

Blue Earth and Faribault County Judicial Ditch No. 49 Repair Report

Blue Earth and Faribault County, Minnesota

Date: March 25th, 2022

ISG Project No.: 20-24339



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I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the state of Minnesota.

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Judicial Ditch No. 49

Blue Earth County, Minnesota

Engineer's Project Number: 20-24339

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EXECUTIVE SUMMARY

ISG was contacted by the Blue Earth County Drainage Authority requesting to prepare a repair report for Blue Earth and Faribault County Judicial Ditch No. 49 (JD 49).

Blue Earth-Faribault County Judicial Ditch No. 49 drains a 16,761-acre watershed, which consists primarily of gently rolling agricultural land. The system was originally constructed as JD 2 and JD 3 in 1909. In 1958 the two systems were incorporated as JD 49 as an open ditch system consisting of 36,268-feet of open ditch. In 1970 an improvement was made to the system by installing 11,730-feet of tile as lateral 1. The last repair to JD 49 was to the main open ditch which was cleaned in 1984. In 2012 Branch 3 tile was abandoned.

The existing open ditch is in poor condition with large sediment deposits, bank erosion and sloughing, and damages to existing tile outlets, creating erosion in the ditch. The system also contains heavy vegetation and trees within the buffer and slopes of the ditch causing additional erosion to unprotected banks.

A drone survey was completed along portions of the open ditch in July of 2020, subsequently a draft repair report was completed with the information collected from the drone aerial survey. A landowner meeting was held in November of 2020 where two options were presented to repair the large amount of sloughing occurring in the system. Upon feedback from landowners, a topographical survey of the entire ditch was completed and is used as the basis for the repairs necessary for JD 49 in this report.

The proposed project includes cleaning 18,581-feet of the open ditch to legal grade and widening 8,739-feet of open ditch. Additionally, the project aims to repair the side slopes of the system that have severe erosion by widening the ditch banks. Tile outlets within the system will be protected to prevent further erosion of the ditch banks.

The preliminary cost estimate for the Blue Earth County Judicial Ditch No. 49 repair project is \$1,402,227.

SYSTEM WATERSHED

Location

JD 49's watershed is located in Sections 10, 11, 12, 13, 14, 15, 22, 23, 24, 25, 26, 35, and 36 of Shelby Township in Blue Earth County, sections 7, 8, 16, 17, 18, 19, 20, 29, 30, 31, and 32 of Sterling Township in Blue Earth County, sections 1, 2, 11, 12, 13, 14, and 23 of Winnebago City Township in Faribault County, and from sections 5, 6, 7, 8, 17, and 18 of Delavan Township in Faribault County. The system provides drainage to approximately 16,761 acres of land predominately in agricultural row crop production. The mainline ditch generally runs north from its end in Section 31 of Sterling Township in Blue Earth County to Section 16 of Sterling County in Blue Earth County to its outlet, Providence Creek. After checking the historical DNR Public Waters Inventory Map, the DNR Buffer Map, and the GIS version of the Public Waters Inventory Map, the outlet is a Public Water.

HISTORY

Original System

According to materials supplied by Blue Earth County the system was originally constructed as Judicial Ditch No. 2 and Judicial Ditch No. 3 in 1909. In 1958 JD 2 and JD 3 were incorporated into JD 49 and the system was deepened and extended. The system consisted of 36,268 feet of mainline ditch, 1,420-feet of Branch 1 tile, 1,125-feet of Branch 2 tile, and 2,550-feet of Branch 3 tile.

ESTABLISHMENTS AND IMPROVEMENTS

In 1970, Lateral 1 was established to the JD 49 system. The Lateral drains land in Sections 13 and 14 of Shelby Township. Lateral 1 consists of 11,730 feet of reinforced concrete and corrugated metal tile.

REPAIRS

Maintenance records indicate that JD 49 has been cleaned irregularly.

Petitioned repairs were accomplished on JD 49 in 1984. The repair included: Cleaning of the system and a redetermination of benefits of the system.

In 2002 the County Highway department petitioned to replace a Sterling Township Bridge with dual 10-foot by 14-foot box culverts crossing at 103rd street. The petition was granted.

ABANDONMENT

Branch 3 Tile of the original system was abandoned in 2012.

IMPROVEMENT TO SURROUNDING SYSTEMS

The JD 49 system serves as the outlet for Judicial Ditch No. 38 (1,641-acre watershed) which was improved in 2014. The improvement included installation of 5,485-feet of tile and added a low flow weir near the outlet into JD 49, the existing open ditch was lowered to serve as a sediment basin for the system.

SYSTEM INVENTORY

This document has been prepared using the original JD 49 drawings and alignment maps provided by Blue Earth County, a drone survey completed by ISG in July of 2020, topographical survey completed by ISG in December of 2020 and January of 2021, LiDAR contours, Minnesota Department of Natural Resources (DNR) Watershed lines, and aerial photographs. A map illustrating the JD 49 system can be found in the Repair Plans.

An inventory of items needing repair was accomplished for JD 49 using the results of the drone flight and topographical survey. That inventory has been presented in tabular form below.

TABLE 1. DITCHES

Ditch Description	Location	ACSIC Cross-section	Present Cross-section	Condition	Concerns
Mainline	SE ¼ SE ¼ of Section 31 to NE ¼ SE ¼ of Section 31	Bot: 6', Side Slopes: 1X1.5	Bot: 4', Side Slopes: 1X2	Poor	Sloughed side slopes, sediment deposition
	NE ¼ SE ¼ of Section 31 to SE ¼ NE ¼ of Section 31	Bot: 8', Side Slopes: 1X1.5	Bot: 6', Side Slopes: 1X1.5	Poor	Sloughed side slopes, sediment deposition
	SE ¼ NE ¼ of Section 31 to NW ¼ NE ¼ of Section 31	Bot: 8', Side Slopes: 1X2	Bot: 6', Side Slopes: 1X1.5	Poor	Sloughed side slopes, sediment deposition
	NW ¼ NE ¼ of Section 31 to SW ¼ SE ¼ of Section 30	Bot: 10', Side Slopes: 1X2	Bot: 6', Side Slopes: 1X2	Poor	Sloughed side slopes, sediment deposition
	SW ¼ SE ¼ of Section 30 to SE ¼ NW ¼ of Section 30	Bot: 10', Side Slopes: 1X1.5	Bot: 7', Side Slopes: 1X2	Poor	Sloughed side slopes, sediment deposition
	SE ¼ NW ¼ of Section 30 to SW ¼ NW ¼ of Section 19	Bot: 12', Side Slopes: 1X1.5	Bot: 11', Side Slopes: 1X1.5	Poor	Sloughed side slopes, sediment deposition
	SW ¼ NW ¼ of Section 19 to NW ¼ NW ¼ of Section 19	Bot: 12', Side Slopes: 1X2	Bot: 14', Side Slopes: 1X1.5	Poor	Sloughed side slopes, sediment deposition
	NW ¼ NW ¼ of Section 19 to NW ¼ SW ¼ of Section 18	Bot: 15', Side Slopes: 1X2	Bot: 13', Side Slopes: 1X2	Poor	Sloughed side slopes, sediment deposition, heavy vegetation
	NW ¼ SW ¼ of Section 18 to SW ¼ NW ¼ of Section 16	Bot: 15', Side Slopes: 1X1.5	Bot: 11', Side Slopes: 1X2	Poor	Sloughed side slopes, sediment deposition, heavy vegetation

TABLE 2. CULVERTS

Crossing Description	Location	ACSIC Size	Present Size	Condition	Concerns
Mainline 119 th Street	NW ¼ SE ¼ of Section 17 of Sterling Township	Dual 12 x 12 ft. boxes.	Same.	Poor	Sediment deposition, Unprotected banks
Mainline 542 nd Avenue	SE ¼ SE ¼ of Section 18 of Sterling Township	12 x 12 ft. box	Same	Poor	Sediment deposition, Unprotected banks
Mainline Highway 30	NW ¼ NW ¼ of Section 19 of Sterling Township	Dual 10 x 8 ft. boxes	Same	Poor	Sediment deposition, Unprotected banks
Mainline 108 th Street	NE ¼ SW ¼ of Section 30 of Sterling Township	Dual 77 ¼ x 122 in. Arches	Same	Poor	Sediment deposition, Unprotected banks
Mainline 103 rd Street	NE ¼ SE ¼ of Section 31 of Sterling Township	14 x 10 ft. box	Same	Poor	Sediment deposition, Unprotected banks

Sediment Deposition + Vegetation Growth

Deposited sediment provides an opportunity for vegetation growth in the bottom of the channel. The effects of vegetation in the ditch vary depending on the type present. Grasses in the ditch bottom, as shown in Figure 1 and Figure 2, can impede water flow leading to localized flooding during storm events. Sediment deposits along with vegetation growth can cause the ditch to meander, potentially eroding side slopes.

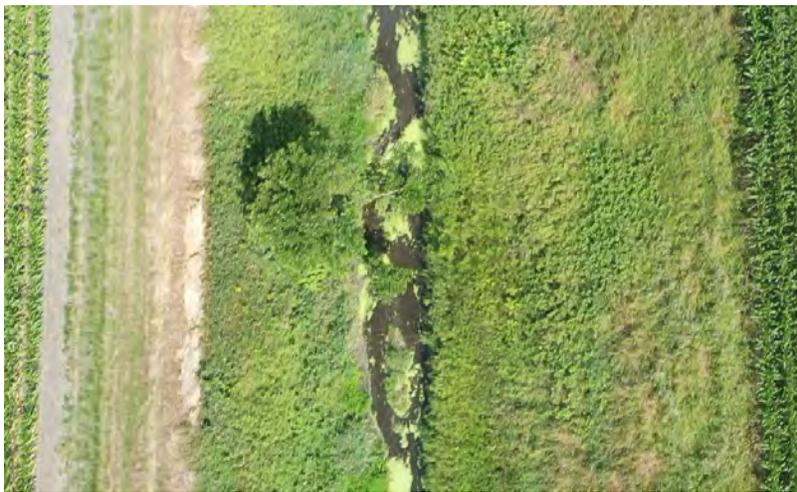


Figure 1. Vegetation in Open Ditch North of 108th Street in Section 30 of Sterling Township

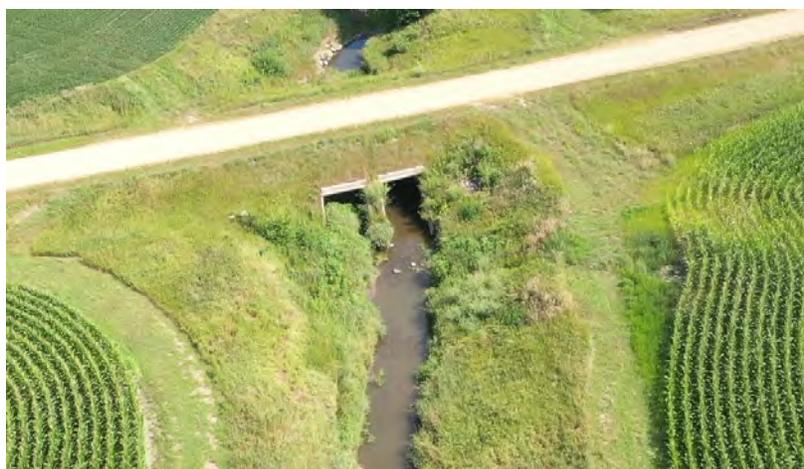


Figure 2. Vegetation Growth in Culvert Crossing across 119th Street in Section 17 of Sterling Township

Trees and Shrubs

Trees and shrubs growing in or falling into a ditch restrict flow. The trees also provide a canopy across ditch banks and buffers creating poor conditions for grasses and other native vegetation in the buffer to grow. This makes the ditch more susceptible to erosion. Perennial grass along the ditch bank and on side slopes provides dense root growth, creating stable banks and reducing erosion.

Tree removal quantities are broken up into three categories based on the conditions observed. The three categories consisted of heavy vegetative clearing, tree removal, and heavy vegetative clearing with tree removal. Vegetative clearing is usually quantified by acre, while tree removal is quantified by an estimated amount. The totals for tree and vegetative removal can be seen in Table 3. Tree and Vegetative removal. Detailed locations for all vegetation and tree removals can be found in the Repair Plans.

TABLE 3. TREE AND VEGETATIVE REMOVAL

Category	Unit	Quantity
Heavy Vegetative Clearing	AC	3.3
Tree Removal	EA	24
Heavy Vegetative Clearing with Tree removal	AC	3.0

Heavy vegetative clearing with tree removal is used in areas with dense tree cover, canopy coverage, and large diameter trees. Tree removal is utilized in areas that have large diameter trees in isolated groups along the ditch banks. Heavy vegetative clearing is applied in areas where

smaller trees and shrubs are encountered sporadically along the ditch. Trees will be removed within the channel of the ditch and within the 1-rod buffer and construction easement. Examples follow in Figure 3 and Figure 4.



Figure 3. Heavy Vegetative Clearing with Tree Removal Area Located West of 542nd Avenue in the Southwest quarter of Section 18 of Sterling Township



Figure 4. Tree Removal in Section 30 of Sterling Township

Outlets + Intakes

All tile outlets into the open ditch will be replaced or repaired as part of this project. Some of the tile outlets are in good shape and only require riprap protection on geotextile fabric; however some tiles are bent, broken, covered or completely washed away causing erosion to the ditch banks. The repair of damaged tiles will consist of replacing the outlets into the ditch with a section of new tile. Figure 5 and Figure 6 show examples of the unprotected tile within JD 49.



Figure 5. Unprotected Tile Draining into the Main Open Ditch



Figure 6. Collapsed Tile into the Main Open Ditch

Sloughing

Sloughing occurs when the bank of a ditch shears and collapses into the ditch. Causes of sloughing include overland flow overtopping the ditch bank, lack of buffer vegetation, steep side slopes, and meandering of the ditch. When sloughing occurs, it deposits sediment in the ditch restricting flow. Sloughing was identified at various locations along the ditches in JD 49. Figure 7 shows severe sloughing.

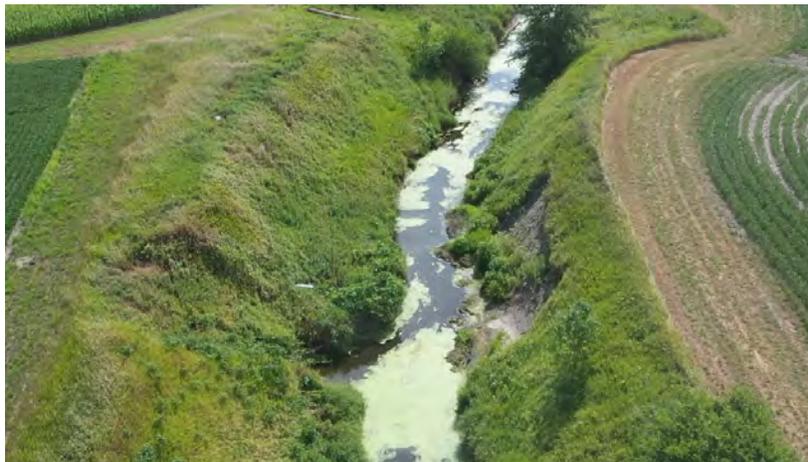


Figure 7. Sloughing along open ditch in the Southeast Quarter of Section 18 in Sterling Township

Ditch Bank Erosion

Gully erosion (natural side inlets or field drainageway inlets) through the banks of the ditch were identified in a number of locations. These uncontrolled inlets become the avenue for sediment disposition in the ditch. Gully erosion occurs when runoff becomes concentrated and cuts through the ditch bank. Gully erosion can be seen in Figure 8. Sheet erosion is also present on the ditch. The sheet erosion is due to the lack of a buffer and the water runs over the banks and washes the sediment into the ditch.



Figure 8. Gully Erosion in the Southeast Quarter of Section 18 in Sterling Township

Field + Road Crossings

Crossings throughout the ditch system were found to be in varying levels of unmaintained and unprotected. The crossings within the system have lacked maintenance, have strong sediment accumulation, and unprotected banks. Figure 9 shows an example of a culvert at a road crossing needing repair (clean out) and protection.



Figure 9. Constricted Road Crossing on 119th Street on the Main Open Ditch

Capacity Analysis

The capacity of agricultural drainage conveyance infrastructure (ditch or tile) is expressed as a drainage coefficient in inches per day (in/day); the depth of water over the entire area of the upstream watershed that a ditch, tile, or culvert can drain in 24-hours. For a ditch system like JD 49, a drainage coefficient of 1.0 in/day is recommended, the present repair must not exceed the capacity of the As Constructed or Subsequently Improved Condition (ACSIC) of the system established in the original design. The drainage coefficients for JD 49 were calculated based on the ACSIC culvert crossings. Table 4 summarizes the maximum capacity (drainage coefficient) of the culverts throughout the watershed as if they were in new condition with no sediment accumulation or blockages. The culverts were evaluated for drainage coefficients as well as their condition.

TABLE 4. CULVERT CROSSINGS

Crossing # on Map	Station	Roadway	Existing Type	Existing Material	Existing Width (ft)	Existing Height (ft)	Existing Rise x Span (in)	Existing Slope (%)	Drainage Area (Acres)	Existing Drainage Coefficient (in/day)
1	22+50	119th Street	BOX CULVERT DUAL	RCP	12	12	-	0.12%	16435	4.17
2	67+25	542nd Avenue	BOX CULVERT	RCP	12	12	-	0.30%	15661	3.46
3	157+50	Highway 30	BOX CULVERT DUAL	RCP	10	8	-	0.45%	12422	4.99
4	227+00	108th Street	ARCH CULVERT DUAL	RCP	-	-	77 1/4 x 122	1.01%	5293	8.27
5	290+00	103rd Street	BOX CULVERT	RCP	14	10	-	0.04%	4358	4.50

The culverts within the JD 49 watershed are above the 1.0 in/day drainage coefficient.

It should be noted that the ACSIC ditch culvert capacities listed in Table 4 are functioning as originally designed. The actual operating capacities may be less due to the majority of the culverts within JD 49 having large sediment accumulation, restricting the flow through the ditch. A portion of the repair will consist of removing the existing sediment within the culvert crossings.

REPAIRS

EROSION CONTROL

Required temporary erosion control will consist of silt fence or bio-roll around all surface intakes and ditches until vegetation is established. The temporary erosion control will be maintained throughout the construction process according to the Minnesota Pollution Control Agency (MPCA) regulations.

Permanent erosion control will consist of riprap around all tile outlets into ditches as necessary, as well as at the upstream and downstream end of ditch culvert crossings. Seeding and erosion control blanket will be placed on all disrupted areas around road crossings. All disturbed vegetation throughout the project will be reseeded with the appropriate seed mix and mulch.

Ditch Repair

DITCH CLEANING AND WIDENING

For ditch systems like JD 49, cleaning is recommended every 8 to 10 years. The majority of the ditch has accumulated sediment in the channel bottom above the ACSIC grade. The accumulated sediment has led to vegetation growth. It has also caused the flow channel to meander causing slope erosion.

This drainage project proposes to repair Blue Earth/Faribault Judicial Ditch No. 49 by cleaning 18,581 linear feet of mainline open ditch. Also, the project proposes to widen 8,739 linear feet of mainline open ditch for bank stability. See Table 5 for lengths of cleaning and Table 6 for lengths for ditch widening.

TABLE 5. DITCH CLEANING

Ditch Description	From	To	Length (ft)	Bottom Width (ft)
Mainline	64+00	82+50	1,850	15
	83+73	113+75	3,002	15
	123+25	153+20	2,995	15
	158+75	162+25	350	15
	168+55	172+95	440	15
	173+90	188+45	1,455	12
	196+50	233+70	3,720	12
	235+75	242+27	652	10
	243+18	260+75	1,757	10
	295+75	302+25	650	8
	311+40	315+75	435	8
315+75	328+50	1,275	6	

TABLE 6. DITCH WIDENING

Ditch Description	From	To	Length (ft)	Bottom Width (ft)
Mainline	51+25	64+00	1,275	15
	113+75	123+25	950	15
	153+20	158+75	555	15
	162+25	168+55	630	15
	188+45	196+50	805	12
	233+70	235+75	205	12
	260+75	285+75	2,500	10
	285+75	295+75	1,000	8
	302+25	305+14	289	8
	306+10	315+75	530	8

TREE REMOVAL

Trees, brush, and shrubs were identified along the banks of the ditches throughout the watershed. To prevent future erosion of the ditch banks the present repair will include removing these obstructions. An estimated 3.3 acres of heavy vegetation removal, 24 tree removals, and approximately 3.0 acres of heavy vegetation removal with tree removal. Removals will be predicated on the condition of the vegetation along the ditch banks at time of construction, increasing the amounts in the estimates.

DITCH SIDESLOPE REPAIRS

The drone and topographical survey revealed significant ditch slope sloughing and erosion throughout the entire ditch system. Repairs will include reestablishing a stable ditch bank where a slough or erosion has occurred as well as seeding the repaired area. This will be accomplished by reestablishing existing sediment onto the slopes of the ditch when possible. In the proposed repair the side slopes will be repaired by flattening the slopes of the ditch to create stable bank slopes to prevent future damage. For severe cases of sloughing, rip rap with geotextile fabric at the toe of the ditch will be used to prevent further deterioration of the banks. It is estimated that there is approximately 6,475 linear feet of slough repair necessary on the system. Additional ditch sideslope repairs may be necessary based on the condition of the banks at the time of construction.

TILE OUTLET REPAIR

All tile outlets entering the ditch will be replaced or repaired as part of this project. Some of the tile outlets are in good shape and only require riprap protection. However, some tiles are bent, broken, or completely washed away causing erosion to the ditch banks. The repair of a damaged tile outlet will consist of replacing it with a section of new tile and placing riprap protection per the detail found in the Repair Plans.

ALTERNATIVE SIDE INLETS AS REPAIR

Early ditch systems were designed to allow water to enter the ditch by sheet flow or, as flows were concentrated, via field drainageways. However, the latter would allow for head cutting (erosion along the drainageways) up into the field. To remedy the head cutting, the original (traditional) side inlet (“side inlet control” per Chapter 103E) was designed as a pipe from the field through the ditch berm to the ditch. While this eliminated the head cutting, any sediment laden water from the surrounding field was allowed to go directly through the pipe to the ditch.

Recently, Alternative Side Inlets (ASI) have been proposed for locations along the ditch where concentrated flows are encountered. While there are a number of different types of ASIs, they all are designed to reduce sediment transport from the field to the ditch. They are characterized by two things: 1. temporary ponding of water to settle out sediment (using one of many different intakes including rock filters), and 2. energy dissipation (some using drop structures and others by use of rock filters or rock weirs).

There are two types of ASI’s that are proposed for the present project: an ASI or Alternative Side Inlet with Riprap Overflow (ASIRO). Both types have their intakes located as completely in the ditch buffer as possible to reduce potential damage during field operations. The ditch berm with or without riprap, along with a restricted intake, creates a temporary pond. When large concentrations of flow are coming to a particular ASI, rip rap will be used to form an emergency overflow, creating an ASIRO. Sediment and field residue that accumulates around the ASI’s intake will need to be removed periodically. There are 12 ASI’s slated for installation during the present repair project. Additional ASI’s may be necessary as construction progresses.

See Repair Plans for ASI and ASIRO details.

CULVERT CROSSINGS

JD 49 has 5 culvert crossings which need to be cleaned and protected with rip rap (See Table 2. Culverts). The existing culverts have sufficient capacity for a system like JD 49. It is proposed to clean out the sediment that has accumulated within the culverts that have begun to restrict flow and cause partial vegetation growth within the crossings. All culverts will be protected upstream and downstream per the details in the Repair Plans to prevent ditch bank erosion.

TABLE 7. DITCH CULVERT CROSSINGS – REPAIR ACTIONS

Crossing Description	Location	Concerns (From Table 2)	Repair Action
Mainline 119 th Street	38+50	Sediment Accumulation, Unprotected Banks	Clean and Place Rip Rap along Banks
Mainline 542 nd Avenue	83+00	Sediment Accumulation, Unprotected Banks	Clean and Place Rip Rap along Banks
Mainline Highway 30	173+50	Sediment Accumulation, Unprotected Banks	Clean and Place Rip Rap along Banks
Mainline 108 th Street	242+50	Sediment Accumulation, Unprotected Banks	Clean and Place Rip Rap along Banks
Mainline 103 rd Street	305+50	Sediment Accumulation, Unprotected Banks	Clean and Place Rip Rap along Banks

REPAIR COST ESTIMATE - SUMMARY

The proposed repair will bring the system back to its As Constructed or Subsequently Improved Condition. Table 8 summarizes the cost of the repair project. Detailed cost estimates are included in Appendix D.

Other Project Related Costs

All drainage projects have indirect costs that must be accounted for in project cost estimates and used in cost benefit analyses. They include costs related to drainage authority administration; topographic survey; reports, plans and specifications; and construction staking and administration. Along with a 10% (of total cost) contingency line item to cover unforeseen items. The temporary damages costs cover any damages or loss of crops because of the project construction. The land acquisition/permanent damages cost covers loss of crop land due to ditch widening. The county administration costs are an estimate of the total cost for hearings and meetings required for the project. The survey, staking, and constructions administration costs are estimates for the total costs of constructing the project. The reports and plans cost are an estimate of the total engineering costs for the project.

Cost Estimates

Unit prices were estimated based on recent projects with similar scale and scope of work. The following tables summarize the estimated cost for each option of the proposed repair of the system.

TABLE 8. PRELIMINARY COST ESTIMATES

Area	Repair Cost
Mainline Open Ditch	\$ 1,402,227
Total Cost	\$ 1,402,227

The total repair cost for JD 49 is approximately \$1,402,227. An Additional cost for buffer strip acquisition is included in the cost estimate because of the widening of the ditch in certain locations, this amount 0.52 acres and a total cost of \$3,374.

SUMMARY OF FINDINGS, CONCLUSIONS, + RECOMMENDATIONS

The current condition of Judicial Ditch No. 49 shows that repairs are necessary for the system to operate correctly. Ditch banks with heavy vegetation and tree growth have caused lack of natural grasses in ditch banks and buffer areas leading to unstable side slopes and sediment accumulation within the ditch. An extensive amount of damaged ditch side slopes has been found within the system that have also increased the amount of sediment within the ditch bottom, reducing the efficiency of the system. All these lead to the heavy amount of sedimentation in the ditch channel which promotes vegetation growth within the ditch bottom.

The repairs needed in the JD 49 system aim on creating stable bank slopes and reducing the amount of sediment that is deposited into the ditch channel. The heavy vegetation and trees will be removed from the system and replaced with native grasses. The side slopes will be repaired by flattening the side slopes to create stable bank channels. Existing tile outlets into the ditch will place protective rip rap to minimize the amount of erosion that occurs from the outlet. The ditch will be cleaned to remove the excess sedimentation that has built up from the legal grade of the ditch along the specified areas along the ditch. The preliminary cost estimate for this project is \$1,402,227.

Based on the findings of the drone and topographical survey, the proposed project is necessary and should follow the repair items outlines in this report to restore the system back to the original function and capacity.

In accordance with Section 103E.715 REPAIR BY PETITION, Subd. 2, Whereas the engineer has ascertained the As Constructed or Subsequently Improved Condition (ACSIC) of the System, and whereas the engineer has shown the necessary repairs, and whereas the engineer has shown the proposed repair to be of public utility, benefit, and welfare per Section 103E.015, Subd. 2, and whereas the engineer has provided estimated costs of the repairs, and whereas the engineer has, on behalf of the drainage authority, investigated potential external sources of funds and

technical assistance, and whereas the engineer has provided plans for the repair, therefore the engineer recommends the proposed repair project to the Drainage Authority for approval.

Appendix A: Preliminary Repair Plans

BLUE EARTH COUNTY JUDICIAL DITCH No. 49 REPAIR



BLUE EARTH COUNTY, MINNESOTA

PRELIMINARY PLANS

ISG PROJECT # 20-24339



**BLUE EARTH
COUNTY**

NOTE:
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PROJECT

**BLUE EARTH
COUNTY
JUDICIAL DITCH
No. 49 REPAIRS**

BLUE EARTH COUNTY MINNESOTA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

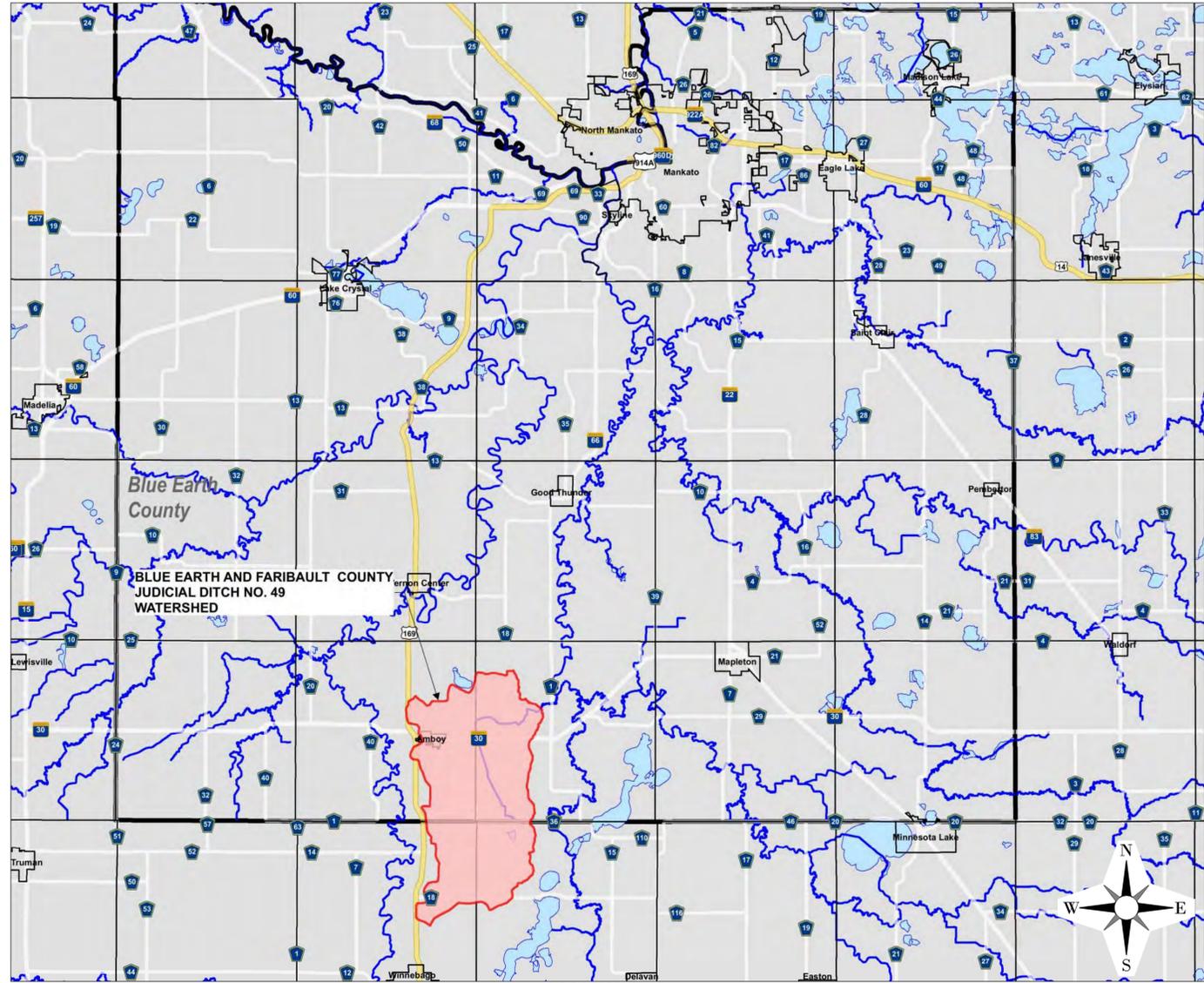
PROJECT NO.	20-24339
FILE NAME	24339 TITLE
DRAWN BY	KJH
DESIGNED BY	KBW
REVIEWED BY	CJB
ORIGINAL ISSUE DATE	--/--
CLIENT PROJECT NO.	20-24339

TITLE
TITLE

SHEET
1
OF 36

LEGEND

- EXISTING**
- WATERSHED BOUNDARY
 - CITY LIMITS
 - SECTION LINE
 - QUARTER SECTION LINE
 - RIGHT OF WAY LINE
 - PROPERTY / LOTLINE
 - EASEMENT LINE
 - ACCESS CONTROL
 - WATER EDGE
 - WETLAND BOUNDARY
 - FENCE LINE
 - EXISTING OPEN DITCH
 - CULVERT
 - TILE
 - PRIVATE TILE
 - WATER
 - GAS
 - OVERHEAD ELECTRIC
 - UNDERGROUND ELECTRIC
 - UNDERGROUND TELEPHONE
 - UNDERGROUND TV
 - OVERHEAD UTILITY
 - UNDERGROUND UTILITY
 - UNDERGROUND FIBER OPTIC
 - CONTOUR (MAJOR)
 - CONTOUR (MINOR)
 - DECIDUOUS TREE
 - CONIFEROUS TREE
 - TREE LINE
 - DROP INTAKE
 - HYDRANT
 - POWER POLE
- PROPOSED**
- EASEMENT
 - PROPOSED OPEN DITCH
 - OPEN DITCH REPAIR
 - CULVERT (RCP)
 - CULVERT (CMP)
 - CULVERT (HDPE)
 - TILE
 - TILE (PIPE WIDTH)
 - PRIVATE TILE
 - WATER
 - GAS
 - OVERHEAD ELECTRIC
 - UNDERGROUND ELECTRIC
 - UNDERGROUND TV
 - CONTOUR (MAJOR)
 - CONTOUR (MINOR)
 - DROP INTAKE
 - SLOUGH REPAIR
 - SPOIL PLACEMENT
 - TREE CLEARING
 - REMOVE TREE
 - BUFFER



LOCATION MAP

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| 10 | TYPICAL DETAILS | | |
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| 12 | PLAN - PROFILE MAINLINE | | |
| 13 | PLAN - PROFILE MAINLINE | | |
| 14 | PLAN - PROFILE MAINLINE | | |
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| 21 | PLAN - PROFILE MAINLINE | | |
| 22 | PLAN - PROFILE MAINLINE | | |
| 23 | PLAN - PROFILE MAINLINE | | |
| 24 | PLAN - PROFILE MAINLINE | | |
| 25 | CROSS SECTIONS MAINLINE | | |
| 26 | CROSS SECTIONS MAINLINE | | |
| 27 | CROSS SECTIONS MAINLINE | | |

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PROJECT GENERAL NOTES

- ALL WORK SHALL CONFORM TO THE CONTRACT DOCUMENTS, WHICH INCLUDE, BUT ARE NOT LIMITED TO, THE OWNER - CONTRACTOR AGREEMENT, THE PROJECT MANUAL (WHICH INCLUDES GENERAL SUPPLEMENTARY CONDITIONS AND SPECIFICATIONS), DRAWINGS OF ALL DISCIPLINES AND ALL ADDENDA, MODIFICATIONS AND CLARIFICATIONS ISSUED BY THE ARCHITECT/ENGINEER.
- CONTRACT DOCUMENTS SHALL BE ISSUED TO ALL SUBCONTRACTORS BY THE GENERAL CONTRACTOR IN COMPLETE SETS IN ORDER TO ACHIEVE THE FULL EXTENT AND COMPLETE COORDINATION OF ALL WORK.
- WRITTEN DIMENSIONS TAKE PRECEDENCE OVER SCALED DIMENSIONS. NOTIFY ARCHITECT/ENGINEER OF ANY DISCREPANCIES OR CONDITIONS REQUIRING INFORMATION OR CLARIFICATION BEFORE PROCEEDING WITH THE WORK.
- FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS. NOTIFY ARCHITECT/ENGINEER OF ANY DISCREPANCIES OR CONDITIONS REQUIRING INFORMATION OR CLARIFICATION BEFORE PROCEEDING WITH THE WORK.
- DETAILS SHOWN ARE INTENDED TO BE INDICATIVE OF THE PROFILES AND TYPE OF DETAILING REQUIRED THROUGHOUT THE WORK. DETAILS NOT SHOWN ARE SIMILAR IN CHARACTER TO DETAILS SHOWN, WHERE SPECIFIC DIMENSIONS, DETAILS OR DESIGN INTENT CANNOT BE DETERMINED, NOTIFY ARCHITECT/ENGINEER BEFORE PROCEEDING WITH THE WORK.
- ALL MANUFACTURED ARTICLES, MATERIALS AND EQUIPMENT SHALL BE APPLIED, INSTALLED, CONNECTED, ERECTED, CLEANED AND CONDITIONED ACCORDING TO MANUFACTURERS' INSTRUCTIONS. IN CASE OF DISCREPANCIES BETWEEN MANUFACTURERS' INSTRUCTIONS AND THE CONTRACT DOCUMENTS, NOTIFY ARCHITECT/ENGINEER BEFORE PROCEEDING WITH THE WORK.
- ALL DISSIMILAR METALS SHALL BE EFFECTIVELY ISOLATED FROM EACH OTHER TO AVOID GALVANIC CORROSION.
- THE LOCATION AND TYPE OF ALL INPLACE UTILITIES SHOWN ON THE PLANS ARE FOR GENERAL INFORMATION ONLY AND ARE ACCURATE AND COMPLETE TO THE BEST OF THE KNOWLEDGE OF I & S GROUP, INC. (ISG). NO WARRANTY OR GUARANTEE IS IMPLIED. THE CONTRACTOR SHALL VERIFY THE SIZES, LOCATIONS AND ELEVATIONS OF ALL INPLACE UTILITIES PRIOR TO CONSTRUCTION. CONTRACTOR SHALL IMMEDIATELY NOTIFY ENGINEER OF ANY DISCREPANCIES OR VARIATIONS FROM PLAN.
- THE CONTRACTOR IS TO CONTACT "GOPHER STATE ONE CALL" FOR UTILITY LOCATIONS, MINIMUM 2 BUSINESS DAYS PRIOR TO ANY EXCAVATION / CONSTRUCTION (1-800-252-1166).

PROJECT INDEX:

OWNER:
**BLUE EARTH COUNTY
DRAINAGE AUTHORITY
204 S. FIFTH STREET
P.O. BOX 8606
MANKATO, MN 56001
PH: 507.304.4253**

**PROJECT
ADDRESS / LOCATION:**
**SECTION 13, SHELBY TWP.
SECTIONS 16-19/30-32,
STERLING TWP.
BLUE EARTH COUNTY, MINNESOTA**

MANAGING OFFICE:

**MANKATO OFFICE
115 EAST HICKORY STREET
SUITE 300
MANKATO, MN 56001
PHONE: 507.387.6651**
**PROJECT MANAGER: CHUCK BRANDEL
EMAIL: CHUCK.BRANDEL@ISGNC.COM**

SPECIFICATIONS REFERENCE
ALL CONSTRUCTION SHALL COMPLY WITH THE BLUE EARTH COUNTY REQUIREMENTS AND MDDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION, 2018 EDITION, AND THE STANDARD SPECIFICATIONS FOR SANITARY SEWER, STORM DRAIN AND WATERMAIN AS PROPOSED BY THE CITY ENGINEERS ASSOCIATION OF MINNESOTA 2013, UNLESS DIRECTED OTHERWISE.
PROJECT DATUM
HORIZONTAL COORDINATES HAVE BEEN REFERENCED TO THE NORTH AMERICAN DATUM OF 1983 (NAD83), 1986 ADJUSTMENT (NAD83(1996)) ON THE BLUE EARTH COUNTY COORDINATE SYSTEM, IN U.S. SURVEY FEET.
ELEVATIONS HAVE BEEN REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
RTK GPS METHODS WERE USED TO ESTABLISH HORIZONTAL AND VERTICAL COORDINATES FOR THIS PROJECT.

B.M. ELEVATION = XXXX.XX
TOPOGRAPHIC SURVEY
THIS PROJECT'S TOPOGRAPHIC SURVEY CONSISTS OF DATA COLLECTED IN DECEMBER, 2020 BY ISG.



BLUE EARTH COUNTY

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PRELIMINARY NOT FOR CONSTRUCTION
CHARLES J. BRANDEL

DATE: _____ LIC. NO. 43359

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PROJECT
BLUE EARTH COUNTY
JUDICIAL DITCH
No. 49 REPAIRS
BLUE EARTH COUNTY MINNESOTA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	20-24339
FILE NAME	24339 DETAILS
DRAWN BY	KJH
DESIGNED BY	KBW
REVIEWED BY	CJB
ORIGINAL ISSUE DATE	--/--
CLIENT PROJECT NO.	20-24339

TITLE
ESTIMATED QUANTITIES AND SCHEDULES

TOTAL ESTIMATED QUANTITIES			
Item Code	Item	Unit	Estimated Quantity
01.7113.1000.01	MOBILIZATION	LS	1
31.1100.1000.02	TREE REMOVAL	EA	24
31.1100.1000.10	HEAVY VEGETATIVE CLEARING	AC	3.3
31.1100.1000.10	HEAVY VEGETATIVE CLEARING WITH TREE REMOVAL	AC	3
31.2311.1000.03	DITCH CLEANING (15' WIDE DITCH BOTTOM)	LF	8637
31.2311.1000.03	DITCH CLEANING (12' WIDE DITCH BOTTOM)	LF	5175
31.2311.1000.03	DITCH CLEANING (10' WIDE DITCH BOTTOM)	LF	2409
31.2311.1000.03	DITCH CLEANING (8' WIDE DITCH BOTTOM)	LF	1085
31.2311.1000.03	DITCH CLEANING (6' WIDE DITCH BOTTOM)	LF	1275
31.3700.1000.07	CLASS III RIPRAP WITH GEOTEXTILE FABRIC	CY	1448
31.2311.1000.03	CULVERT CLEANING	EA	5
31.2311.1000.03	DITCH WIDENING (15' WIDE DITCH BOTTOM)	LF	3410
31.2311.1000.03	DITCH WIDENING (12' WIDE DITCH BOTTOM)	LF	1010
31.2311.1000.03	DITCH WIDENING (10' WIDE DITCH BOTTOM)	LF	2500
31.2311.1000.03	DITCH WIDENING (8' WIDE DITCH BOTTOM)	LF	1819
31.2311.1000.03	DITCH SIDESLOPE REPAIR	LF	6475
31.3700.1000.07	CLASS III RIPRAP WITH GEOTEXTILE FABRIC (FOR ASIRO)	CY	150
31.2500.1000.03	INSTALL FLOATATION SILT CURTAIN	LF	20
32.9219.1000.10	16.5' BUFFER STRIP SEEDING	AC	20.7
32.9219.1000.10	SIDESLOPE SEEDING	AC	12.55
32.9219.1000.10	MOWING	AC	41.4
32.9219.1000.10	WEED SPRAYING	AC	53.95
33.0513.1000.02	INSTALL 24-INCH ASI RISER ASSEMBLY W/TRASH GRATE	EA	1
33.0513.1000.02	INSTALL 18-INCH ASI RISER ASSEMBLY W/TRASH GRATE	EA	2
33.0513.1000.02	INSTALL 15-INCH ASI RISER ASSEMBLY W/TRASH GRATE	EA	1
33.0513.1000.02	INSTALL 12-INCH ASI RISER ASSEMBLY W/TRASH GRATE	EA	2
33.0513.1000.02	INSTALL 10-INCH ASI RISER ASSEMBLY W/TRASH GRATE	EA	2
33.0513.1000.02	INSTALL 8-INCH ASI RISER ASSEMBLY W/TRASH GRATE	EA	3
33.0513.1000.02	INSTALL 8-INCH ASI RISER ASSEMBLY W/STANDARD	EA	1
33.0513.1000.02	INSTALL 24-INCH ASI OUTLET ASSEMBLY	EA	3
33.0513.1000.02	INSTALL 15-INCH ASI OUTLET ASSEMBLY	EA	1
33.0513.1000.02	INSTALL 12-INCH ASI OUTLET ASSEMBLY	EA	2
33.0513.1000.02	INSTALL 10-INCH ASI OUTLET ASSEMBLY	CY	3
33.0513.1000.02	INSTALL 8-INCH ASI OUTLET ASSEMBLY	EA	3
33.4510.1000.02	54-INCH TILE OUTLET	EA	1
33.4510.1000.02	42-INCH TILE OUTLET	EA	2
33.4510.1000.02	36-INCH TILE OUTLET	EA	2
33.4510.1000.02	30-INCH TILE OUTLET	EA	3
33.4510.1000.02	24-INCH TILE OUTLET	EA	4
33.4510.1000.02	18-INCH TILE OUTLET	EA	19
33.4510.1000.02	15-INCH TILE OUTLET	EA	8
33.4510.1000.02	12-INCH TILE OUTLET	EA	7
33.4510.1000.02	10-INCH TILE OUTLET	EA	4
33.4510.1000.02	8-INCH TILE OUTLET	EA	10
33.4510.1000.02	ARMOR TILE OUTLET (RIPRAP & GEOTEXTILE FABRIC)	EA	67
31.2311.1000.03	REMOVE EXISTING WOODEN BRIDGE	EA	1

ALTERNATIVE SIDE INLET (ASI)								
ID	Description		Bid Item			Bid Item		
	BRANCH (LOCATION)	STATION	INTAKE TYPE	RISER SIZE (in)	RISER DEPTH (LF)	OUTLET SIZE (in)	OUTLET LENGTH (LF)	OUTLET GRADE (%)
1	Main (N)	65+97	Trash Grate	12	9	12	50	2.00%
2	Main (S)	71+15	Trash Grate	8	9	8	40	2.00%
3	Main (S)	78+40	Trash Grate	12	11	12	90	2.00%
4	Main (N)	103+23	Trash Grate	8	15	10	90	2.00%
5	Main (N)	106+69	Trash Grate	10	15	10	80	2.00%
6	Main (E)	175+41	Trash Grate	18	4	24	30	2.00%
7	Main (E)	275+00	Trash Grate	18	4	24	60	2.00%

ALTERNATIVE SIDE INLET W/RIPRAP (ASIRO)									
ID	Description		Bid Item			Bid Item			Bid Item
	BRANCH (LOCATION)	STATION	INTAKE TYPE	RISER SIZE (in)	RISER DEPTH (LF)	OUTLET SIZE (in)	OUTLET LENGTH (LF)	OUTLET GRADE (%)	
1	Main (S)	46+42	Trash Grate	15	6	15	50	2.00%	30
2	Main (S)	59+79	Trash Grate	24	9	24	30	2.00%	30
3	Main (S)	92+35	Trash Grate	8	13	8	50	2.00%	30
4	Main (N)	95+85	Standard Riser	8	15	8	70	2.00%	30
5	Main (S)	99+26	Trash Grate	10	11	10	30	2.00%	30
Total (CY)									150

EXISTING CULVERT CLEANING SCHEDULE								
ID	LOCATION			DESCRIPTION				TOTAL LF
	BRANCH (LOCATION)	CROSSING	STATION	TYPE	SIZE	LENGTH	NUMBER	
1	MAIN	CSAH 29	38+50	RC BOX	12'x12'	105	1	105
2	MAIN	COUNTY ROAD 150	83+00	RC BOX	12'x12'	122	1	122
3	MAIN	MNTH 30	173+50	RC BOX	10'x8'	98	2	196
4	MAIN	COUNTY ROAD 148	242+75	RCP ARCH	11'x7'	90	2	180
5	MAIN	103RD STREET	305+75	RC BOX	14'x10'	97	1	97
Total (LF)								700

CULVERT CLEANING SHALL BE PAID FOR BY THE LF, REGARDLESS OF CULVERT TYPE OR SIZE. THE TOTAL LF IS ESTIMATED AND SHALL BE ADJUSTED BASED ON SITE CONDITIONS.
ANY MATERIAL PLACED FROM THE CLEANING OF THE CULVERT SHALL BE COORDINATED WITH THE ENGINEER PRIOR TO PLACEMENT. APPROVED MATERIALS MAY PLACED WITHIN THE BUFFER STRIP.
ALL EXISTING CULVERT BARRELS, SECTIONS, END SECTIONS, AND APRONS SHALL BE PROTECTED.

RIPRAP Schedule											
ID	BRANCH (LOCATION)	CROSSING	STATION	Upstream			Downstream				
				MnDOT RIPRAP Size	Length (FT)	Width (FT)	Volume (CY)	MnDOT RIPRAP Size	Length (FT)	Width (FT)	Volume (CY)
1	Main	CSAH 29	38+50	Class III	60	50	167	Class III	60	50	167
2	Main	County Road 150	83+00	Class III	54	50	150	Class III	48	44	117
3	Main	MNTH 30	173+50	Class III	60	50	167	Class III	60	50	167
4	Main	County Road 148	242+75	Class III	60	46	153	Class III	60	40	133
5	Main	103rd Street	305+75	Class III	60	38	127	Class III	56	32	100
Total (CY)											1447

GENERAL PROJECT NOTES:

- DURING CONSTRUCTION, CONTRACTOR SHALL MAINTAIN A DRAINAGE OUTLET FOR THE ENTIRE JD 49 PROJECT AREA.
- ALL PIPE DIMENSIONS REFERENCED IN THE PLANS REFER TO THE INSIDE DIAMETER.
- RODENT GUARDS SHALL BE INSTALLED ON ALL OUTLETS 18" AND SMALLER. (INCIDENTAL TO RESPECTIVE BID ITEMS).
- ALL ROAD SIGNAGE, COORDINATION, AND TRAFFIC CONTROL SIGNAGE SHALL BE INCIDENTAL TO ROAD RESTORATIONS.
- THE CONTRACTOR SHALL SUBMIT A WINTER CONSTRUCTION PLAN FOR SITE STABILIZATION, EROSION PREVENTION, AND SEDIMENT CONTROL IF THE PROJECT IS NOT COMPLETED BY OCTOBER 15 OF THE GIVEN CONSTRUCTION SEASON. UNLESS APPROVED BY THE ENGINEER. THE PLAN SHALL BE DEVELOPED TO SPECIFICALLY ADDRESS SHUTDOWN PROCEDURES OR ACTIVE CONSTRUCTION PLANS.
- ALL DEWATERING FOR THE PROJECT IS INCIDENTAL.
- PRODUCT MATERIAL SHALL BE AS SPECIFIED IN THE PLANS. IF NO SPECIFIC MATERIAL IS CALLED OUT, MATERIAL SHALL CONFORM TO THE APPROVED PRODUCT LIST IN THE APPROPRIATE SPECIFICATION.
- ALL EFFORTS SHALL BE MADE DURING CONSTRUCTION TO SEPARATE SOIL TYPES. BACKFILL SHALL BE COMPACTED PRIOR TO PLACEMENT OF TOPSOIL, EXCEPT THE TOP TWO (2) FEET, FOR WHICH COMPACTION SHALL BE MINIMIZED TO THE EXTENT POSSIBLE. TOPSOIL SHALL BE PLACED TO A MINIMUM DEPTH OF 18", OR UNIFORM TO THE TOPSOIL DEPTH OF THE SURROUNDING AREA UNLESS SPECIFIED ELSEWHERE IN THE PLANS. EXCAVATED SPOILS SHALL BE SPREAD EVENLY IN CONSTRUCTION AREA AS TO NOT IMPEDE DRAINAGE. ALL EFFORTS SHALL BE MADE TO KEEP TOPSOIL ON TOP AND SEPARATED. NO TOPSOIL SHALL BE PLACED IN THE TRENCH BELOW 2' FROM EXISTING GROUND UNLESS APPROVED BY THE ENGINEER.
- ALL SPOIL LEVELING, GRADING, AND RESTORATION OF DISTURBED AREAS SHALL BE IN ACCORDANCE TO THE CONTRACT DOCUMENTS AND SHALL BE INCIDENTAL TO THE WORK.
- HEAVY VEGETATIVE CLEARING WITH TREE REMOVAL SHALL ONLY BE COMPLETED AS NECESSARY FOR SAFE CONSTRUCTION PRACTICES AND WITHIN THE ALLOWED CONSTRUCTION EASEMENT, UNLESS APPROVED BY THE ENGINEER. TREE REMOVAL AND GRUBBING SHALL BE INCIDENTAL TO HEAVY VEGETATIVE CLEARING WITH TREE REMOVAL BID ITEM.
- TREES CALLED OUT AS "REMOVE TREE" SHALL BE PAID FOR BY EACH OCCURRENCE. IF TREES ARE NOT CALLED OUT IN THE CONSTRUCTION DOCUMENTS AS REMOVE TREE, THEN THE REMOVAL SHALL BE PAID FOR BY THE ACRE AS HEAVY VEGETATIVE CLEARING WITH TREE REMOVAL.
- AGGREGATE SURFACE SHALL BE INCIDENTAL TO CROSSING OR ROAD RESTORATION.
- RIPRAP QUANTITIES ARE ESTIMATED. ADDITIONAL QUANTITY MAY BE REQUIRED BY THE ENGINEER. ALL RIPRAP QUANTITIES SHALL BE PAID BY THE CUBIC YARD INSTALLED, UNLESS RIPRAP IS INCIDENTAL TO A SEPARATE PAY ITEM. ALL EXCAVATION AND GEOTEXTILE FABRIC SHALL BE INCIDENTAL TO RESPECTIVE BID ITEM.
- ALL WORK SHALL BE DONE IN 2,500 LF SECTIONS, UNLESS APPROVED OF BY THE ENGINEER. PRIOR TO COMMENCING ON A NEW SECTION, ALL WORK IN THE PREVIOUS SECTION MUST BE COMPLETED IN ADHERENCE WITH THE CONTRACT DOCUMENTS. THE ENGINEER RESERVES THE RIGHT TO CEASE OPERATIONS AND/OR WITHHOLD PAYMENT UNTIL COMPLIANCE HAS BEEN ACHIEVED.
- EXISTING TILES THAT ARE DISTURBED DURING CONSTRUCTION SHALL BE REPAIRED AT NO COST TO THE PROJECT, UNLESS OTHERWISE SPECIFIED.
- ALL SIGNS AND MARKERS SHALL BE PROTECTED OR REMOVED AND REINSTALLED AT NO ADDITIONAL COST TO THE PROJECT, UNLESS OTHERWISE SPECIFIED. THE ENGINEER SHALL BE NOTIFIED OF ANY SIGNS OR MARKERS IN POOR CONDITION PRIOR TO REMOVAL.
- THE DRAINAGE AUTHORITY TAKES NO AUTHORITY OVER OR RESPONSIBILITY FOR ANY AND ALL PRIVATE TILE SHOWN ON THESE PLANS. PRIVATE TILE LOCATIONS HAVE BEEN SUPPLIED BY LANDOWNERS FOR USE BY THE CONTRACTOR

UTILITY NOTES:

- THE SUBSURFACE UTILITY INFORMATION IN THIS PLAN IS UTILITY LEVEL D. THE UTILITY LEVEL WAS DETERMINED ACCORDING TO THE GUIDELINES OF CI/ASCE 38-02, ENTITLED: STANDARD GUIDELINES FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA.

GENERAL OPEN DITCH NOTES:

- UNLESS OTHERWISE NOTED, CONTRACTOR SHALL LIMIT CONSTRUCTION ACTIVITY TO WITHIN A 33-FOOT WIDE AREA ALONG TOP OF DITCH ALIGNMENTS. DISTURBANCE THROUGH ROAD CROSSINGS, ROAD DITCHES, AND GRASS BUFFERS SHALL BE LIMITED TO THE TRENCH WIDTH NECESSARY FOR SAFE CONSTRUCTION PRACTICES.
- A 16.5-FOOT GRASS STRIP SHALL BE ESTABLISHED IN AREAS THAT DO NOT HAVE AN EXISTING 16.5-FOOT GRASS STRIP. FINAL SEEDING SHALL OCCUR AFTER ALL WORK HAS BEEN COMPLETED IN THE AREA AND SHALL COMPLY WITH THE CONTRACT DOCUMENTS. TEMPORARY SEEDING MAY BE REQUIRED AND SHALL BE INCIDENTAL.
- DITCH CLEANING SHALL BE PERFORMED ON THE SIDE OF THE DITCH THAT IS THE LOWEST FOR THE GREATEST DISTANCE ALONG THE OPEN DITCH SEGMENT. DITCH CLEANING SPOILS SHALL BE PLACED AND LEVELED (INCIDENTAL) WITHIN THE 16.5-FOOT WIDE GRASS STRIP FROM THE TOP OF DITCH SLOPE UNLESS OTHERWISE DETERMINED BY THE ENGINEER.
- TOPSOIL IN TOPSOIL STRIP AREAS DESIGNATED ON THE PLANS SHALL BE STRIPPED PRIOR TO THE PLACEMENT OF FILL MATERIAL FROM DITCH EXCAVATION. TOPSOIL STRIP AREAS MAY ADJUST BASED ON ACTUAL TOPSOIL THICKNESS. RECLAIMING AND LEVELING OF THE TOPSOIL ON TOP OF THE SPOILS SHALL BE INCIDENTAL TO TOPSOIL STRIPPING.
- SHAPING AROUND SIDE INLETS, ASIS, ASIROS, AND CULVERT INLETS SHALL BE INCIDENTAL TO THEIR RESPECTIVE PAY ITEMS.
- ALL EXISTING TILE OUTLETS INTO THE OPEN DITCH, INCLUDING ANY NOT SHOWN ON THE PLANS, SHALL BE REPAIRED OR ARMORED. UNLESS SPECIFICALLY NOTED, HDPE OR PVC SHALL BE THE ONLY ACCEPTABLE MATERIAL FOR ALL TILE REPAIRS (SEE DETAILS).
- EXISTING TILE OUTLETS MAY BE SALVAGED, REUSED, AND PROTECTED WITH RIPRAP IF THE OUTLET IS DETERMINED TO BE IN GOOD CONDITION BY THE ENGINEER. TILE REPAIR AT THESE LOCATIONS SHALL BE PAID FOR AS BID ITEM "ARMOR TILE OUTLET" (SEE DETAILS).
- MISCELLANEOUS TREE CLEARING SHALL BE INCIDENTAL TO DITCH PAY ITEM(S), UNLESS SPECIFICALLY CALLED OUT IN THE PLANS.
- HEAVY VEGETATIVE CLEARING WITH TREE REMOVAL IS REQUIRED ON DITCH SIDE SLOPES AND WITHIN THE 1-ROD BUFFER (UNLESS OTHERWISE SPECIFIED) AND WILL BE PAID FOR BY THE ACRE. APPROXIMATE LOCATIONS ARE INCLUDED ON THE MAP FOR REFERENCE. TREES SHALL BE CLEARED, GRUBBED, AND THE AREA AROUND THE TREE SPRAYED AFTER COMPLETE.
- DITCH BANKS SHALL BE SEEDED WITHIN SEVEN (7) DAYS OF FINISHED EXCAVATION UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

ABBREVIATIONS

AC	ACRE	GA	GAUGE	PP	POLYPROPYLENE
ADD	ADDENDUM	GAL	GALLON	PSI	POUNDS PER SQUARE INCH
AGG	AGGREGATE	GPM	GALLONS PER MINUTE	PVC	POLYVINYL CHLORIDE
APPROX	APPROXIMATE	HDPE	HIGH DENSITY POLYETHYLENE	PVMT	PAVEMENT
BIT	BITUMINOUS	HORIZ	HORIZONTAL	QTY	QUANTITY
CAD	COMPUTER-AIDED DESIGN	HR	HOUR	RCP	REINFORCED CONCRETE PIPE
CFS	CUBIC FEET PER SECOND	HWL	HIGH WATER LEVEL	REBAR	REINFORCING BAR
CF	CUBIC FOOT	HWY	HIGHWAY	REM	REMOVE
CL	CENTERLINE	HYD	HYDRANT	ROW	RIGHT OF WAY
CMP	CORRUGATED METAL PIPE	I	INVERT	R/W	RIGHT OF WAY
CONC	CONCRETE	ID	INSIDE DIAMETER	SCH	SCHEDULE
CONST	CONSTRUCTION	IN	INCH	SF	SQUARE FOOT
CONT	CONTINUOUS	INV	INVERT	SPEC	SPECIFICATION
CR	COUNTY ROAD	LF	LINEAR FEET	SQ	SQUARE
CSAH	COUNTY STATE AID	LIN	LINEAR	STA	STATION
	HIGHWAY	LS	LUMP SUM	SY	SQUARE YARD
CY	CUBIC YARD	MAX	MAXIMUM	TEMP	TEMPORARY
DI	DROP INTAKE	MH	MANHOLE	THRU	THROUGH
DIA	DIAMETER	MIN	MINIMUM	TRANS	TRANSFORMER
DIM	DIMENSION	MISC	MISCELLANEOUS	TV	TELEVISION
EA	EACH	NO	NUMBER	TYP	TYPICAL
ELEC	ELECTRICAL	NTS	NOT TO SCALE		UTILITY, UNDERGROUND
ELEV	ELEVATION	NWL	NORMAL WATER LEVEL	UT	TELEPHONE
EOF	EMERGENCY OVERFLOW	OC	ON CENTER	VCP	VITRIFIED CLAY PIPE
EQ	EQUAL	OCEW	ON CENTER EACH WAY	W/O	WITHOUT
EX	EXISTING	OH	OVERHEAD	W/	WITH
FDN	FOUNDATION	OHWL	ORDINARY HIGH WATER	YD	YARD
FPM	FEET PER MINUTE	OZ	OUNCE	YR	YEAR
FPS	FEET PER SECOND	PERF	PERFORATED		
FT	FOOT, FEET	PL	PROPERTY LINE		



BLUE EARTH COUNTY

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PRELIMINARY NOT FOR CONSTRUCTION
CHARLES J. BRANDEL

DATE: _____ LIC. NO. 43359

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PROJECT

BLUE EARTH COUNTY

JUDICIAL DITCH No. 49 REPAIRS

BLUE EARTH COUNTY MINNESOTA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

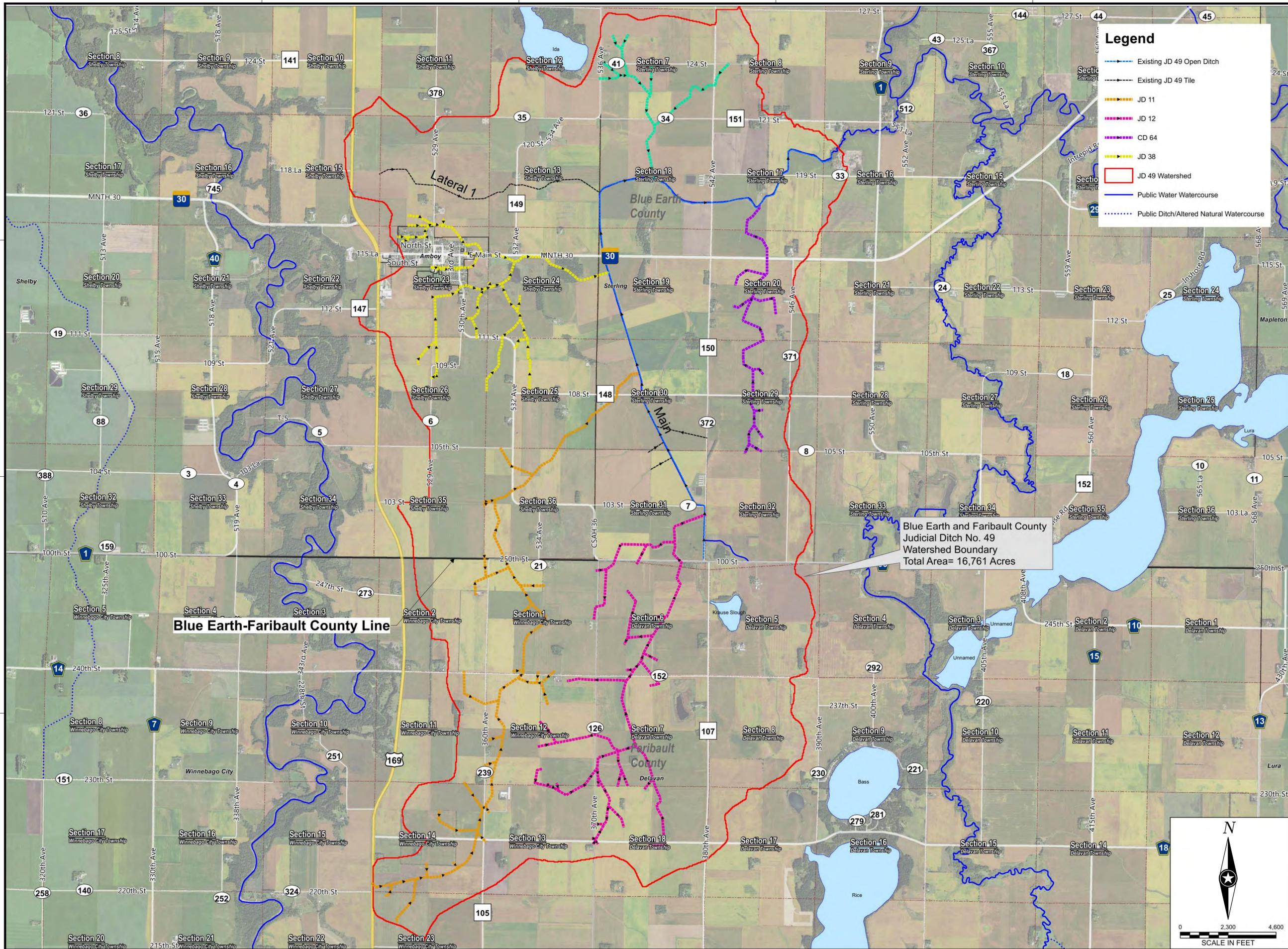
PROJECT NO.	20-24339
FILE NAME	24339 DETAILS
DRAWN BY	KJH
DESIGNED BY	KBW
REVIEWED BY	CJB
ORIGINAL ISSUE DATE	--/--
CLIENT PROJECT NO.	20-24339

TITLE
CONSTRUCTION NOTES

SHEET

3

OF 36



Legend

- Existing JD 49 Open Ditch
- Existing JD 49 Tile
- JD 11
- JD 12
- CD 64
- JD 38
- JD 49 Watershed
- Public Water Watercourse
- Public Ditch/Altered Natural Watercourse



BLUE EARTH COUNTY

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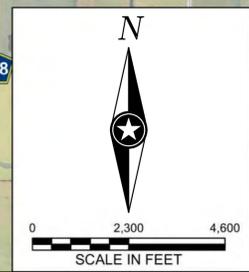
PROJECT
BLUE EARTH COUNTY JUDICIAL DITCH No. 49 REPAIRS
BLUE EARTH COUNTY MINNESOTA

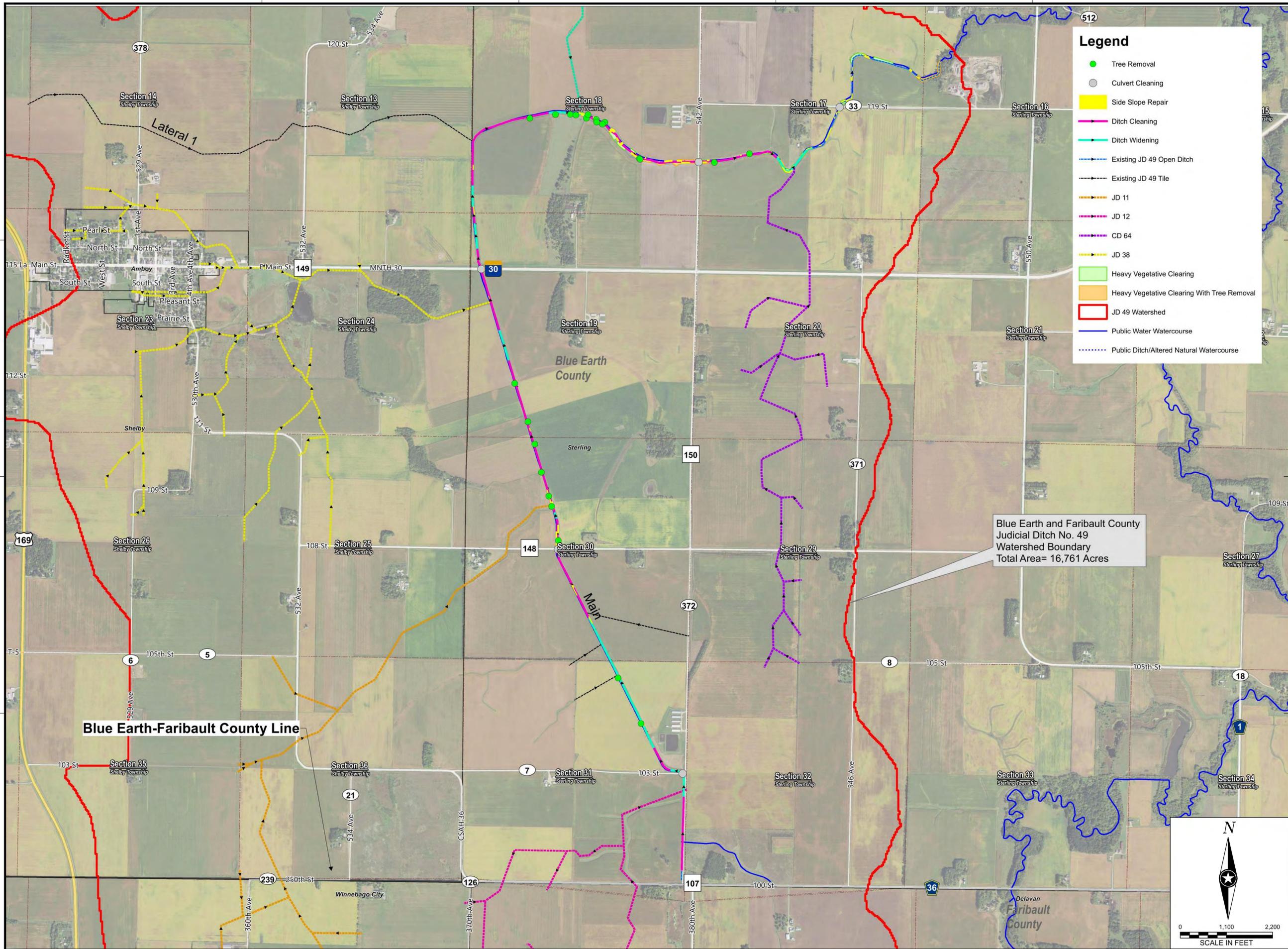
REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	20-24339
FILE NAME	24339 TITLE
DRAWN BY	KJH
DESIGNED BY	KBW
REVIEWED BY	CJB
ORIGINAL ISSUE DATE	---/---/---
CLIENT PROJECT NO.	20-24339

TITLE
OVERALL WATERSHED

SHEET
4 OF 36





Legend

- Tree Removal
- Culvert Cleaning
- Side Slope Repair
- Ditch Cleaning
- Ditch Widening
- Existing JD 49 Open Ditch
- Existing JD 49 Tile
- JD 11
- JD 12
- CD 64
- JD 38
- Heavy Vegetative Clearing
- Heavy Vegetative Clearing With Tree Removal
- JD 49 Watershed
- Public Water Watercourse
- Public Ditch/Altered Natural Watercourse



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PROJECT
BLUE EARTH COUNTY
JUDICIAL DITCH No. 49 REPAIRS

BLUE EARTH COUNTY MINNESOTA

REVISION SCHEDULE		
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DRAWN BY	KJH
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CLIENT PROJECT NO.	20-24339

TITLE
REPAIR MAP

SHEET
5 OF 36

Blue Earth and Faribault County
 Judicial Ditch No. 49
 Watershed Boundary
 Total Area= 16,761 Acres

Blue Earth-Faribault County Line

Legend

- Tree Removal
- Existing JD 49 Open Ditch
- - - Existing JD 49 Tile
- - - CD 64
- - - JD 23
- Parcels_2020
- Heavy Vegetative Clearing
- Heavy Vegetative Clearing With Tree Removal
- JD 49 Watershed

Heavy Vegetative Clearing with Tree Removal

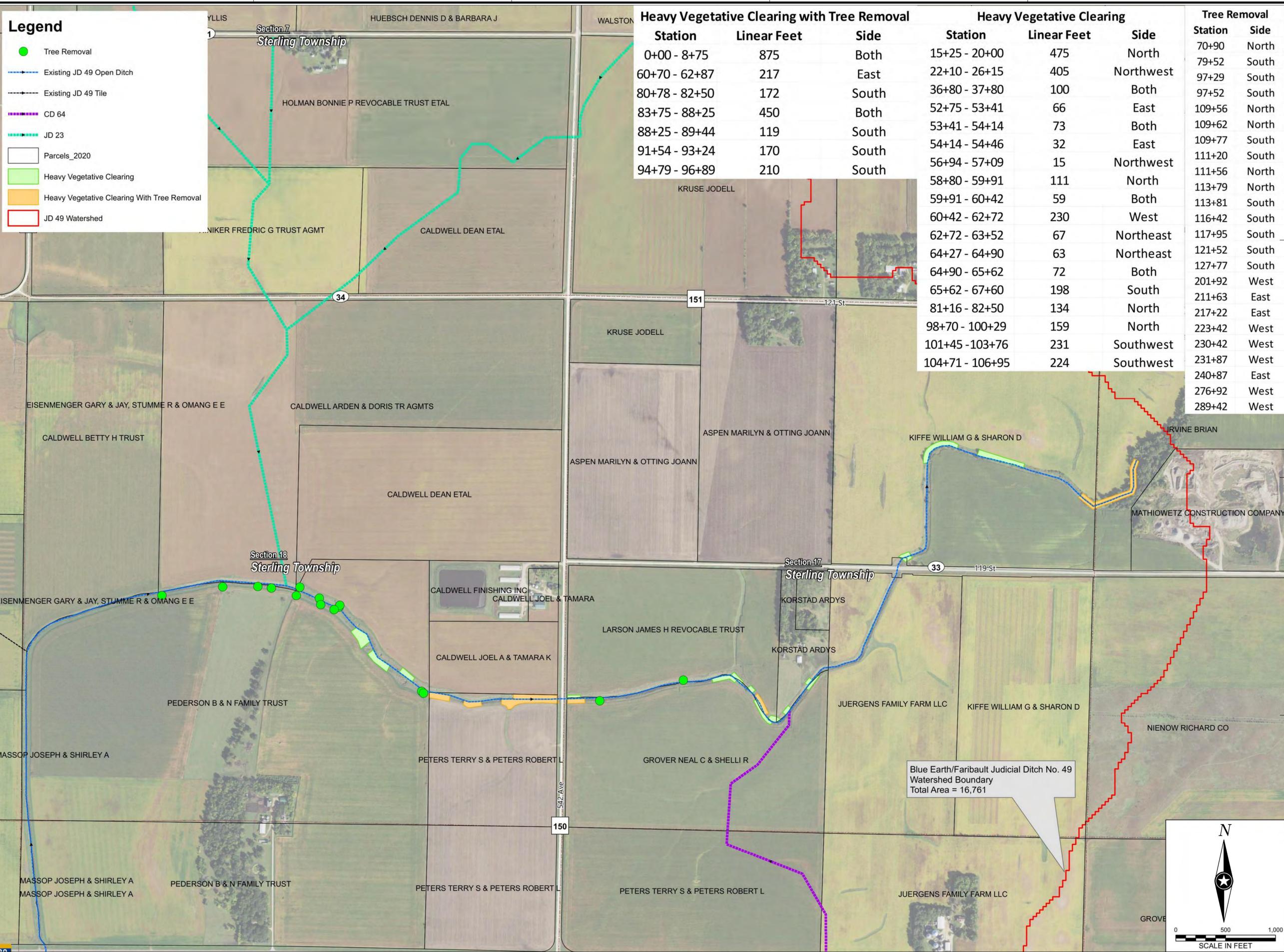
Station	Linear Feet	Side
0+00 - 8+75	875	Both
60+70 - 62+87	217	East
80+78 - 82+50	172	South
83+75 - 88+25	450	Both
88+25 - 89+44	119	South
91+54 - 93+24	170	South
94+79 - 96+89	210	South

Heavy Vegetative Clearing

Station	Linear Feet	Side
15+25 - 20+00	475	North
22+10 - 26+15	405	Northwest
36+80 - 37+80	100	Both
52+75 - 53+41	66	East
53+41 - 54+14	73	Both
54+14 - 54+46	32	East
56+94 - 57+09	15	Northwest
58+80 - 59+91	111	North
59+91 - 60+42	59	Both
60+42 - 62+72	230	West
62+72 - 63+52	67	Northeast
64+27 - 64+90	63	Northeast
64+90 - 65+62	72	Both
65+62 - 67+60	198	South
81+16 - 82+50	134	North
98+70 - 100+29	159	North
101+45 - 103+76	231	Southwest
104+71 - 106+95	224	Southwest

Tree Removal

Station	Side
70+90	North
79+52	South
97+29	South
97+52	South
109+56	North
109+62	North
109+77	South
111+20	South
111+56	North
113+79	North
113+81	South
116+42	South
117+95	South
121+52	South
127+77	South
201+92	West
211+63	East
217+22	East
223+42	West
230+42	West
231+87	West
240+87	East
276+92	West
289+42	West



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PROJECT
BLUE EARTH COUNTY
JUDICIAL DITCH No. 49 REPAIRS

BLUE EARTH COUNTY MINNESOTA

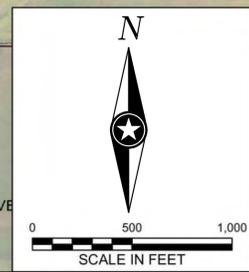
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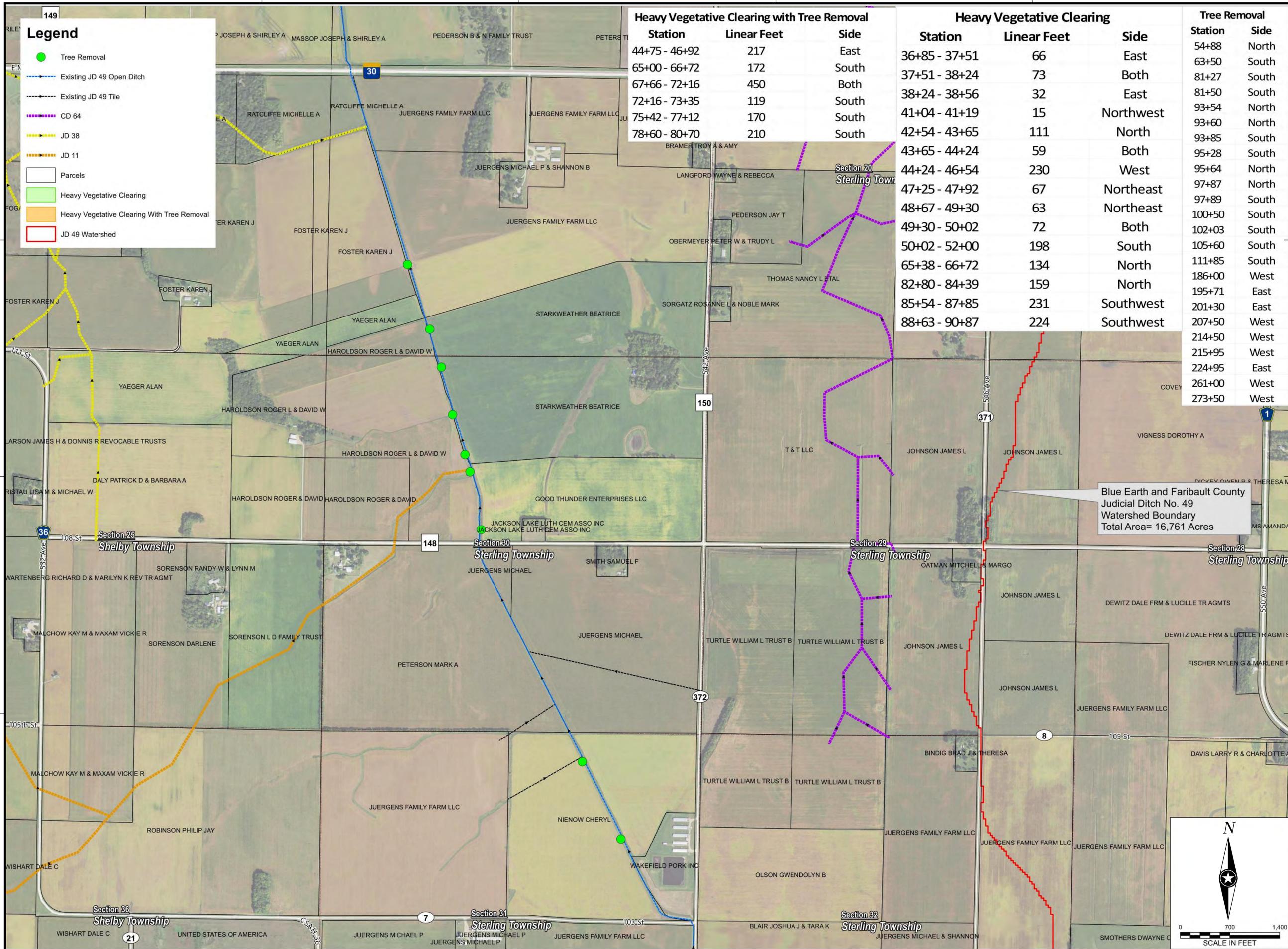
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CLIENT PROJECT NO.	20-24339

TITLE
TREE REMOVALS (NORTH)

SHEET
6 OF 36

Blue Earth/Faribault Judicial Ditch No. 49 Watershed Boundary
Total Area = 16,761





Legend

- Tree Removal
- Existing JD 49 Open Ditch
- - - Existing JD 49 Tile
- CD 64
- JD 38
- JD 11
- Parcels
- Heavy Vegetative Clearing
- Heavy Vegetative Clearing With Tree Removal
- JD 49 Watershed

Heavy Vegetative Clearing with Tree Removal

Station	Linear Feet	Side
44+75 - 46+92	217	East
65+00 - 66+72	172	South
67+66 - 72+16	450	Both
72+16 - 73+35	119	South
75+42 - 77+12	170	South
78+60 - 80+70	210	South

Heavy Vegetative Clearing

Station	Linear Feet	Side
36+85 - 37+51	66	East
37+51 - 38+24	73	Both
38+24 - 38+56	32	East
41+04 - 41+19	15	Northwest
42+54 - 43+65	111	North
43+65 - 44+24	59	Both
44+24 - 46+54	230	West
47+25 - 47+92	67	Northeast
48+67 - 49+30	63	Northeast
49+30 - 50+02	72	Both
50+02 - 52+00	198	South
65+38 - 66+72	134	North
82+80 - 84+39	159	North
85+54 - 87+85	231	Southwest
88+63 - 90+87	224	Southwest

Tree Removal

Station	Side
54+88	North
63+50	South
81+27	South
81+50	South
93+54	North
93+60	North
93+85	South
95+28	South
95+64	North
97+87	North
97+89	South
100+50	South
102+03	South
105+60	South
111+85	South
186+00	West
195+71	East
201+30	East
207+50	West
214+50	West
215+95	West
224+95	East
261+00	West
273+50	West



BLUE EARTH COUNTY

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Blue Earth and Faribault County Judicial Ditch No. 49 Watershed Boundary Total Area= 16,761 Acres

PROJECT

BLUE EARTH COUNTY

JUDICIAL DITCH No. 49 REPAIRS

BLUE EARTH COUNTY MINNESOTA

REVISION SCHEDULE

DATE	DESCRIPTION	BY

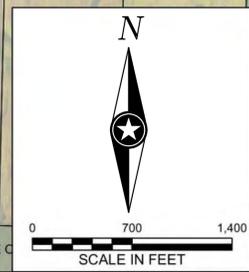
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CLIENT PROJECT NO.	20-24339

TITLE

TREE REMOVALS (SOUTH)

SHEET

7 OF 36





BLUE EARTH COUNTY

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PRELIMINARY NOT FOR CONSTRUCTION
CHARLES J. BRANDEL

DATE: _____ LIC. NO. 43359

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PROJECT

BLUE EARTH COUNTY

JUDICIAL DITCH No. 49 REPAIRS

BLUE EARTH COUNTY MINNESOTA

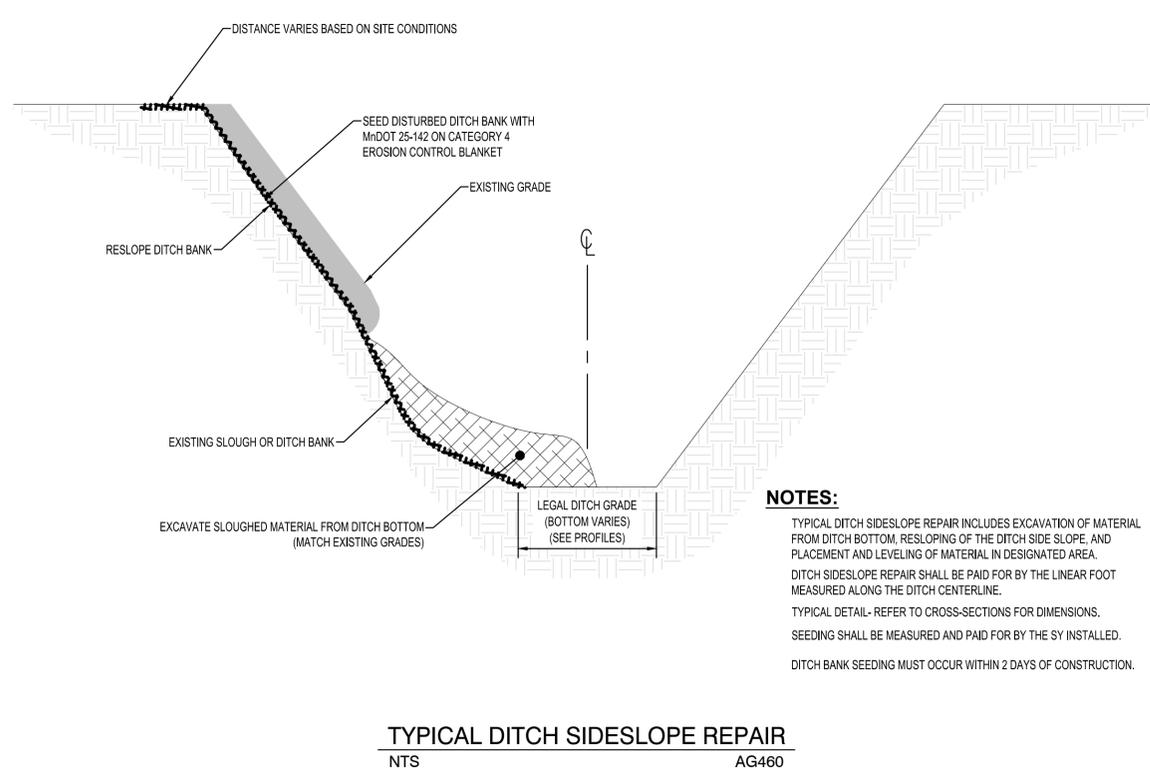
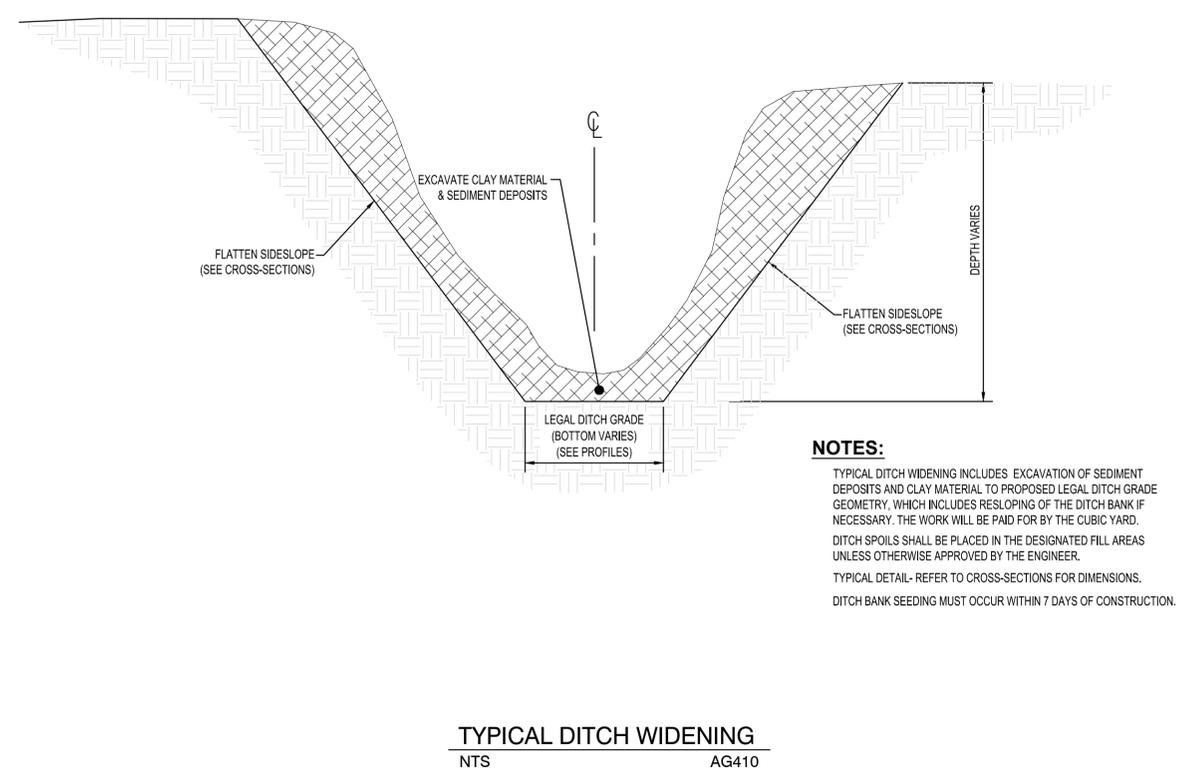
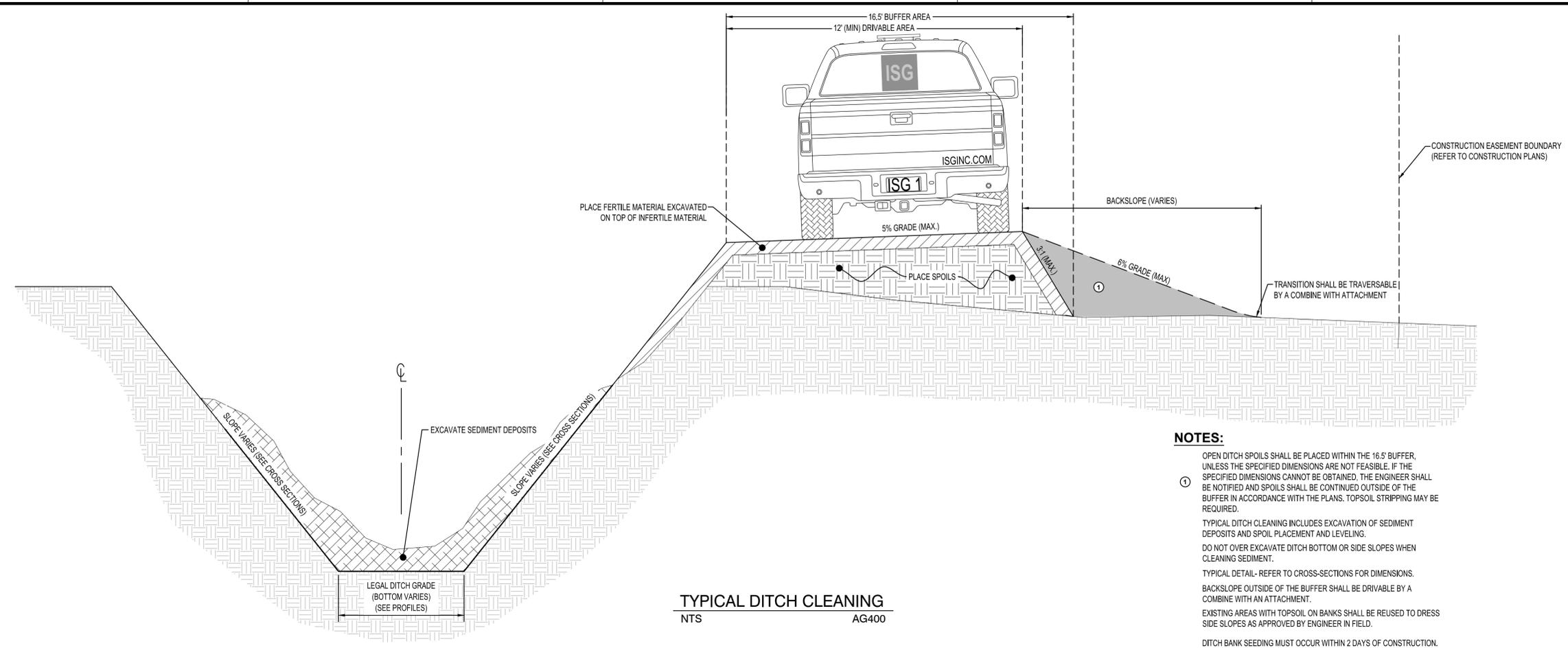
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TITLE

TYPICAL DETAILS

SHEET





BLUE EARTH COUNTY

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BLUE EARTH COUNTY

JUDICIAL DITCH No. 49 REPAIRS

BLUE EARTH COUNTY MINNESOTA

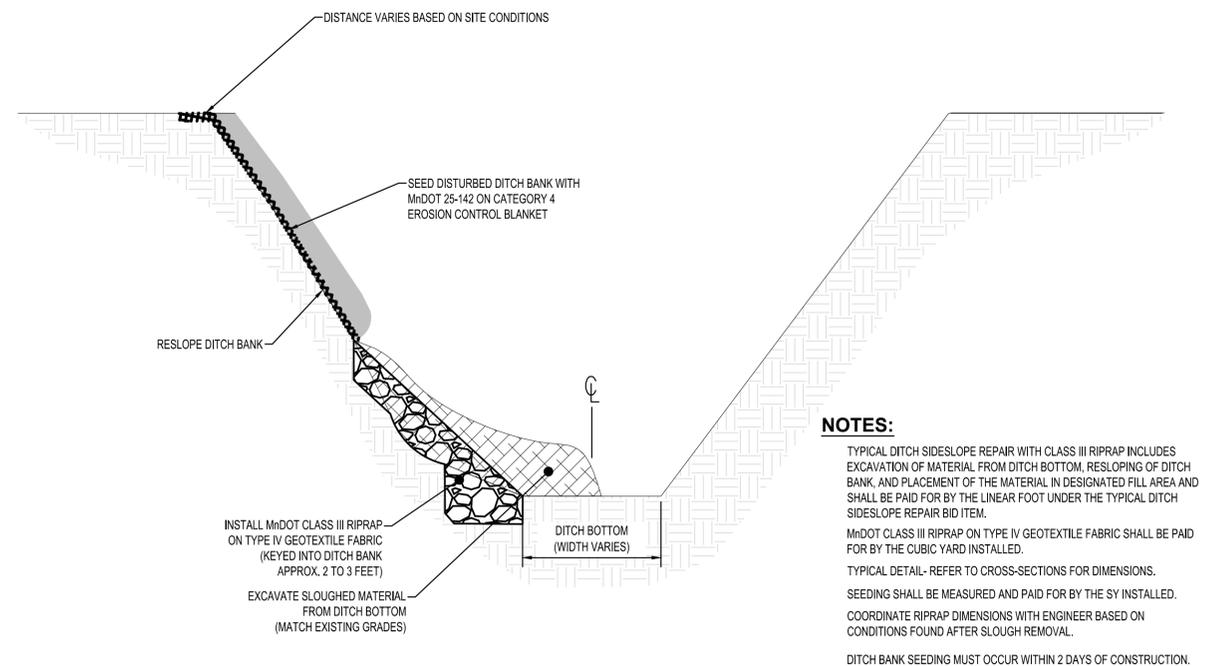
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TYPICAL DETAILS

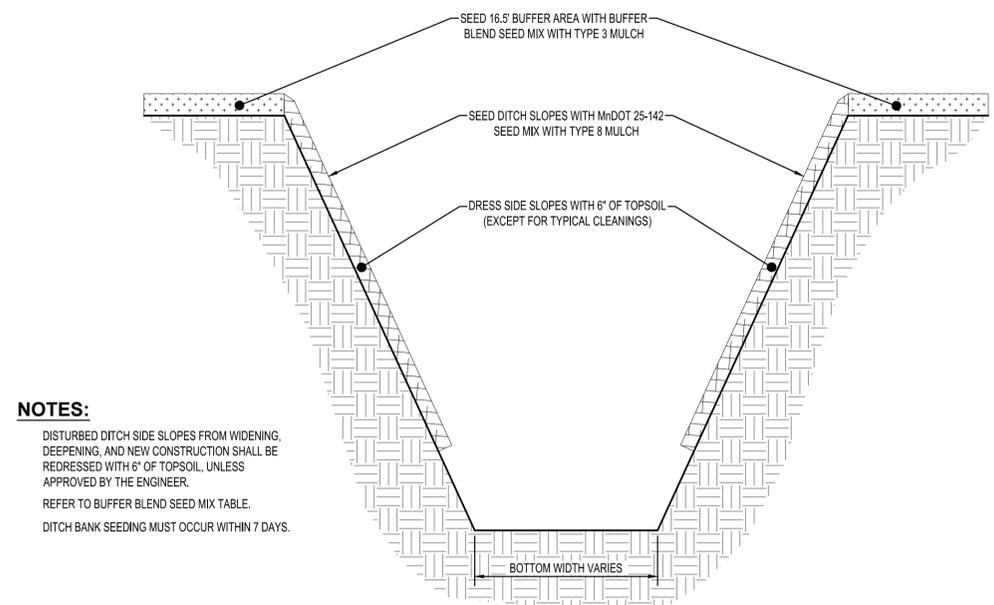
SHEET



TYPICAL DITCH SIDESLOPE REPAIR WITH CLASS III RIPRAP

NTS AG470

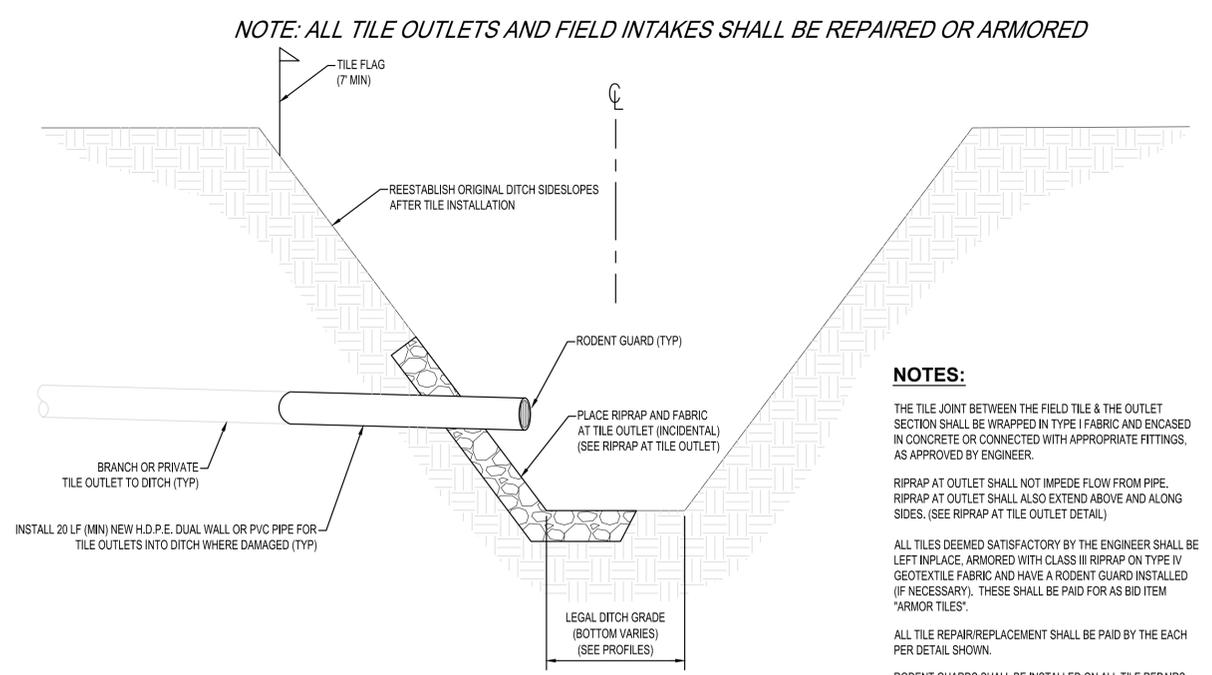
NOTES:
TYPICAL DITCH SIDESLOPE REPAIR WITH CLASS III RIPRAP INCLUDES EXCAVATION OF MATERIAL FROM DITCH BOTTOM, RESLOPING OF DITCH BANK, AND PLACEMENT OF THE MATERIAL IN DESIGNATED FILL AREA AND SHALL BE PAID FOR BY THE LINEAR FOOT UNDER THE TYPICAL DITCH SIDESLOPE REPAIR BID ITEM.
MnDOT CLASS III RIPRAP ON TYPE IV GEOTEXTILE FABRIC SHALL BE PAID FOR BY THE CUBIC YARD INSTALLED.
TYPICAL DETAIL- REFER TO CROSS-SECTIONS FOR DIMENSIONS.
SEEDING SHALL BE MEASURED AND PAID FOR BY THE SY INSTALLED.
COORDINATE RIPRAP DIMENSIONS WITH ENGINEER BASED ON CONDITIONS FOUND AFTER SLOUGH REMOVAL.
DITCH BANK SEEDING MUST OCCUR WITHIN 2 DAYS OF CONSTRUCTION.



TYPICAL OPEN DITCH SEEDING SECTION

NTS AG930

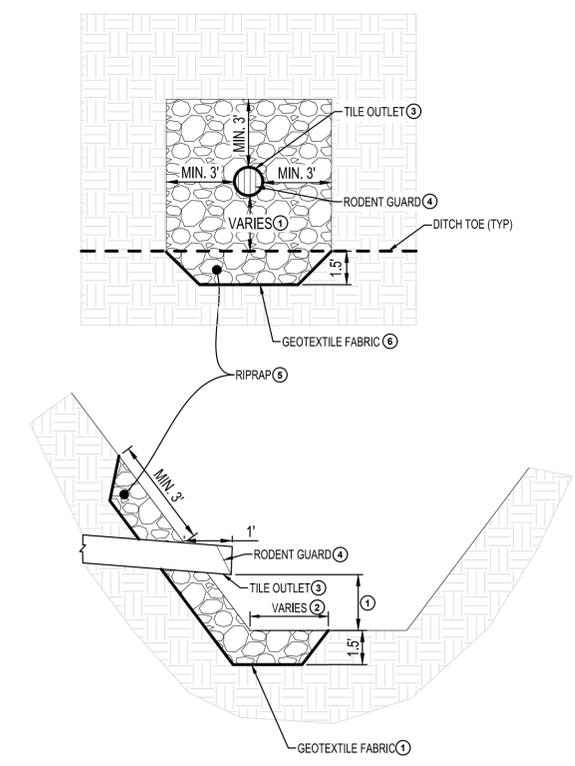
NOTES:
DISTURBED DITCH SIDE SLOPES FROM WIDENING, DEEPENING, AND NEW CONSTRUCTION SHALL BE REDRESSED WITH 6" OF TOPSOIL, UNLESS APPROVED BY THE ENGINEER.
REFER TO BUFFER BLEND SEED MIX TABLE.
DITCH BANK SEEDING MUST OCCUR WITHIN 7 DAYS.



TYPICAL TILE OUTLET REPAIR

NTS AG630

NOTES:
THE TILE JOINT BETWEEN THE FIELD TILE & THE OUTLET SECTION SHALL BE WRAPPED IN TYPE I FABRIC AND ENCASED IN CONCRETE OR CONNECTED WITH APPROPRIATE FITTINGS, AS APPROVED BY ENGINEER.
RIPRAP AT OUTLET SHALL NOT IMPEDE FLOW FROM PIPE. RIPRAP AT OUTLET SHALL ALSO EXTEND ABOVE AND ALONG SIDES. (SEE RIPRAP AT TILE OUTLET DETAIL)
ALL TILES DEEMED SATISFACTORY BY THE ENGINEER SHALL BE LEFT IN PLACE, ARMORED WITH CLASS III RIPRAP ON TYPE IV GEOTEXTILE FABRIC AND HAVE A RODENT GUARD INSTALLED (IF NECESSARY). THESE SHALL BE PAID FOR AS BID ITEM "ARMOR TILES".
ALL TILE REPAIR/REPLACEMENT SHALL BE PAID BY THE EACH PER DETAIL SHOWN.
RODENT GUARDS SHALL BE INSTALLED ON ALL TILE REPAIRS 18" AND SMALLER, AND ARE INCIDENTAL TO THE PAY ITEM.
ALL FITTINGS TO CONNECT EXISTING TILE SHALL BE INCIDENTAL TO TILE OUTLET REPAIR.
REFER TO OPEN DITCH NOTES FOR ACCEPTABLE OUTLET MATERIAL TYPES.
SEEDING MUST OCCUR WITHIN 7 DAYS OF CONSTRUCTION.



DIMENSIONS	
NOMINAL PIPE DIA	RIPRAP (5)
UNDER 12"	8 CY
12"-15"	8.5 CY
18" TO 36"	9 CY
42" TO 60"	10 CY
ABOVE 60"	12 CY

NOTES:
① DISTANCE VARIES. REFER TO PLANS AND DETAILS.
② DISTANCE VARIES. 4" OR 1/2 OF DITCH BOTTOM, WHICHEVER IS GREATER.
③ SIZE AND TYPE VARIES. REFER TO PLANS AND SCHEDULES.
④ RODENT GUARDS SHALL BE INSTALLED ON ALL OUTLETS 18" AND SMALLER. (INCIDENTAL TO RESPECTIVE BID ITEMS).
⑤ RIPRAP SHALL BE MnDOT CLASS III, UNLESS OTHERWISE SPECIFIED. THE CUBIC YARD LISTED IN THE TABLE SHALL BE INCIDENTAL TO THE RESPECTIVE BID ITEM. ADDITIONAL RIPRAP SHALL BE PAID FOR BY THE CUBIC YARD INSTALLED.
⑥ GEOTEXTILE FABRIC SHALL BE MnDOT TYPE IV. (INCIDENTAL TO RESPECTIVE BID ITEM)
RIPRAP DIMENSIONS SHOWN ARE TYPICAL AND MAY BE MODIFIED ON A SITUATIONAL BASIS, IF APPROVED BY THE ENGINEER.
RIPRAP SHALL NOT IMPEDE FLOW FROM THE TILE OUTLET OR THE RECEIVING BODY. RIPRAP OF THE OPPOSITE BANK MAY BE REQUIRED BY THE ENGINEER IN THE FIELD OR AS CALLED OUT IN THE PLANS. PAID FOR BY THE CUBIC YARD INSTALLED.

RIPRAP AT TILE OUTLET

NTS AG640



BLUE EARTH COUNTY

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PROJECT

**BLUE EARTH COUNTY
JUDICIAL DITCH
No. 49 REPAIRS**

BLUE EARTH COUNTY MINNESOTA

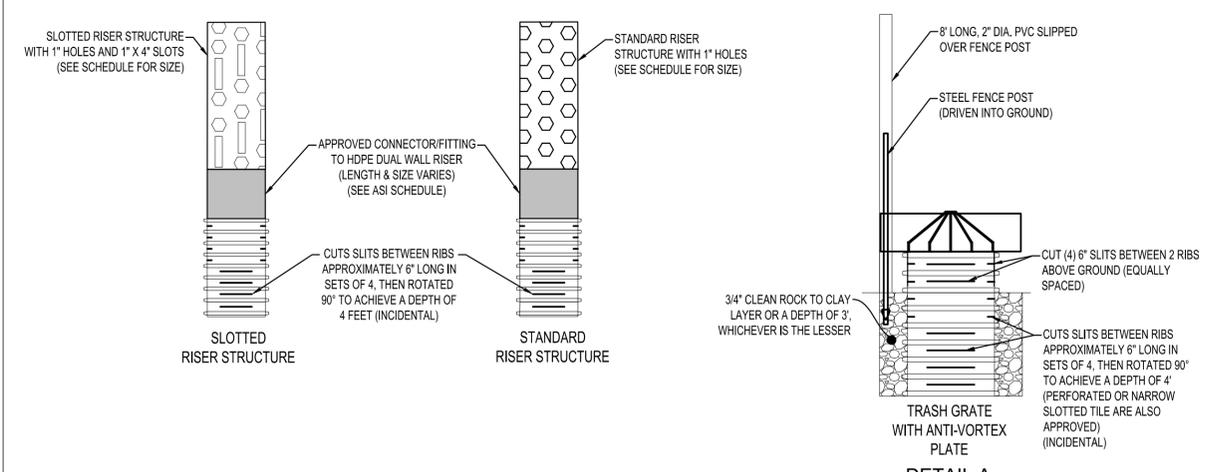
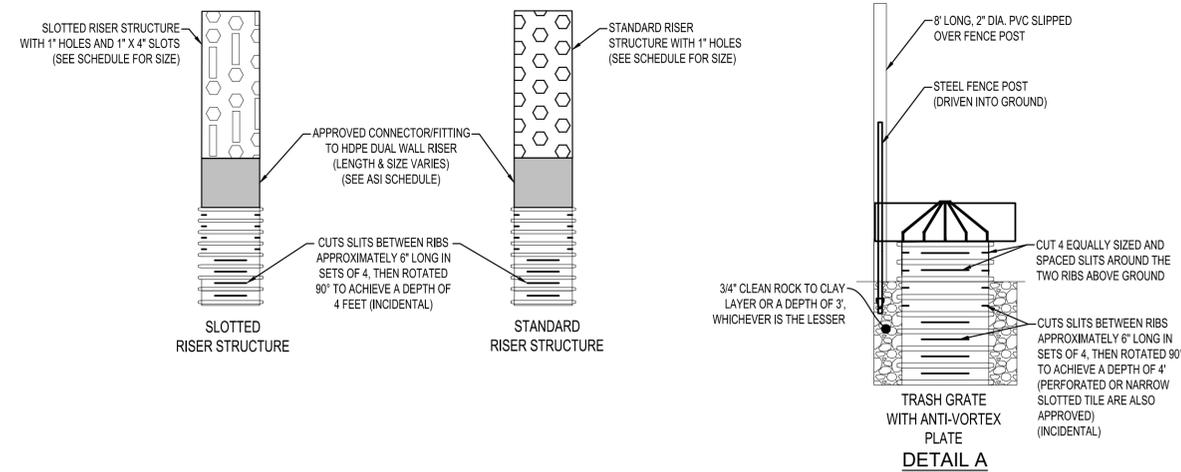
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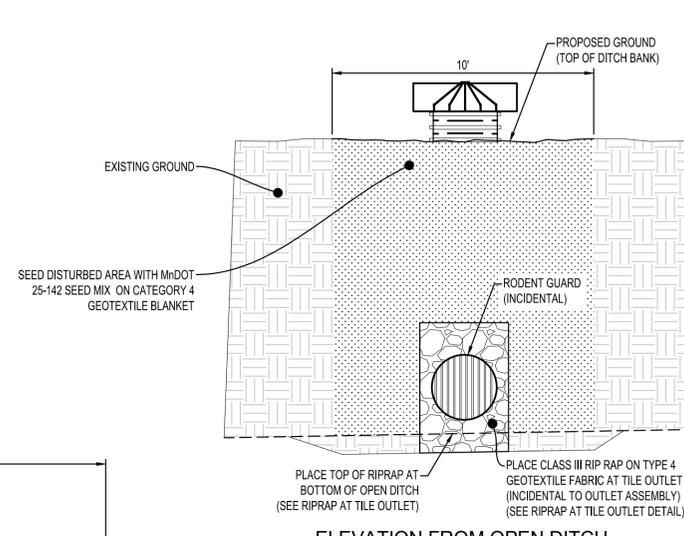
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TYPICAL DETAILS

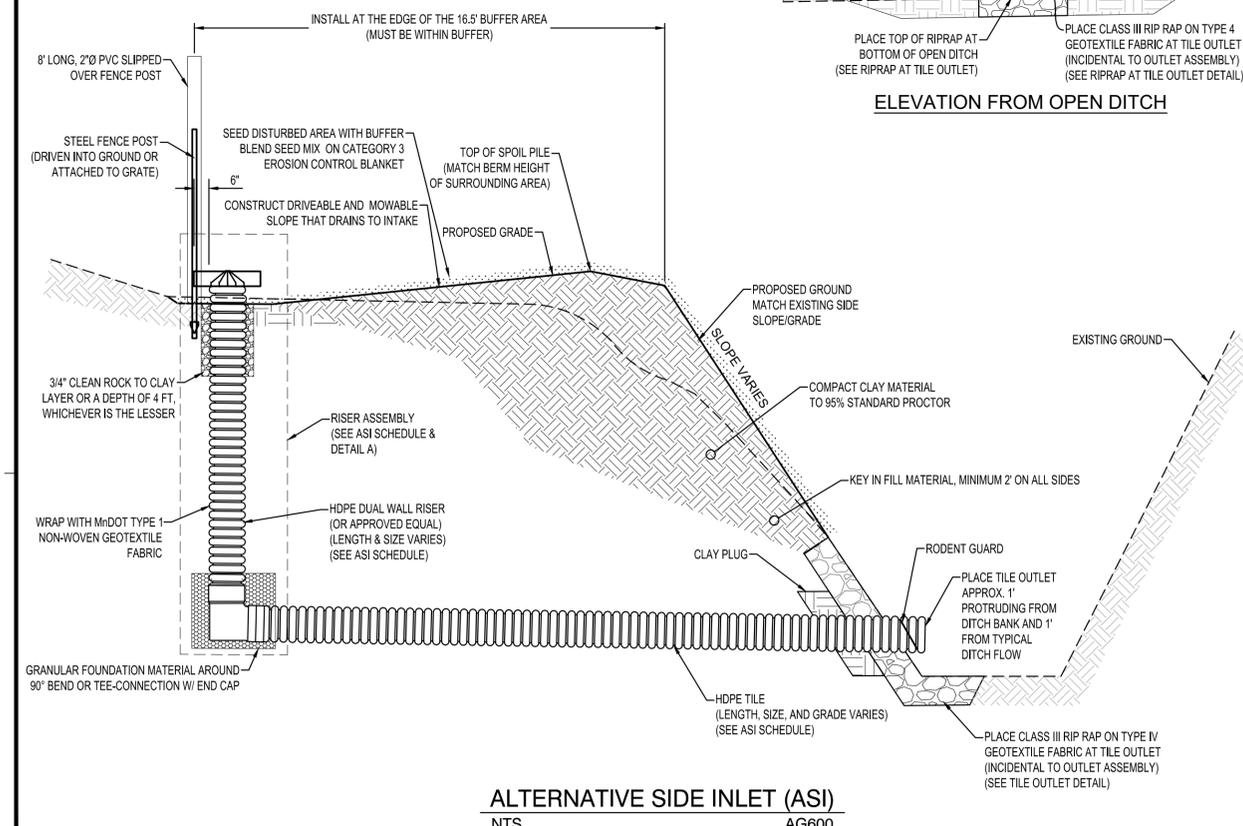
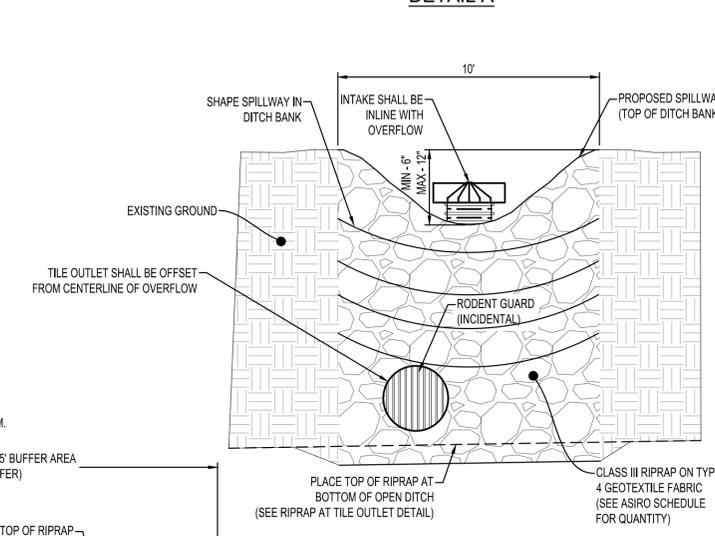
SHEET



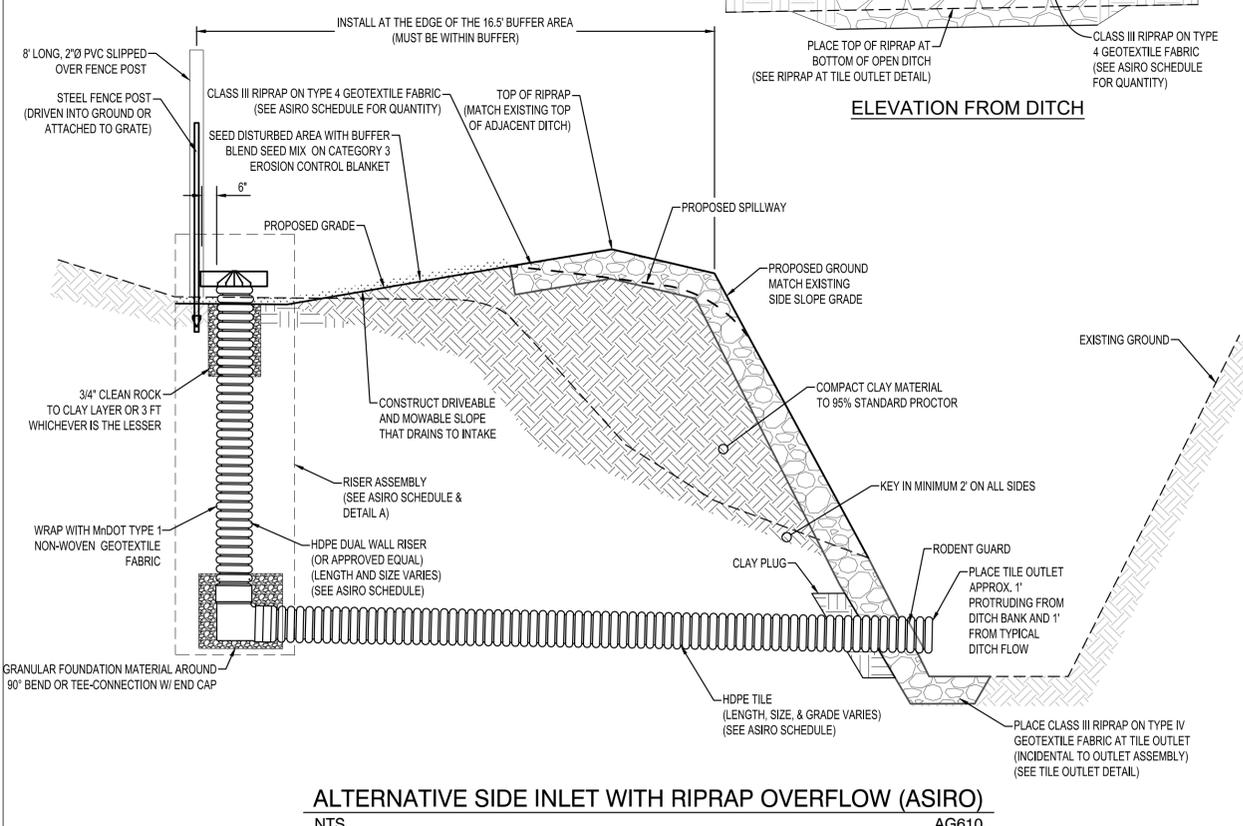
- NOTES:**
- INTAKE TYPE AND TILE SIZE VARIES PER ASI. (SEE SCHEDULE)
 - RISER ASSEMBLY SHALL BE A SEPARATE PAY ITEM THAN THE OUTLET ASSEMBLY.
 - ALL DISTURBED AREAS WITHIN BUFFER EASEMENT SHALL BE SEEDED WITH BUFFER BLEND SEED MIX ON CATEGORY III EROSION CONTROL BLANKET.
 - ALL EFFORTS SHALL BE MADE TO SEPARATE SOIL TYPES. BACKFILL SHALL BE COMPACTED PRIOR TO PLACEMENT OF TOPSOIL, EXCEPT THE TOP TWO (2) FEET, FOR WHICH COMPACTION SHALL BE MINIMIZED TO THE EXTENT POSSIBLE. TOPSOIL SHALL BE PLACED TO A MINIMUM DEPTH OF 6", OR UNIFORM TO THE TOPSOIL DEPTH OF THE SURROUNDING AREA. ALL EFFORTS SHALL BE MADE TO KEEP TOPSOIL ON TOP AND SEPARATED. NO TOPSOIL SHALL BE PLACED IN THE TRENCH BELOW 2' FROM EXISTING GROUND UNLESS APPROVED BY THE ENGINEER.
 - ALL INTAKES SHALL BE WRAPPED WITH MNDOT TYPE 1 GEOTEXTILE FABRIC. (INCIDENTAL TO RISER ASSEMBLY)
 - ALL SLITS CUT INTO RISER ARE INCIDENTAL TO RISER ASSEMBLY.
 - ALL 3/4" CLEAN ROCK AND GRANULAR FOUNDATION MATERIAL IS INCIDENTAL TO RISER ASSEMBLY.
 - ALL OUTLET RIPRAP IS INCIDENTAL TO OUTLET ASSEMBLY.
 - INTAKES SHALL BE FIELD ADJUSTED BASED ON ACTUAL LOCATION OF LOW AREAS, AS DETERMINED BY THE ENGINEER.
 - TILE OUTLET ASSEMBLY SHALL CONFORM TO STANDARD TILE INSTALLATION.
 - SHAPING OF LOW AREA TO GRADE TO DROP INTAKE SHALL BE INCIDENTAL TO PAY ITEM.



- NOTES:**
- INTAKE TYPE & TILE SIZE VARIES PER ASI. (SEE SCHEDULE)
 - RISER ASSEMBLY SHALL BE A SEPARATE PAY ITEM THAN THE OUTLET ASSEMBLY.
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 - SHAPING OF LOW AREA TO GRADE TO DROP INTAKE SHALL BE INCIDENTAL TO PAY ITEM.



ALTERNATIVE SIDE INLET (ASI)
NTS AG600



ALTERNATIVE SIDE INLET WITH RIPRAP OVERFLOW (ASIRO)
NTS AG610



BLUE EARTH COUNTY

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PROJECT

**BLUE EARTH COUNTY
JUDICIAL DITCH
No. 49 REPAIRS**

BLUE EARTH COUNTY MINNESOTA

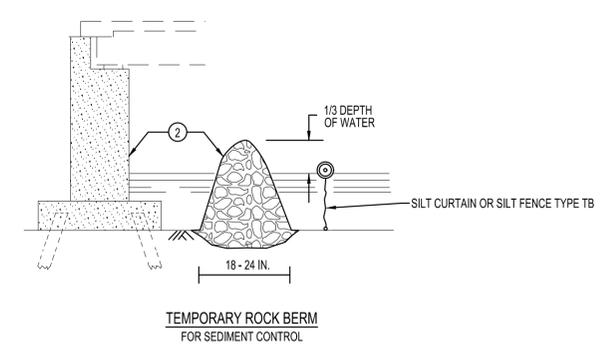
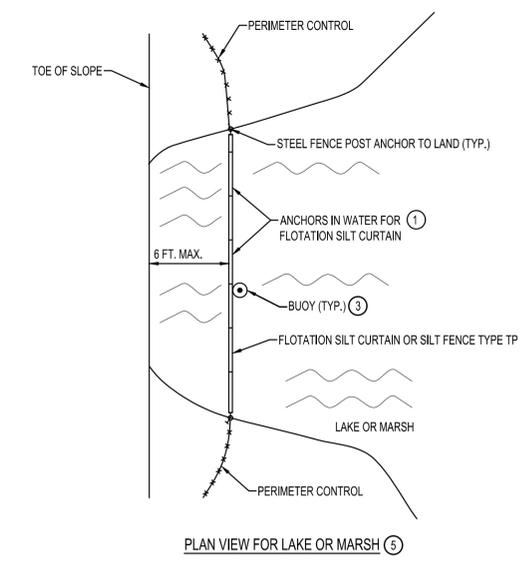
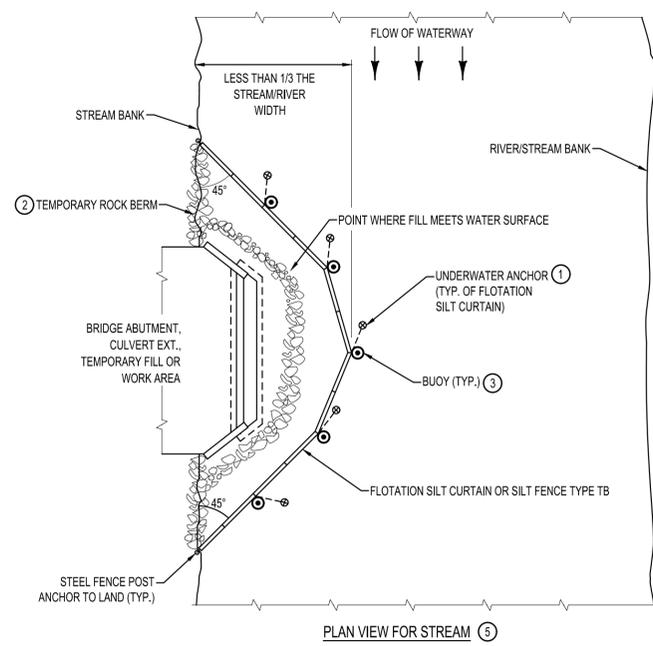
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TITLE

TYPICAL DETAILS

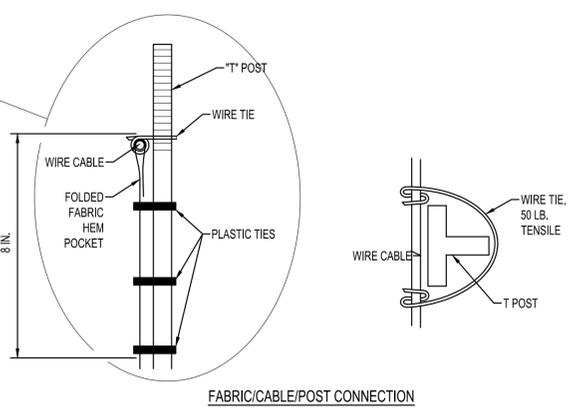
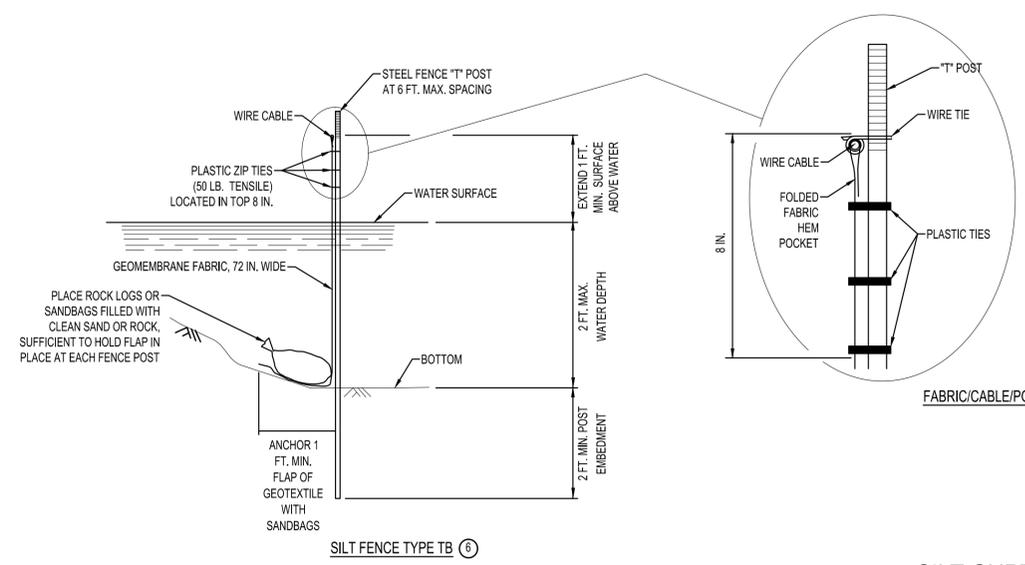
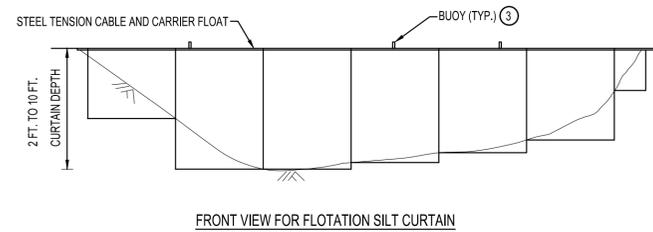
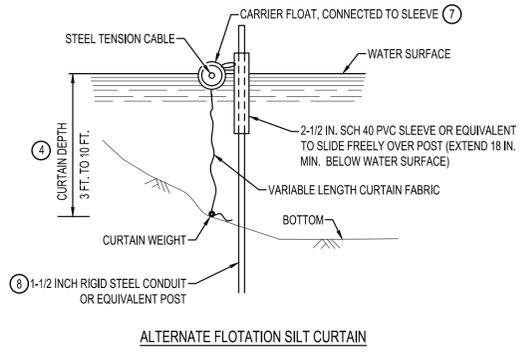
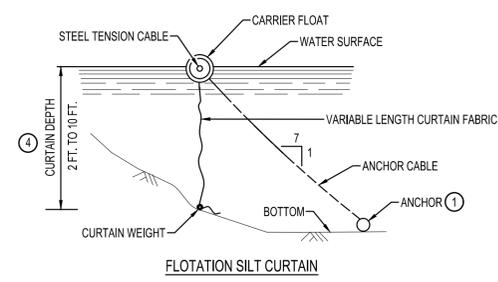
SHEET



**INSTALLATION GUIDELINES
SILT FENCE TYPE TB**
MINIMUM WATER DEPTH: 1 FT.
MAXIMUM WATER DEPTH: 3 FT.
MAXIMUM WATER VELOCITY: 5 FT./SEC.

**INSTALLATION GUIDELINES ④
FLOTATION SILT CURTAIN
TYPE: STILL WATER**
MINIMUM WATER DEPTH: 3 FT.
MAXIMUM WATER DEPTH: 10 FT.
MAXIMUM WATER VELOCITY: 2 FT./SEC.
MAXIMUM WAVE HEIGHT: 1 FT

**INSTALLATION GUIDELINES ④
FLOTATION SILT CURTAIN
TYPE: MOVING WATER**
MINIMUM WATER DEPTH: 3 FT.
MAXIMUM WATER DEPTH: 10 FT.
MAXIMUM WATER VELOCITY: 5 FT./SEC.
MAXIMUM WAVE HEIGHT: 2 FT.



**SILT CURTAIN OR SILT FENCE TYPE TB
MNDOT STANDARD PLAN 5-297.405**

NTS AG 990

NOTES:

- SEE SPECS. 2573, 3886, 3887 & 3893.
- ① FOR ANCHOR SPACING AND WEIGHT REQUIREMENTS, SEE SPEC. 2573.
- ② IN AREAS WHERE THE PLAN CALLS FOR RIPRAP AT A BRIDGE, CULVERT, OR SLOPE, A TEMPORARY ROCK BERM CONSTRUCTED FROM THE RIPRAP CAN BE USED TO PROVIDE ADDITIONAL PROTECTION. WHEN THE WORK IS COMPLETE THE RIPRAP CAN THEN BE MOVED TO THE PERMANENT LOCATION INDICATED IN THE PLANS. THE TEMPORARY ROCK BERM IS INCIDENTAL.
- ③ ON U.S. COAST GUARD OR OTHER MOTORIZED WATERWAYS, BUOYS ARE REQUIRED TO MARK THE ENDS AND SPECIAL AREAS FOR VISIBILITY. PLACE BUOYS AS REQUIRED FOR NAVIGATIONAL PURPOSES.
- ④ MINIMUM WATER DEPTH APPLIES TO THE DEEPEST POINT ALONG THE FLOTATION SILT CURTAIN OR SILT FENCE TYPE TB FOR DETERMINING APPLICABILITY OF FLOTATION SILT CURTAIN OR SILT FENCE TYPE TB.
- ⑤ SILT CURTAIN SHOULD BE REMOVED WHEN THE AREA CONTRIBUTING DIRECT RUNOFF HAS BEEN TEMPORARILY OR PERMANENTLY STABILIZED. SILT CURTAIN SHOULD ALSO BE REMOVED BEFORE WINTER IF ICE UP OR ICE FLOW IS ANTICIPATED.
- ⑥ EMBED POST INTO BOTTOM A MINIMUM OF 40% OF THE WATER DEPTH (INCLUDING WAVE HEIGHT), BUT IN NO CASE SHALL EMBEDMENT BE LESS THAN 2 FEET.
- ⑦ ANCHOR FLOAT MUST BE CONNECTED SECURELY TO SLEEVE WITH A MINIMUM TENSILE STRENGTH OF 100 LBS. CONNECTION METHOD MUST ALLOW FOR SLEEVE TO MOVE FREELY ON POST.
- ⑧ PROVIDE SUFFICIENT NUMBER OF POST ANCHORS TO MAINTAIN SILT CURTAIN POSITION.



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PRELIMINARY NOT FOR CONSTRUCTION
CHARLES J. BRANDEL

DATE: _____ LIC. NO. 43359

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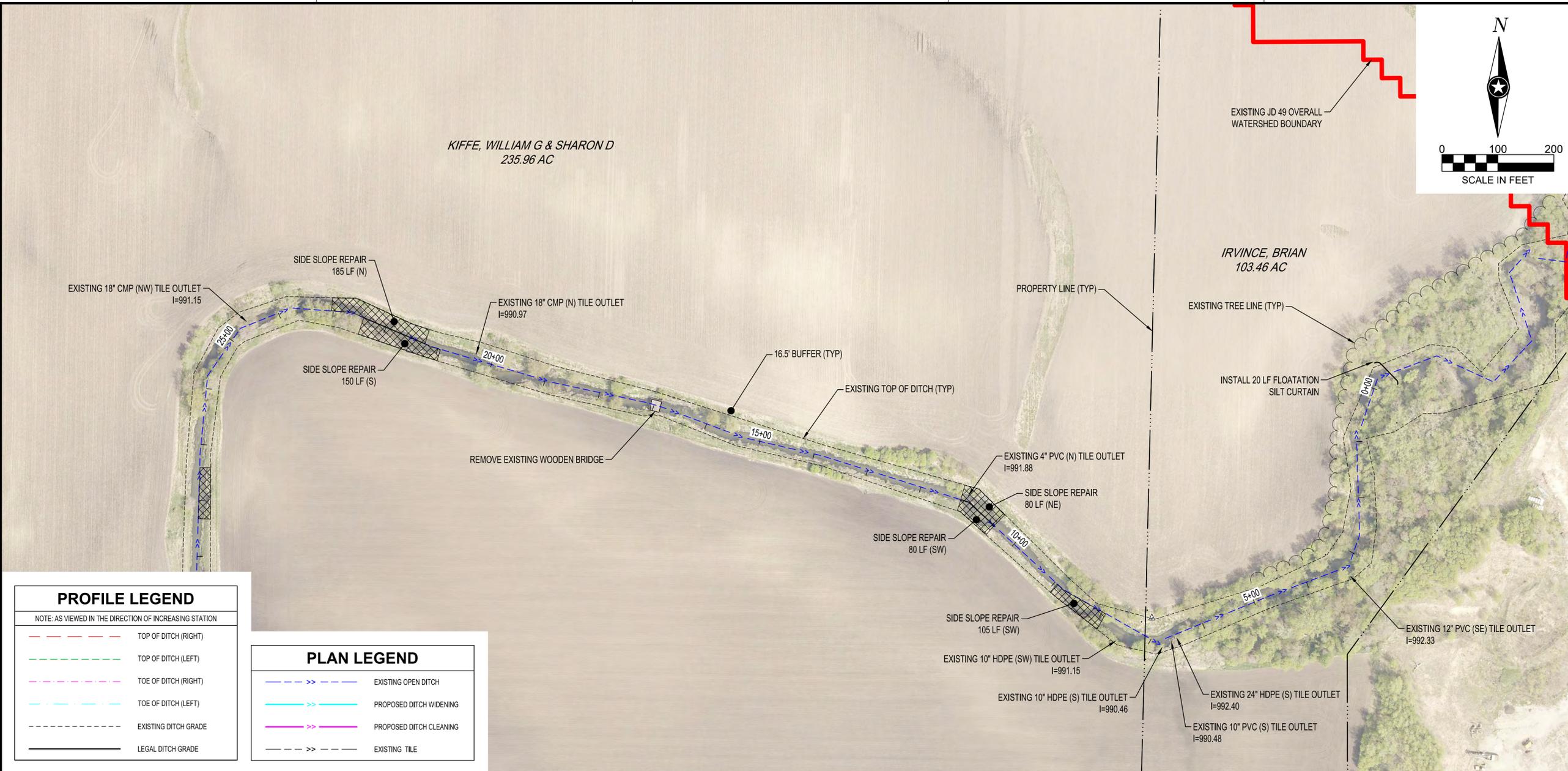
PROJECT
BLUE EARTH COUNTY
JUDICIAL DITCH
No. 49 REPAIRS
BLUE EARTH COUNTY MINNESOTA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	20-24339
FILE NAME	24339 MAINLINE PROFILES
DRAWN BY	KJH
DESIGNED BY	KBW
REVIEWED BY	CJB
ORIGINAL ISSUE DATE	---/---/---
CLIENT PROJECT NO.	20-24339

TITLE
PLAN - PROFILE
MAINLINE

SHEET
12
OF 36



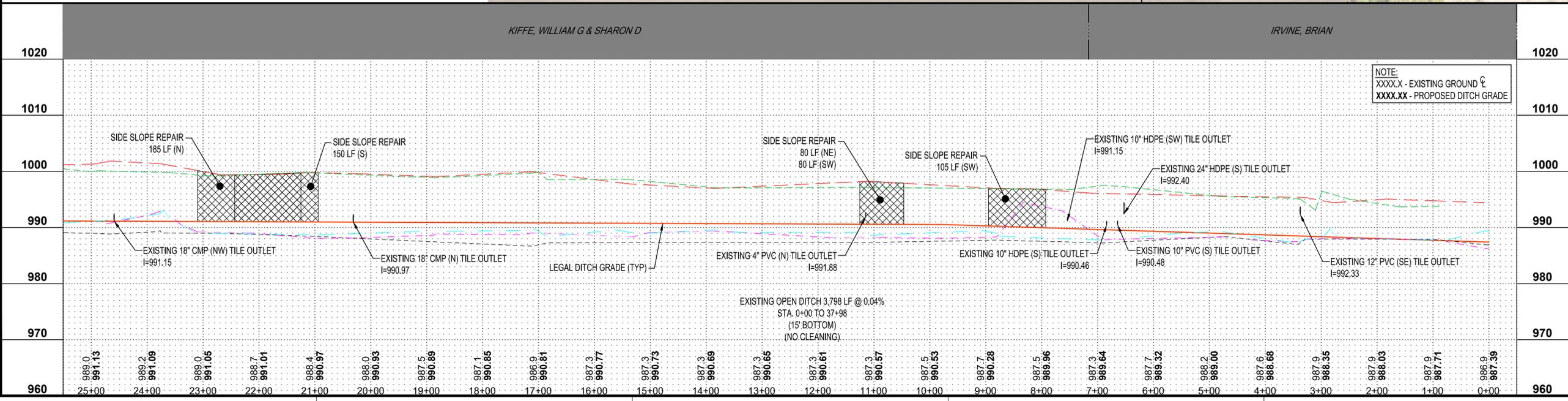
PROFILE LEGEND

NOTE: AS VIEWED IN THE DIRECTION OF INCREASING STATION

---	TOP OF DITCH (RIGHT)
---	TOP OF DITCH (LEFT)
---	TOE OF DITCH (RIGHT)
---	TOE OF DITCH (LEFT)
---	EXISTING DITCH GRADE
---	LEGAL DITCH GRADE

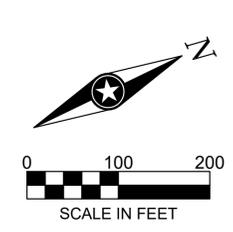
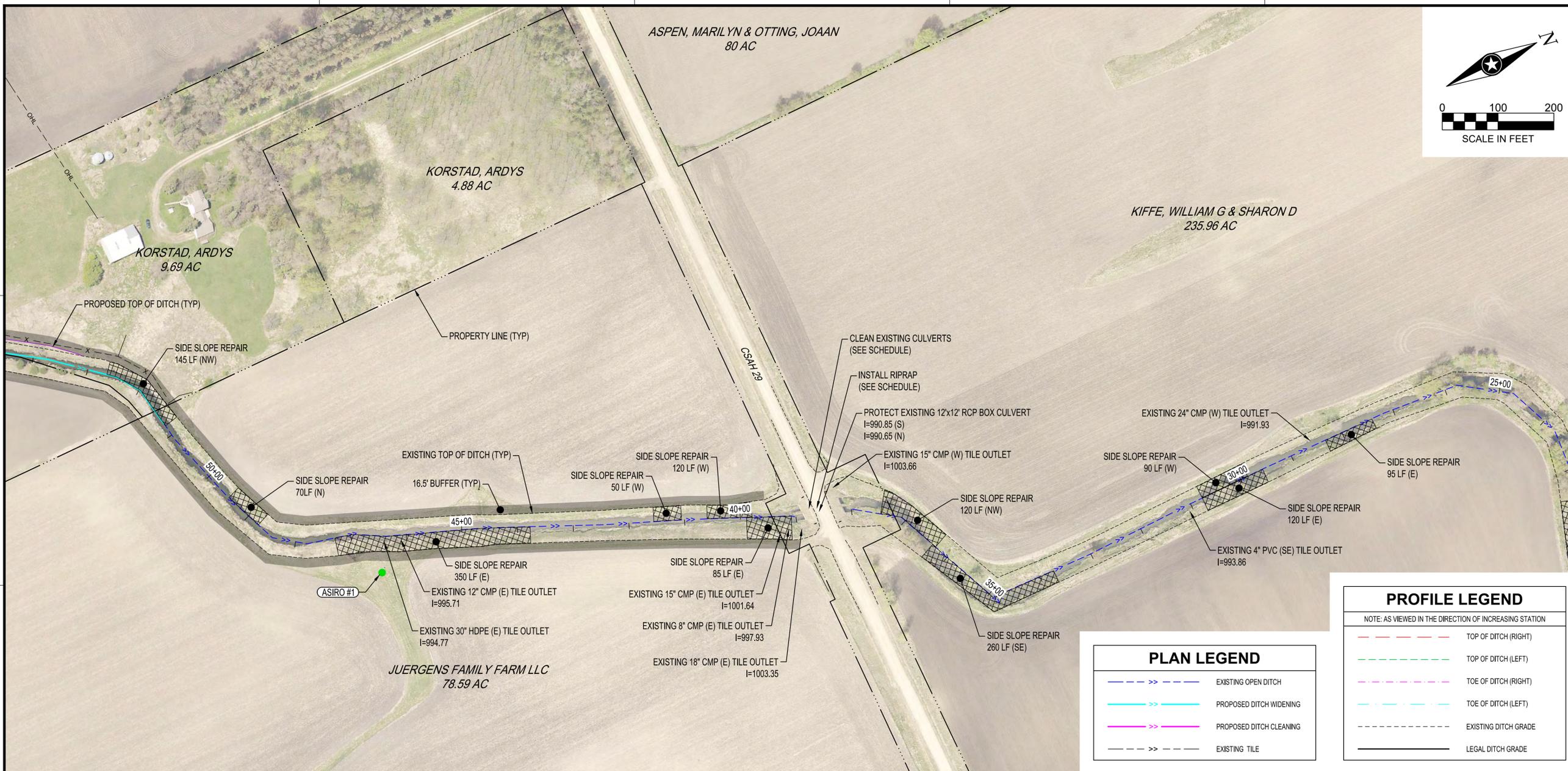
PLAN LEGEND

---	EXISTING OPEN DITCH
---	PROPOSED DITCH WIDENING
---	PROPOSED DITCH CLEANING
---	EXISTING TILE



NOTE:
XXXX.X - EXISTING GROUND ζ
XXXX.XX - PROPOSED DITCH GRADE

EXISTING OPEN DITCH 3,798 LF @ 0.04%
STA. 0+00 TO 37+98
(15' BOTTOM)
(NO CLEANING)



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PROJECT
BLUE EARTH COUNTY
JUDICIAL DITCH No. 49 REPAIRS
BLUE EARTH COUNTY MINNESOTA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

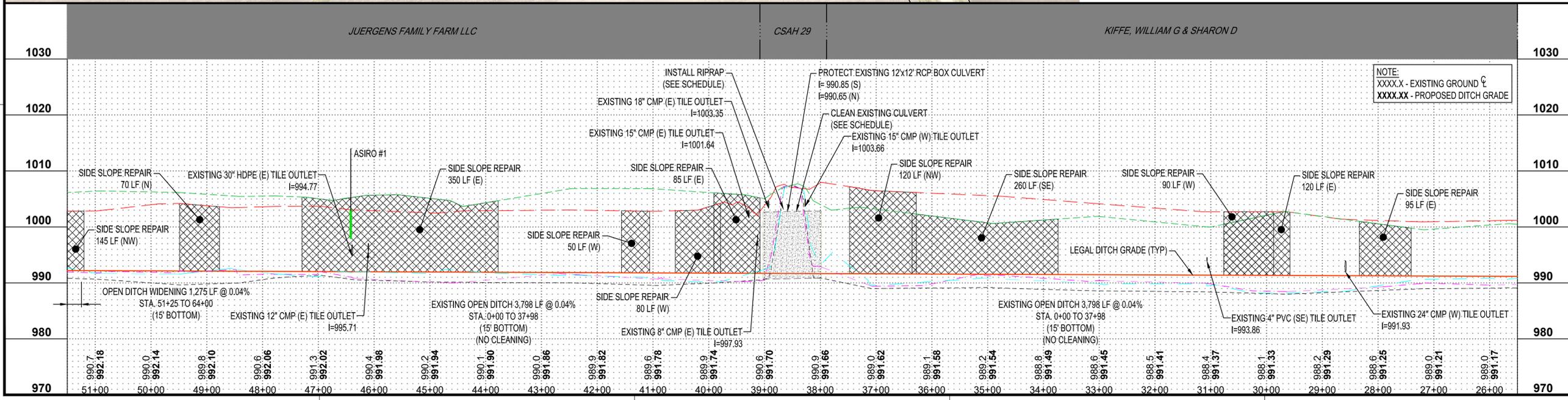
PROJECT NO.	20-24339
FILE NAME	24339 MAINLINE PROFILES
DRAWN BY	KJH
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ORIGINAL ISSUE DATE	---/---/---
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TITLE
PLAN - PROFILE MAINLINE

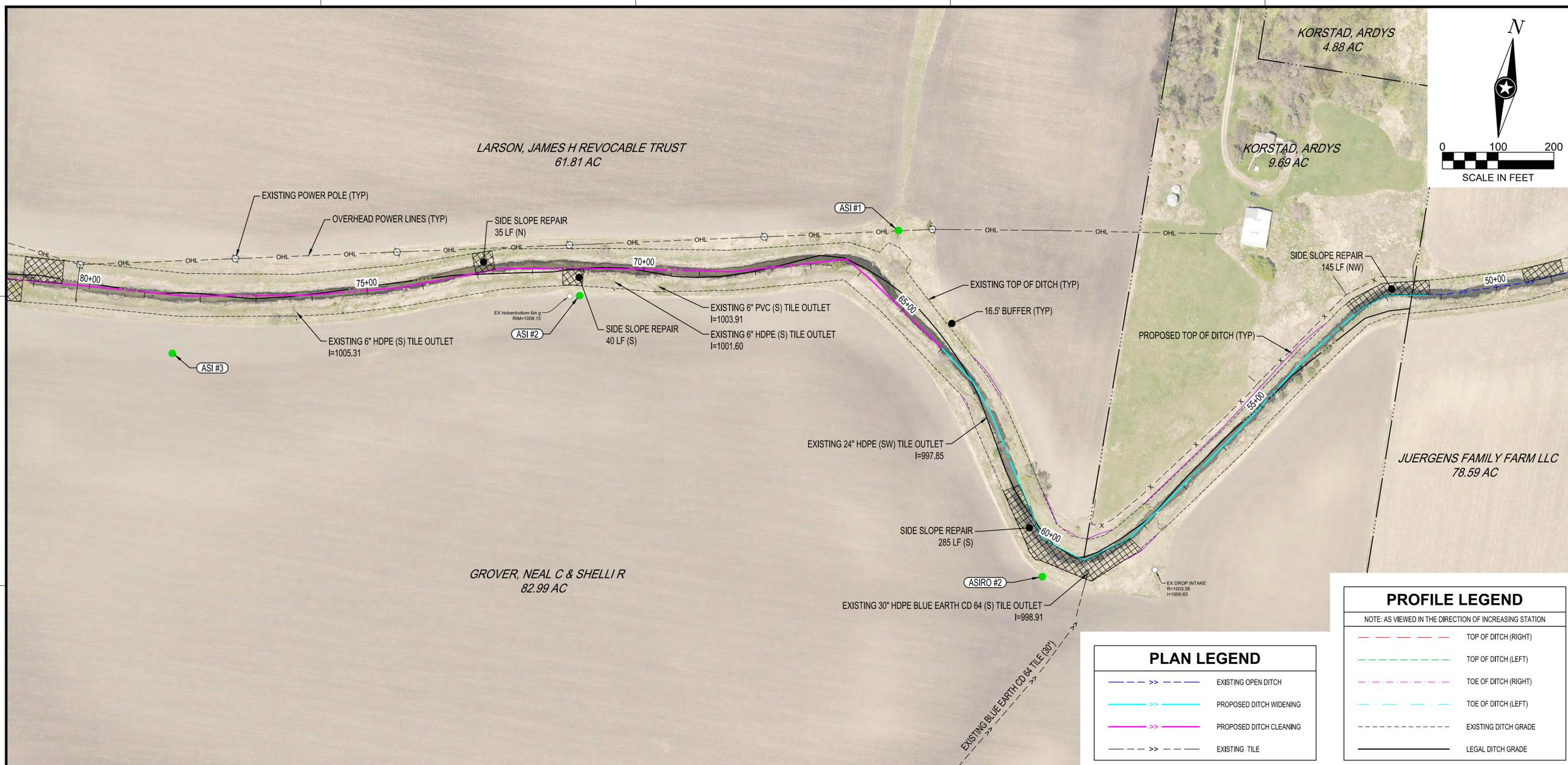
SHEET
13 OF 36

PLAN LEGEND	
	EXISTING OPEN DITCH
	PROPOSED DITCH WIDENING
	PROPOSED DITCH CLEANING
	EXISTING TILE

PROFILE LEGEND	
NOTE: AS VIEWED IN THE DIRECTION OF INCREASING STATION	
	TOP OF DITCH (RIGHT)
	TOP OF DITCH (LEFT)
	TOE OF DITCH (RIGHT)
	TOE OF DITCH (LEFT)
	EXISTING DITCH GRADE
	LEGAL DITCH GRADE



NOTE:
XXXX.X - EXISTING GROUND \bar{c}
XXXX.XX - PROPOSED DITCH GRADE



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PLAN LEGEND

- >> EXISTING OPEN DITCH
- >> PROPOSED DITCH WIDENING
- >> PROPOSED DITCH CLEANING
- >> EXISTING TILE

PROFILE LEGEND

NOTE: AS VIEWED IN THE DIRECTION OF INCREASING STATION

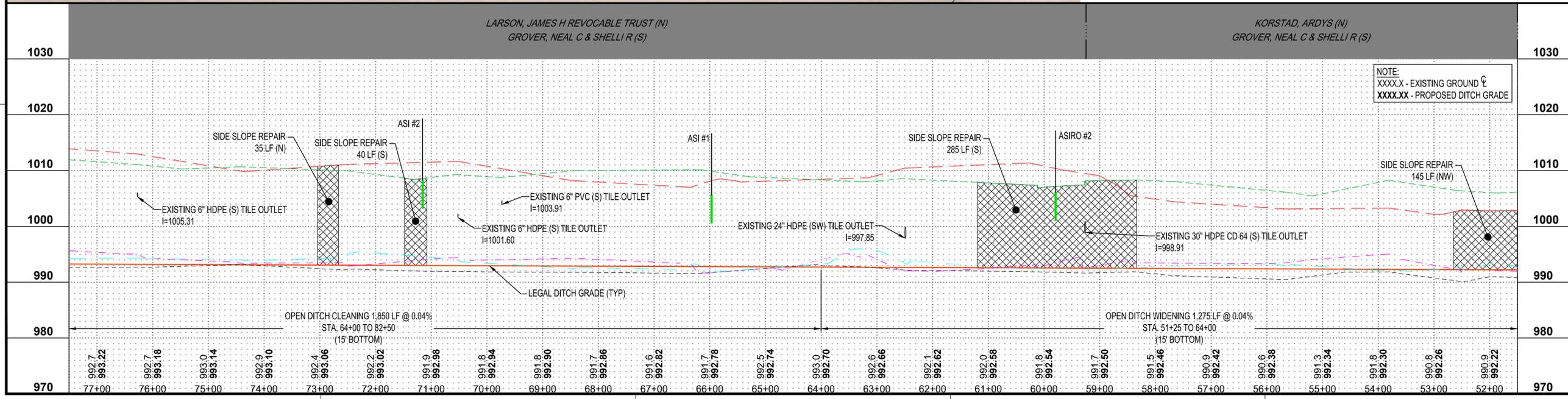
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- - - - TOE OF DITCH (RIGHT)
- - - - TOE OF DITCH (LEFT)
- - - - EXISTING DITCH GRADE
- - - - LEGAL DITCH GRADE

PROJECT
BLUE EARTH COUNTY
JUDICIAL DITCH No. 49 REPAIRS
BLUE EARTH COUNTY MINNESOTA

REVISION SCHEDULE

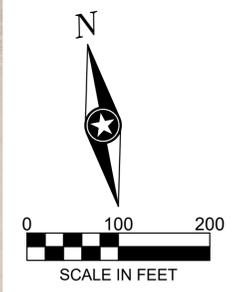
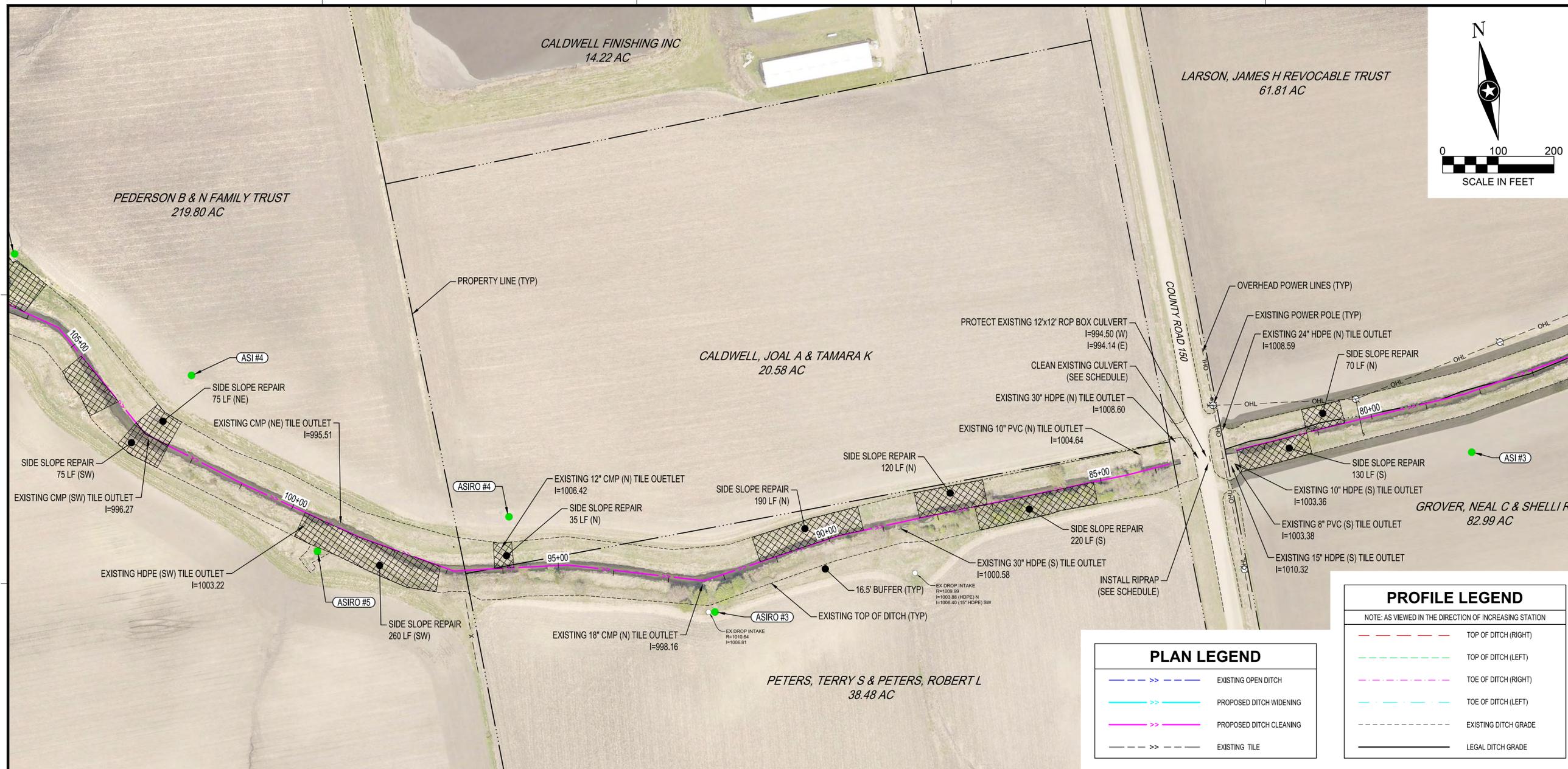
DATE	DESCRIPTION	BY

PROJECT NO.	20-24339
FILE NAME	24339 MAINLINE PROFILES
DRAWN BY	KJH
DESIGNED BY	KBW
REVIEWED BY	CJB
ORIGINAL ISSUE DATE	11/1/20
CLIENT PROJECT NO.	20-24339



TITLE
PLAN - PROFILE MAINLINE

SHEET
14 OF 36



BLUE EARTH COUNTY

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PLAN LEGEND

	EXISTING OPEN DITCH
	PROPOSED DITCH WIDENING
	PROPOSED DITCH CLEANING
	EXISTING TILE

PROFILE LEGEND

NOTE: AS VIEWED IN THE DIRECTION OF INCREASING STATION

	TOP OF DITCH (RIGHT)
	TOP OF DITCH (LEFT)
	TOE OF DITCH (RIGHT)
	TOE OF DITCH (LEFT)
	EXISTING DITCH GRADE
	LEGAL DITCH GRADE

PROJECT
BLUE EARTH COUNTY JUDICIAL DITCH No. 49 REPAIRS
BLUE EARTH COUNTY MINNESOTA

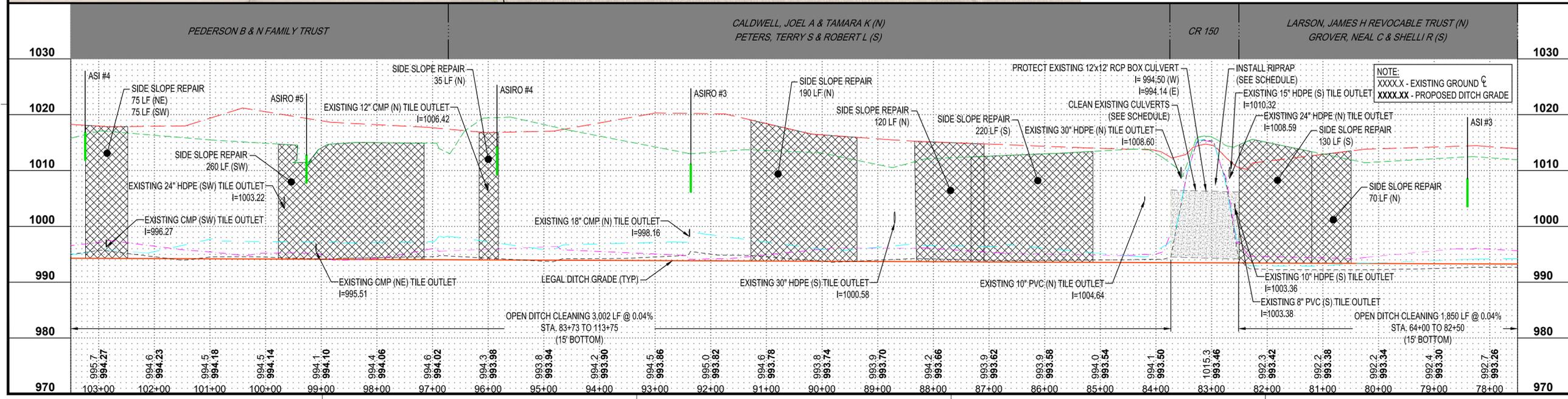
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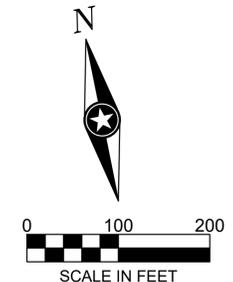
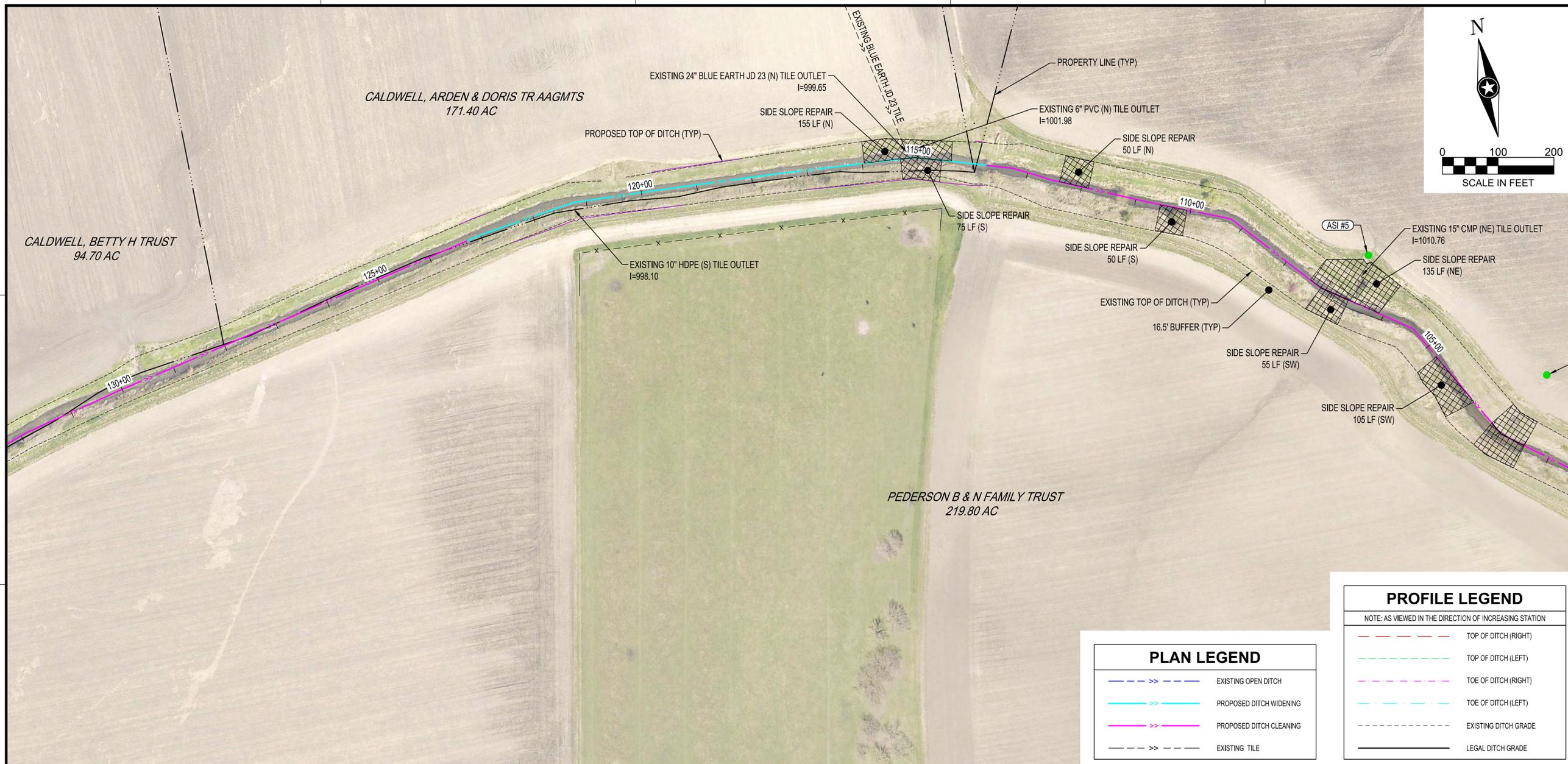
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TITLE
PLAN - PROFILE MAINLINE

SHEET
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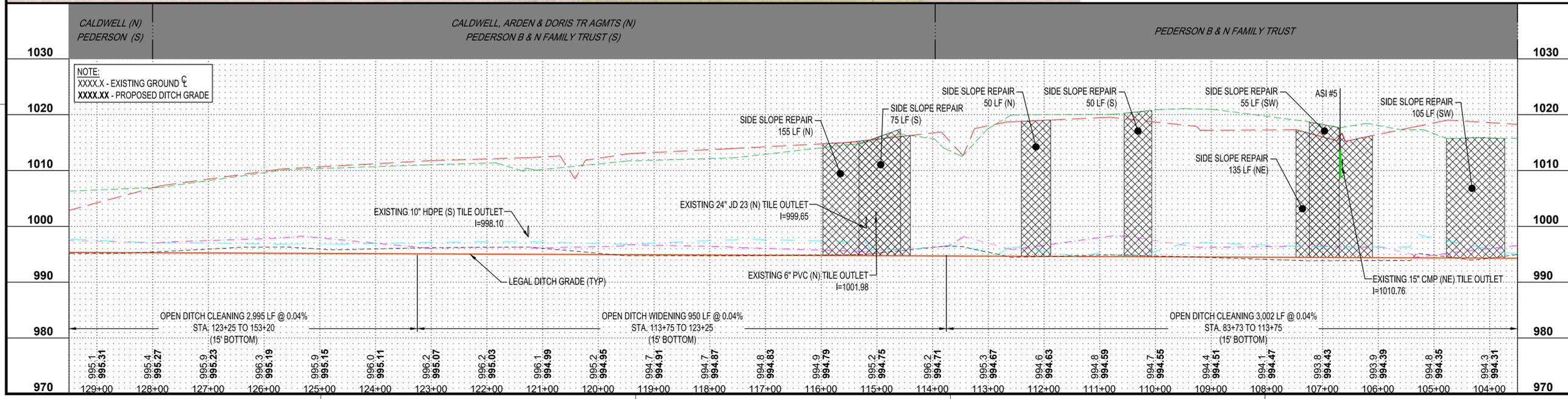
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PROJECT
BLUE EARTH COUNTY
JUDICIAL DITCH No. 49 REPAIRS
BLUE EARTH COUNTY MINNESOTA

PLAN LEGEND	
	EXISTING OPEN DITCH
	PROPOSED DITCH WIDENING
	PROPOSED DITCH CLEANING
	EXISTING TILE

PROFILE LEGEND	
NOTE: AS VIEWED IN THE DIRECTION OF INCREASING STATION	
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	LEGAL DITCH GRADE

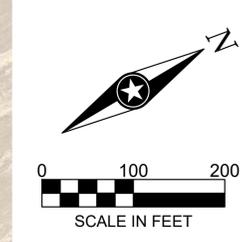
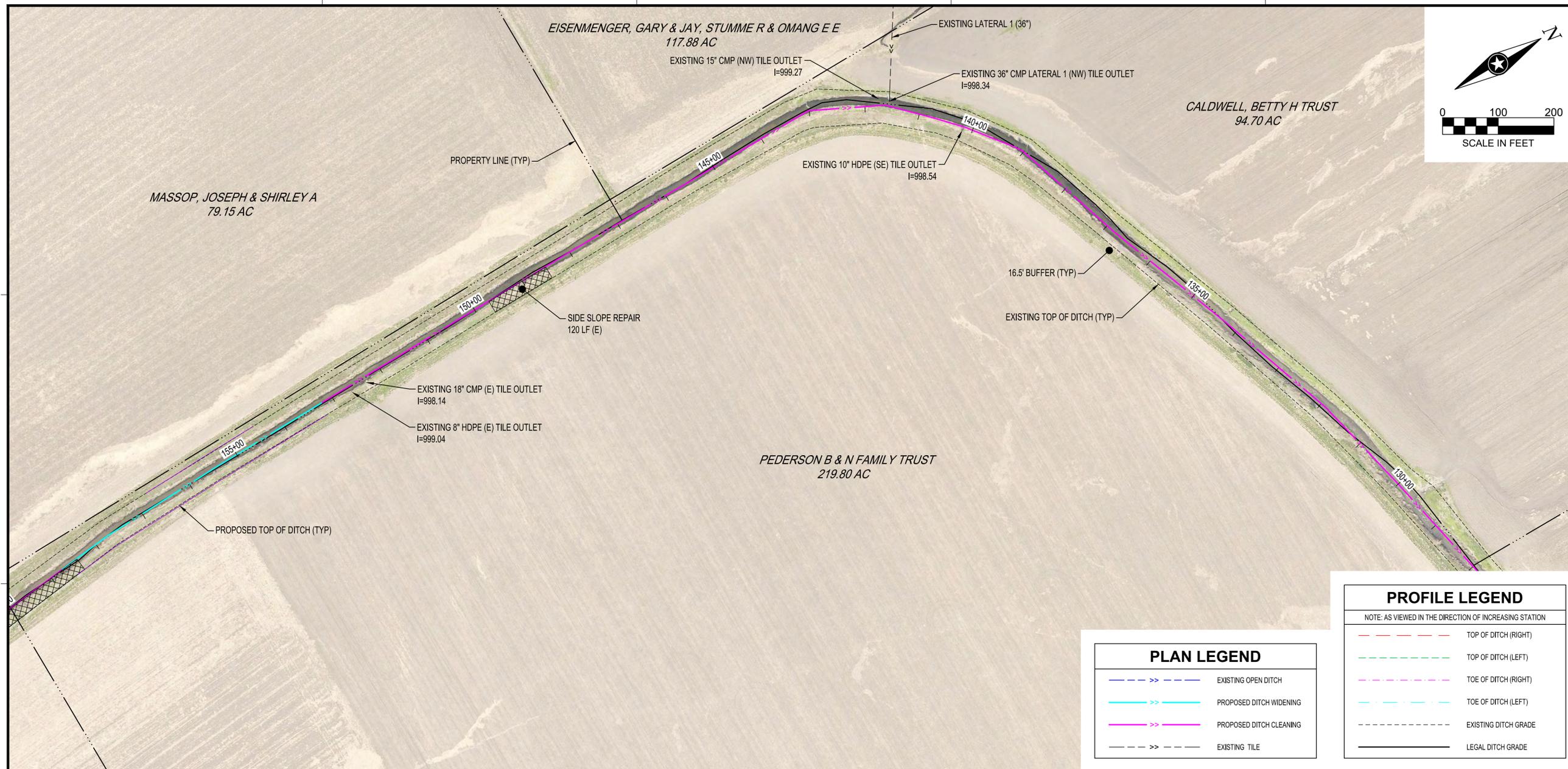


REVISION SCHEDULE		
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DRAWN BY	KJH
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TITLE
PLAN - PROFILE MAINLINE

SHEET
16 OF 36



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PRELIMINARY PLAN FOR CONSTRUCTION

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PLAN LEGEND	
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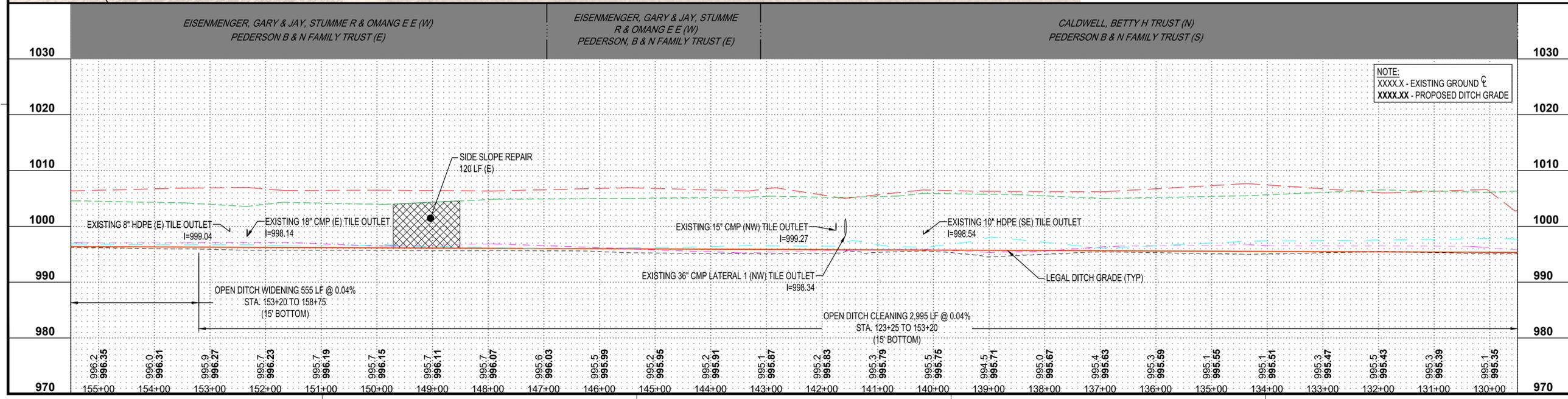
PROJECT
BLUE EARTH COUNTY
JUDICIAL DITCH No. 49 REPAIRS
BLUE EARTH COUNTY MINNESOTA

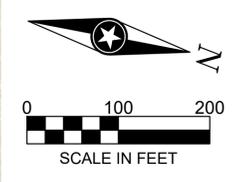
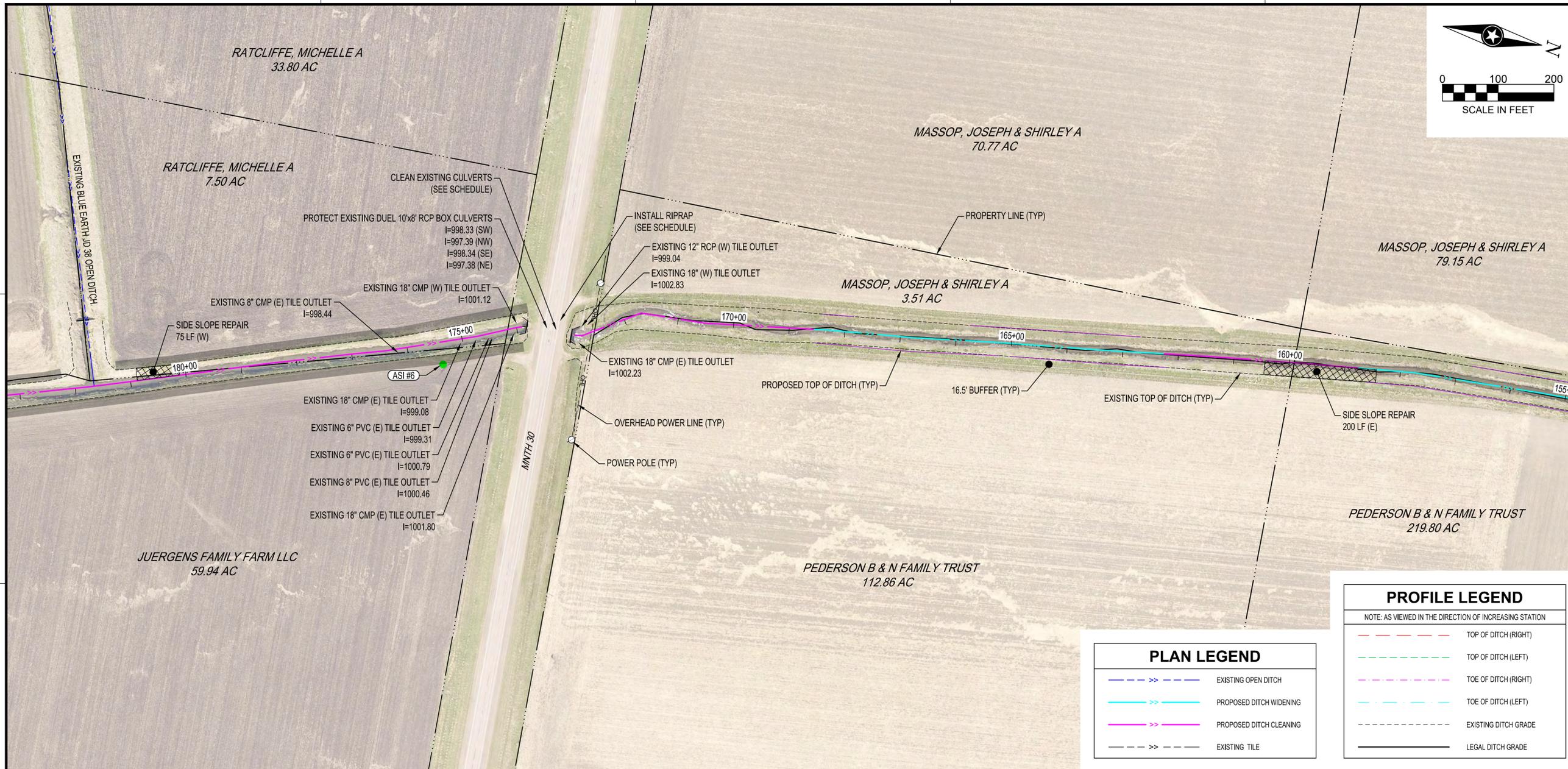
REVISION SCHEDULE		
DATE	DESCRIPTION	BY

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TITLE
PLAN - PROFILE MAINLINE

SHEET
17 OF 36





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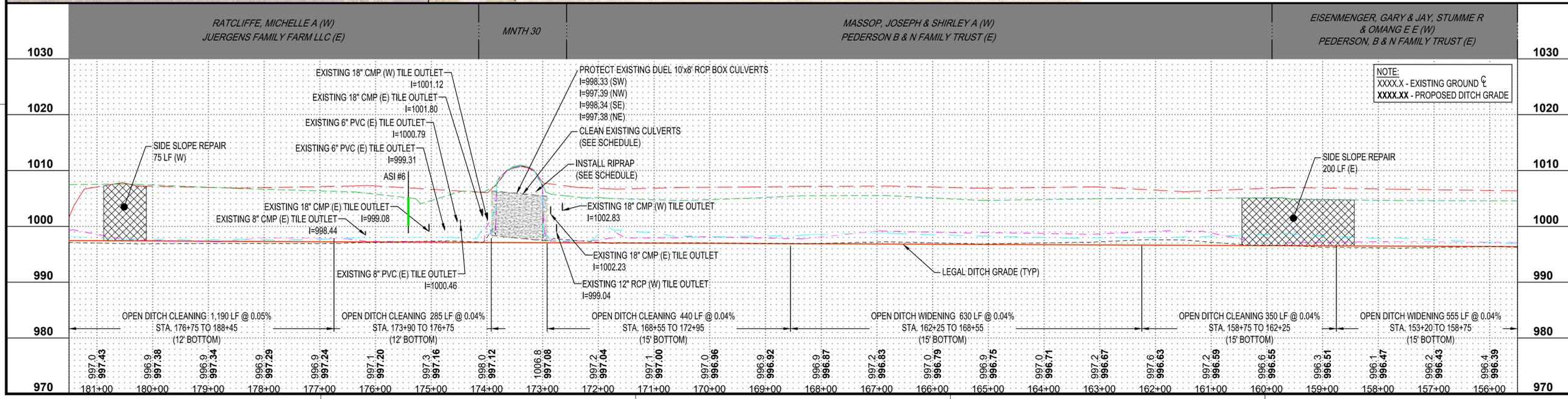
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PLAN LEGEND	
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	PROPOSED DITCH CLEANING
	EXISTING TILE

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	EXISTING DITCH GRADE
	LEGAL DITCH GRADE

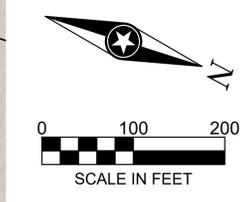
PROJECT
BLUE EARTH COUNTY
JUDICIAL DITCH
No. 49 REPAIRS
BLUE EARTH COUNTY MINNESOTA



REVISION SCHEDULE		
DATE	DESCRIPTION	BY

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TITLE
PLAN - PROFILE
MAINLINE
SHEET
18
OF 36

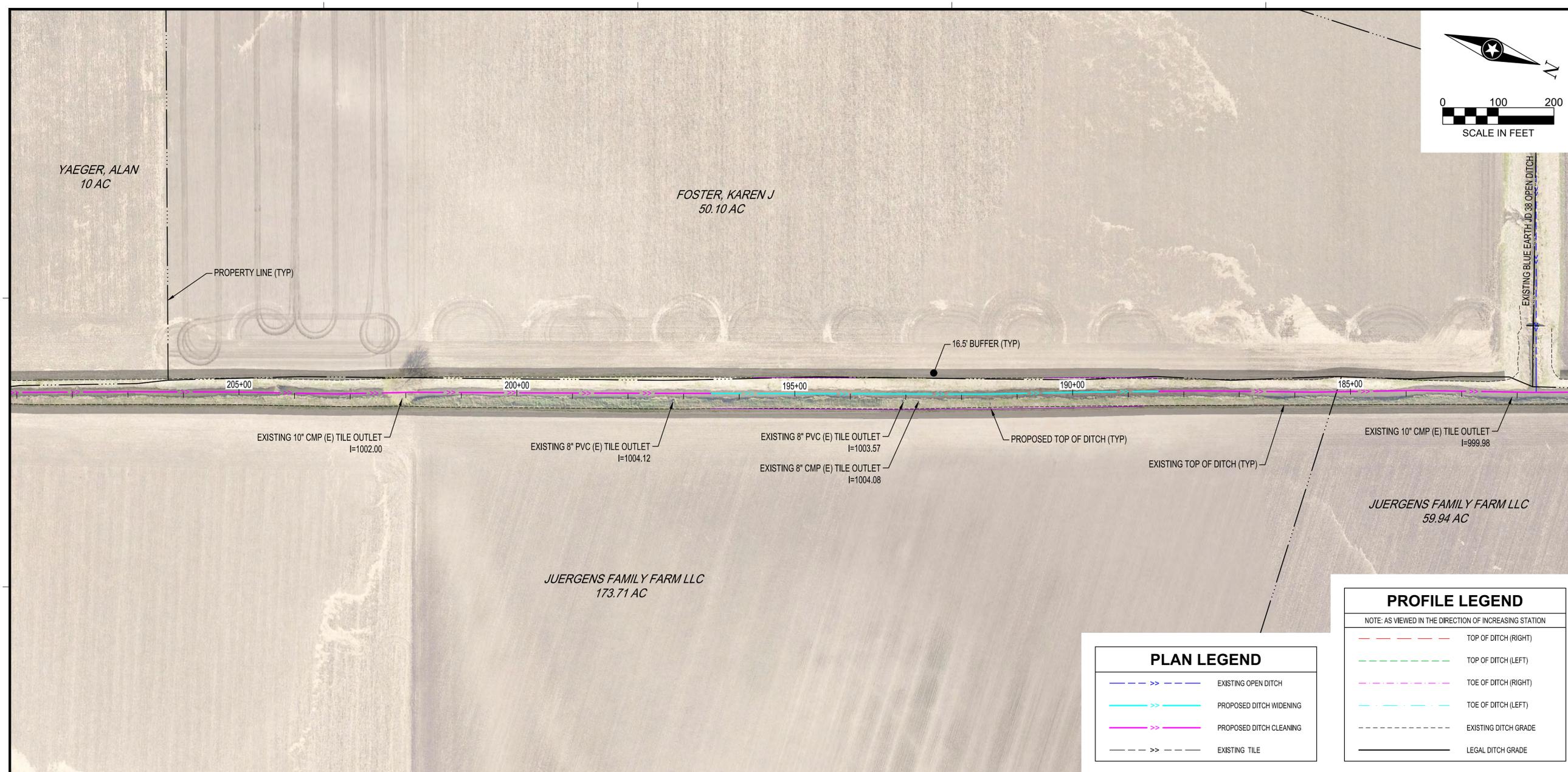


BLUE EARTH COUNTY

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PLAN LEGEND

- >--- EXISTING OPEN DITCH
- >--- PROPOSED DITCH WIDENING
- >--- PROPOSED DITCH CLEANING
- >--- EXISTING TILE

PROFILE LEGEND

NOTE: AS VIEWED IN THE DIRECTION OF INCREASING STATION

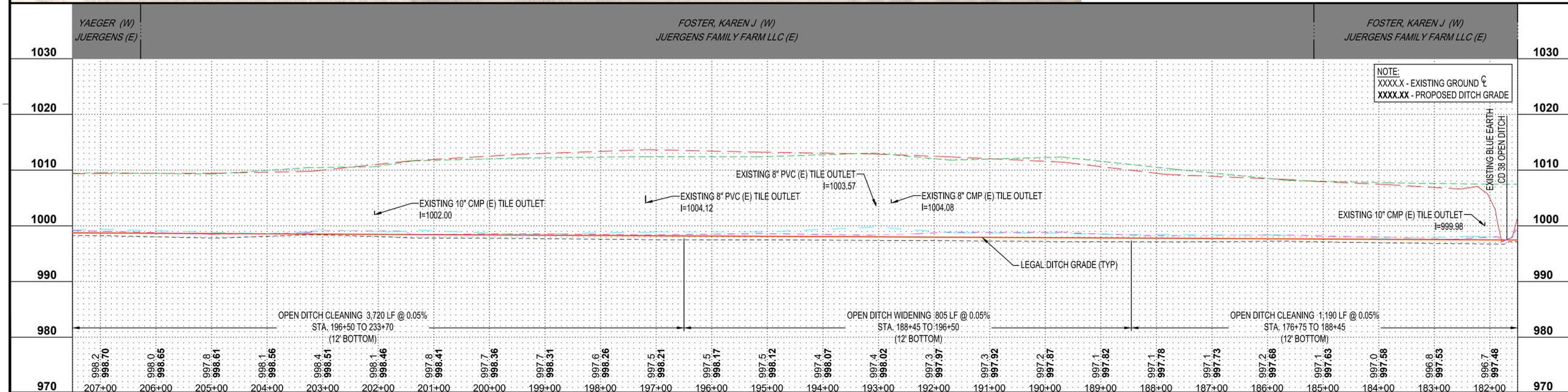
- TOP OF DITCH (RIGHT)
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- TOE OF DITCH (LEFT)
- EXISTING DITCH GRADE
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PROJECT
BLUE EARTH COUNTY
JUDICIAL DITCH No. 49 REPAIRS
BLUE EARTH COUNTY MINNESOTA

REVISION SCHEDULE

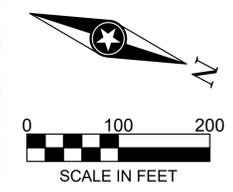
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TITLE
PLAN - PROFILE MAINLINE

SHEET
19 OF 36



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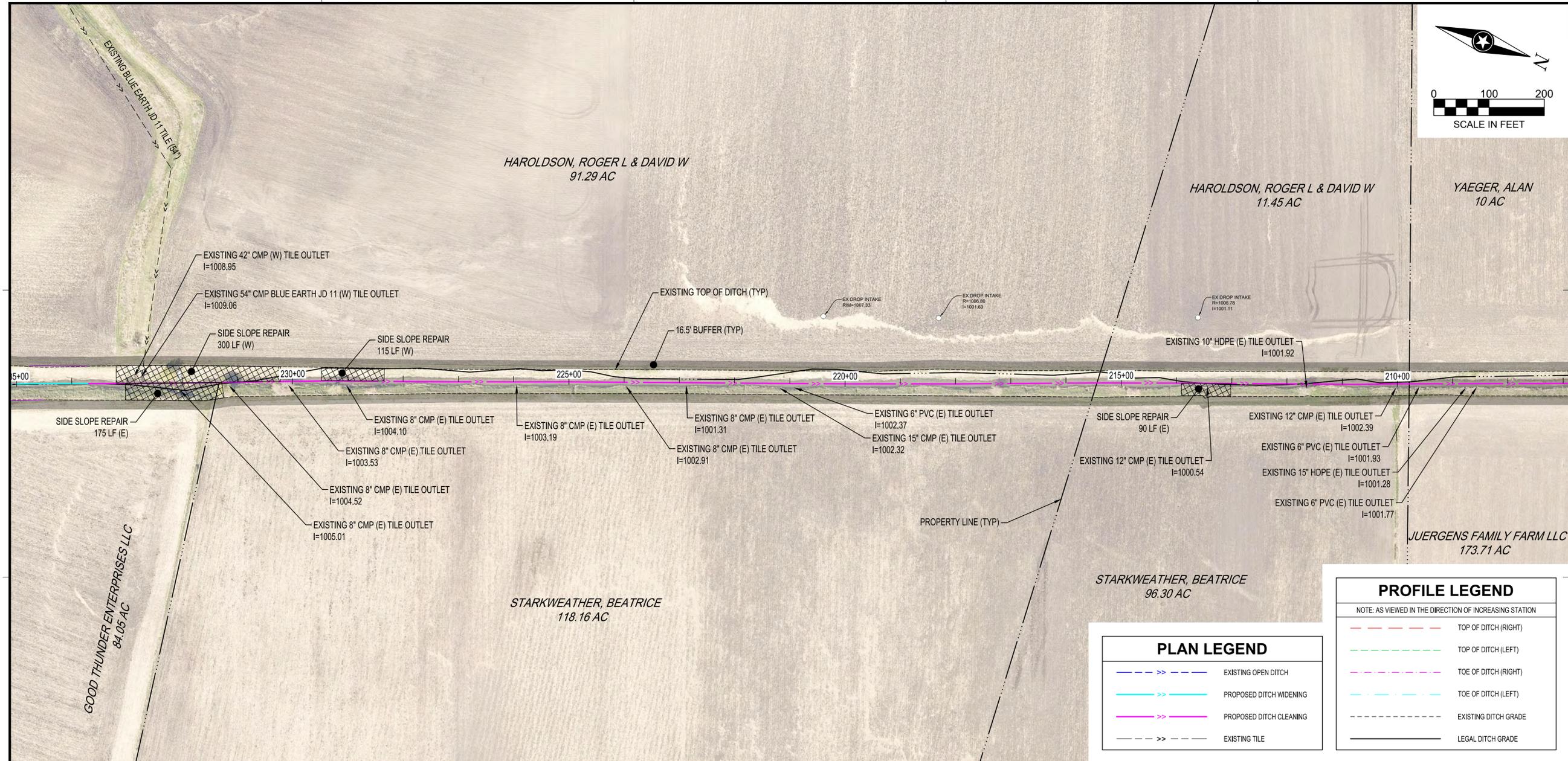
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PROJECT
BLUE EARTH COUNTY
JUDICIAL DITCH
No. 49 REPAIRS
 BLUE EARTH COUNTY MINNESOTA

REVISION SCHEDULE		
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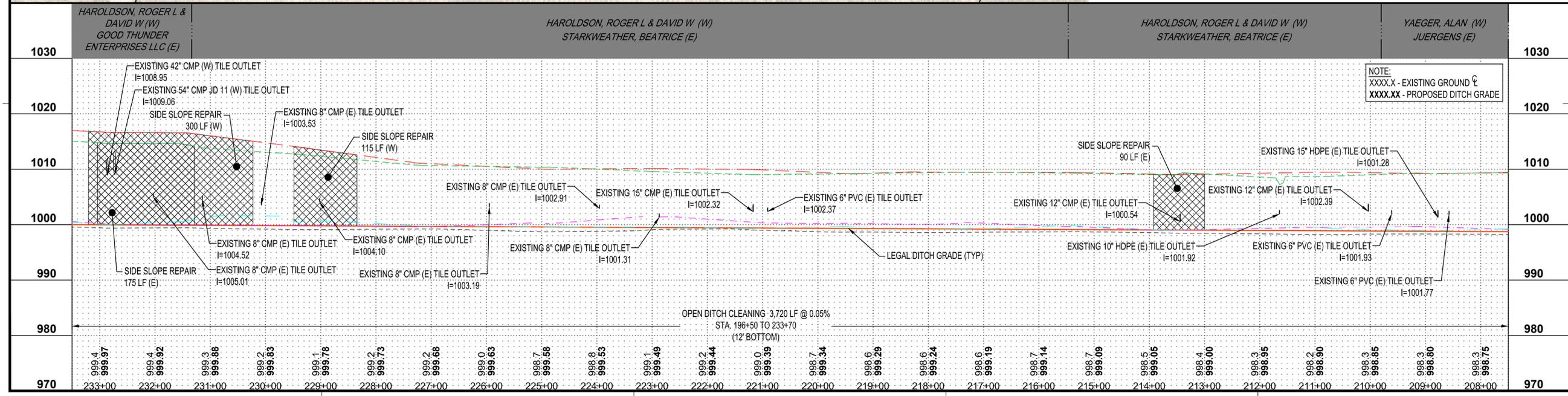
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TITLE
PLAN - PROFILE
MAINLINE
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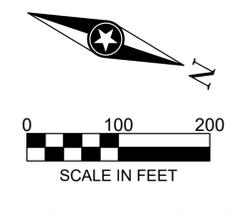
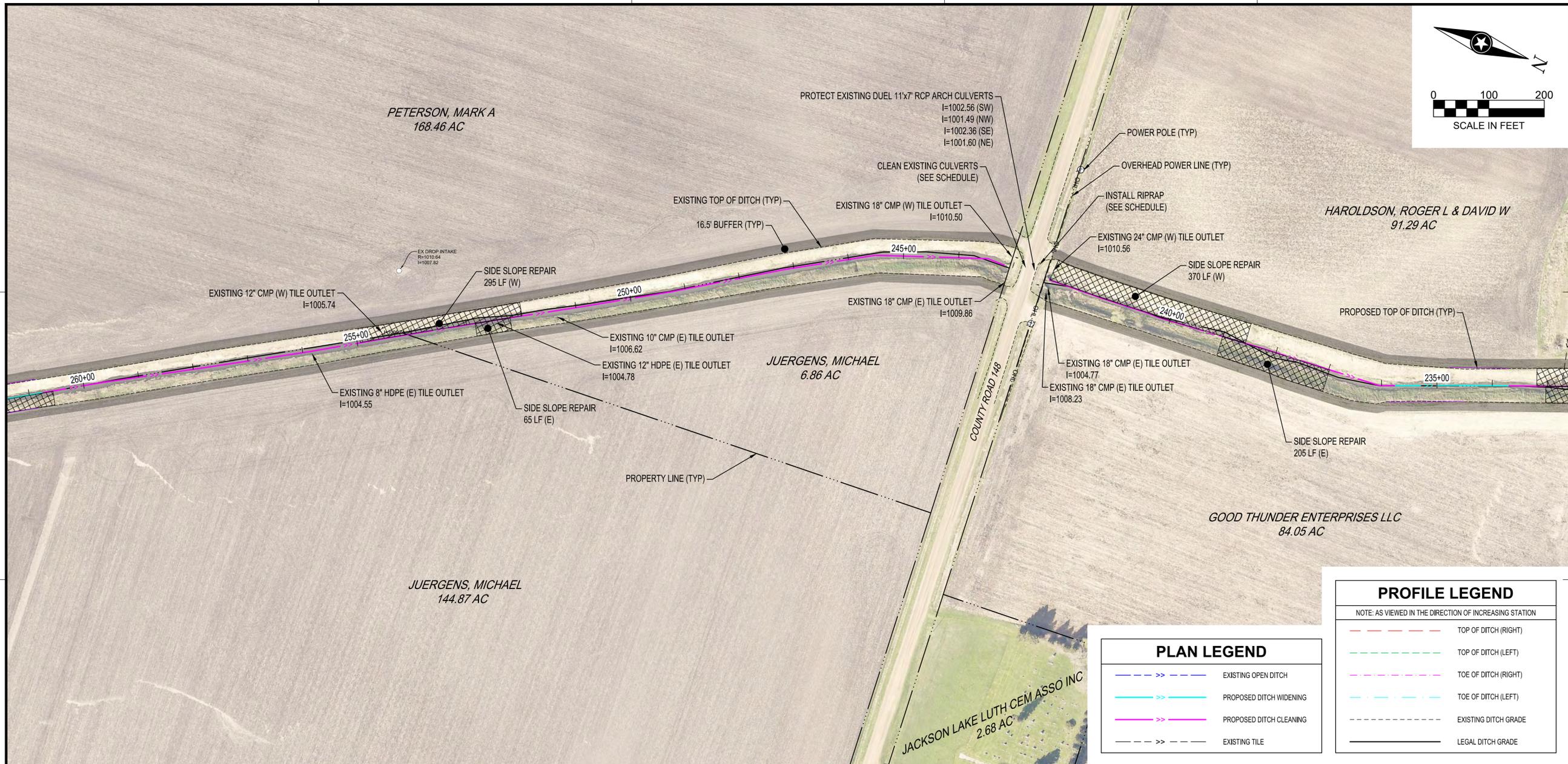
PLAN LEGEND	
	EXISTING OPEN DITCH
	PROPOSED DITCH WIDENING
	PROPOSED DITCH CLEANING
	EXISTING TILE

PROFILE LEGEND	
NOTE: AS VIEWED IN THE DIRECTION OF INCREASING STATION	
	TOP OF DITCH (RIGHT)
	TOP OF DITCH (LEFT)
	TOE OF DITCH (RIGHT)
	TOE OF DITCH (LEFT)
	EXISTING DITCH GRADE
	LEGAL DITCH GRADE



NOTE:
 XXXX.X - EXISTING GROUND ζ
 XXXX.XX - PROPOSED DITCH GRADE

OPEN DITCH CLEANING: 3,720 LF @ 0.05%
 STA. 196+50 TO 233+70
 (12' BOTTOM)



BLUE EARTH COUNTY

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PROFILE LEGEND

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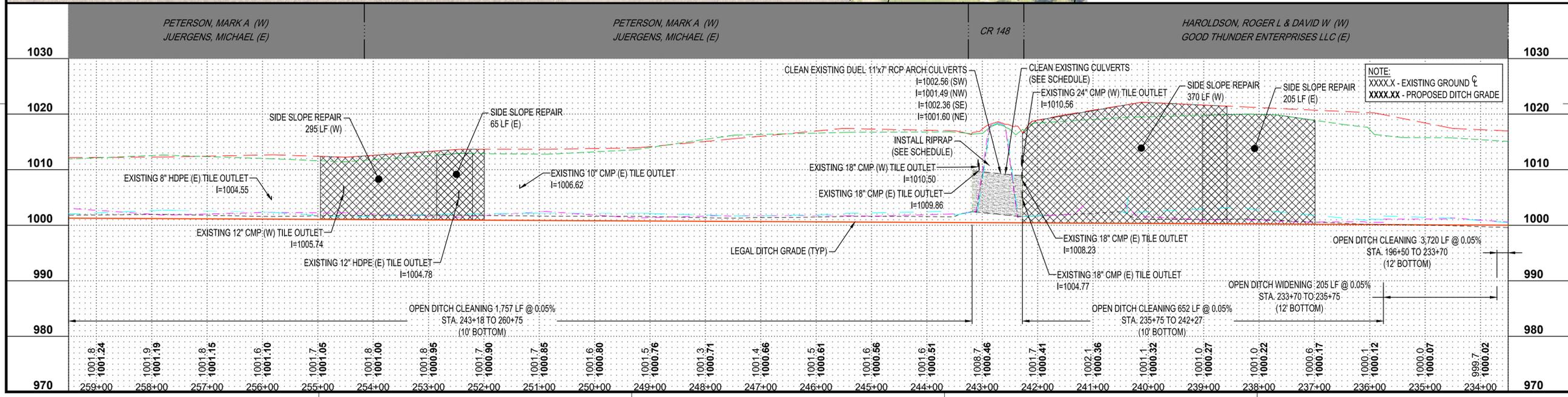
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BLUE EARTH COUNTY
JUDICIAL DITCH
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BLUE EARTH COUNTY MINNESOTA

REVISION SCHEDULE

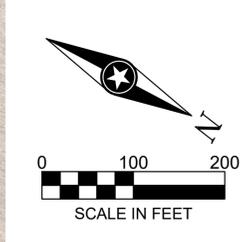
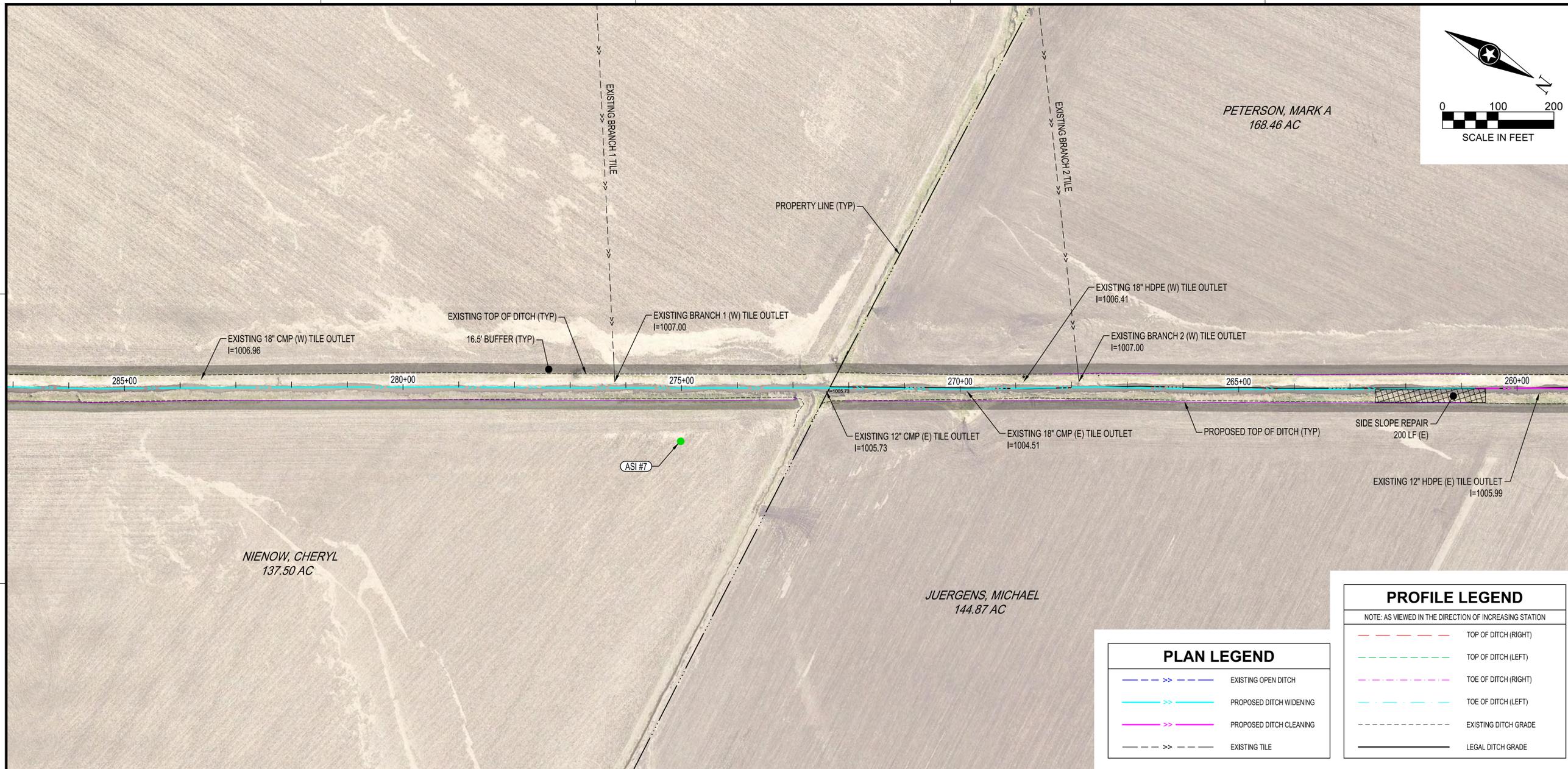
DATE	DESCRIPTION	BY

PROJECT NO.	20-24339
FILE NAME	24339 MAINLINE PROFILES (1)
DRAWN BY	KJH
DESIGNED BY	KBW
REVIEWED BY	CJB
ORIGINAL ISSUE DATE	---/---/---
CLIENT PROJECT NO.	20-24339



TITLE
PLAN - PROFILE
MAINLINE

SHEET
21 OF 36



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CHARLES J. BRANDEL

PRELIMINARY NOT FOR CONSTRUCTION

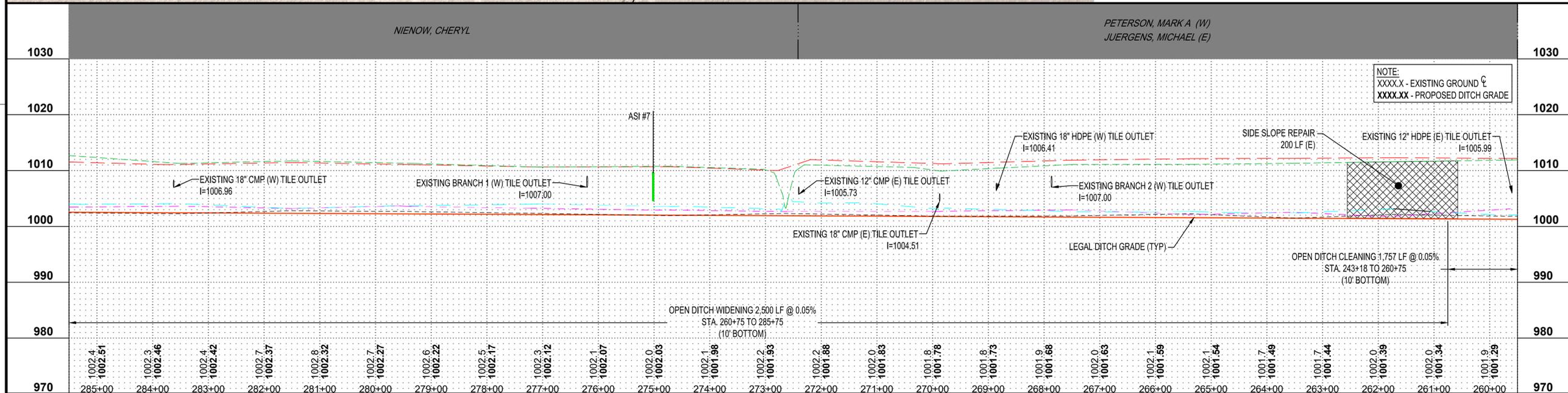
DATE: _____ LIC. NO. 43359

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PLAN LEGEND	
	EXISTING OPEN DITCH
	PROPOSED DITCH WIDENING
	PROPOSED DITCH CLEANING
	EXISTING TILE

PROFILE LEGEND	
NOTE: AS VIEWED IN THE DIRECTION OF INCREASING STATION	
	TOP OF DITCH (RIGHT)
	TOP OF DITCH (LEFT)
	TOE OF DITCH (RIGHT)
	TOE OF DITCH (LEFT)
	EXISTING DITCH GRADE
	LEGAL DITCH GRADE

PROJECT
BLUE EARTH COUNTY
JUDICIAL DITCH No. 49 REPAIRS
BLUE EARTH COUNTY MINNESOTA

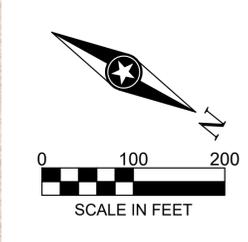


REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	20-24339
FILE NAME	24339 MAINLINE PROFILES (1)
DRAWN BY	KJH
DESIGNED BY	KBW
REVIEWED BY	CJB
ORIGINAL ISSUE DATE	11/1/20
CLIENT PROJECT NO.	20-24339

TITLE
PLAN - PROFILE MAINLINE

SHEET
22 OF 36

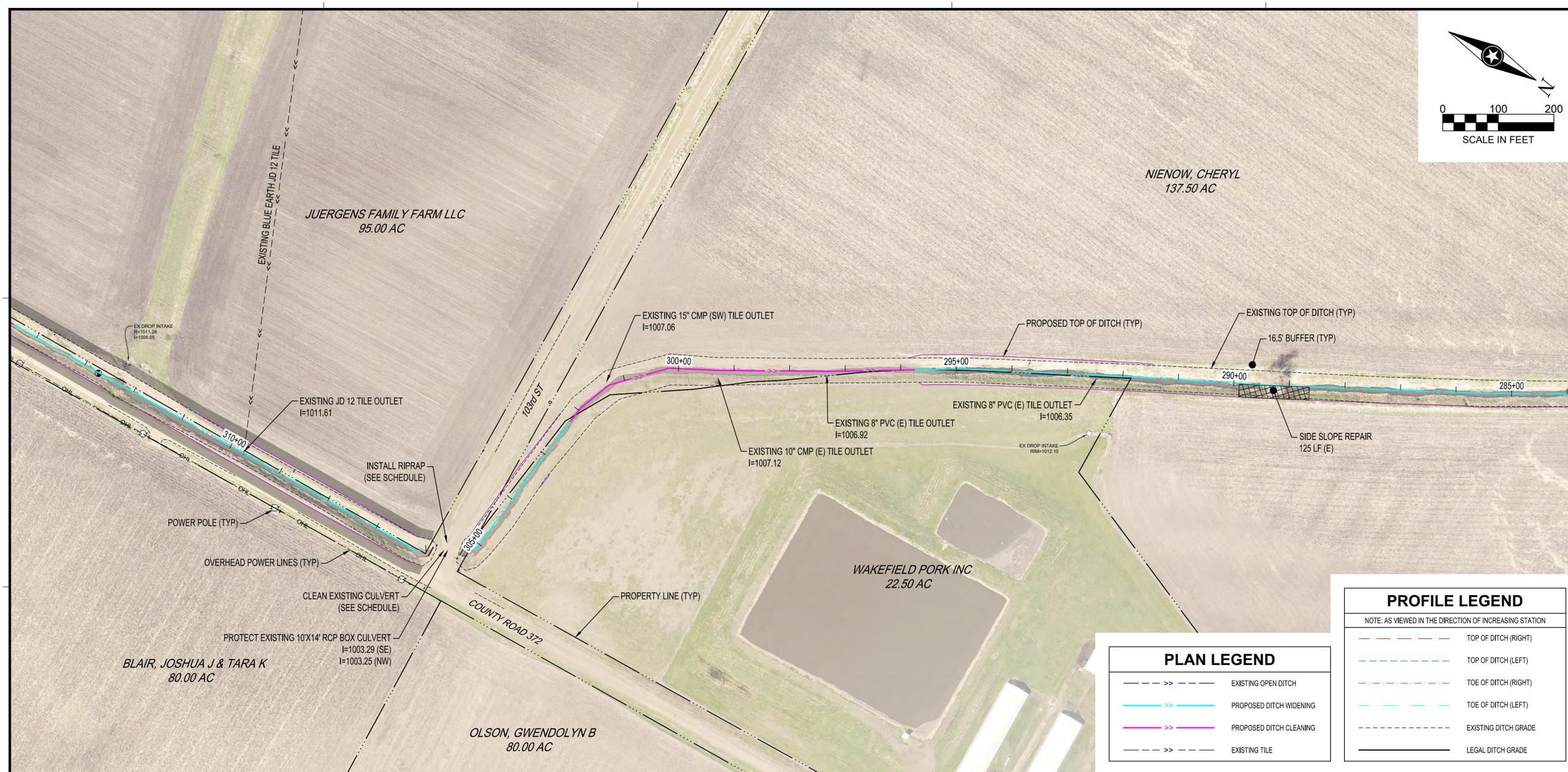


BLUE EARTH COUNTY

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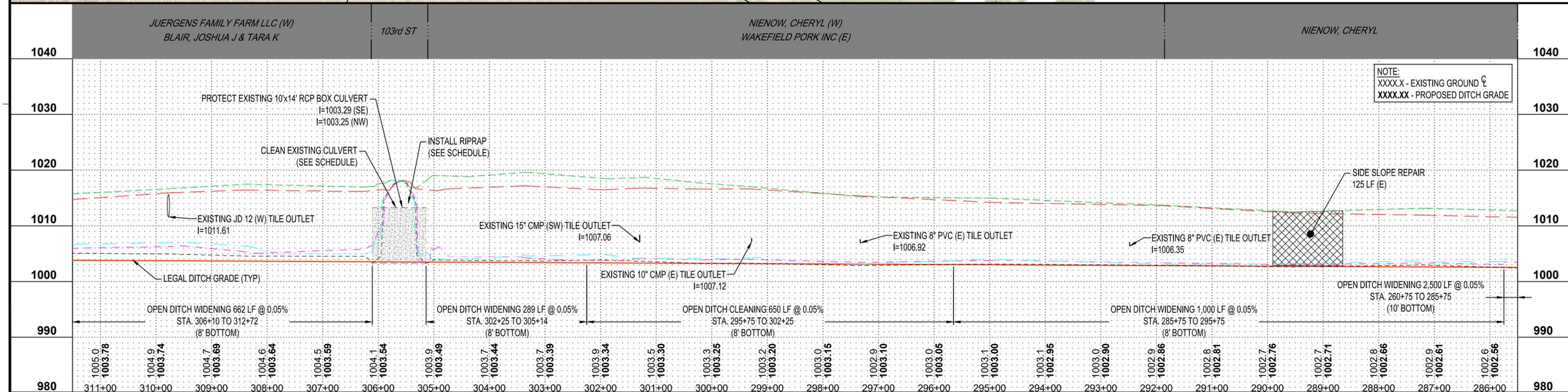
- EXISTING OPEN DITCH
- PROPOSED DITCH WIDENING
- PROPOSED DITCH CLEANING
- EXISTING TILE

PROFILE LEGEND

NOTE: AS VIEWED IN THE DIRECTION OF INCREASING STATION

- TOP OF DITCH (RIGHT)
- TOP OF DITCH (LEFT)
- TOE OF DITCH (RIGHT)
- TOE OF DITCH (LEFT)
- EXISTING DITCH GRADE
- LEGAL DITCH GRADE

PROJECT
BLUE EARTH COUNTY
JUDICIAL DITCH No. 49 REPAIRS
BLUE EARTH COUNTY MINNESOTA



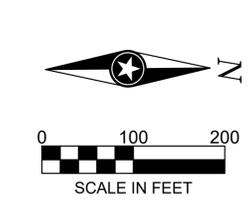
REVISION SCHEDULE

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ORIGINAL ISSUE DATE	---/---/---
CLIENT PROJECT NO.	20-24339

TITLE
PLAN - PROFILE MAINLINE

SHEET
23 OF 36

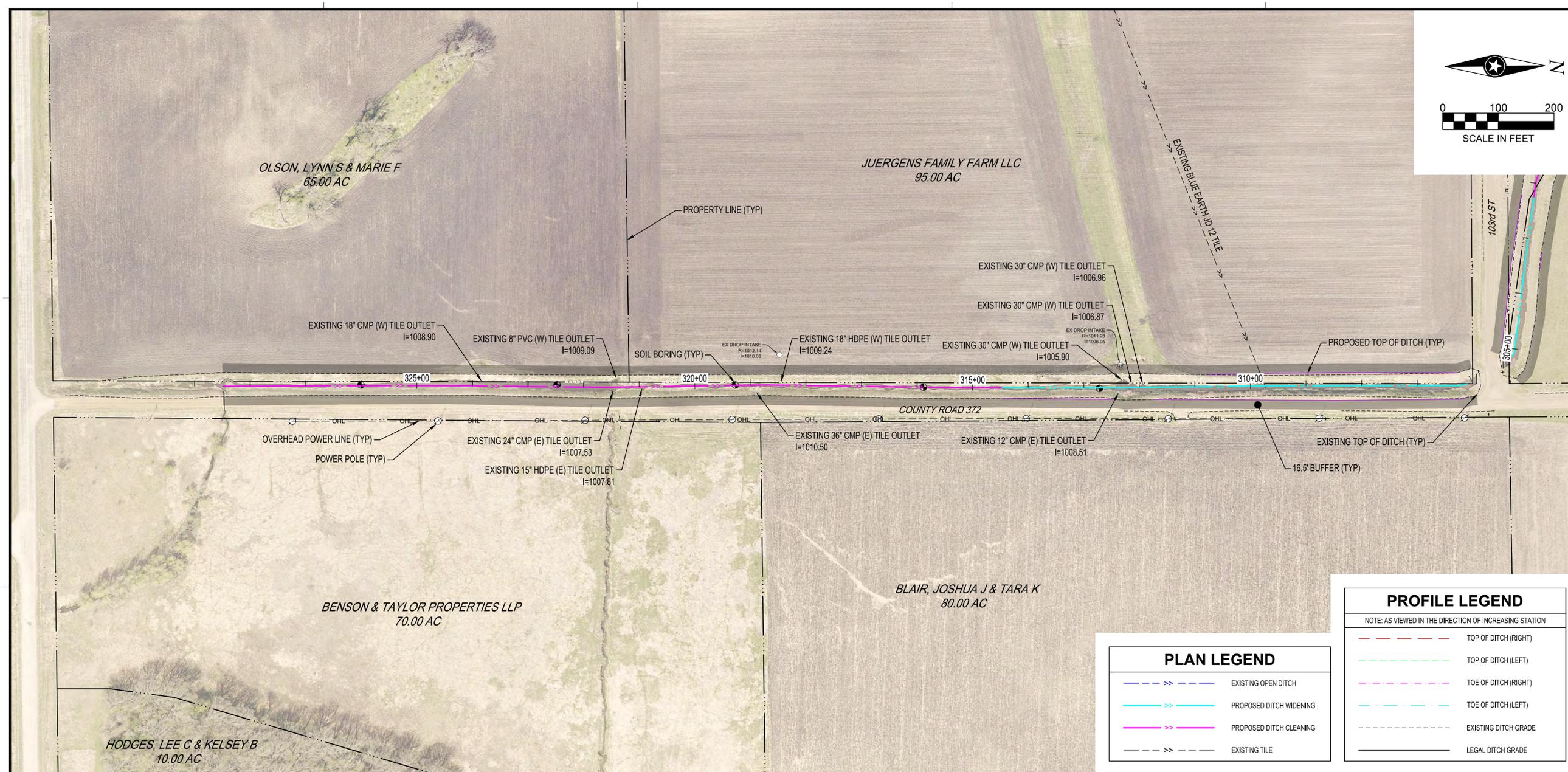


BLUE EARTH COUNTY

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PLAN LEGEND

	EXISTING OPEN DITCH
	PROPOSED DITCH WIDENING
	PROPOSED DITCH CLEANING
	EXISTING TILE

PROFILE LEGEND

NOTE: AS VIEWED IN THE DIRECTION OF INCREASING STATION

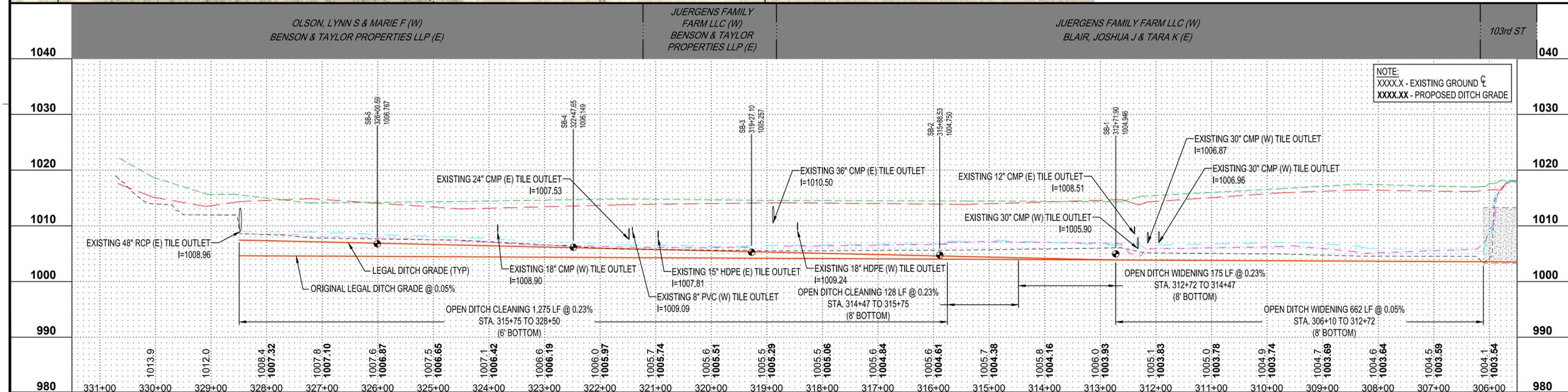
	TOP OF DITCH (RIGHT)
	TOP OF DITCH (LEFT)
	TOE OF DITCH (RIGHT)
	TOE OF DITCH (LEFT)
	EXISTING DITCH GRADE
	LEGAL DITCH GRADE

PROJECT
BLUE EARTH COUNTY
JUDICIAL DITCH No. 49 REPAIRS
BLUE EARTH COUNTY MINNESOTA

REVISION SCHEDULE

DATE	DESCRIPTION	BY

PROJECT NO.	20-24339
FILE NAME	24339 MAINLINE PROFILES (1)
DRAWN BY	KJH
DESIGNED BY	KBW
REVIEWED BY	CJB
ORIGINAL ISSUE DATE	11/11/24
CLIENT PROJECT NO.	20-24339



TITLE
PLAN - PROFILE MAINLINE

SHEET
24 OF 36

SECTION VIEW LEGEND	
NOTE: AS VIEWED IN THE DIRECTION OF INCREASING STATION	
---	EXISTING GROUND
---	PROPOSED GROUND
1000.0 1000.00	XXX.X - EXISTING GROUND E
	XXX.XX - PROPOSED GROUND E



BLUE EARTH COUNTY

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PROJECT
**BLUE EARTH COUNTY
JUDICIAL DITCH
No. 49 REPAIRS**

BLUE EARTH COUNTY MINNESOTA

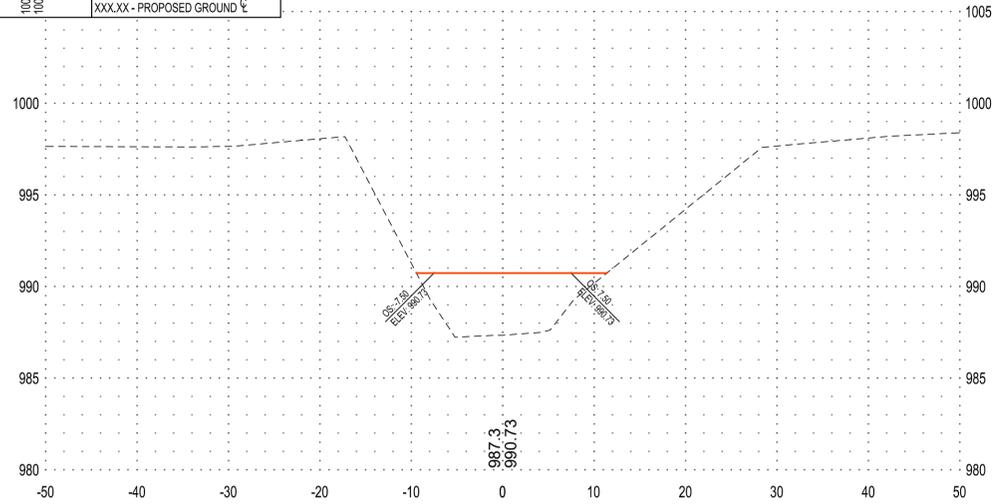
REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	20-24339
FILE NAME	24339 SECTIONS
DRAWN BY	-
DESIGNED BY	-
REVIEWED BY	-
ORIGINAL ISSUE DATE	--/--
CLIENT PROJECT NO.	20-24339

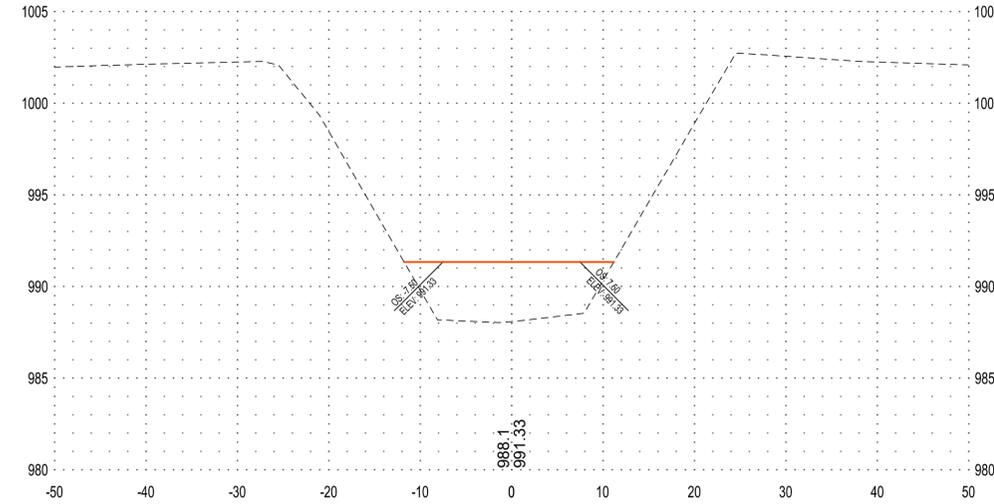
TITLE
**CROSS SECTIONS
MAINLINE**

SHEET
25
OF 36

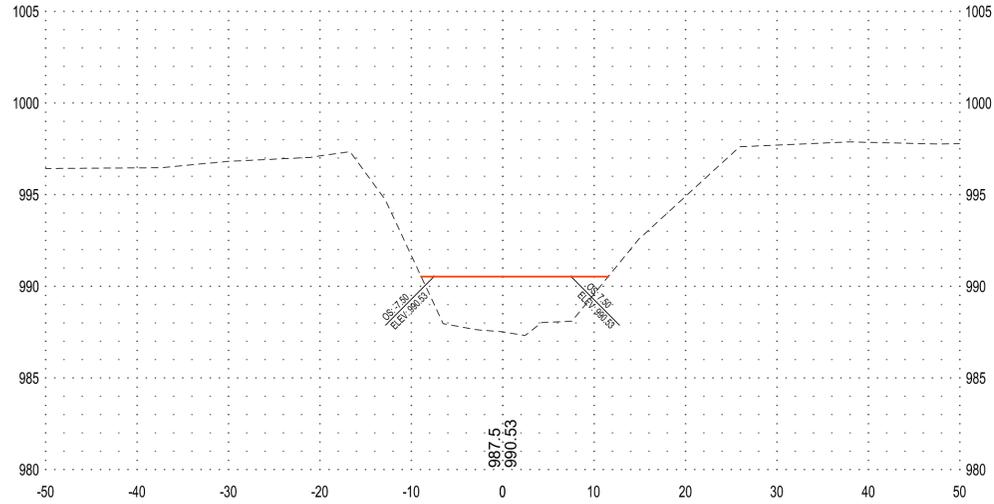
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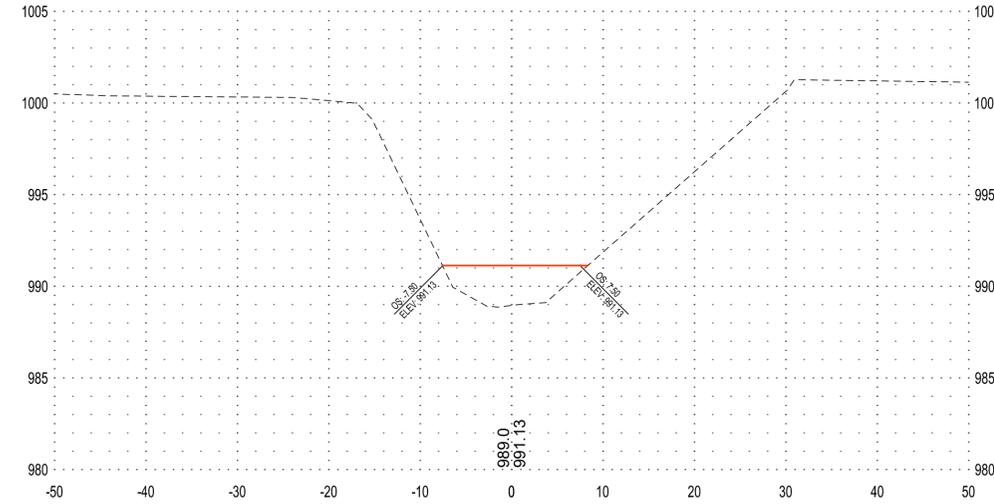
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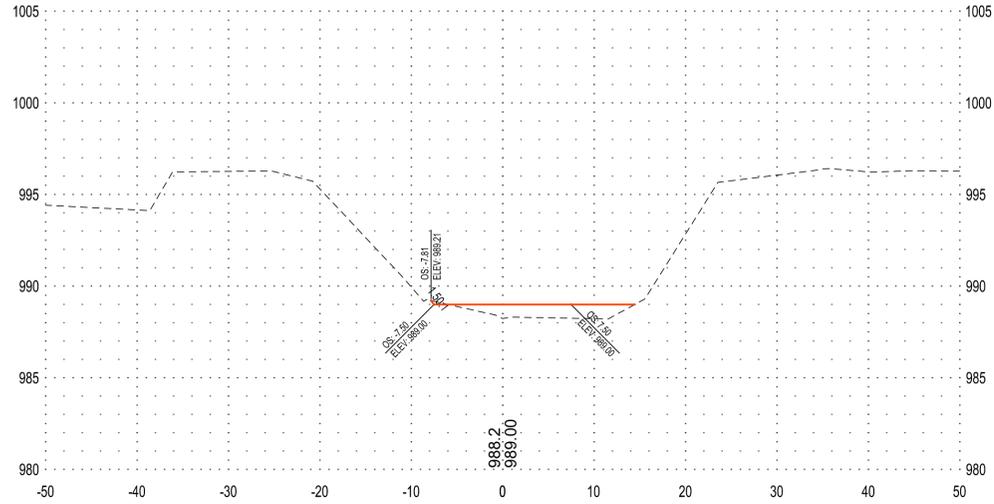
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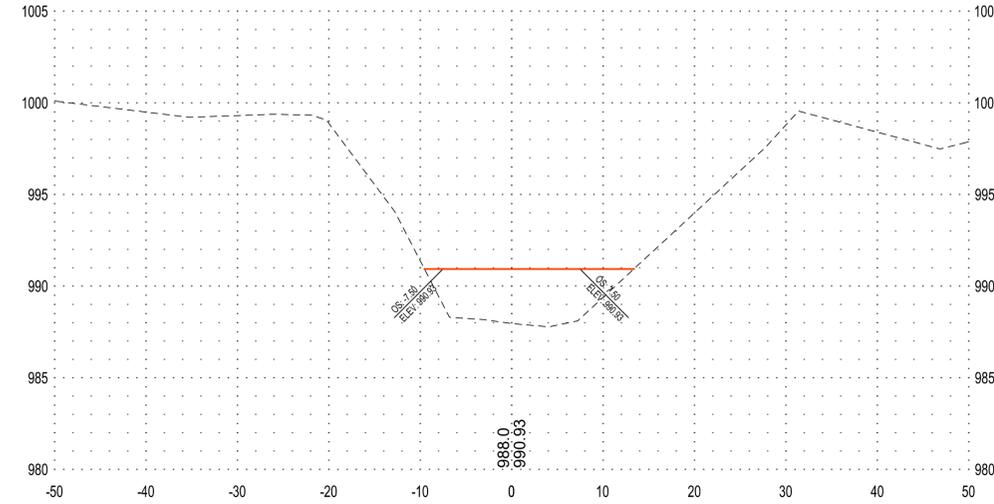
25+00



5+00



20+00



SECTION VIEW LEGEND	
NOTE: AS VIEWED IN THE DIRECTION OF INCREASING STATION	
---	EXISTING GROUND
---	PROPOSED GROUND
1000.0 1000.00	XXX.X - EXISTING GROUND E
	XXX.XX - PROPOSED GROUND E



BLUE EARTH COUNTY

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PROJECT
BLUE EARTH COUNTY
JUDICIAL DITCH
No. 49 REPAIRS
BLUE EARTH COUNTY MINNESOTA

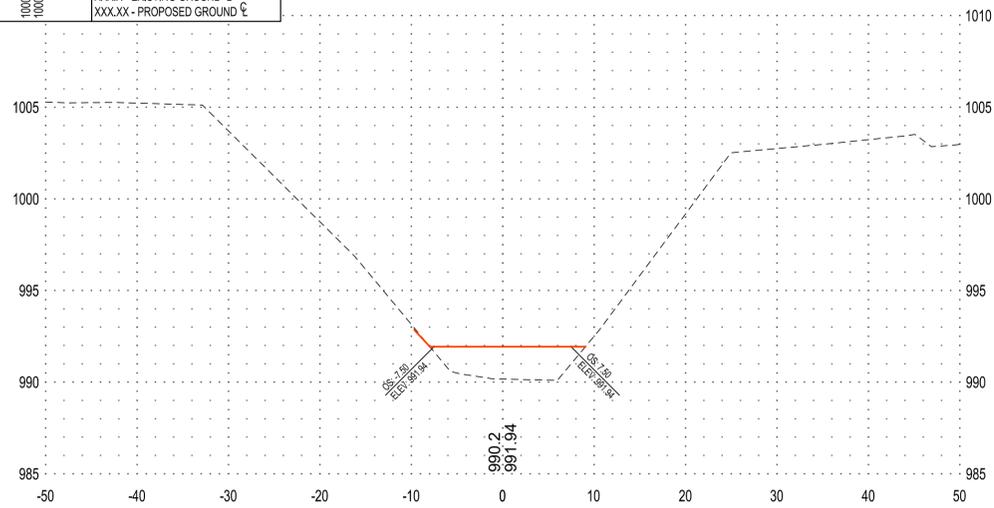
REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	20-24339
FILE NAME	24339 SECTIONS
DRAWN BY	-
DESIGNED BY	-
REVIEWED BY	-
ORIGINAL ISSUE DATE	--/--
CLIENT PROJECT NO.	20-24339

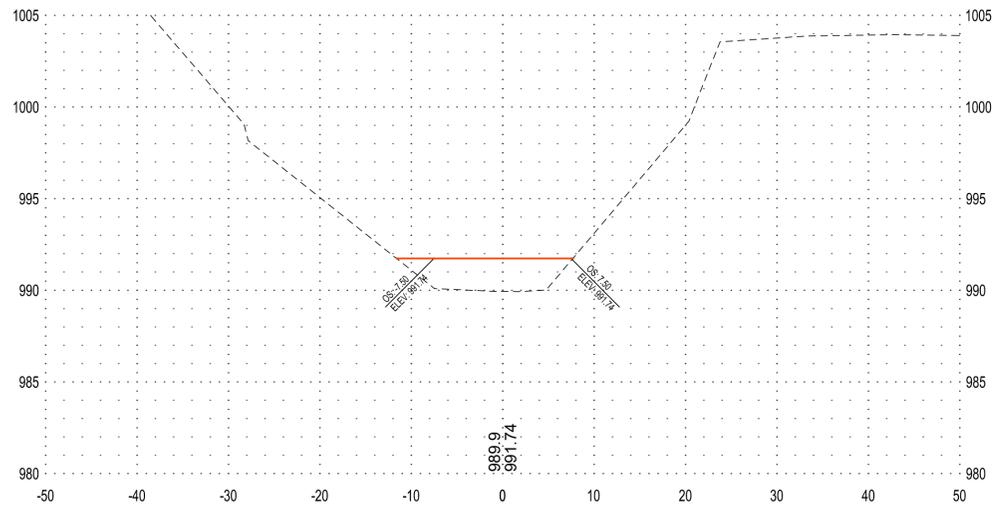
TITLE
CROSS SECTIONS
MAINLINE

SHEET
26 OF 36

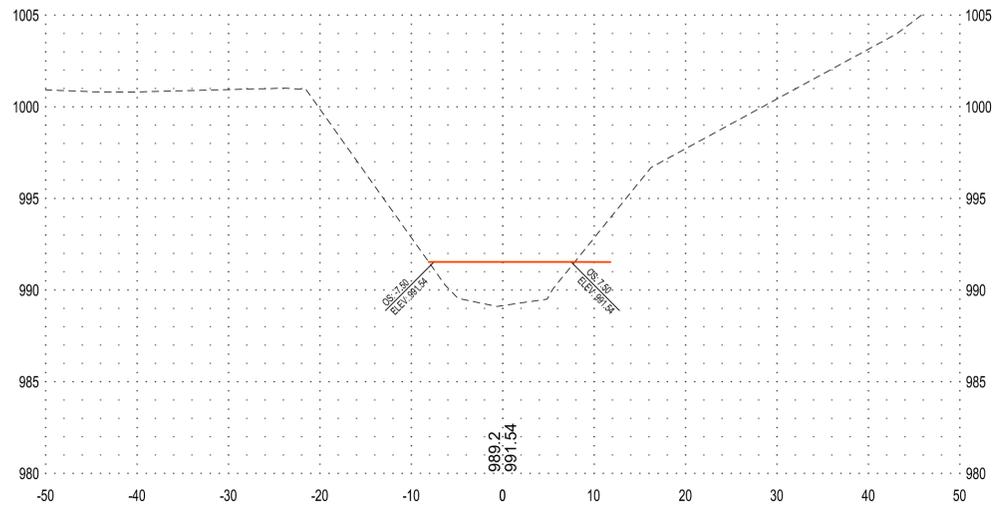
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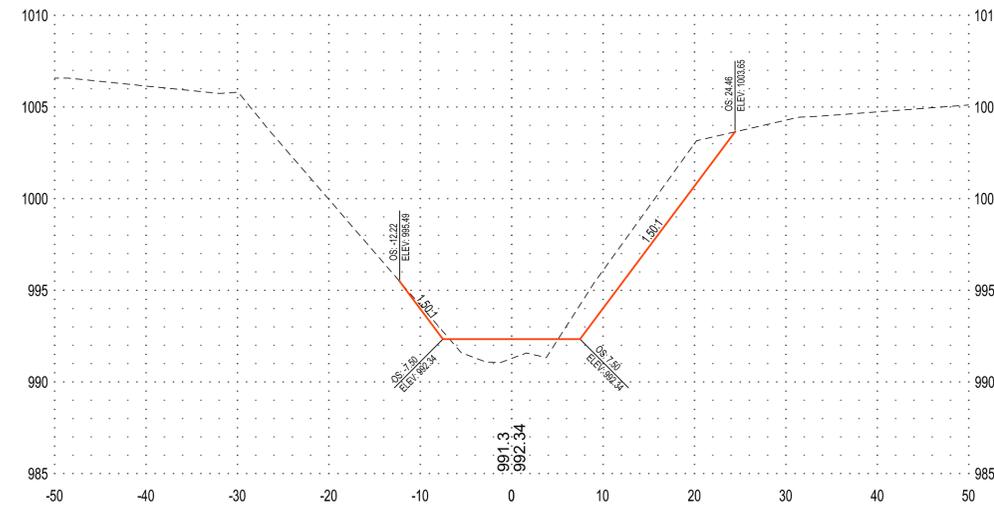
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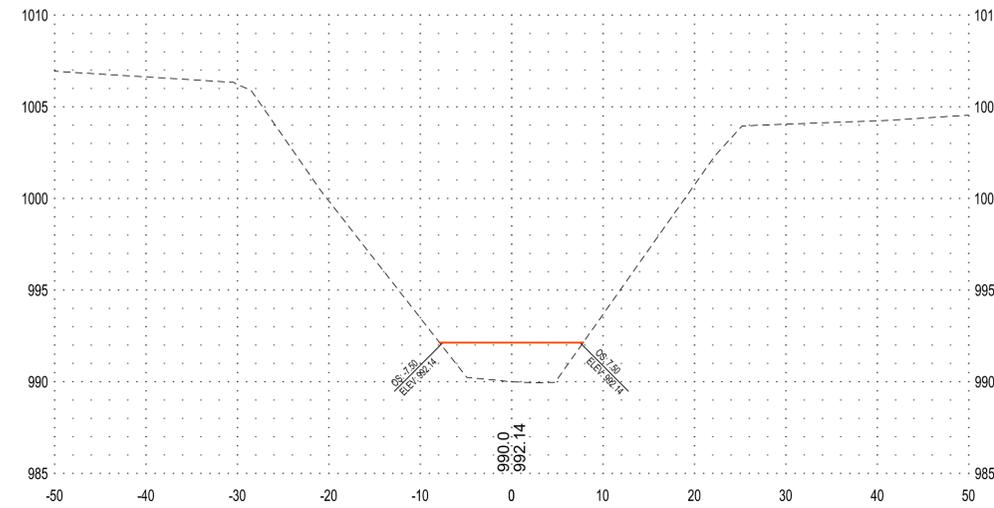
35+00



55+00



50+00



SECTION VIEW LEGEND	
NOTE: AS VIEWED IN THE DIRECTION OF INCREASING STATION	
---	EXISTING GROUND
---	PROPOSED GROUND
1000.0	XXX.X - EXISTING GROUND E
1000.00	XXX.XX - PROPOSED GROUND E



BLUE EARTH COUNTY

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PROJECT
BLUE EARTH COUNTY
JUDICIAL DITCH
No. 49 REPAIRS
BLUE EARTH COUNTY MINNESOTA

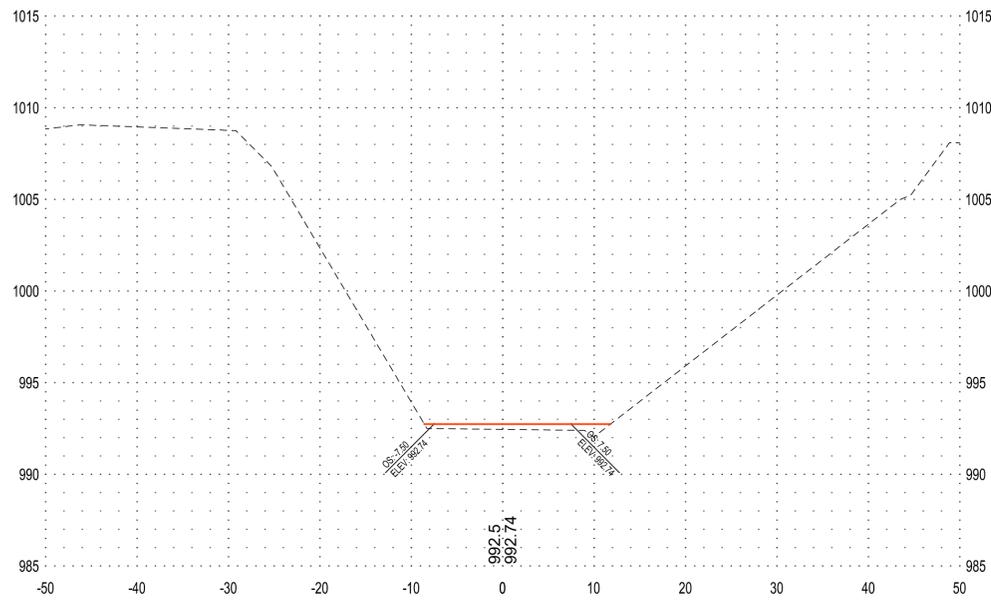
REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	20-24339
FILE NAME	24339 SECTIONS
DRAWN BY	-
DESIGNED BY	-
REVIEWED BY	-
ORIGINAL ISSUE DATE	---/---/---
CLIENT PROJECT NO.	20-24339

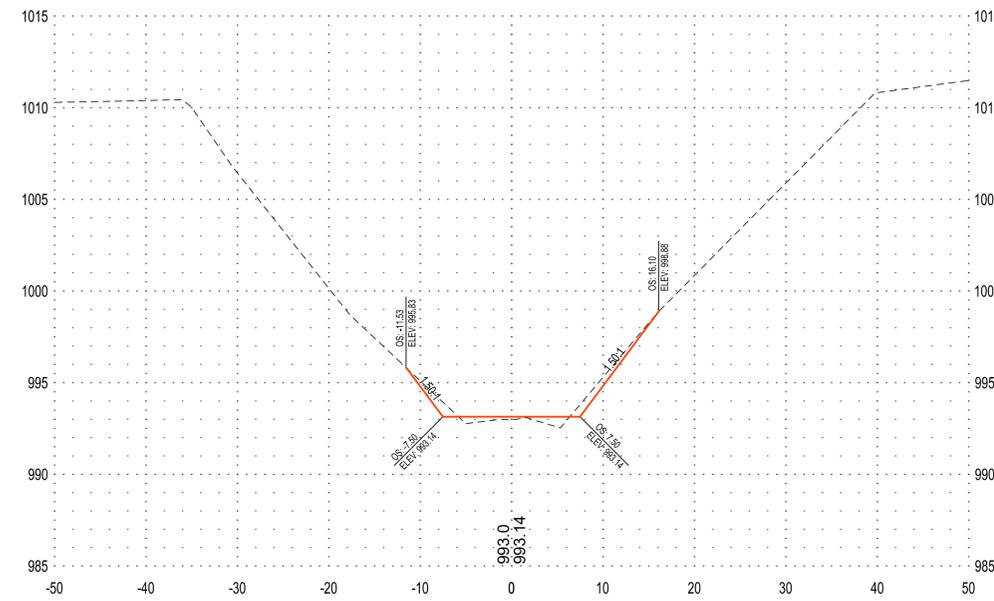
TITLE
CROSS SECTIONS
MAINLINE

SHEET
27 OF 36

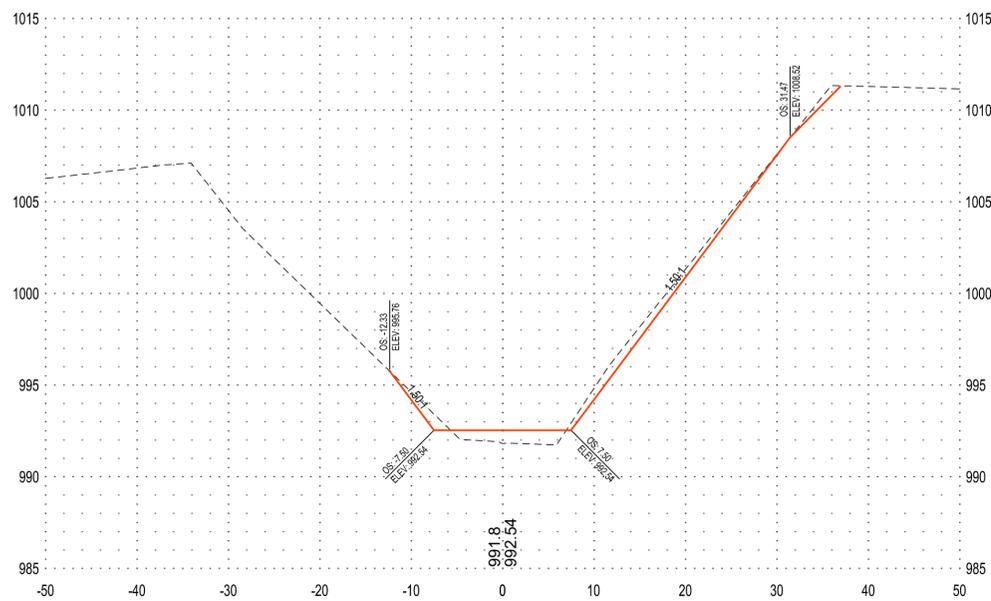
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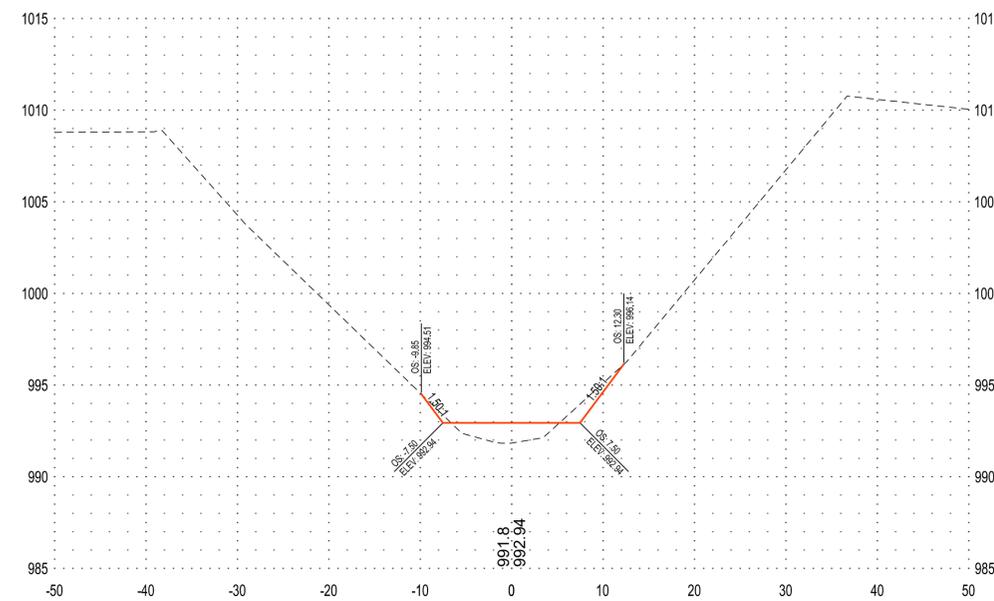
75+00



60+00



70+00



SECTION VIEW LEGEND	
NOTE: AS VIEWED IN THE DIRECTION OF INCREASING STATION	
---	EXISTING GROUND
---	PROPOSED GROUND
1000.0	XXX.X - EXISTING GROUND E
1000.00	XXX.XX - PROPOSED GROUND E



BLUE EARTH COUNTY

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PROJECT
BLUE EARTH COUNTY
JUDICIAL DITCH
No. 49 REPAIRS

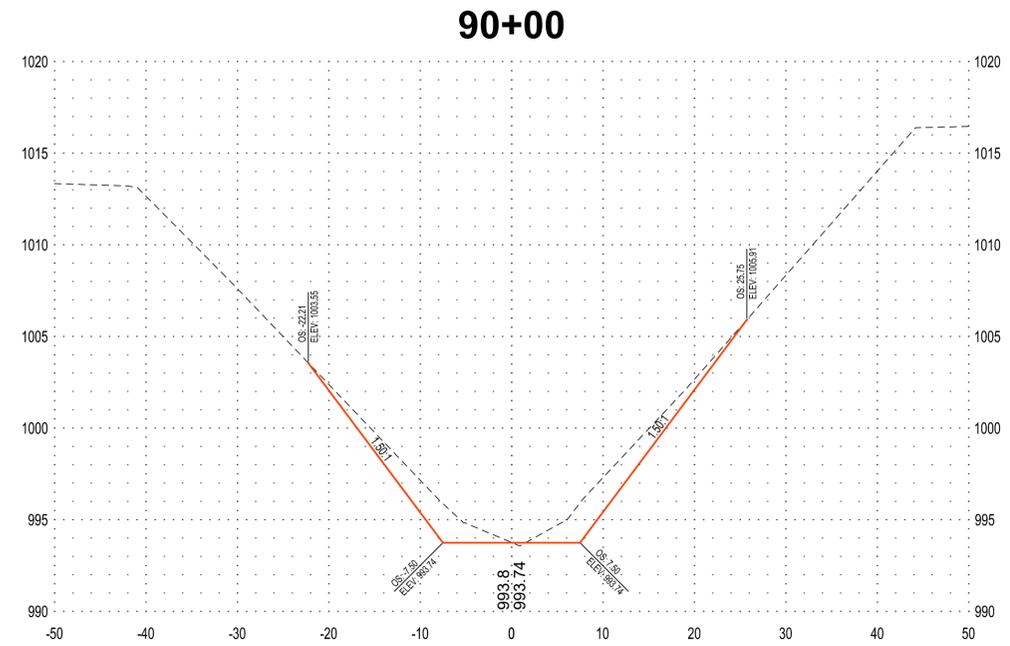
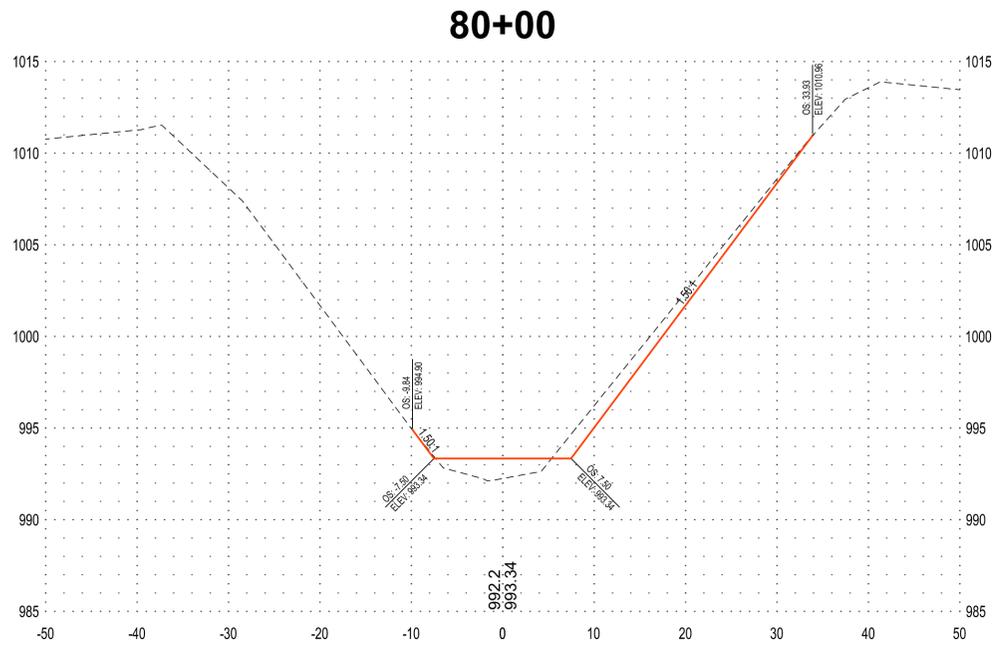
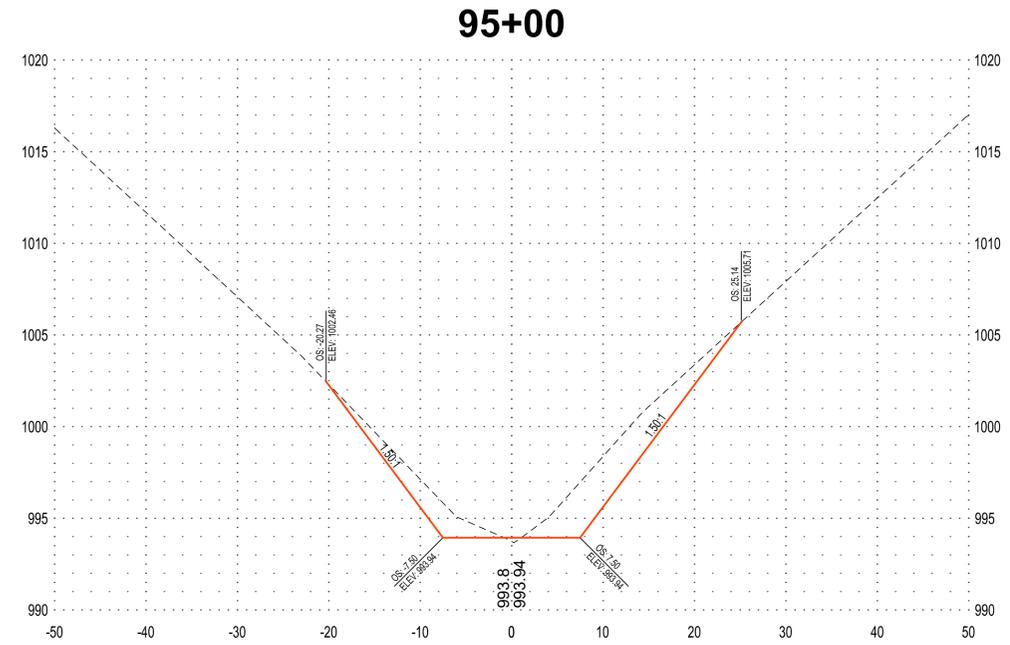
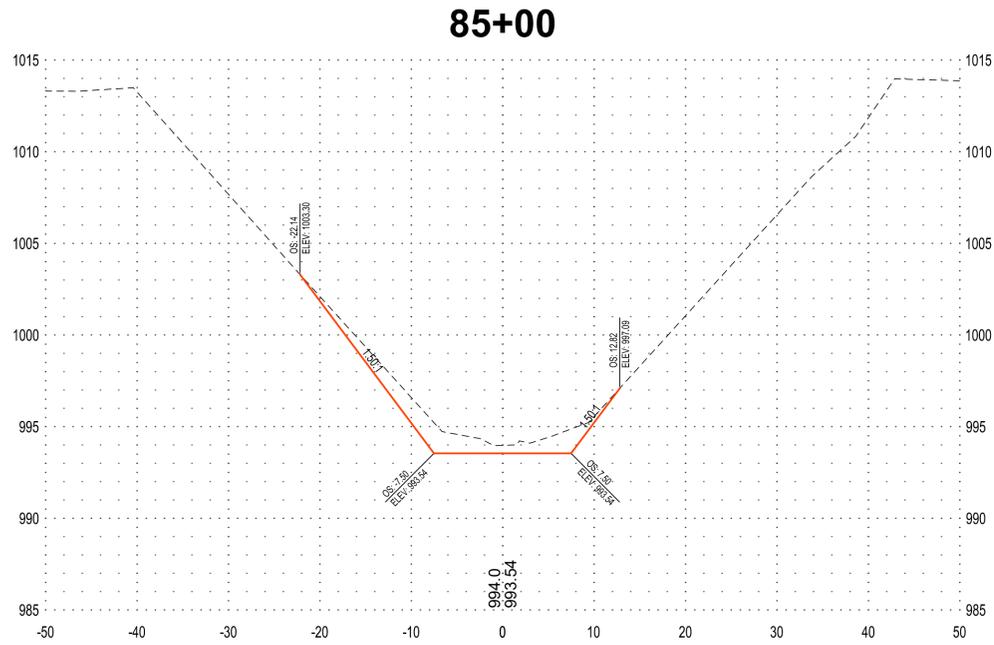
BLUE EARTH COUNTY MINNESOTA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	20-24339
FILE NAME	24339 SECTIONS
DRAWN BY	-
DESIGNED BY	-
REVIEWED BY	-
ORIGINAL ISSUE DATE	---/---/---
CLIENT PROJECT NO.	20-24339

TITLE
CROSS SECTIONS
MAINLINE

SHEET
28 OF 36



SECTION VIEW LEGEND	
NOTE: AS VIEWED IN THE DIRECTION OF INCREASING STATION	
---	EXISTING GROUND
---	PROPOSED GROUND
1000.0 1000.00	XXX.X - EXISTING GROUND E XXX.XX - PROPOSED GROUND E



BLUE EARTH COUNTY

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No. 49 REPAIRS
BLUE EARTH COUNTY MINNESOTA

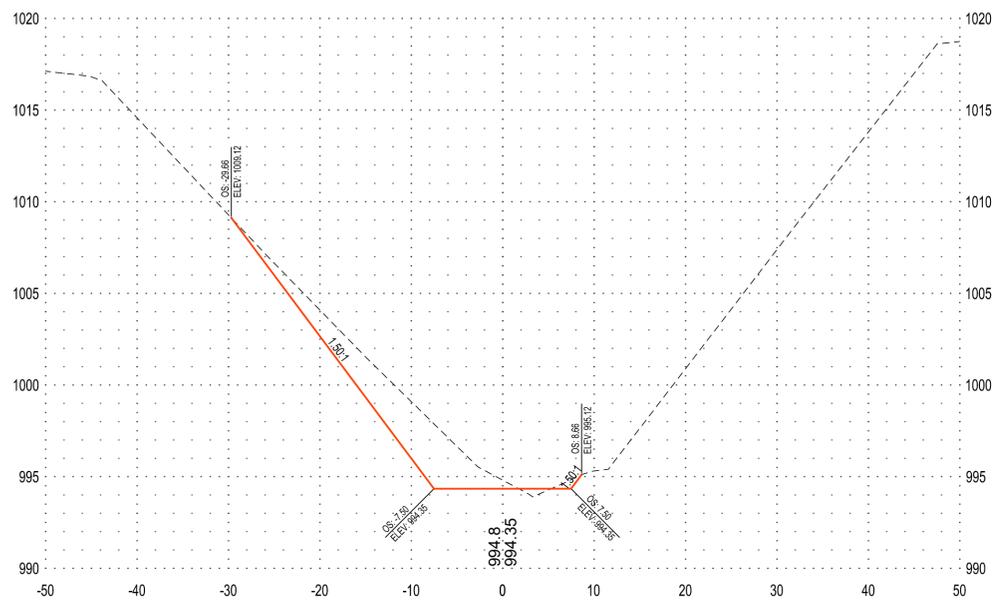
REVISION SCHEDULE		
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PROJECT NO.	20-24339
FILE NAME	24339 SECTIONS
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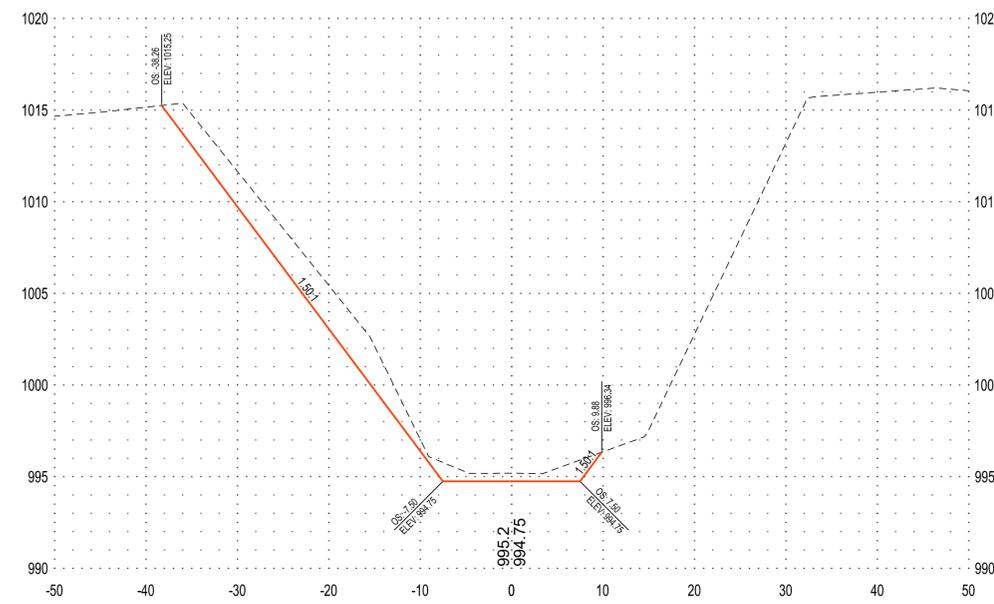
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MAINLINE

SHEET
29 OF 36

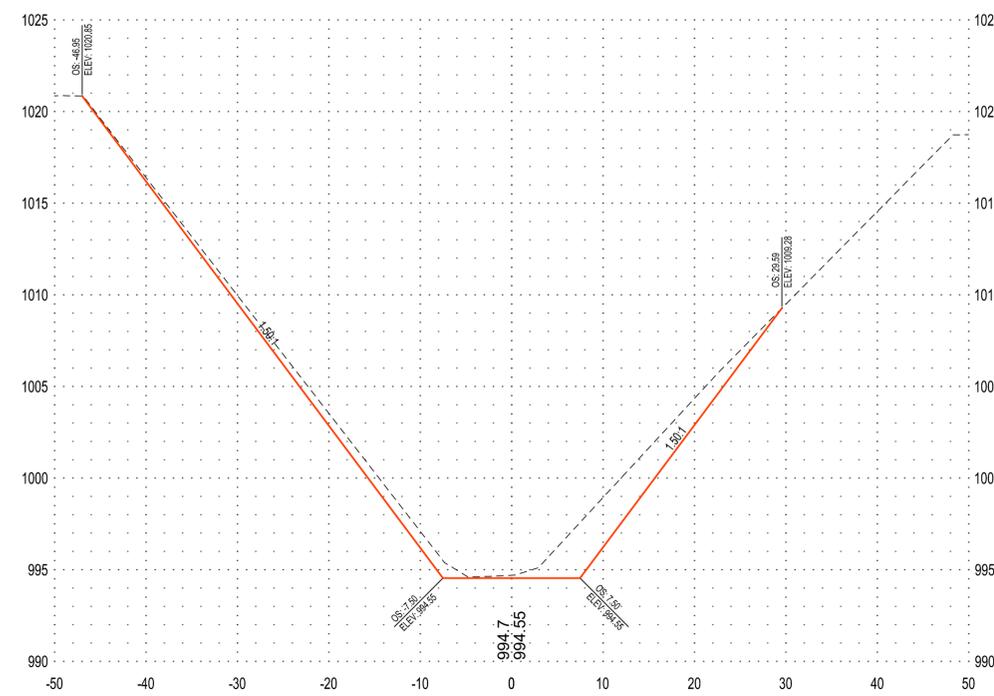
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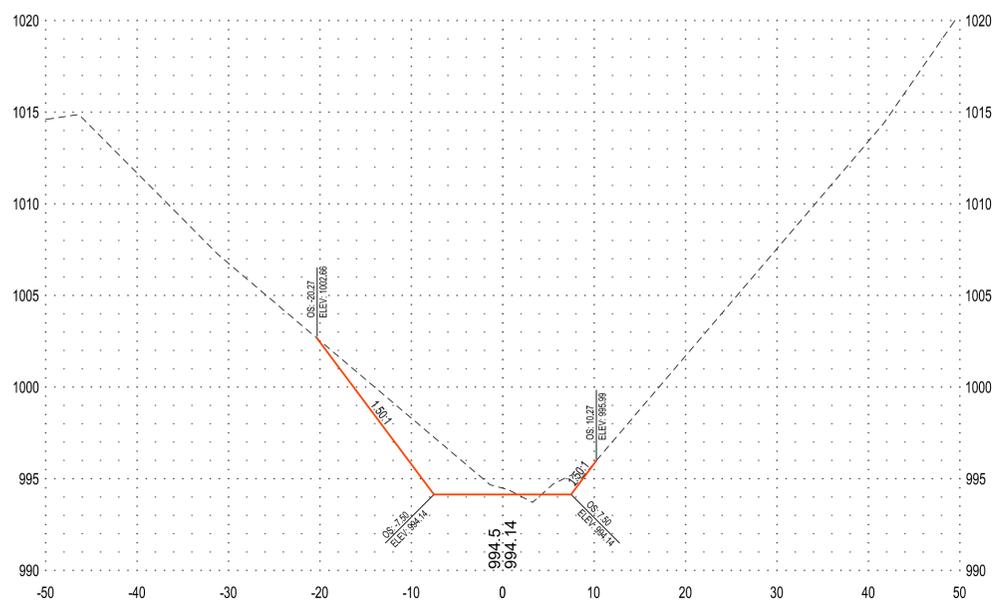
115+00



110+00



100+00



SECTION VIEW LEGEND	
NOTE: AS VIEWED IN THE DIRECTION OF INCREASING STATION	
---	EXISTING GROUND
---	PROPOSED GROUND
1000.0 1000.00	XXX.X - EXISTING GROUND E
	XXX.XX - PROPOSED GROUND E



BLUE EARTH COUNTY

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PROJECT
BLUE EARTH COUNTY JUDICIAL DITCH No. 49 REPAIRS
BLUE EARTH COUNTY MINNESOTA

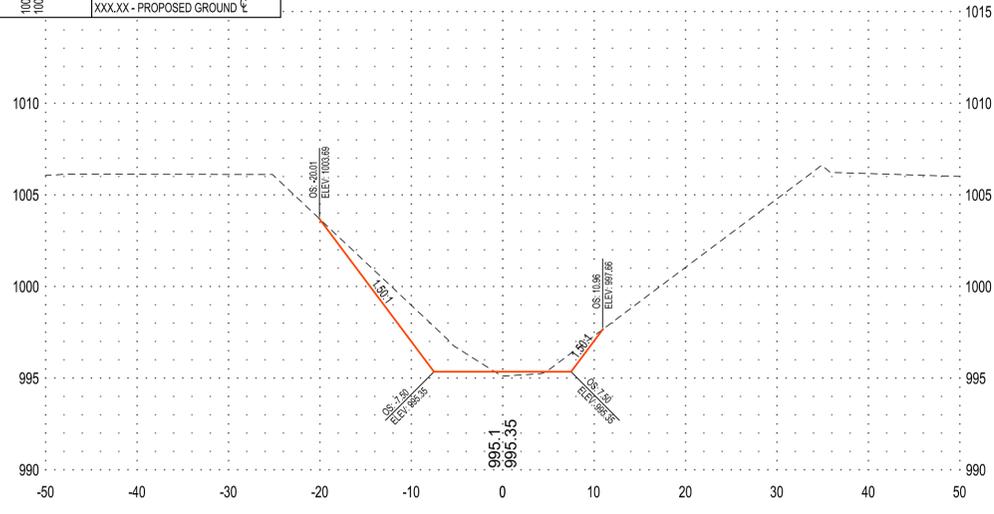
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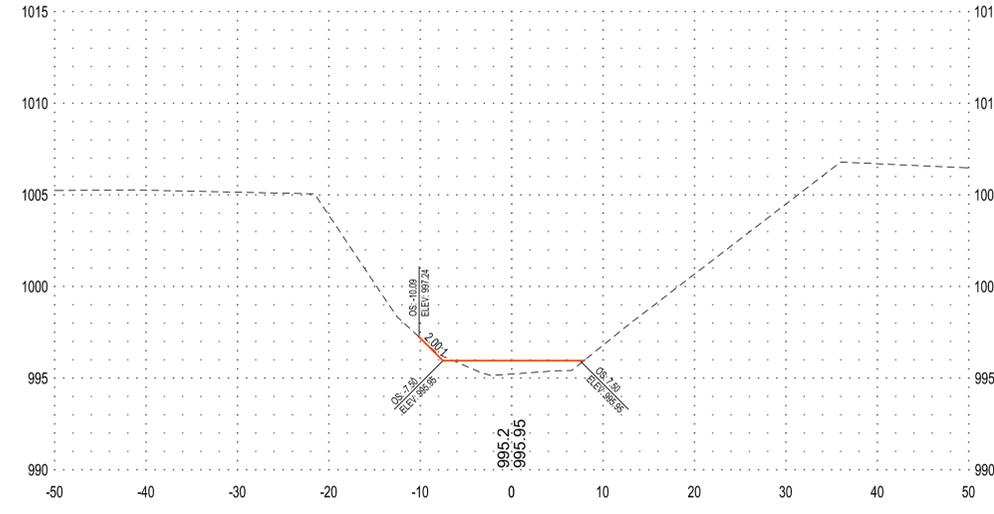
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SHEET
30 OF 36

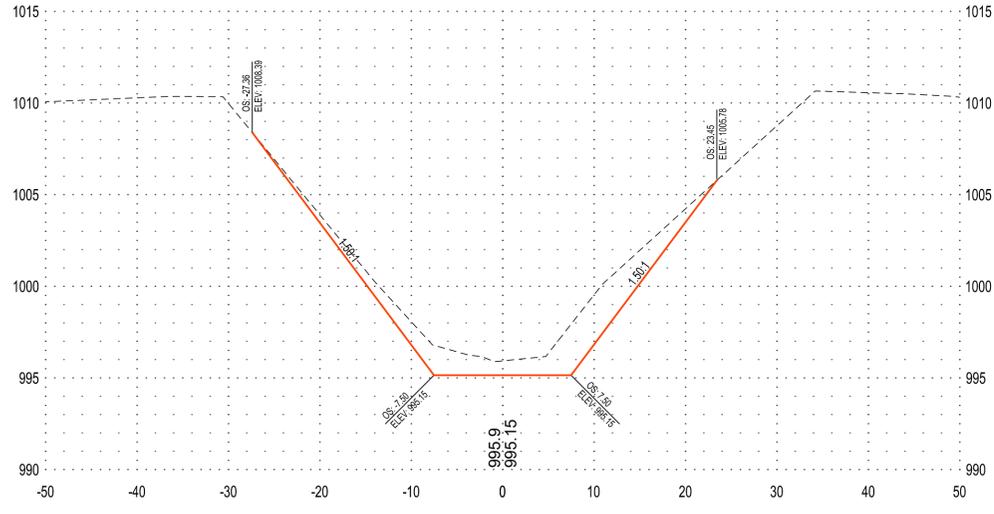
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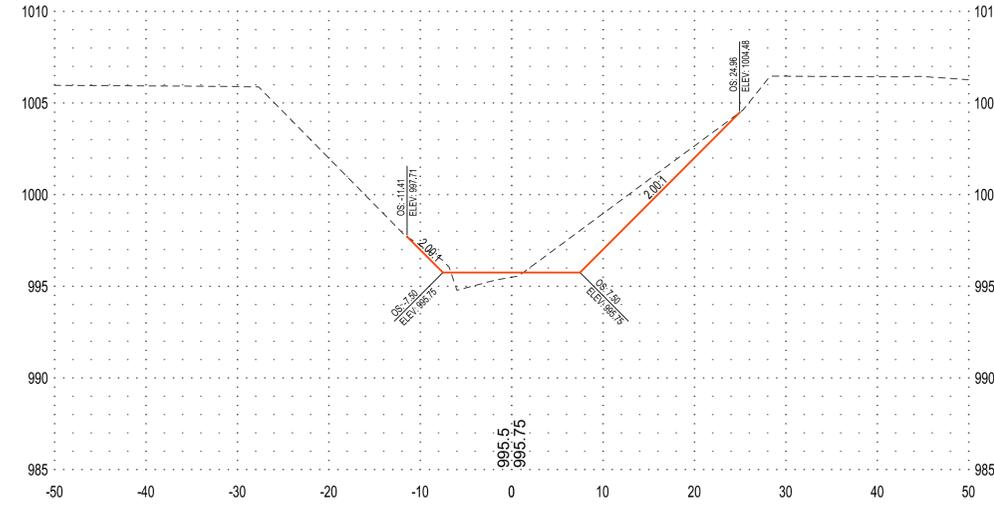
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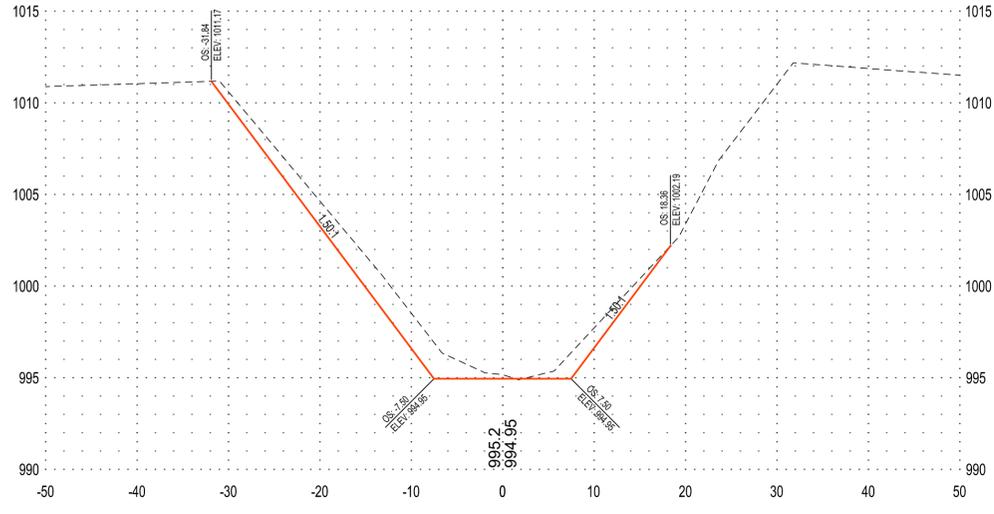
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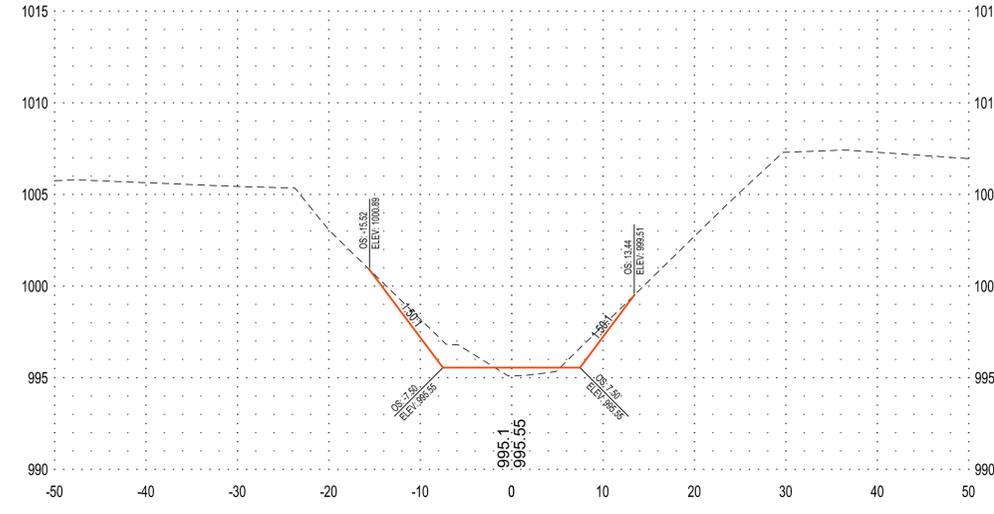
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120+00



135+00



SECTION VIEW LEGEND	
NOTE: AS VIEWED IN THE DIRECTION OF INCREASING STATION	
---	EXISTING GROUND
---	PROPOSED GROUND
1000.0	XXX.X - EXISTING GROUND E
1000.0	XXX.XX - PROPOSED GROUND E



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PROJECT
BLUE EARTH COUNTY
JUDICIAL DITCH
No. 49 REPAIRS
BLUE EARTH COUNTY MINNESOTA

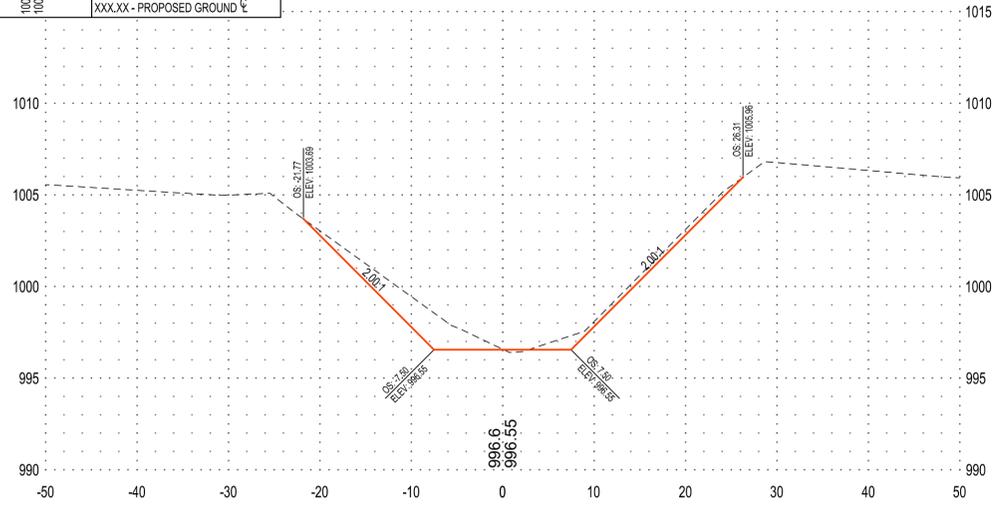
REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	20-24339
FILE NAME	24339 SECTIONS
DRAWN BY	-
DESIGNED BY	-
REVIEWED BY	-
ORIGINAL ISSUE DATE	--/--
CLIENT PROJECT NO.	20-24339

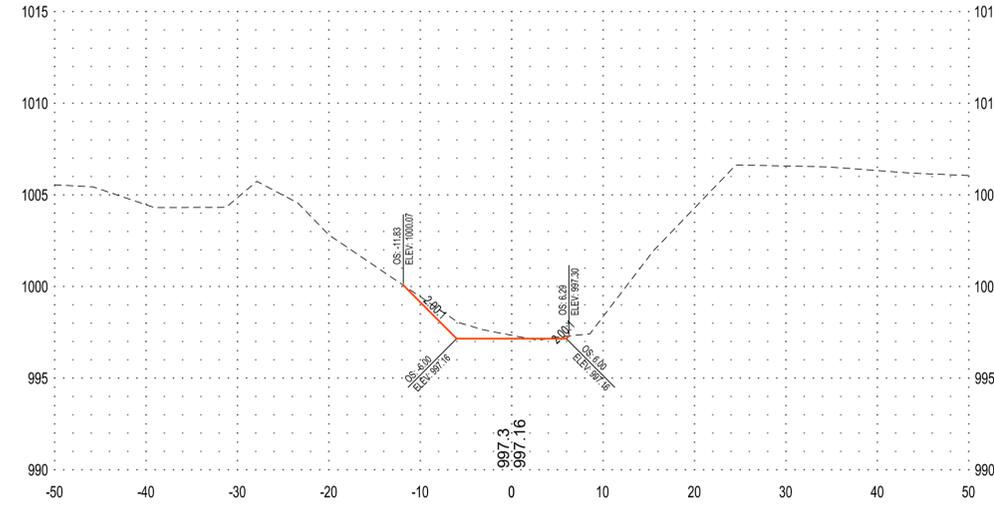
TITLE
CROSS SECTIONS
MAINLINE

SHEET
31 OF 36

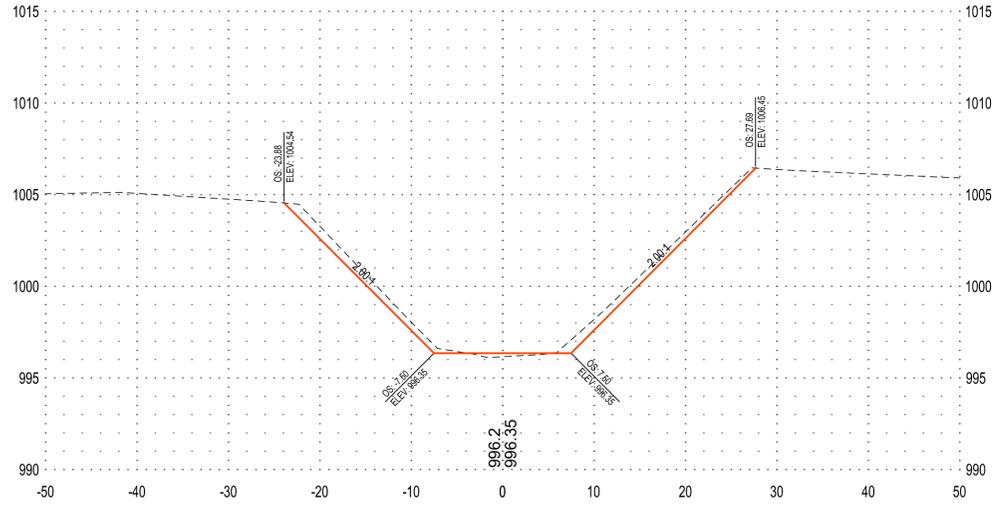
160+00



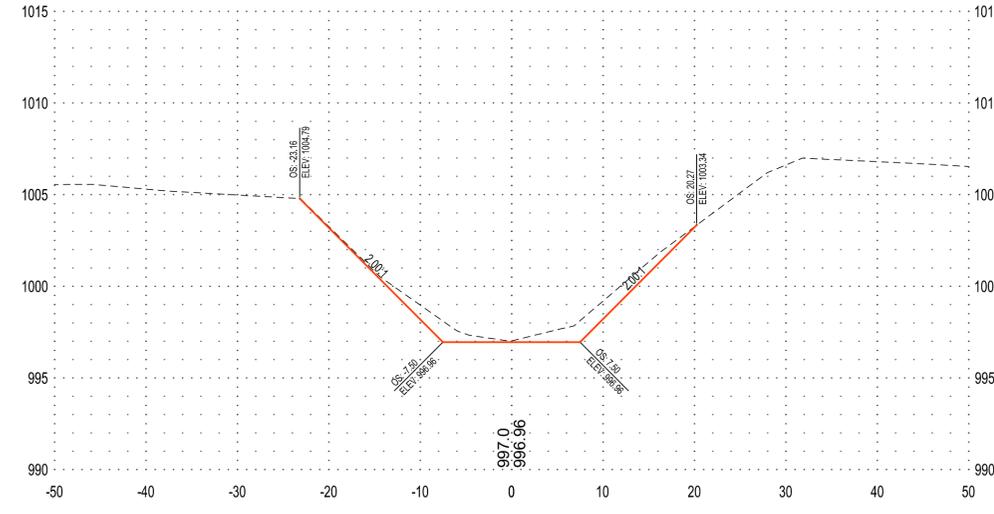
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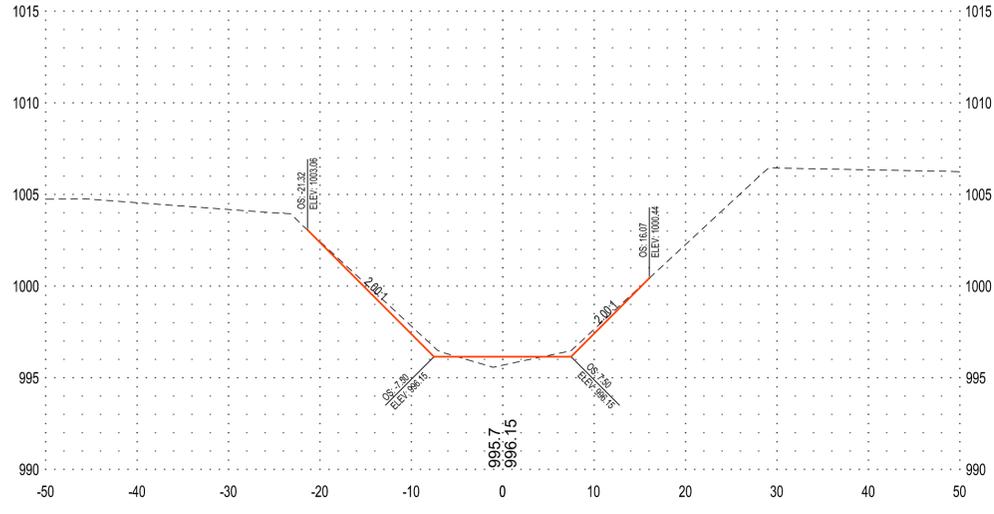
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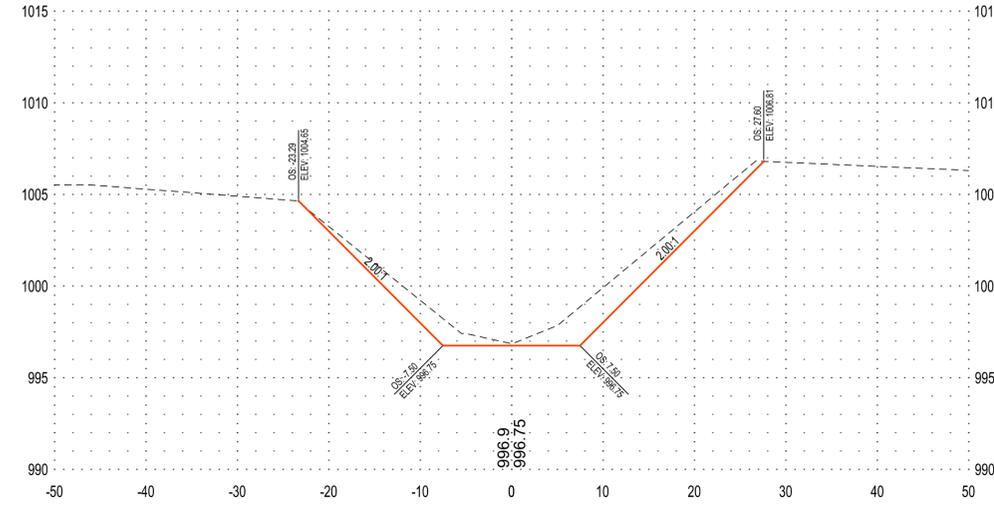
170+00



150+00



165+00



SECTION VIEW LEGEND	
NOTE: AS VIEWED IN THE DIRECTION OF INCREASING STATION	
---	EXISTING GROUND
---	PROPOSED GROUND
1000.0	XXX.X - EXISTING GROUND E
1000.00	XXX.XX - PROPOSED GROUND E



BLUE EARTH COUNTY

NOTE:
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PRELIMINARY NOT FOR CONSTRUCTION
CHARLES J. BRANDEL

DATE: _____ LIC. NO. 43359

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PROJECT
BLUE EARTH COUNTY JUDICIAL DITCH No. 49 REPAIRS

BLUE EARTH COUNTY MINNESOTA

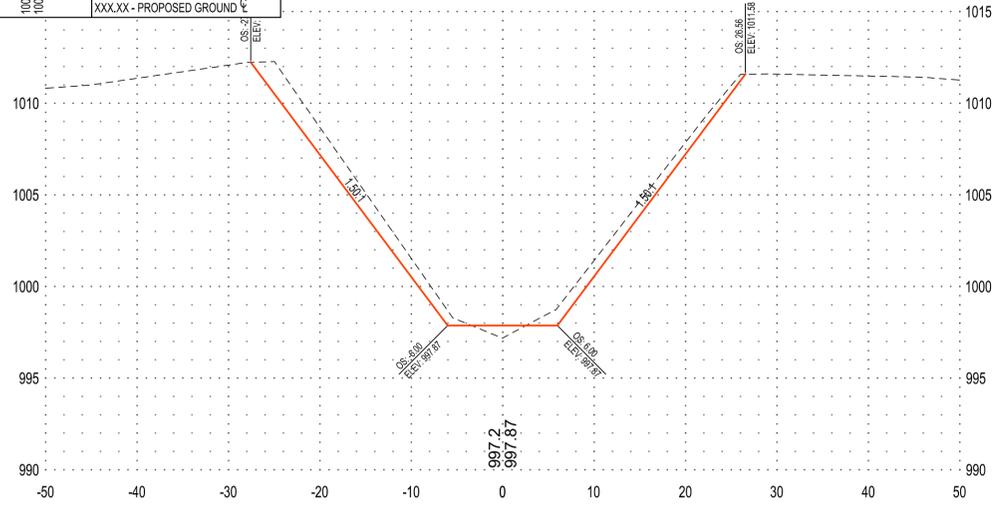
REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	20-24339
FILE NAME	24339 SECTIONS
DRAWN BY	-
DESIGNED BY	-
REVIEWED BY	-
ORIGINAL ISSUE DATE	--/--
CLIENT PROJECT NO.	20-24339

TITLE
CROSS SECTIONS MAINLINE

SHEET
32 OF 36

190+00



SECTION VIEW LEGEND	
NOTE: AS VIEWED IN THE DIRECTION OF INCREASING STATION	
---	EXISTING GROUND
---	PROPOSED GROUND
1000.0 1000.00	XXX.X - EXISTING GROUND E
	XXX.XX - PROPOSED GROUND E



BLUE EARTH COUNTY

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PROJECT
**BLUE EARTH COUNTY
JUDICIAL DITCH
No. 49 REPAIRS**

BLUE EARTH COUNTY MINNESOTA

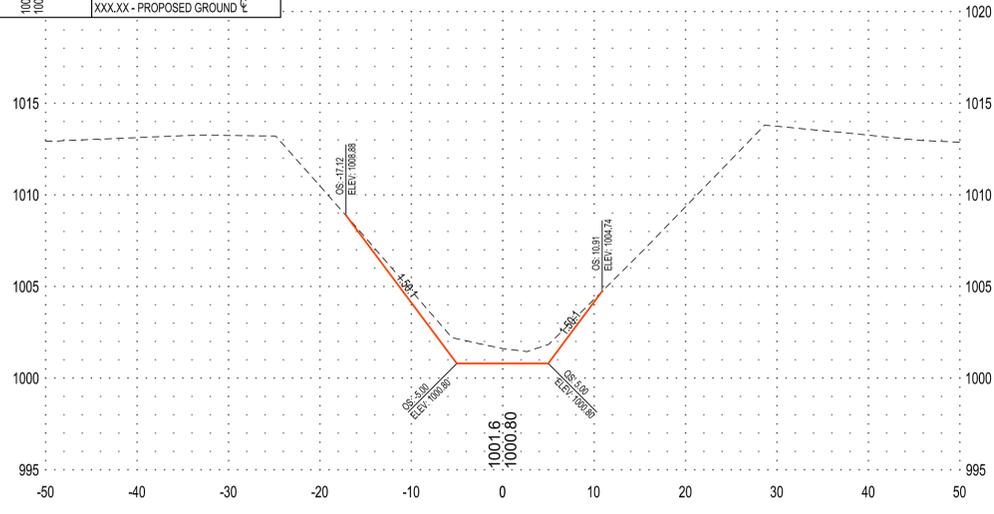
REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	20-24339
FILE NAME	24339 SECTIONS
DRAWN BY	-
DESIGNED BY	-
REVIEWED BY	-
ORIGINAL ISSUE DATE	--/--
CLIENT PROJECT NO.	20-24339

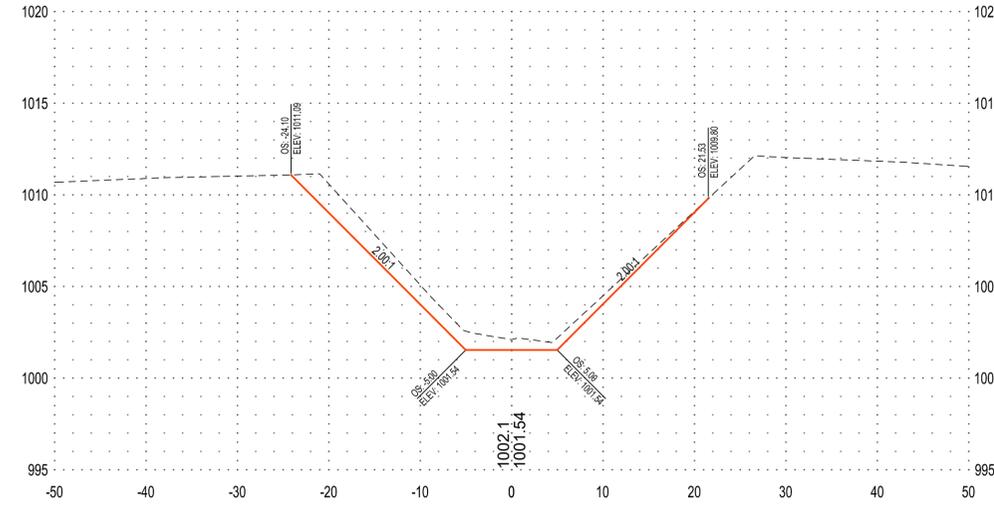
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**CROSS SECTIONS
MAINLINE**

SHEET
34
OF 36

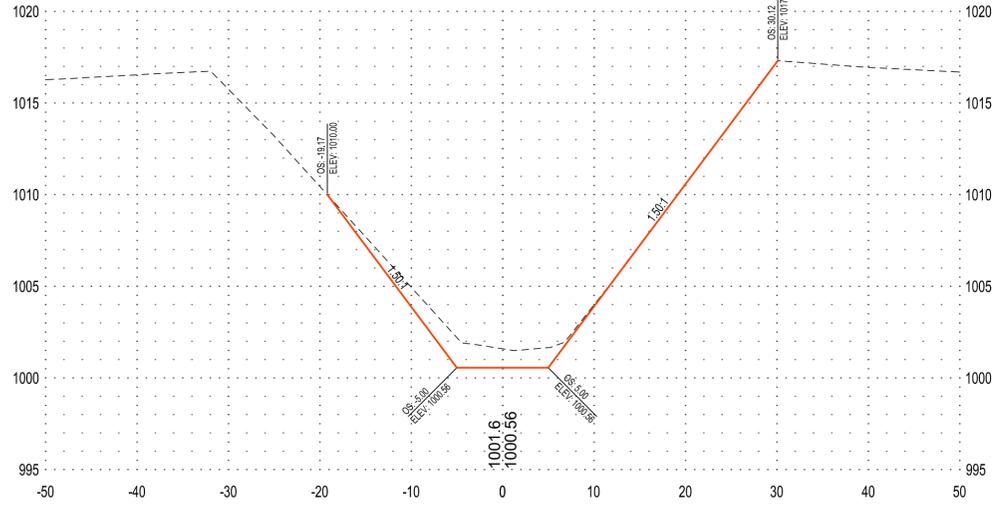
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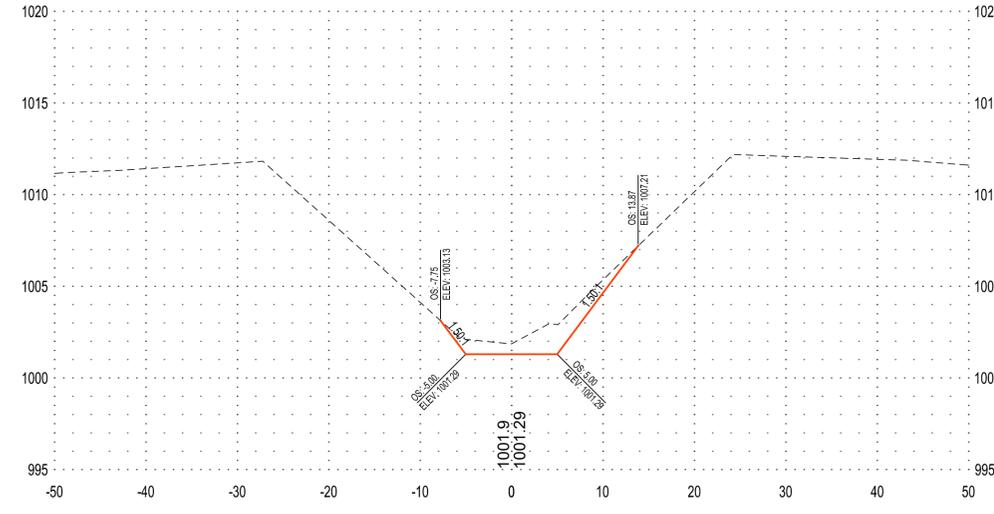
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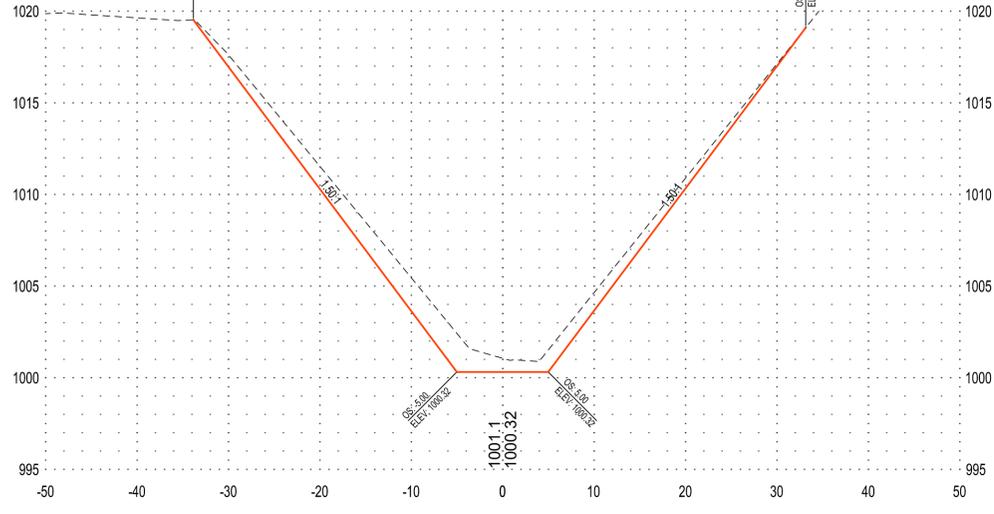
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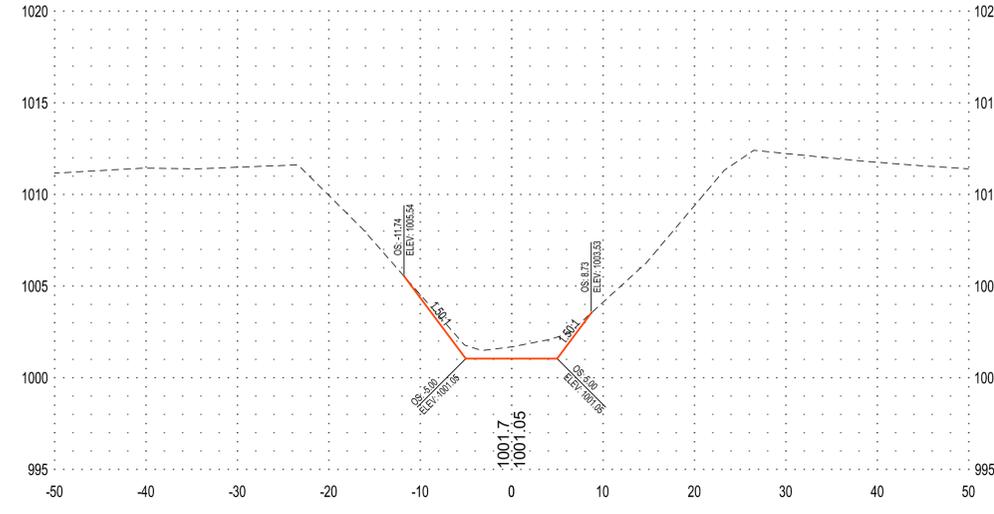
260+00



240+00



255+00



SECTION VIEW LEGEND	
NOTE: AS VIEWED IN THE DIRECTION OF INCREASING STATION	
---	EXISTING GROUND
---	PROPOSED GROUND
1000.0 1000.00	XXX.X - EXISTING GROUND E
	XXX.XX - PROPOSED GROUND E



BLUE EARTH COUNTY

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PROJECT
BLUE EARTH COUNTY
JUDICIAL DITCH
No. 49 REPAIRS
BLUE EARTH COUNTY MINNESOTA

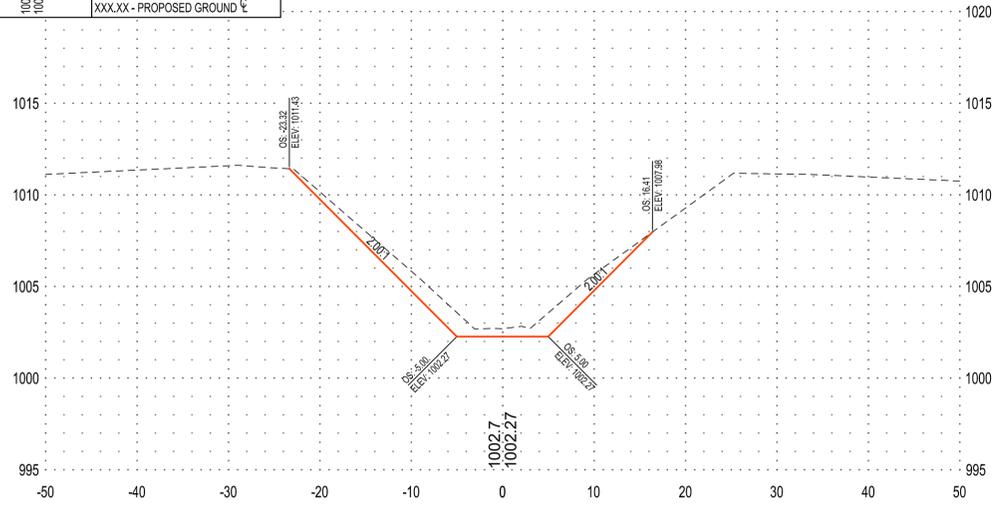
REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	20-24339
FILE NAME	24339 SECTIONS
DRAWN BY	-
DESIGNED BY	-
REVIEWED BY	-
ORIGINAL ISSUE DATE	--/--
CLIENT PROJECT NO.	20-24339

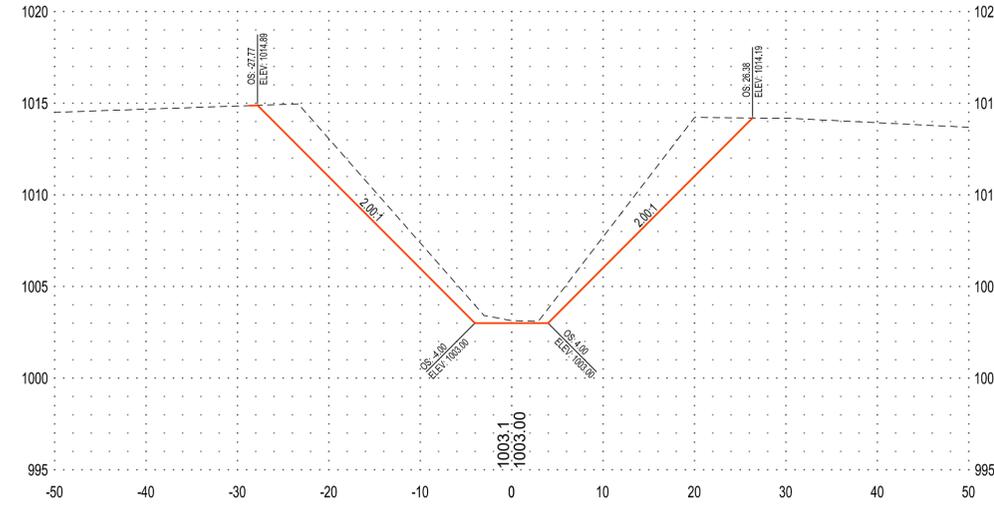
TITLE
CROSS SECTIONS
MAINLINE

SHEET
35
OF 36

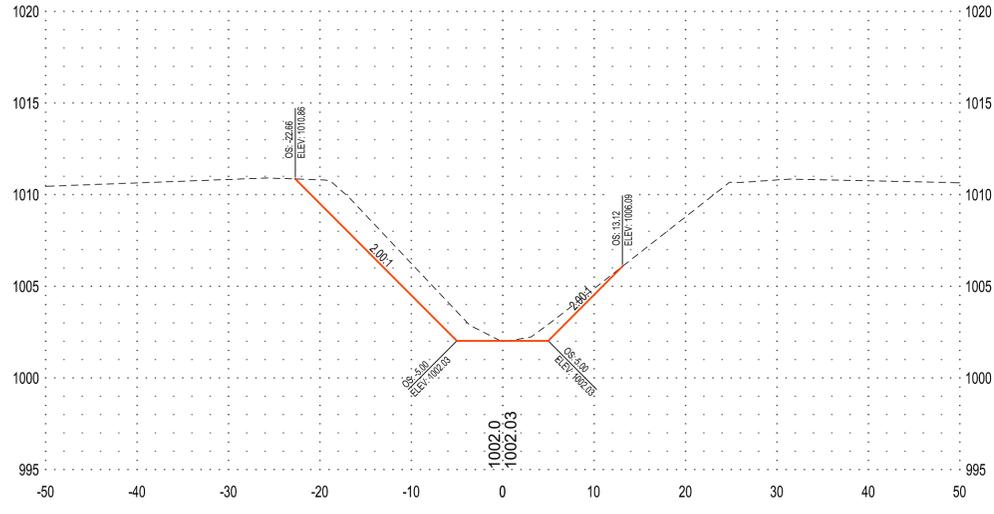
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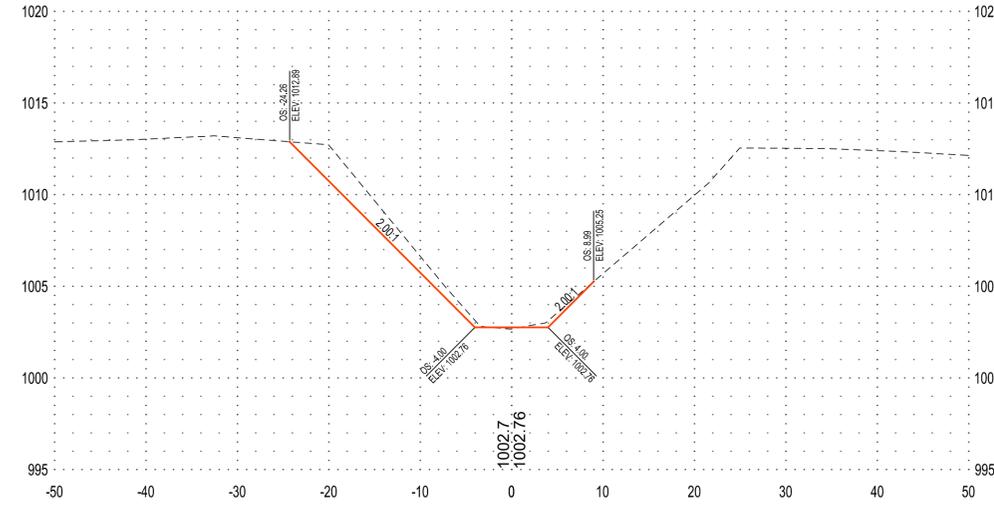
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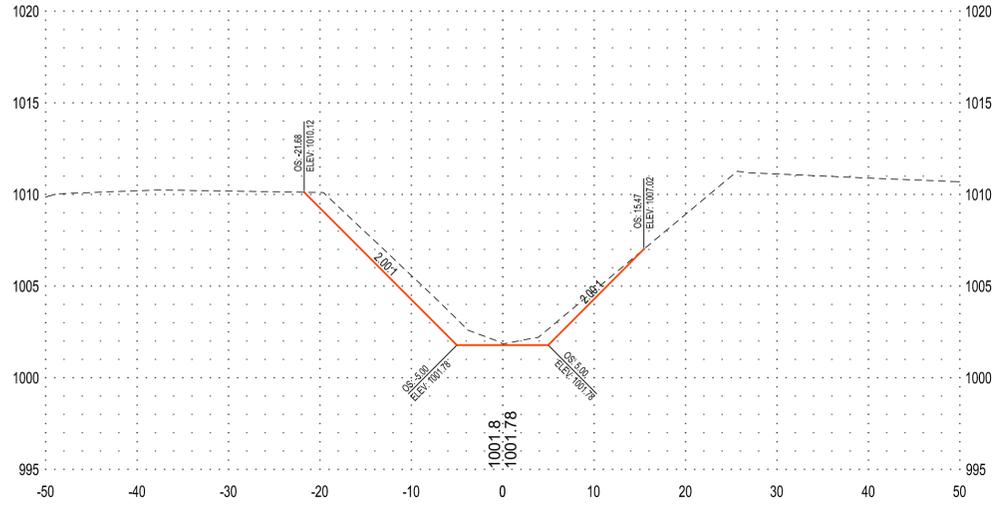
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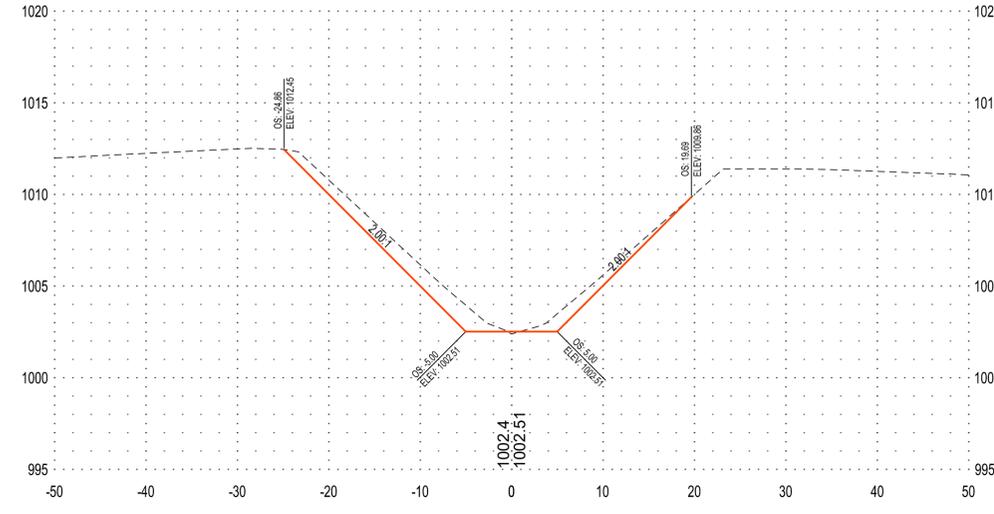
290+00



270+00



285+00



SECTION VIEW LEGEND	
NOTE: AS VIEWED IN THE DIRECTION OF INCREASING STATION	
---	EXISTING GROUND
---	PROPOSED GROUND
1000.0 1000.00	XXX.X - EXISTING GROUND E
1000.0 1000.00	XXX.XX - PROPOSED GROUND E



BLUE EARTH COUNTY

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PROJECT
**BLUE EARTH COUNTY
JUDICIAL DITCH
No. 49 REPAIRS**

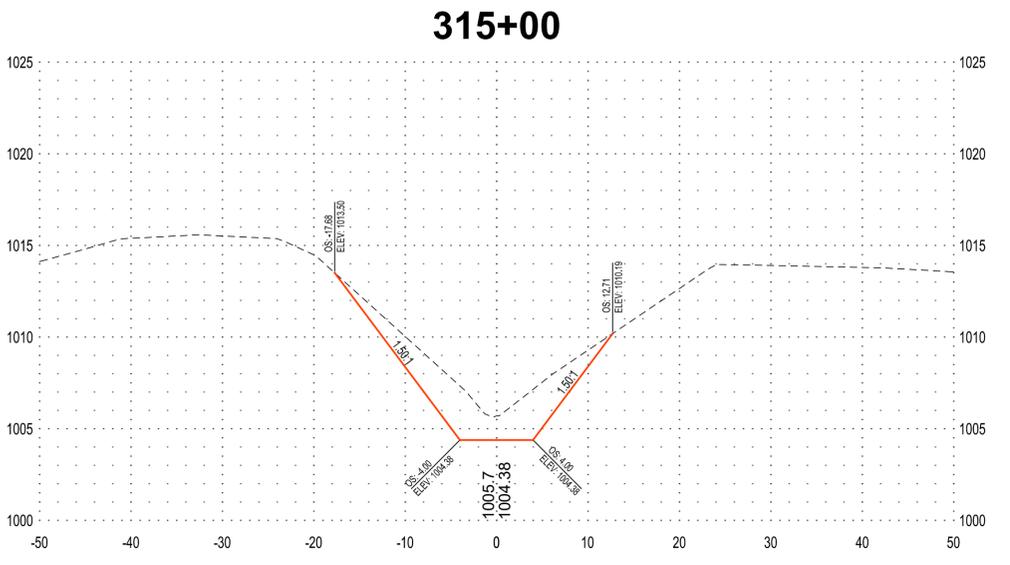
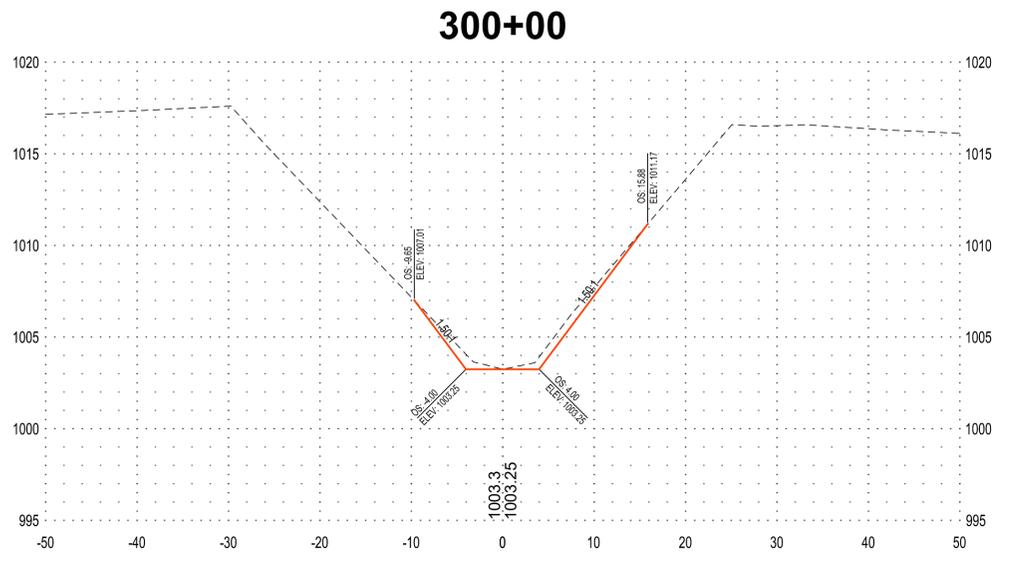
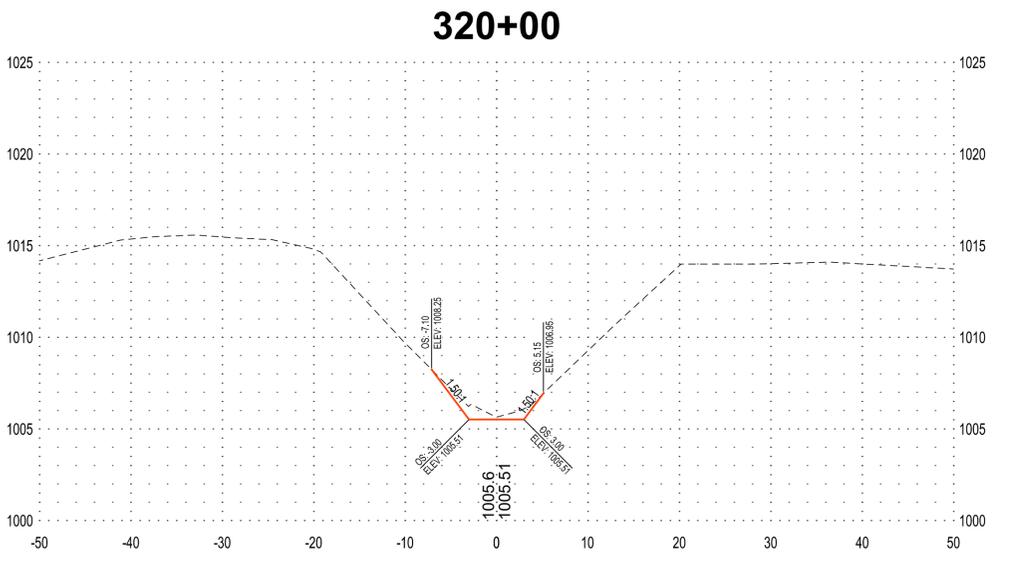
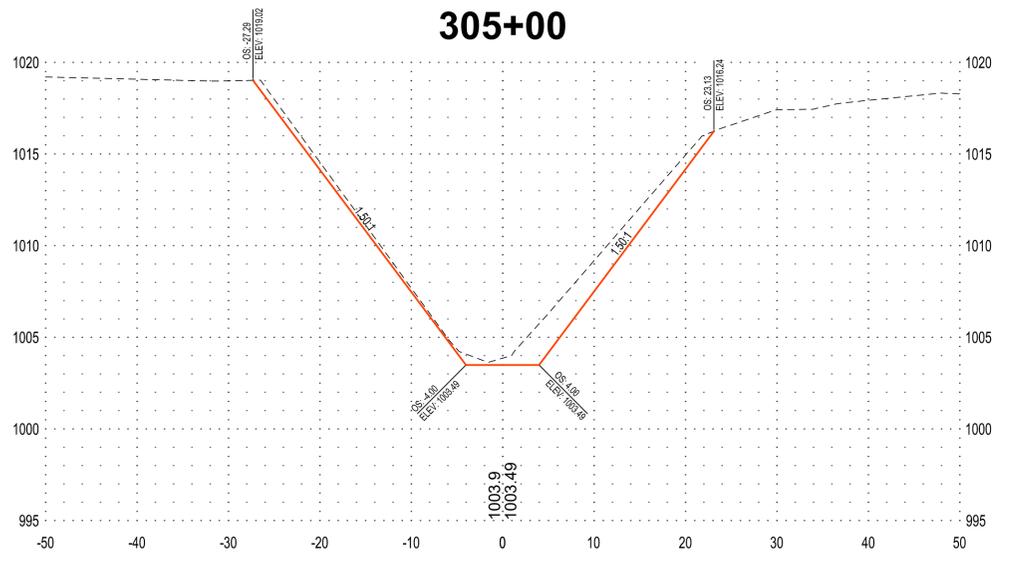
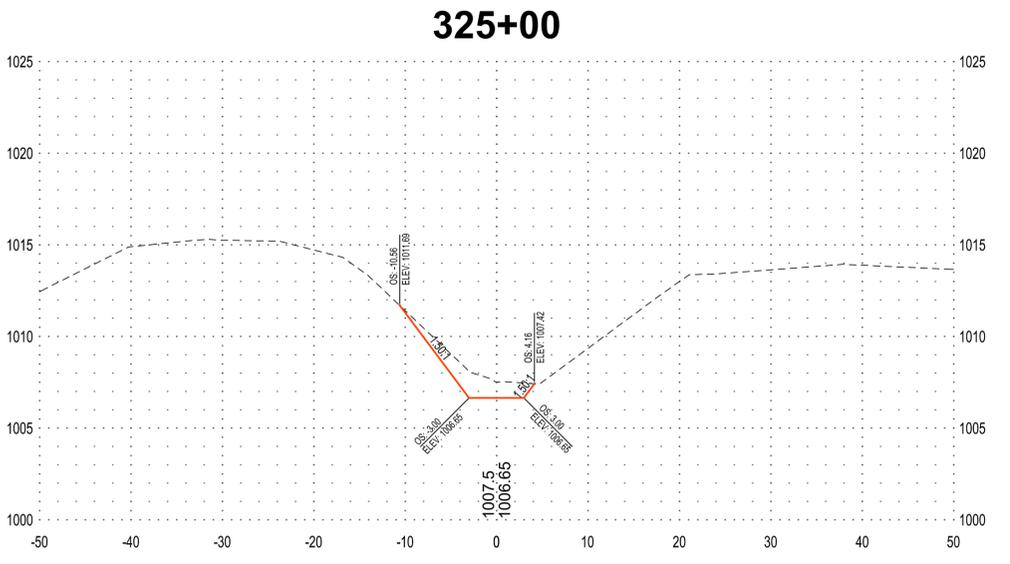
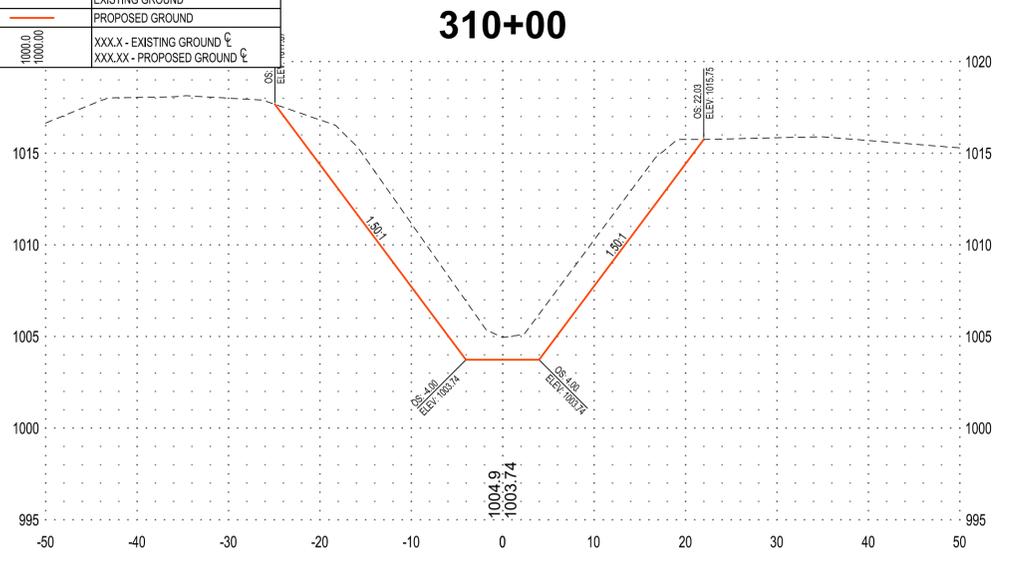
BLUE EARTH COUNTY MINNESOTA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	20-24339
FILE NAME	24339 SECTIONS
DRAWN BY	-
DESIGNED BY	-
REVIEWED BY	-
ORIGINAL ISSUE DATE	---/---/---
CLIENT PROJECT NO.	20-24339

TITLE
**CROSS SECTIONS
MAINLINE**

SHEET
36
OF 36



Appendix B: Maps



Overall
Watershed
Map
Judicial Ditch No 49
Blue Earth County,
Minnesota
Monday, March 1, 2021

- Legend**
- Existing JD49 Open Ditch
 - Existing JD49 Tile
 - JD 11
 - JD 12
 - CD 64
 - JD 23
 - JD 38
 - JD 49 Watershed

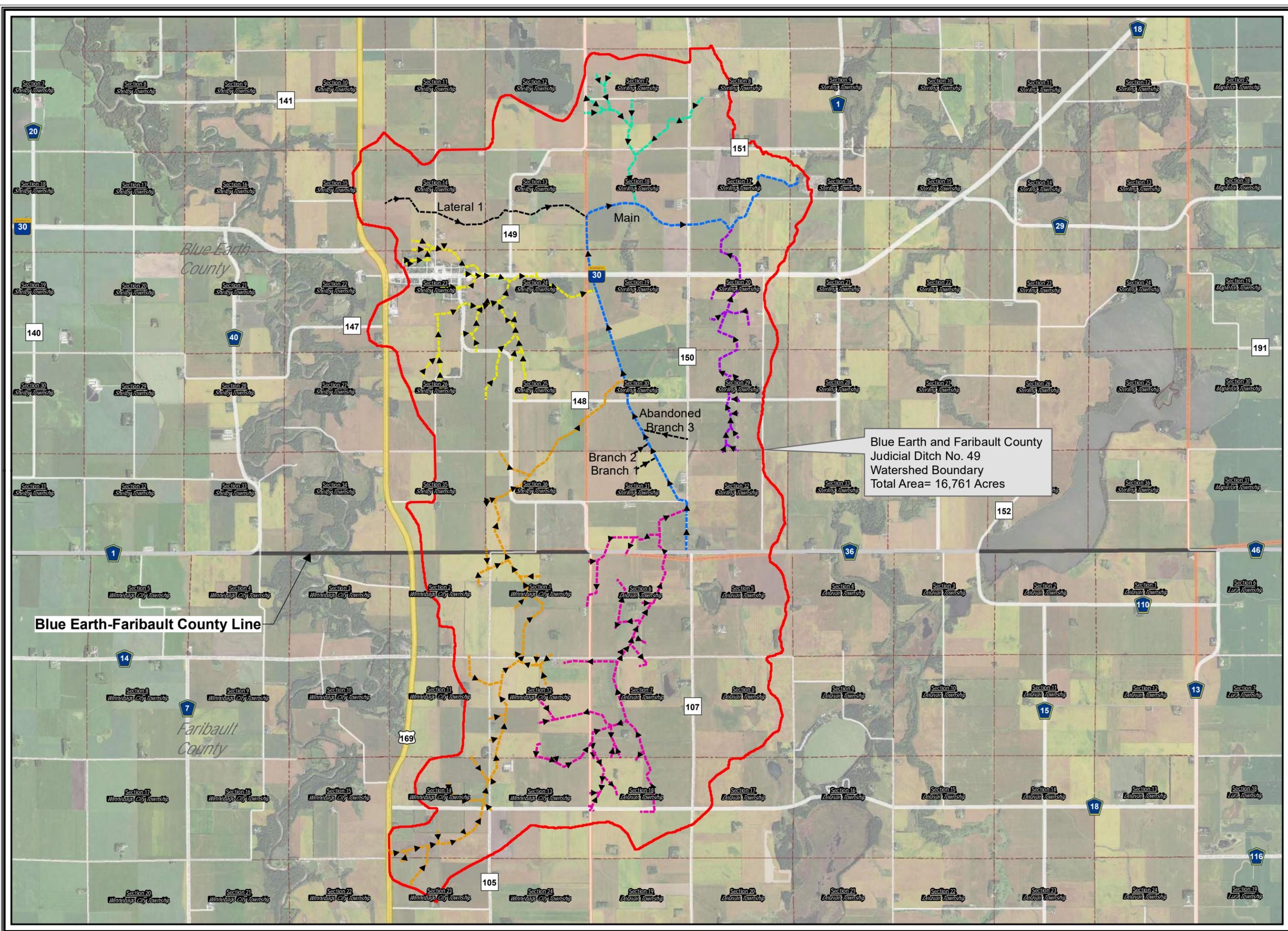
PN: 20-24339

Source:

Orthophotograph (MnGeo WMS, 2015)
Tile/Ditch (Blue Earth County, 12/16/2016)
Parcels (Blue Earth County, 12/16/2016)
Lakes (MN DNR, July, 2008)
Major Stream (MN DNR, July 2008)
Counties (MN DNR, July 2013)
PLSS (MnGeo/USGS)



0 1,150 2,300 4,600
Feet



Blue Earth and Faribault County
Judicial Ditch No. 49
Watershed Boundary
Total Area= 16,761 Acres

Blue Earth-Faribault County Line

Lateral 1

Main

Abandoned
Branch 3

Branch 2

Branch 1

Blue Earth
County

Faribault
County

Section 7 Shelby Township, Section 8 Shelby Township, Section 9 Shelby Township, Section 10 Shelby Township, Section 11 Shelby Township, Section 12 Shelby Township, Section 7 Sterling Township, Section 8 Sterling Township, Section 9 Sterling Township, Section 10 Sterling Township, Section 11 Sterling Township, Section 12 Sterling Township, Section 7 Mapleton Township, Section 13 Sterling Township, Section 14 Sterling Township, Section 15 Sterling Township, Section 16 Sterling Township, Section 17 Sterling Township, Section 18 Sterling Township, Section 19 Sterling Township, Section 20 Sterling Township, Section 21 Sterling Township, Section 22 Sterling Township, Section 23 Sterling Township, Section 24 Sterling Township, Section 7 Mapleton Township, Section 8 Mapleton Township, Section 9 Mapleton Township, Section 10 Mapleton Township, Section 11 Mapleton Township, Section 12 Mapleton Township, Section 13 Mapleton Township, Section 14 Mapleton Township, Section 15 Mapleton Township, Section 16 Mapleton Township, Section 17 Mapleton Township, Section 18 Mapleton Township, Section 19 Mapleton Township, Section 20 Mapleton Township, Section 21 Mapleton Township, Section 22 Mapleton Township, Section 23 Mapleton Township, Section 24 Mapleton Township, Section 7 Winnebago City Township, Section 8 Winnebago City Township, Section 9 Winnebago City Township, Section 10 Winnebago City Township, Section 11 Winnebago City Township, Section 12 Winnebago City Township, Section 7 Delavan Township, Section 8 Delavan Township, Section 9 Delavan Township, Section 10 Delavan Township, Section 11 Delavan Township, Section 12 Delavan Township, Section 7 Lura Township, Section 8 Lura Township, Section 9 Lura Township, Section 10 Lura Township, Section 11 Lura Township, Section 12 Lura Township, Section 13 Lura Township, Section 14 Lura Township, Section 15 Lura Township, Section 16 Lura Township, Section 17 Lura Township, Section 18 Lura Township, Section 19 Lura Township, Section 20 Lura Township, Section 21 Lura Township, Section 22 Lura Township, Section 23 Lura Township, Section 24 Lura Township, Section 7 Winnebago City Township, Section 8 Winnebago City Township, Section 9 Winnebago City Township, Section 10 Winnebago City Township, Section 11 Winnebago City Township, Section 12 Winnebago City Township, Section 7 Delavan Township, Section 8 Delavan Township, Section 9 Delavan Township, Section 10 Delavan Township, Section 11 Delavan Township, Section 12 Delavan Township, Section 7 Lura Township, Section 8 Lura Township, Section 9 Lura Township, Section 10 Lura Township, Section 11 Lura Township, Section 12 Lura Township, Section 13 Lura Township, Section 14 Lura Township, Section 15 Lura Township, Section 16 Lura Township, Section 17 Lura Township, Section 18 Lura Township, Section 19 Lura Township, Section 20 Lura Township, Section 21 Lura Township, Section 22 Lura Township, Section 23 Lura Township, Section 24 Lura Township



Elevation Map

Judicial Ditch No 49

Blue Earth County, Minnesota
Monday, March 1, 2021

Legend

- Existing JD49 Open Ditch
- Existing JD49 Tile
- JD 11
- JD 12
- CD 64
- JD 23
- JD 38
- JD 49 Watershed

DEM (ft)

- Value**
- High : 1088.83
 - Low : 981.079

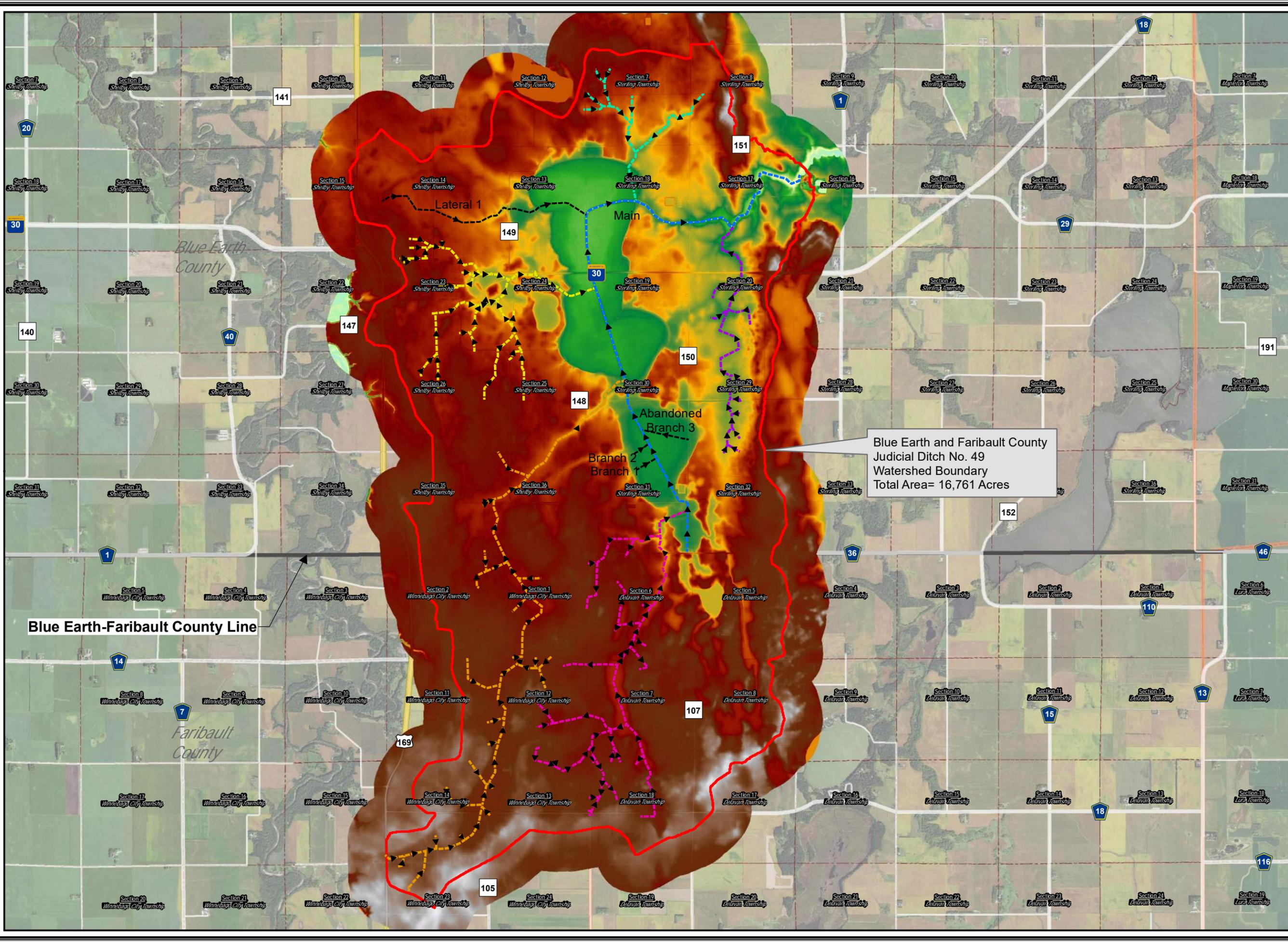
PN: 20-24339

Source:

Orthophotograph (MnGeo WMS, 2015)
Tile/Ditch (Blue Earth County, 12/16/2016)
Parcels (Blue Earth County, 12/16/2016)
Lakes (MN DNR, July, 2008)
Major Stream (MN DNR, July 2008)
Counties (MN DNR, July 2013)
PLSS (MnGeo/USGS)



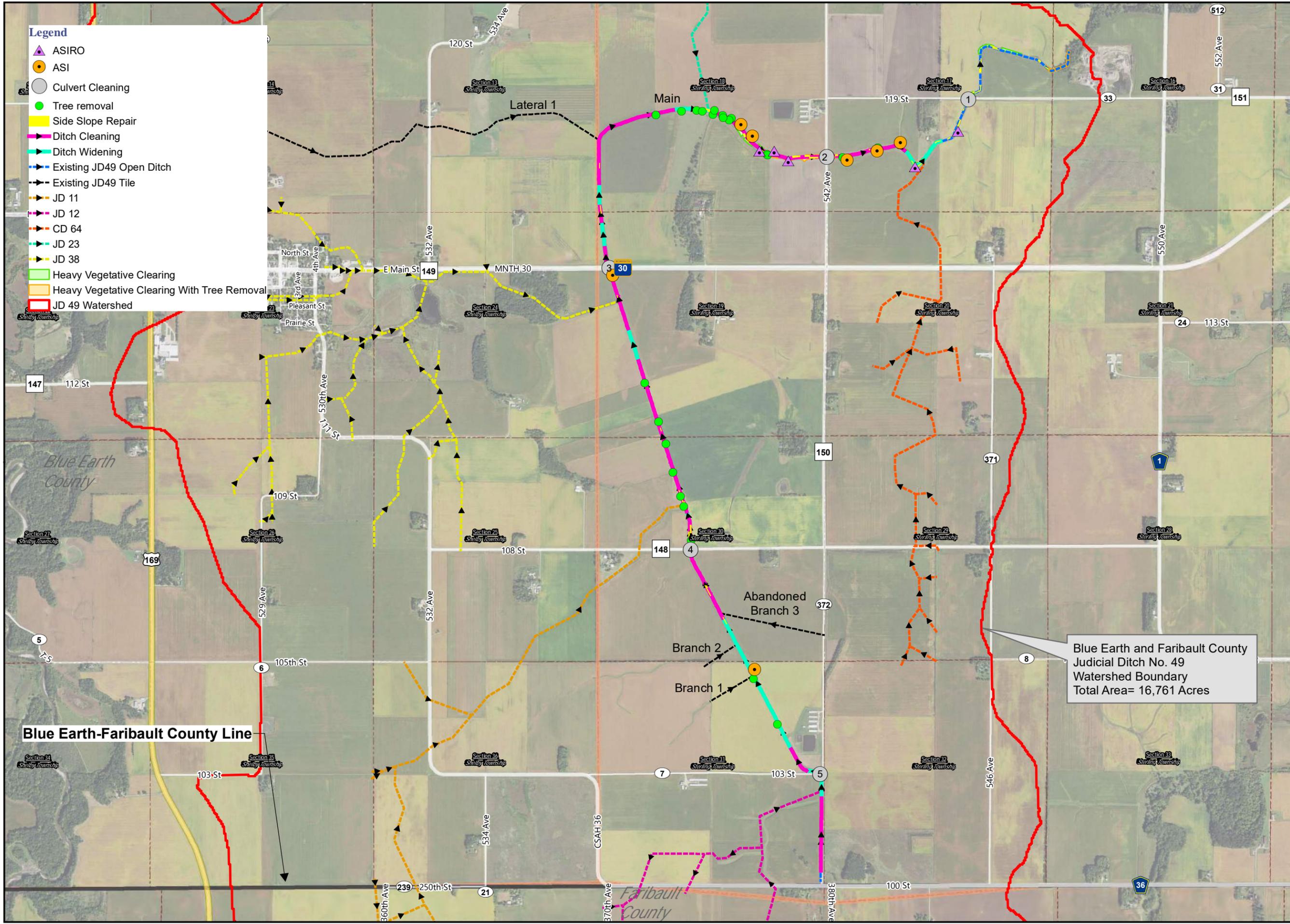
0 1,150 2,300 4,600 Feet





Repair Map
Judicial Ditch No 49
 Blue Earth County,
 Minnesota
 Tuesday, March 30, 2021

- Legend**
- ▲ ASIRO
 - ASI
 - Culvert Cleaning
 - Tree removal
 - Side Slope Repair
 - Ditch Cleaning
 - Ditch Widening
 - Existing JD49 Open Ditch
 - Existing JD49 Tile
 - JD 11
 - JD 12
 - CD 64
 - JD 23
 - JD 38
 - Heavy Vegetative Clearing
 - Heavy Vegetative Clearing With Tree Removal
 - JD 49 Watershed



Blue Earth and Faribault County
 Judicial Ditch No. 49
 Watershed Boundary
 Total Area= 16,761 Acres

Blue Earth-Faribault County Line

PN: 20-24339

Source:

- Orthophotograph (MnGeo WMS, 2015)
- Tile/Ditch (Blue Earth County, 12/16/2016)
- Parcels (Blue Earth County, 12/16/2016)
- Lakes (MN DNR, July, 2008)
- Major Stream (MN DNR, July 2008)
- Counties (MN DNR, July 2013)
- PLSS (MnGeo/USGS)



0 500 1,000 2,000 Feet





**Drone Flight
Path Map
Judicial Ditch
No 49
Blue Earth County,
Minnesota
Monday, March 1, 2021**

Legend

- JD 11
- JD 12
- CD 64
- JD 23
- JD 38
- Drone Flight Path
- Existing JD49 Open Ditch
- Existing JD49 Tile
- JD 49 Watershed

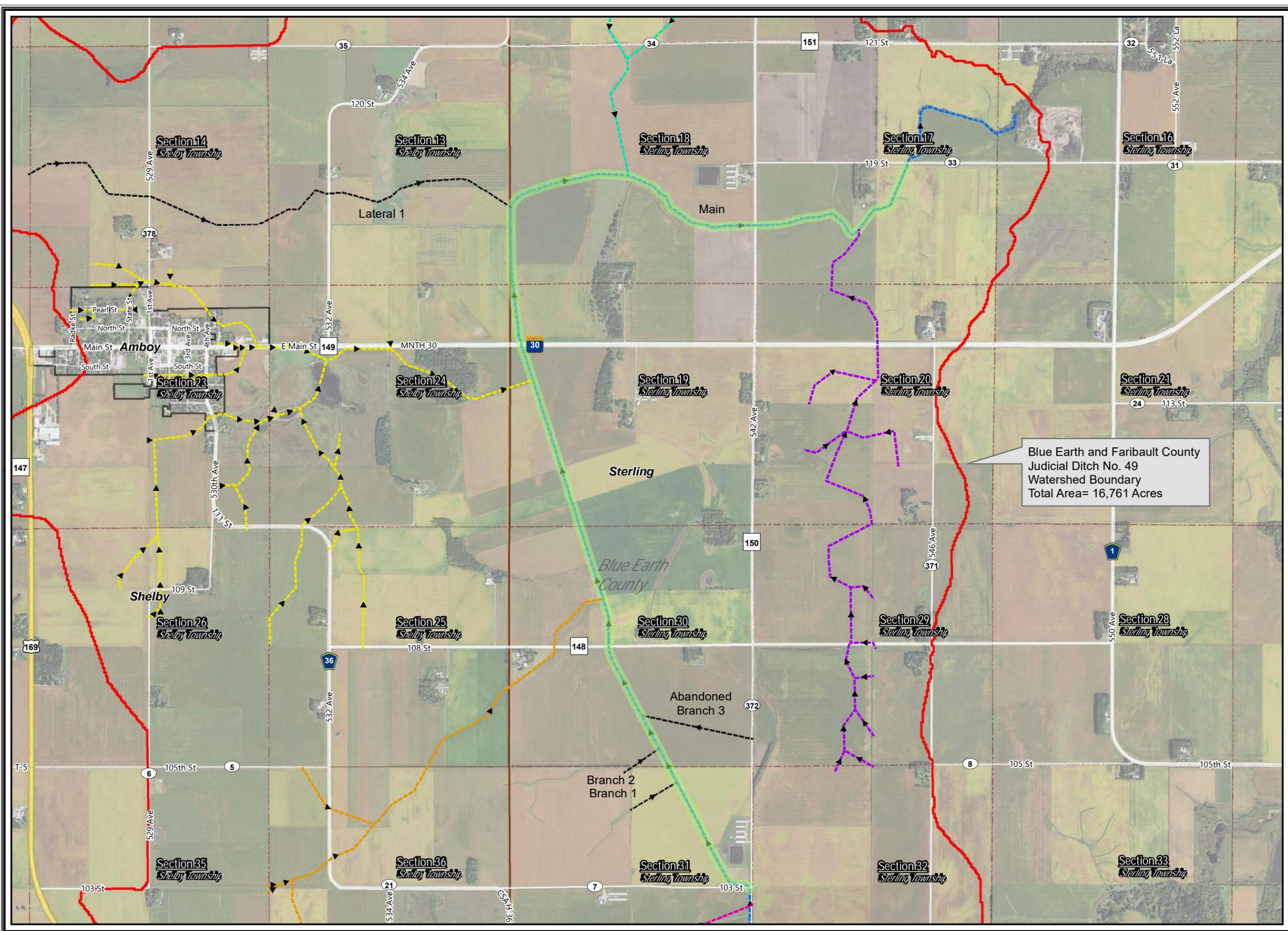
PN: 20-24339

Source:

Orthophotograph (MnGeo WMS, 2015)
Tile/Ditch (Blue Earth County, 12/16/2016)
Parcels (Blue Earth County, 12/16/2016)
Lakes (MN DNR, July, 2008)
Major Stream (MN DNR, July 2008)
Counties (MN DNR, July 2013)
PLSS (MnGeo/USGS)



0 475 950 1,900
Feet



Blue Earth and Faribault County
Judicial Ditch No. 49
Watershed Boundary
Total Area= 16,761 Acres



Public Waters, Public Lands, National Wetlands, and Conservation Lands Map

Judicial Ditch No 49
Blue Earth County,
Minnesota
Monday, March 1, 2021

- Legend**
- Existing JD49 Open Ditch
 - Existing JD49 Tile
 - JD 11
 - JD 12
 - CD 64
 - JD 23
 - JD 38
 - JD 49 Watershed
 - Public Water Watercourse
 - Public Ditch/Altered Natural Watercourse
 - Public Waters Basins
 - BWSR RIM Easements**
 - BWSR RIM Easements

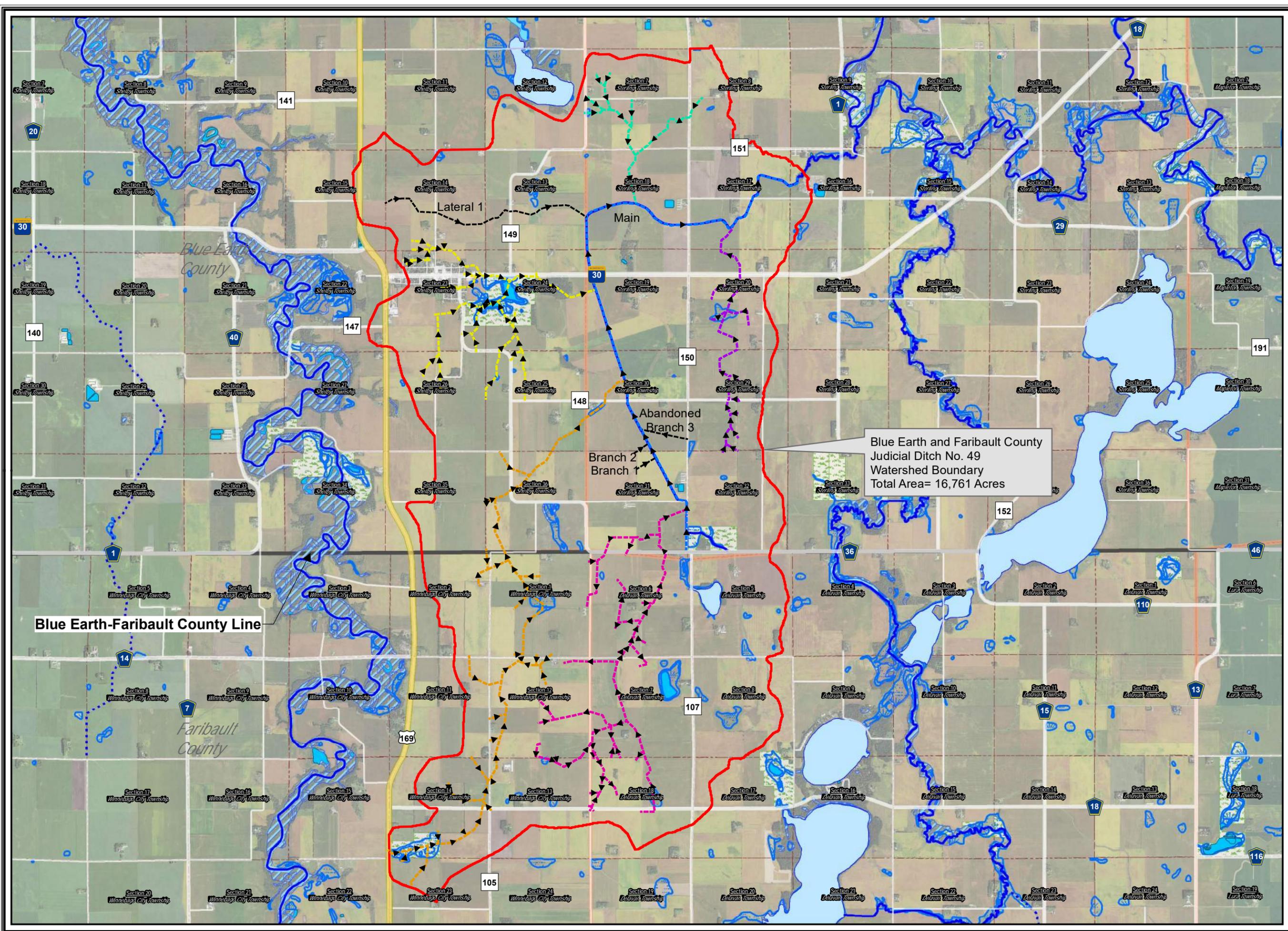
PN: 20-24339

Source:

Orthophotograph (MnGeo WMS, 2015)
Tile/Ditch (Blue Earth County, 12/16/2016)
Parcels (Blue Earth County, 12/16/2016)
Lakes (MN DNR, July, 2008)
Major Stream (MN DNR, July 2008)
Counties (MN DNR, July 2013)
PLSS (MnGeo/USGS)



0 1,150 2,300 4,600 Feet



Blue Earth and Faribault County
Judicial Ditch No. 49
Watershed Boundary
Total Area= 16,761 Acres

Blue Earth-Faribault County Line

Lateral 1
Main

Abandoned
Branch 3
Branch 2
Branch 1

Blue Earth
County

Faribault
County

Section 7
Shelby Township

Section 18
Shelby Township

Section 19
Shelby Township

Section 30
Shelby Township

Section 41
Shelby Township

Section 8
Winnepago City Township

Section 9
Winnepago City Township

Section 17
Winnepago City Township

Section 20
Winnepago City Township

Section 8
Shelby Township

Section 17
Shelby Township

Section 26
Shelby Township

Section 35
Shelby Township

Section 44
Shelby Township

Section 5
Winnepago City Township

Section 6
Winnepago City Township

Section 14
Winnepago City Township

Section 21
Winnepago City Township

Section 9
Shelby Township

Section 18
Shelby Township

Section 27
Shelby Township

Section 36
Shelby Township

Section 45
Shelby Township

Section 14
Winnepago City Township

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Section 10
Shelby Township

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Section 28
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Section 37
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Section 46
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Section 15
Winnepago City Township

Section 16
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Section 24
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Section 31
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Section 11
Shelby Township

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Section 47
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Section 17
Winnepago City Township

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Section 36
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Section 21
Winnepago City Township

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Section 55
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Section 40
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Section 20
Shelby Township

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Shelby Township

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Section 57
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Section 26
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Section 42
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Section 22
Shelby Township

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Section 58
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Section 27
Winnepago City Township

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Section 61
Shelby Township

Section 30
Winnepago City Township

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Winnepago City Township

Section 39
Winnepago City Township

Section 46
Winnepago City Township

Section 26
Shelby Township

Section 35
Shelby Township

Section 44
Shelby Township

Section 53
Shelby Township

Section 62
Shelby Township

Section 31
Winnepago City Township

Section 32
Winnepago City Township

Section 40
Winnepago City Township

Section 47
Winnepago City Township

Section 27
Shelby Township

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Shelby Township

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Shelby Township

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Shelby Township

Section 63
Shelby Township

Section 32
Winnepago City Township

Section 33
Winnepago City Township

Section 41
Winnepago City Township

Section 48
Winnepago City Township

Section 28
Shelby Township

Section 37
Shelby Township

Section 46
Shelby Township

Section 55
Shelby Township

Section 64
Shelby Township

Section 33
Winnepago City Township

Section 34
Winnepago City Township

Section 42
Winnepago City Township

Section 49
Winnepago City Township

Section 29
Shelby Township

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Shelby Township

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Section 56
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Winnepago City Township

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Winnepago City Township

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Winnepago City Township

Section 33
Shelby Township

Section 42
Shelby Township

Section 51
Shelby Township

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Shelby Township

Section 69
Shelby Township

Section 38
Winnepago City Township

Section 39
Winnepago City Township

Section 47
Winnepago City Township

Section 54
Winnepago City Township

Section 34
Shelby Township

Section 43
Shelby Township

Section 52
Shelby Township

Section 61
Shelby Township

Section 70
Shelby Township

Section 39
Winnepago City Township

Section 40
Winnepago City Township

Section 48
Winnepago City Township

Section 55
Winnepago City Township

Section 35
Shelby Township

Appendix C: Drainage Calculations



EXISTING DITCH CULVERT SUMMARY

Crossing # on Map	Station	Roadway	Existing Type	Existing Material	Existing Width (ft)	Existing Height (ft)	Existing Rise x Span (in)	Existing Slope (%)	Drainage Area (Acres)	Existing Drainage Coefficient (in/day)
1	22+50	119th Street	BOX CULVERT DUAL	RCP	12	12	-	0.12%	16435	4.17
2	67+25	542nd Avenue	BOX CULVERT	RCP	12	12	-	0.30%	15661	3.46
3	157+50	Highway 30	BOX CULVERT DUAL	RCP	10	8	-	0.45%	12422	4.99
4	227+00	108th Street	ARCH CULVERT DUAL	RCP	-	-	77 1/4 x 122	1.01%	5293	8.27
5	290+00	103rd Street	BOX CULVERT	RCP	14	10	-	0.04%	4358	4.50

Appendix D: Cost Estimates

BLUE EARTH AND FARIBAUT COUNTY
JUDICIAL DITCH No. 49
March 22, 2022



PROPOSED REPAIR

Mainline Open Ditch

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 45,920.00	\$ 45,920
102	INSTALL 24-INCH ASI RISER ASSEMBLY W/TRASH GRATE	EA	1	\$ 1,799.46	\$ 1,799
103	INSTALL 18-INCH ASI RISER ASSEMBLY W/TRASH GRATE	EA	2	\$ 1,743.80	\$ 3,488
104	INSTALL 15-INCH ASI RISER ASSEMBLY W/TRASH GRATE	EA	1	\$ 1,477.30	\$ 1,477
105	INSTALL 12-INCH ASI RISER ASSEMBLY W/TRASH GRATE	EA	2	\$ 1,292.60	\$ 2,585
106	INSTALL 10-INCH ASI RISER ASSEMBLY W/TRASH GRATE	EA	2	\$ 976.70	\$ 1,953
107	INSTALL 8-INCH ASI RISER ASSEMBLY W/TRASH GRATE	EA	3	\$ 1,230.00	\$ 3,690
108	INSTALL 8-INCH ASI RISER ASSEMBLY W/STANDARD	EA	1	\$ 1,023.40	\$ 1,023
109	INSTALL 24-INCH ASI OUTLET ASSEMBLY	EA	3	\$ 1,838.40	\$ 5,515
110	INSTALL 15-INCH ASI OUTLET ASSEMBLY	EA	1	\$ 1,336.75	\$ 1,337
111	INSTALL 12-INCH ASI OUTLET ASSEMBLY	EA	2	\$ 1,080.70	\$ 2,161
112	INSTALL 10-INCH ASI OUTLET ASSEMBLY	CY	3	\$ 916.88	\$ 2,751
113	INSTALL 8-INCH ASI OUTLET ASSEMBLY	EA	3	\$ 907.31	\$ 2,722
114	CLASS III RIPRAP WITH GEOTEXTILE FABRIC (FOR ASIRO)	CY	150	\$ 90.86	\$ 13,629
115	DITCH CLEANING (15' WIDE DITCH BOTTOM)	LF	8637	\$ 9.00	\$ 77,733
116	DITCH CLEANING (12' WIDE DITCH BOTTOM)	LF	5175	\$ 8.36	\$ 43,263
117	DITCH CLEANING (10' WIDE DITCH BOTTOM)	LF	2409	\$ 4.90	\$ 11,804
118	DITCH CLEANING (8' WIDE DITCH BOTTOM)	LF	1085	\$ 3.00	\$ 3,255
119	DITCH CLEANING (6' WIDE DITCH BOTTOM)	LF	1275	\$ 2.60	\$ 3,315
120	DITCH WIDENING (15' WIDE DITCH BOTTOM)	LF	3410	\$ 16.30	\$ 55,583
121	DITCH WIDENING (12' WIDE DITCH BOTTOM)	LF	1010	\$ 15.67	\$ 15,827
122	DITCH WIDENING (10' WIDE DITCH BOTTOM)	LF	2500	\$ 14.30	\$ 35,750
123	DITCH WIDENING (8' WIDE DITCH BOTTOM)	LF	1819	\$ 11.50	\$ 20,919
124	DITCH SIDESLOPE REPAIR	LF	6475	\$ 9.79	\$ 63,390
125	54-INCH TILE OUTLET	EA	1	\$ 8,666.70	\$ 8,667
126	42-INCH TILE OUTLET	EA	2	\$ 2,459.30	\$ 4,919
127	36-INCH TILE OUTLET	EA	2	\$ 3,136.17	\$ 6,272
128	30-INCH TILE OUTLET	EA	3	\$ 2,257.62	\$ 6,773
129	24-INCH TILE OUTLET	EA	4	\$ 1,956.16	\$ 7,825
130	18-INCH TILE OUTLET	EA	19	\$ 1,564.98	\$ 29,735
131	15-INCH TILE OUTLET	EA	8	\$ 1,349.60	\$ 10,797
132	12-INCH TILE OUTLET	EA	7	\$ 1,295.11	\$ 9,066
133	10-INCH TILE OUTLET	EA	4	\$ 1,098.56	\$ 4,394
134	8-INCH TILE OUTLET	EA	10	\$ 1,104.47	\$ 11,045
135	ARMOR TILE OUTLET (RIPRAP & GEOTEXTILE FABRIC)	EA	67	\$ 878.54	\$ 58,862
136	HEAVY VEGETATIVE CLEARING	AC	3.3	\$ 16,464.13	\$ 54,332
137	TREE REMOVAL	EA	24	\$ 417.70	\$ 10,025
138	HEAVY VEGETATIVE CLEARING WITH TREE REMOVAL	AC	3	\$ 14,868.13	\$ 44,604
139	16.5' BUFFER STRIP SEEDING	AC	20.7	\$ 1,500.31	\$ 31,056
140	SIDESLOPE SEEDING	AC	12.55	\$ 3,881.76	\$ 48,716
141	MOWING	AC	41.4	\$ 214.40	\$ 8,876
142	WEED SPRAYING	AC	53.95	\$ 307.80	\$ 16,606
143	INSTALL FLOATATION SILT CURTAIN	LF	20	\$ 876.20	\$ 17,524
144	CLASS III RIPRAP WITH GEOTEXTILE FABRIC	CY	1448	\$ 85.24	\$ 123,428
145	CULVERT CLEANING	EA	5	\$ 4,000.00	\$ 20,000
146	REMOVE EXISTING WOODEN BRIDGE	EA	1	\$ 3,000.00	\$ 3,000
SUBTOTAL CONSTRUCTION COST					\$ 957,410
10% UNFORSEEN					\$ 95,741
TOTAL CONSTRUCTION COST					\$ 1,053,151
TEMPORARY DAMAGES		AC	14.08	\$ 650.00	\$ 9,150
LAND ACQUISITION/ PERMANENT DAMAGES		AC	0.52	\$ 6,500.00	\$ 3,374
COUNTY ADMINISTRATION COSTS					\$ 52,658
TOPOGRAPHIC SURVEY					\$ 25,872
REPORTS, PLANS AND SPECIFICATIONS					\$ 115,847
CONSTRUCTION STAKING & ADMINISTRATION					\$ 142,176
TOTAL MAINLINE OPEN DITCH REPAIR COST					\$ 1,402,227

Appendix E: Drone Photos

PROJECT NAME Blue Earth Judicial Ditch No. 49
PROJECT NO. 20-24339
REVIEWED DATE 9/8/2020
DRONE FLIGHT DATE 7/24/2020



Picture #1: Road Crossing With 103rd Street in Section 31 of Sterling Township



Picture #2: Tree Removal in Section 31 of Sterling Township



Picture #3: Meandering Channel in section 30 of Sterling Township



Picture #4: Sediment and Vegetation Accumulation in Culvert Crossing along 108th Street in Section 30 of Sterling Township



PROJECT NAME Blue Earth Judicial Ditch No. 49
PROJECT NO. 20-24339
REVIEWED DATE 9/8/2020
DRONE FLIGHT DATE 7/24/2020



Picture #5: Sloughing along Ditch Bank in Section 30 of Sterling Township



Picture #6: Heavy Vegetation along ditch Banks and Unprotected Tile Outlets in Section 30 of Sterling Township



Picture #7: Sediment and Vegetation Accumulation along the Open Ditch in Section 30 of Sterling Township



Picture #8: Meandering Ditch in Section 19 of Sterling Township

PROJECT NAME Blue Earth Judicial Ditch No. 49
PROJECT NO. 20-24339
REVIEWED DATE 9/8/2020
DRONE FLIGHT DATE 7/24/2020



Picture #9: Culvert Crossing with Highway 30 in Section 19 of Sterling Township.



Picture #10: Unprotected Tile Outlet in Section 18 of Sterling Township.



Picture #11: Eroded Tile Outlet in Section 18 of Sterling Township



Picture #12: Washed Out Tile and Banks in Section 18 of Sterling Township



PROJECT NAME Blue Earth Judicial Ditch No. 49
PROJECT NO. 20-24339
REVIEWED DATE 9/8/2020
DRONE FLIGHT DATE 7/24/2020



Picture #13: Bank Failure/Sloughing in Section 18 of Sterling Township



Picture #14: Severe Eroded Side Sloped in Section 18 of Sterling Township



Picture #15: Collapsed Tile in Section 18 of Sterling Township



Picture #16: Severe Washout from Collapsed Tile in Section 18 of Sterling Township

PROJECT NAME Blue Earth Judicial Ditch No. 49
PROJECT NO. 20-24339
REVIEWED DATE 9/8/2020
DRONE FLIGHT DATE 7/24/2020



Picture #17: Heavy Vegetation in Section 18 of Sterling Township



Picture #18: Culvert Crossing with 542nd Ave in Section 17 of Sterling Township



Picture #19: Bank Erosion and Debris in Section 17 of Sterling Township



Picture #20: Severely Eroded Banks in Section 17 of Sterling Township

PROJECT NAME Blue Earth Judicial Ditch No. 49
PROJECT NO. 20-24339
REVIEWED DATE 9/8/2020
DRONE FLIGHT DATE 7/24/2020



Picture #21: Culvert Crossing with
119th Street in Section 17 of Sterling
Township, Heavy Sediment Deposition
in West Box Culvert