-88-24	SE NE LT IN COYOTE BEND WLF AREA LAND ALONG DD	100 (50 each side)	1.38
Ose Family Farms LLC	11-88-24	NE NE EXC LT	100 (50 each side)	1.28
Hamilton County Conservation Bd	11-88-24	NE NE LT IN COYOTE BEND WLF AREA LAND ALONG DD	100 (50 each side)	1.15
O'Connor, Larry	12-88-24	NW NW	100 (50 each side)	1.53
Patterson, Eric C	1-88-24	SW SW	100 (50 each side)	3.14
Patterson, Eric C	1-88-24	NW SW	100 (50 each side)	3.08
Keane, Robert L Revocable Trust & Keane, Elaine M Revocable Trust	1-88-24	SW NW	100 (50 each side)	1.82
Keane, Robert L Revocable Trust & Keane, Elaine M Revocable Trust	1-88-24	SE NW	100 (50 each side)	2.19
Keane, Connie S Living Trust	1-88-24	NE NW	100 (50 each side)	2.72
O'Connor, Larry E	1-88-24	NW NE	100 (50 each side)	2.69
Anderson, Allen W	32-89-23	SW SE	100 (50 each side)	4.19
Anderson, Allen W	32-89-23	NW SE EXC LT	100 (50 each side)	3.19

Main Open Ditch Right-of-Way				
Anderson, Jon L Etal	32-89-23	SW NE	100 (50 each side)	2.09
Phillips, Evonne J Living Trust	32-89-23	SE NW EXC TR	100 (50 each side)	2.96
Phillips, Evonne J Living Trust	32-89-23	SW NW	100 (50 each side)	0.6
Total Acres				83.22

Williams Branch Open Ditch Right-of-Way				
Deedholder	S-T-R	Legal	Width (ft)	Acres
Phillips, Evonne J Living Trust	32-89-23	SW NW	160	3.03
Phillips, Evonne J Living Trust	32-89-23	NW NW	160	5.4
Phillips, Evonne J Living Trust	32-89-23	NE NW	80	0.34
VanDiest Family LLC	29-89-23	SW SW	80	2.36
Patterson, Eric C & Beth A	29-89-23	SE SW EXC EAST 10.5 AC & EXC AUDITOR PARCEL E	80	2.36
Total Acres				13.49

Appendix Q - Farm Equipment in Right-of-Way



Saratoga Ave => 240th St (Upstream)

AgriVia

Farm Equipment near Station 67+50.



Tucker Ave => 220th St (Downstream)

AgriVia

Farm Equipment near Station 372+50.



Tucker Ave -> 220th St (Downstream)

AgriVia

Farm equipment near Station 380+00.

Appendix R - Private Farm Crossings



240th St => Saratoga Ave (Downstream)

Sta. 71+00 - Steel Bridge to be removed, concrete footings will remain.



Hwy 20 -> 240th St (Downstream)

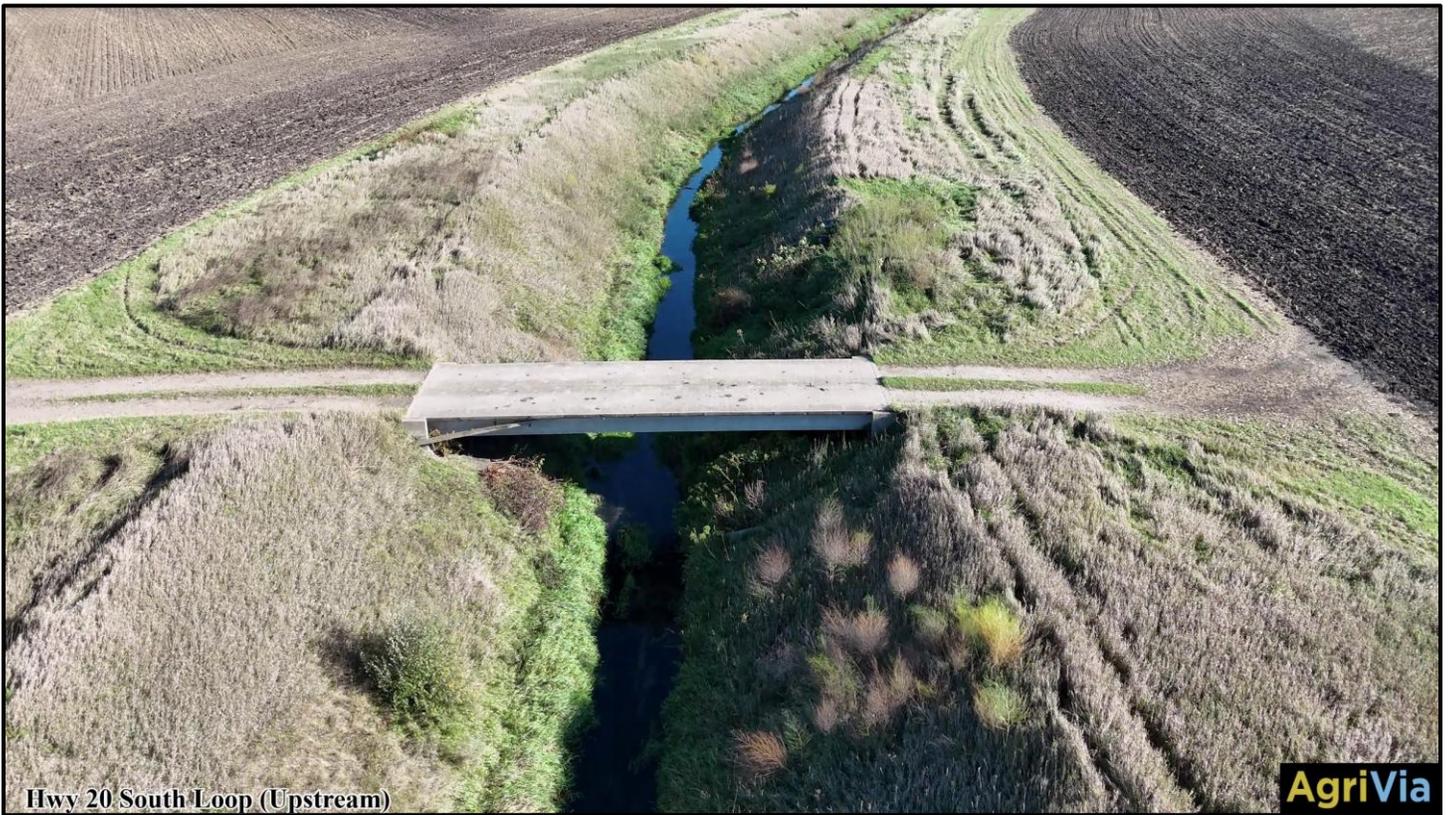
Sta. 114+50 - Wood Bridge to be removed.



Hwy 20 North Loop (Downstream)

AgriVia

Sta. 147+00 - Concrete bridge.



Hwy 20 South Loop (Upstream)

AgriVia

Sta. 178+50 - Concrete bridge.



Hwy 20 South Loop (Upstream)

AgriVia

Sta. 225+00 - Steel culvert.



220th St -> 230th St (Downstream)

AgriVia

Sta. 326+00 - Wood Bridge to be removed.

Appendix T – Pipe Table

Main Open Ditch

Station	Existing Size	Length	Type	Side	Additional Replacement Notes
09+36	24	40	SD	LT	
10+01	8	20	TE	LT	
11+25					Fill gully and install new 40 LF 18" CMP SD.
12+23	24	40	SD	LT	
22+41	24	40	SD	LT	
25+52	8	20	TE	LT	
25+78	24	50	SD	LT	Replace with one 50 LF 36" CMP SD.
25+80	18	50	SD	LT	
25+97	8	20	TE	LT	
27+06	18		SD	RT	Existing-to-remain.
27+36	12		TE	LT	Existing-to-remain.
27+47	18		SD	LT	Existing-to-remain.
28+22	18		SD	RT	Existing-to-remain.
28+54	18		SD	LT	Existing-to-remain.
28+57	12		TE	LT	Existing-to-remain.
29+67	15	40	SD	LT	Replace with 40 LF 18" CMP SD.
29+72	8	20	TE	LT	
33+92	18	40	SD	RT	
34+25	15	40	SD	LT	Replace with 40 LF 18" CMP SD.
41+17	24	40	SD	RT	
46+57	24	60	SD	RT	
52+72	18		TE	RT	Existing-to-remain.
53+81	18		SD	RT	Existing-to-remain.
54+54	15	20	TE	RT	
54+89	6	20	TE	LT	Replace with 20 LF 8" CMP TE.
55+03	36	40	SD	LT	
58+45	12	20	TE	LT	
58+49	12	20	TE	LT	
63+32	15	40	SD	LT	Replace with 40 LF 18" CMP SD.
63+36	12	20	TE	RT	
63+45	18	20	TE	RT	
66+36	18	40	SD	LT	
67+25	12	50	SD	RT	Replace with 50 LF 18" CMP SD.
70+91	18	20	TE	RT	
72+28	15	20	TE	LT	
75+48	18		SD	LT	Replace with one 50 LF 24" CMP SD.
75+50	15		SD	LT	
75+61	15	20	TE	RT	
75+76	15	20	TE	LT	
76+45					Fill gully and install new 40 LF 18" CMP SD.
76+88	6	20	TE	RT	Replace with 20 LF 8" CMP TE.

Main Open Ditch					
Station	Existing Size	Length	Type	Side	Additional Replacement Notes
80+19	15	40	SD	LT	Replace with 40 LF 18" CMP SD.
82+63	18	20	TE	LT	
82+92	12	50	SD	RT	Replace with 50 LF 18" CMP SD.
90+99	15	20	TE	LT	
91+03	18		SD	RT	Existing-to-remain.
91+05	18		SD	LT	Existing-to-remain.
91+87	15		SD	LT	Existing-to-remain.
91+89	24		SD	RT	Existing-to-remain.
91+95	15	20	TE	RT	
94+61	12	20	TE	LT	
95+56	18	40	SD	LT	
98+15	15	40	SD	RT	Replace with 40 LF 18" CMP SD.
98+23	18	20	TE	LT	
98+50	24		SD	LT	Replace with rock chute.
98+66	24		SD	LT	
98+76	24		SD	LT	
101+68	12	40	SD	RT	Replace with 40 LF 18" CMP SD.
102+38	18	20	TE	LT	
108+02	15	40	SD	RT	Replace with 40 LF 18" CMP SD.
112+99	8	20	TE	RT	
113+04	12	50	SD	RT	Replace with 50 LF 18" CMP SD.
116+24	15	20	TE	RT	
120+05	Unk.	20	TE	LT	Assume to be replaced with 20 LF 12" CMP TE.
120+65	24		SD	LT	Existing-to-remain.
120+77	18		SD	RT	Existing-to-remain.
123+05	15		SD	RT	Existing-to-remain.
123+53	36		SD	LT	Existing-to-remain.
123+61	36		SD	LT	Existing-to-remain.
128+13	15	20	TE	LT	
129+29	8	20	TE	RT	
131+90	8	20	TE	RT	
131+92	8	20	TE	RT	
132+94	6	20	TE	LT	Replace with 20 LF 8" CMP TE.
135+23	15	40	SD	RT	Replace with 40 LF 18" CMP SD.
139+69	15	20	TE	LT	
141+11	12	20	TE	RT	
142+80	15	50	SD	RT	Replace with 50 LF 18" CMP SD.
146+68	15	20	TE	LT	
146+94	12	20	TE	RT	
148+32	24	60	SD	LT	
150+32	15	20	TE	RT	
150+85	15	20	TE	LT	

Main Open Ditch					
Station	Existing Size	Length	Type	Side	Additional Replacement Notes
156+26	15	50	SD	RT	Replace with 50 LF 18" CMP SD.
156+69	15	60	SD	LT	Replace with 60 LF 18" CMP SD.
157+62	15	20	TE	LT	
157+77	15	20	TE	LT	
158+31	30		SD	RT	Existing-to-remain.
158+75	36		SD	LT	Existing-to-remain.
161+26	30		SD	RT	Existing-to-remain.
161+28	12		TE	RT	Existing-to-remain.
161+33	30		SD	LT	Existing-to-remain.
161+67	12	20	TE	LT	
164+18	12	20	TE	LT	
166+31	15	50	SD	RT	Replace with 50 LF 18" CMP SD.
169+26	8	20	TE	LT	
170+32	6	20	TE	RT	Replace with 20 LF 8" CMP TE.
172+44	15	40	SD	RT	Replace with 40 LF 18" CMP SD.
173+16	12	40	SD	LT	Replace with 40 LF 18" CMP SD.
174+56	Unk.	20	TE	RT	Assume to be replaced with 20 LF 12" CMP TE.
177+76	12	20	TE	LT	
178+28	15	50	SD	RT	Replace with 50 LF 18" CMP SD.
179+40	8	20	TE	RT	
180+06	12	40	SD	LT	Replace with 40 LF 18" CMP SD.
184+43	12	20	TE	RT	
192+82	15	20	TE	RT	
193+02	15	20	TE	RT	
205+11	8	20	TE	LT	
209+47	15	20	TE	RT	
210+32	18	20	TE	RT	
213+80	12	40	SD	RT	Replace with 40 LF 18" CMP SD.
214+19	12	20	TE	RT	
214+21	12	20	TE	RT	
215+31	15	80	SD	LT	Replace with 80 LF 18" CMP SD.
220+35	12	20	TE	RT	
220+63	24	40	SD	RT	
225+62	6	20	TE	RT	Existing-to-remain.
226+67	12	20	TE	RT	
227+71	12	20	TE	RT	
227+73	12	20	TE	RT	
230+00	18	80	SD	LT	
230+20	Unk.	20	TE	RT	Assume to be replaced with 20 LF 12" CMP TE.
233+22	15	20	TE	RT	
233+77	15	20	TE	RT	
236+32	24		SD	RT	Existing-to-remain.

Main Open Ditch					
Station	Existing Size	Length	Type	Side	Additional Replacement Notes
236+76	24		SD	LT	Existing-to-remain.
239+43	24		SD	RT	Existing-to-remain.
239+44	24		SD	LT	Existing-to-remain.
239+69	Unk.		TE	LT	Existing-to-remain.
240+33	12	20	TE	RT	
240+50	Unk.	20	TE	LT	Assume to be replaced with 20 LF 12" CMP TE.
250+97	8	20	TE	RT	
252+57	12	20	TE	RT	
253+37	8	20	TE	LT	
257+37	12	40	SD	LT	Replace with 40 LF 18" CMP SD.
260+84	15	20	TE	LT	
261+58	15	20	TE	LT	
262+84	15		SD	RT	Existing-to-remain.
262+86	15		SD	LT	Existing-to-remain.
263+07	6	20	TE	RT	Replace with 20 LF 8" CMP TE.
269+23	15		TE	LT	Existing-to-remain.
269+47	15		SD	RT	Existing-to-remain.
270+47	15		SD	RT	Existing-to-remain.
272+56	15	60	SD	RT	Replace with 60 LF 18" CMP SD.
273+71	18	20	TE	RT	
279+24	24	20	TE	RT	
280+03	12	20	TE	RT	
283+28	12	40	SD	LT	Replace with 40 LF 18" CMP SD.
283+95	Unk.	20	TE	LT	Assume to be replaced with 20 LF 12" CMP TE.
284+02	12	50	SD	RT	Replace with 50 LF 18" CMP SD.
290+83	36	20	TE	LT	
294+24	8	20	TE	RT	
299+56	24	20	TE	RT	
299+57	15	20	TE	LT	
299+77	18	80	SD	LT	
300+67	8	20	TE	RT	
300+78	Unk.	20	TE	LT	Assume to be replaced with 20 LF 12" CMP TE.
310+49	18	20	TE	LT	
315+83	Unk.	20	TE	LT	Assume to be replaced with 20 LF 12" CMP TE.
315+86	15	50	SD	RT	Replace with 50 LF 18" CMP SD.
319+91	18	20	TE	LT	
327+35	15		SD	RT	Replace with one 40 LF 24" CMP SD.
327+37	15		SD	RT	
327+50	8	20	TE	LT	
335+43	15	20	TE	RT	
336+53	15	20	TE	LT	
338+34	24		TE	RT	Existing-to-remain.

Main Open Ditch					
Station	Existing Size	Length	Type	Side	Additional Replacement Notes
338+37	24		TE	LT	Existing-to-remain.
338+40	18		SD	RT	Existing-to-remain.
341+43	12	20	TE	LT	
342+17	18	20	TE	RT	
353+07	18	40	SD	LT	
354+30	15		TE	RT	Existing-to-remain.
358+95	15	20	TE	RT	
362+50	15	40	SD	RT	Replace with 40 LF 18" CMP SD.
371+97	15	60	SD	RT	Replace with 60 LF 18" CMP SD.
375+01	15	20	TE	RT	
381+50	6	20	TE	RT	Replace with 20 LF 8" CMP TE.
381+53	15		SD	LT	Existing-to-remain.
381+62	15		SD	RT	Existing-to-remain.
381+61	15		SD	LT	Existing-to-remain.
382+54	15		SD	LT	Existing-to-remain.
382+55	15		SD	RT	Existing-to-remain.
382+79	8		TE	RT	Existing-to-remain.
383+27	12		TE	RT	Existing-to-remain.
387+38	18	50	SD	RT	
389+68	24		SD	LT	Existing-to-remain.
396+98	18		TE	LT	Existing-to-remain.
397+89	18		SD	RT	Existing-to-remain.

Williams Branch Open Ditch					
Station	Existing Size	Length	Type	Side	Additional Replacement Notes
00+23	30		TE	LT	Existing-to-remain.
00+63	24		SD	LT	Existing-to-remain.
00+87	24		SD	LT	Existing-to-remain.
00+98	12		TE	LT	Existing-to-remain.
01+08	18		SD	RT	Existing-to-remain.
06+04	18		SD	LT	Existing-to-remain.
09+11	12	20	TE	RT	
09+50	18		SD	RT	Existing-to-remain.
09+63	12	20	TE	LT	
17+40	15	70	SD	LT	Replace with 70 LF 18" CMP SD.
23+17	24		SD	RT	Existing-to-remain.
23+18	42	20	TE	RT	
23+18	24		SD	RT	Existing-to-remain.
23+20	12	20	TE	RT	
26+15	42	20	TE	RT	
26+19	24		SD	RT	Existing-to-remain.
26+21	30		TE	LT	Existing-to-remain.

Williams Branch Open Ditch					
Station	Existing Size	Length	Type	Side	Additional Replacement Notes
26+48	8	20	TE	RT	Existing-to-remain.
26+72	12	20	TE	LT	
36+79	42	20	TE	RT	
37+04	12	20	TE	LT	
37+34	36	20	TE	RT	
37+38	36	20	TE	RT	

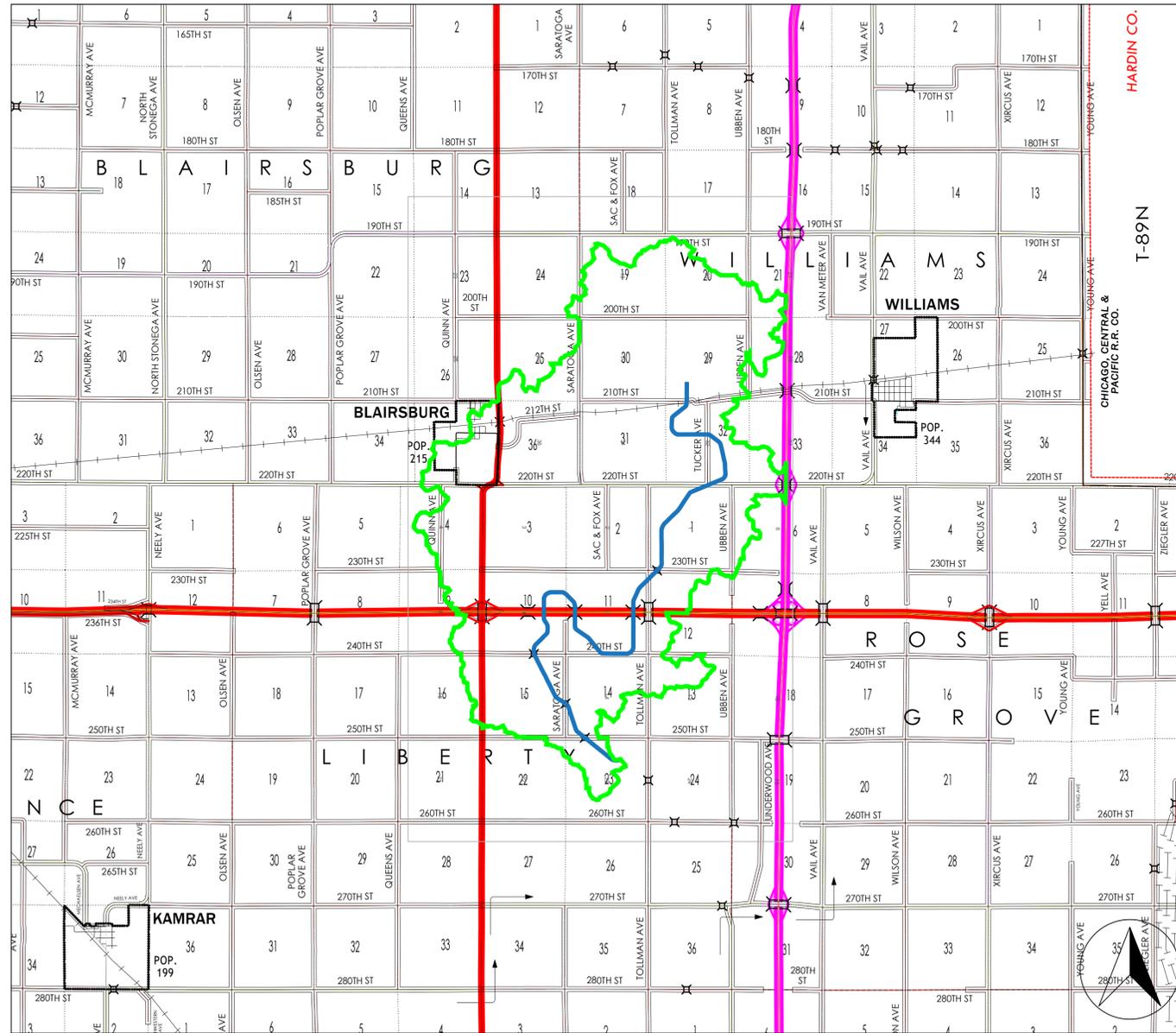
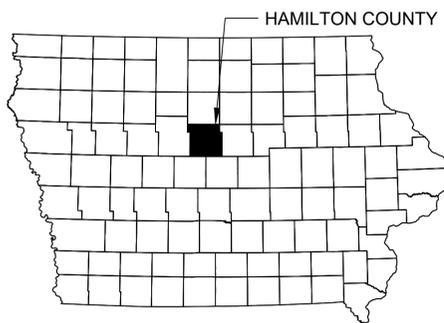
PROPOSED PLANS FOR DRAINAGE DISTRICT NO. 4 OPEN DITCH REPAIRS HAMILTON COUNTY, IA 2025



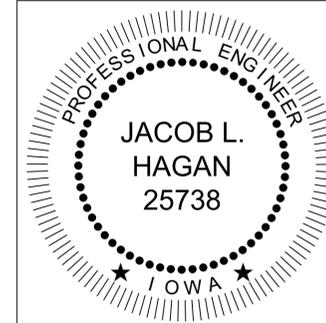
The contractor shall field verify exact locations prior to commencing construction as required by state law. Notify Iowa One Call, 811 or 1-800-292-8989.

Specifications
Unless otherwise noted, the governing standards for this project shall be the 2025 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 Number	Sheet Title
A.01	Title Sheet
A.02	District Plat
D.01	Main Open Ditch (Sta 0+00 → 20+00)
D.02	Main Open Ditch (Sta 20+00 → 40+00)
D.03	Main Open Ditch (Sta 40+00 → 60+00)
D.04	Main Open Ditch (Sta 60+00 → 80+00)
D.05	Main Open Ditch (Sta 80+00 → 100+00)
D.06	Main Open Ditch (Sta 100+00 → 120+00)
D.07	Main Open Ditch (Sta 120+00 → 140+00)
D.08	Main Open Ditch (Sta 140+00 → 160+00)
D.09	Main Open Ditch (Sta 160+00 → 180+00)
D.10	Main Open Ditch (Sta 180+00 → 200+00)
D.11	Main Open Ditch (Sta 200+00 → 220+00)
D.12	Main Open Ditch (Sta 220+00 → 240+00)
D.13	Main Open Ditch (Sta 240+00 → 260+00)
D.14	Main Open Ditch (Sta 260+00 → 280+00)
D.15	Main Open Ditch (Sta 280+00 → 300+00)
D.16	Main Open Ditch (Sta 300+00 → 320+00)
D.17	Main Open Ditch (Sta 320+00 → 340+00)
D.18	Main Open Ditch (Sta 340+00 → 360+00)
D.19	Main Open Ditch (Sta 360+00 → 380+00)
D.20	Main Open Ditch (Sta 380+00 → 400+00)
D.21	Main Open Ditch (Sta 400+00 → 420+00)
D.22	Williams Branch Open Ditch (Sta 0+00 → 20+00)
D.23	Williams Branch Open Ditch (Sta 20+00 → 40+00)



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: TJB
Drafter: TJB
Checker: JLH

PLAN LEGEND
Open Ditch Facilities
Benefitted Area

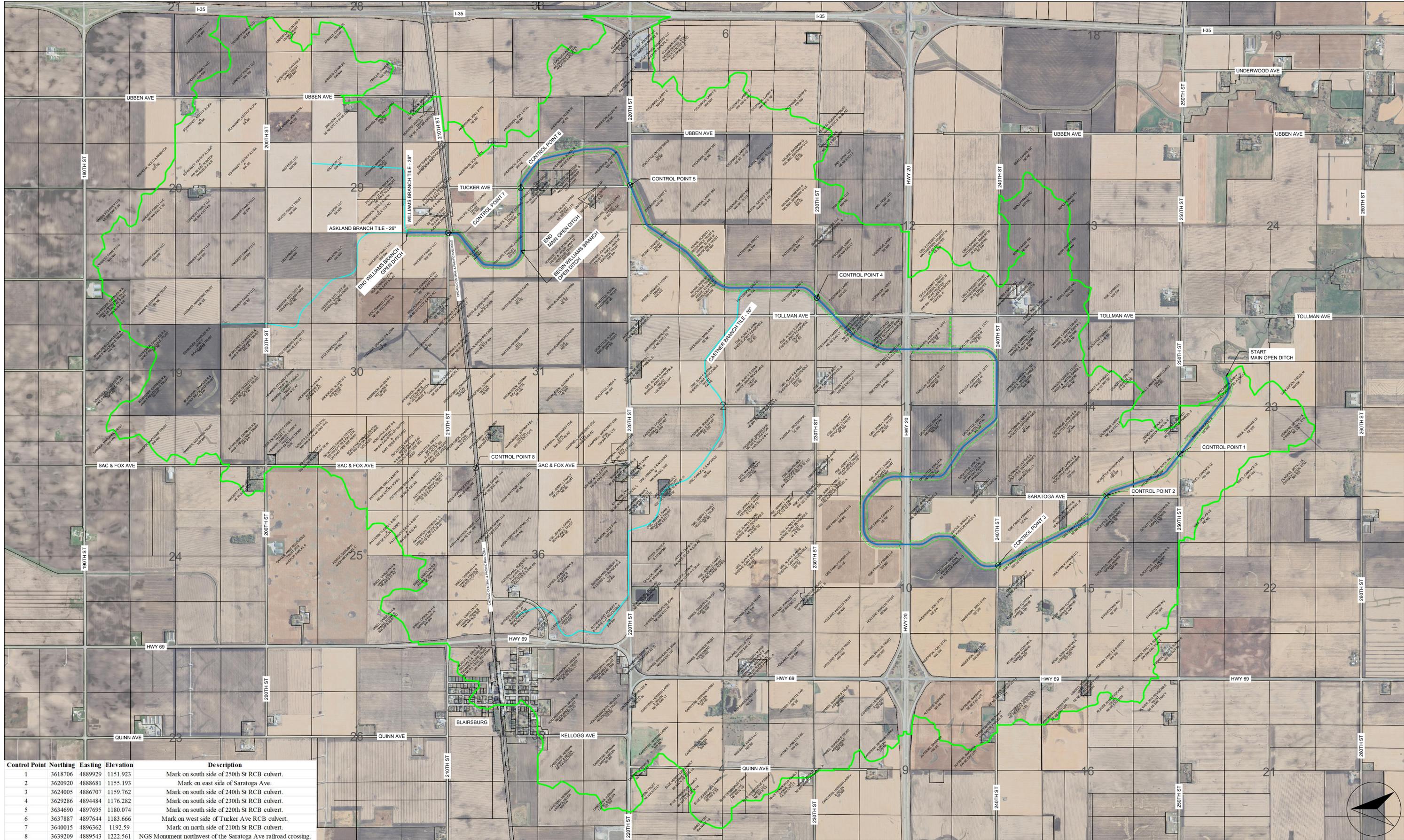
Project Datum:
State Plane, IA83-NF
NAVD 88

No.	Revision/Issue	Date

Sheet Name
Title Sheet

Project Name, Client, and Address
Open Ditch Repairs
Drainage District No. 4
Hamilton County, IA
250th St & Saratoga Ave, Blairsburg, IA 50034

Project: 2515-40
Date: 2026-01-19
Plan Scale: 1" = 10,000'
Sheet: A.01



Control Point	Northing	Easting	Elevation	Description
1	3618706	4889929	1151.923	Mark on south side of 250th St RCB culvert.
2	3620920	4888681	1155.193	Mark on east side of Saratoga Ave.
3	3624005	4886707	1159.762	Mark on south side of 240th St RCB culvert.
4	3629286	4894484	1176.282	Mark on south side of 230th St RCB culvert.
5	3634690	4897695	1180.074	Mark on south side of 220th St RCB culvert.
6	3637887	4897644	1183.666	Mark on west side of Tucker Ave RCB culvert.
7	3640015	4896362	1192.59	Mark on north side of 210th St RCB culvert.
8	3639209	4889543	1222.561	NGS Monument northwest of the Saratoga Ave railroad crossing.



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

Designer
TJB
 Drafter
TJB
 Checker
JLH

PLAN LEGEND
 Open Ditch Facilities ———
 District Tile ———
 Benefitted Area ———
 Parcel Lines ———
 Work Limits (ROW) - - - - -

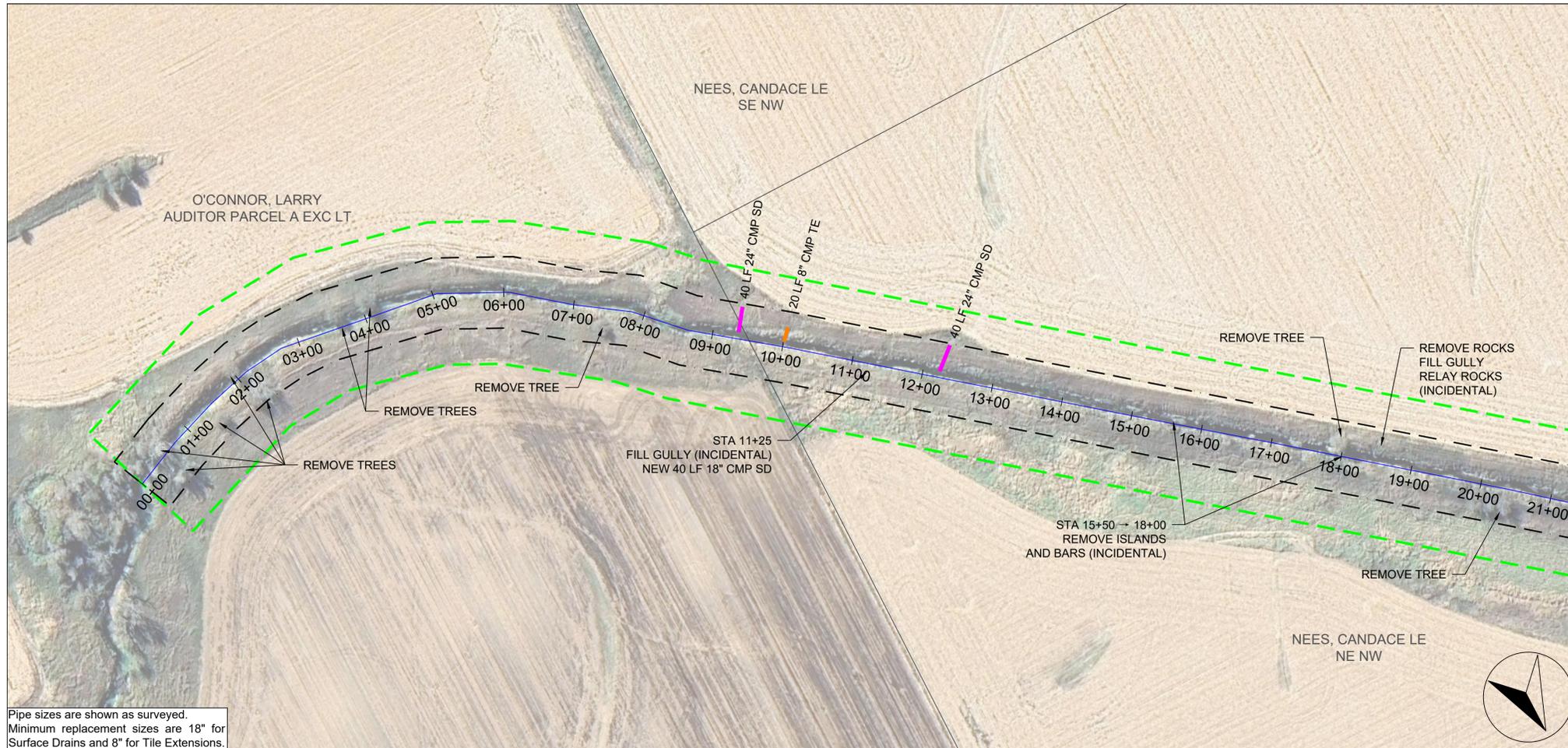
No.	Revision/Issue	Date

Sheet Name
District Plat

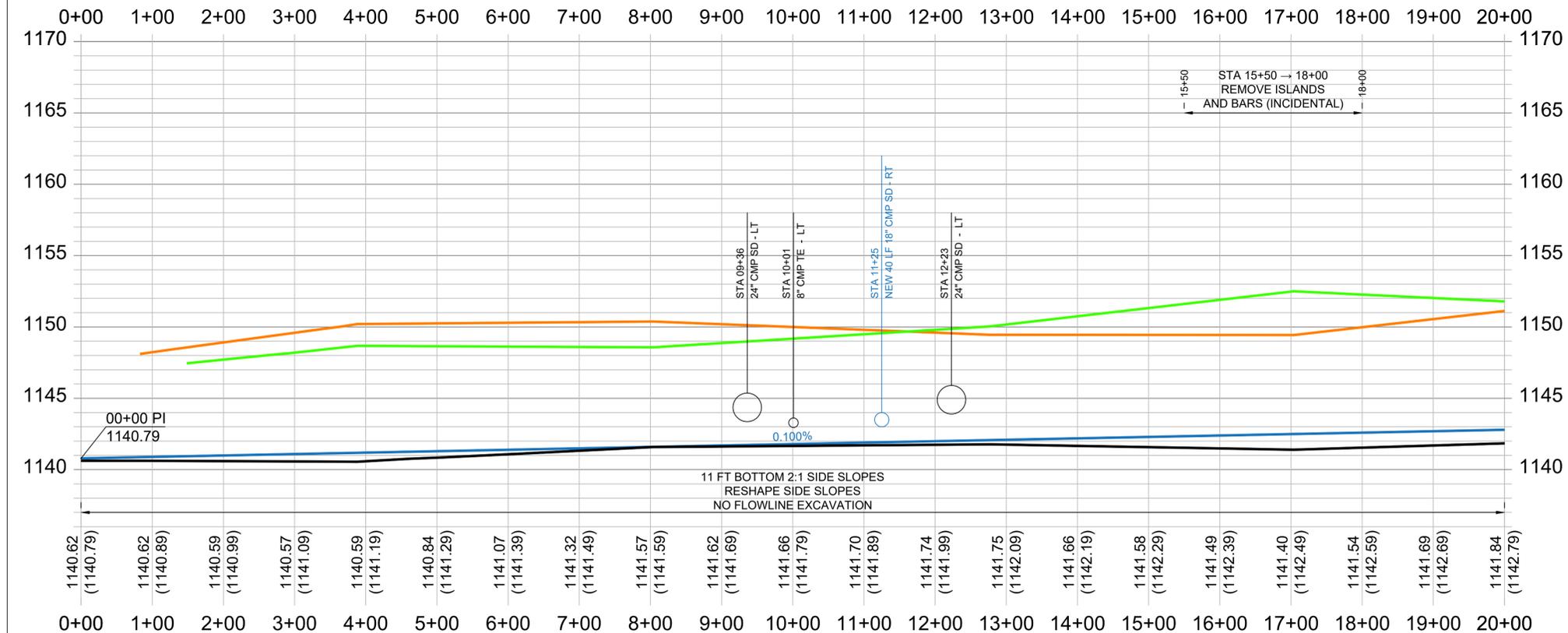
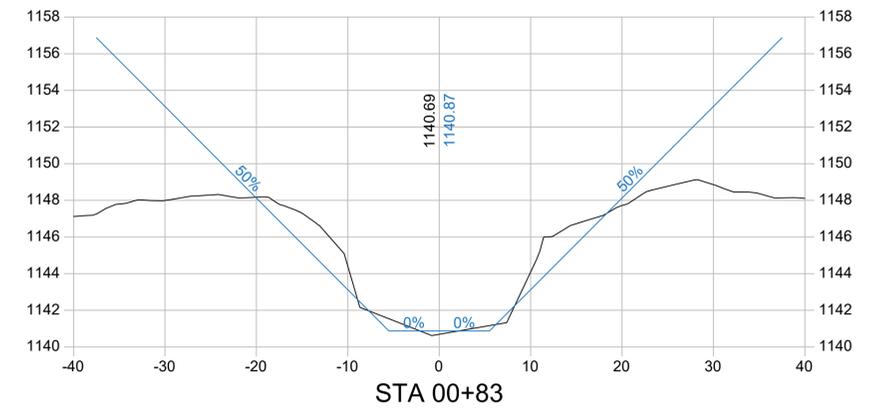
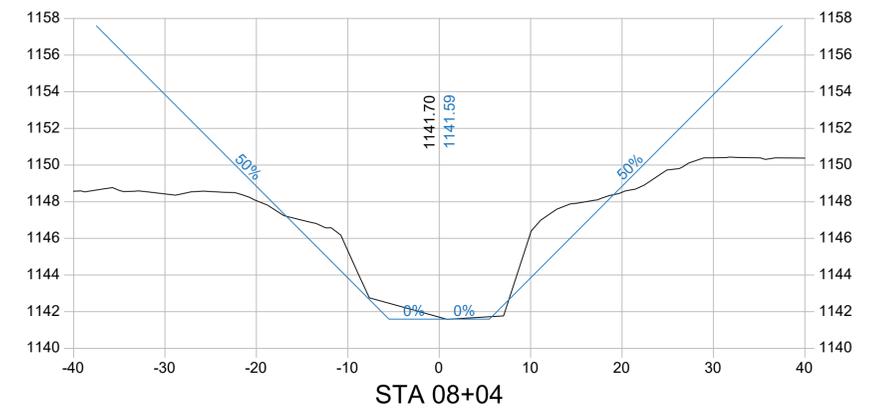
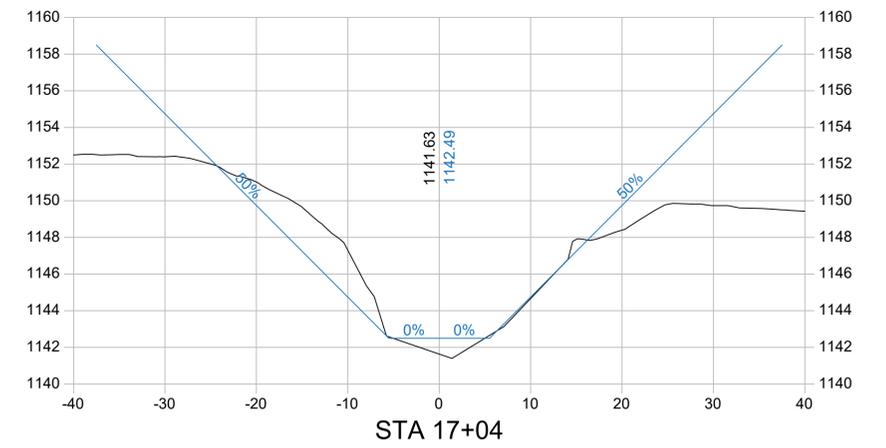
Project Name, Client, and Address
Open Ditch Repairs
Drainage District No. 4
Hamilton County, IA
250th St & Saratoga Ave, Blairsburg, IA 50034

Project
2515-40
 Date
2026-01-19
 Plan Scale
1" = 1,250'

Sheet
A.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
TJB
Drafter
TJB
Checker
JLH

PLAN LEGEND

- Parcel Lines
- Work Limits (100' each side)
- Ditch ROW (50' each side)
- Tile Extensions
- Surface Drains
- Utilities (in red)

PROFILE LEGEND

- 1963 Ditch Grade
- Surveyed Ditch Bottom
- Left Top of Bank
- Right Top of Bank

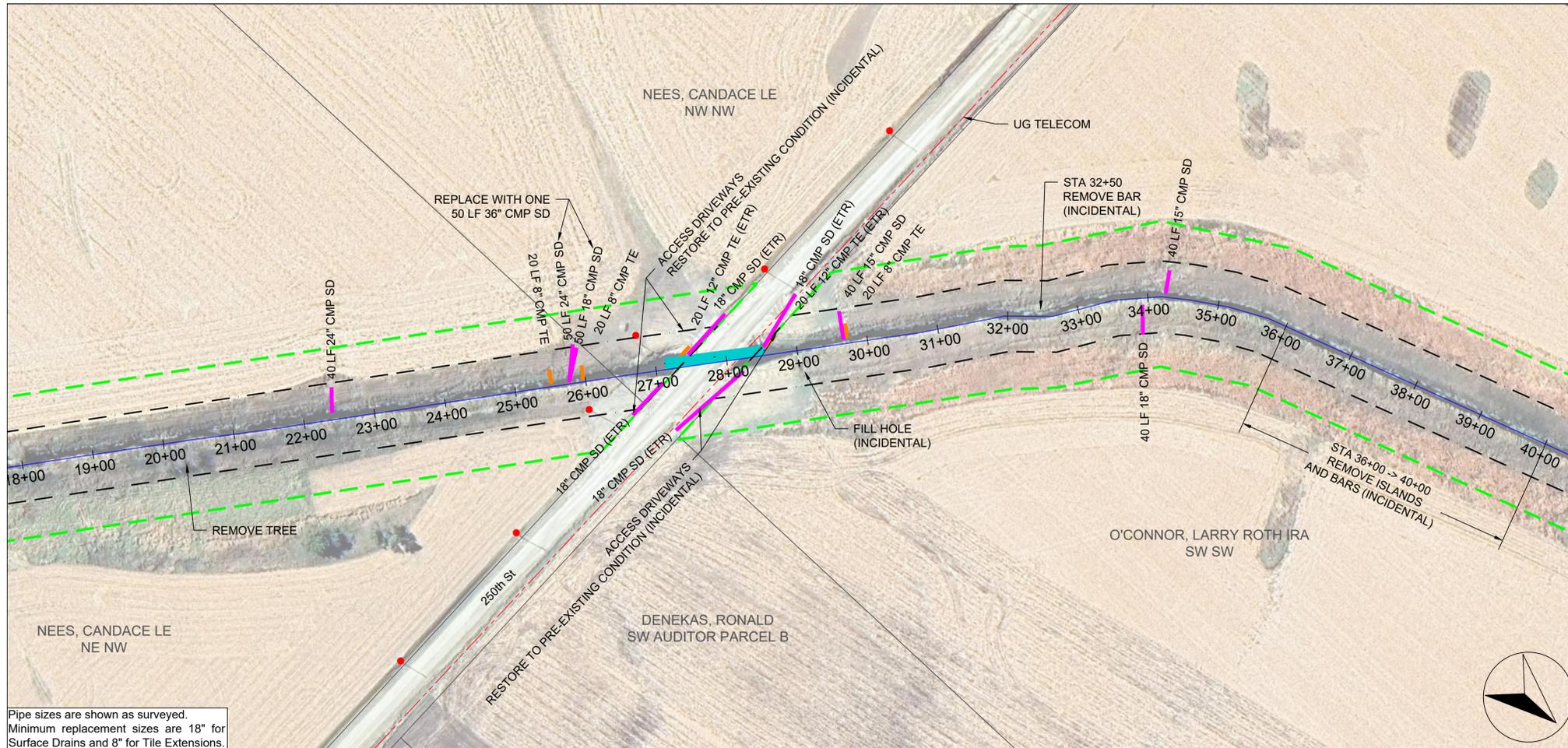
No.	Revision/Issue	Date

Sheet Name
**Main Open Ditch
Plan & Profile
Sta 0+00 → 20+00**

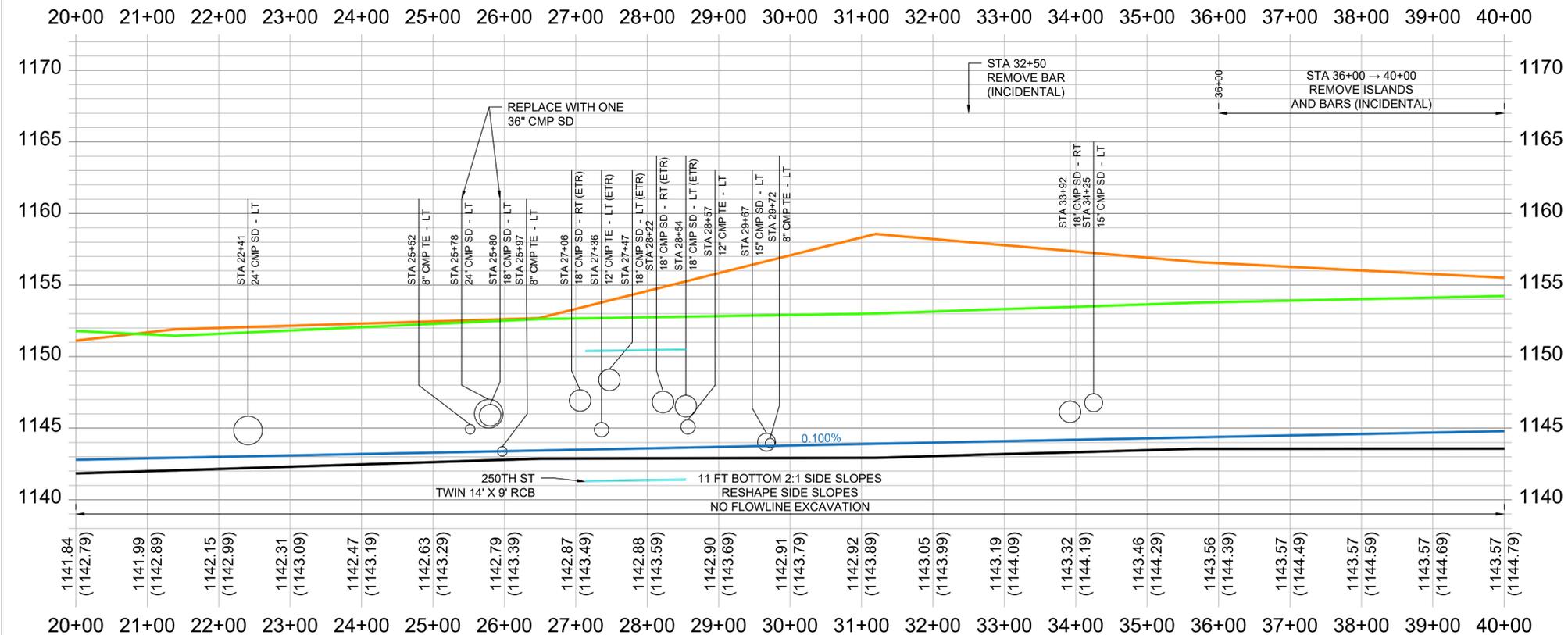
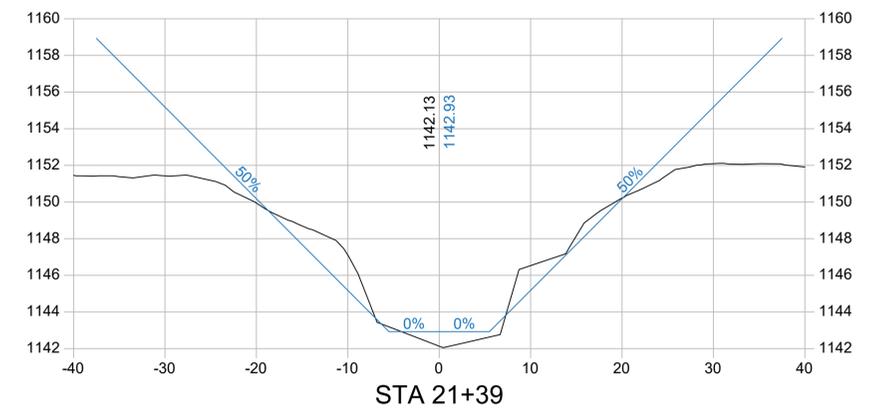
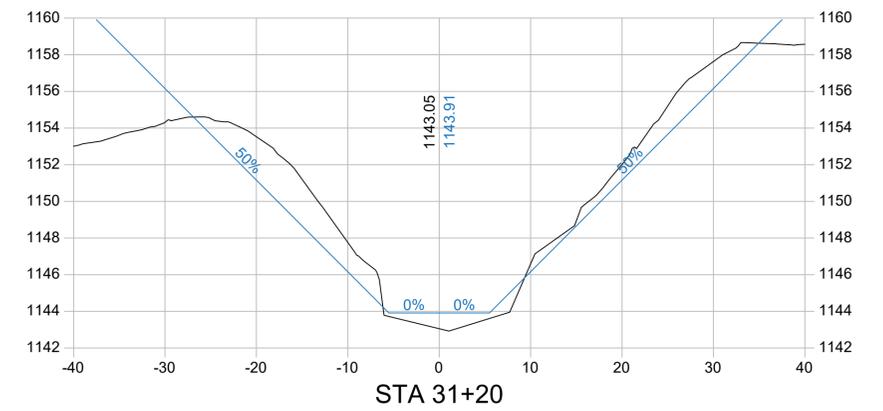
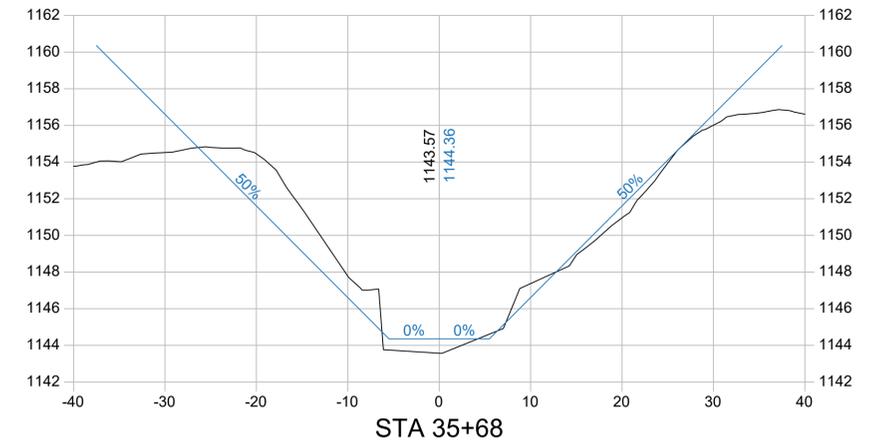
Project Name, Client, and Address
**Open Ditch Repairs
Drainage District No. 4
Hamilton County, IA
250th St & Saratoga Ave, Blairsburg, IA 50034**

Project
2515-40
Date
2026-01-19
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
 PO Box 44
 1124 Willis Ave
 Perry, IA 50220

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

PLAN LEGEND

Parcel Lines	1963 Ditch Grade
Work Limits (100' each side)	Surveyed Ditch Bottom
Ditch ROW (50' each side)	Left Top of Bank
Tile Extensions	Right Top of Bank
Surface Drains	
Utilities (in red)	

PROFILE LEGEND

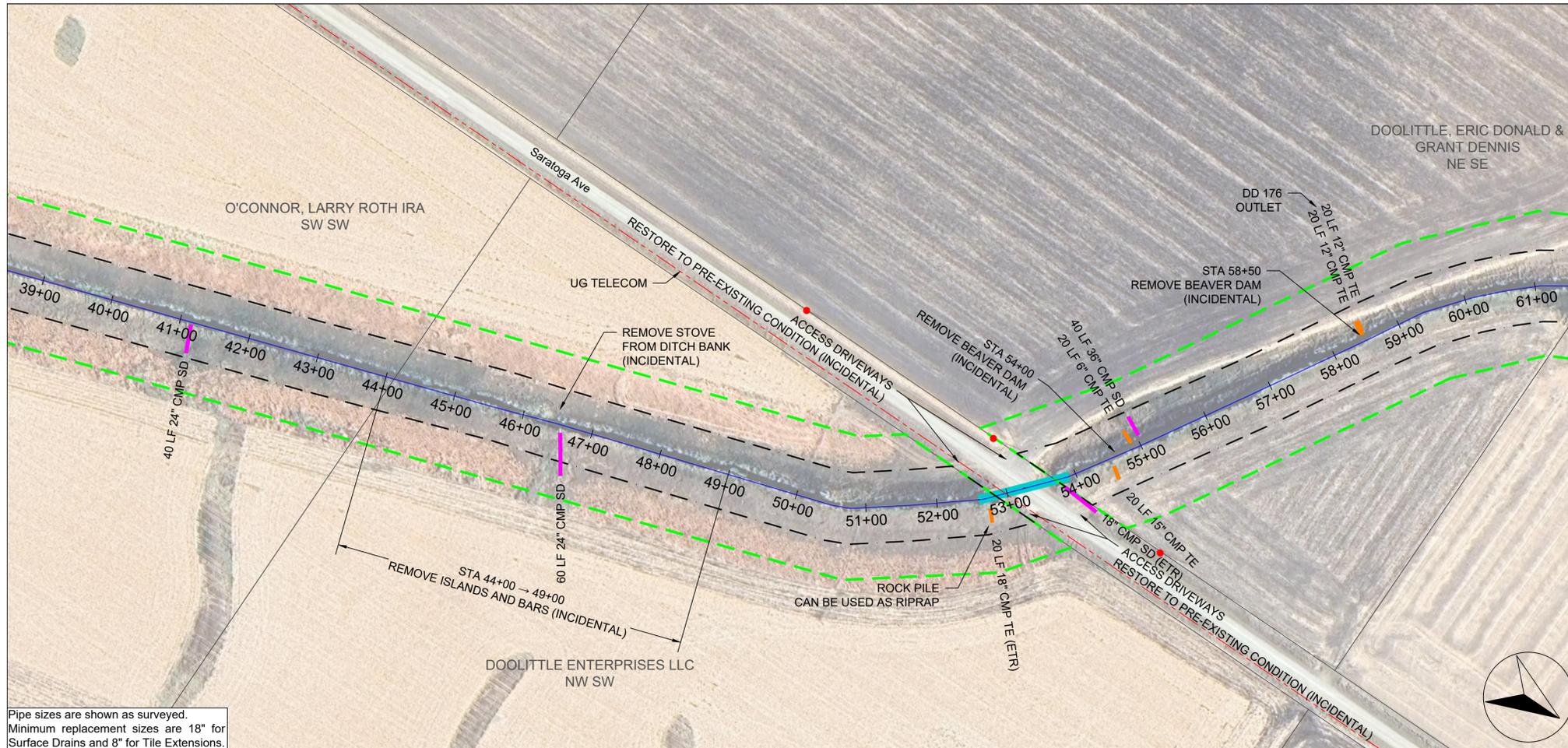
No.	Revision/Issue	Date

Sheet Name
**Main Open Ditch
 Plan & Profile
 Sta 20+00 → 40+00**

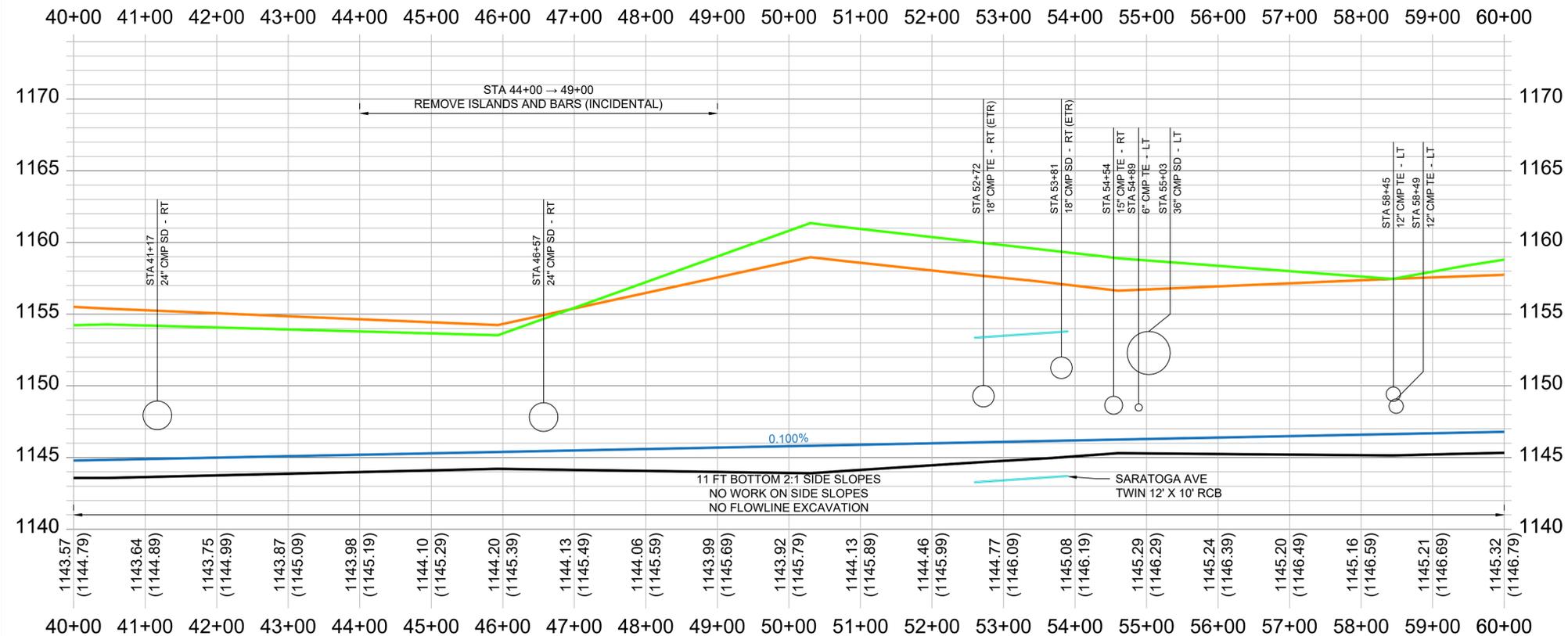
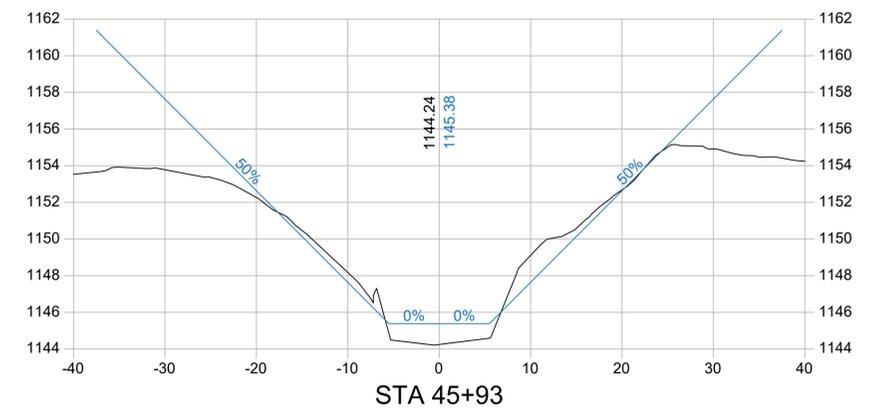
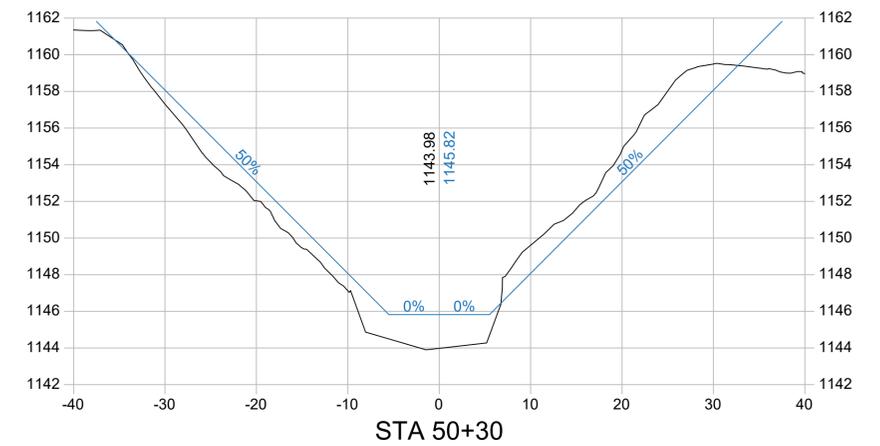
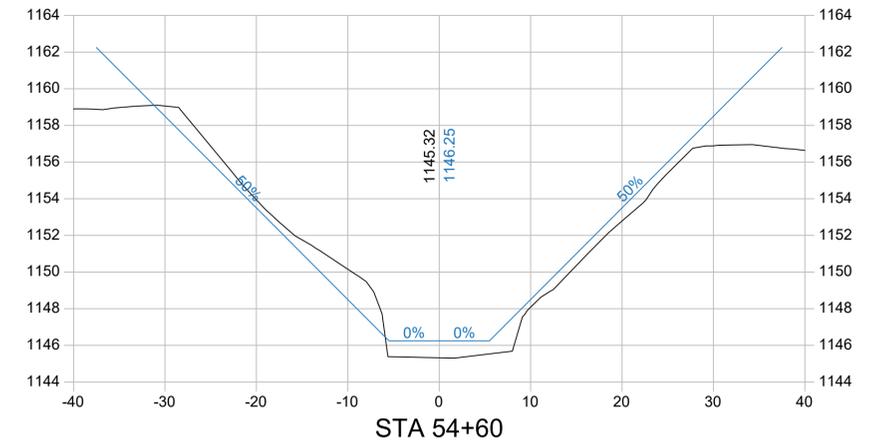
Project Name, Client, and Address
**Open Ditch Repairs
 Drainage District No. 4
 Hamilton County, IA
 250th St & Saratoga Ave, Blairsburg, IA 50034**

Project: **2515-40**
 Date: **2026-01-19**
 Plan Scale: **1" = 200'**

Sheet: **D.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
TJB
Drafter
TJB
Checker
JLH

PLAN LEGEND

Parcel Lines	1963 Ditch Grade
Work Limits (100' each side)	Surveyed Ditch Bottom
Ditch ROW (50' each side)	Left Top of Bank
Tile Extensions	Right Top of Bank
Surface Drains	
Utilities (in red)	

PROFILE LEGEND

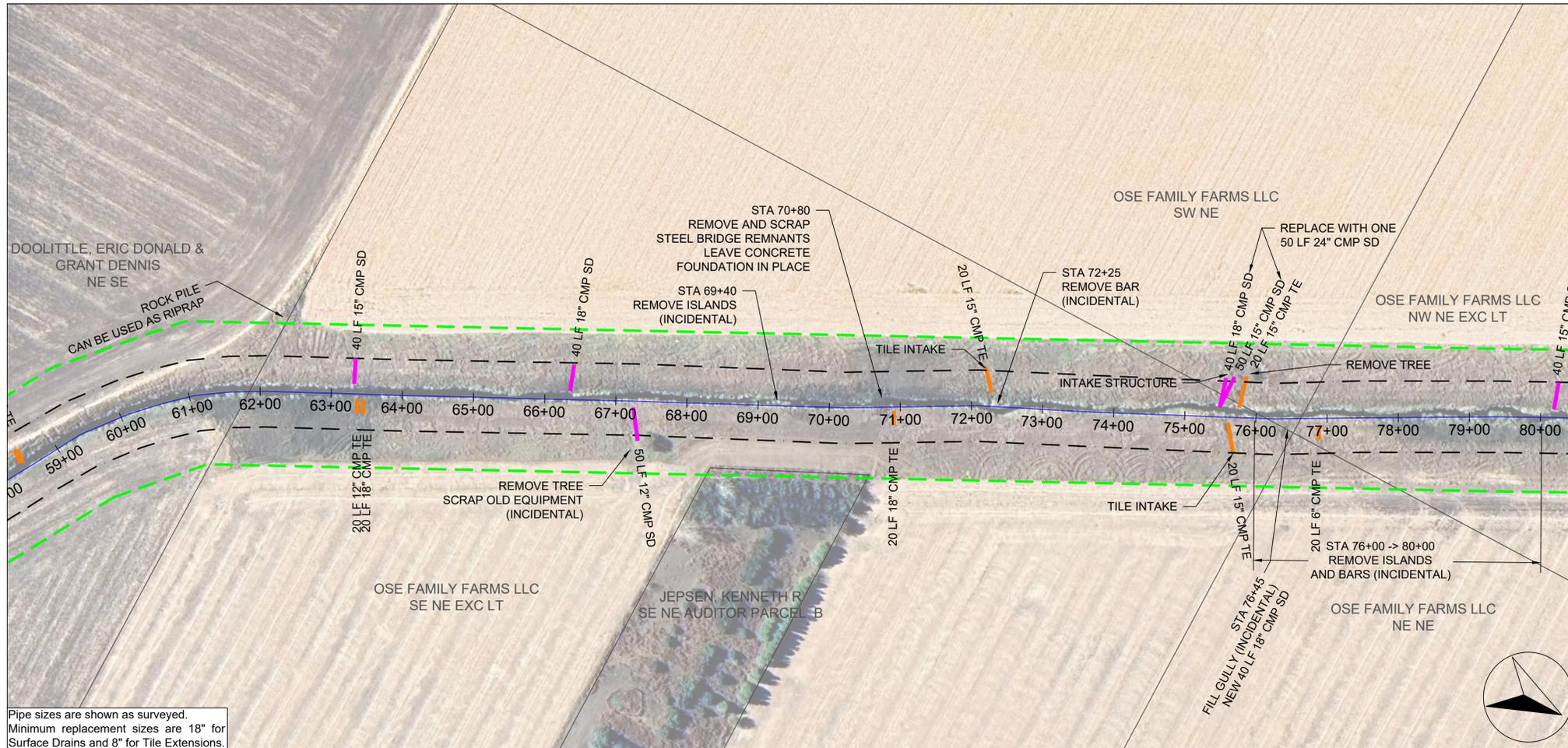
No.	Revision/Issue	Date

Sheet Name
**Main Open Ditch
Plan & Profile
Sta 40+00 → 60+00**

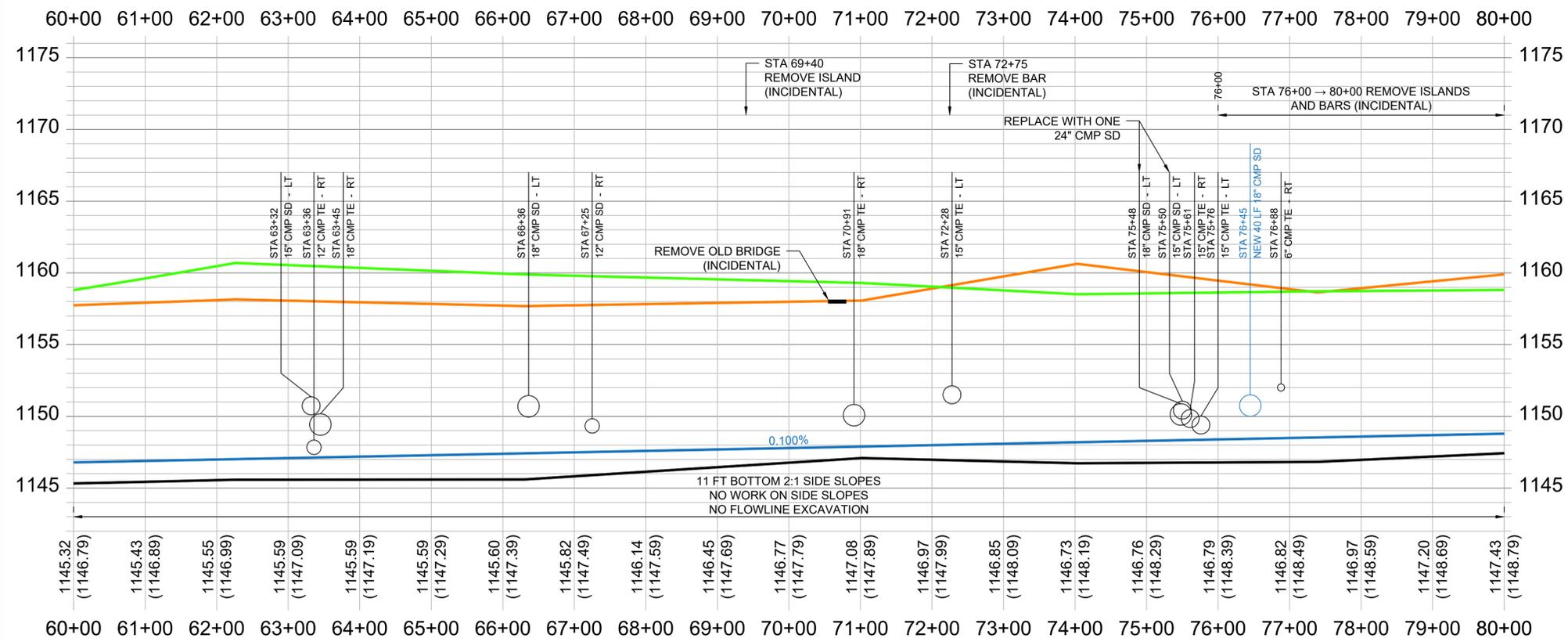
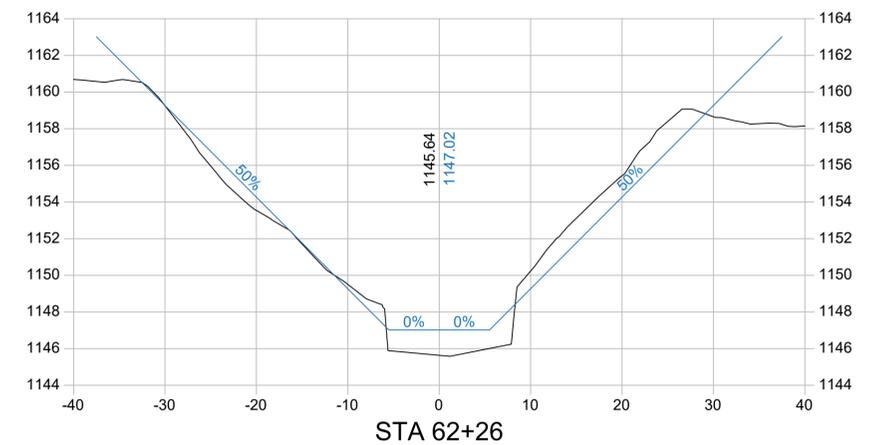
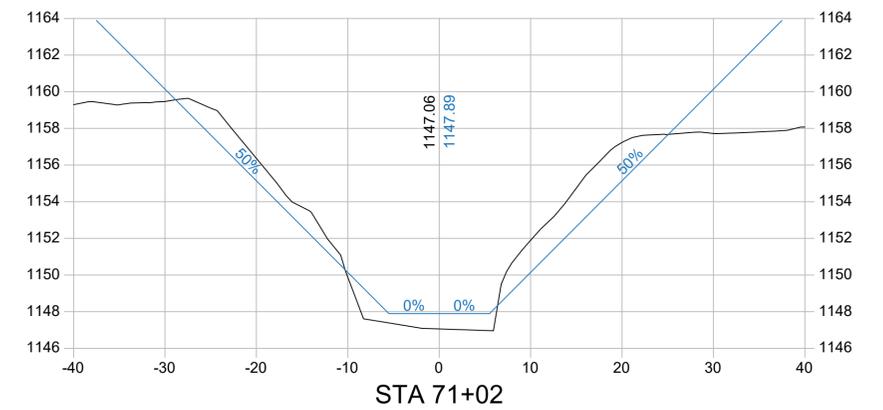
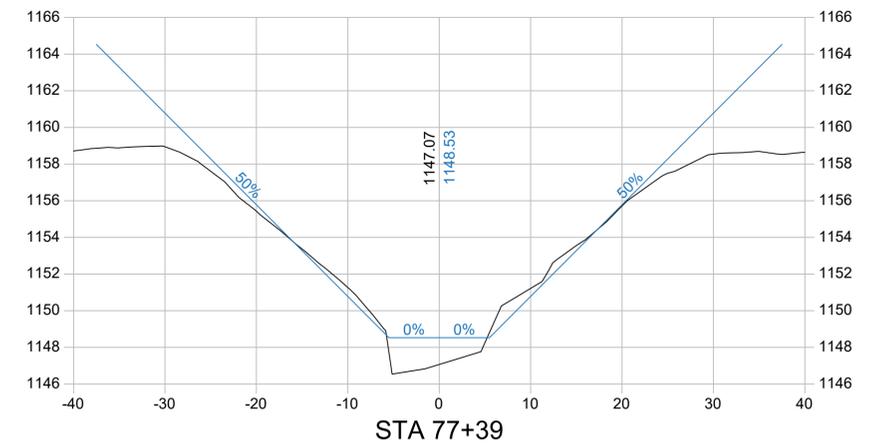
Project Name, Client, and Address
**Open Ditch Repairs
Drainage District No. 4
Hamilton County, IA
250th St & Saratoga Ave, Blairsburg, IA 50034**

Project
2515-40
Date
2026-01-19
Plan Scale
1" = 200'

Sheet
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: **TJB**
Drafter: **TJB**
Checker: **JLH**

PLAN LEGEND

Parcel Lines	1963 Ditch Grade
Work Limits (100' each side)	Surveyed Ditch Bottom
Ditch ROW (50' each side)	Left Top of Bank
Tile Extensions	Right Top of Bank
Surface Drains	
Utilities (in red)	

PROFILE LEGEND

No.	Revision/Issue	Date

Revision/Issue

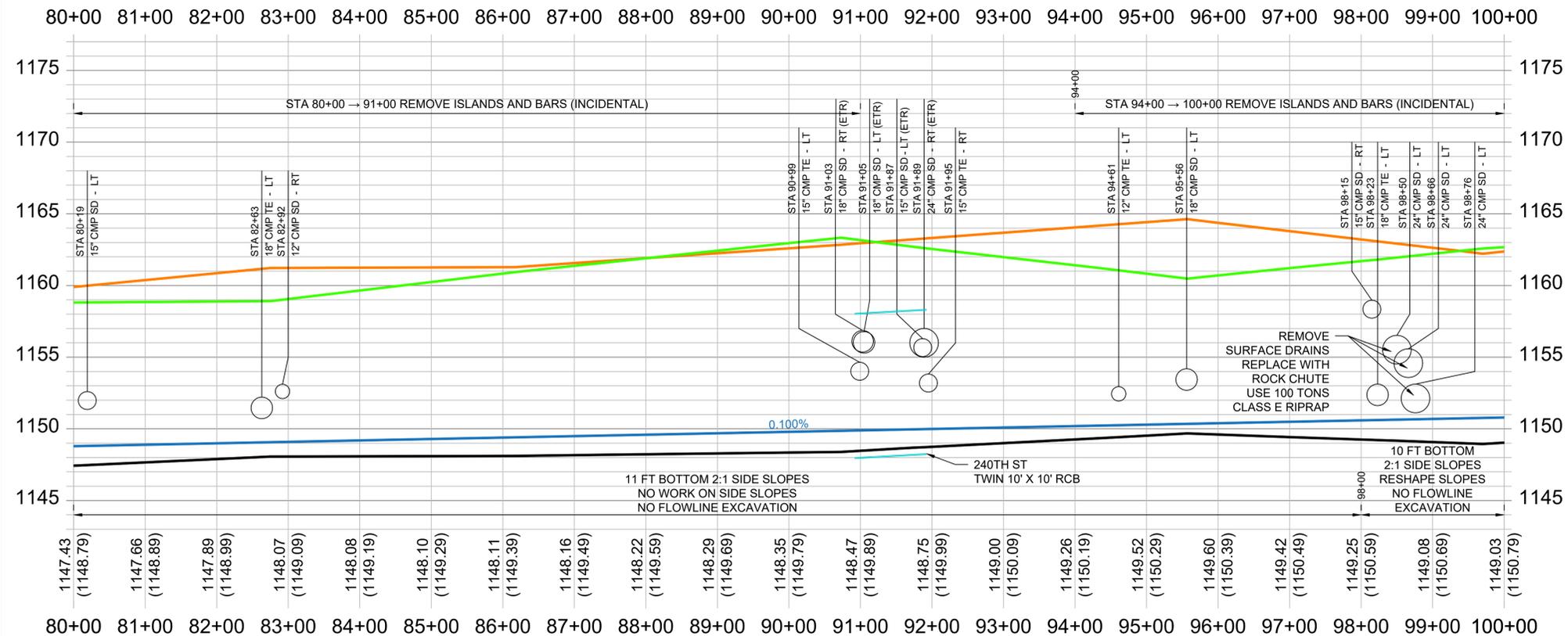
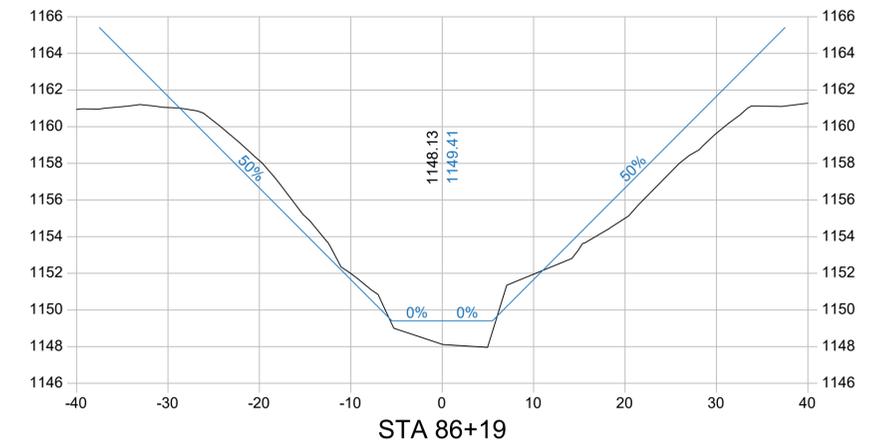
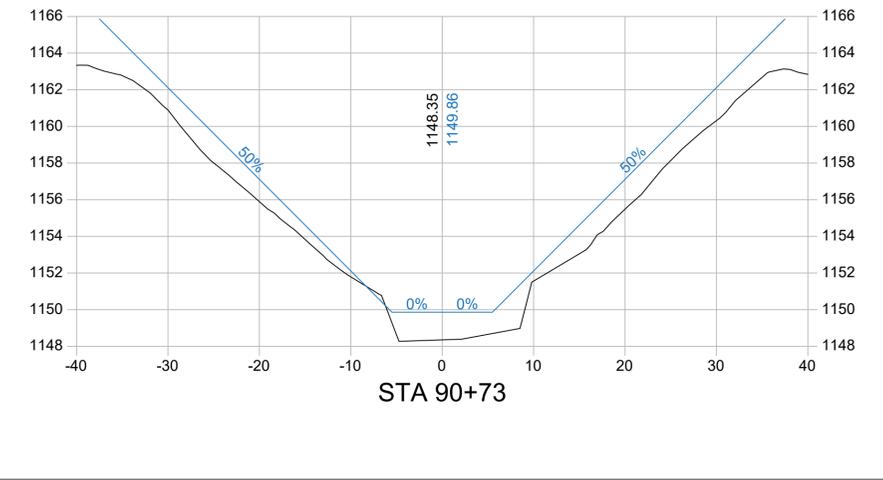
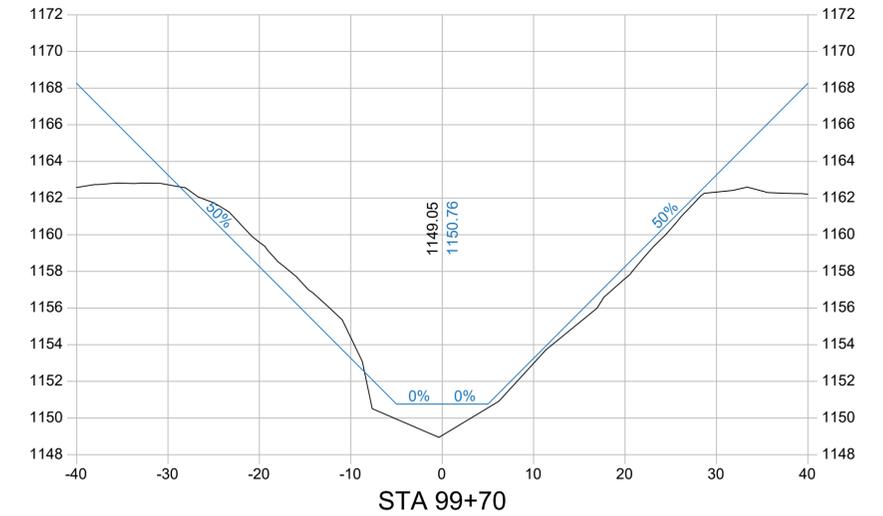
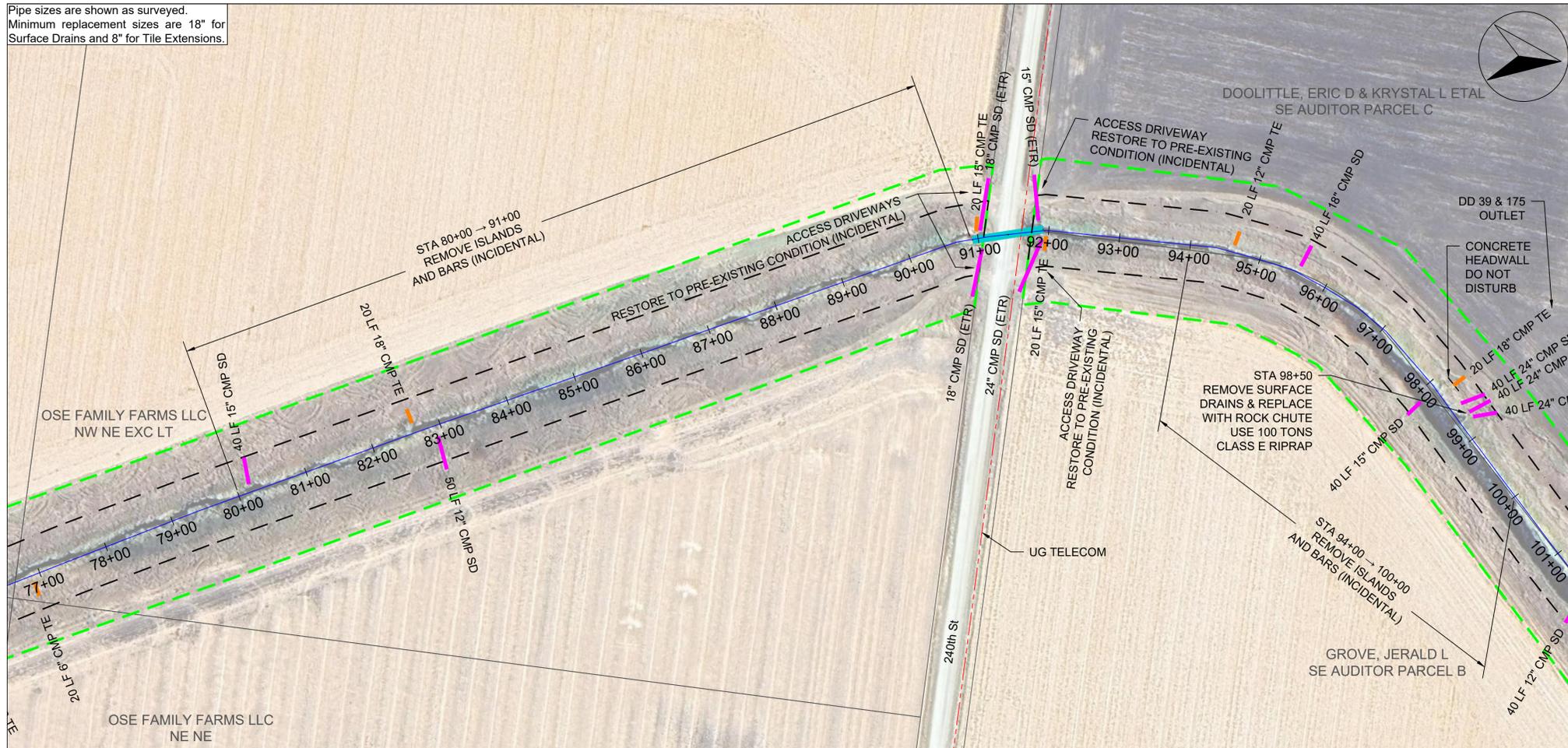
No.	Revision/Issue	Date

Sheet Name
**Main Open Ditch
Plan & Profile
Sta 60+00 → 80+00**

Project Name, Client, and Address
**Open Ditch Repairs
Drainage District No. 4
Hamilton County, IA
250th St & Saratoga Ave, Blairsburg, IA 50034**

Project: **2515-40**
Date: **2026-01-19**
Sheet: **D.04**
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: **TJB**
Drafter: **TJB**
Checker: **JLH**

PLAN LEGEND

Parcel Lines	1963 Ditch Grade
Work Limits (100' each side)	Surveyed Ditch Bottom
Ditch ROW (50' each side)	Left Top of Bank
Tile Extensions	Right Top of Bank
Surface Drains	
Utilities (in red)	

PROFILE LEGEND

No.	Revision/Issue	Date

Sheet Name
**Main Open Ditch
Plan & Profile
Sta 80+00 → 100+00**

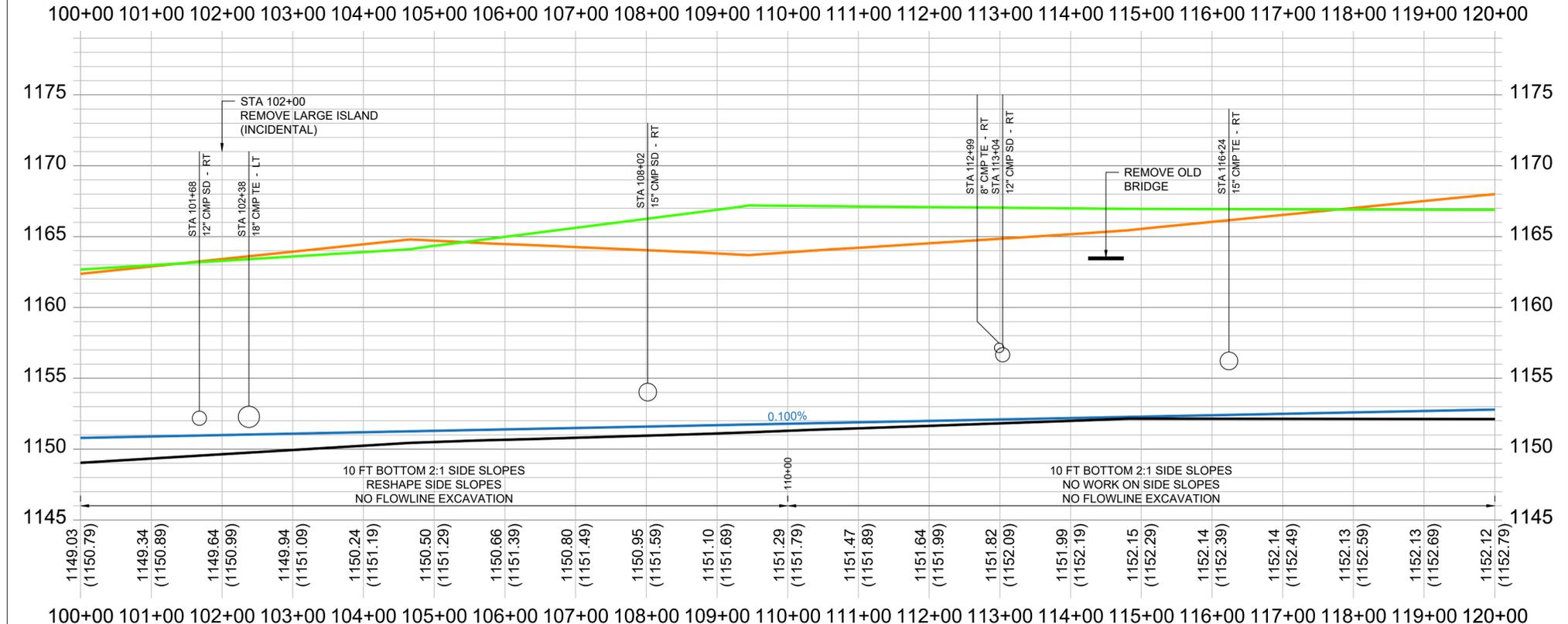
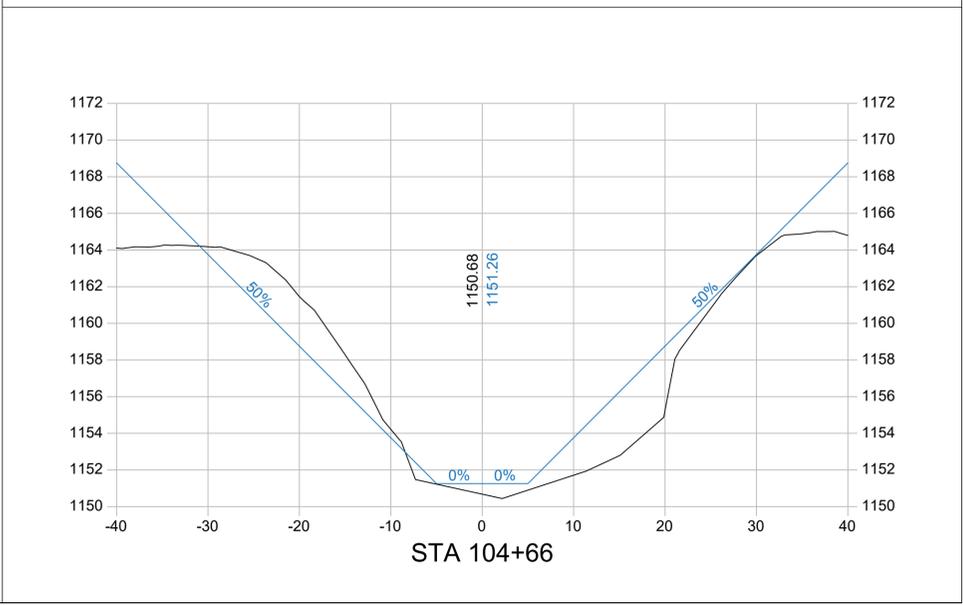
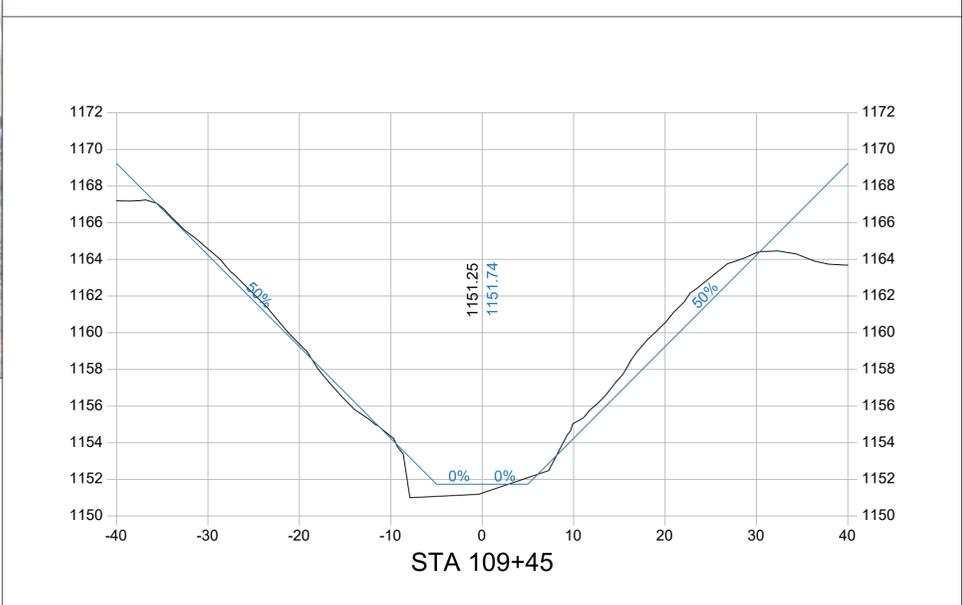
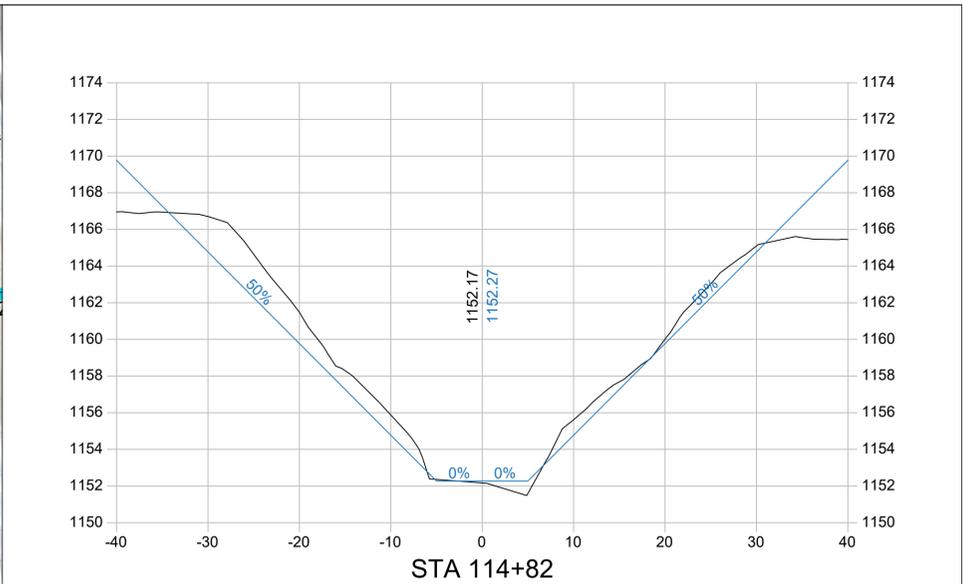
Project Name, Client, and Address
**Open Ditch Repairs
Drainage District No. 4
Hamilton County, IA
250th St & Saratoga Ave, Blairsburg, IA 50034**

Project: **2515-40**
Date: **2026-01-19**
Plan Scale: **1" = 200'**

Sheet: **D.05**



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: **TJB**
Drafter: **TJB**
Checker: **JLH**

PLAN LEGEND

Parcel Lines	1963 Ditch Grade
Work Limits (100' each side)	Surveyed Ditch Bottom
Ditch ROW (50' each side)	Left Top of Bank
Tile Extensions	Right Top of Bank
Surface Drains	
Utilities (in red)	

PROFILE LEGEND

No.	Revision/Issue	Date

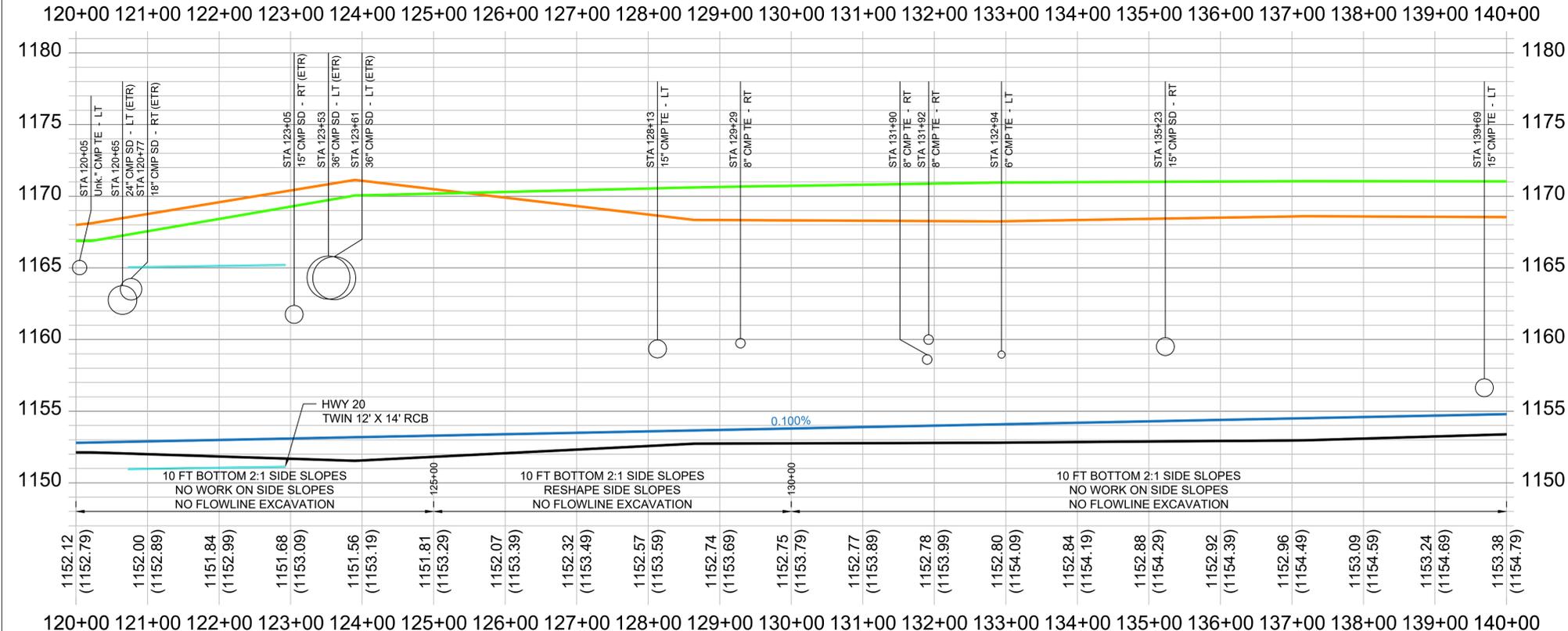
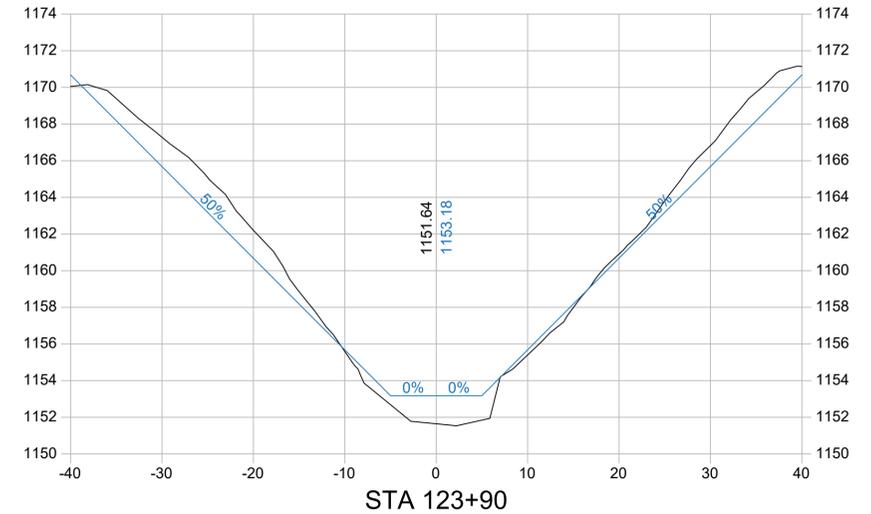
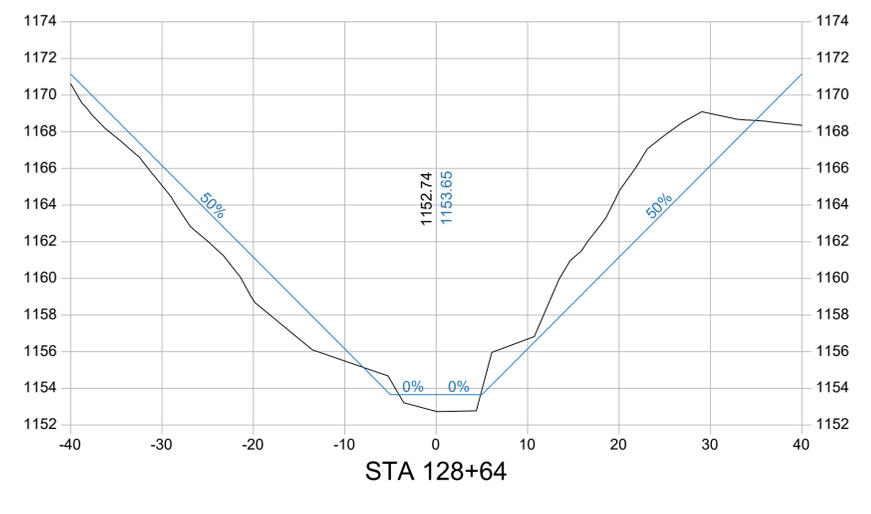
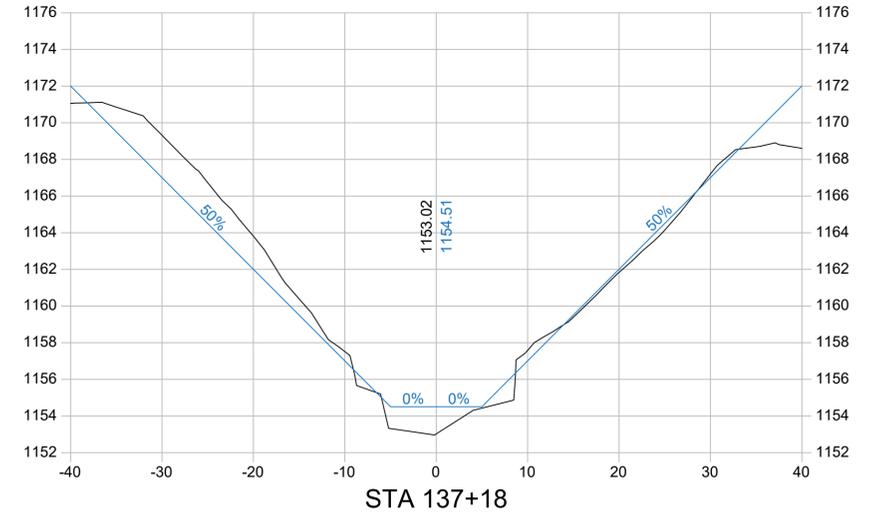
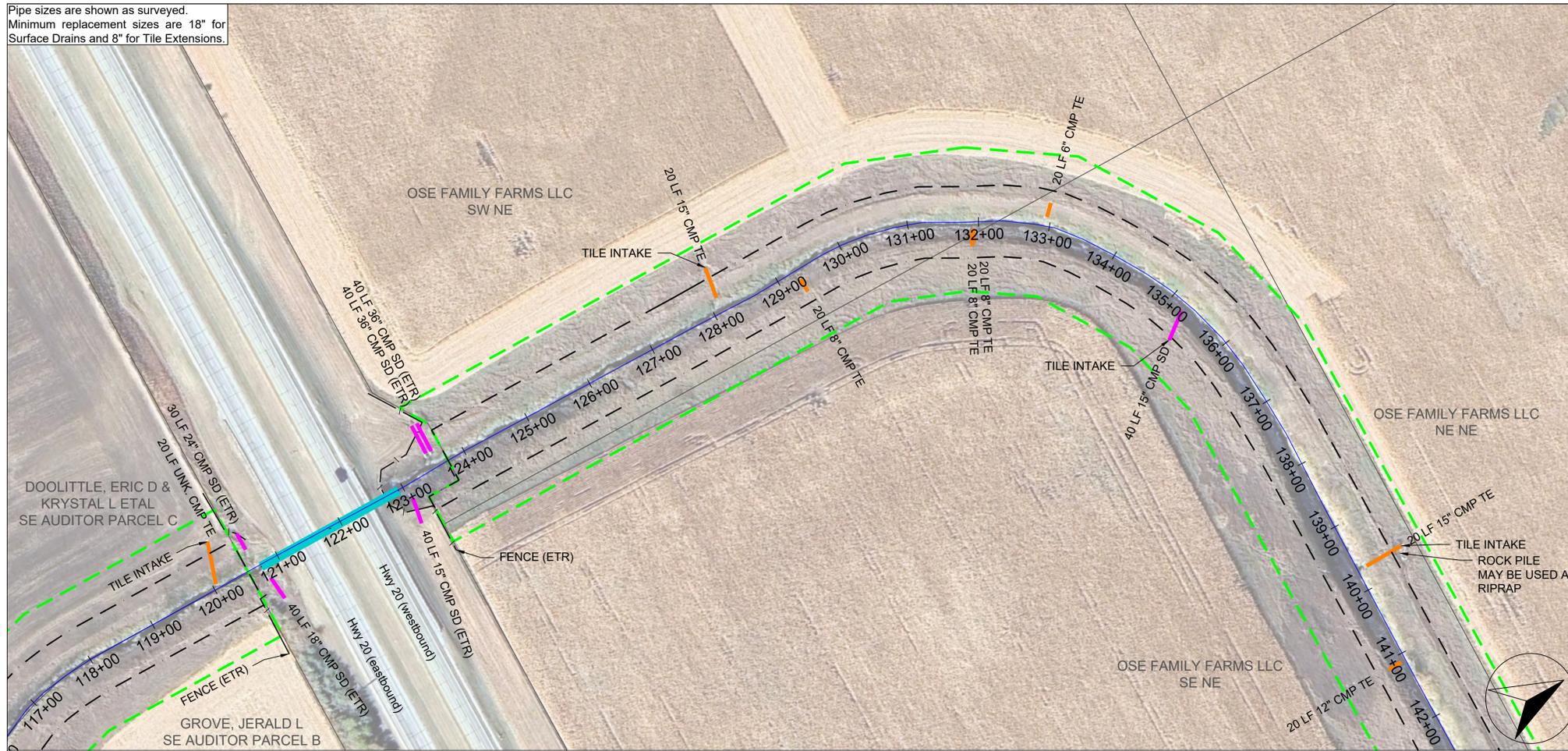
Sheet Name
Main Open Ditch
Plan & Profile
Sta 100+00 → 120+00

Project Name, Client, and Address
Open Ditch Repairs
Drainage District No. 4
Hamilton County, IA
250th St & Saratoga Ave, Blairsburg, IA 50034

Project: **2515-40**
Date: **2026-01-19**
Plan Scale: **1" = 200'**

Sheet: **D.06**

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
TJB
Drafter
TJB
Checker
JLH

PLAN LEGEND
Parcel Lines
Work Limits (100' each side)
Ditch ROW (50' each side)
Tile Extensions
Surface Drains
Utilities (in red)

PROFILE LEGEND
1963 Ditch Grade
Surveyed Ditch Bottom
Left Top of Bank
Right Top of Bank

No.	Revision/Issue	Date

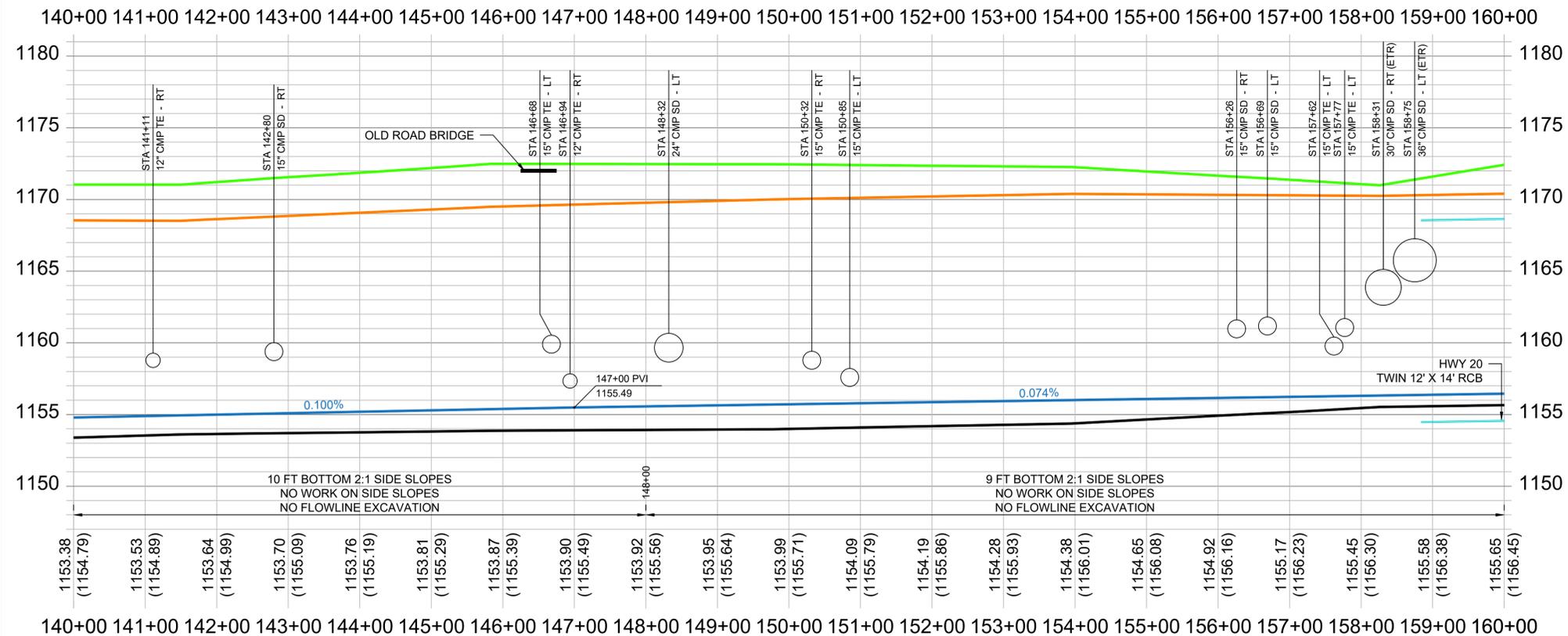
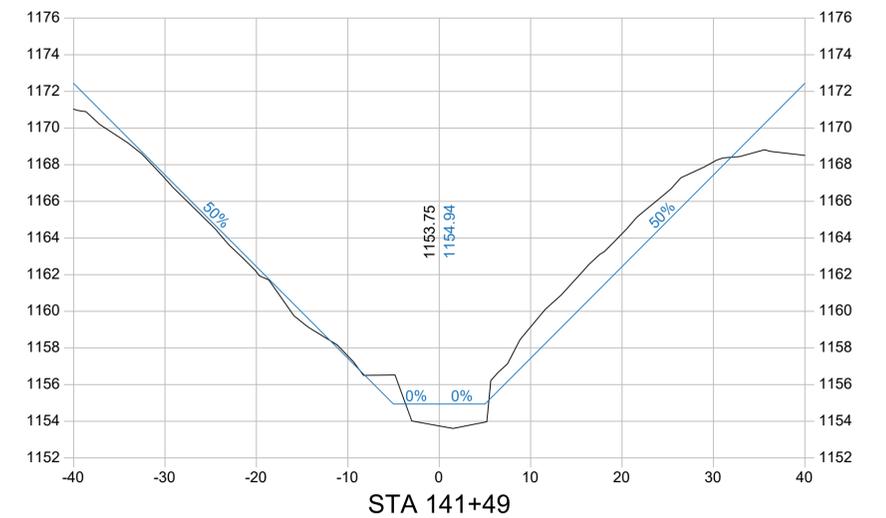
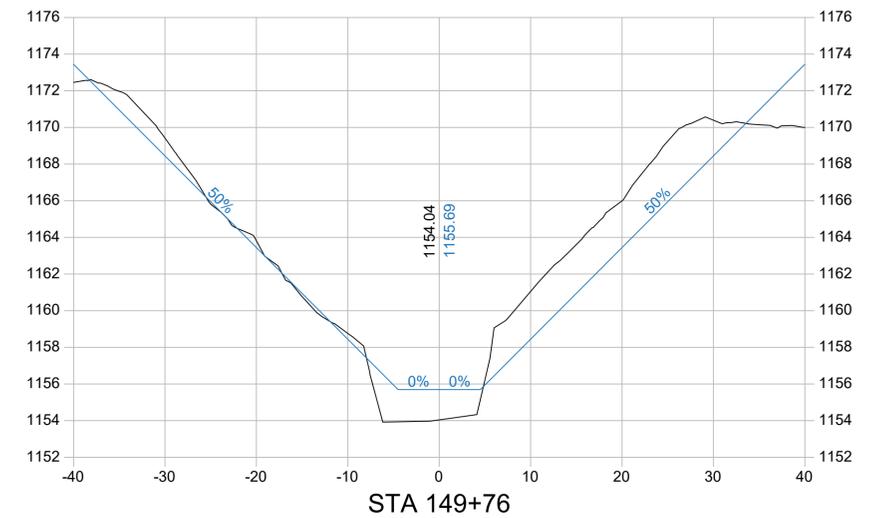
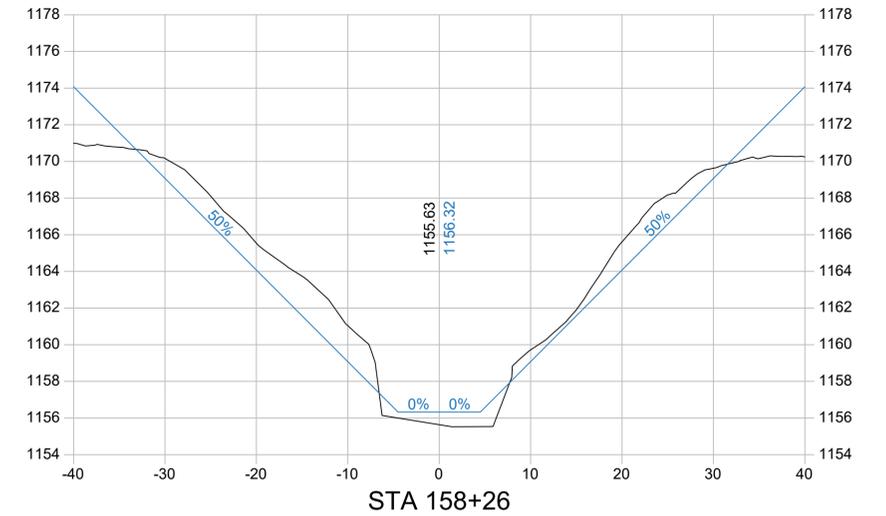
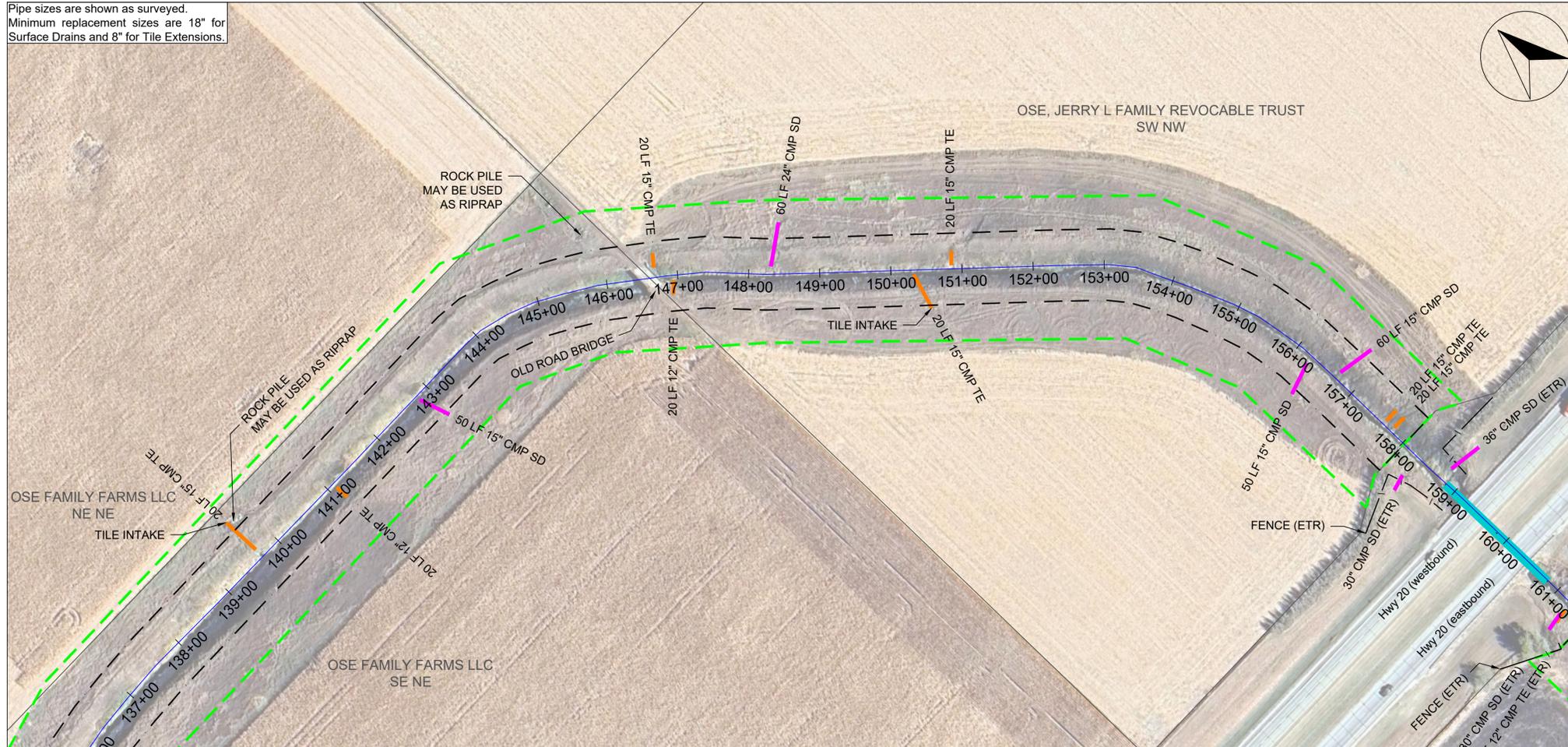
Sheet Name
**Main Open Ditch
Plan & Profile
Sta 120+00 → 140+00**

Project Name, Client, and Address
**Open Ditch Repairs
Drainage District No. 4
Hamilton County, IA
250th St & Saratoga Ave, Blairsburg, IA 50034**

Project
2515-40
Date
2026-01-19
Plan Scale
1" = 200'

D.07

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
TJB
Drafter
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Checker
JLH

PLAN LEGEND
Parcel Lines
Work Limits (100' each side)
Ditch ROW (50' each side)
Tile Extensions
Surface Drains
Utilities (in red)

PROFILE LEGEND
1963 Ditch Grade
Surveyed Ditch Bottom
Left Top of Bank
Right Top of Bank

No.	Revision/Issue	Date

Sheet Name
**Main Open Ditch
Plan & Profile
Sta 140+00 → 160+00**

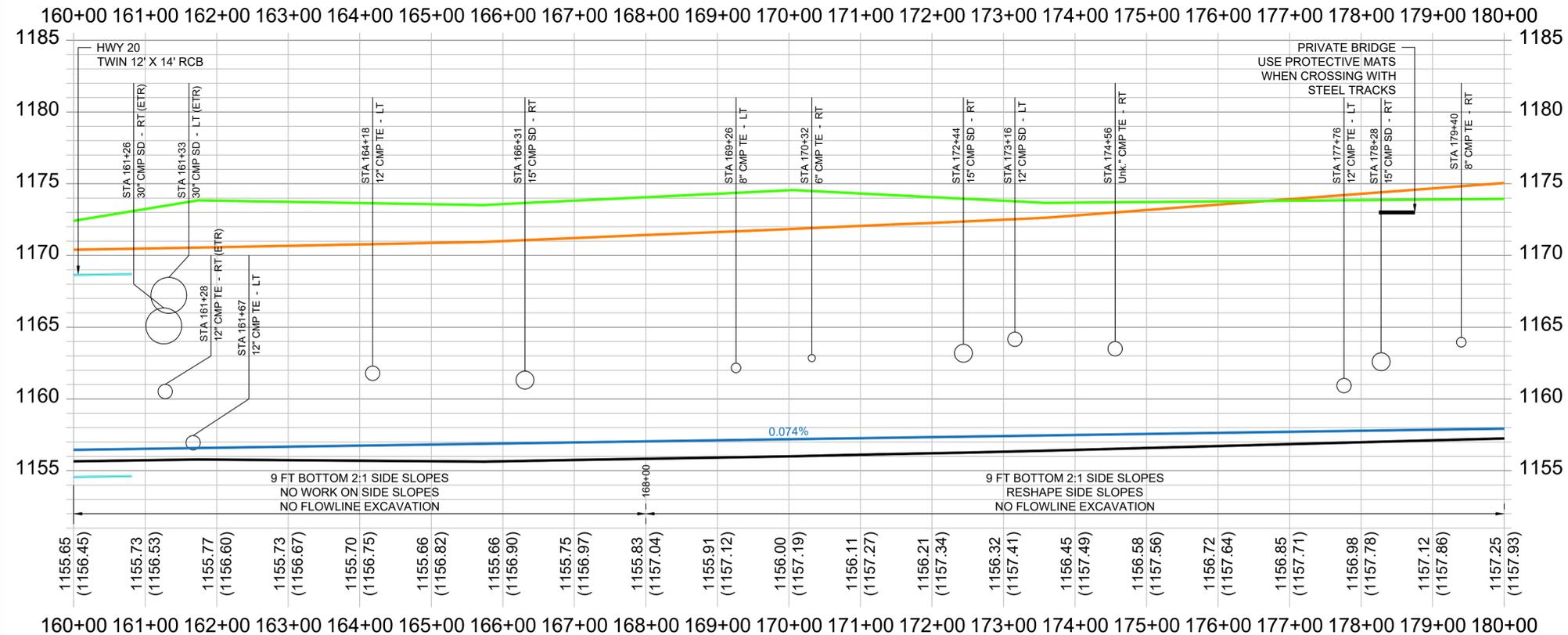
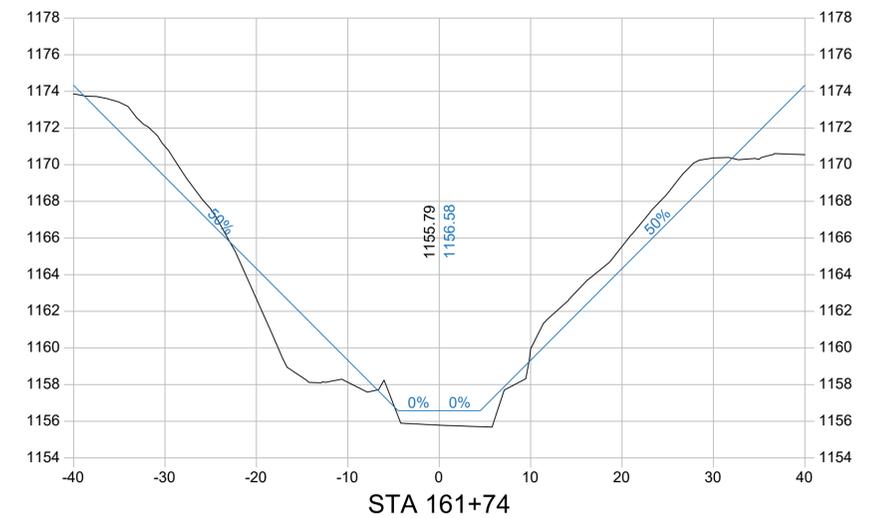
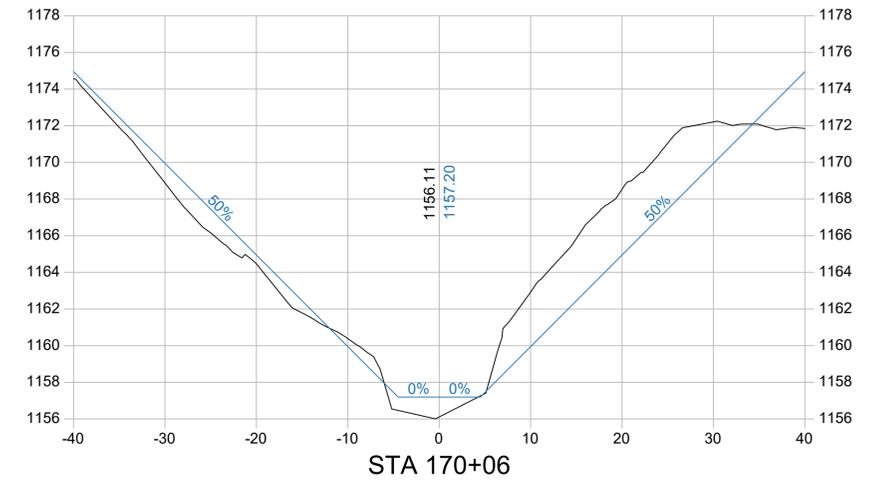
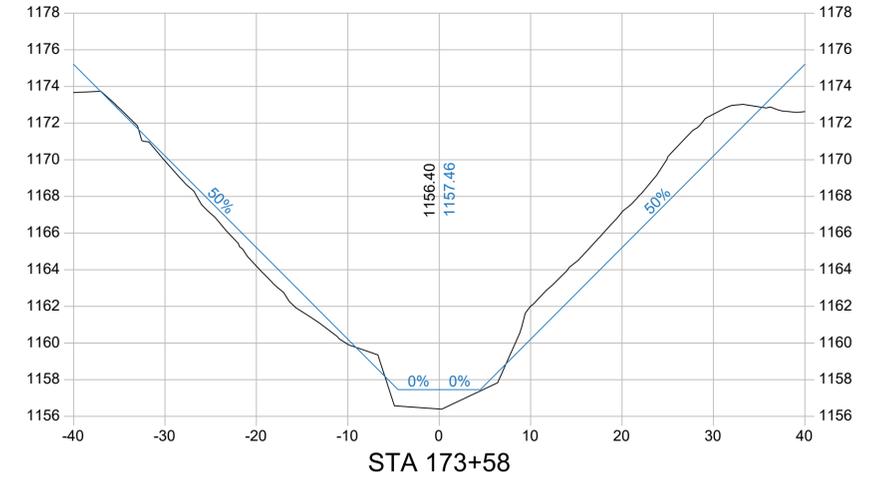
Project Name, Client, and Address
**Open Ditch Repairs
Drainage District No. 4
Hamilton County, IA
250th St & Saratoga Ave, Blairsburg, IA 50034**

Project
2515-40
Date
2026-01-19
Plan Scale
1" = 200'

D.08



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
TJB
Drafter
TJB
Checker
JLH

PLAN LEGEND

Parcel Lines	—
Work Limits (100' each side)	—
Ditch ROW (50' each side)	—
Tile Extensions	—
Surface Drains	—
Utilities (in red)	—

PROFILE LEGEND

1963 Ditch Grade	—
Surveyed Ditch Bottom	—
Left Top of Bank	—
Right Top of Bank	—

No.	Revision/Issue	Date

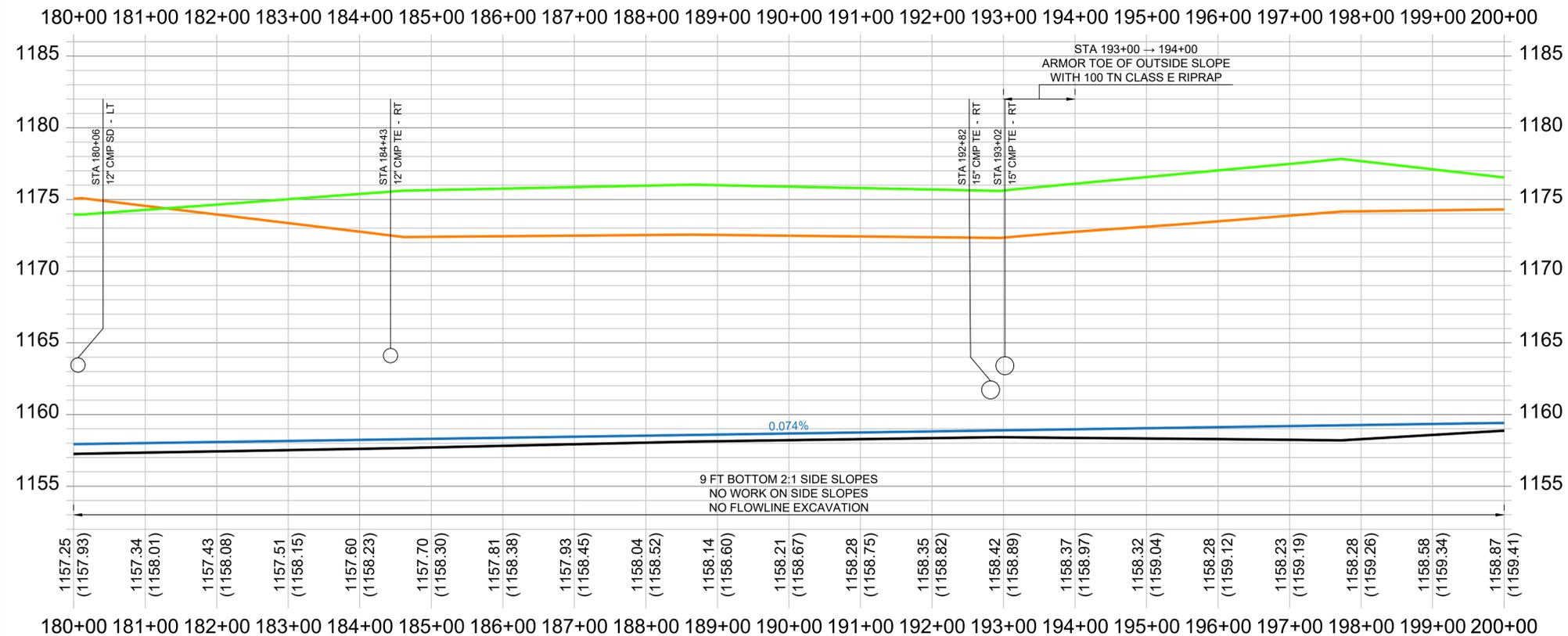
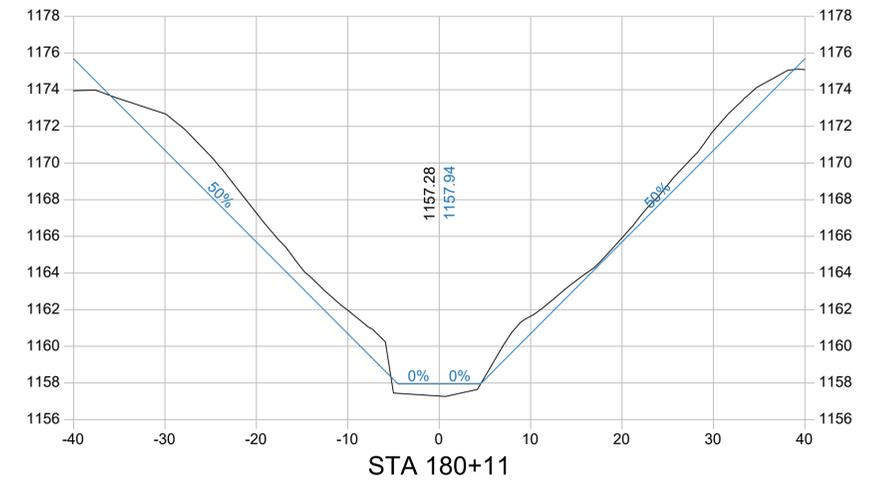
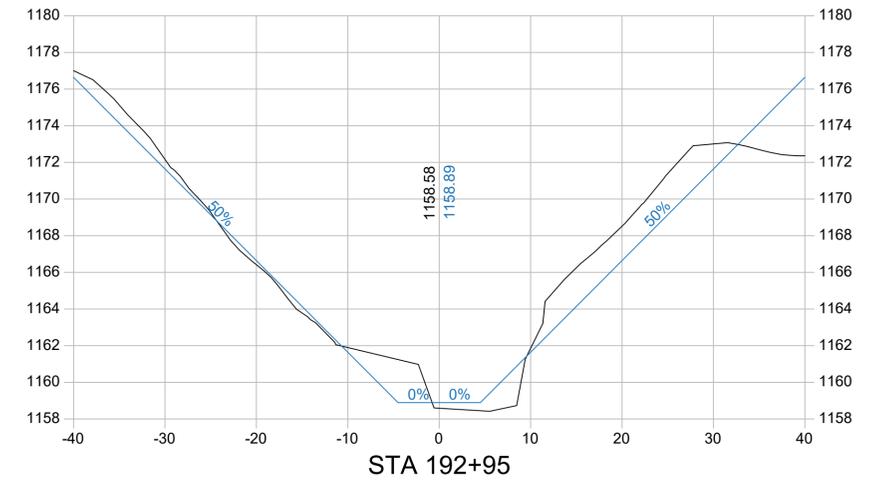
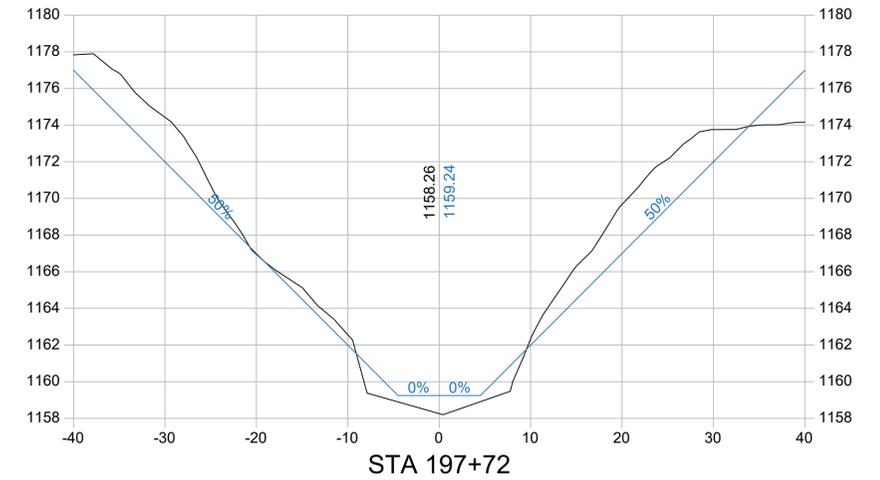
Sheet Name
**Main Open Ditch
Plan & Profile
Sta 160+00 → 180+00**

Project Name, Client, and Address
**Open Ditch Repairs
Drainage District No. 4
Hamilton County, IA
250th St & Saratoga Ave, Blairsburg, IA 50034**

Project 2515-40	D.09
Date 2026-01-19	
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
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 Drafter
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JLH

PLAN LEGEND

Parcel Lines	1963 Ditch Grade
Work Limits (100' each side)	Surveyed Ditch Bottom
Ditch ROW (50' each side)	Left Top of Bank
Tile Extensions	Right Top of Bank
Surface Drains	
Utilities (in red)	

PROFILE LEGEND

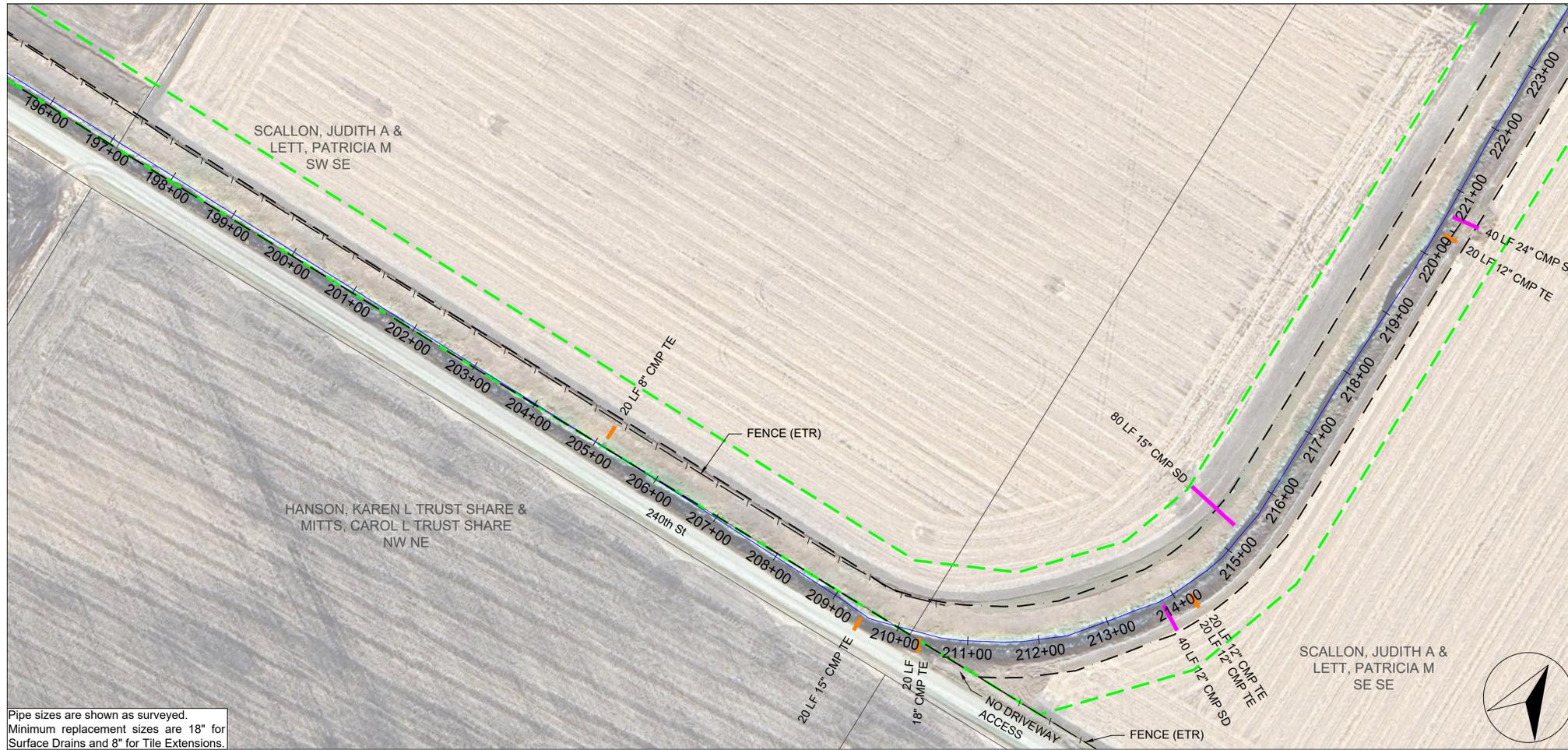
No.	Revision/Issue	Date

Sheet Name
Main Open Ditch
Plan & Profile
Sta 180+00 → 200+00

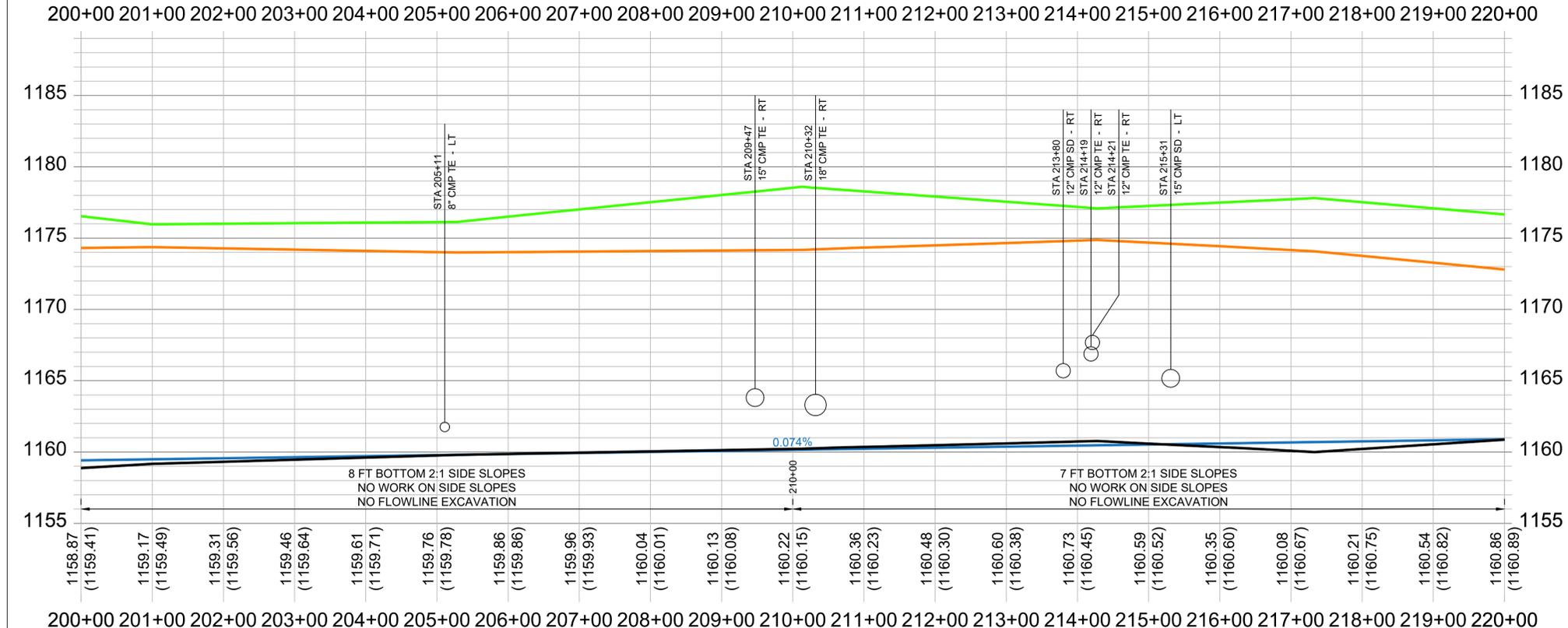
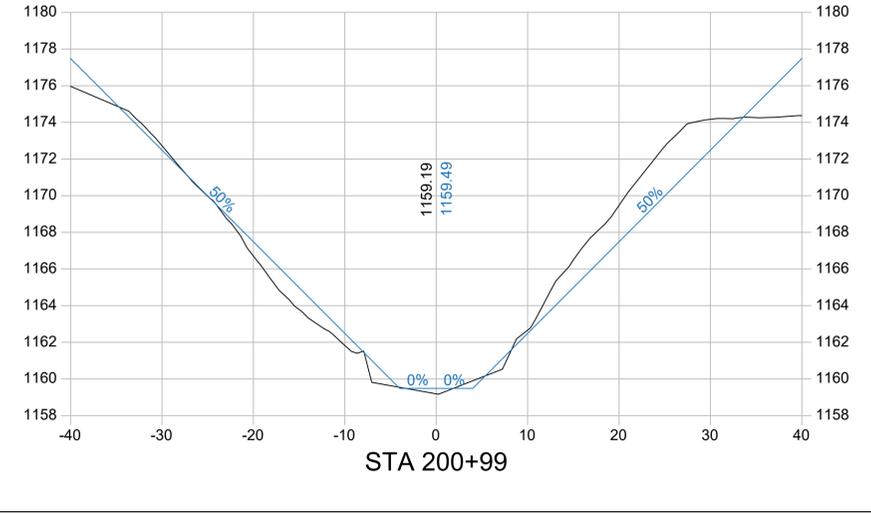
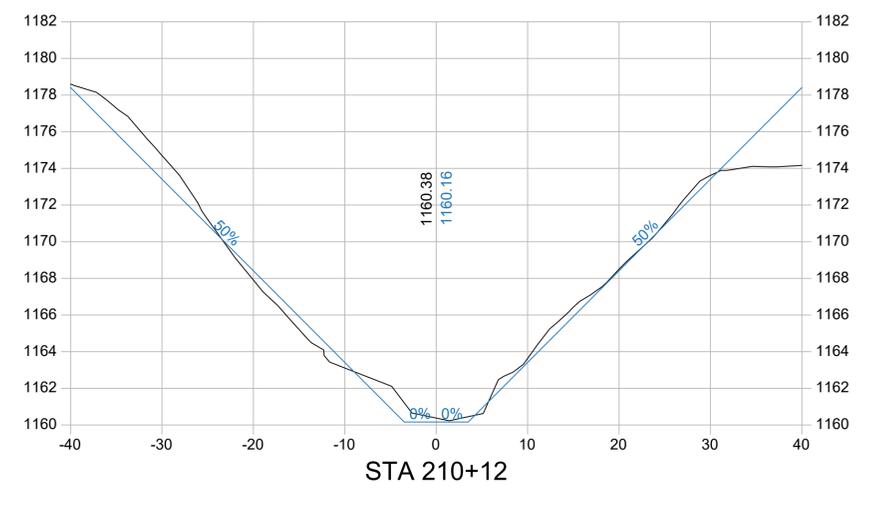
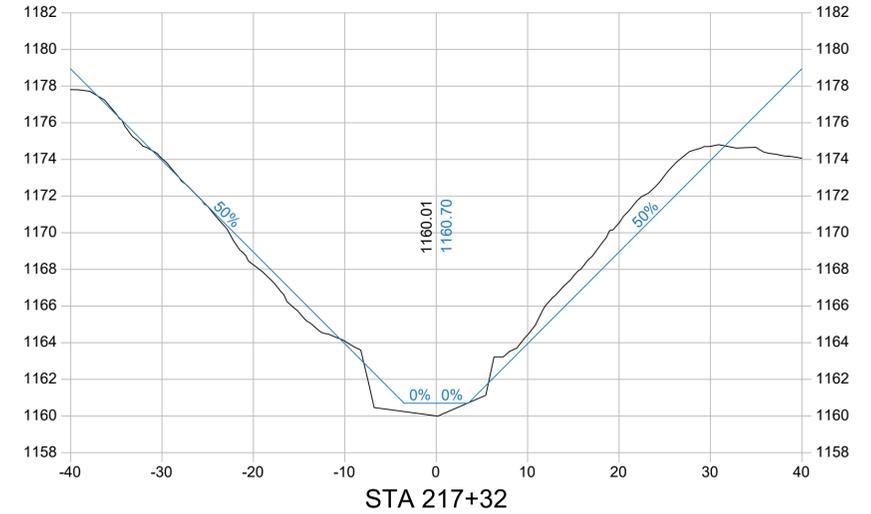
Project Name, Client, and Address
Open Ditch Repairs
Drainage District No. 4
Hamilton County, IA
250th St & Saratoga Ave, Blairsburg, IA 50034

Project
2515-40
 Date
2026-01-19
 Plan Scale
1" = 200'

Sheet
D.10



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
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TJB
Checker
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PLAN LEGEND

Parcel Lines	—
Work Limits (100' each side)	—
Ditch ROW (50' each side)	—
Tile Extensions	—
Surface Drains	—
Utilities (in red)	—

PROFILE LEGEND

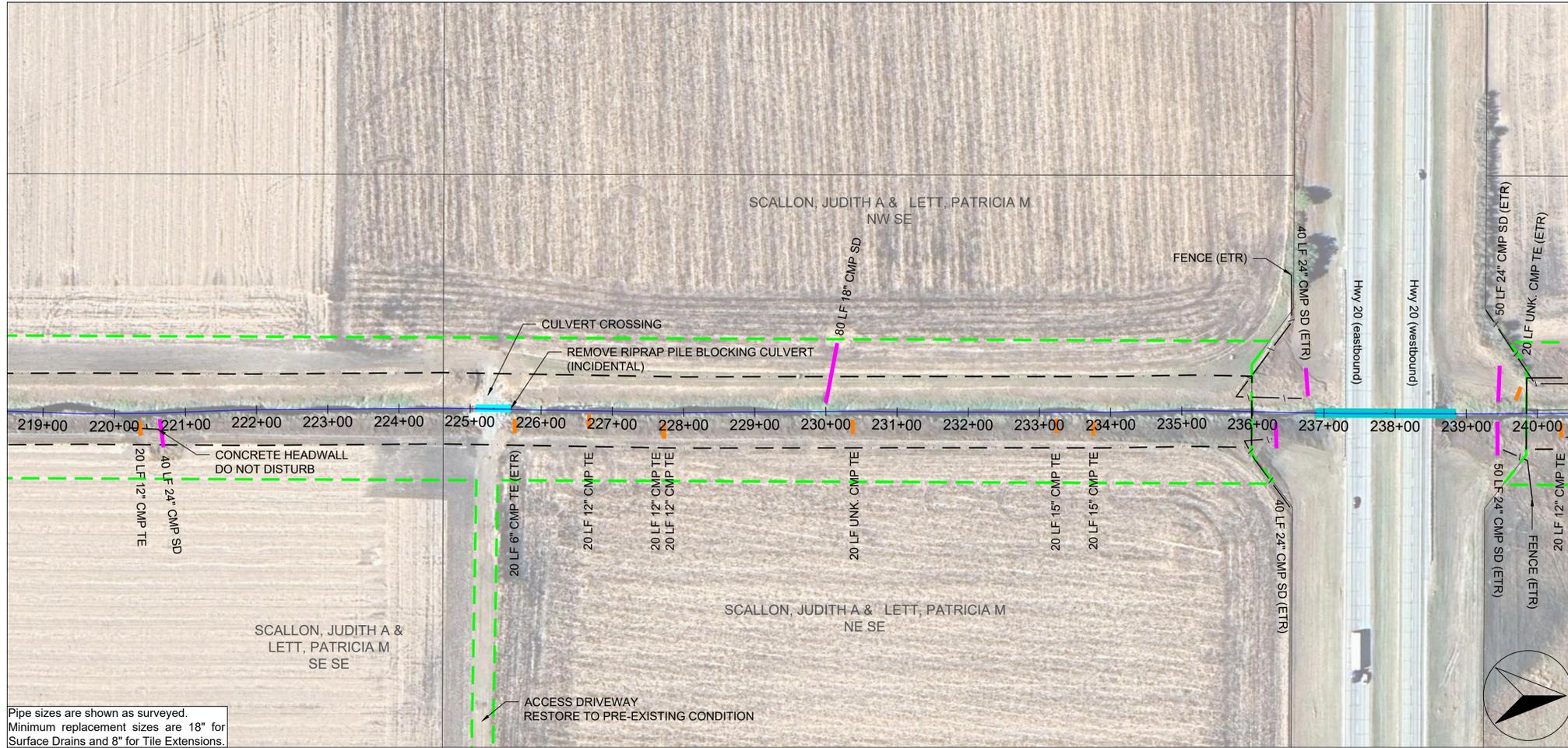
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Work Limits (100' each side)	—
Surveyed Ditch Bottom	—
Left Top of Bank	—
Right Top of Bank	—

No.	Revision/Issue	Date

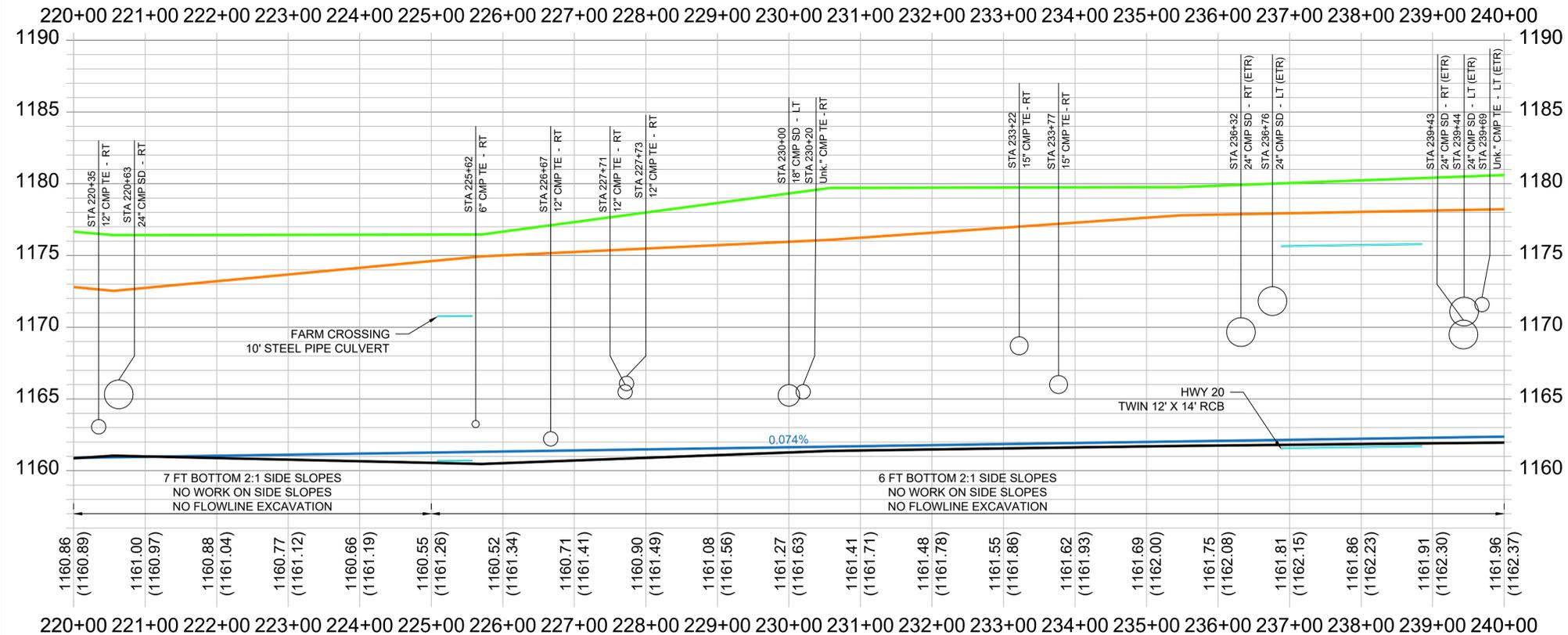
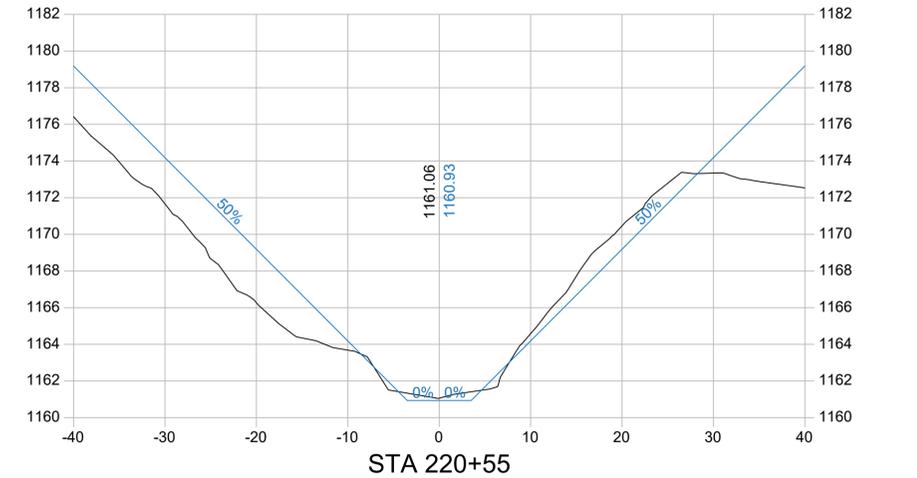
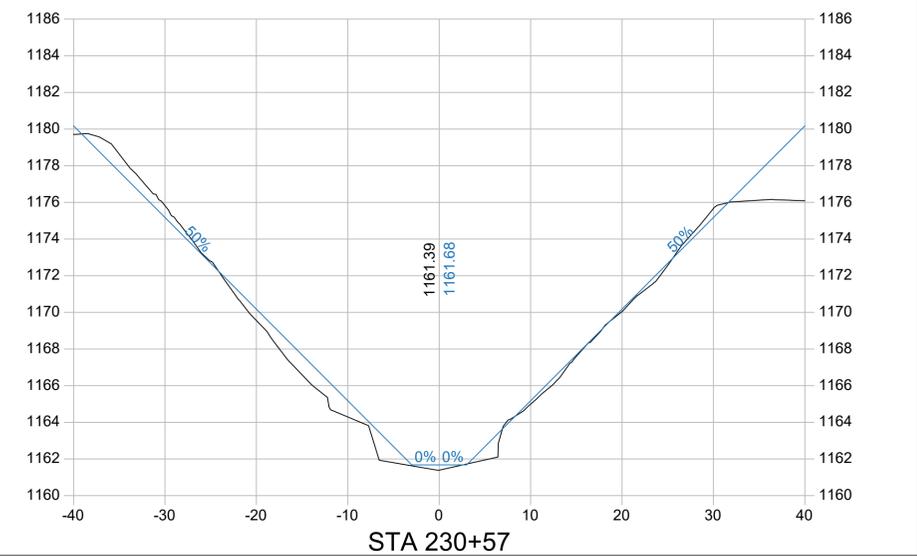
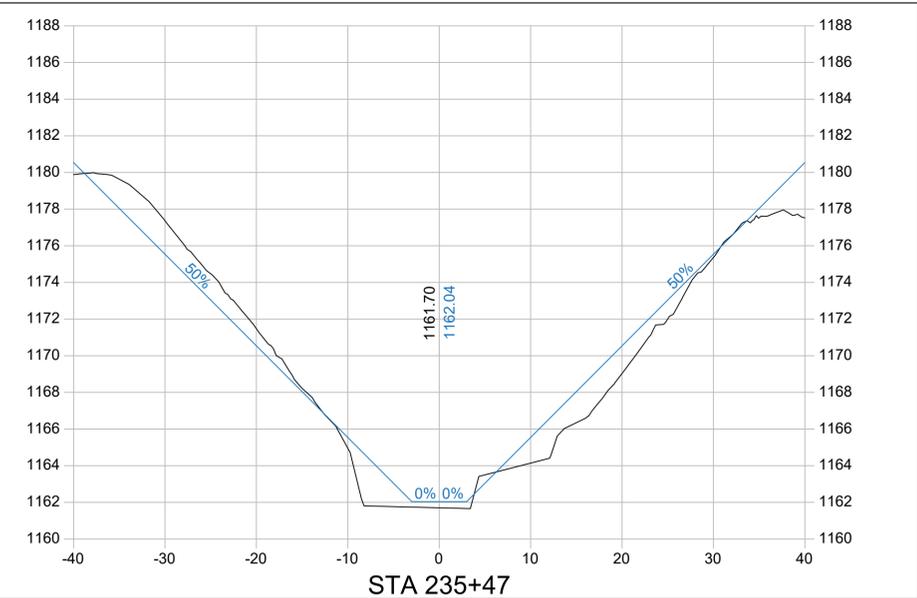
Sheet Name
**Main Open Ditch
Plan & Profile
Sta 200+00 → 220+00**

Project Name, Client, and Address
**Open Ditch Repairs
Drainage District No. 4
Hamilton County, IA
250th St & Saratoga Ave, Blairsburg, IA 50034**

Project 2515-40	Sheet D.11
Date 2026-01-19	
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
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TJB
Checker
JLH

PLAN LEGEND

- Parcel Lines
- Work Limits (100' each side)
- Ditch ROW (50' each side)
- Tile Extensions
- Surface Drains
- Utilities (in red)

PROFILE LEGEND

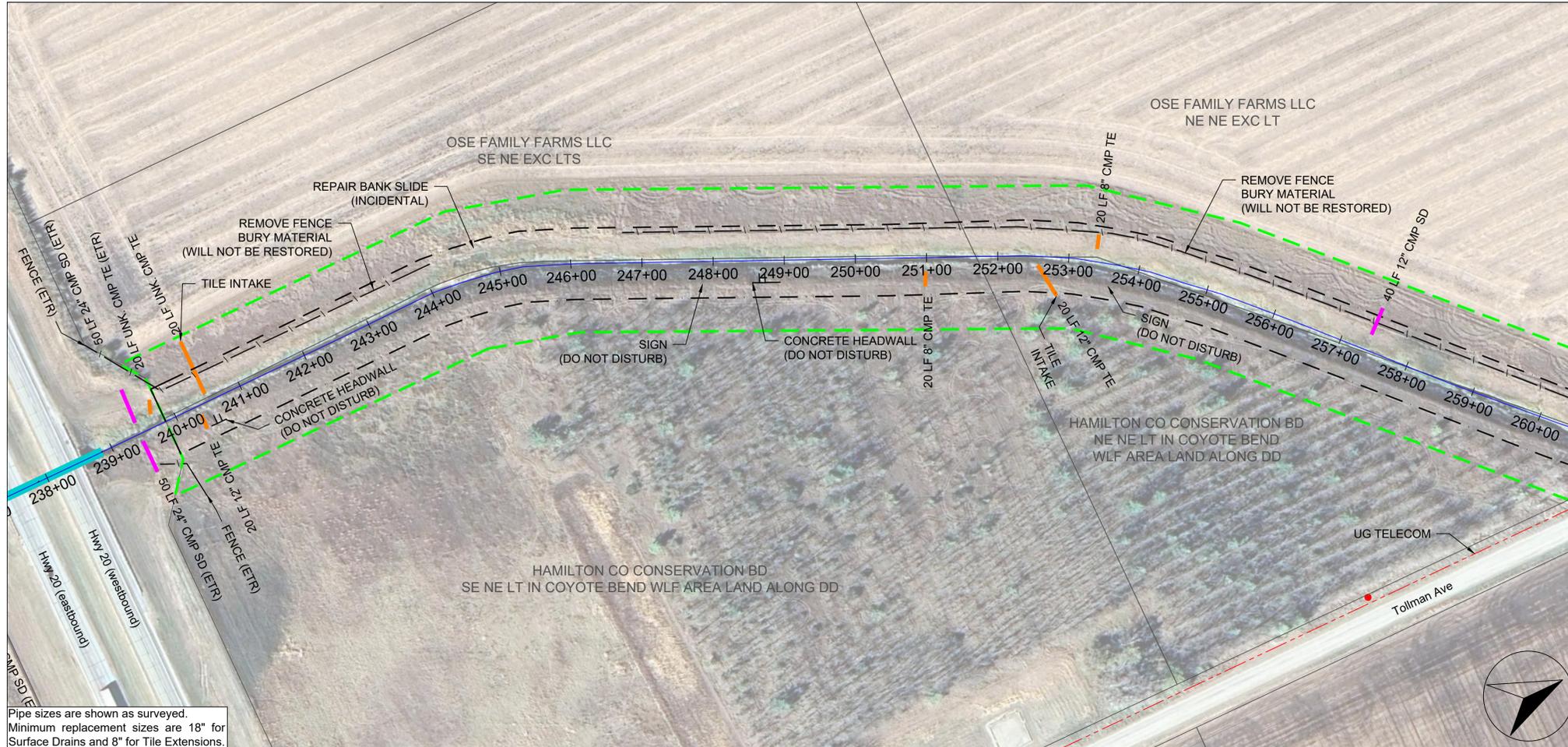
- 1963 Ditch Grade
- Surveyed Ditch Bottom
- Left Top of Bank
- Right Top of Bank

No.	Revision/Issue	Date

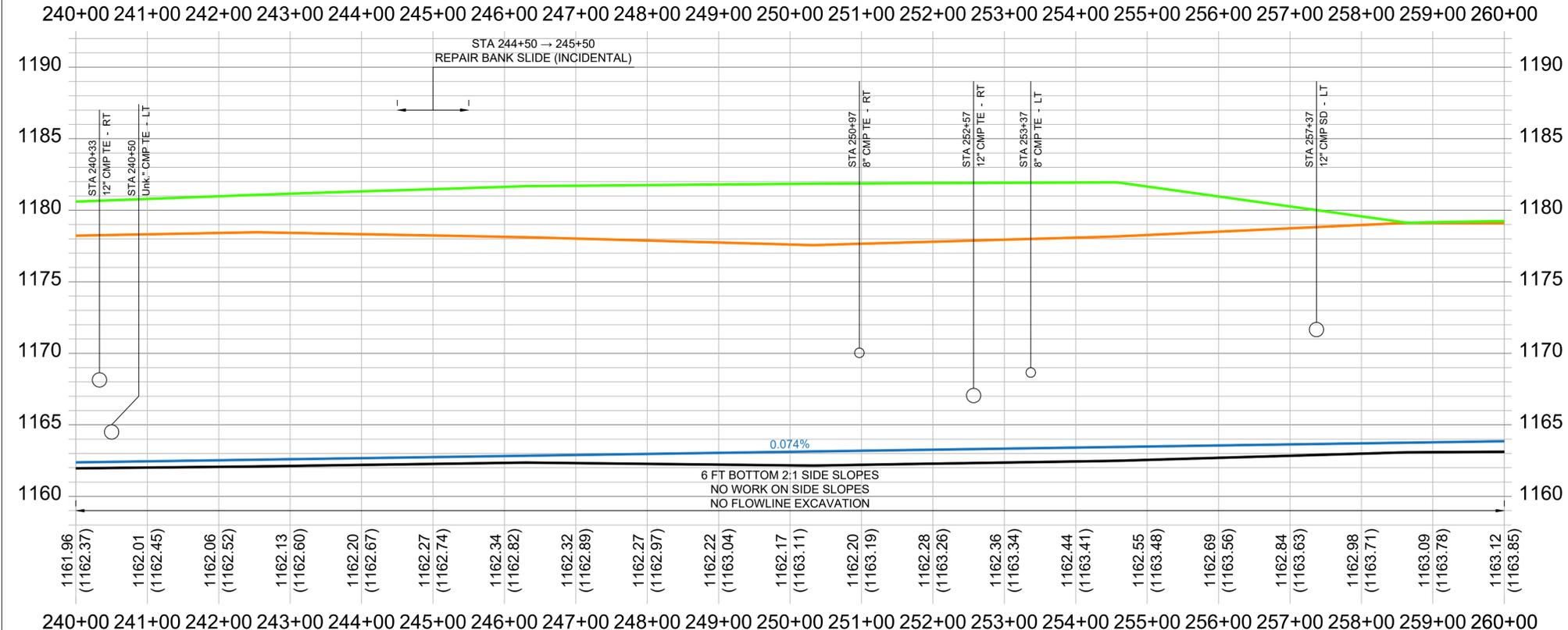
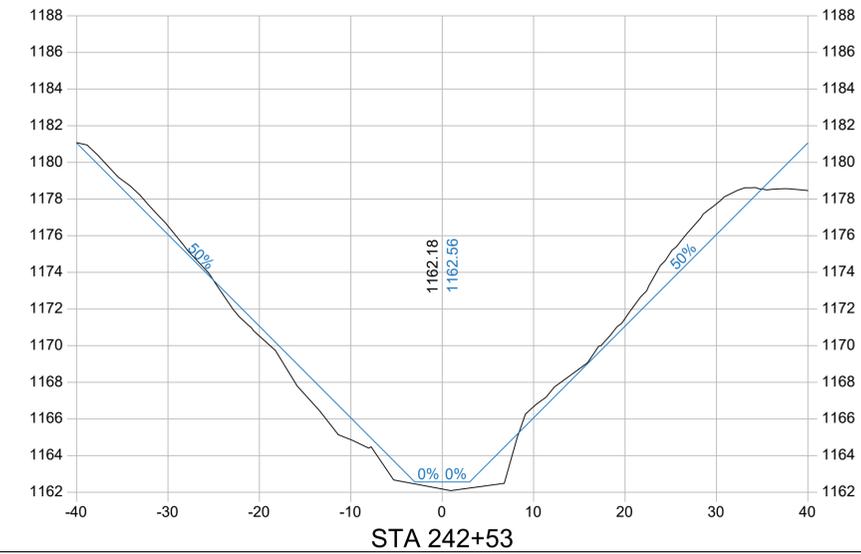
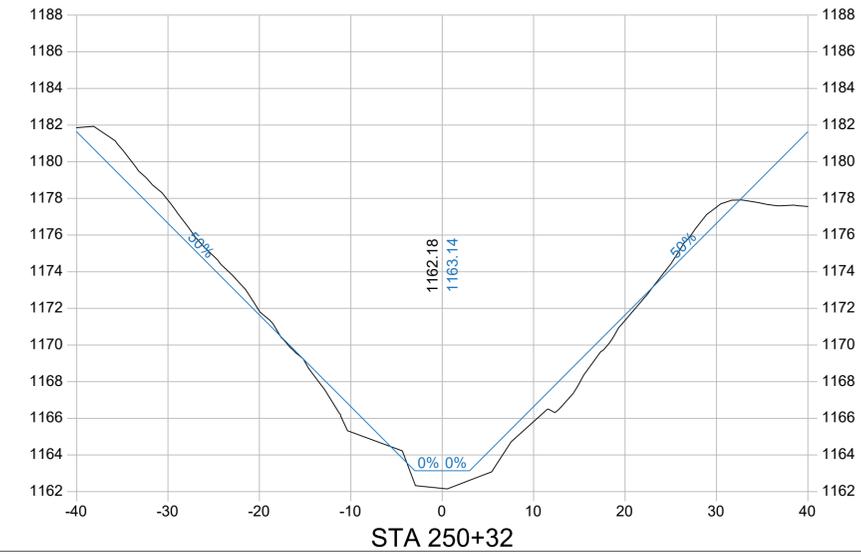
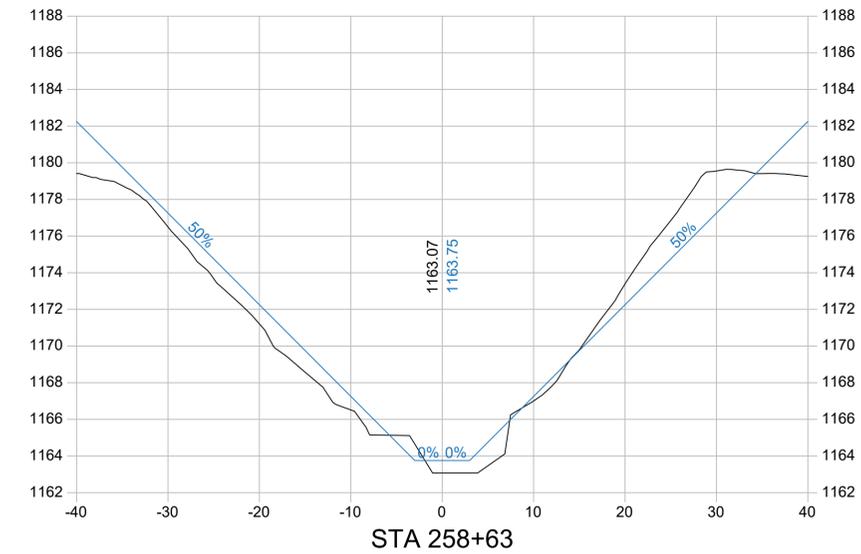
Sheet Name
**Main Open Ditch
Plan & Profile
Sta 220+00 → 240+00**

Project Name, Client, and Address
**Open Ditch Repairs
Drainage District No. 4
Hamilton County, IA
250th St & Saratoga Ave, Blairsburg, IA 50034**

Project 2515-40	Sheet
Date 2026-01-19	D.12
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
TJB
Drafter
TJB
Checker
JLH

PLAN LEGEND

Parcel Lines	1963 Ditch Grade
Work Limits (100' each side)	Surveyed Ditch Bottom
Ditch ROW (50' each side)	Left Top of Bank
Tile Extensions	Right Top of Bank
Surface Drains	
Utilities (in red)	

PROFILE LEGEND

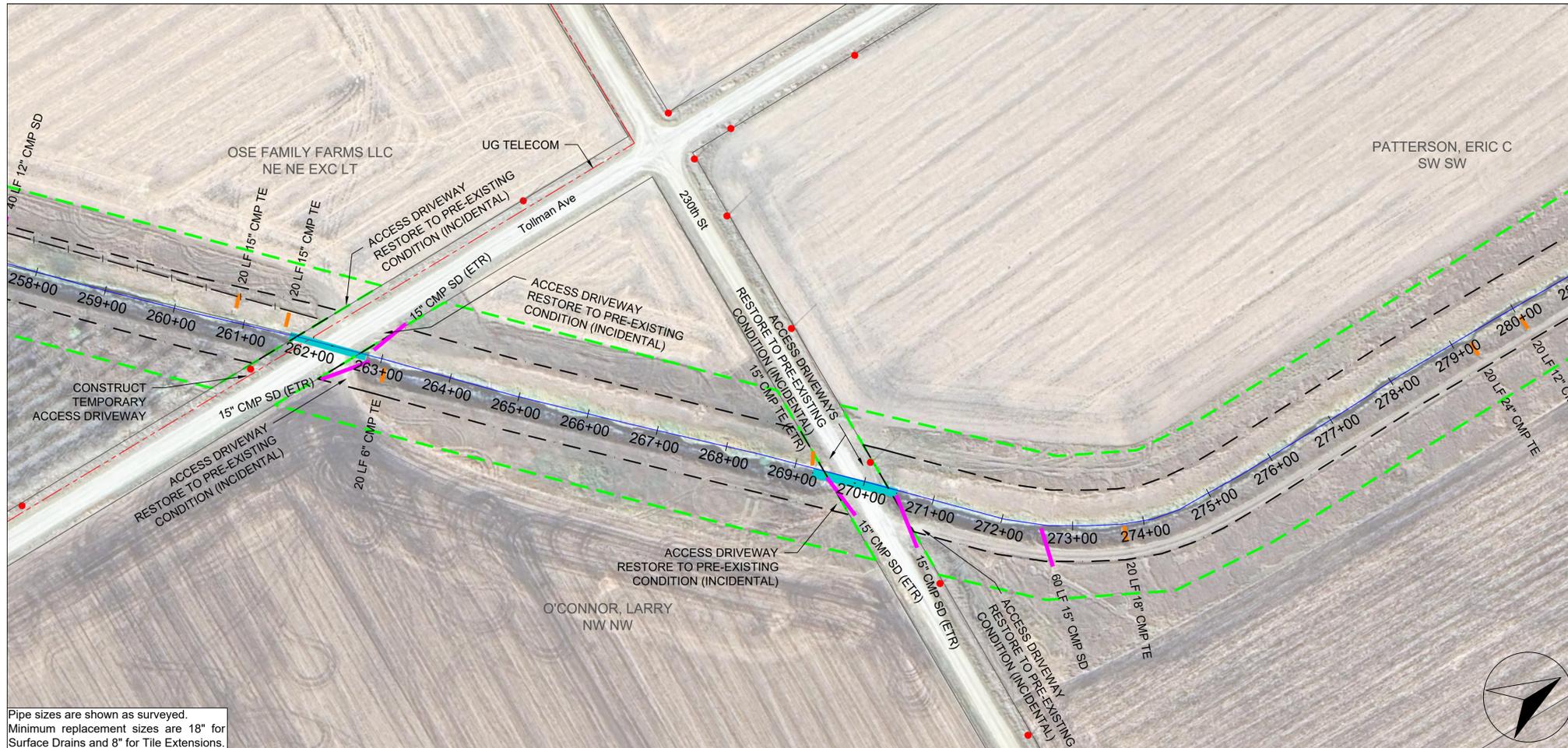
No.	Revision/Issue	Date

Sheet Name
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Plan & Profile
Sta 240+00 → 260+00**

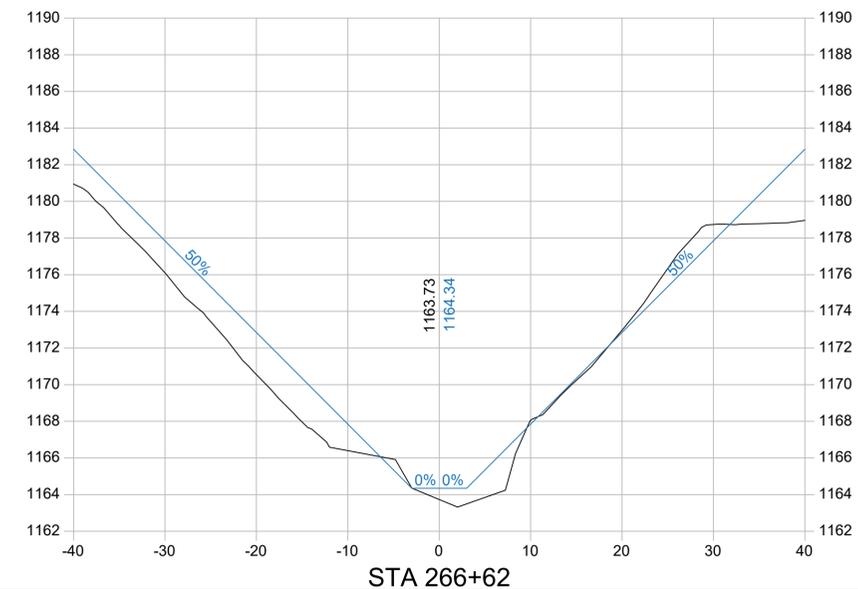
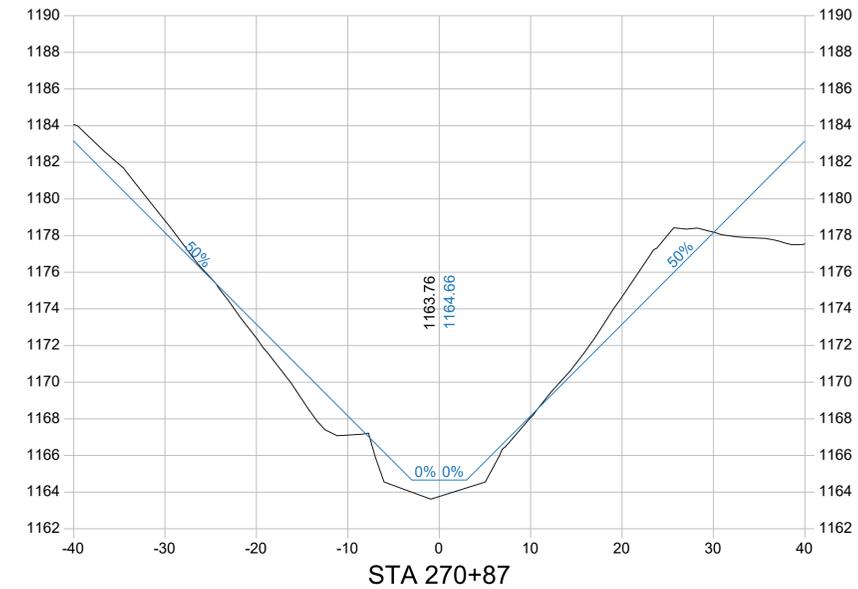
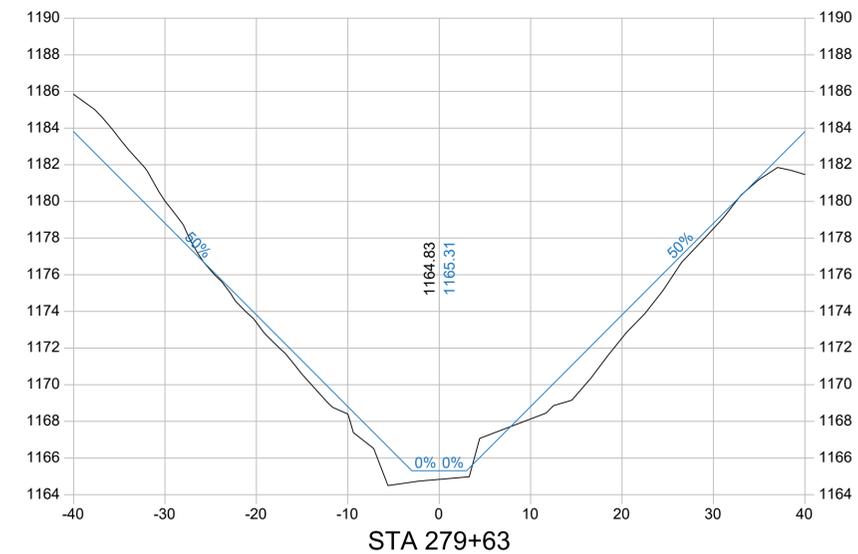
Project Name, Client, and Address
**Open Ditch Repairs
Drainage District No. 4
Hamilton County, IA
250th St & Saratoga Ave, Blairsburg, IA 50034**

Project
2515-40
Date
2026-01-19
Plan Scale
1" = 200'

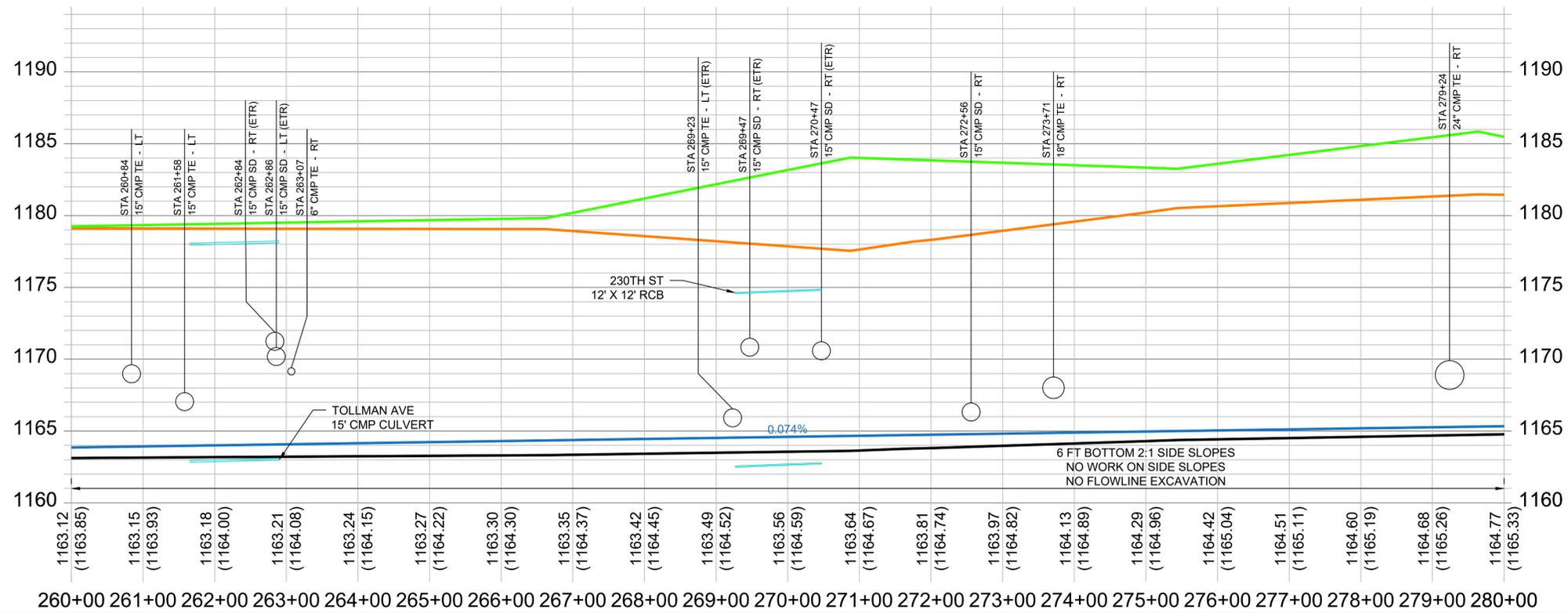
Sheet
D.13



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



260+00 261+00 262+00 263+00 264+00 265+00 266+00 267+00 268+00 269+00 270+00 271+00 272+00 273+00 274+00 275+00 276+00 277+00 278+00 279+00 280+00



260+00 261+00 262+00 263+00 264+00 265+00 266+00 267+00 268+00 269+00 270+00 271+00 272+00 273+00 274+00 275+00 276+00 277+00 278+00 279+00 280+00



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

Designer
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Checker
JLH

PLAN LEGEND

- Parcel Lines
- Work Limits (100' each side)
- Ditch ROW (50' each side)
- Tile Extensions
- Surface Drains
- Utilities (in red)

PROFILE LEGEND

- 1963 Ditch Grade
- Surveyed Ditch Bottom
- Left Top of Bank
- Right Top of Bank

No.	Revision/Issue	Date

Sheet Name
**Main Open Ditch
Plan & Profile
Sta 260+00 → 280+00**

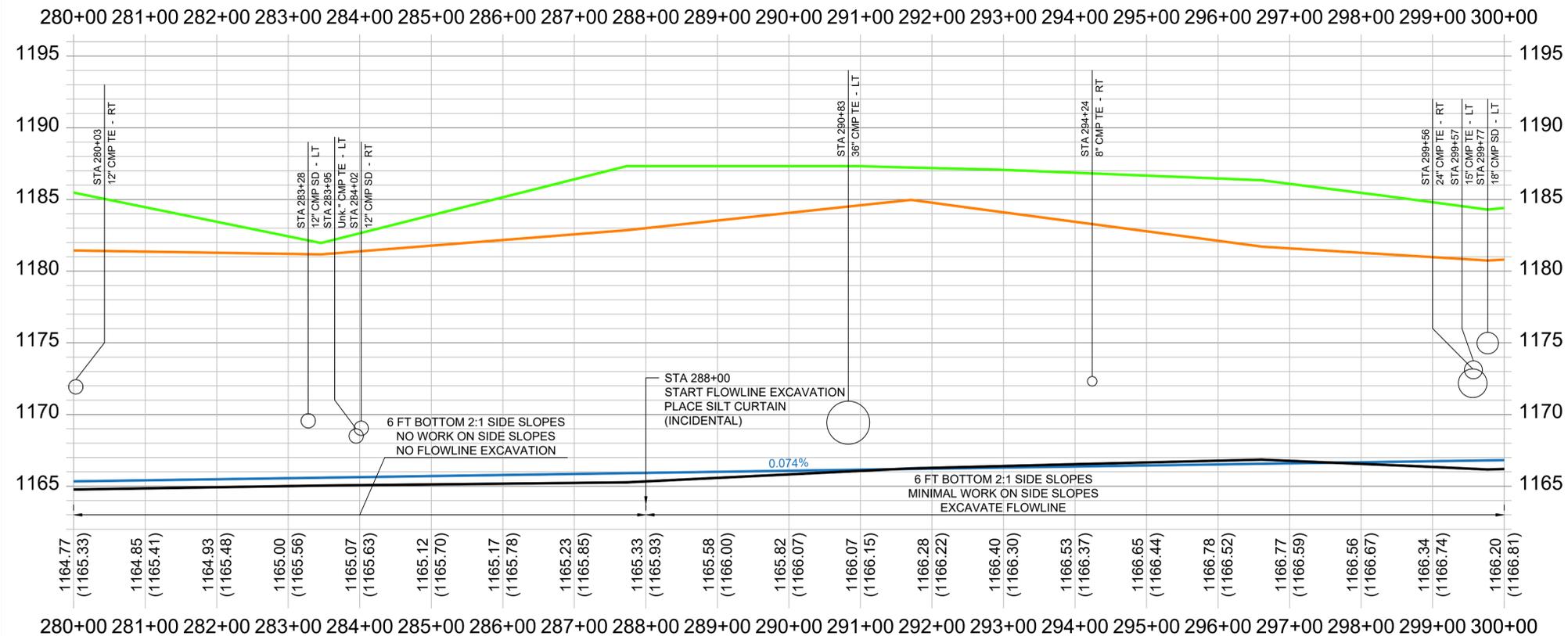
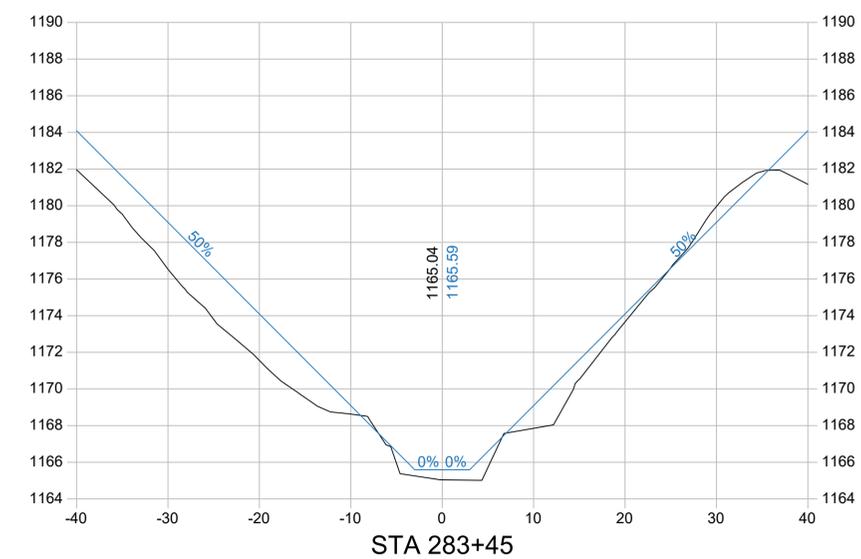
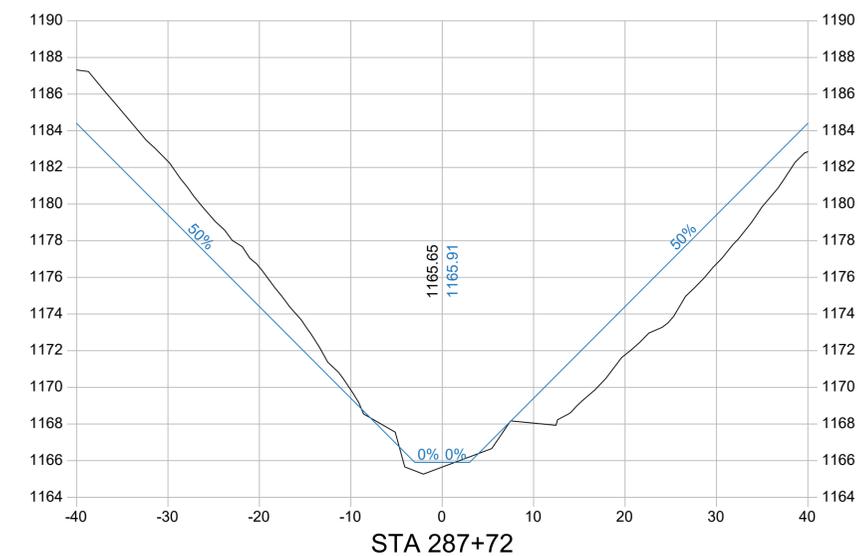
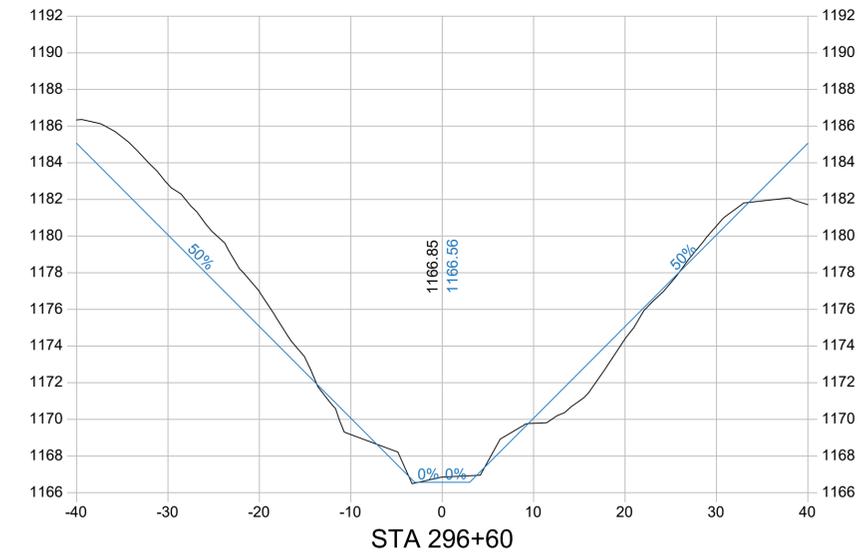
Project Name, Client, and Address
**Open Ditch Repairs
Drainage District No. 4
Hamilton County, IA
250th St & Saratoga Ave, Blairsburg, IA 50034**

Project
2515-40
Date
2026-01-19
Plan Scale
1" = 200'

D.14



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
TJB
Drafter
TJB
Checker
JLH

PLAN LEGEND

Parcel Lines	—
Work Limits (100' each side)	—
Ditch ROW (50' each side)	—
Tile Extensions	—
Surface Drains	—
Utilities (in red)	—

PROFILE LEGEND

1963 Ditch Grade	—
Surveyed Ditch Bottom	—
Left Top of Bank	—
Right Top of Bank	—

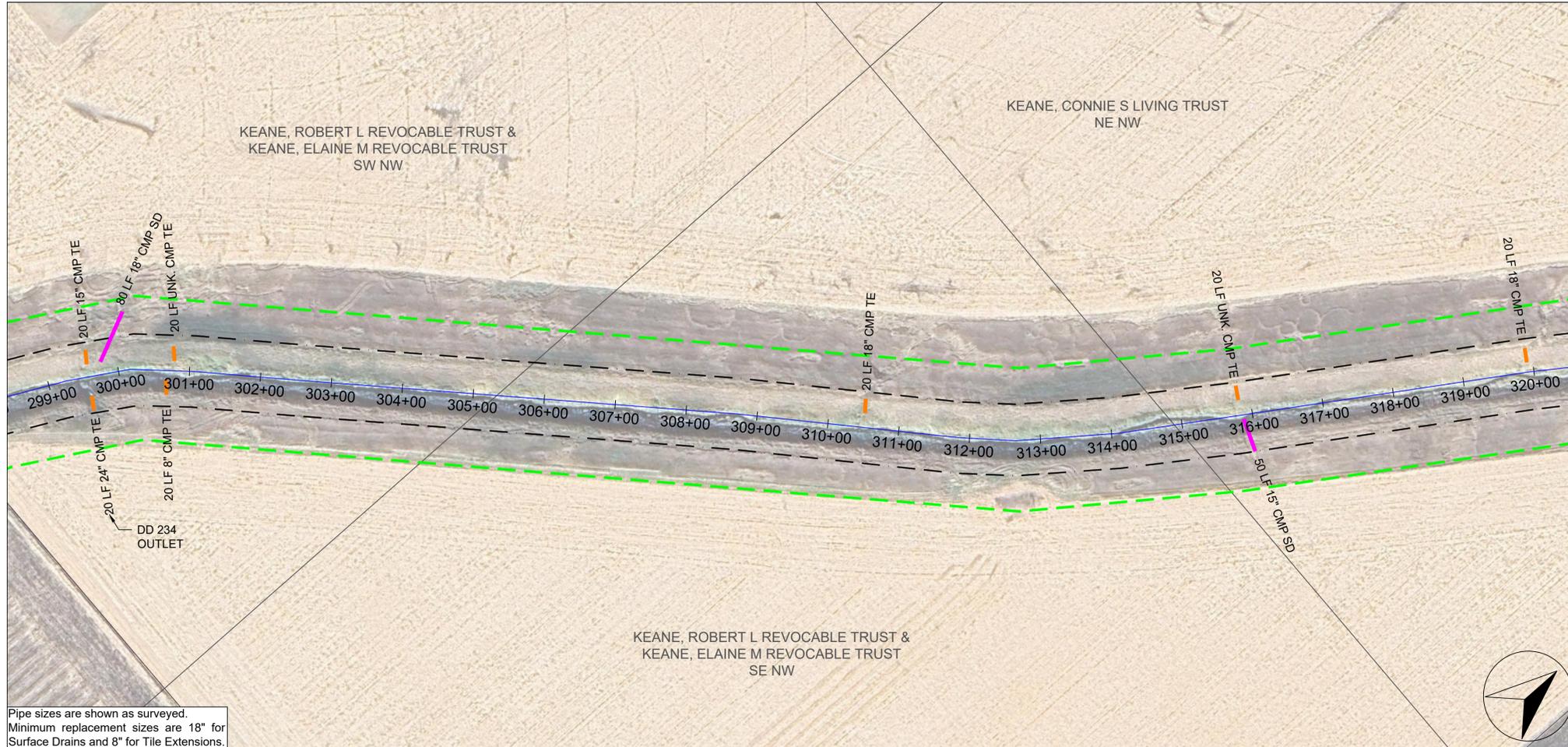
No.	Revision/Issue	Date

Sheet Name
**Main Open Ditch
Plan & Profile
Sta 280+00 → 300+00**

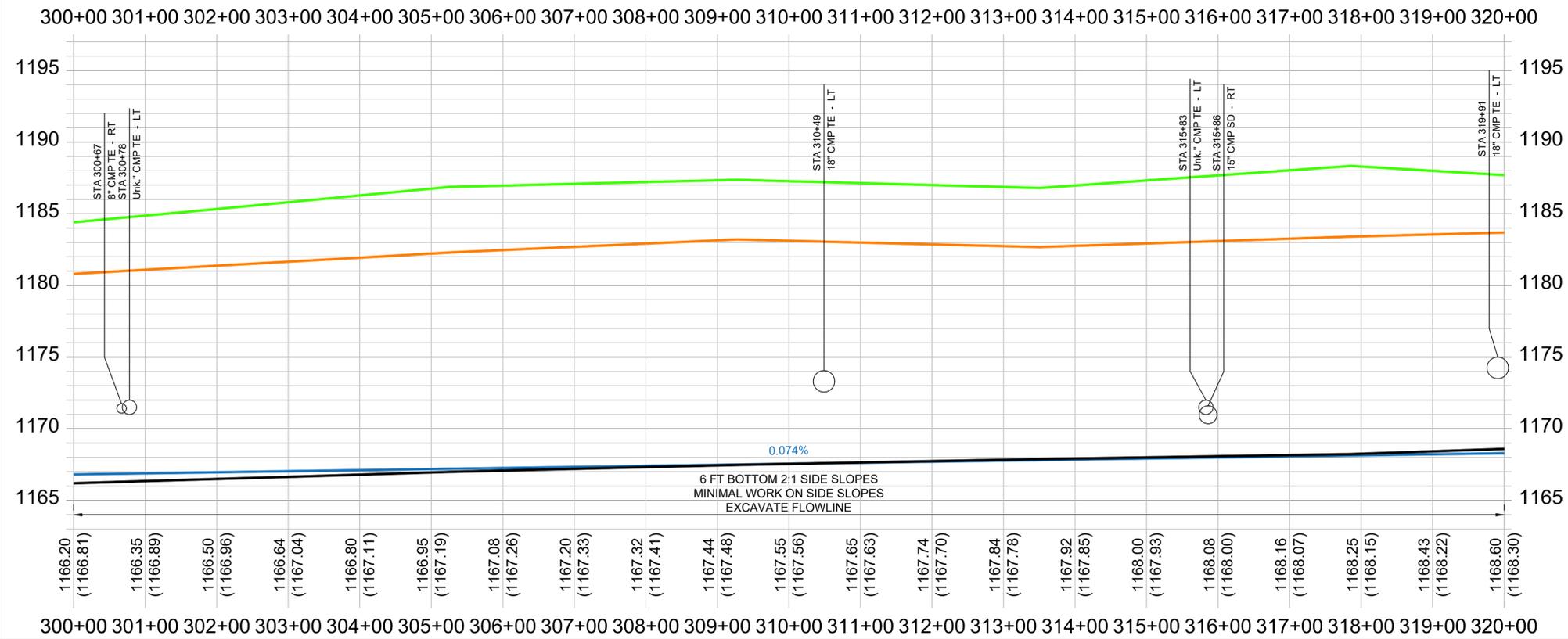
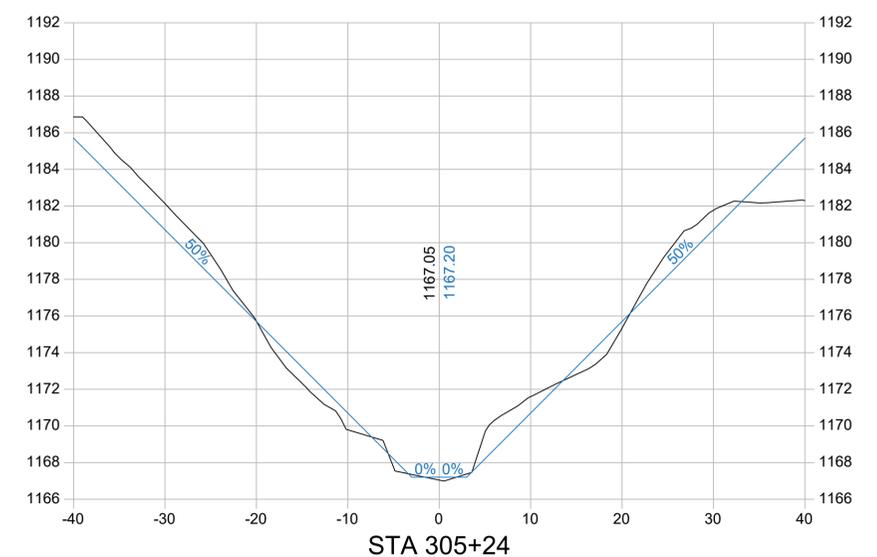
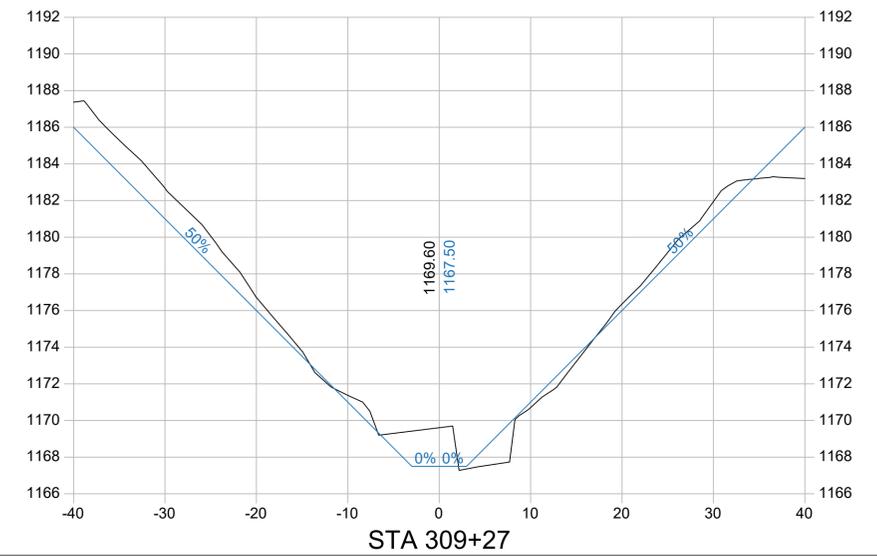
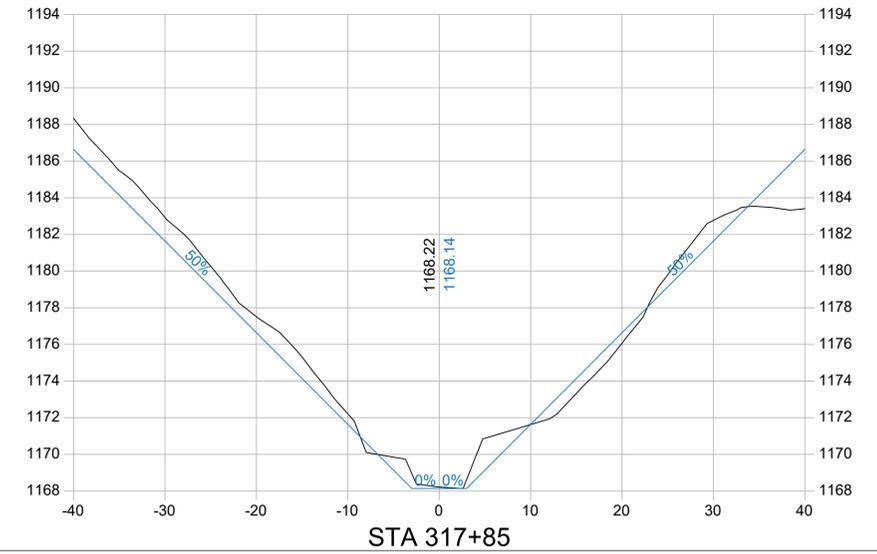
Project Name, Client, and Address
**Open Ditch Repairs
Drainage District No. 4
Hamilton County, IA
250th St & Saratoga Ave, Blairsburg, IA 50034**

Project
2515-40
Date
2026-01-19
Plan Scale
1" = 200'

Sheet
D.15



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: **TJB**
Drafter: **TJB**
Checker: **JLH**

PLAN LEGEND

Parcel Lines	1963 Ditch Grade
Work Limits (100' each side)	Surveyed Ditch Bottom
Ditch ROW (50' each side)	Left Top of Bank
Tile Extensions	Right Top of Bank
Surface Drains	
Utilities (in red)	

PROFILE LEGEND

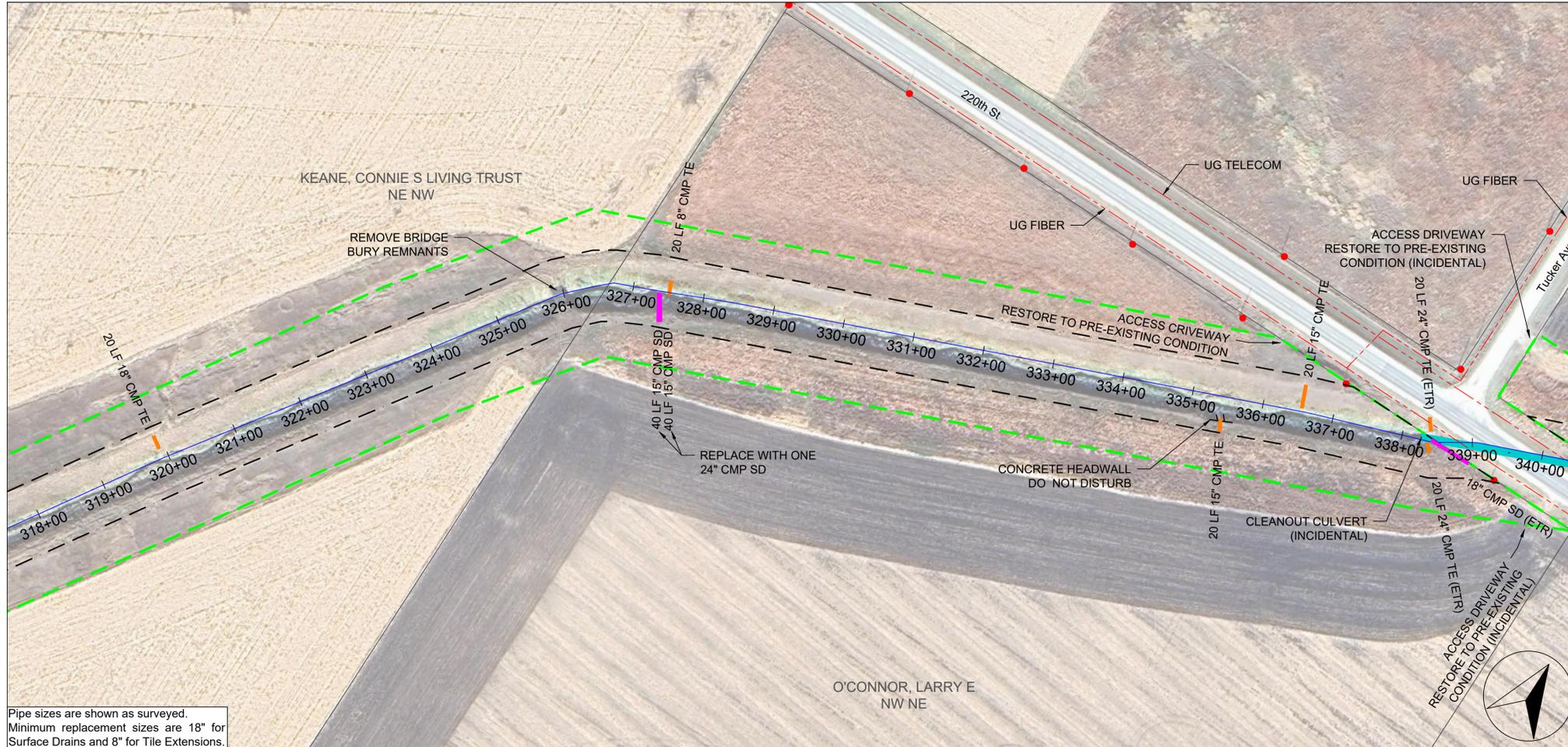
No.	Revision/Issue	Date

Sheet Name
Main Open Ditch
Plan & Profile
Sta 300+00 → 320+00

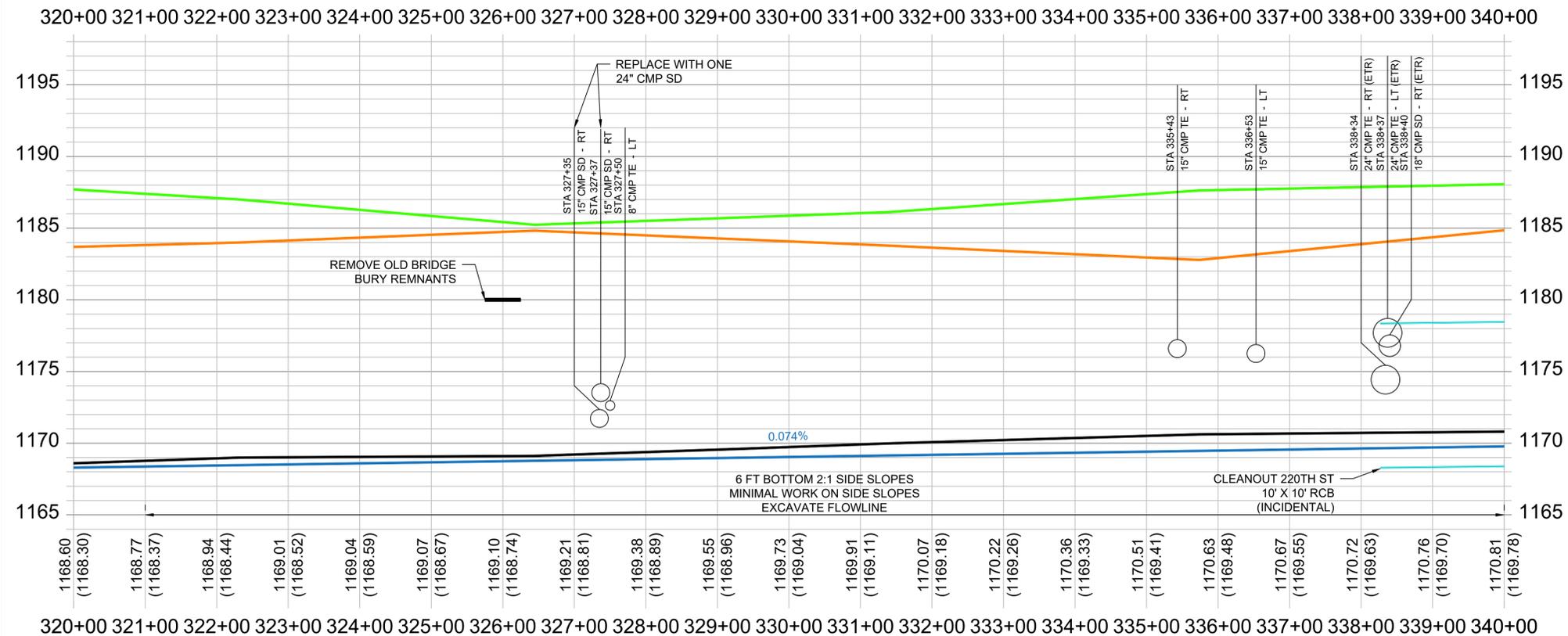
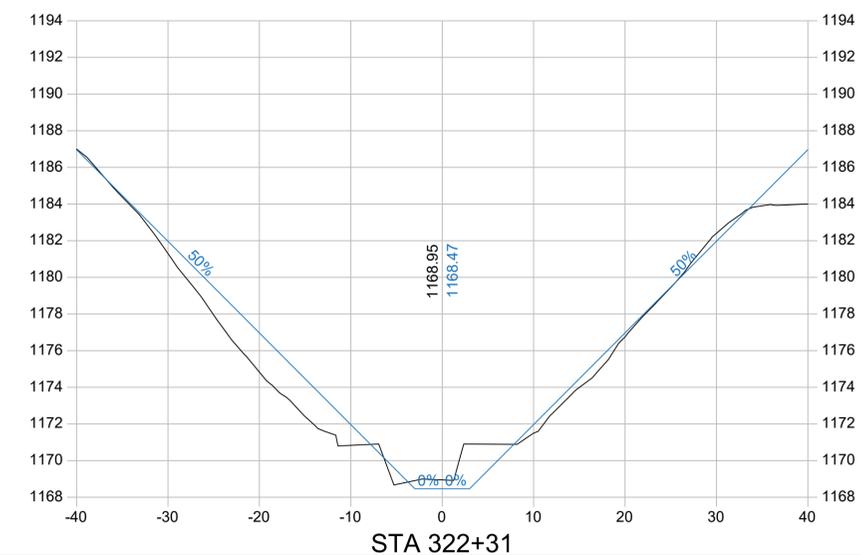
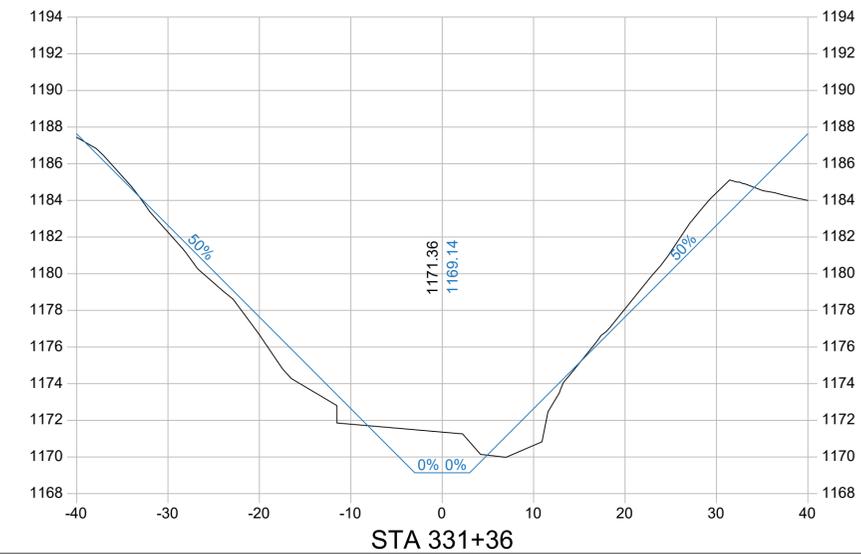
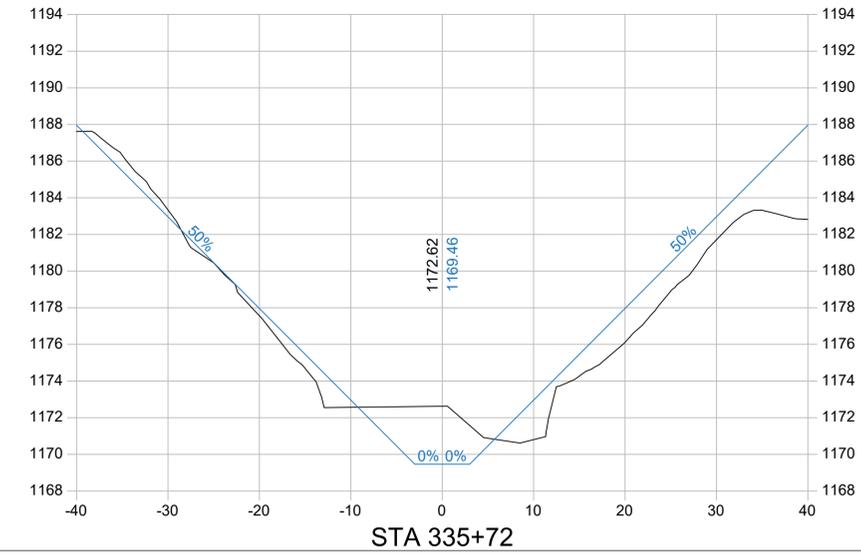
Project Name, Client, and Address
Open Ditch Repairs
Drainage District No. 4
Hamilton County, IA
250th St & Saratoga Ave, Blairsburg, IA 50034

Project: **2515-40**
Date: **2026-01-19**
Plan Scale: **1" = 200'**

Sheet: **D.16**



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
TJB
 Drafter
TJB
 Checker
JLH

PLAN LEGEND

Parcel Lines	—
Work Limits (100' each side)	—
Ditch ROW (50' each side)	—
Tile Extensions	—
Surface Drains	—
Utilities (in red)	—

PROFILE LEGEND

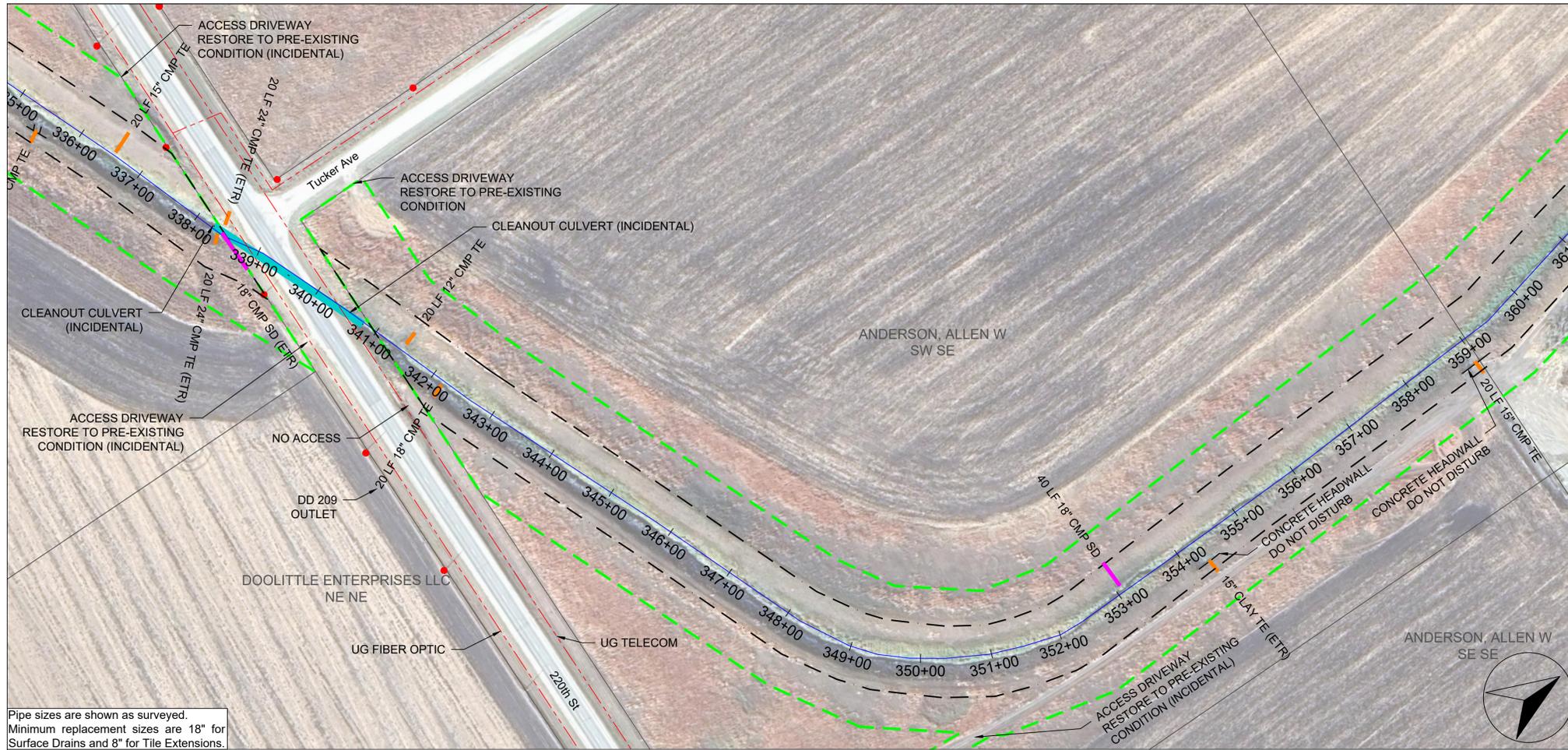
1963 Ditch Grade	—
Surveyed Ditch Bottom	—
Left Top of Bank	—
Right Top of Bank	—

No.	Revision/Issue	Date

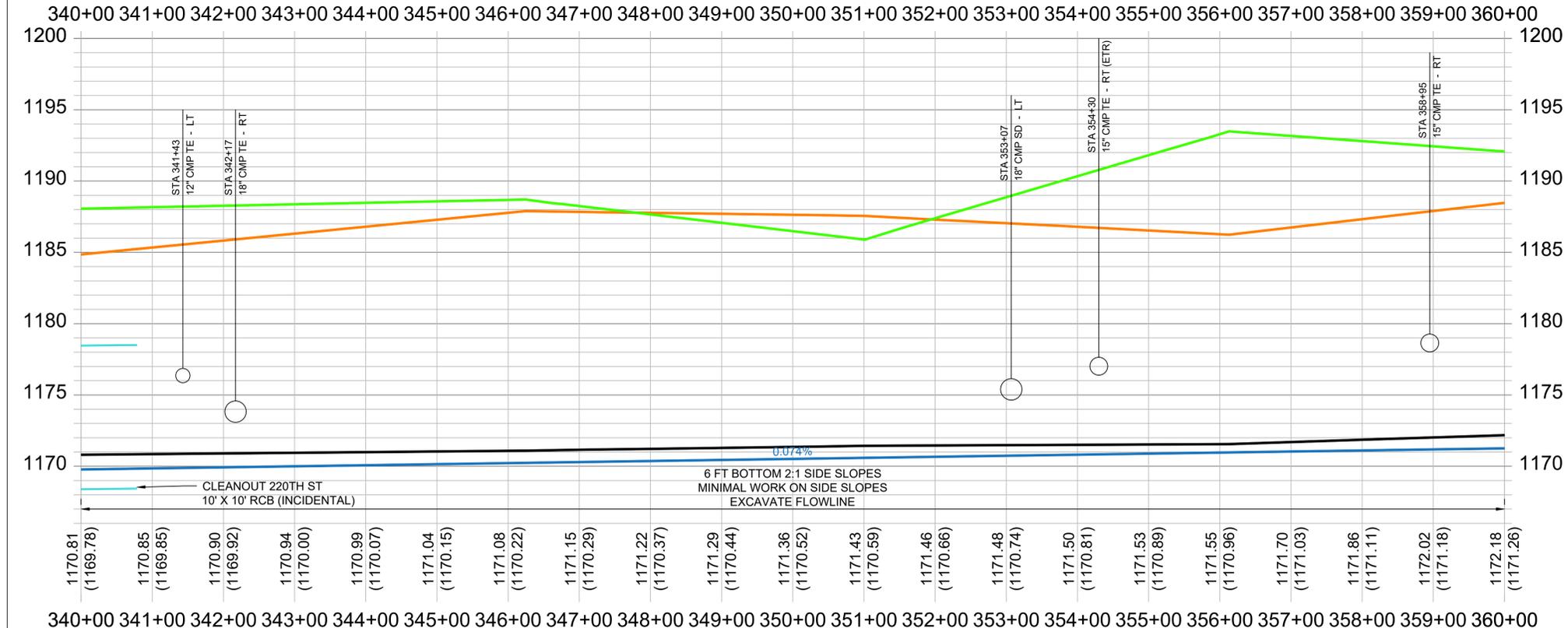
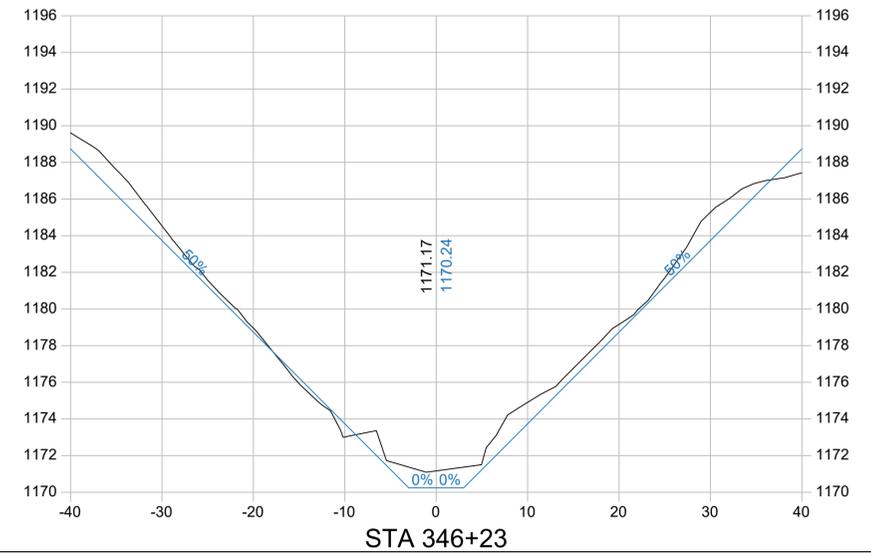
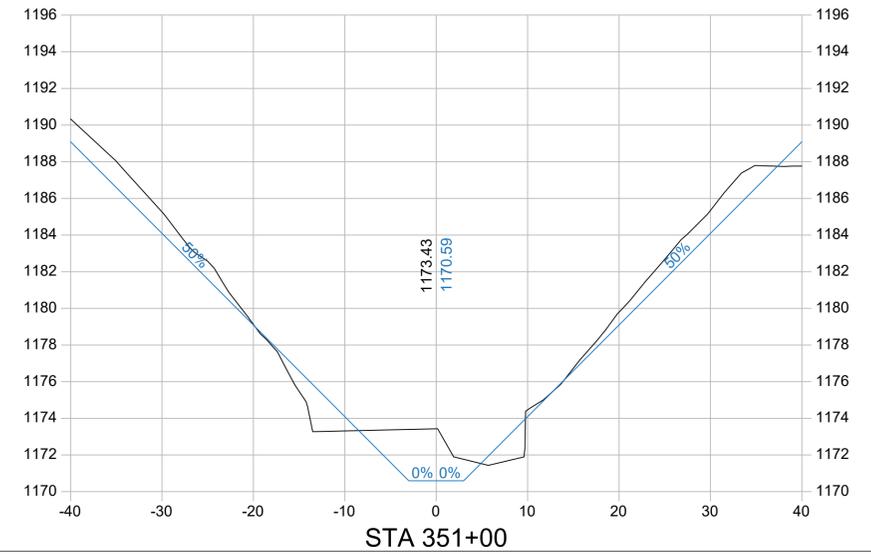
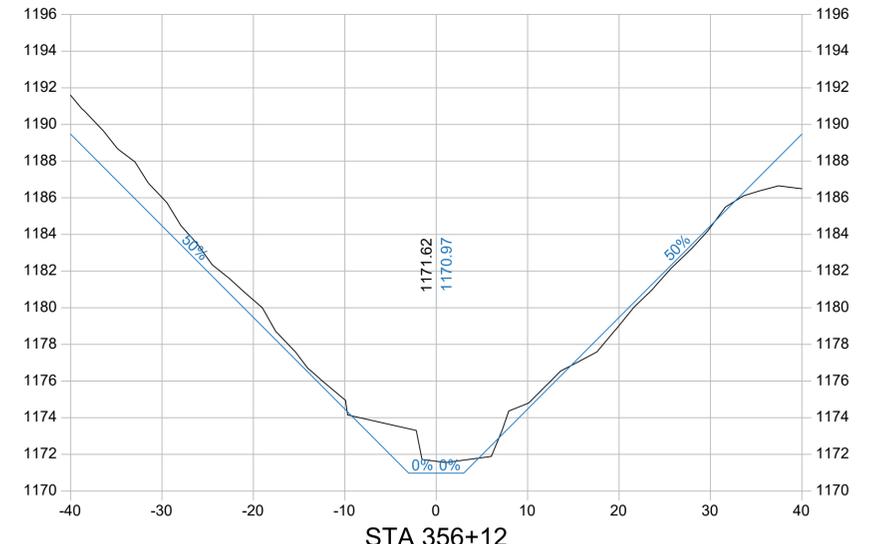
Sheet Name
**Main Open Ditch
 Plan & Profile
 Sta 320+00 → 340+00**

Project Name, Client, and Address
**Open Ditch Repairs
 Drainage District No. 4
 Hamilton County, IA
 250th St & Saratoga Ave, Blairsburg, IA 50034**

Project 2515-40	Sheet D.17
Date 2026-01-19	
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
TJB
 Drafter
TJB
 Checker
JLH

PLAN LEGEND

Parcel Lines	—
Work Limits (100' each side)	—
Ditch ROW (50' each side)	—
Tile Extensions	—
Surface Drains	—
Utilities (in red)	—

PROFILE LEGEND

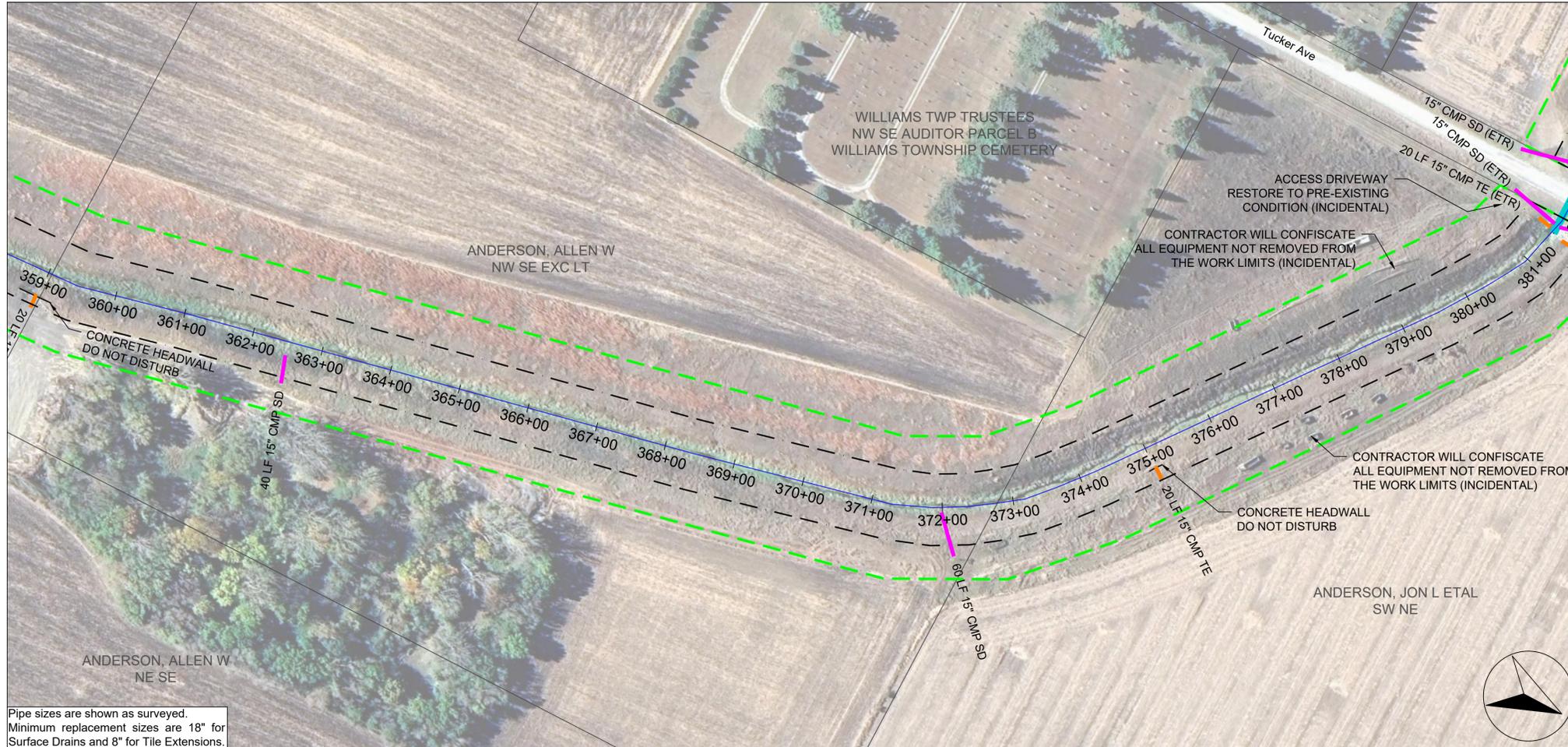
1963 Ditch Grade	—
Surveyed Ditch Bottom	—
Left Top of Bank	—
Right Top of Bank	—

No.	Revision/Issue	Date

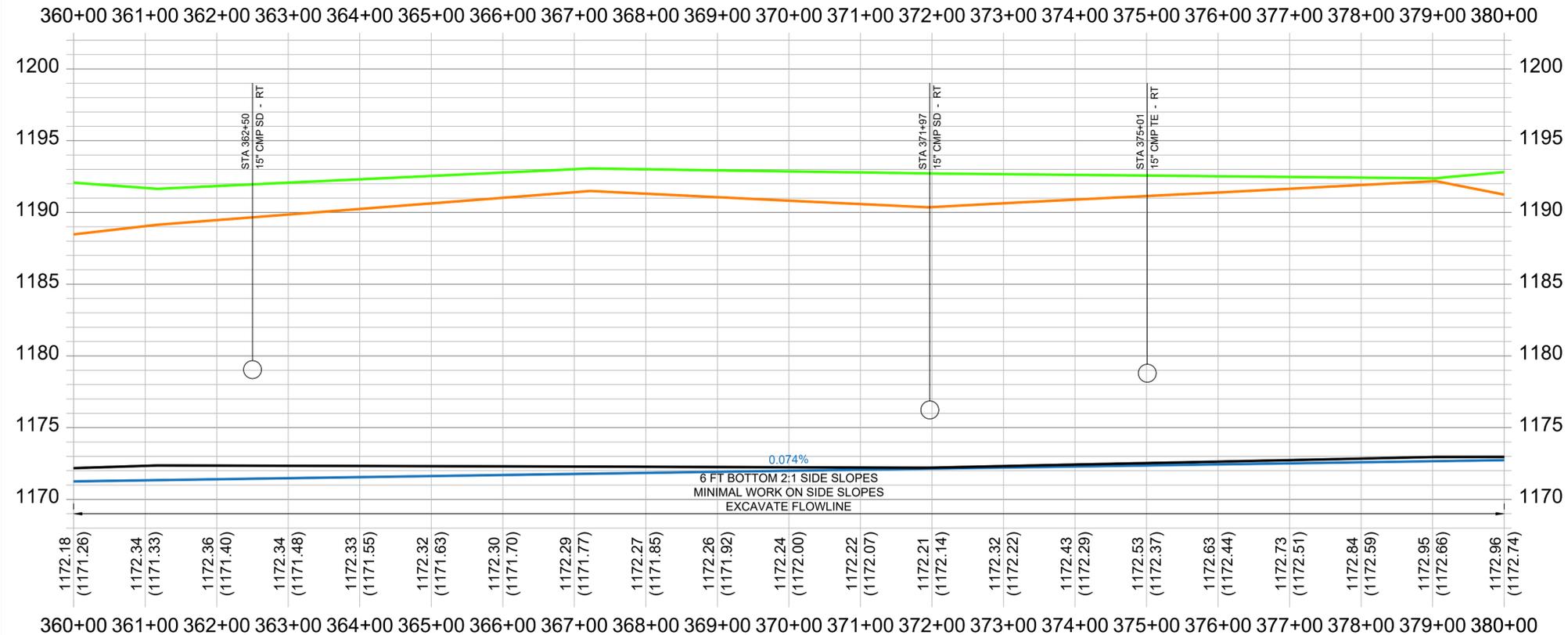
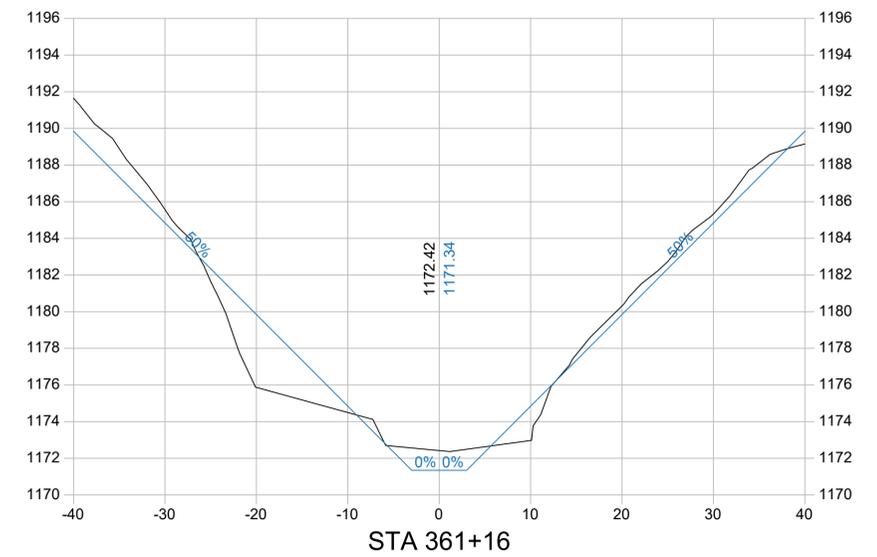
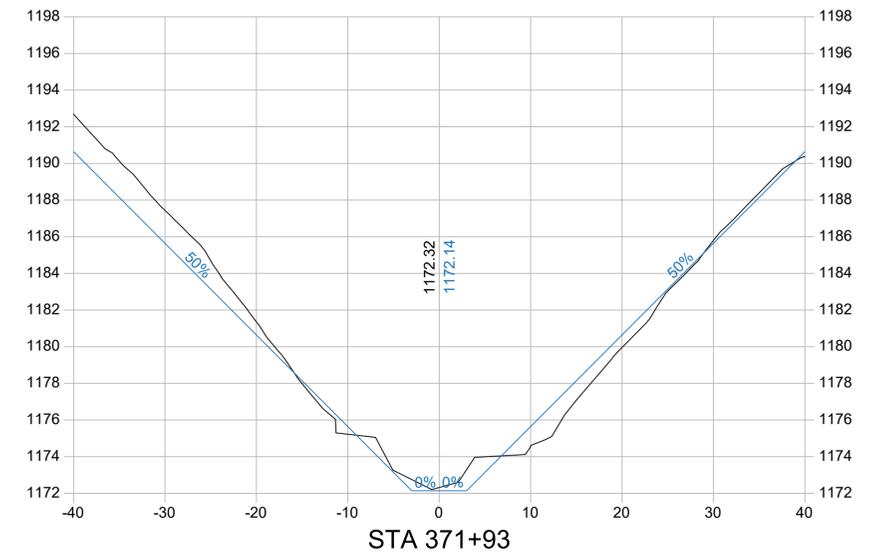
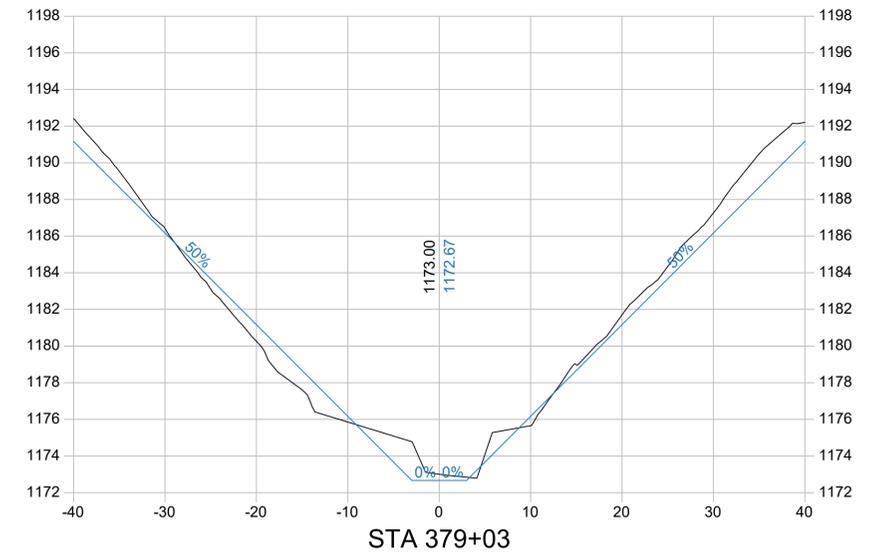
Sheet Name
Main Open Ditch
Plan & Profile
 Sta 340+00 → 360+00

Project Name, Client, and Address
Open Ditch Repairs
Drainage District No. 4
Hamilton County, IA
250th St & Saratoga Ave, Blairsburg, IA 50034

Project 2515-40	D.18
Date 2026-01-19	
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
TJB
 Drafter
TJB
 Checker
JLH

PLAN LEGEND

Parcel Lines	—
Work Limits (100' each side)	—
Ditch ROW (50' each side)	—
Tile Extensions	—
Surface Drains	—
Utilities (in red)	—

PROFILE LEGEND

1963 Ditch Grade	—
Surveyed Ditch Bottom	—
Left Top of Bank	—
Right Top of Bank	—

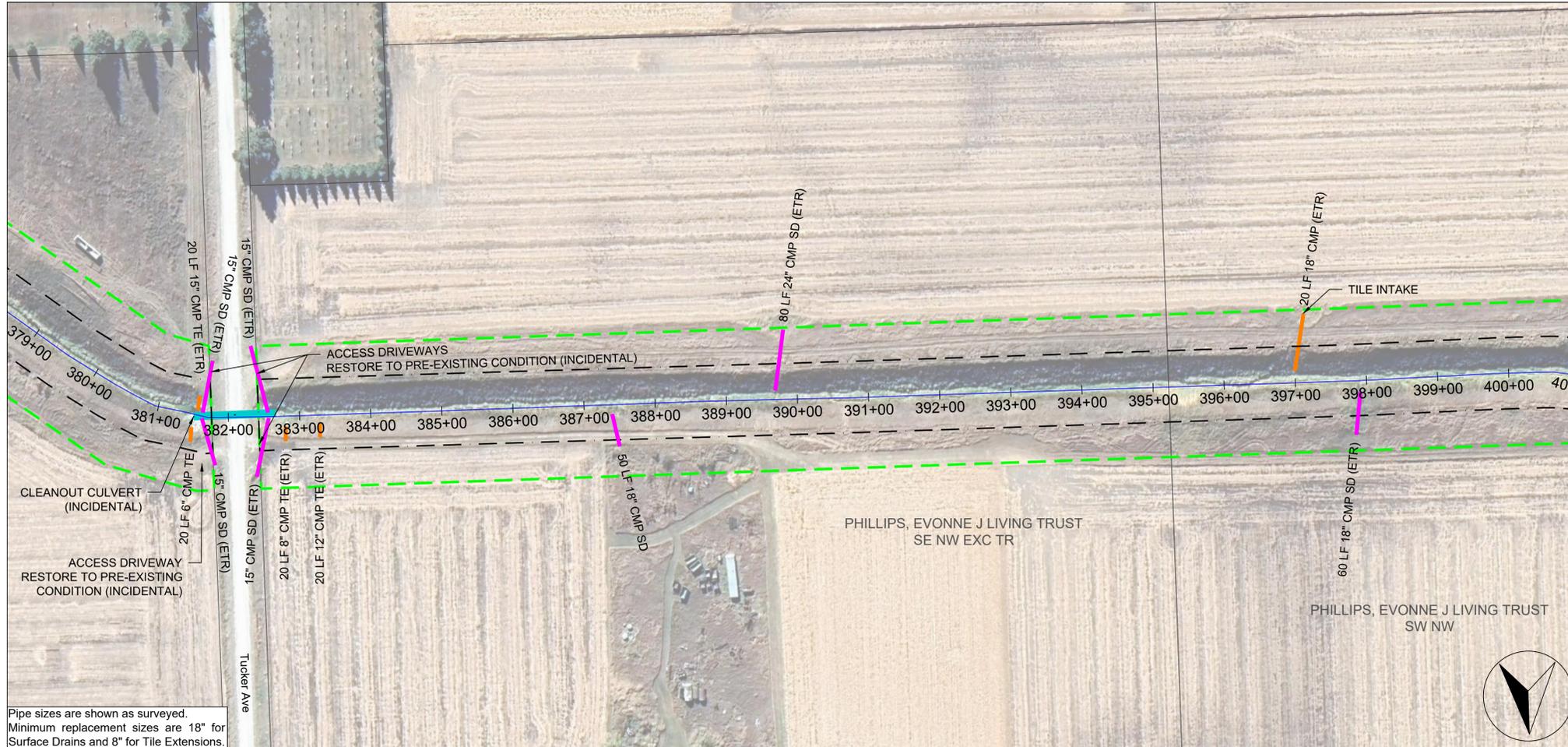
No.	Revision/Issue	Date

Sheet Name
**Main Open Ditch
 Plan & Profile
 Sta 360+00 → 380+00**

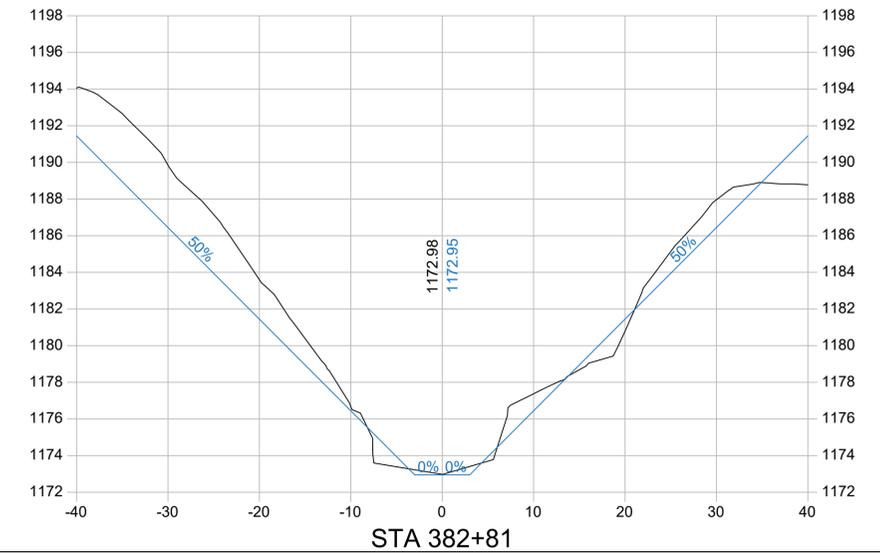
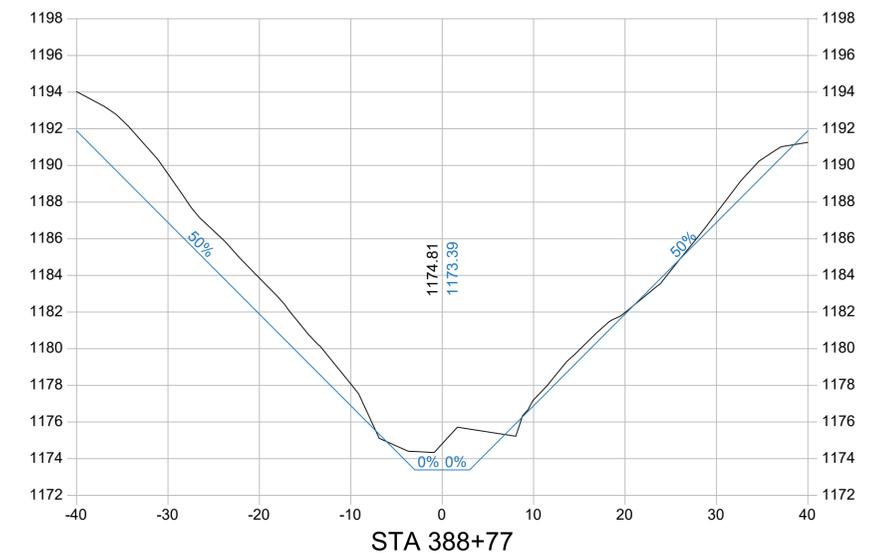
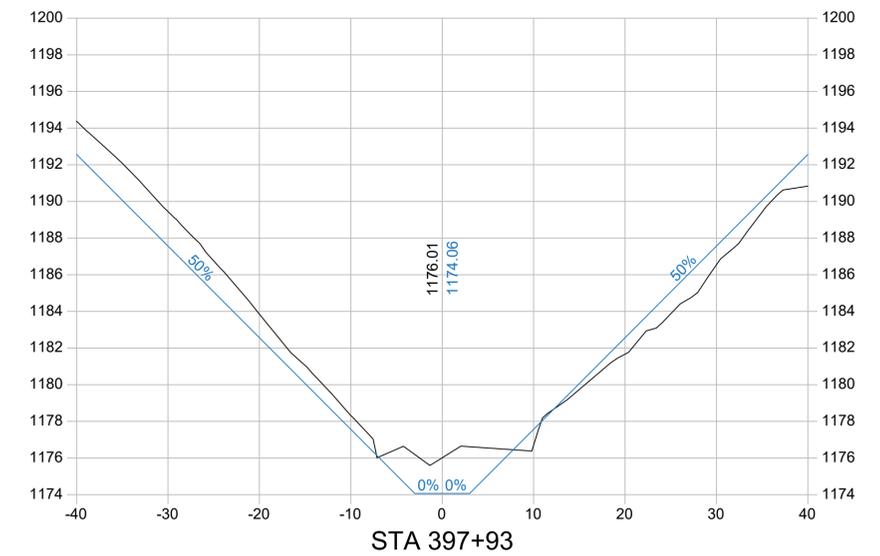
Project Name, Client, and Address
**Open Ditch Repairs
 Drainage District No. 4
 Hamilton County, IA
 250th St & Saratoga Ave, Blairsburg, IA 50034**

Project
2515-40
 Date
2026-01-19
 Plan Scale
1" = 200'

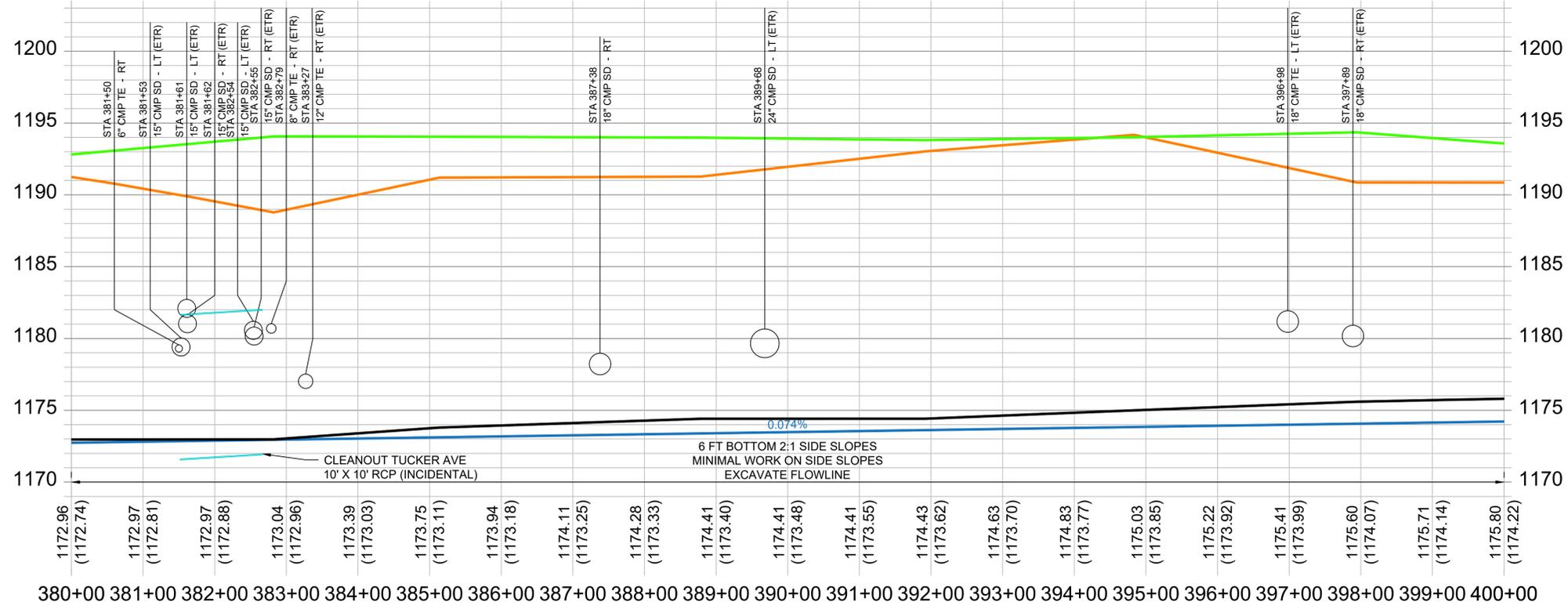
Sheet
D.19



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



380+00 381+00 382+00 383+00 384+00 385+00 386+00 387+00 388+00 389+00 390+00 391+00 392+00 393+00 394+00 395+00 396+00 397+00 398+00 399+00 400+00



380+00 381+00 382+00 383+00 384+00 385+00 386+00 387+00 388+00 389+00 390+00 391+00 392+00 393+00 394+00 395+00 396+00 397+00 398+00 399+00 400+00



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

Designer
TJB
Drafter
TJB
Checker
JLH

PLAN LEGEND

- Parcel Lines
- Work Limits (100' each side)
- Surveyed Ditch Bottom
- Ditch ROW (50' each side)
- Tile Extensions
- Surface Drains
- Utilities (in red)

PROFILE LEGEND

- 1963 Ditch Grade
- Surveyed Ditch Bottom
- Left Top of Bank
- Right Top of Bank

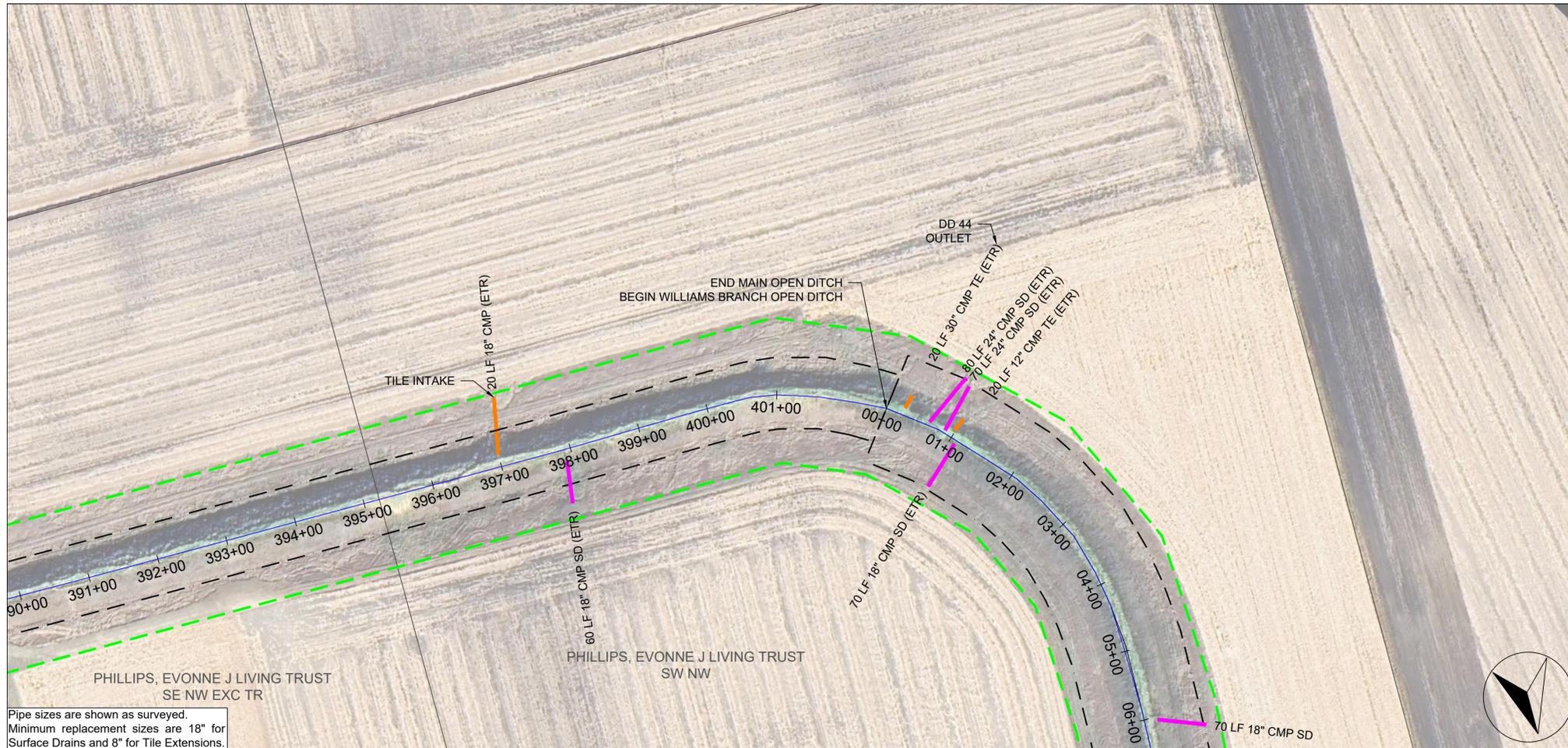
No.	Revision/Issue	Date

Sheet Name
**Main Open Ditch
Plan & Profile
Sta 380+00 → 400+00**

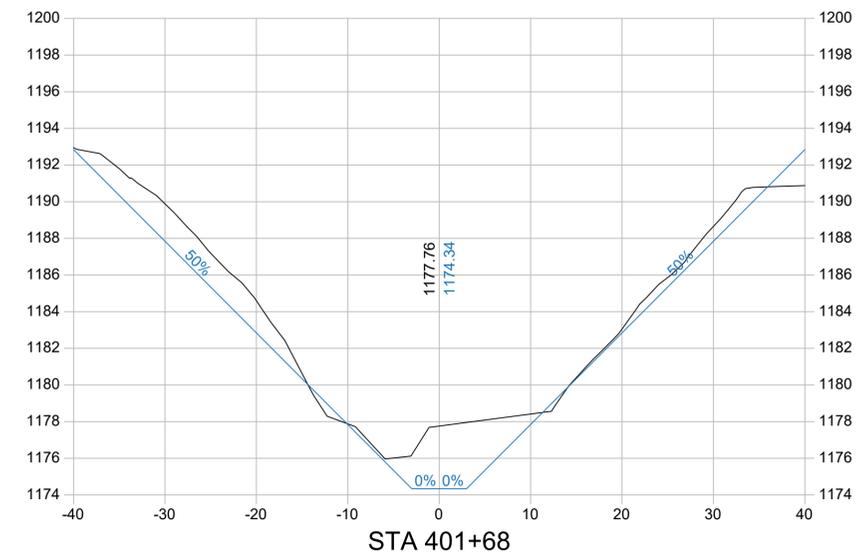
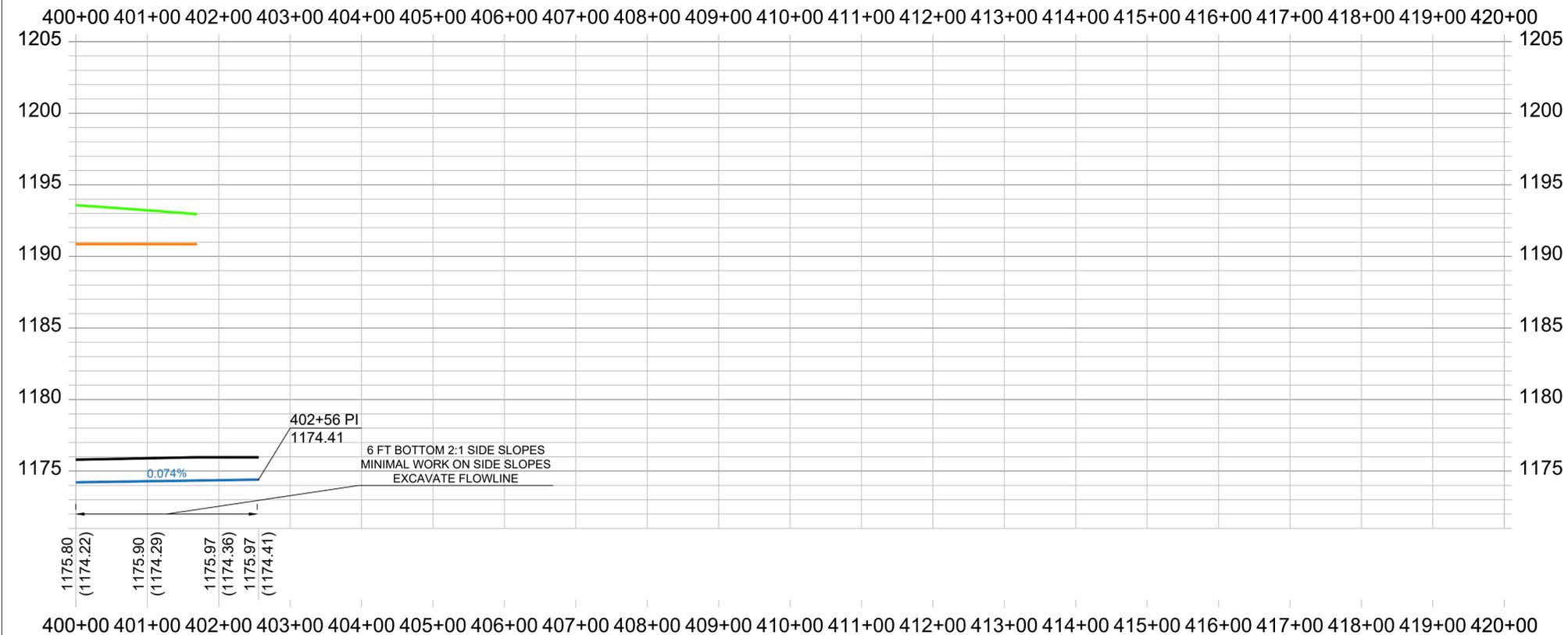
Project Name, Client, and Address
**Open Ditch Repairs
Drainage District No. 4
Hamilton County, IA
250th St & Saratoga Ave, Blairsburg, IA 50034**

Project
2515-40
Date
2026-01-19
Plan Scale
1" = 200'

Sheet
D.20



Pipe sizes are shown as surveyed.
Minimum replacement sizes are 18\"/>



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

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

PLAN LEGEND

Parcel Lines	—
Work Limits (100' each side)	—
Ditch ROW (50' each side)	—
Tile Extensions	—
Surface Drains	—
Utilities (in red)	—

PROFILE LEGEND

1963 Ditch Grade	—
Surveyed Ditch Bottom	—
Left Top of Bank	—
Right Top of Bank	—

No.	Revision/Issue	Date

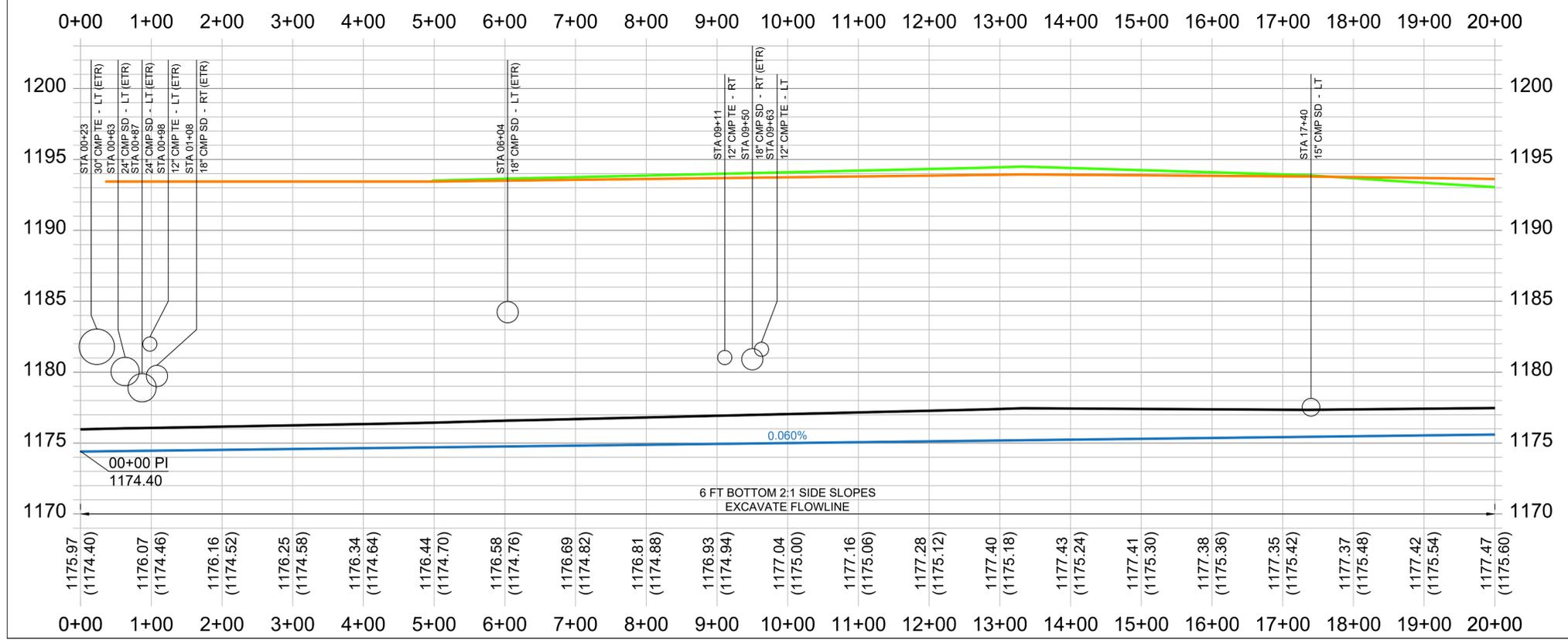
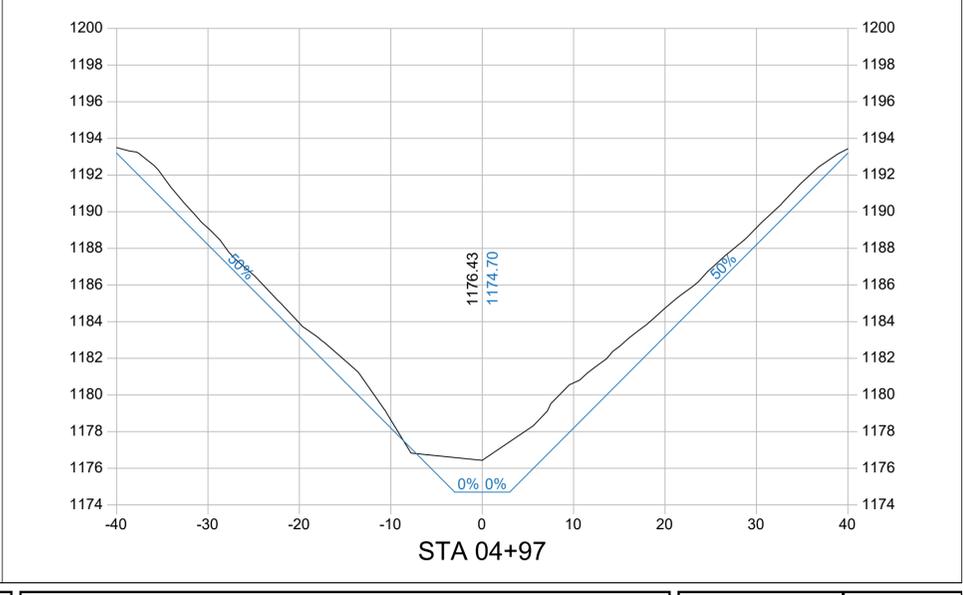
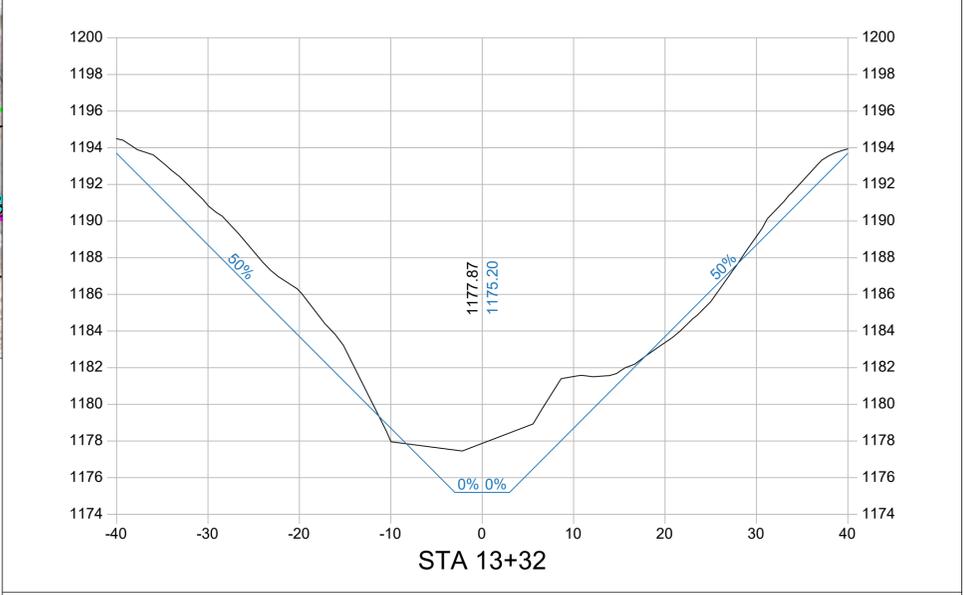
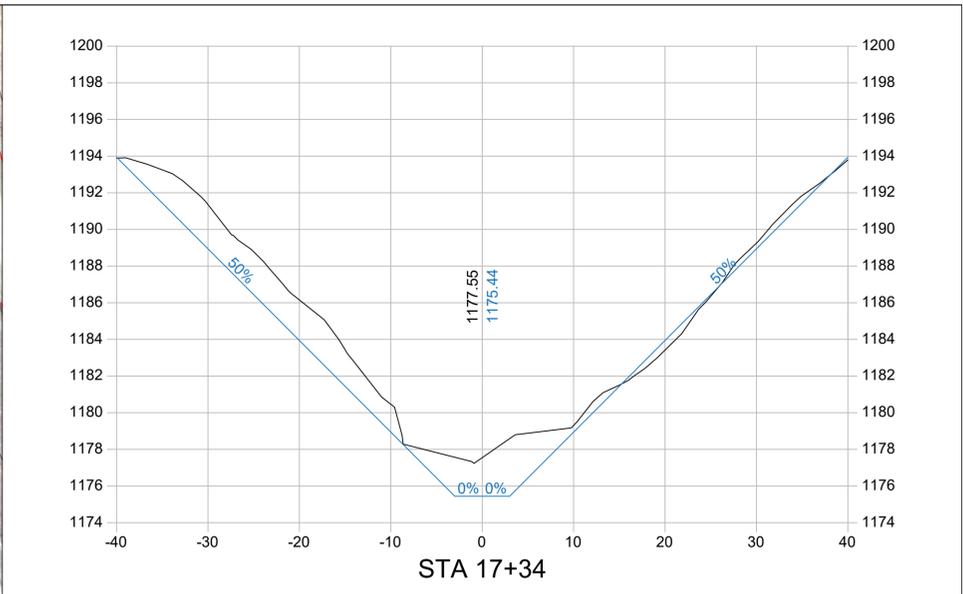
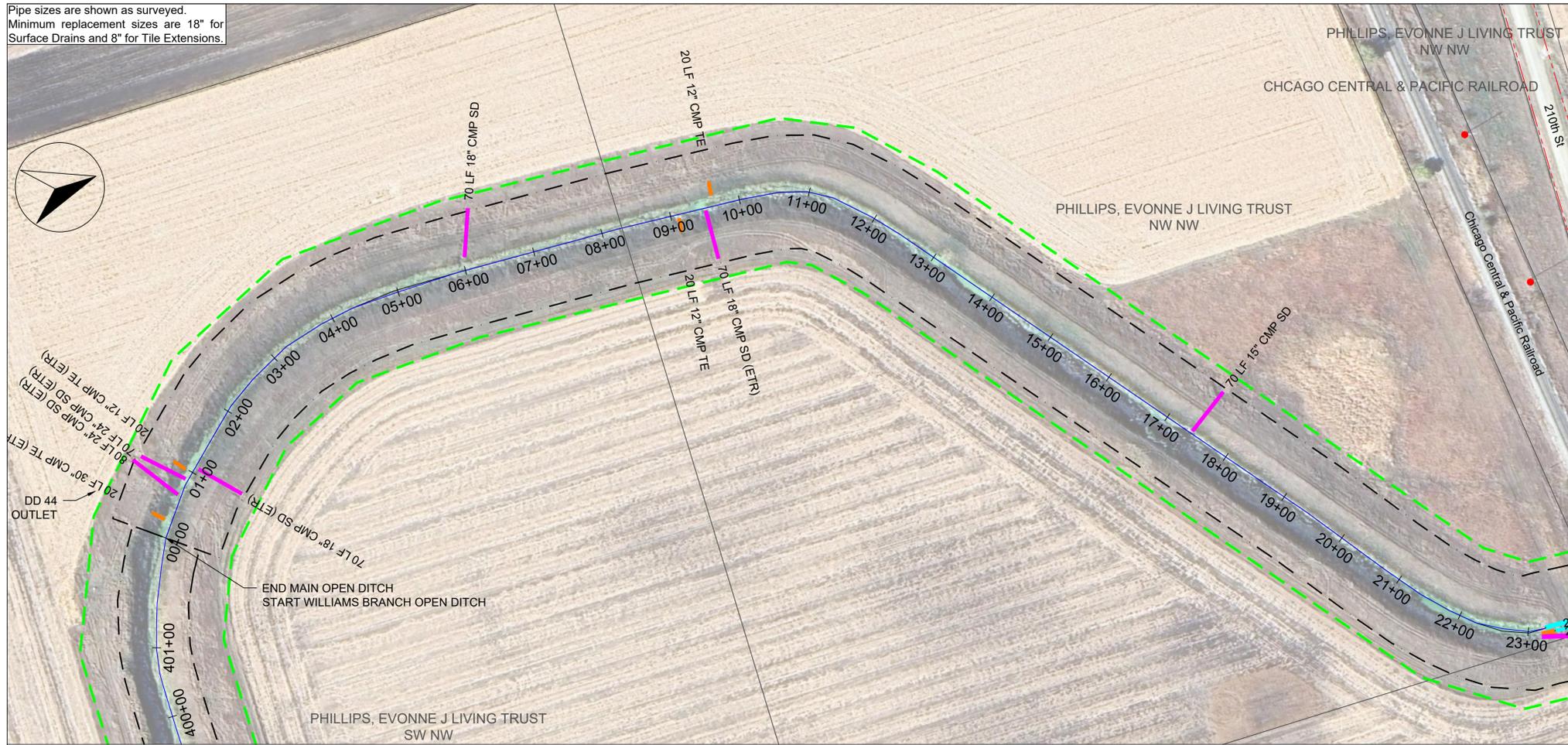
Sheet Name
**Main Open Ditch
Plan & Profile
Sta 400+00 → 420+00**

Project Name, Client, and Address
**Open Ditch Repairs
Drainage District No. 4
Hamilton County, IA
250th St & Saratoga Ave, Blairsburg, IA 50034**

Project: **2515-40**
Date: **2026-01-19**
Plan Scale: **1" = 200'**

Sheet: **D.21**

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: **TJB**
Drafter: **TJB**
Checker: **JLH**

PLAN LEGEND

Parcel Lines	—
Work Limits (100' each side)	—
Ditch ROW (50' each side)	—
Tile Extensions	—
Surface Drains	—
Utilities (in red)	—

PROFILE LEGEND

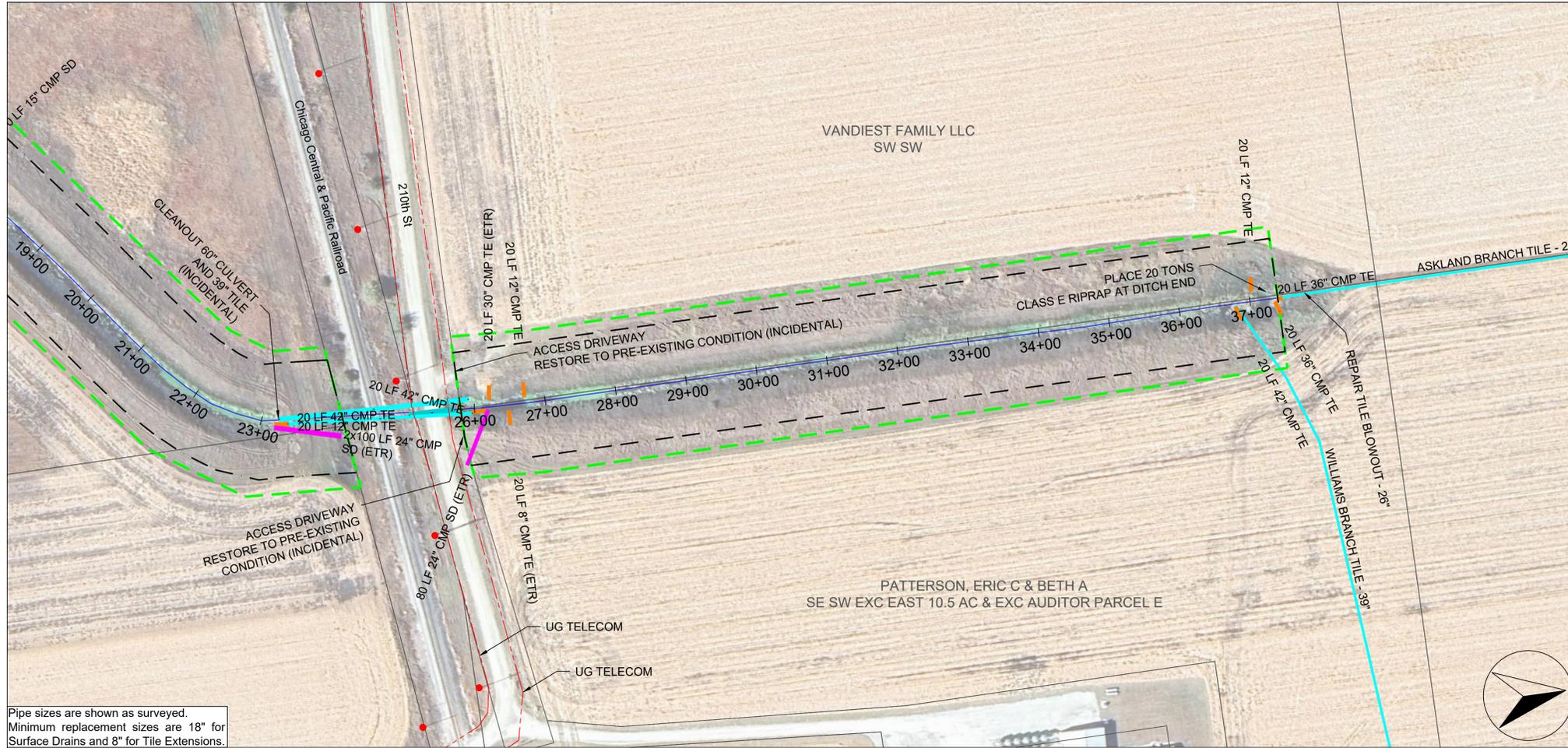
1963 Ditch Grade	—
Work Limits (100' each side)	—
Surveyed Ditch Bottom	—
Left Top of Bank	—
Right Top of Bank	—

No.	Revision/Issue	Date

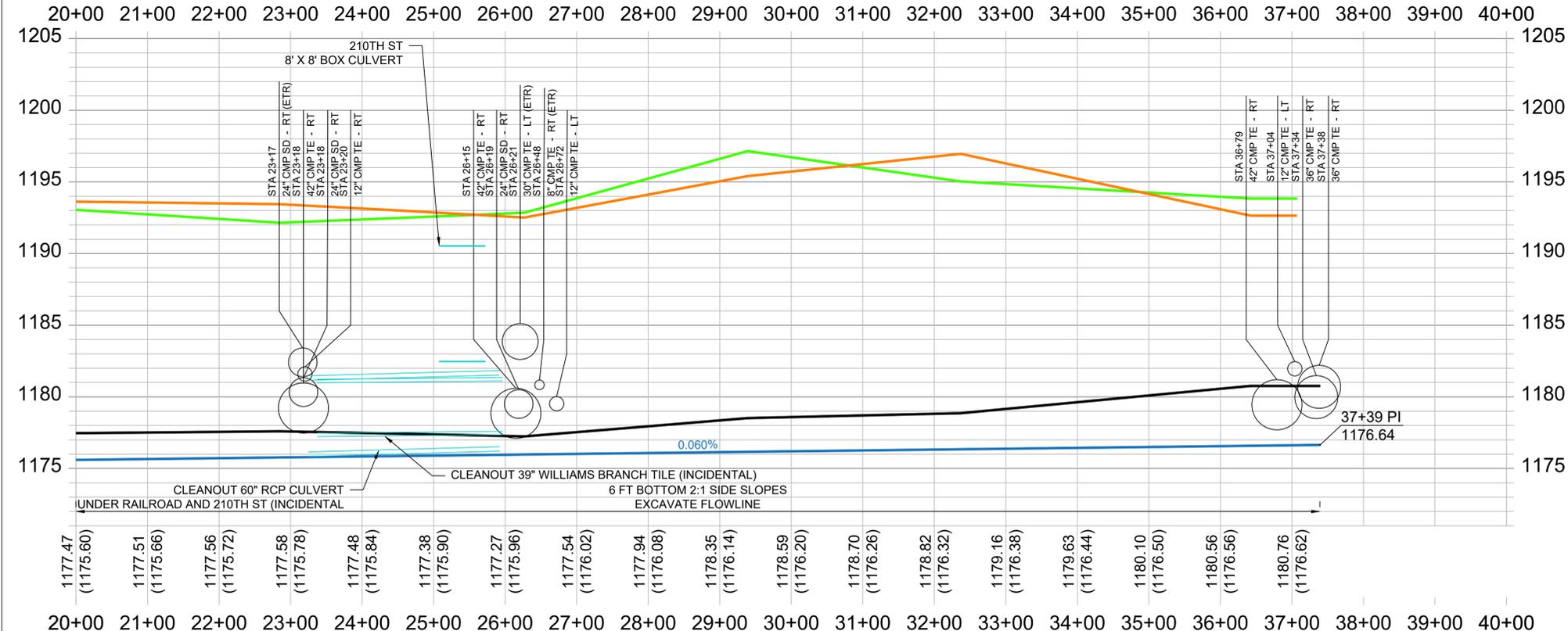
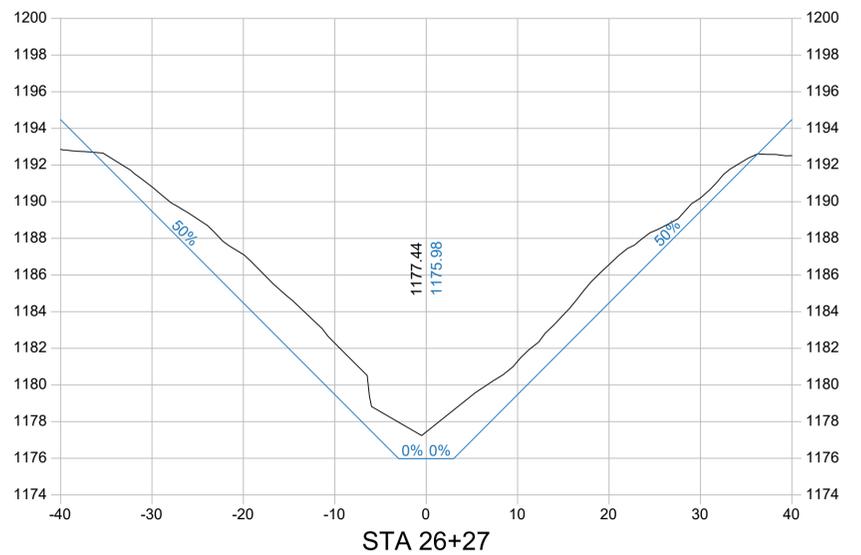
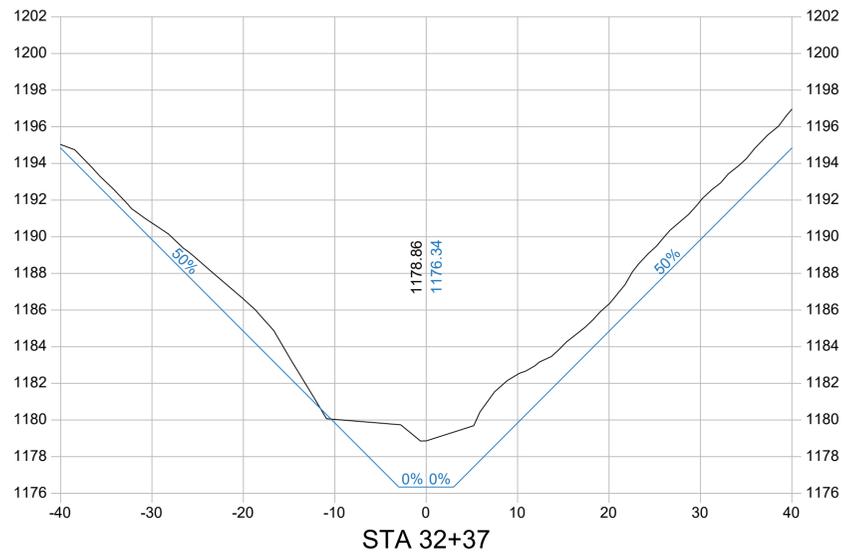
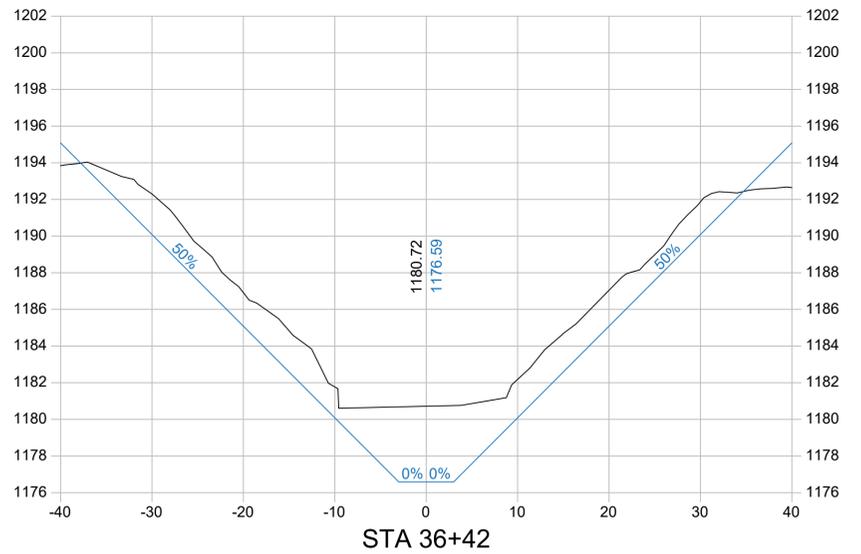
Sheet Name
**Williams Branch
Open Ditch
Plan & Profile
Sta 0+00 → 20+00**

Project Name, Client, and Address
**Open Ditch Repairs
Drainage District No. 4
Hamilton County, IA
250th St & Saratoga Ave, Blairsburg, IA 50034**

Project: **2515-40**
Date: **2026-01-19**
Plan Scale: **1" = 200'**
Sheet: **D.22**



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: **TJB**
Drafter: **TJB**
Checker: **JLH**

PLAN LEGEND

Parcel Lines	—
Work Limits (100' each side)	—
Ditch ROW (50' each side)	—
Tile Extensions	—
Surface Drains	—
Utilities (in red)	—

PROFILE LEGEND

1963 Ditch Grade	—
Surveyed Ditch Bottom	—
Left Top of Bank	—
Right Top of Bank	—

No.	Revision/Issue	Date

Sheet Name
**Main Open Ditch
Plan & Profile
Sta 20+00 → 40+00**

Project Name, Client, and Address
**Open Ditch Repairs
Drainage District No. 4
Hamilton County, IA
250th St & Saratoga Ave, Blairsburg, IA 50034**

Project	2515-40	Sheet	D.23
Date	2026-01-19		
Plan Scale	1" = 200'		