

# REPAIR REPORT FOR:

## COUNTY DITCH NO. 24 REPAIR: FAIRBAULT COUNTY, MINNESOTA

JUNE 14, 2021

Project No. 19-23499

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# Signature Sheet

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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**County Ditch No. 24 Repair**  
**Faribault County, Minnesota**

Engineer's Project Number: 19-23499

Dated this 14<sup>th</sup> day of June, 2021



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## REPAIR PETITION

A repair petition was filed to address items currently in disrepair in Faribault County Ditch No. 24 (CD 24). Items listed within the repair petition include:

- Address continued erosion concerns through open ditch
- Repair sloughs
- Repair drop intake outlet
- Protect driveway entrance
- Straighten culvert under 338<sup>th</sup> Avenue

The Faribault County Drainage Authority approved the repair petition and appointed ISG as the engineer to evaluate the existing condition and propose repairs and repair alternatives to address maintenance items and erosion issues. The order added no further requirements.

## LOCATION + WATERSHED

Faribault County Ditch No. 24 lies within Winnebago City Township of Faribault County in northwest Faribault County. The watershed provides drainage to approximately 970 acres and includes land from Sections 8, 9, 10, 16 and 17 of Winnebago City Township. Elevations within the watershed range from approximately 996 to 1062 Mean Sea Level (MSL). Faribault County Ditch No. 24 serves as the outlet for Faribault Judicial County Ditch No. 201 (JCD 201). JCD 201 drains approximately 2,270 acres; in turn, CD 24 serves as the outlet for a total of 3,240 acres.

The hydrological soil classification of CD 24 watershed is predominantly Type "C/D" soils which are considered prime for farmland, if adequately drained based on Natural Resources Conservation Service (NRCS) web soil survey. On-site soil analysis took place to confirm the soil textures present within the open ditch channel. Thirty-six soil samples were taken with a hand auger strategically that varied in depth and location within the open ditch channel. The soil samples confirmed soil texture present range from silty clay loam to silty clay; soils that are prone to erosion. Soil texture was a design consideration when determining solutions to erosion issues.

The system outlets through a series of berms, drop structures, and outlet pipes to control flow through an existing ravine to the Blue Earth River. Upstream of the ravine there is 1,800-feet of open ditch in Section 9 of Winnebago City Township. The open ditch contains a riprap spillway at the upstream portion before it crosses 338<sup>th</sup> Avenue with a 66-inch culvert. The repair items outlined in the petition are mainly within this portion of the system. In addition, CD 24 includes approximately 17,730 feet of subsurface drainage tile, and 9,000 feet of grass waterway. Complete maps of the existing conditions for the CD 24 watershed can be found in Appendix C.

## HISTORY

Faribault County Ditch No. 24 was first constructed in 1915 as a subsurface tile system. In 1959, the system was improved with the addition of 1,800 feet of open ditch at the outlet of the system and 9,000 feet of grass waterway. In 2013, a repair was ordered which consisted of open ditch cleaning, partial Mainline tile replacement, crossing repairs, implementation of alternative side inlets, and installation of an outlet structure for ravine stabilization. The outlet structure consisted of a 60-inch outlet in the ravine with a 96-inch drop intake towards the inlet of the 60-inch pipe. Another 96-inch drop intake was installed further downstream to handle the flows during the higher rainfall events. This repair was completed to convey the flow through structures rather than overland down the ravine which has caused severe erosion and bluff instability over the years. Construction of the ravine repairs occurred in 2014 and 2015.

An improvement was petitioned in 2016 to improve the tile capacities throughout of the system. The Faribault County Drainage Authority approved the Final Engineers Report (FER), although the project is still in litigation. No resolution has been reached to this date.



Repairs to the downstream portions of the waterway and open ditch were petitioned in 2016 with a repair report developed later that year. The repairs included cleaning the open ditch, installing a 42-inch control structure in the outlet of the open ditch prior to flowing into the ravine structures, installing a rip rap spillway to connect the waterway to the open ditch, installing two field crossings, and repairing 1,170-feet of tile along Branch B. Construction of the repairs occurred in 2017.

## REPAIR ITEMS

The information has been prepared from the original CD 24 profile drawings and alignment maps provided by Faribault County in conjunction with the additional records from historical repairs and improvements. A topographic survey of the open ditch portions of the open ditch was done by ISG in July of 2019 to address the repairs outlined in the repair petition. A close representation of the CD 24 watershed was created using the survey information in conjunction with LiDAR contours and viewers watershed boundaries provided from the most up-to-date redetermination of benefits. A map illustrating the existing CD 24 system can be found in Appendix C.

Outlined below is the existing condition of the items addressed in the repair petition followed by the proposed repairs or repair alternatives.

### Sloughing

There are multiple areas in the open ditch portion of CD24 on the east side of 338<sup>th</sup> Avenue that are having bank failures. There are several sloughed areas which are causing material to fall into the open ditch and are causing or may have the potential for flow restrictions. There has been natural widening of the ditch caused by high, erosive flows and some downcutting in the past; therefore, the landowners directly adjacent to the ditch have lost productive cropland due to erosion and bank failures.

The sloughs range in size and severity, and the repairs to each slough will be addressed individually. The sloughs recommended to be repair have been numbered 1 through 5. A Slough Location map in Appendix C displays the location and extent of each slough. The slough repair areas were identified as slough that have potential for causing major flow restrictions, sediment export to downstream waters, bank instability, or potential for loss of farmland adjacent to open ditch. Areas that have naturally stabilized will not be addressed in the repair as it may cause more harm than benefit to disturb stabilized areas.

Slough #1, #2, #3, and #4 will be repaired with a bench side slope slough repair where the bench will be near the toe of the ditch. The benched side slope slough repair will create a more stable design for the open ditch. The bench is placed at the toe for these repairs because the sloughed material has naturally formed a bench at this location. The existing edge of buffer will remain in the same location therefore no land acquisition is expected. However, excavation from the repair will expand out into the adjacent fields which will require temporary damages. The buffer will be lowered down to take pressure off of the side slope and toe of ditch. The slide slopes will be flattened to 2:1 or 3:1 side slope ratio depending on the existing side slope ratios. Once the naturally formed bench elevation is reached, the side slope will merge into it. The bench widths will differ throughout each slough repair. Riprap will be placed at the bench to ensure there isn't any additional sloughing in the future and protect the toes from the high velocity flows.

Slough #5 is located on the south side of the ditch directly downstream of 338<sup>th</sup> Avenue. The landowner uses this area as a field access and due to sloughing is in jeopardy of damage. There is minor sloughing near the top of the ditch side slope. To be proactive in protecting the field access from erosive flows from the 338<sup>th</sup> Avenue, erosion control blanket will be installed near the top of the ditch and riprap will be installed at the toe. The riprap will help to stabilize and prevent any further sloughing into the open ditch.

Below are figures that display the location and existing conditions of the sloughs. Cross sections are available in Appendix A with the preliminary construction plans that display the proposed repairs for each individual slough.

It should be noted that the slough repairs noted are not permanent fixes for the open ditch portion of CD 24. The open ditch is still expected to need routine maintenance and erosion control repairs. A more compressive design for the open ditch will provide a more stable channel long term. A comprehensive design is more expensive for initial construction; however, it may reduce routine maintenance cost in the future.



*Figure 1: Slough Locations*

Table 1: Slough Overview

Faribault County Ditch No. 24							
Open Ditch Bank Stability							
Slough Overview	Location	Solution	Start Station	End Station	Total Length (LF)	Temporary Damages (AC)	Riprap (CY)
Slough #1	North	Benched side slope slough repair. Bench near toe of open ditch side slope where natural bench has formed from slumped material.	5+30	6+75	145	0.11	43
Slough #2	North	Benched side slope slough repair. Bench near toe of open ditch side slope where natural bench has formed from slumped material.	8+00	10+15	215	0.17	48
Slough #3	South	Benched side slope slough repair. Bench near toe of open ditch side slope where natural bench has formed from slumped material.	11+00	11+95	95	0.07	21
Slough #4	South	Benched side slope slough repair. Bench near toe of open ditch side slope where natural bench has formed from slumped material.	14+50	15+45	95	0.07	32
Slough #5	South	Re-sloping near top of ditch to prevent further sloughing & instabilities. Riprap will be placed along top of ditch to erosion control from 388th Avenue crossing	15+75	16+25	50	NA	50



Figure 2: Slough #1 viewing downstream





*Figure 3: Slough #1 viewing upstream*



*Figure 4: Slough #2 viewing downstream*



*Figure 5: Slough #2 viewing upstream*

*Figure 6: Slough #3 viewing downstream*



*Figure 7: Slough #3 viewing upstream*





*Figure 8: Slough #4 viewing downstream*



*Figure 9: Slough #4 viewing upstream*



Figure 10: Slough #5



Figure 11: Slough #5 viewing upstream

### Drop Intake Outlet

It is proposed to remove and replace the existing drop intake with a 24-inch alternative side inlet (ASI). The outlet of the ASI will be above the proposed bench for Slough #3 to ensure a free outlet. Benching of side slopes and spoil placement from Slough #3 will be taking place in the area of the ASI and will



direct more surface water to the inlet. Therefore, the ASI will be upsized from an 18-inch to a 24-inch intake to adequately convey surface flow.

### 338<sup>th</sup> Avenue Culvert

The existing 66-inch corrugated metal culvert under 338<sup>th</sup> Avenue connects the CD 24 open ditch diagonally across the road. Due to the angle in which the culvert crosses the road, the outlet on the east side of the culvert causes erosion along open ditch banks. The township has discussed independently to install a bend in the culvert to safely route water to the center of the open ditch and away from the ditch bank. However, this has not been completed to date. Extra rip rap has been added to the Slough #5 repair to add support to the bank and direct flow towards the center of the open ditch.



*Figure 12: 338th Avenue Culvert*

### Seeding

All areas exposed during construction will be reseeded to provide bank stability. Erosion control blanket will be required on all slough repairs to provide fast vegetation establishment and protection from erosion. Seeding will be required to be completed within 2-days after final grading of the slough repair.

### Tree Removals

There are approximately 11 trees within the open ditch or within the 16.5-foot buffer area. Trees in sloughed area in which earthwork and re-shaping of channel geometry will be taking place will be removed. In total, 6 trees are proposed to be removed as part of this repair. The remaining trees will be left in place as to not create additional instabilities in the open ditch channel.

## ALTERNATIVE REPAIR OPTIONS

The above repairs listed specifically address the petitioned repair items and slough repair areas. Since the slough repairs comprise a large portion of the ditch and are also a band aid approach; other repair options should be considered to address the entire open ditch at one time and to factor in the ditch soil stability.

The limiting velocity method was used to determine suitable velocities with corresponding cross sections throughout the ditch. The Limiting Velocity Method determines a maximum recommended velocity based



on the type of soil present. For CD 24, soil textures along the open ditch were identified as silty clay loam from the Natural Resources Conservation Services (NRCS) Web Soil Survey (WSS). Using Table 2 the permissible velocity for silty clay loam soil texture is 3.5 feet per second when fair vegetation is present. This was the design factor for the given conditions on the CD 24 open ditch.

*Table 2: NRCS Permissible Velocity*

Soil Texture	Bare channel m/s (ft/s)	Retardance*	Permissible velocity		
			Channel Poor (ft/s)	Vegetation Fair	Condition Good
Sandy, silt,		B	0.61 (2.0)	0.91 (3.0)	1.22 (4.0)
sandy loam,	0.45 (1.5)	C	0.45 (1.5)	0.76 (2.5)	1.07 (3.5)
and silty loam		D	0.45 (1.5)	0.61 (2.0)	0.91 (3.0)
Silty clay loam and	0.61 (2.0)	B	0.91 (3.0)	1.22 (4.0)	1.52 (5.0)
sandy clay loam		C	0.76 (2.5)	1.07 (3.5)	1.37 (5.0)
D		D	0.61 (2.0)	0.91 (3.0)	1.22 (4.0)
		B	1.07 (3.5)	1.52 (5.0)	1.83 (6.0)
Clay	0.76 (2.5)	C	0.91 (3.0)	1.37 (4.5)	1.68 (5.5)
D			0.76 (2.5)	1.22 (4.0)	1.52 (5.0)
Coarse Gravel	1.52 (5.0)	B, C, or D	1.52 (5.0)	1.83 (6.0)	2.13 (7.0)
Cobbles and shale	1.83 (6.0)	B, C, or D	1.83 (6.0)	2.13 (7.0)	2.44 (8.0)

\*The choice of retardance B, C, or D will depend on the vegetation and maintenance planned for the diversion channel. Refer to the Handbook for Channel Design, SCS-TP-61, or similar information in the field office technical guide, to select the vegetal retardance.

Figure 7. Permissible velocities for diversions

Reference: USDA, NRCS Part 354 Stream Restoration Design, National Engineering Handbook, Chapter 8, Threshold Channel Design

Several different bank side slope configurations were modeled using XP SWMM, a 2-dimensional software used for hydrological and hydraulic modeling. Exports from the model show the anticipated channel velocities for each cross-section configuration. As shown in Table 3, the flatter the side slope; the lower the channel velocity. Also shown in the table are two-stage ditch configurations. This includes an inner (low flow) channel with benches serving as floodplains. The banks of the two-stage options were designed at 3:1. Figure 13 shows an example cross section of a two-stage ditch and side slope flattened to 5:1 along the CD 24 open ditch while Appendix C contains more cross sections of the two - stage and 5:1 channel options.

*Table 3: Permissible Velocity Analysis*

Velocity Comparisons (ft/s)							
	Existing	Flatten Side Slopes	Flatten Side Slopes	Flatten Side Slopes	Flatten Side Slopes	Two-Stage Ditch	Two-Stage Ditch
	2:1	3:1	4:1	5:1	6:1	15 - ft bench	20-ft bench
2yr	3.99	3.35	3.11	3.01	2.93	3.20	3.20
5yr	4.47	3.71	3.37	3.23	3.16	3.19	3.19
10yr	4.56	3.78	3.49	3.40	3.29	3.21	3.21
25yr	4.71	3.88	3.54	3.40	3.32	3.30	3.16
50yr	4.80	3.95	3.60	3.42	3.35	3.41	3.17
100yr	4.88	4.04	3.64	3.46	3.38	3.46	3.25



Figure 13: Two-Stage and 5:1 Cross Section

### Option 1: Flatten Side Slopes to 5:1

Based on the results of the XP SWMM model and the anticipated channel velocities; Option 1 includes flattening ditch side slopes to a 5:1 slope for bank stability. Currently the CD 24 banks are at a side slope ratio of 2:1 and are not stable for the velocities flowing through the open ditch. Flattening the side slopes to a 5:1 ratio provides a channel velocity of under 3.5 feet per second for all modeled rainfall events.

In order to construct the ditch to a 5:1 side slope, land acquisition is needed to flatten the top of the ditch bank and extend the 1-rod buffer laterally away from the top of the ditch. Additionally, spoils from excavation will be spread out away from the ditch bank which will require temporary damages to those lands for disturbance. In Option 1, there are approximately 3.75 acres of land acquisition needed and 5.29 acres of temporary impacts for spoil placement. On average, the new top of ditch with is 225-feet wide not include the buffer on each side. The ditch side slopes of 5:1 will allow for an excavator to crawl down along the side for future ditch maintenance.

### Option 2: Two-Stage Ditch

Option 2 considers converting the open ditch east of 338<sup>th</sup> Avenue into a two-stage ditch. The two-stage is designed with an inner channel width of 4-feet with 1:1 side slope ratio for a depth of 3-feet. The inner channel was designed to hold the 1.5-year storm event and also to utilize the existing channel as much as possible. The benches were designed to be 2 to 3 times the width of the top of the inner channel (7-feet). Each bench is proposed at 15-feet where it transitions back to a 3:1 side slope up to the top of the ditch. The new top of ditch width is on average 140-feet wide. The two-stage ditch alternatives were designed to follow design standards set by NRCS in the National Engineering Handbook – Part 654 for Two-Stage Ditch Design in combination with recommendations from the Department of Natural Resources Geomorphology team.

Since the two-stage ditch utilizes portions of the existing open ditch and has a 3:1 side slope; the overall footprint of the channel is much less than Option 1. Permanent damages are estimated at 1.49-acres while temporary damages are estimated at 2.76-acres.

Given the proposed geometry of the two-stage ditch and the deep ditch; a long reach excavator will not be able to maintain the open channel from the new top of ditch bank. A ramp off of 338<sup>th</sup> Avenue will be constructed to access the bench of the two-stage ditch for maintenance to the open channel. This will allow for smaller equipment (mini-excavator, tractor backhoe, etc.) to clean the inner channel of the open ditch. Cleaning frequencies are much less with the natural two-stage ditch cross section; therefore, maintenance is expected to be periodic spot cleaning.

### Option 3: 42-Inch Pipe with Waterway

Option 3 proposes to replace the open ditch east of 338<sup>th</sup> Avenue with a 42-inch pipe and waterway over the top. The existing 66-inch culvert would remain in place and flow directly into the 42-inch pipe. The ditch would be filled in to provide 4-feet of cover over the top of the pipe for protection.

A rip rap overflow would be built at the headwall of the pipe apron and waterway beginning. This will provide protection of the pipe and waterway transition and also allow peak water levels to flow over and utilize the waterway for overflow. The headwall and 42-inch pipe will be placed downstream of Slough #5 so that slough can be repaired and to provide space for flow from the culvert to enter into the pipe without backwater. The headwall will be placed 90 feet downstream of the 338<sup>th</sup> Avenue culvert. At this location, the invert elevation (matching legal ditch grade) is 1036.87.

In lieu of a round pipe, a 42-inch arch equivalent pipe (31-inch x 51-inch span) would provide a lower the overall bottom elevation of the waterway overflow to lessen upstream impacts on the west side of 338<sup>th</sup> Avenue. The difference in height between a 42-inch RCP and 51-inch span arch pipe is 1.54 feet which has significant impacts upstream on the CD 24 waterway.

At the headwall beginning, the top of the 51-inch span pipe would be at elevation 1039.83 which brings the 4-foot cover elevation to 1043.83. If a 42-inch round RCP was used, the elevation after accounting for 4-feet of cover would be at 1045.37. The legal rip rap spillway elevation at the end of the waterway is at elevation 1044.95. Using a 51-inch span arch pipe provides 1.12-feet of freeboard while using a 42-inch round RCP would be 0.42-feet above the rip rap spillway elevation.

The proposed pipe would be placed a 0.2% matching the legal ditch grade and elevation. The pipe would be required to have a minimum of 6-inches of crushed rock as foundation. At the end of the pipe-waterway combination; a rip rap spillway will be constructed to transition the waterway flow back into the 42-inch pipe control structure. The open ditch control structure will remain in place with an emergency trash grate at elevation 1045.00.

The installation of a pipe would eliminate the potential for open ditch sloughing, erosion, and sediment delivery downstream. The pipe would also control flow at the outlet of CD 24. The filling of the open ditch would not require land acquisition, and the open ditch would be filled in with an overflow waterway.

Although, there would be considerable benefits at the outlet of the system in terms of bank stabilization and water quality, the reduction in flow and water storage volume in the system increases flood extents and water elevations to upstream landowners. Table 4 below compares the maximum flood extents for each option under all modeled rainfall frequencies for each landowner impacted. As shown, there are increases in flooded areas under the 5-year through 25-year events ranging from 0.4-acres to 5.2-acres. Under these frequencies, the filled open ditch and pipe do back up water given the restriction and timing of flow to the open ditch.

Under the 2-year event, the improvement tile carries flow to the open ditch faster than the existing conditions which reduces the overall flow in the waterway and open ditch. Under the extreme events (50-year and 100-year), flow is no longer restricted by the pipe and waterway and the culvert controls the flows to the open ditch. With the timing change from the improvement tile, there is less water that uses the waterway for overland flow and ultimately there is a reduction in flooding.

Table 4: Area Flooded Comparison

Location	2-Year (acres)			5-Year (acres)			10-Year (acres)		
	Existing	Pipe	Arch	Existing	Pipe	Arch	Existing	Pipe	Arch
Carlson	10.2	10.2	10.2	15.4	15.9	15.6	16.8	18.3	18.1
Cole	2.4	2.4	2.4	2.5	2.5	2.5	2.7	2.7	2.7
Rynearson	4.4	4.4	4.4	9.6	9.8	9.7	12.0	12.2	11.0
<b>Total</b>	<b>17.0</b>	<b>17.0</b>	<b>17.0</b>	<b>27.4</b>	<b>28.2</b>	<b>27.8</b>	<b>31.4</b>	<b>33.2</b>	<b>31.7</b>
Location	25-Year (acres)			50-Year (acres)			100-Year (acres)		
	Existing	Pipe	Arch	Existing	Pipe	Arch	Existing	Pipe	Arch
Carlson	21.7	25.2	23.5	31.2	31.1	31.0	35.0	34.6	34.5
Cole	2.8	3.9	3.2	5.6	5.6	5.6	7.6	7.5	7.5
Rynearson	14.3	14.9	14.3	19.2	18.3	17.2	27.8	26.5	25.8
<b>Total</b>	<b>38.8</b>	<b>44.0</b>	<b>41.0</b>	<b>56.0</b>	<b>55.0</b>	<b>53.7</b>	<b>70.3</b>	<b>68.6</b>	<b>67.8</b>

There are 3 alternatives to Option 3 which include a 31-inch x 51-inch arch pipe; a 42-inch round RCP; and a 42-inch round dual wall HDPE pipe. Given the potential large cost estimate differences, if Option 3 is selected it is recommended to bid all three option as alternates to determine the actual bid price of each alternative.

## COST ESTIMATES

Cost estimates have been generated for the petitioned repair items and all other options for repair. For Options 1 through Option 3B, the repairs to the west side of 338<sup>th</sup> Avenue, and tree removals have been included in the cost estimates to cover the repair petition. Table 5 summarizes the cost estimates for each option while detailed cost estimates are included in Appendix D.

Table 5. Cost Estimate Summary

Repair Option	Estimated Cost
PETITIONED REPAIR	\$ 126,105
OPTION 1: 5:1 SIDE SLOPES	\$ 324,591
OPTION 2: TWO-STAGE DITCH	\$ 206,906
OPTION 3: 31" X 51" ARCH PIPE	\$ 431,871
OPTION 3A: 42" RCP PIPE	\$ 345,824
OPTION 3B: 42" DUAL WALL PIPE	\$ 244,086

It should be noted that the unit prices for the cost estimate are based on previously constructed project with similar scope of work. Based on previous projects, the proposed repairs to the CD 24 system described in this report are cost effective.

## MULTI-PURPOSE DRAINAGE MANAGEMENT

Multi-purpose drainage management incorporates Best Management Practices (BMPs) which utilize effective measures aimed at reducing sediment and nutrient loading and improving water quality. These BMPs are divided into the following three areas.

### Preventative Measures

Preventative measures that can be applied throughout the watershed include crop rotation, cover crops, residue management, and nutrient management. These measures are aimed at controlling sediment, minimizing erosion and nutrient loss, and sustaining the soils health, all without dramatically changing the current land use of the landscape.

### Control Measures

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

### Treatment Measures

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

### Conservative Drainage Practices

Conservative drainage practices, such as construction of controlled drainage systems, provide an option for improving the water quality within a drainage system. Through utilization of control structures, these systems are designed to allow agricultural producers to regulate water levels in their fields. The water level in the ground can be lowered during planting and harvest seasons and allowed to rise during the growing season. Water and nutrients stored in the soil during the growing season can then be used by the crops during drier periods, potentially increasing yields.

### Funding

There are several outside sources of funding to potentially help pay for water quality improvements implemented in a drainage system such as this. A main source of funding for this type of project is through the Minnesota Board of Water and Soil Resources (BWSR) Clean Water Fund (CWF). The primary purpose of activities funded with grants associated with the CWF is to restore, protect and enhance water quality. One CWF grant program is the Multipurpose Drainage Management Grant. This grant is geared towards implementing practices that will reduce the transport of sediment and nutrient loads. Some practices that have been funded in the past include grade stabilization, grassed waterways, water and sediment control basins, alternative side inlets, saturated buffers, storage wetlands, denitrifying bioreactors, etc.

Another potential source is the Legislative-Citizen Commission on Minnesota Resources (LCCMR) Environment and Natural Resources Trust Fund (ENRTF) which was established to provide funding for

activities that protect, conserve, preserve, and enhance Minnesota's "air, water, land, fish, wildlife, and other natural resources." The LCCMR prioritizes innovative ideas that provide multiple benefits.

If landowners are interested in pursuing practices that go beyond this project scope, a few programs may be a source for funding. The Agriculture Best Management Practices (BMP) Loan Program provides loans to rural landowners to encourage BMPs that help counteract pollution problems.

Another option for individual landowners that are interested in pursuing additional practices is the Environmental Quality Incentives Program (EQIP) is a voluntary program through the NRCS that provides financial assistance to individual landowners for various conservative practices as identified above.

In addition, the BWSR Community Partners Grant may be an option. This grant leverages the interest of non-governmental partners such as lake and river associations, boy/girl scout troops and other civic groups to install on-the ground projects that reduce runoff and keep water on the land. It also allows for multiple local government units to work together on a project that involves the Community Partners Grant. Projects installed with the Community Partners Grant are intended to be structural or vegetative practices designed to reduce runoff and/or keep water on the land.

All of the water quality measures proposed with this project are applicable for some source of outside funding. The sources listed above are grants that could be a good fit for this project and if the timing of the project works in conjunction with the grant schedule. These grants can be applied for, if there is support from the drainage authority and/or interest from landowners. Additional water quality measures can be discussed in further detail, if requested.

## CONCLUSIONS + RECOMMENDATIONS

The repair items outlined in the repair petition have been deemed to be in disrepair. There are many areas in which sloughing has widened the top of the open ditch and encroached on the adjacent landowner's property. Sloughing has also caused sediment to fall into the flow line of the ditch causing flow restrictions and water quality concerns. It is the opinion of the engineer that a hearing be held to review the options with the Drainage Authority and landowners to determine a repair option.

# APPENDIX A: PRELIMINARY CONSTRUCTION PLANS



# FARIBAULT COUNTY DITCH 24 REPAIR

FARIBAULT COUNTY, MINNESOTA

REPAIR PLANS

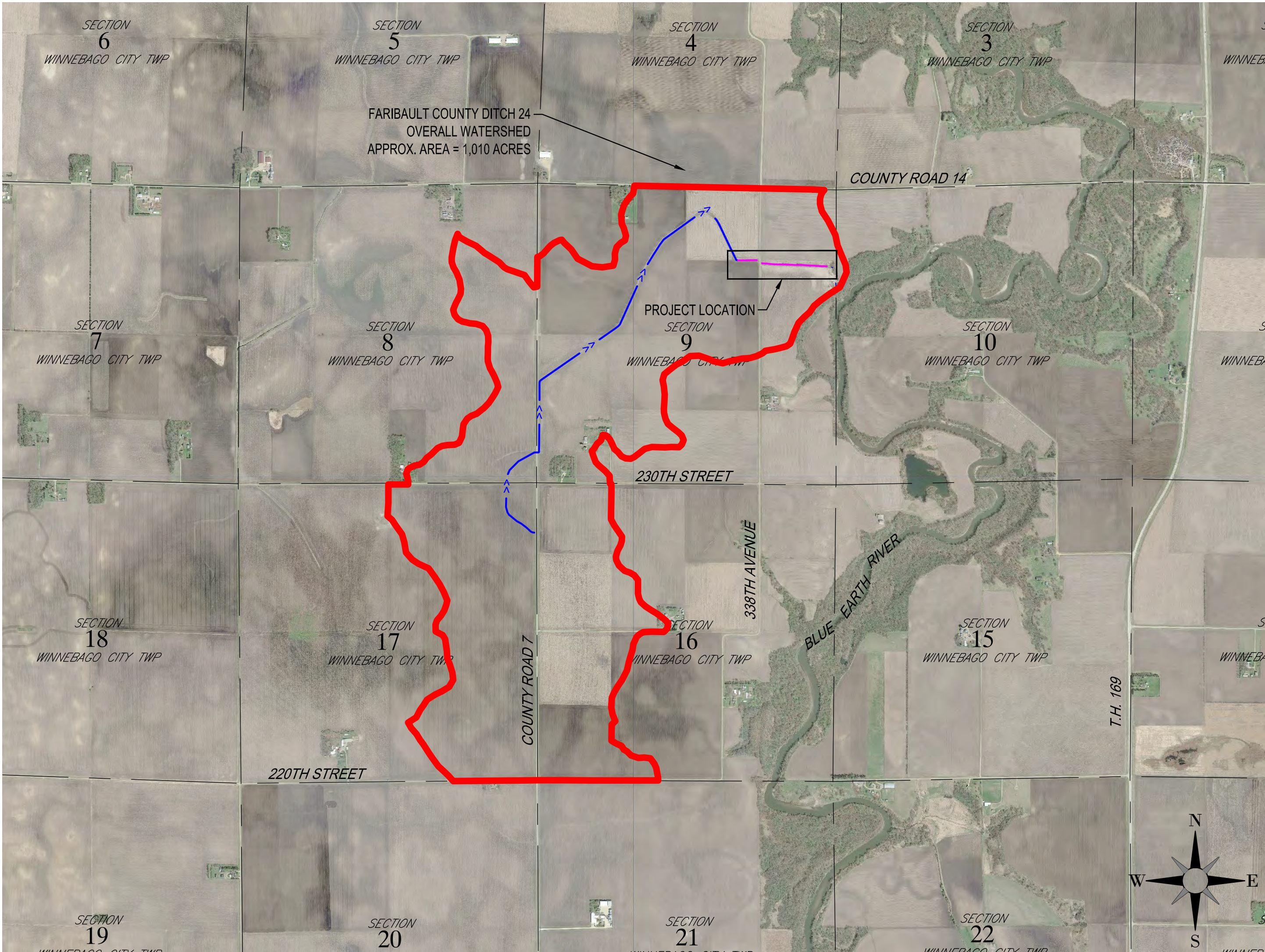
ISG PROJECT # 19-23499



## 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
	DITCH 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)
	TILE
	TILE (PIPE WIDTH)
	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



## SHEET INDEX

- 1 TITLE
- 2 NOTES & QUANTITIES
- 3 DETAILS
- 4 DETAILS
- 5 OVERALL WATERSHED & LANDOWNER MAP
- 6 MAINLINE OPEN DITCH PROFILE
- 7 OVERALL SECTION VIEW PLAN
- 8-22 CROSS-SECTIONS

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PROJECT

**FARIBAULT  
COUNTY**

**DITCH 24 REPAIR**

FARIBAULT COUNTY MINNESOTA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	19-23499
FILE NAME	23499 TITLE
DRAWN BY	SMW
DESIGNED BY	SMW/ MAO
REVIEWED BY	MAO
ORIGINAL ISSUE DATE	11-1-19
CLIENT PROJECT NO.	-

TITLE
<b>TITLE</b>

SHEET
<b>1</b>
OF 22

## PROJECT INDEX:

### OWNER:

**FARIBAULT COUNTY DRAINAGE  
AUTHORITY**  
415 S. GROVE STREET, SUITE 8  
BLUE EARTH, MN 56013  
PH: (507) 526-2388

### PROJECT ADDRESS / LOCATION:

**SECTION: 4, 8-10, 16-17  
WINNEBAGO CITY, TWP**

**FARIBAULT COUNTY, MINNESOTA**

### MANAGING OFFICE:

**MANKATO OFFICE**  
115 EAST HICKORY STREET  
SUITE 300  
MANKATO, MN 56001  
PHONE: 507.387.6651  
FAX: 507.387.3583

PROJECT MANAGER: MARK ORIGER  
EMAIL: MARK.ORIGER@ISGINC.COM

### SPECIFICATIONS REFERENCE

ALL CONSTRUCTION SHALL COMPLY WITH THE FARIBAULT  
COUNTY REQUIREMENTS AND MNDOT 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 FARIBAULT 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=1076.21**  
MnDOT MONUMENT - WINNEBAGO 6 MN043

### TOPOGRAPHIC SURVEY

THIS PROJECT'S TOPOGRAPHIC SURVEY CONSISTS  
OF DATA COLLECTED IN JULY 2019 BY ISG.



GENERAL OPEN DITCH NOTES:

1. DURING CONSTRUCTION, CONTRACTOR SHALL MAINTAIN A DRAINAGE OUTLET FOR THE ENTIRE FARIBAULT COUNTY DITCH 24 PROJECT AREA.
2. ALL PIPE DIMENSIONS REFERENCED IN THE PLANS REFER TO THE INSIDE DIAMETER.
3. 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.
4. A 16.5-FOOT GRASS STRIP SHALL BE ESTABLISHED IN AREAS THAT DO NOT HAVE AN EXISTING 16.5-FOOT GRASS STRIP. SEEDING SHALL OCCUR AFTER ALL WORK HAS BEEN COMPLETED IN THE AREA AND SHALL COMPLY WITH THE CONTRACT DOCUMENTS. THESE AREAS WILL BE DETERMINED BY THE ENGINEER.
5. 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 WITHIN 16.5-FOOT WIDE GRASS STRIP FROM THE TOP OF DITCH SLOPE UNLESS OTHERWISE DETERMINED BY THE ENGINEER.
6. TOPSOIL IN 50' WIDE BY 1' FOOT DEEP SPOIL AREAS AS SPECIFIED ON PLANS SHALL BE STRIPPED PRIOR TO SPOIL PLACEMENT.
7. SHAPING AROUND SIDE INLETS, WASCOBs, AND CULVERT INLETS SHALL BE INCIDENTAL TO THEIR RESPECTIVE PAY ITEMS.
8. ALL SPOIL LEVELING, GRADING, AND RESTORATION OF DISTURBED AREAS SHALL BE IN ACCORDANCE TO THE CONTRACT DOCUMENTS AND SHALL BE INCIDENTAL TO THE WORK PERFORMED.
9. ALL EXISTING TILE OUTLETS INTO THE OPEN DITCH, INCLUDING ANY NOT SHOWN ON THE PLANS, SHALL BE REPAIRED. UNLESS SPECIFICALLY NOTED, HDPE OR PVC SHALL BE ACCEPTABLE MATERIAL FOR ALL TILE REPAIRS (SEE DETAILS).
10. 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 PAY ITEM "ARMOR TILE OUTLET" (SEE DETAILS).
11. CONTRACTOR MUST NOTIFY ENGINEER OF ANY CULVERT SECTIONS DEEMED NOT SALVAGEABLE PRIOR TO REMOVAL AND SHALL BE ADDRESSED BEFORE CULVERT WORK IS DONE.
12. MISCELLANEOUS TREE CLEARING SHALL BE INCIDENTAL TO DITCH CLEANING PAY ITEM(S).
13. ALL TREE REMOVALS MUST BE COMPLETED BY MAY 1, 2020.

TOTAL ESTIMATED QUANTITIES			
Item Code	Item	Unit	Estimated Quantity
2021.501	MOBILIZATION	LS	1
2101.511	CLEAR AND GRUB TREE (OVER 6")	EA	6
2104.509	REMOVE EXISTING SIDE INTAKE	EA	1
2105.602	AGGREGATE BASE (CV) (P), CLASS V (ACCESS ROAD)	CY	20
2106.501	COMMON EXCAVATION	CY	2213
2106.501	OPEN DITCH SIDE SLOPE DRESSING W/ TOP SOIL	CY	263
2106.501	TOP SOIL STRIP & PLACE SPOILS	SY	3108
2506.502	INSTALL 24-INCH ASI RISER ASSEMBLY W/TRASH GRATE	EA	1
2506.502	INSTALL 24-INCH ASI OUTLET ASSEMBLY	EA	1
2511.501	CLASS III RIPRAP WITH GEOTEXTILE FABRIC	CY	381
2575.501	16.5' BUFFER STRIP SEEDING (SEED MIX: BUFFER BLEND WITH TYPE 3 MULCH)	SY	1531
2575.501	STANDARD SIDESLOPE & BENCH SEEDING (SEED MIX: BUFFER BLEND WITH Mn DOT CATEGORY 4 EROSION CONTROL BLANKET)	SY	3797
2575.523	NON-WOVEN GEOTEXTILE FABRIC	SY	25

ALTERNATIVE SIDE INLET (ASI)							
ASI #1	STATION	INTAKE TYPE	RISER SIZE (in)	RISER DEPTH (LF)	OUTLET SIZE (in)	OUTLET LENGTH (LF)	OUTLET GRADE (%)
1	12+00	TRASH GRATE	24	7	24	33	3.00

Faribault County Ditch No. 24							
Open Ditch Bank Stability							
Slough Overview	Location	Solution	Start Station	End Station	Total Length (LF)	Temporary Damages (AC)	Riprap (CY)
Slough #1	North	Benched side slope slough repair. Bench near toe of open ditch side slope where natural bench has formed from slumped material.	5+30	6+75	145	0.11	43
Slough #2	North	Benched side slope slough repair. Bench near toe of open ditch side slope where natural bench has formed from slumped material.	8+00	10+15	215	0.17	48
Slough #3	South	Benched side slope slough repair. Bench near toe of open ditch side slope where natural bench has formed from slumped material.	11+00	11+95	95	0.07	21
Slough #4	South	Benched side slope slough repair. Bench near toe of open ditch side slope where natural bench has formed from slumped material.	14+50	15+45	95	0.07	32
Slough #5	South	Re-sloping near top of ditch to prevent further sloughing & instabilities. Riprap will be placed along top of ditch to erosion control from 388th Avenue crossing	15+75	16+25	50	NA	50



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PROJECT

FARIBAULT COUNTY

DITCH 24 REPAIR

FARIBAULT COUNTY MINNESOTA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

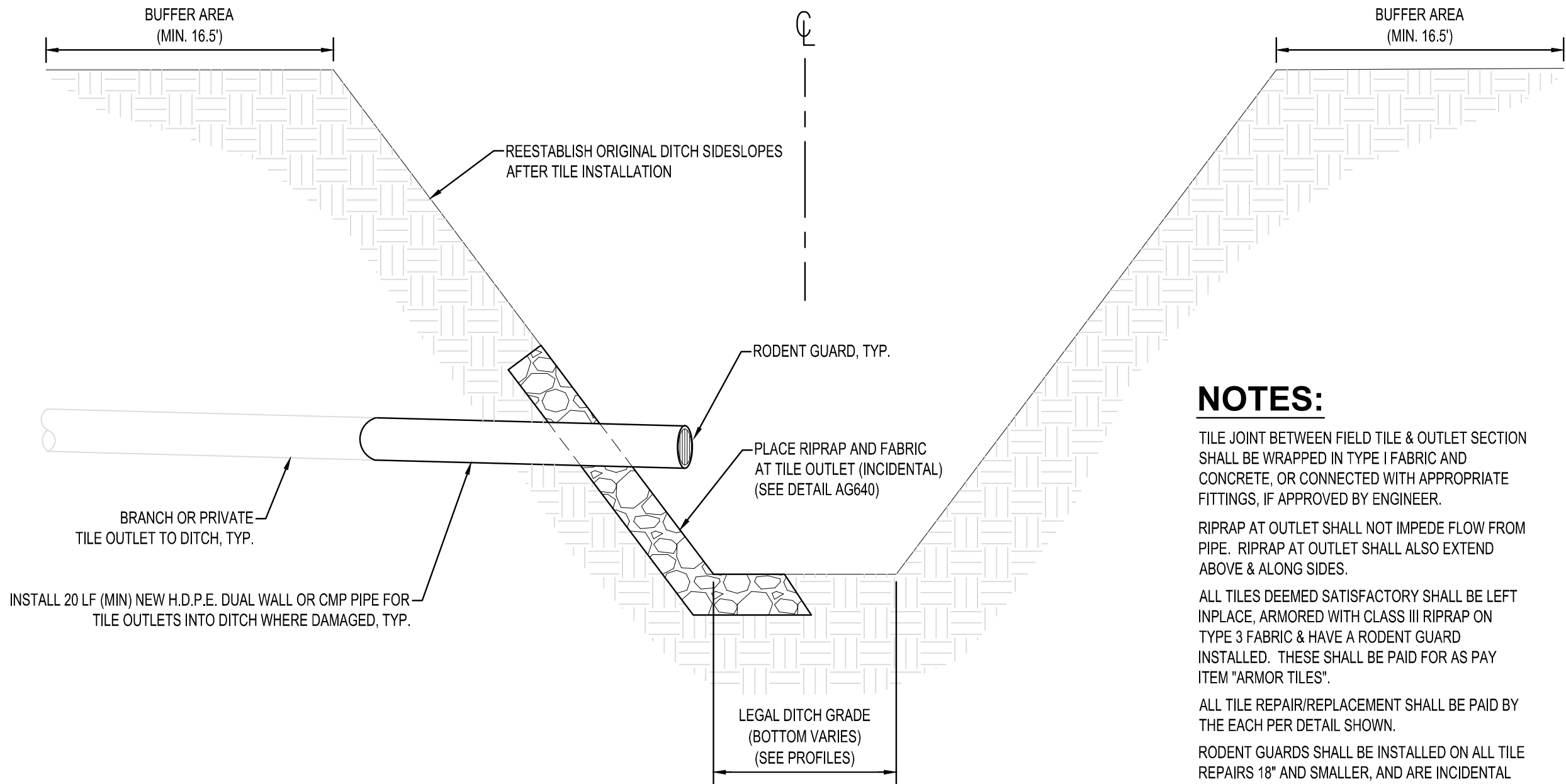
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TITLE

NOTES & QUANTITIES

SHEET

NOTE: ALL TILE OUTLETS AND FIELD INTAKES SHALL BE REPAIRED OR PROTECTED



TYPICAL TILE OUTLET REPAIR  
NTS AG450

NOTES:

TILE JOINT BETWEEN FIELD TILE & OUTLET SECTION SHALL BE WRAPPED IN TYPE I FABRIC AND CONCRETE, OR CONNECTED WITH APPROPRIATE FITTINGS, IF APPROVED BY ENGINEER.

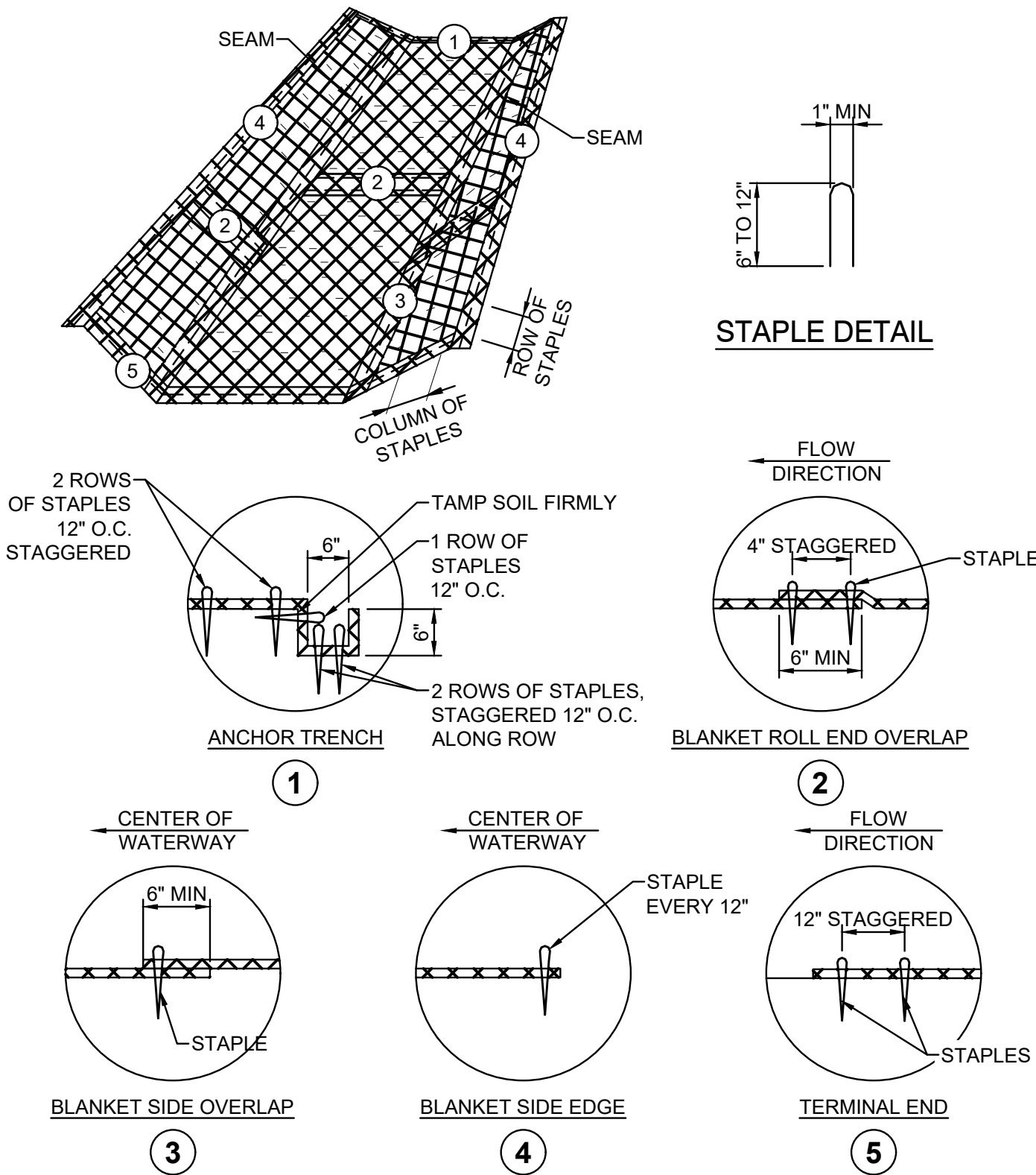
RIPRAP AT OUTLET SHALL NOT IMPEDE FLOW FROM PIPE. RIPRAP AT OUTLET SHALL ALSO EXTEND ABOVE & ALONG SIDES.

ALL TILES DEEMED SATISFACTORY SHALL BE LEFT INPLACE, ARMORED WITH CLASS III RIPRAP ON TYPE 3 FABRIC & HAVE A RODENT GUARD INSTALLED. THESE SHALL BE PAID FOR AS PAY 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.



EROSION CONTROL BLANKET INSTALLATION  
NTS EC700

NOTES:

INSTALL EROSION CONTROL BLANKET (ECB) OVER WATERWAYS AS SHOWN IN THE STORM WATER POLLUTION PREVENTION PLAN.

THE ECB SHALL CONFORM TO MNDOT STANDARD SPECIFICATIONS SECTION 3885.

PREPARE SOIL PRIOR TO INSTALLING ECB, INCLUDING SEEDING AND FERTILIZING.

THE ECB SHALL BE PLACED IN FIRM CONTACT WITH THE SOIL AND NOT BE ALLOWED TO BRIDGE OVER SURFACE IRREGULARITIES. THE MAT SHALL NOT BE STRETCHED.

START LAYING THE MATS BY ROLLING CENTER MAT IN THE DIRECTION OF FLOW, CENTERED ON THE CENTERLINE OF WATERWAY. THERE SHALL NOT BE AN OVERLAP OF MATS AT THE CENTER OF THE WATERWAY.

THE ECB SHALL BE ANCHORED, OVERLAPPED, AND STAPLED ACCORDING TO MANUFACTURER'S INSTRUCTIONS. IF NO MANUFACTURER'S INSTRUCTIONS ARE AVAILABLE, INSTALL THE MAT AS FOLLOWS.

STAPLES SHALL BE "U" SHAPED, 0.12" DIAMETER WIRE OR GREATER (#11 GAUGE). (SEE STAPLE DETAIL FOR DIMENSIONS)

1. BURY UPSTREAM END OF MAT IN A TRENCH 6" WIDE BY 6" DEEP AND STAPLED IN STAGGERED ROWS ACROSS THE WIDTH AS SHOWN IN DETAIL 1.

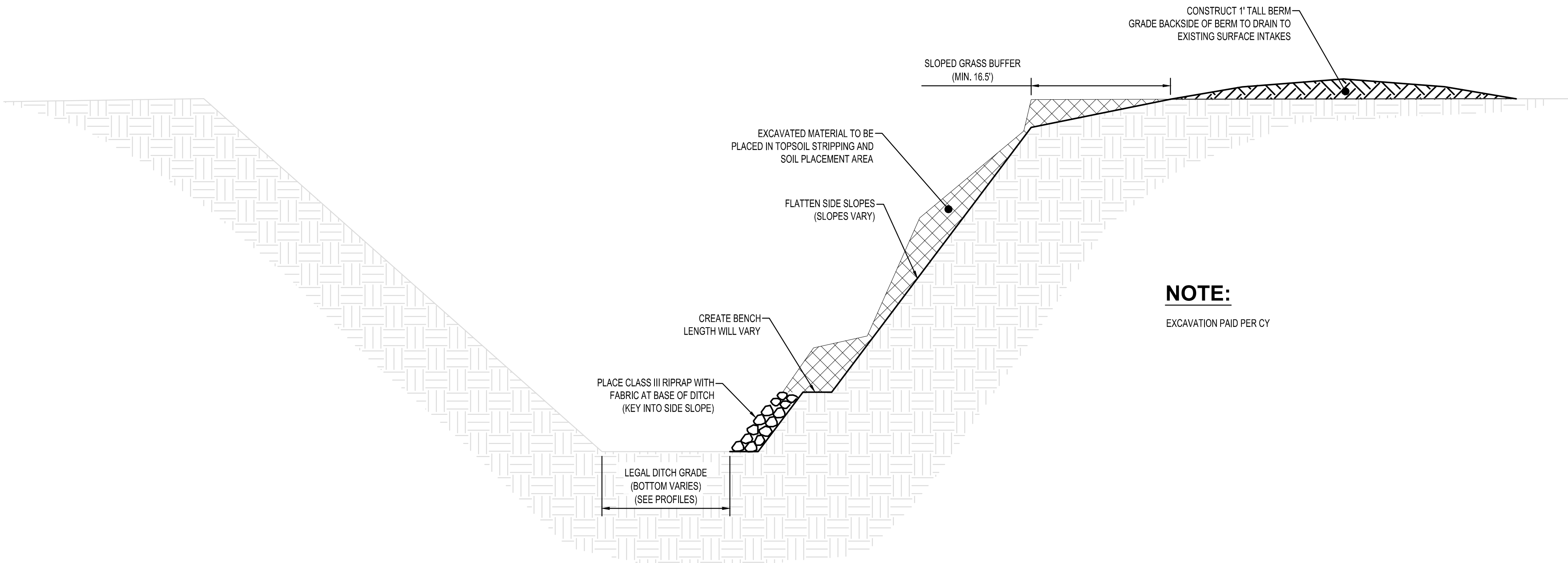
2. C. FOR JOINING ENDS OF ROLLS, OVERLAP END OF UP SLOPE MAT A MINIMUM OF 6" OVER DOWN SLOPE MAT (SHINGLE STYLE). USE A DOUBLE ROW OF STAGGERED STAPLES 4" APART, AS SHOWN IN DETAIL 2.

3. D. MATS ON SIDE SLOPES SHALL OVERLAP A MINIMUM OF 6" OVER THE MAT BELOW (SHINGLE STYLE). STAPLE OVERLAP AT 12" INTERVALS. (SEE DETAIL 3)

4. E. THE OUTER EDGE ALONG SIDES OF THE MAT SHALL BE STAPLED EVERY 12". (SEE DETAIL 4)

5. F. STAPLES ARE TO BE PLACED ALTERNATELY IN COLUMNS (IN THE DIRECTION OF THE WATERWAY) 2' APART AND IN ROWS (ACROSS THE WATERWAY) 3' APART THROUGHOUT THE AREA COVERED BY THE ECB.

6. G. DOWNSTREAM (TERMINAL) END OF BLANKET SHALL BE STAPLED WITH A DOUBLE ROW OF STAGGERED STAPLES 12" APART. (SEE DETAIL 5)

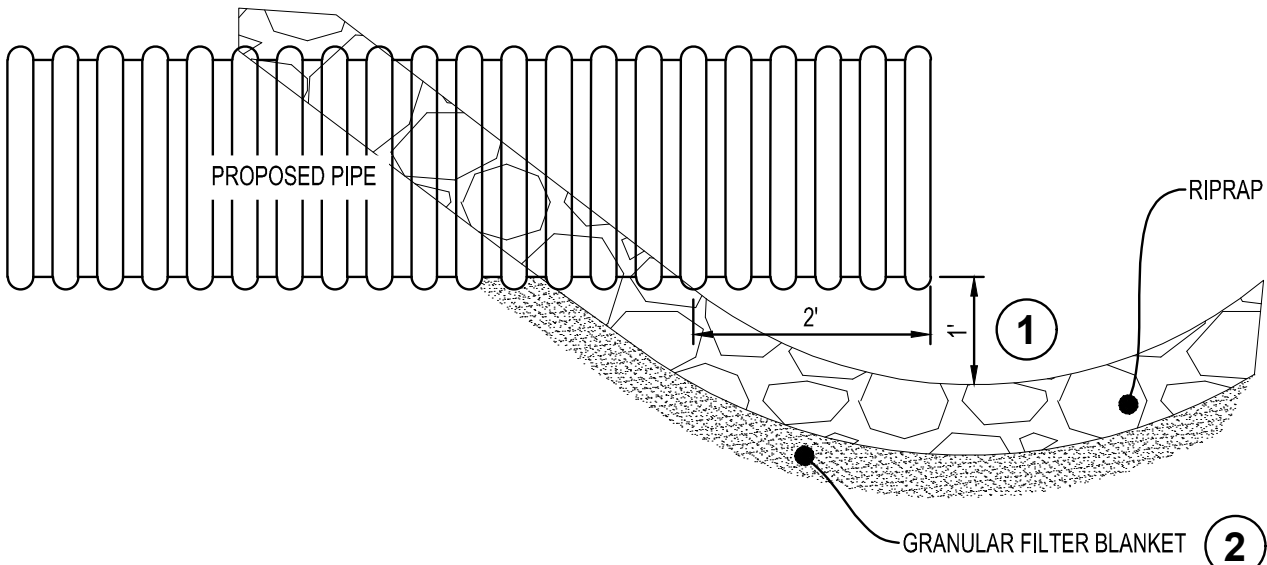


BENCHED SLOPE  
SLOUGH REPAIR WITH SLOPED BUFFER  
NTS

NOTE:

EXCAVATION PAID PER CY

DIMENSIONS	
PIPE DIA	RIPRAP
12" TO 18"	4 CY CLASS III
21" TO 27"	8 CY CLASS III
30" TO 36"	12 CY CLASS III
42" TO 48"	16 CY CLASS III
54" & UP	20 CY CLASS IV



NOTES:

1. 1' MIN. ABOVE RIPRAP. FOR PIPES GREATER THAN OR EQUAL TO 30", USE 1.5' - 2'.
2. THE CONTRACTOR, AS AN OPTION, MAY SUBSTITUTE A GEOTEXTILE FABRIC, SPEC. 3601, FOR THE GRANULAR FILTER BLANKET. THE FABRIC SHOULD EXTEND BEYOND THE RIPRAP BY 3' IN ALL DIRECTIONS.
- FOR PIPES LESS THAN 18", INSTALL RODENT GUARD (INCIDENTAL TO TILE OUTLET)
- RIPRAP AT OUTLET SHALL NOT IMPEDE FLOW FROM PIPE, OR RECEIVING BODY. RIPRAP AT OUTLET SHALL ALSO EXTEND ABOVE AND ALONG SIDES OF PIPE.
- ADDITIONAL RIPRAP MAY BE NECESSARY BASED ON ELEVATIONS (PAID FOR BY CY)

RIPRAP AT TILE OUTLET  
NTS AG620



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PROJECT

**FARIBAULT  
COUNTY**

**DITCH 24 REPAIR**

FARIBAULT COUNTY MINNESOTA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

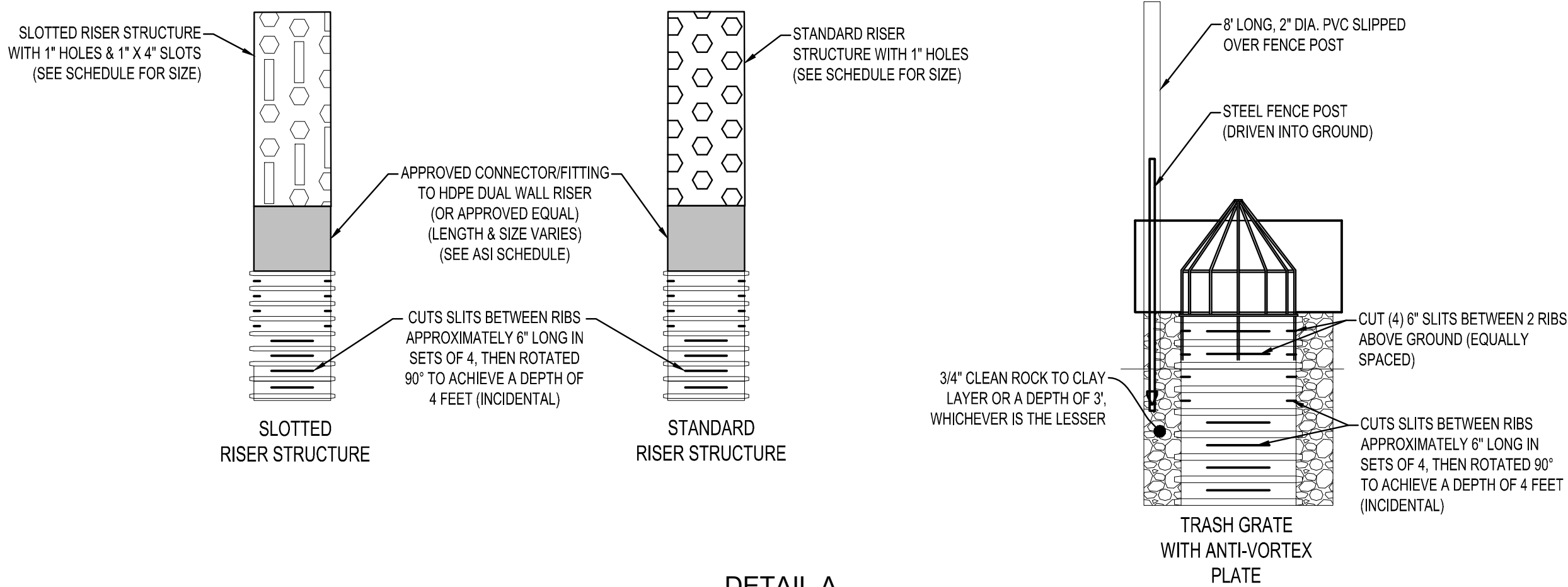
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**DETAILS**

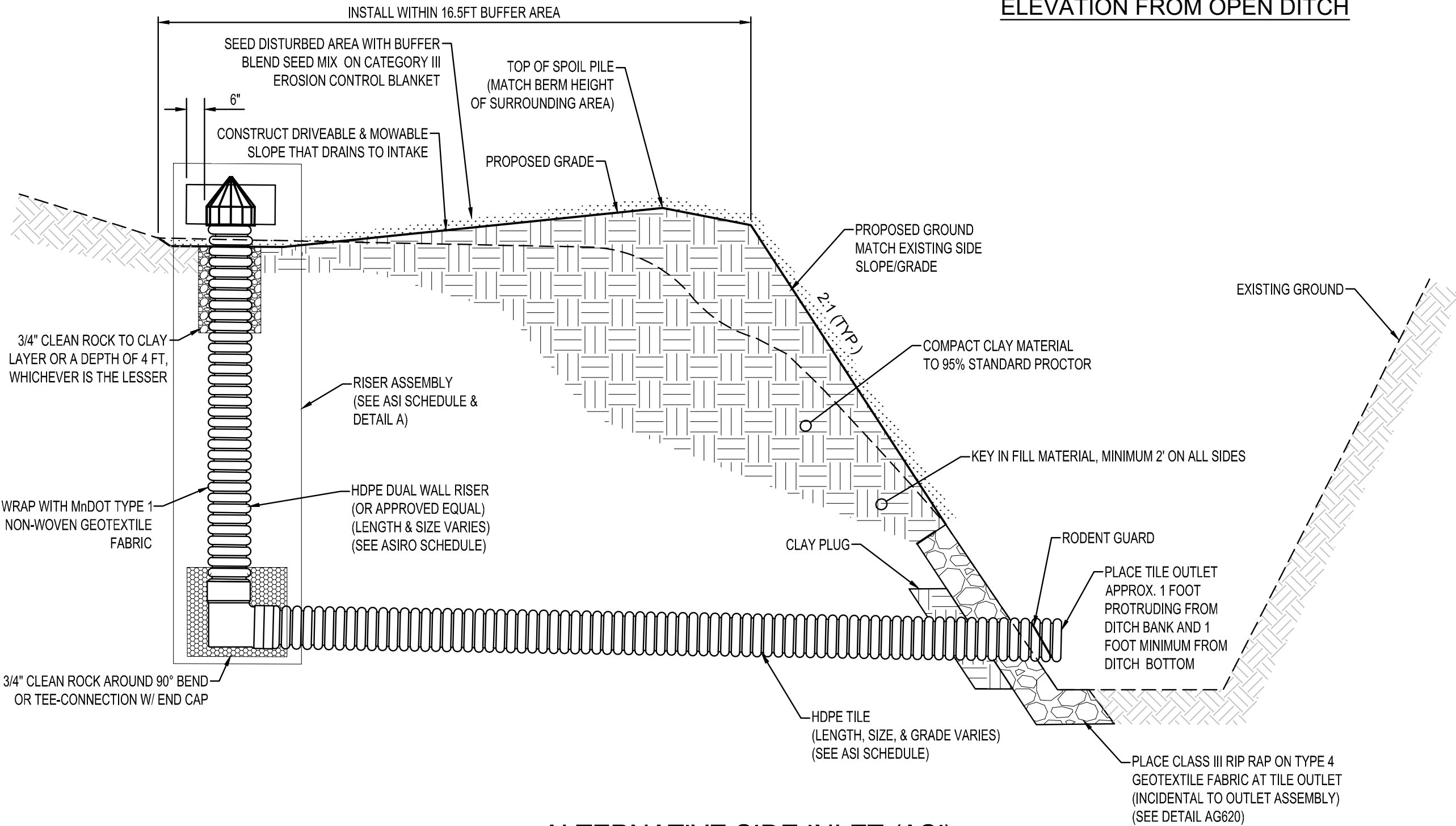
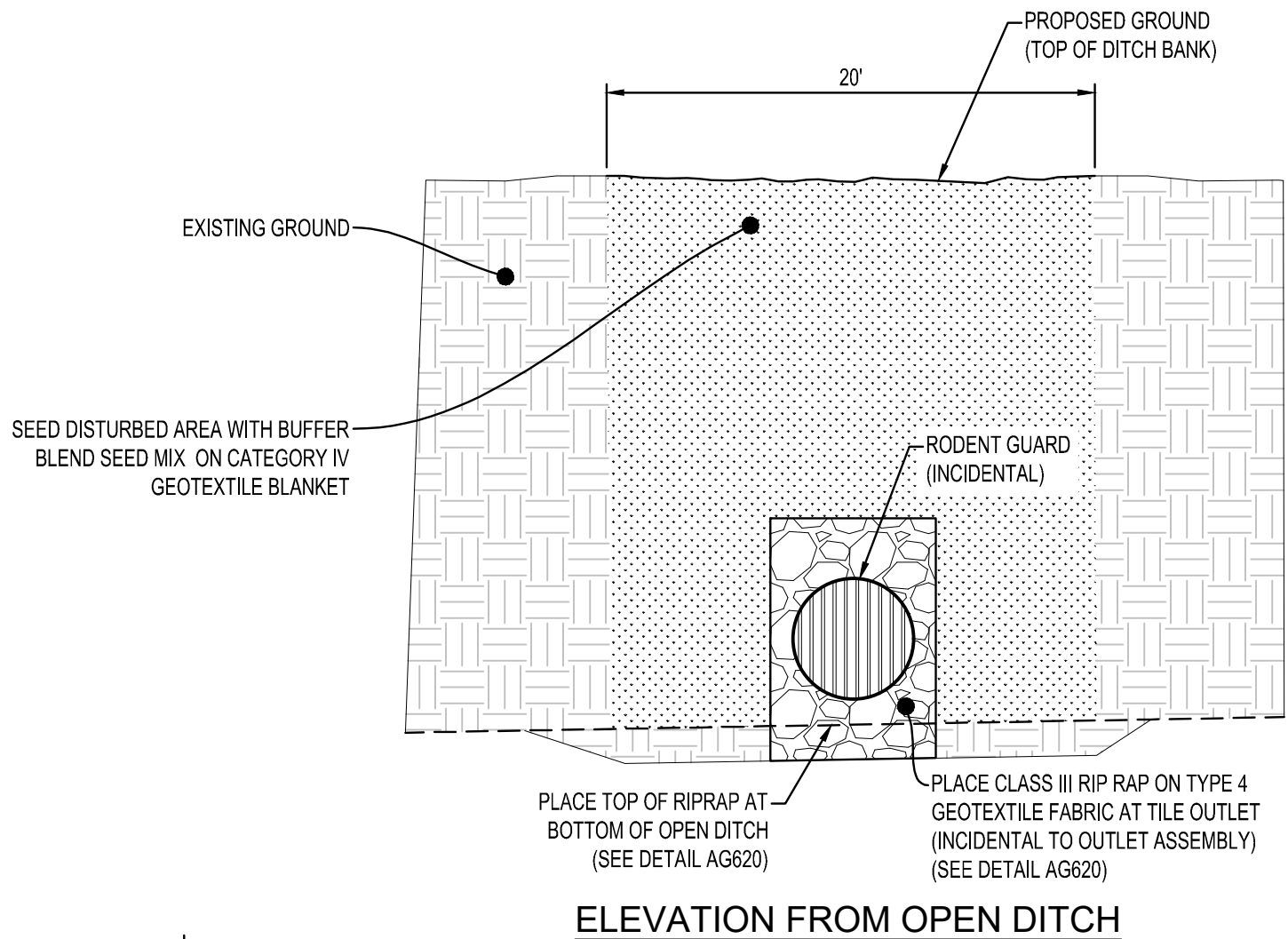
SHEET





NOTES:

- INTAKE TYPE & 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 NON-WOVEN GEOTEXTILE FABRIC. (INCIDENTAL TO RISER ASSEMBLY)
- ALL SLITS CUT INTO RISER ARE INCIDENTAL TO RISER ASSEMBLY.
- ALL 3/4" CLEAN ROCK 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.



ALTERNATIVE SIDE INLET (ASI)  
NTS AG340



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PROJECT

**FARIBAULT  
COUNTY**

**DITCH 24 REPAIR**

FARIBAULT COUNTY MINNESOTA

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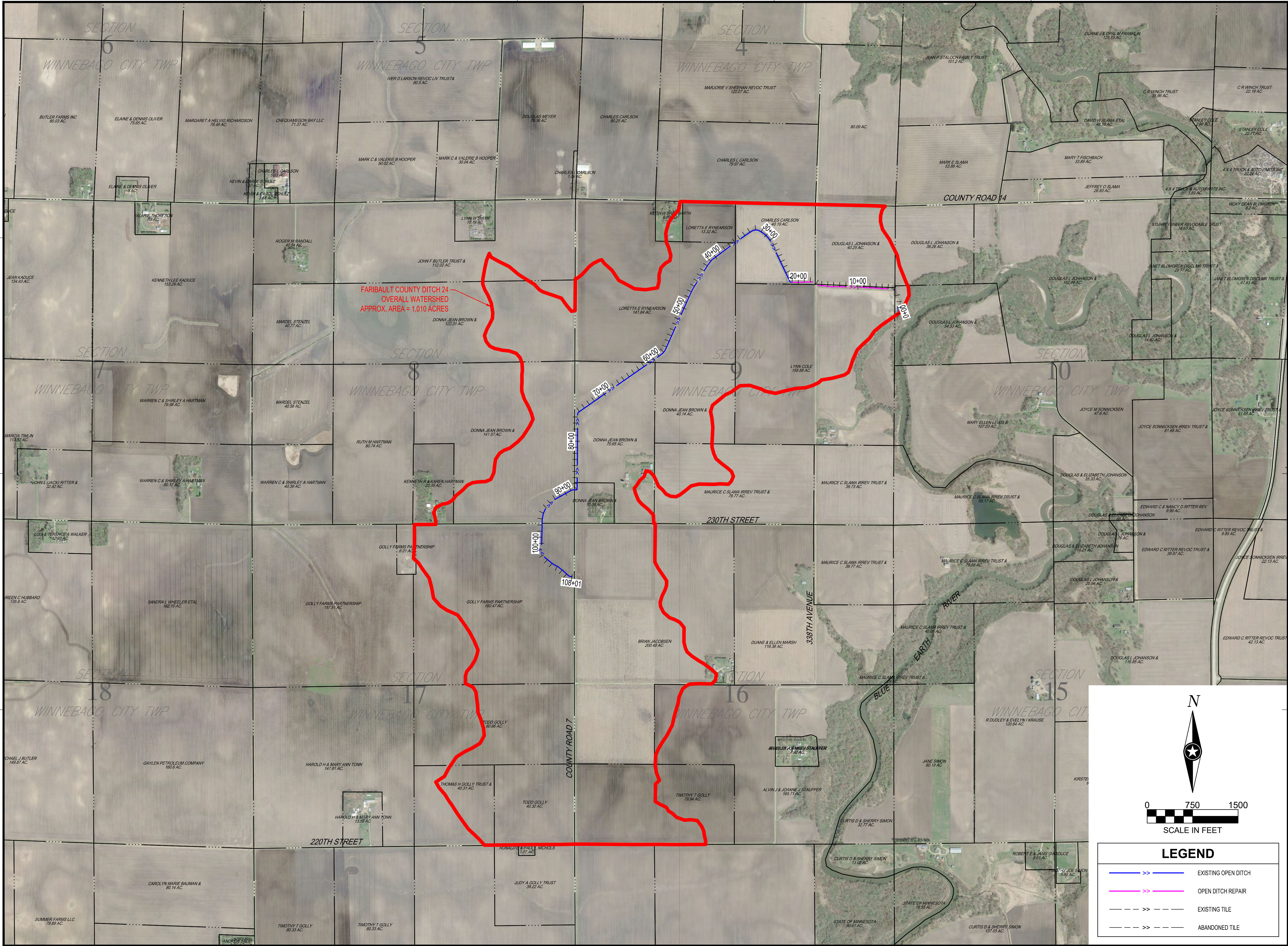
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**4**

OF 22





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PROJECT

## FARIBAULT COUNTY DITCH 24 REPAIR

FARIBAULT COUNTY MINNESOTA

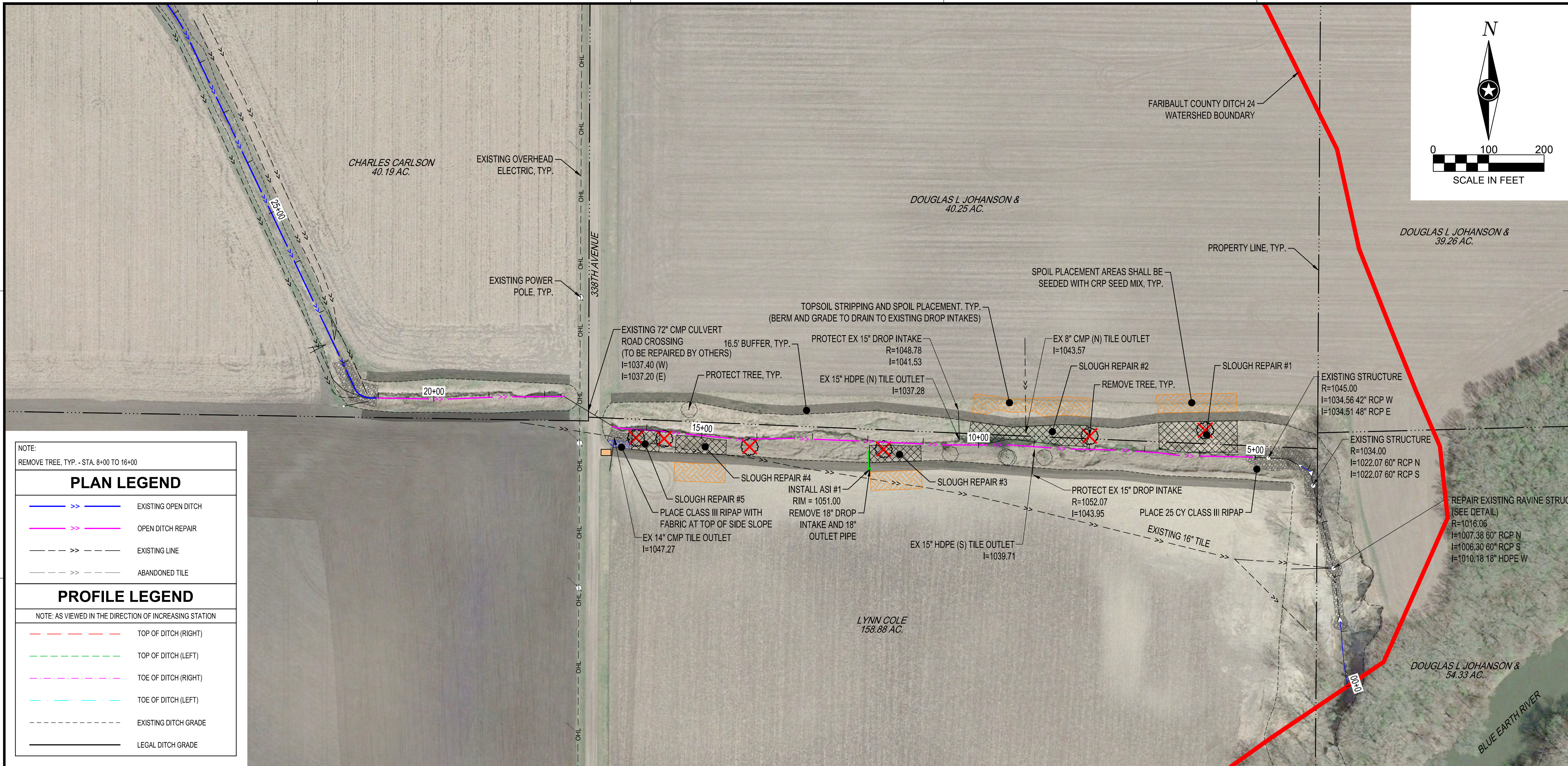
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PROJECT NO.	19-23499
FILE NAME	23499 WATERSHED
DRAWN BY	SMW
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## OVERALL WATERSHED & LANDOWNER MAP

SHEET





NOTE:  
REMOVE TREE, TYP. - STA. 8+00 TO 16+00

PLAN LEGEND

>>

>>

EXISTING OPEN DITCH

>>

>>

OPEN DITCH REPAIR

>>

>>

EXISTING LINE

>>

>>

ABANDONED 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

ISG

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**DITCH 24 REPAIR**

FARIBAULT COUNTY MINNESOTA

REVISION SCHEDULE

DATE	DESCRIPTION	BY

PROJECT NO.

19-23499

FILE NAME

23499 PROF (MAIN) - 1

DRAWN BY

SMW

DESIGNED BY

SMW/ MAO

REVIEWED BY

MAO

ORIGINAL ISSUE DATE

11/1/2019

CLIENT PROJECT NO.

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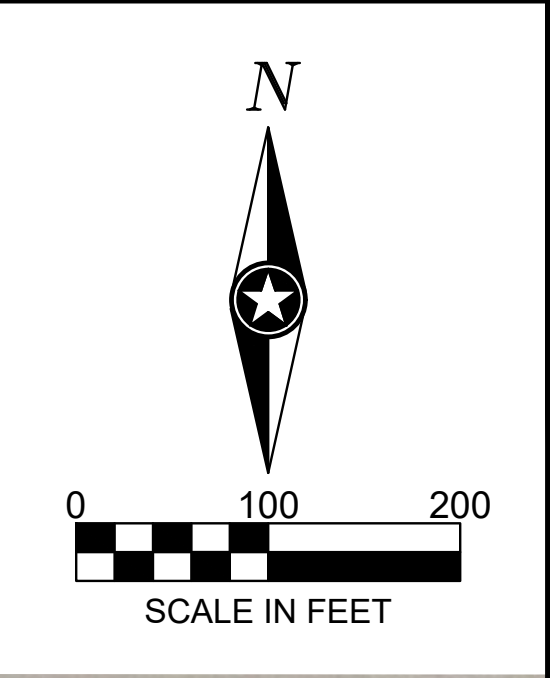
**MAINLINE OPEN DITCH PROFILE**

SHEET

**6**

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ORIGINAL ISSUE DATE	11-1-2019
CLIENT PROJECT NO.	-

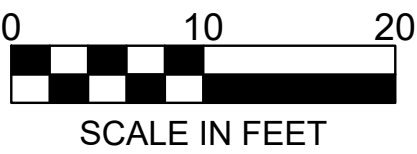
TITLE

**OVERALL SECTION  
VIEW PLAN**

SHEET

PLAN LEGEND	
	EXISTING OPEN DITCH
	OPEN DITCH REPAIR
	EXISTING LINE
	ABANDONED TILE





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PROJECT

**FARIBAULT  
COUNTY**

**DITCH 24 REPAIR**

FARIBAULT COUNTY MINNESOTA

REVISION SCHEDULE

DATE	DESCRIPTION	BY

PROJECT NO.	19-23499
FILE NAME	23499 SECTIONS
DRAWN BY	SMW
DESIGNED BY	SMW/ MAO
REVIEWED BY	MAO
ORIGINAL ISSUE DATE	11-1-19
CLIENT PROJECT NO.	-

TITLE

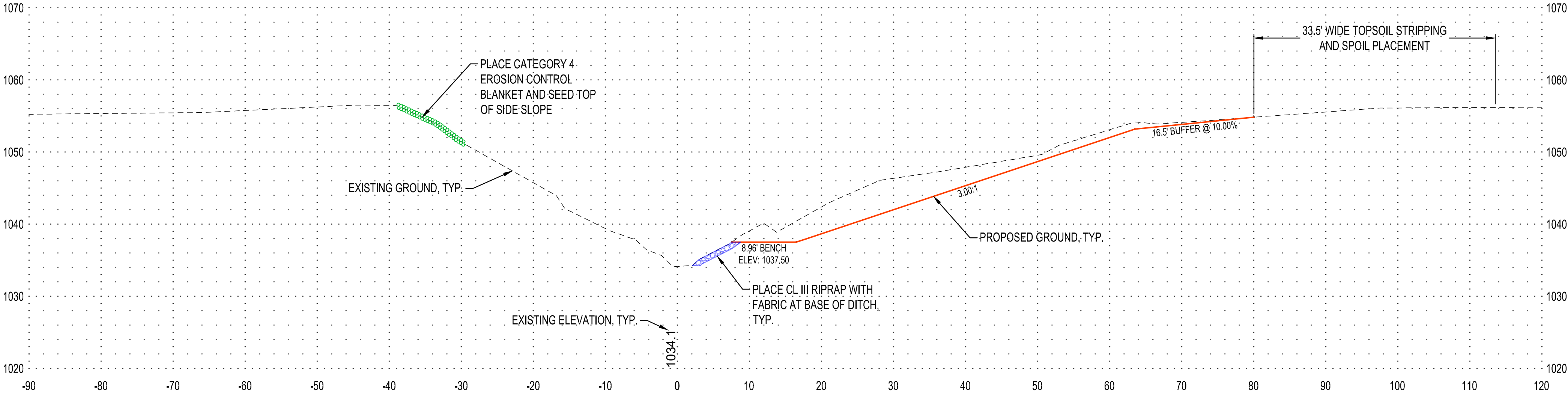
**CROSS-SECTIONS**

SHEET

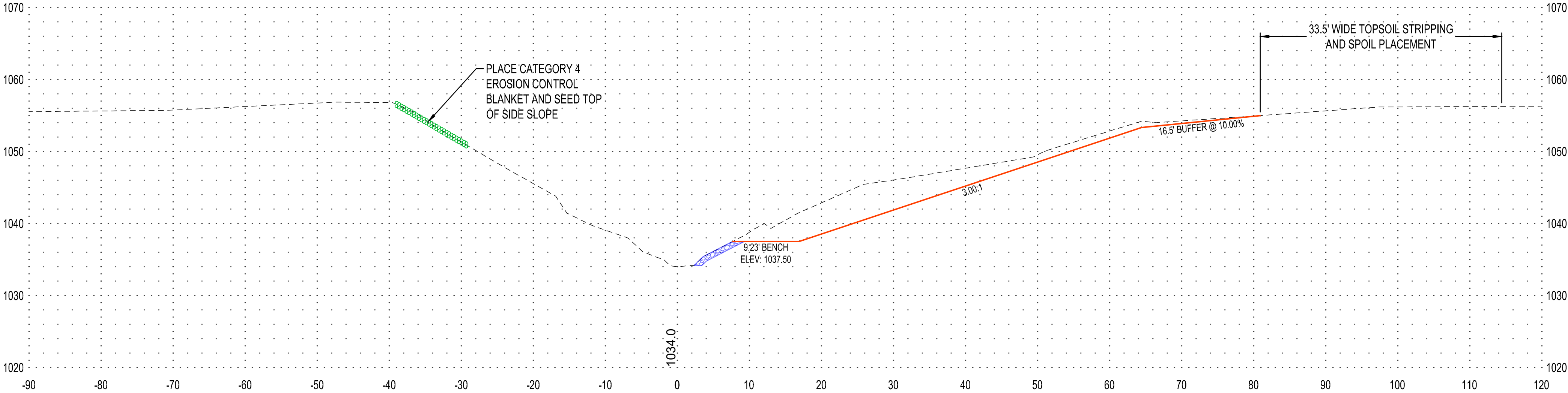
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OF 22

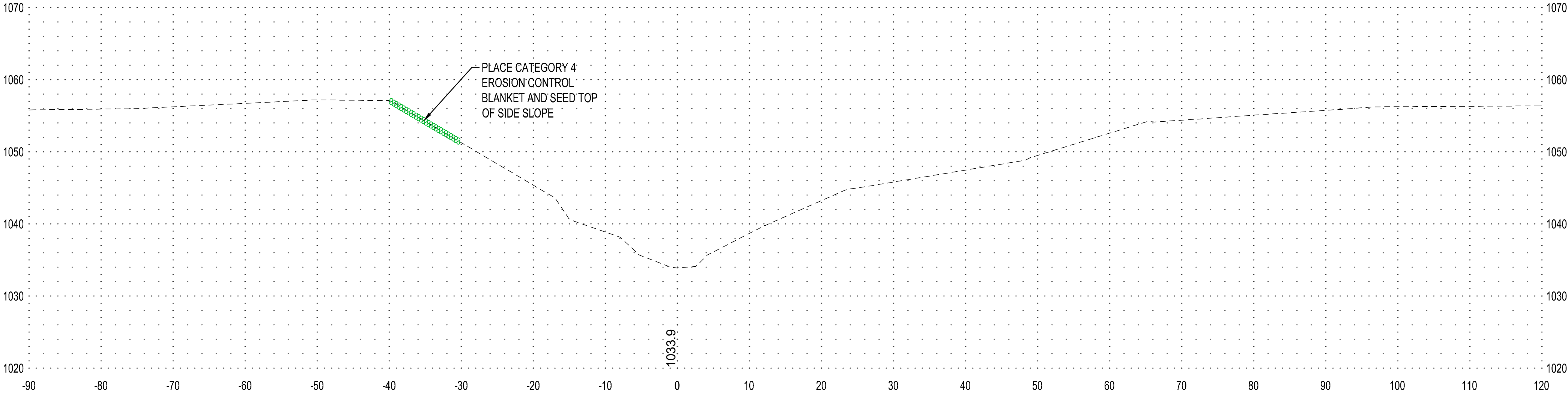
**5+75**



**5+50**



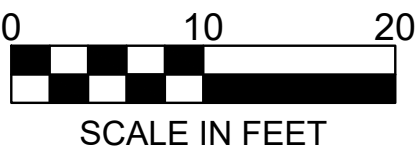
**5+25**



NOTE:  
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INCREASING STATIONING.  
23.5' TOPSOIL STRIPPING AND SPOIL PLACEMENT IS  
MEASURED FROM 10' OUTSIDE OF 16.5' BUFFER  
33.5' TOPSOIL STRIPPING AND SPOIL PLACEMENT  
MEASURED FROM EDGE OF 16.5' BUFFER

**SLOUGH REPAIR  
LEGEND**

STA. TO STA.	SLOUGH OVERVIEW	LOCATION
5+30 TO 6+75	SLOUGH #1	NORTH
8+00 TO 10+15	SLOUGH #2	NORTH
11+00 TO 11+95	SLOUGH #3	SOUTH
14+50 TO 15+45	SLOUGH #4	SOUTH
15+75 TO 16+25	SLOUGH #5	SOUTH
18+00 TO 20+45	SLOUGH #6	NORTH
20+30 TO 20+70	SLOUGH #7	SOUTH



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PROJECT

**FARIBAULT  
COUNTY**

**DITCH 24 REPAIR**

FARIBAULT COUNTY MINNESOTA

REVISION SCHEDULE

DATE	DESCRIPTION	BY

PROJECT NO.	19-23499
FILE NAME	23499 SECTIONS
DRAWN BY	SMW
DESIGNED BY	SMW/ MAO
REVIEWED BY	MAO
ORIGINAL ISSUE DATE	11-1-11
CLIENT PROJECT NO.	-

TITLE

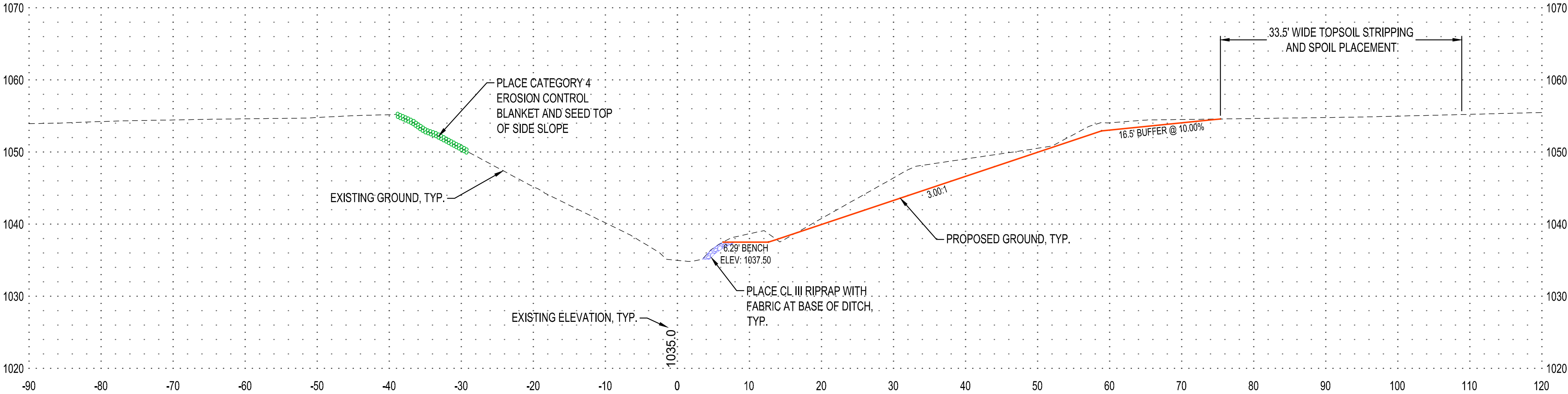
**CROSS-SECTIONS**

SHEET

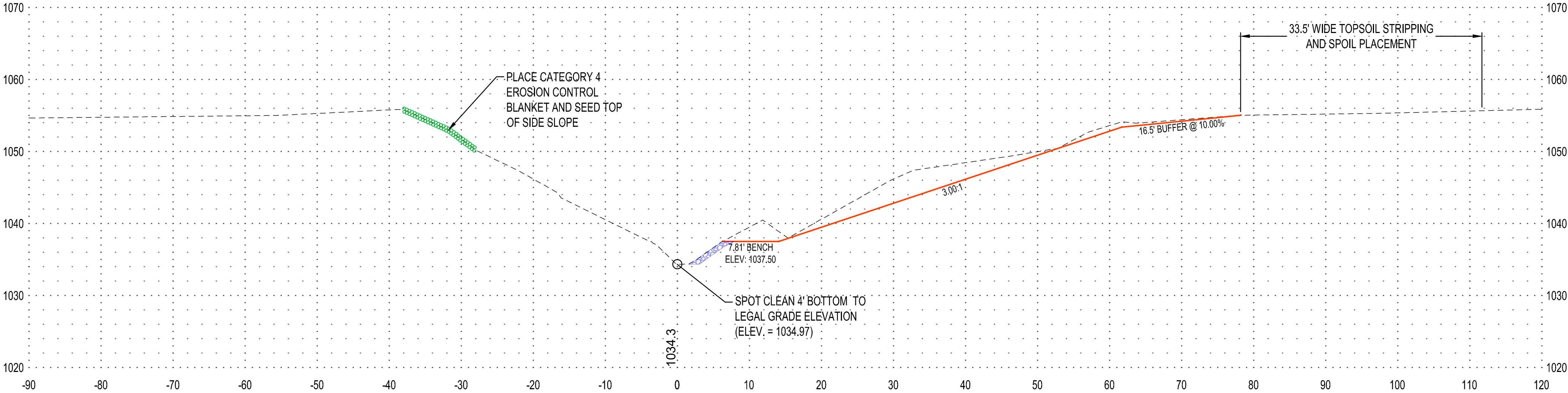
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OF 22

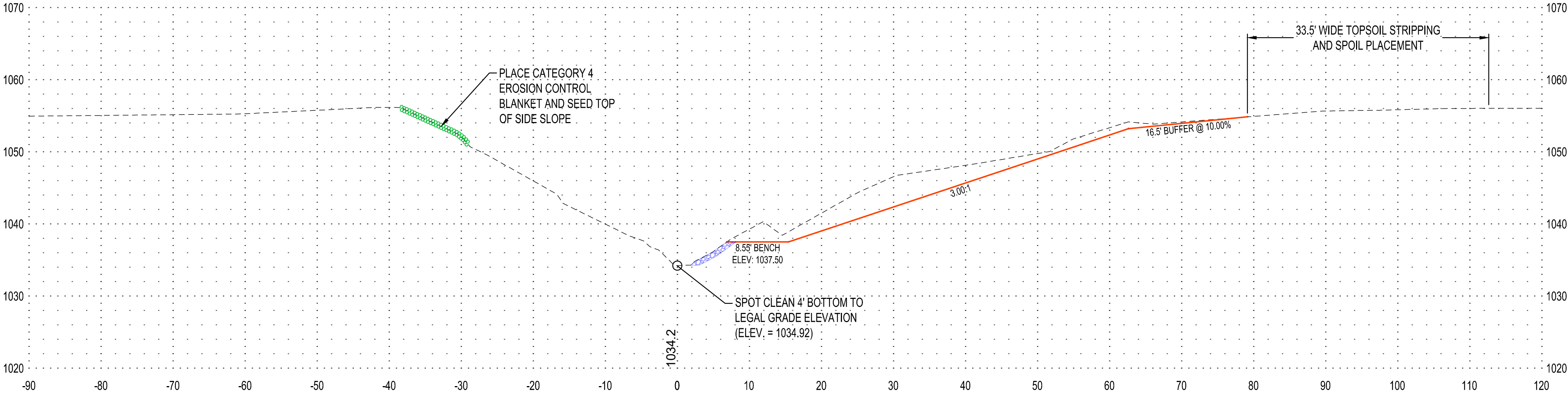
**6+50**



**6+25**



**6+00**

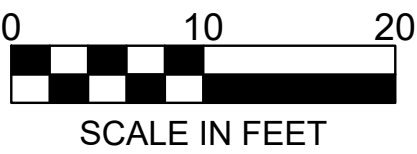


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33.5' TOPSOIL STRIPPING AND SPOIL PLACEMENT  
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**SLOUGH REPAIR  
LEGEND**

STA. TO STA.	SLOUGH OVERVIEW	LOCATION
5+30 TO 6+75	SLOUGH #1	NORTH
8+00 TO 10+15	SLOUGH #2	NORTH
11+00 TO 11+95	SLOUGH #3	SOUTH
14+50 TO 15+45	SLOUGH #4	SOUTH
15+75 TO 16+25	SLOUGH #5	SOUTH
18+00 TO 20+45	SLOUGH #6	NORTH
20+30 TO 20+70	SLOUGH #7	SOUTH





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PROJECT

**FARIBAULT  
COUNTY**

**DITCH 24 REPAIR**

FARIBAULT COUNTY MINNESOTA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	19-23499
FILE NAME	23499 SECTIONS
DRAWN BY	SMW
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ORIGINAL ISSUE DATE	--/--
CLIENT PROJECT NO.	-

TITLE

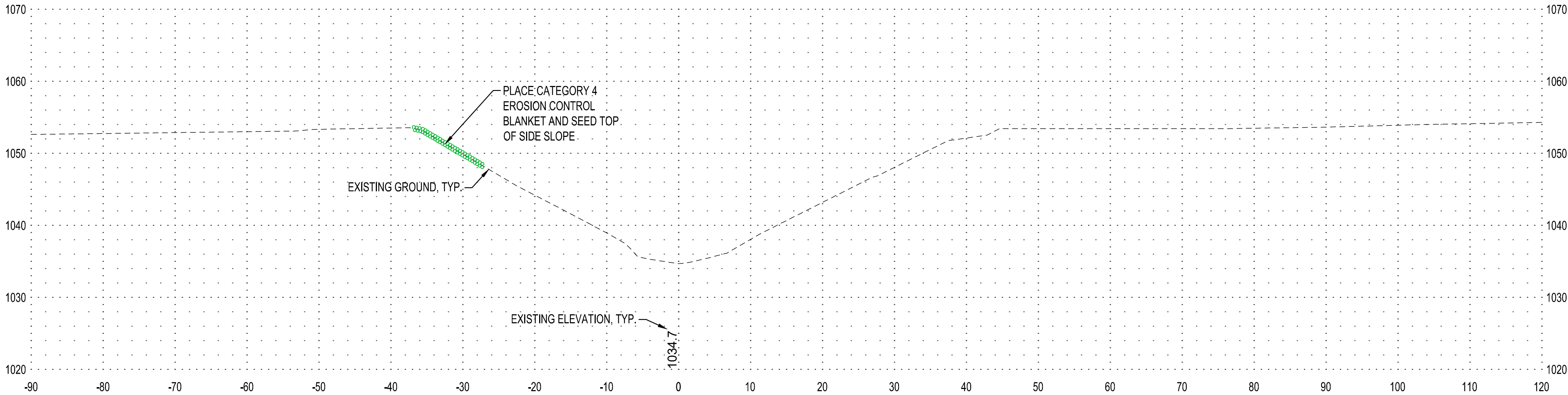
**CROSS-SECTIONS**

SHEET

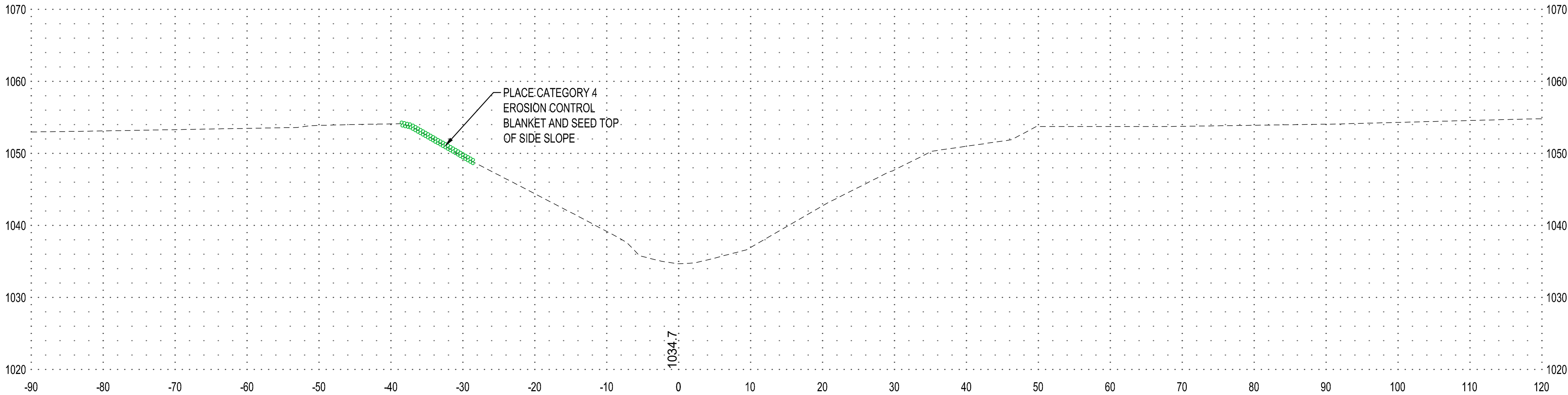
**10**

OF 22

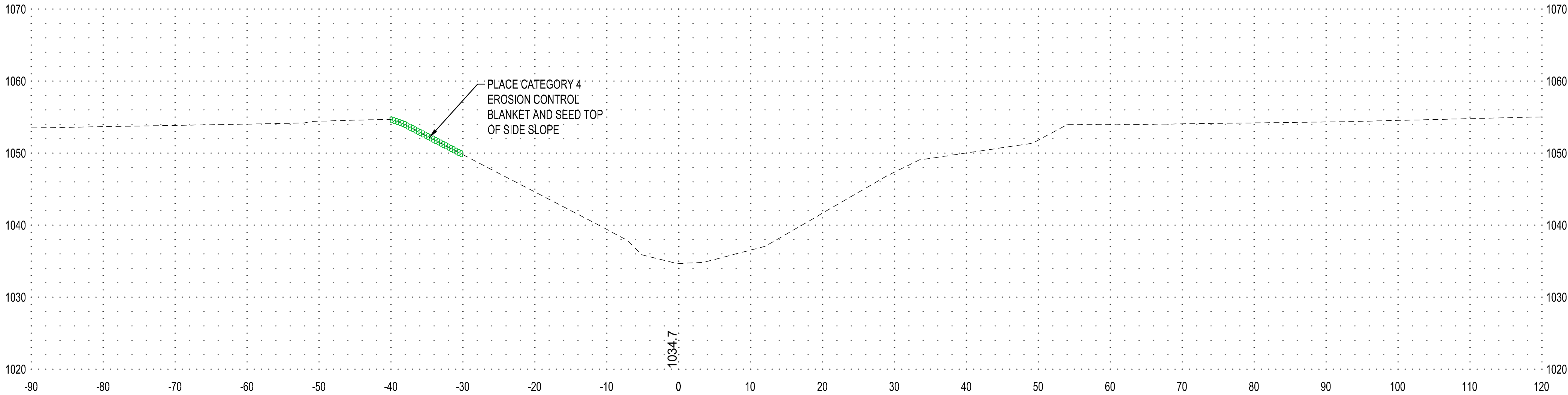
**7+25**



**7+00**



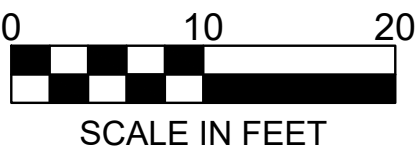
**6+75**



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33.5' TOPSOIL STRIPPING AND SPOIL PLACEMENT  
MEASURED FROM EDGE OF 16.5' BUFFER

### SLOUGH REPAIR LEGEND

STA. TO STA.	SLOUGH OVERVIEW	LOCATION
5+30 TO 6+75	SLOUGH #1	NORTH
8+00 TO 10+15	SLOUGH #2	NORTH
11+00 TO 11+95	SLOUGH #3	SOUTH
14+50 TO 15+45	SLOUGH #4	SOUTH
15+75 TO 16+25	SLOUGH #5	SOUTH
18+00 TO 20+45	SLOUGH #6	NORTH
20+30 TO 20+70	SLOUGH #7	SOUTH



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PROJECT

**FARIBAULT  
COUNTY**

**DITCH 24 REPAIR**

FARIBAULT COUNTY MINNESOTA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	19-23499
FILE NAME	23499 SECTIONS
DRAWN BY	SMW
DESIGNED BY	SMW/ MAO
REVIEWED BY	MAO
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CLIENT PROJECT NO.	-

TITLE

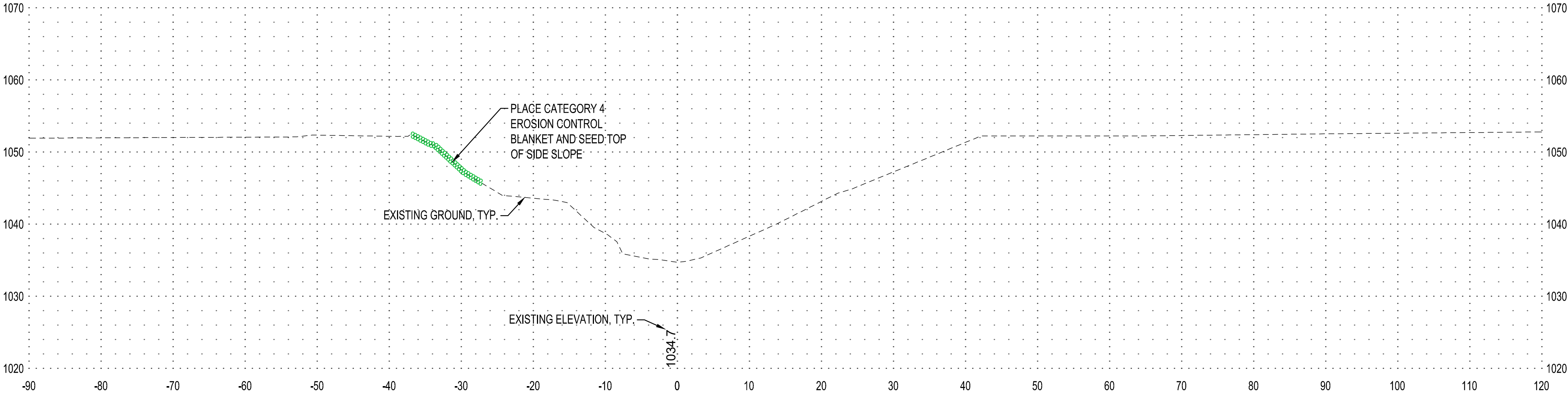
**CROSS-SECTIONS**

SHEET

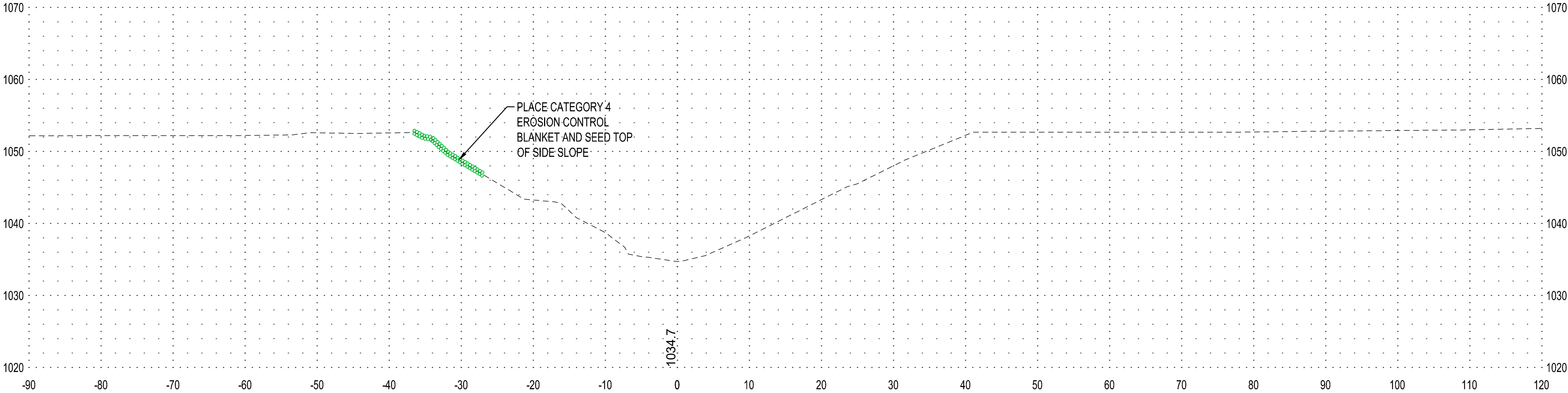
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OF 22

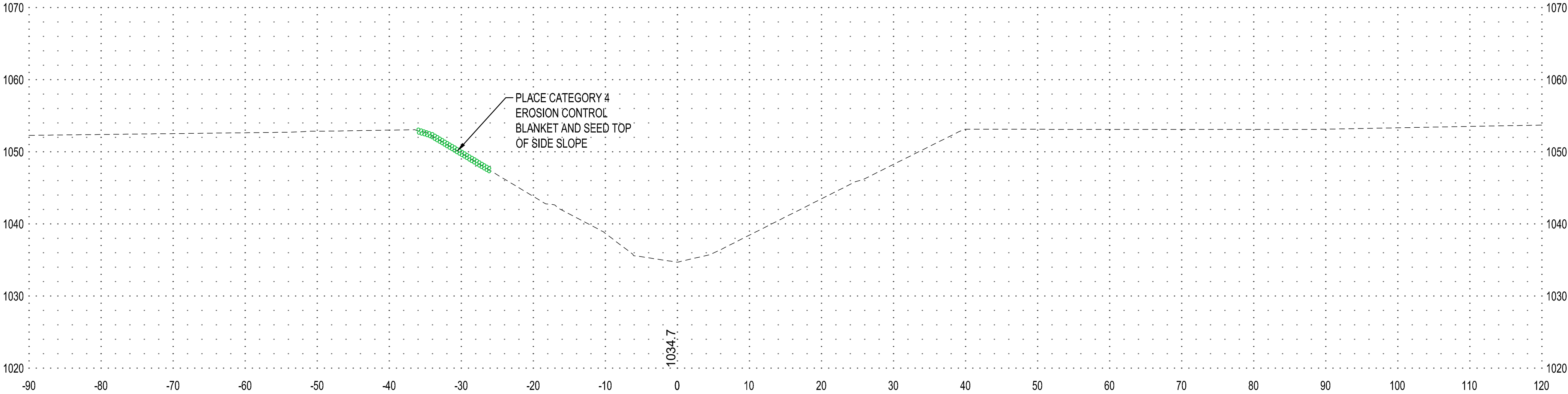
**8+00**



**7+75**



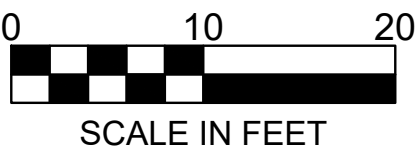
**7+50**



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### SLOUGH REPAIR LEGEND

STA. TO STA.	SLOUGH OVERVIEW	LOCATION
5+30 TO 6+75	SLOUGH #1	NORTH
8+00 TO 10+15	SLOUGH #2	NORTH
11+00 TO 11+95	SLOUGH #3	SOUTH
14+50 TO 15+45	SLOUGH #4	SOUTH
15+75 TO 16+25	SLOUGH #5	SOUTH
18+00 TO 20+45	SLOUGH #6	NORTH
20+30 TO 20+70	SLOUGH #7	SOUTH



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PROJECT

**FARIBAULT  
COUNTY**

**DITCH 24 REPAIR**

FARIBAULT COUNTY MINNESOTA

REVISION SCHEDULE

DATE	DESCRIPTION	BY

PROJECT NO.	19-23499
FILE NAME	23499 SECTIONS
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CLIENT PROJECT NO.	-

TITLE

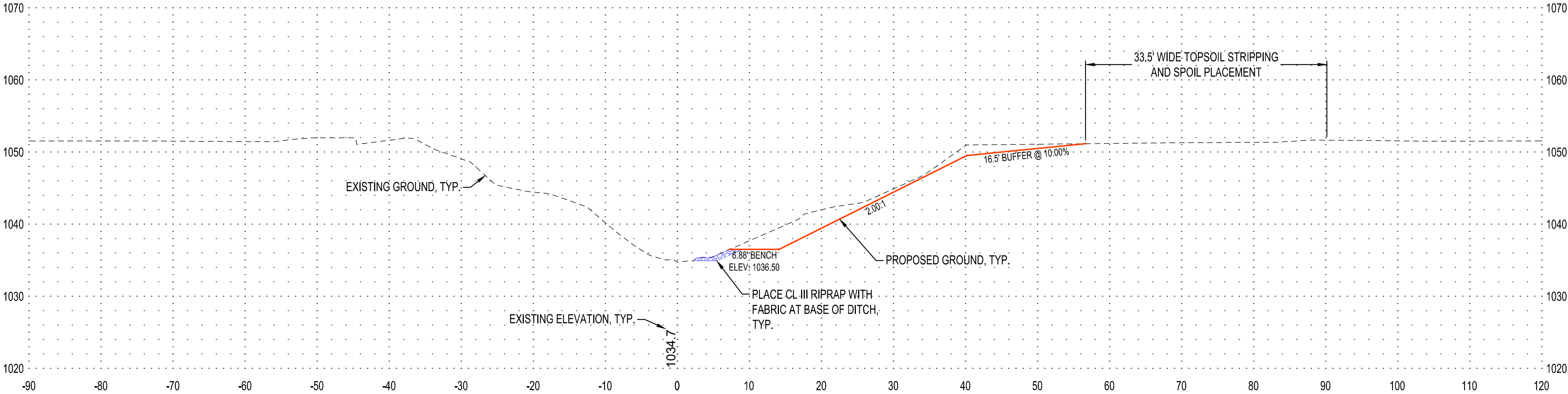
**CROSS-SECTIONS**

SHEET

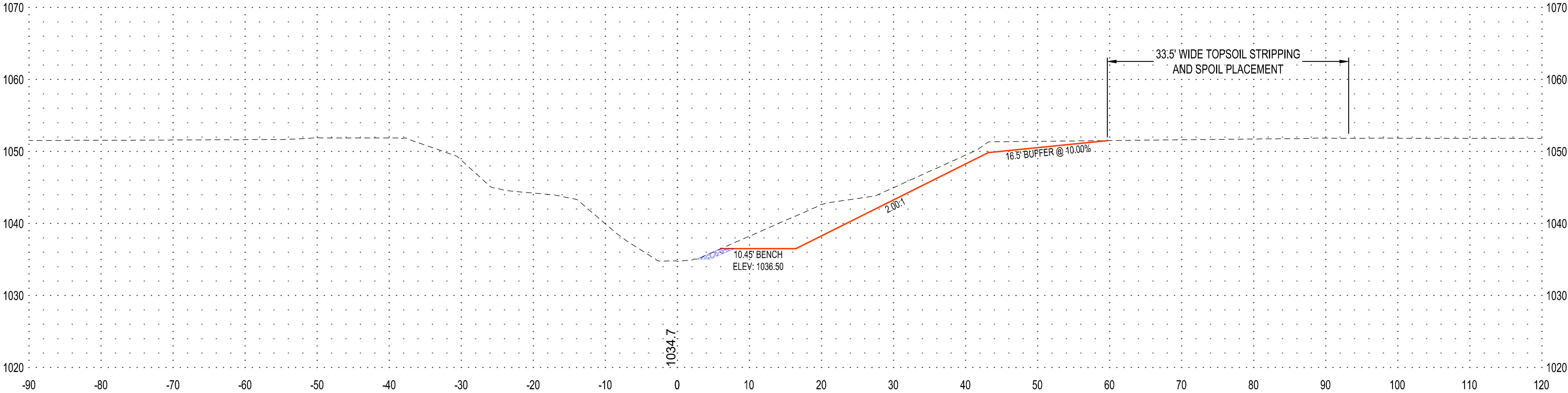
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OF 22

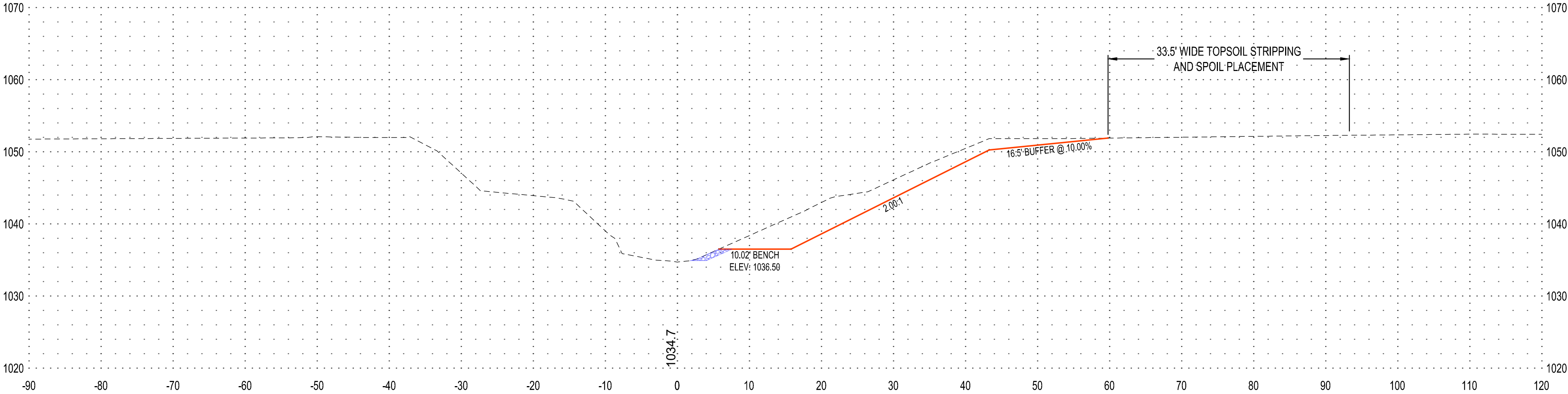
**8+75**



**8+50**



**8+25**

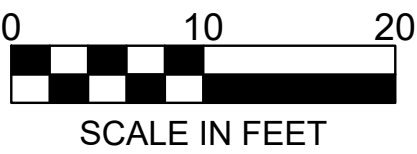


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**SLOUGH REPAIR  
LEGEND**

STA. TO STA.	SLOUGH OVERVIEW	LOCATION
5+30 TO 6+75	SLOUGH #1	NORTH
8+00 TO 10+15	SLOUGH #2	NORTH
11+00 TO 11+95	SLOUGH #3	SOUTH
14+50 TO 15+45	SLOUGH #4	SOUTH
15+75 TO 16+25	SLOUGH #5	SOUTH
18+00 TO 20+45	SLOUGH #6	NORTH
20+30 TO 20+70	SLOUGH #7	SOUTH





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PROJECT

**FARIBAULT  
COUNTY**

**DITCH 24 REPAIR**

FARIBAULT COUNTY MINNESOTA

REVISION SCHEDULE

DATE	DESCRIPTION	BY

PROJECT NO.	19-23499
FILE NAME	23499 SECTIONS
DRAWN BY	SMW
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CLIENT PROJECT NO.	-

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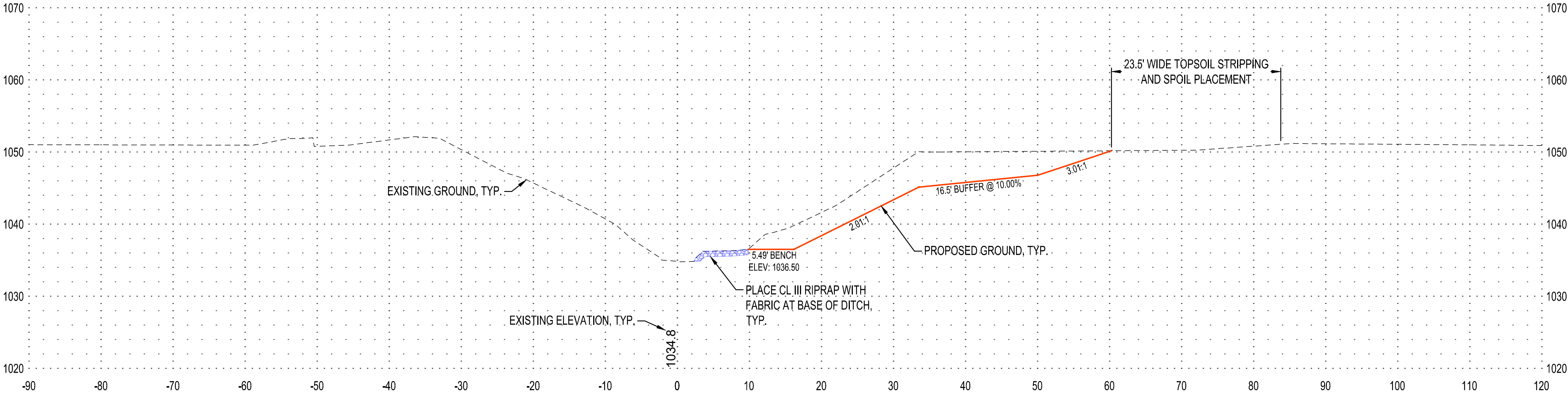
**CROSS-SECTIONS**

SHEET

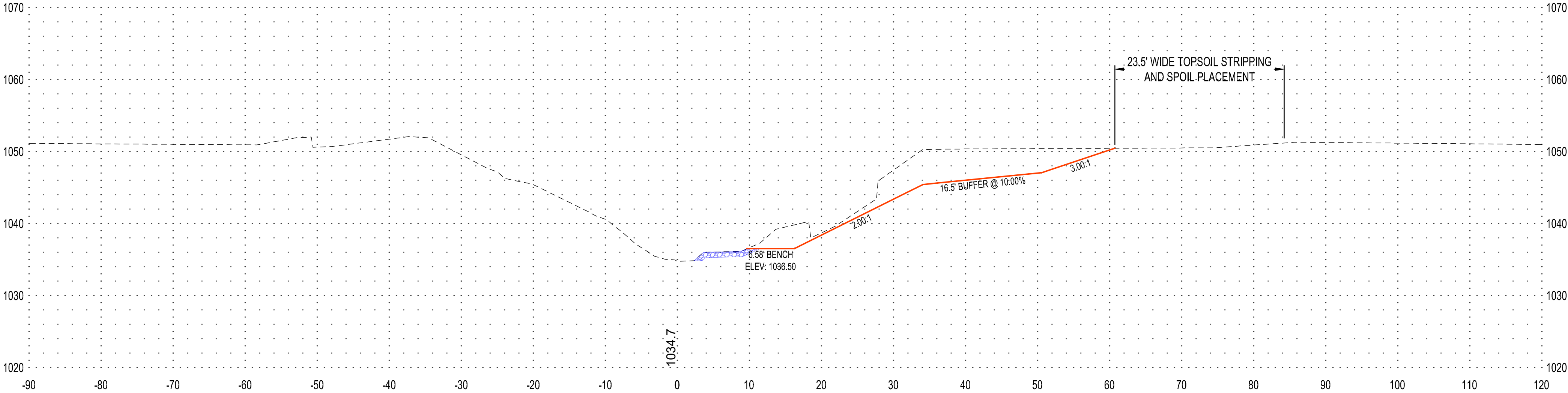
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OF 22

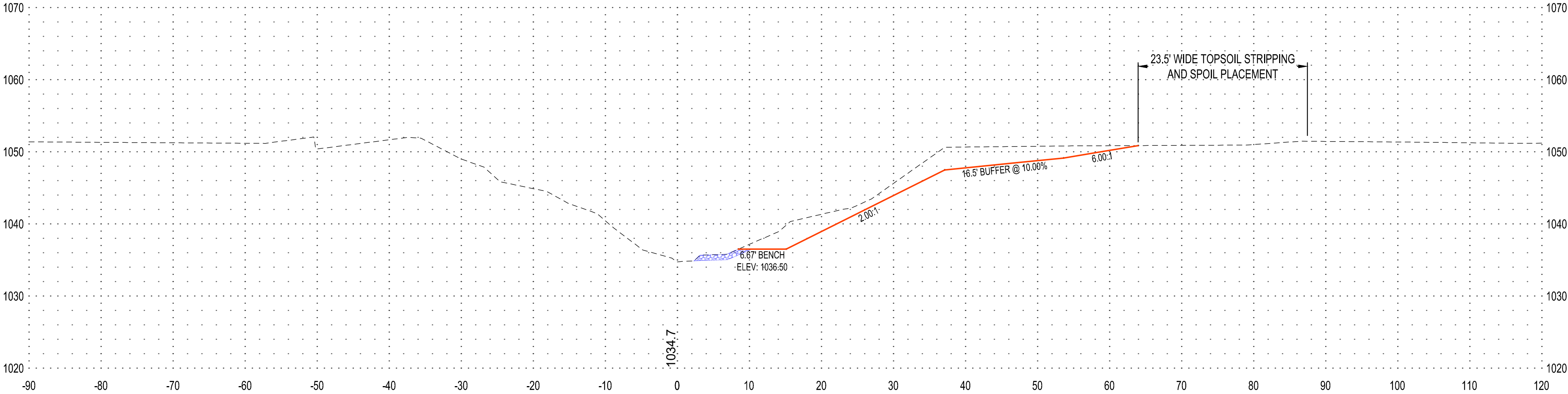
**9+50**



**9+25**



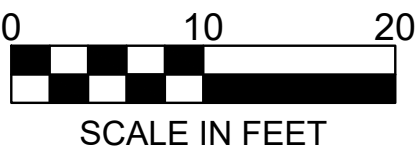
**9+00**



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**SLOUGH REPAIR  
LEGEND**

STA. TO STA.	SLOUGH OVERVIEW	LOCATION
5+30 TO 6+75	SLOUGH #1	NORTH
8+00 TO 10+15	SLOUGH #2	NORTH
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18+00 TO 20+45	SLOUGH #6	NORTH
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PROJECT

**FARIBAULT  
COUNTY**

**DITCH 24 REPAIR**

FARIBAULT COUNTY MINNESOTA

REVISION SCHEDULE

DATE	DESCRIPTION	BY

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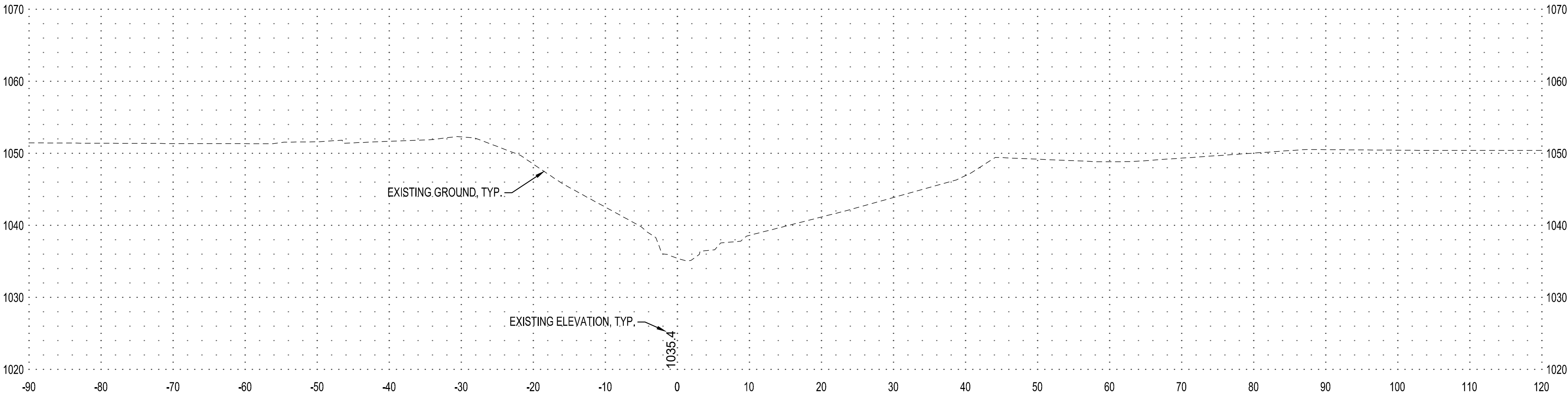
**CROSS-SECTIONS**

SHEET

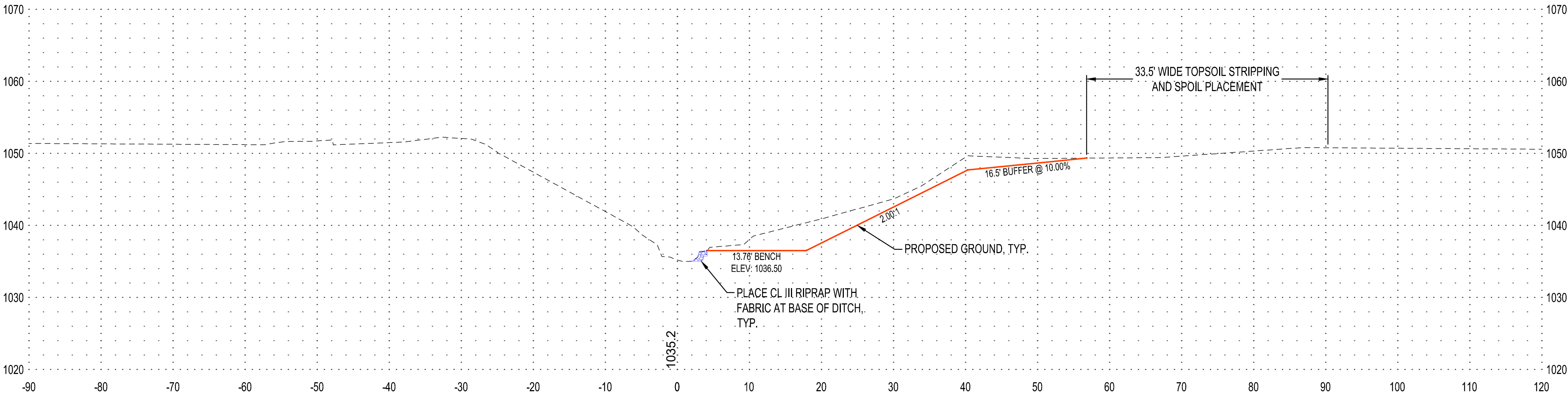
**14**

OF 22

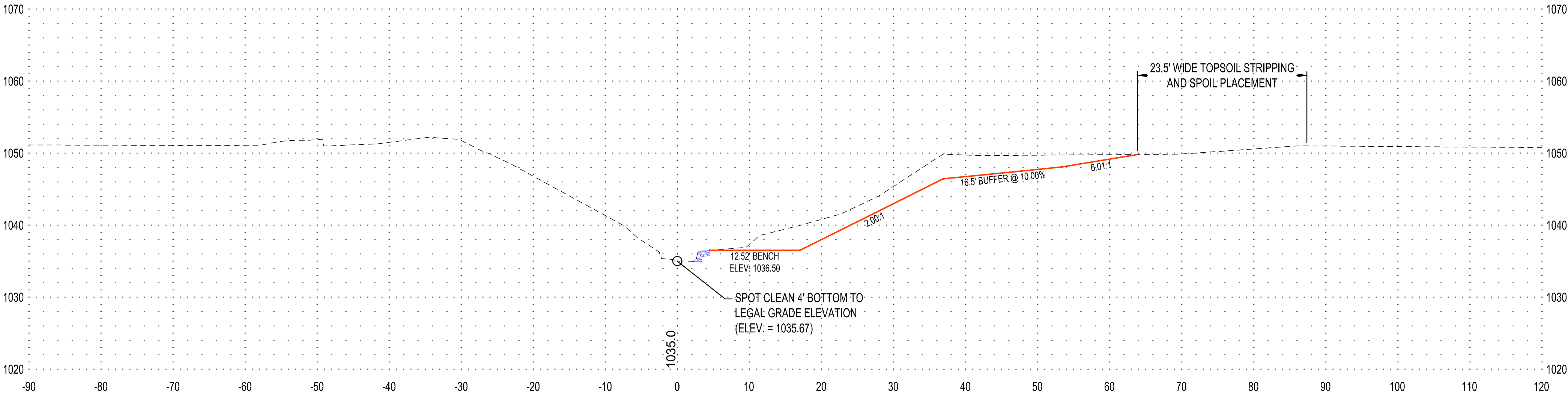
**10+25**



**10+00**



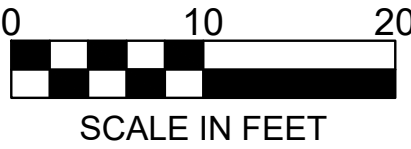
**9+75**



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**SLOUGH REPAIR  
LEGEND**

STA. TO STA.	SLOUGH OVERVIEW	LOCATION
5+30 TO 6+75	SLOUGH #1	NORTH
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PROJECT

**FARIBAULT  
COUNTY**

**DITCH 24 REPAIR**

FARIBAULT COUNTY MINNESOTA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

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TITLE

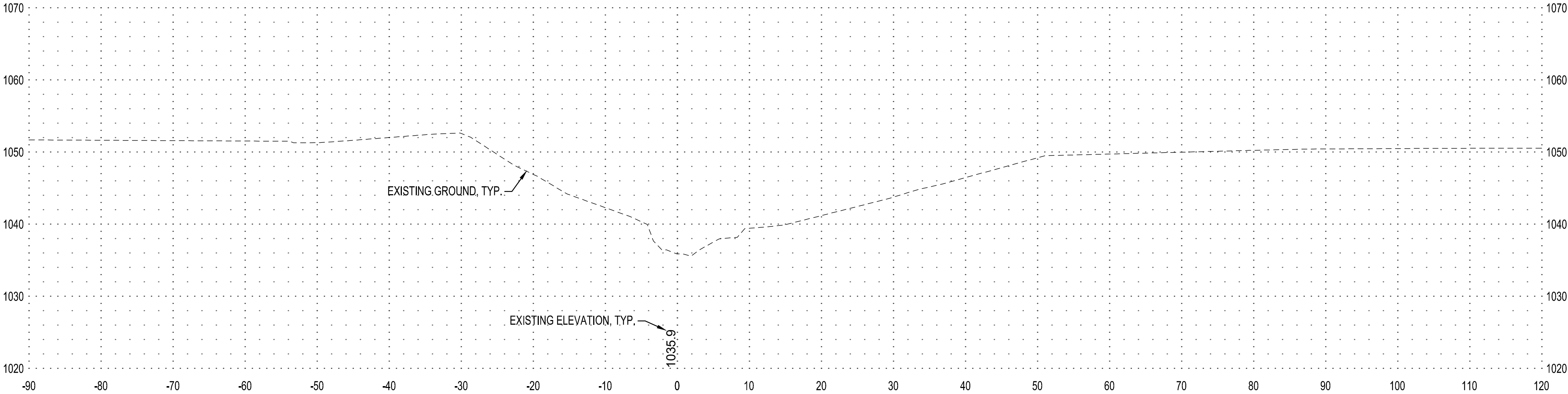
**CROSS-SECTIONS**

SHEET

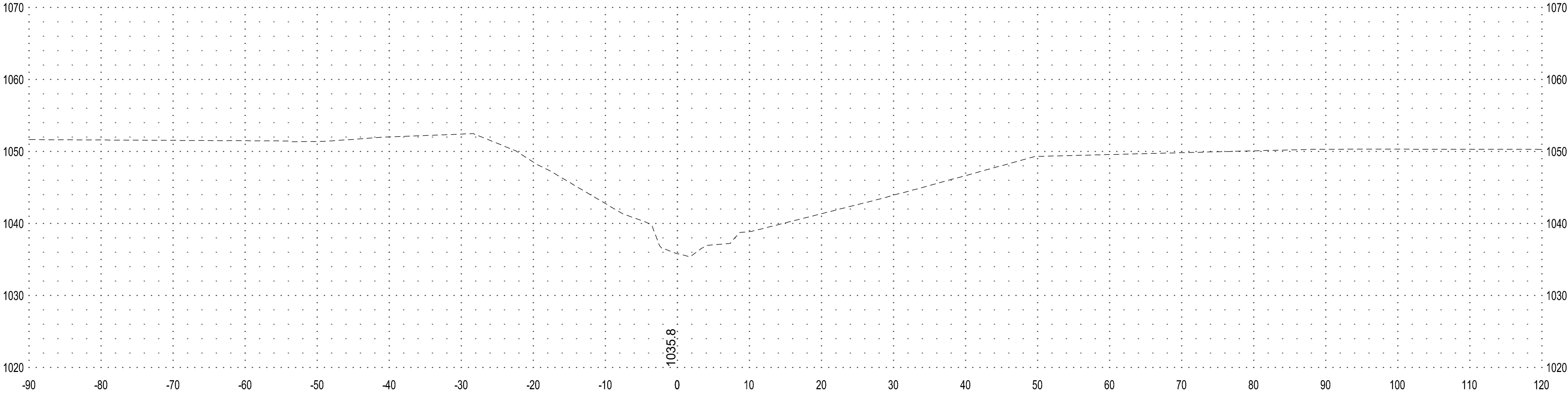
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OF 22

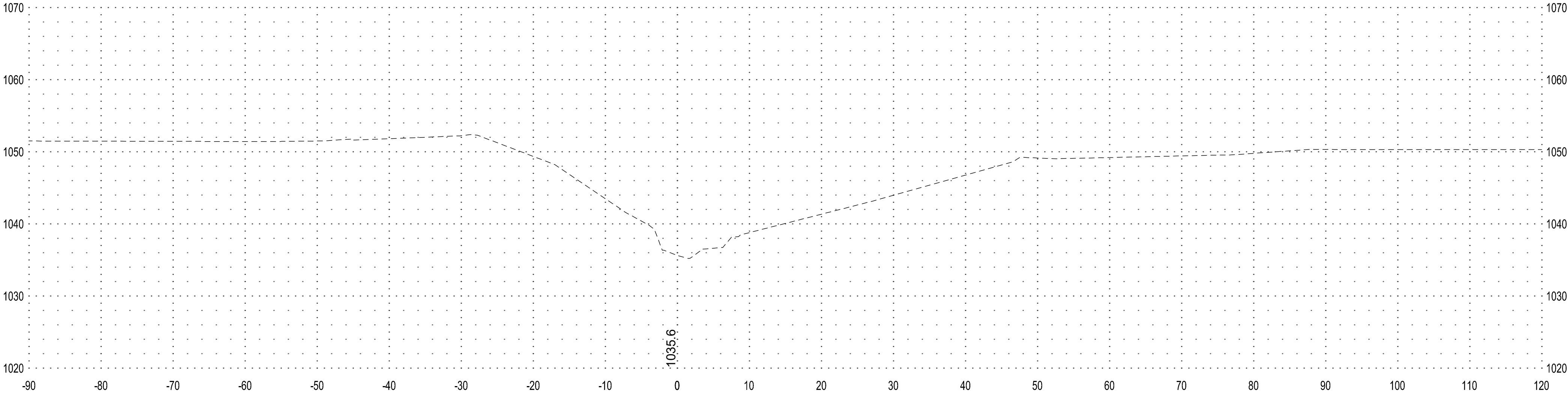
**11+00**



**10+75**



**10+50**

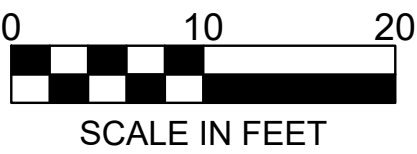


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**SLOUGH REPAIR  
LEGEND**

STA. TO STA.	SLOUGH OVERVIEW	LOCATION
5+30 TO 6+75	SLOUGH #1	NORTH
8+00 TO 10+15	SLOUGH #2	NORTH
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15+75 TO 16+25	SLOUGH #5	SOUTH
18+00 TO 20+45	SLOUGH #6	NORTH
20+30 TO 20+70	SLOUGH #7	SOUTH





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PROJECT

**FARIBAULT  
COUNTY**

**DITCH 24 REPAIR**

FARIBAULT COUNTY MINNESOTA

REVISION SCHEDULE

DATE	DESCRIPTION	BY

PROJECT NO.	19-23499
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DESIGNED BY	SMW/ MAO
REVIEWED BY	MAO
ORIGINAL ISSUE DATE	11-1-11
CLIENT PROJECT NO.	-

TITLE

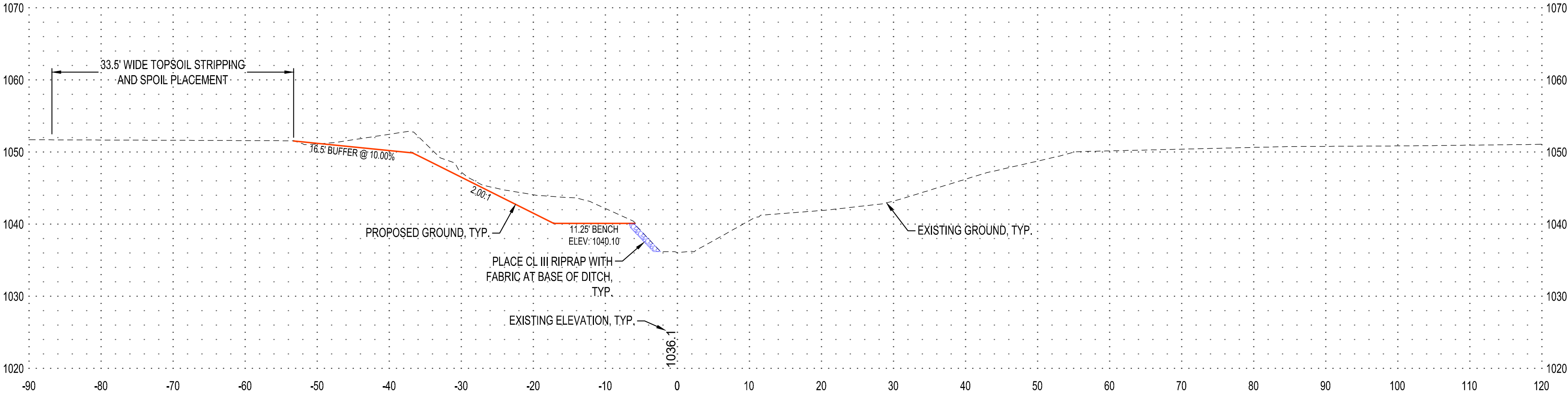
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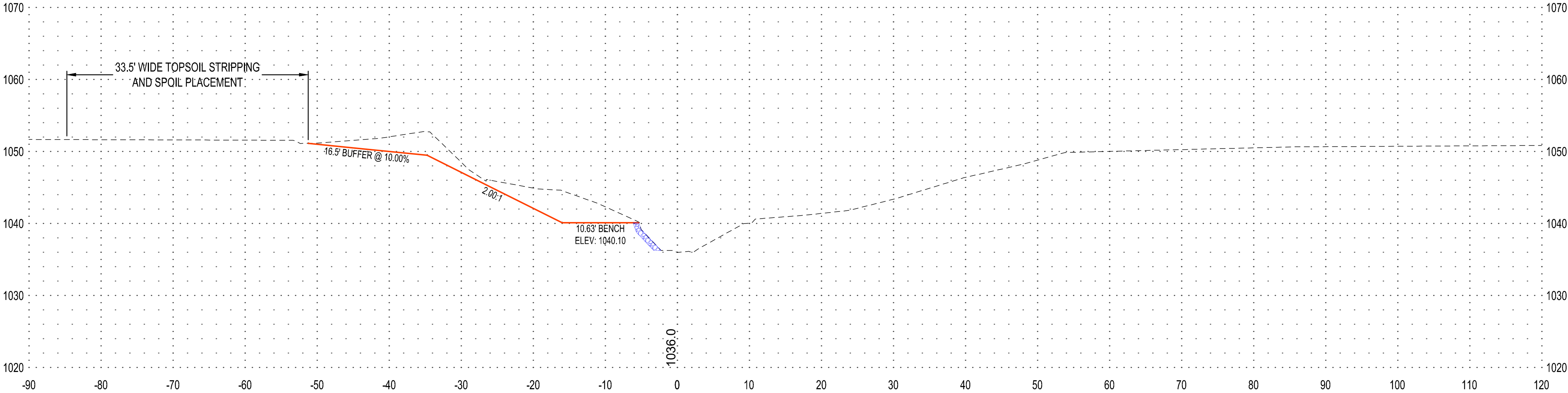
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OF 22

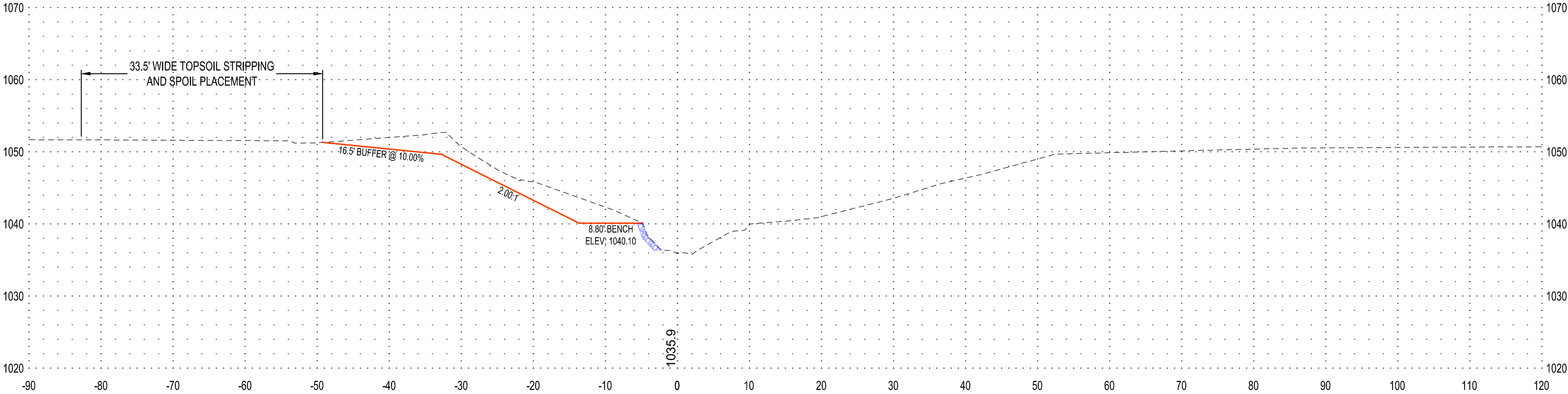
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**11+50**



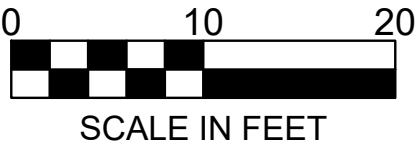
**11+25**



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LEGEND**

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8+00 TO 10+15	SLOUGH #2	NORTH
11+00 TO 11+95	SLOUGH #3	SOUTH
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COUNTY**

**DITCH 24 REPAIR**

FARIBAULT COUNTY MINNESOTA

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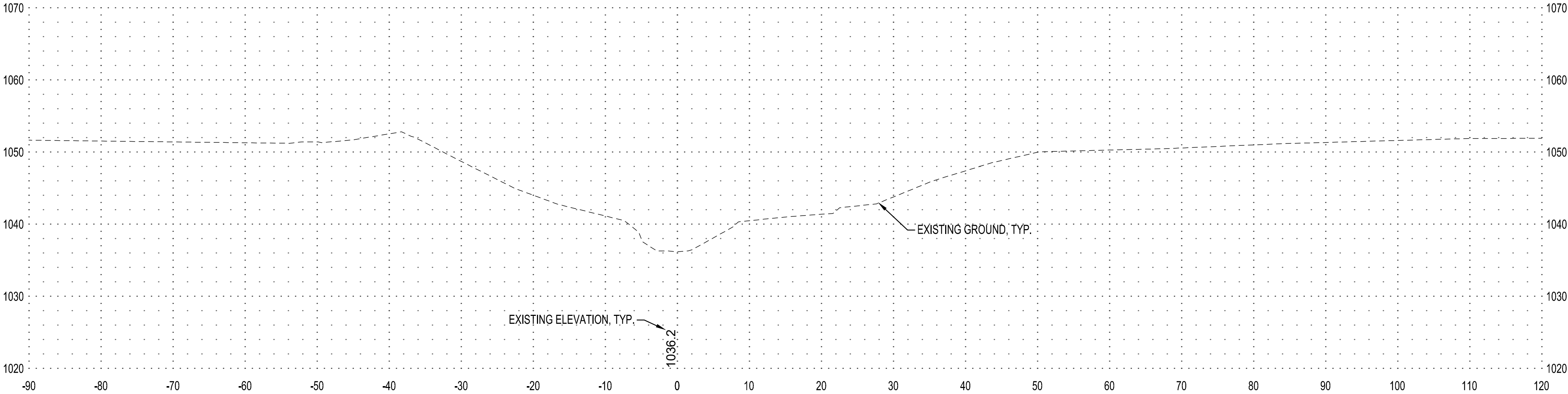
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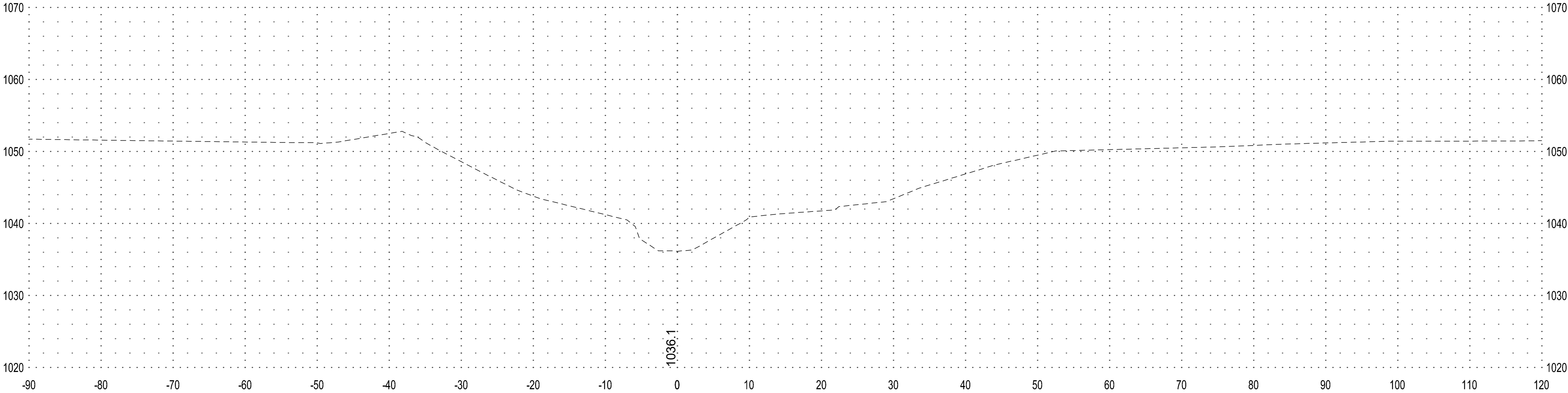
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OF 22

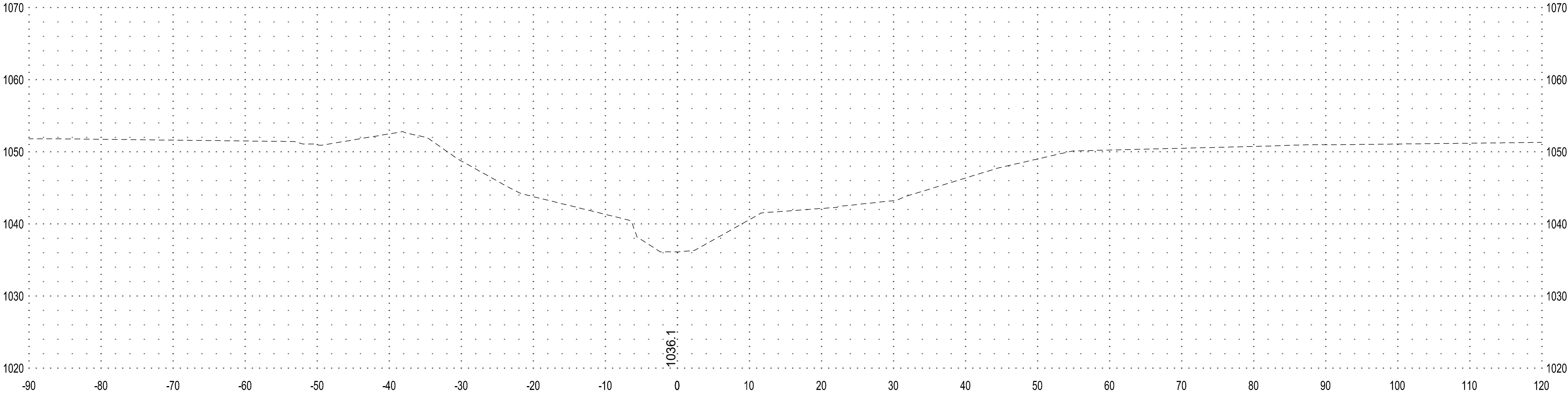
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**12+25**



**12+00**

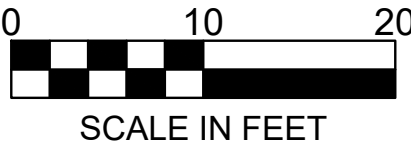


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**FARIBAULT  
COUNTY**

**DITCH 24 REPAIR**

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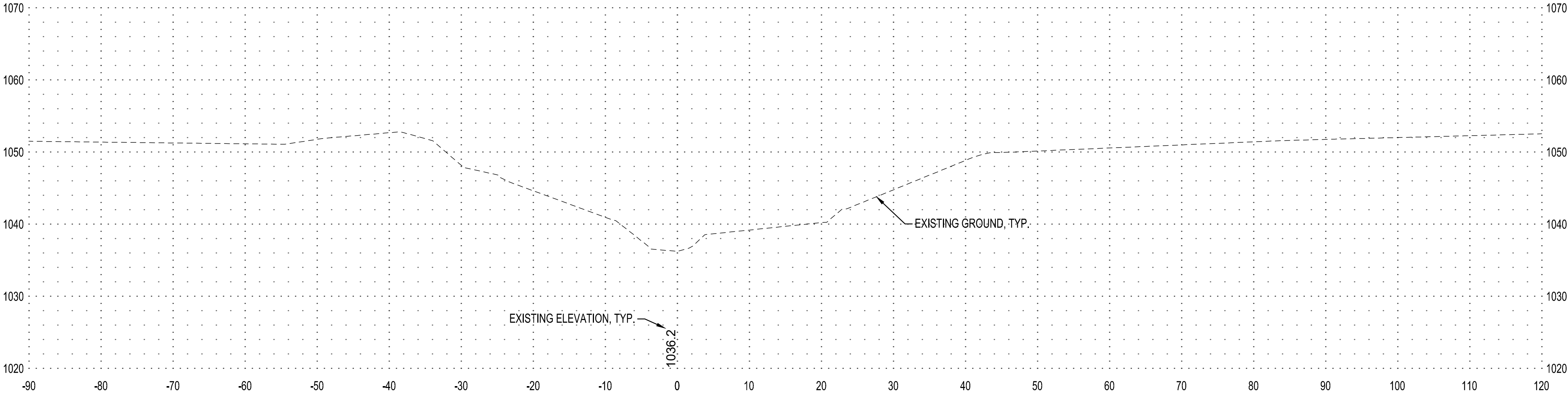
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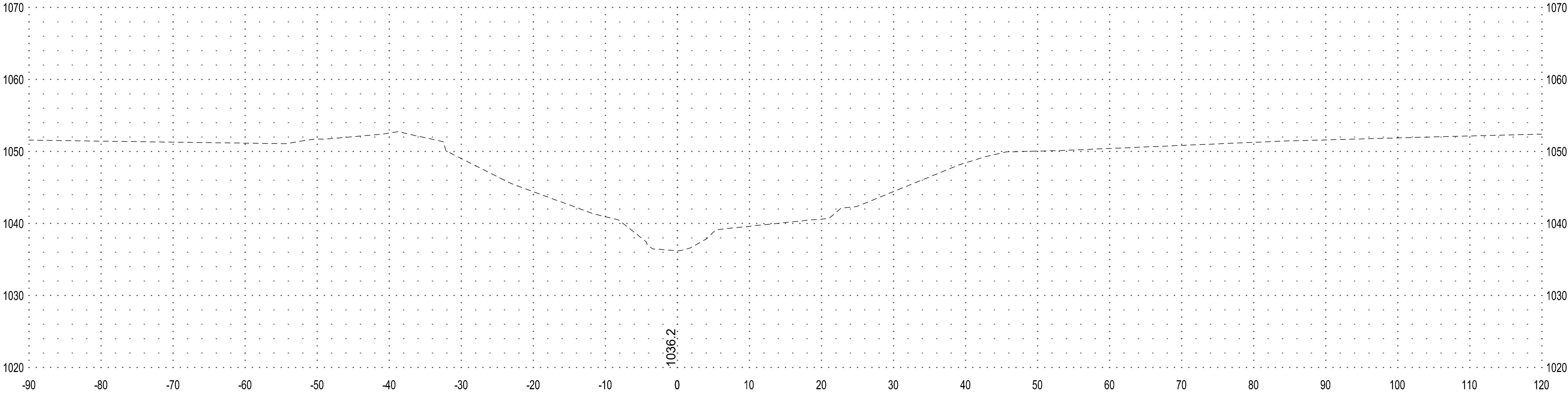
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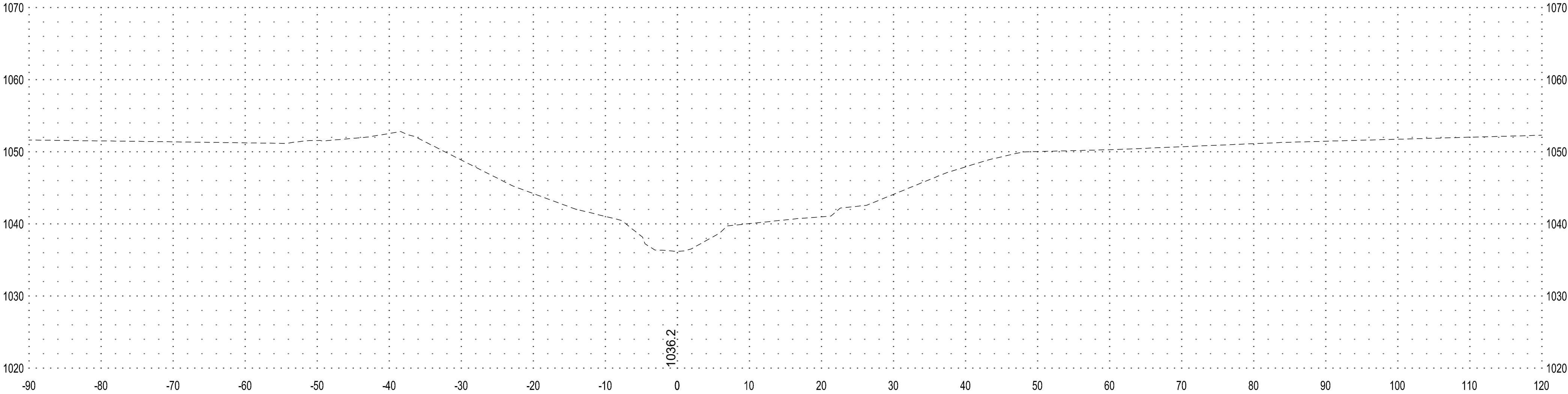
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**13+00**



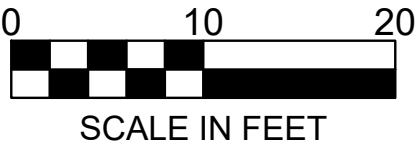
**12+75**



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**FARIBAULT  
COUNTY**

**DITCH 24 REPAIR**

FARIBAULT COUNTY MINNESOTA

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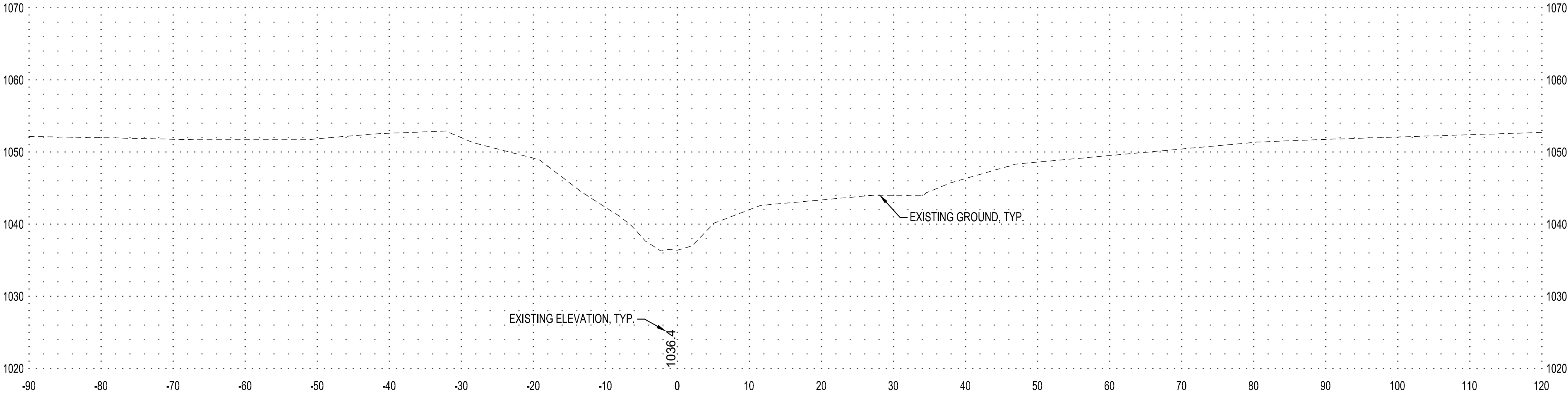
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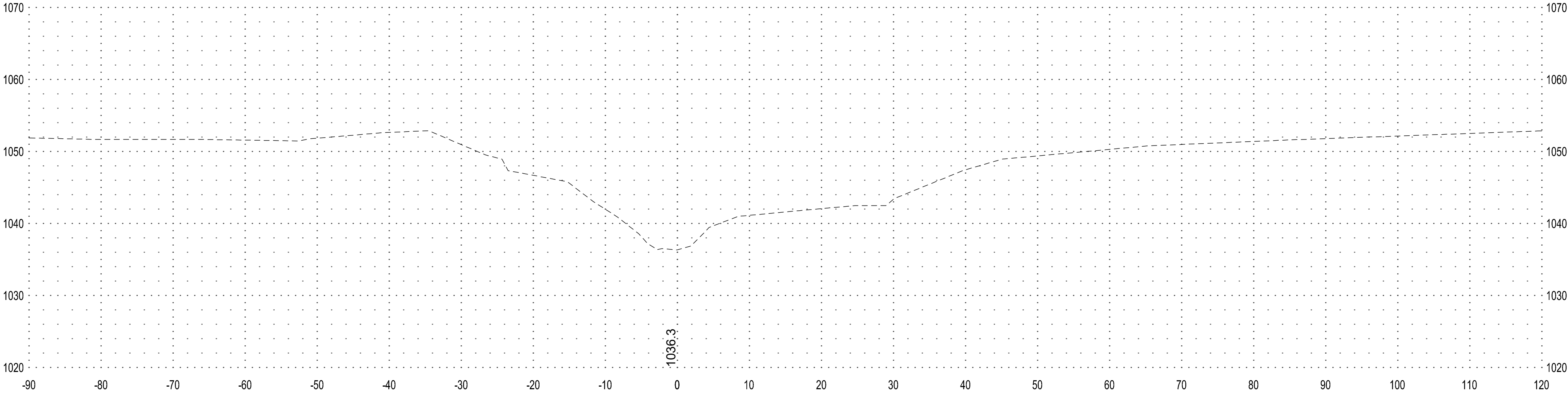
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OF 22

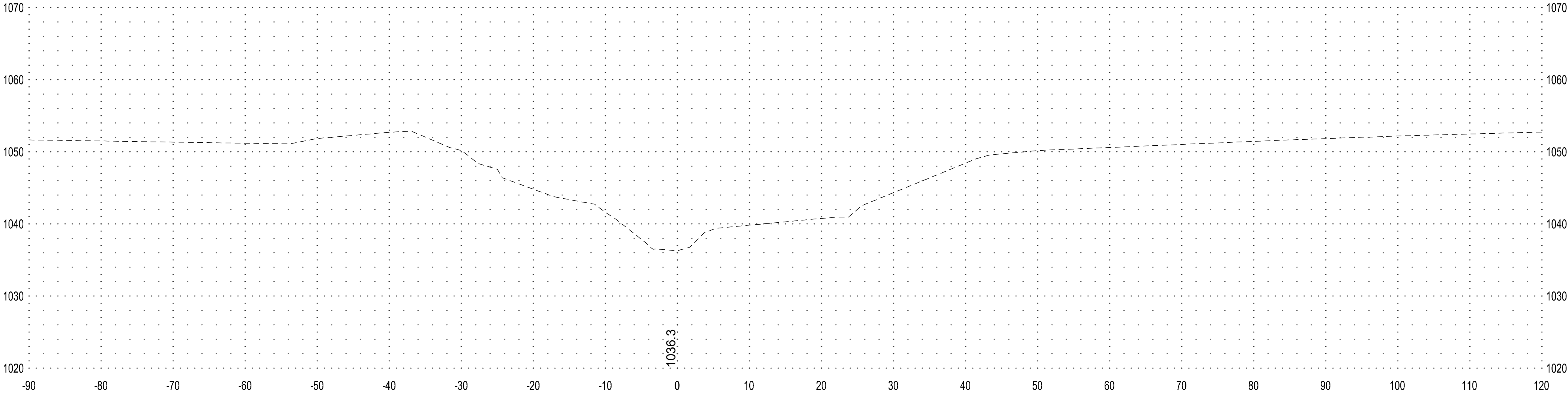
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**13+75**



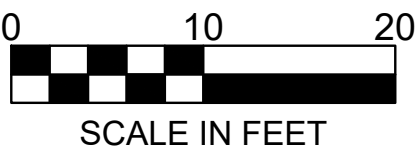
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**FARIBAULT  
COUNTY**

**DITCH 24 REPAIR**

FARIBAULT COUNTY MINNESOTA

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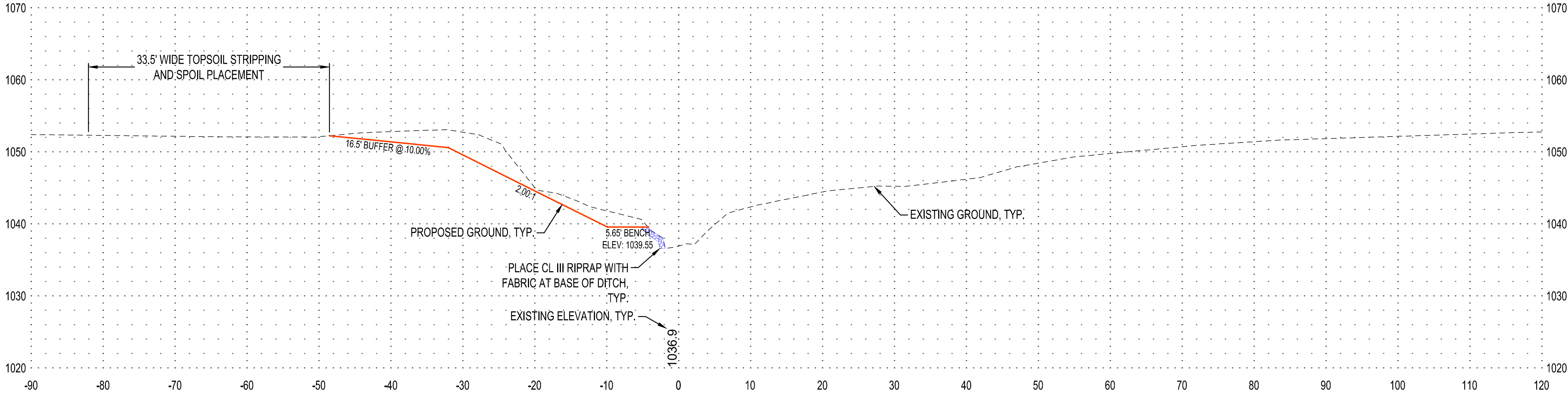
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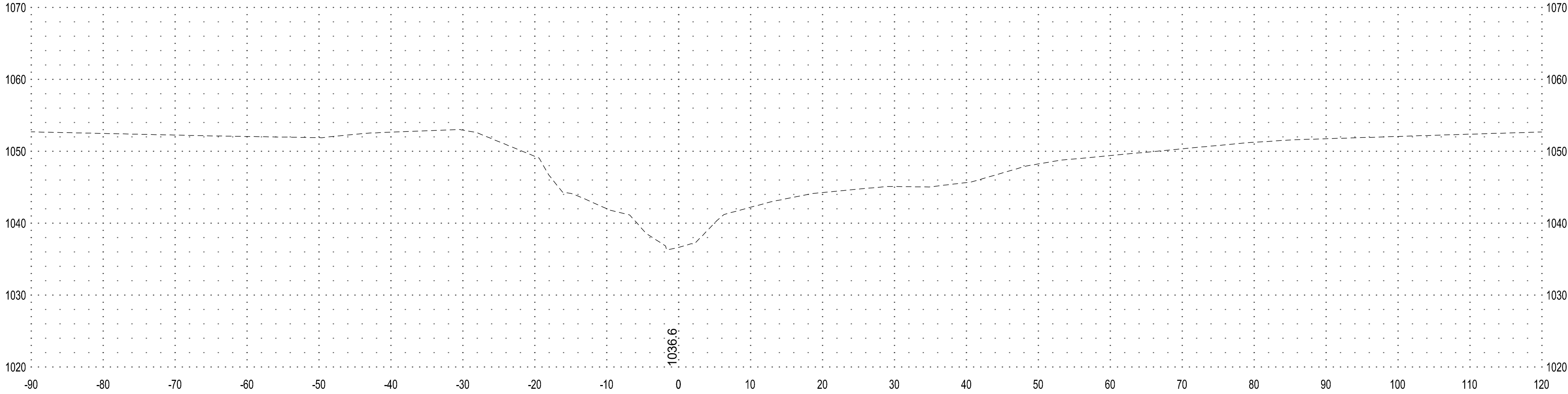
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OF 22

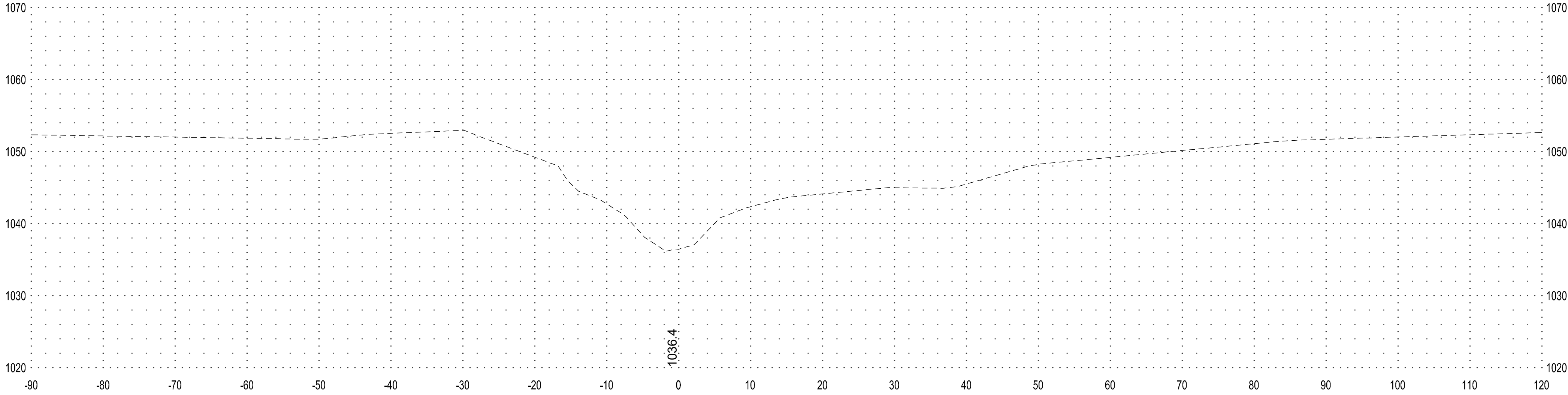
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**14+50**



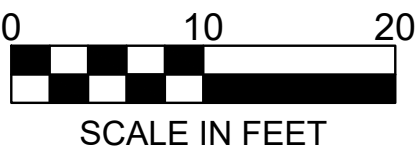
**14+25**



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**DITCH 24 REPAIR**

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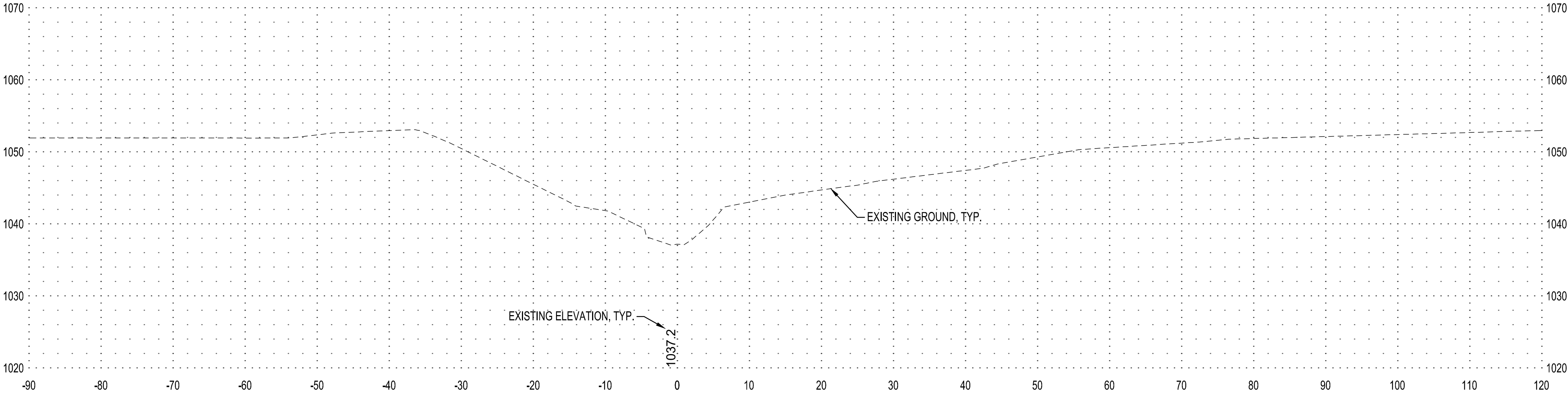
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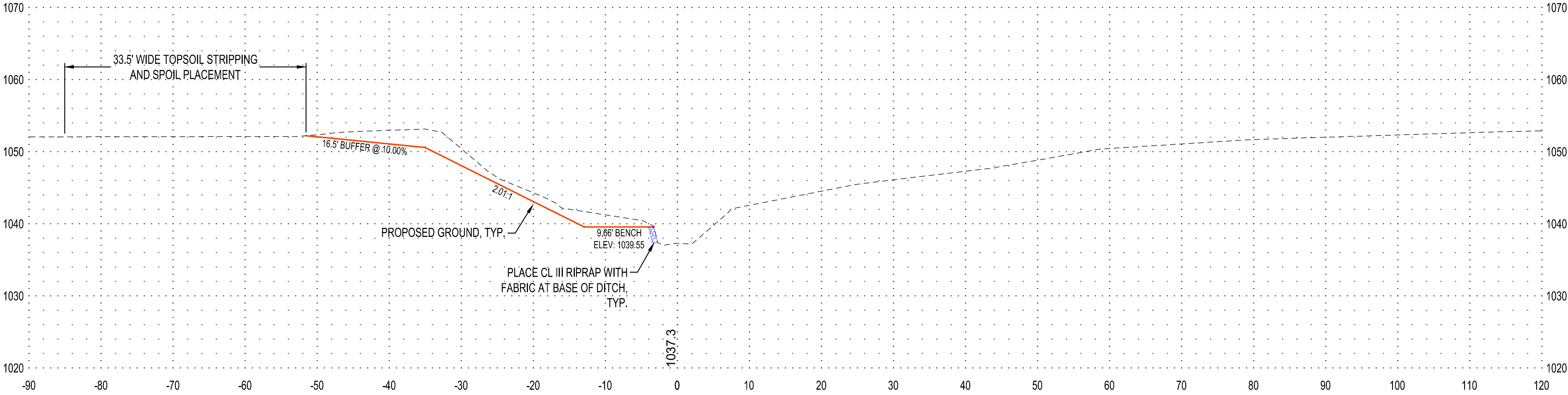
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OF 22

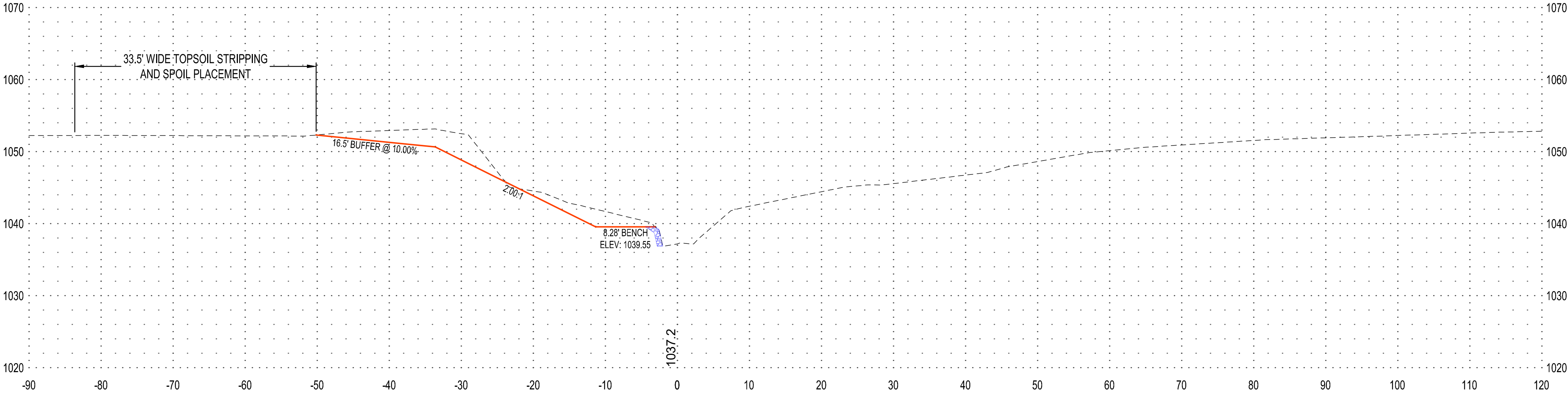
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**15+25**



**15+00**

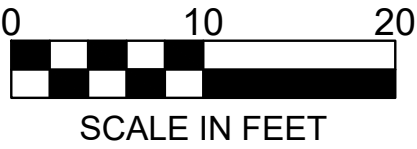


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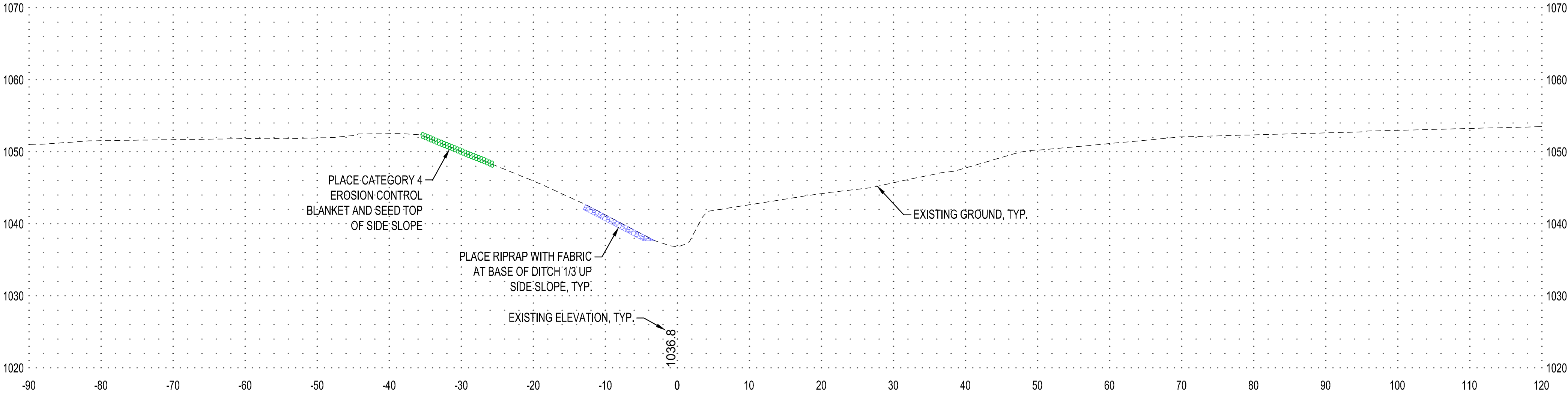
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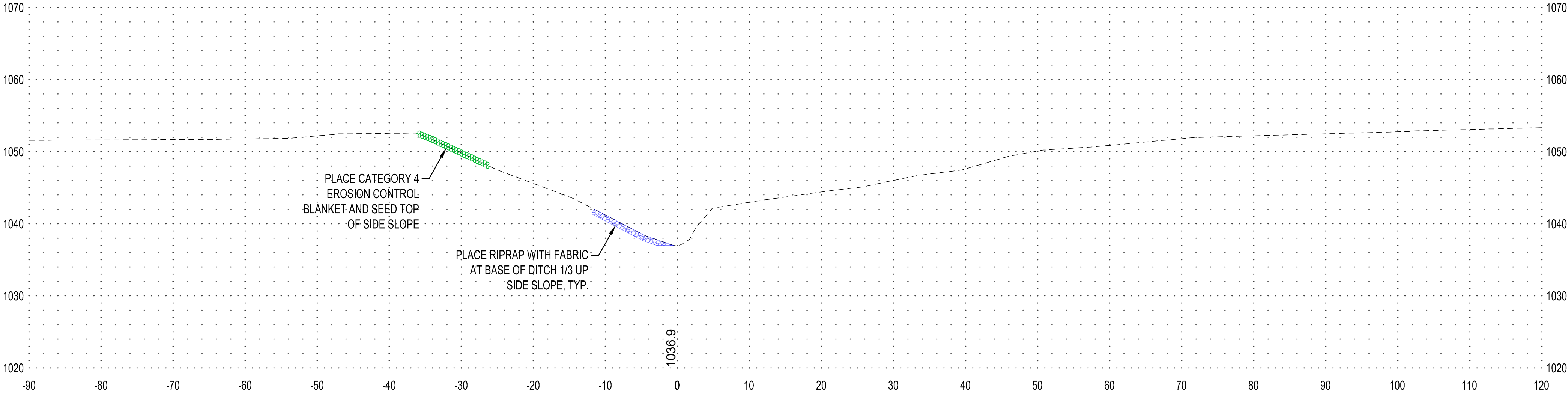
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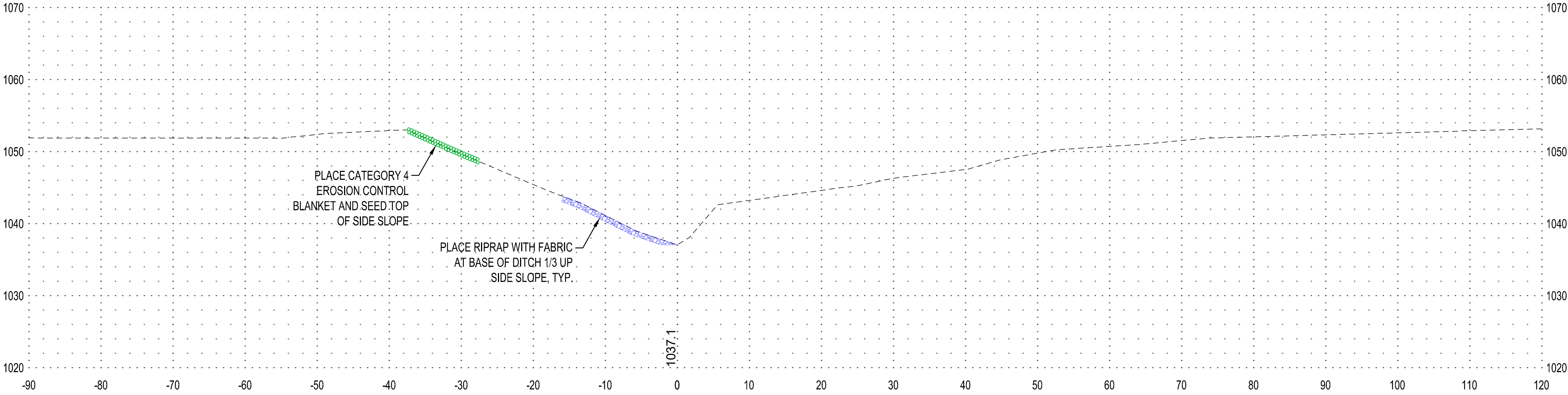
16+25



16+00



15+75



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SLOUGH REPAIR LEGEND		
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# APPENDIX B: REPAIR PETITION



## PETITION FOR REPAIR OF DRAINAGE SYSTEM

Drainage System:

County Ditch # 24

Location of System:

Winnebago City

Township

9

Section

SENE, NENE

¼ Section

### BEFORE THE FARIBAULT COUNTY BOARD OF COMMISSIONERS ACTING AS THE DRAINAGE AUTHORITY FOR FARIBAULT COUNTY DITCH # 24

WHEREAS, Petition(s) are individuals or an entity interested in or affected by Faribault County Ditch # 24; and

WHEREAS, Faribault County Ditch # 24 is in need of repair; and

WHEREAS, Petitioner(s) are requesting that the following locations on Faribault County Ditch # 24 are in need of repair; and

WHEREAS, Petitioners believe this drainage system needs

stop the erosion  
Repair Sluff areas, Need another Drop Inlet, & Raise  
existing out lets on South Side, fix driveway entrances,  
More riprap on control structure, Area needs reseeded, Straighten  
culvert

WHEREAS, Petitioner(s) requests that Repair Inspection be done by the selected option:

under Rd

Without an Engineer being appointed by the Drainage Authority and allows for a full drainage inspection to be done and to the hiring of a contractor to do a preliminary investigation.

Or

☒ With the Faribault County Board of Commissioners acting as Drainage Authority for the Faribault County Ditch identified and to proceed in the repair procedure under Minn. Stat. § 103E.715, Subd. 2. This requires appointing an Engineer and holding a public hearing to examine the drainage system.

#### MINNESOTA STATUTE 103E.701 DEFINES A REPAIR AS:

The term "repair," as used in this section, means to restore all or a part of a drainage system as nearly as practicable to the same condition as originally constructed and subsequently improved, including re-sloping of ditches and leveling of waste banks if necessary to prevent further deterioration, realignment to original construction if necessary to restore the effectiveness of the drainage system, and routine operations that may be required to remove obstructions and maintain the efficiency of the drainage system.

"Repair" also includes:

1. Incidental straightening of a tile system resulting from the tile-laying technology used to replace tiles; and
2. Replacement of tiles with the next larger size that is readily available, if the original size is not readily available.



*As a petitioner of this project, I have read and understand the information that has been provided to me on the Petition for Repair of Drainage System.*

Petitioner Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Print Name: \_\_\_\_\_

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

Address: \_\_\_\_\_

Petitioner Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Print Name: \_\_\_\_\_

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

Address: \_\_\_\_\_

Petitioner Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Print Name: \_\_\_\_\_

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

Address: \_\_\_\_\_

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Print Name: \_\_\_\_\_

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

Address: \_\_\_\_\_

Petitioner Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Print Name: \_\_\_\_\_

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

Address: \_\_\_\_\_

Received this 31<sup>st</sup>  
day of May 2019  
By [Signature] Deputy  
Faribault County Auditor

Please include the following:

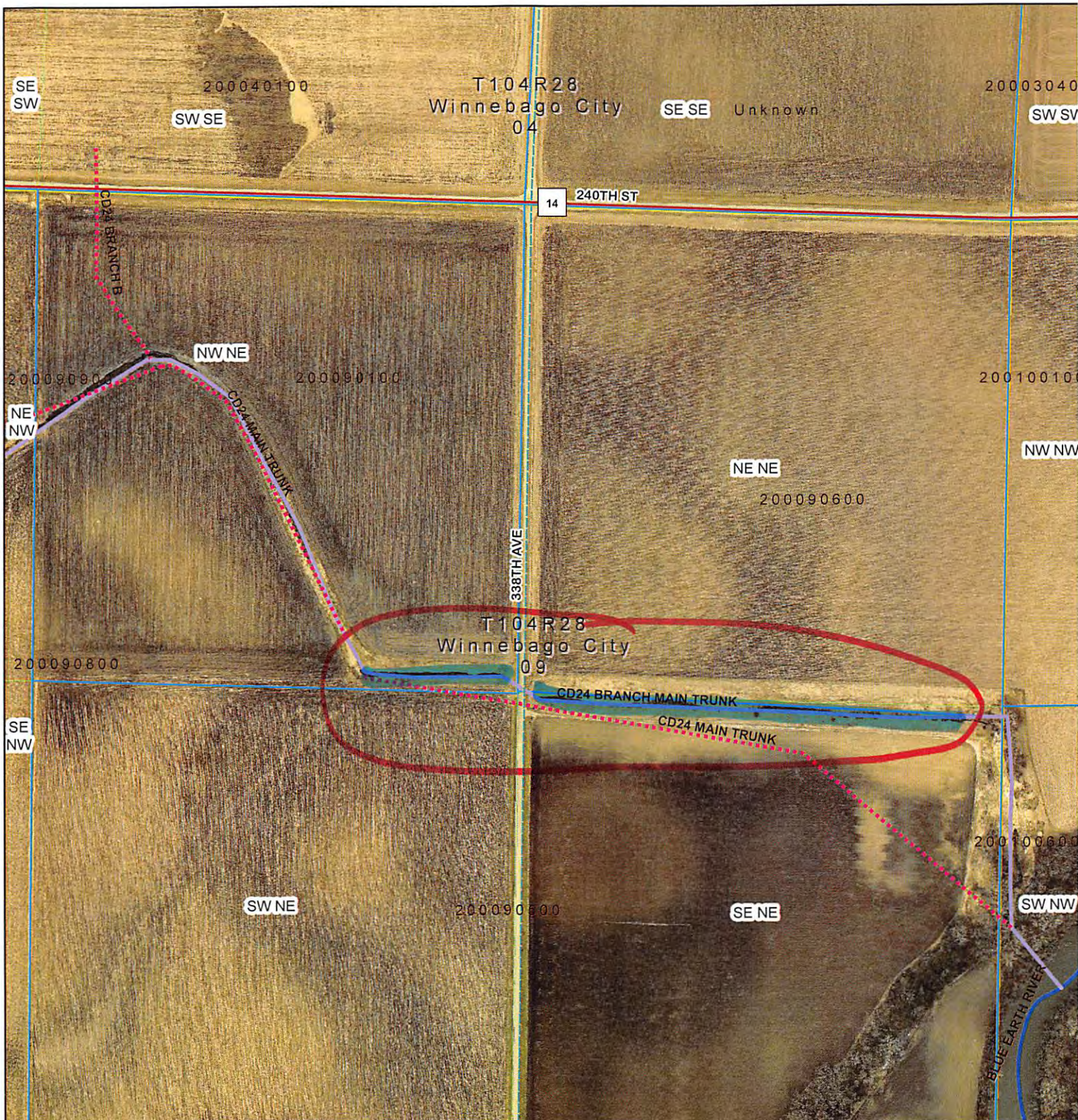
Photo(s) of area(s) needing repair is/are attached? ☒ Y ☐ N

Records of Repairs? ☐ Y ☐ N

Drainage Maps? ☒ Y ☐ N

Any Other Pertinent Documentation ? ☐ Y ☐ N





www.faribaultcountyswcd.com  
www.co.faribault.mn.us

**FARIBAULT COUNTY  
SOIL & WATER CONSERVATION DISTRICT  
PLANNING & ZONING  
DRAINAGE DEPARTMENT**

1 inch = 367 feet



Disclaimer: Faribault County and Faribault County SWCD do not warrant or guarantee accuracy of the GIS data. The data is meant for reference purposes only and should not be used for official decisions. The data contained in the maps we compiled from the best available records that could be found and may contain errors or omissions.









**103E.715 REPAIR BY PETITION.**

Subdivision 1. **Repair petition.** An individual or an entity interested in or affected by a drainage system may file a petition to repair the drainage system. The petition must state that the drainage system needs repair. The auditor shall present the petition to the board at its next meeting or, for a joint county drainage system, to the drainage authority within ten days after the petition is filed.

Subd. 2. **Engineer's repair report.** If the drainage authority determines that the drainage system needs repair, the drainage authority shall appoint an engineer to examine the drainage system and make a repair report. The report must show the necessary repairs, the estimated cost of the repairs, and all details, plans, and specifications necessary to prepare and award a contract for the repairs. The drainage authority may give notice and order a hearing on the petition before appointing the engineer.

Subd. 3. **Notice of hearing.** When the repair report is filed, the auditor shall promptly notify the drainage authority. The drainage authority in consultation with the auditor shall set a time, by order, not more than 30 days after the date of the order for a hearing on the repair report. At least ten days before the hearing, the auditor shall give notice by mail of the time and location of the hearing to the petitioners, owners of property, and political subdivisions likely to be affected by the repair in the repair report.

Subd. 4. **Hearing on repair report.** (a) The drainage authority shall make findings and order the repair to be made if:

(1) the drainage authority determines from the repair report and the evidence presented that the repairs recommended are necessary for the best interests of the affected property owners; or

(2) the repair petition is signed by the owners of at least 26 percent of the property area affected by and assessed for the original construction of the drainage system, and the drainage authority determines that the drainage system is in need of repair so that it no longer serves its original purpose and the cost of the repair will not exceed the total benefits determined in the original drainage system proceeding.

(b) The order must direct the auditor and the chair of the board or, for a joint county drainage system, the auditors of the affected counties to proceed and prepare and award a contract for the repair of the drainage system. The contract must be for the repair described in the repair report and as determined necessary by the drainage authority, and be prepared in the manner provided in this chapter for the original drainage system construction.

Subd. 5. **Apportioning repair cost for joint county drainage system.** For the repair of a joint county drainage system, the drainage authority shall, by order, apportion the repair cost among affected counties in the same manner required in the original construction of the drainage system.

Subd. 6. **Repair by resloping ditches, incorporating multistage ditch cross-section, leveling spoil banks, installing erosion control, or removing trees.** (a) For a drainage system that is to be repaired by resloping ditches, incorporating a multistage ditch cross-section, leveling spoil banks, installing erosion control measures, or removing trees, before ordering the repair, the drainage authority must appoint viewers to assess and report on damages and benefits if it determines that:

(1) the resloping, incorporation of a multistage ditch cross-section, spoil bank leveling, installation of erosion control measures, or tree removal will require the taking of any property not contemplated and included in the proceeding for the establishment or subsequent improvement of the drainage system; or

(2) any spoil bank leveling or tree removal will directly benefit property where the spoil bank leveling or tree removal is specified.

(b) The viewers shall assess and report damages and benefits as provided by sections 103E.315 and 103E.321. The drainage authority shall hear and determine the damages and benefits as provided in sections 103E.325, 103E.335, and 103E.341. The hearing shall be held within 30 days after the property owners' report is mailed. Damages must be paid as provided by section 103E.315 as a part of the cost of the repair, and benefits must be added to the benefits previously determined as the basis for the pro rata assessment for the repair of the drainage system for the repair proceeding only.

**History:** 1990 c 391 art 5 s 93; 2013 c 4 s 14



# APPENDIX C: MAPS AND EXHIBITS



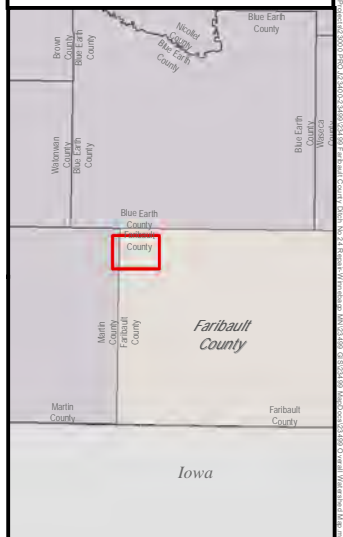


Faribault County,  
Minnesota  
Wednesday, December 18, 2019

**Legend**

- Open Ditch
- Existing Tile
- Grass Waterway
- Repair Area
- CD 24 Watershed
- JCD 201 Watershed
- Public Watercourse

0 500 1,000 2,000 Feet  
1 inch = 2,083 feet







Watershed  
Map  
County Ditch No. 24  
Faribault County,  
Minnesota  
Wednesday, December 18, 2019

- Legend**
- Open Ditch
  - Existing Tile
  - Grass Waterway
  - Repair Area
  - Watershed
  - Public Watercourse

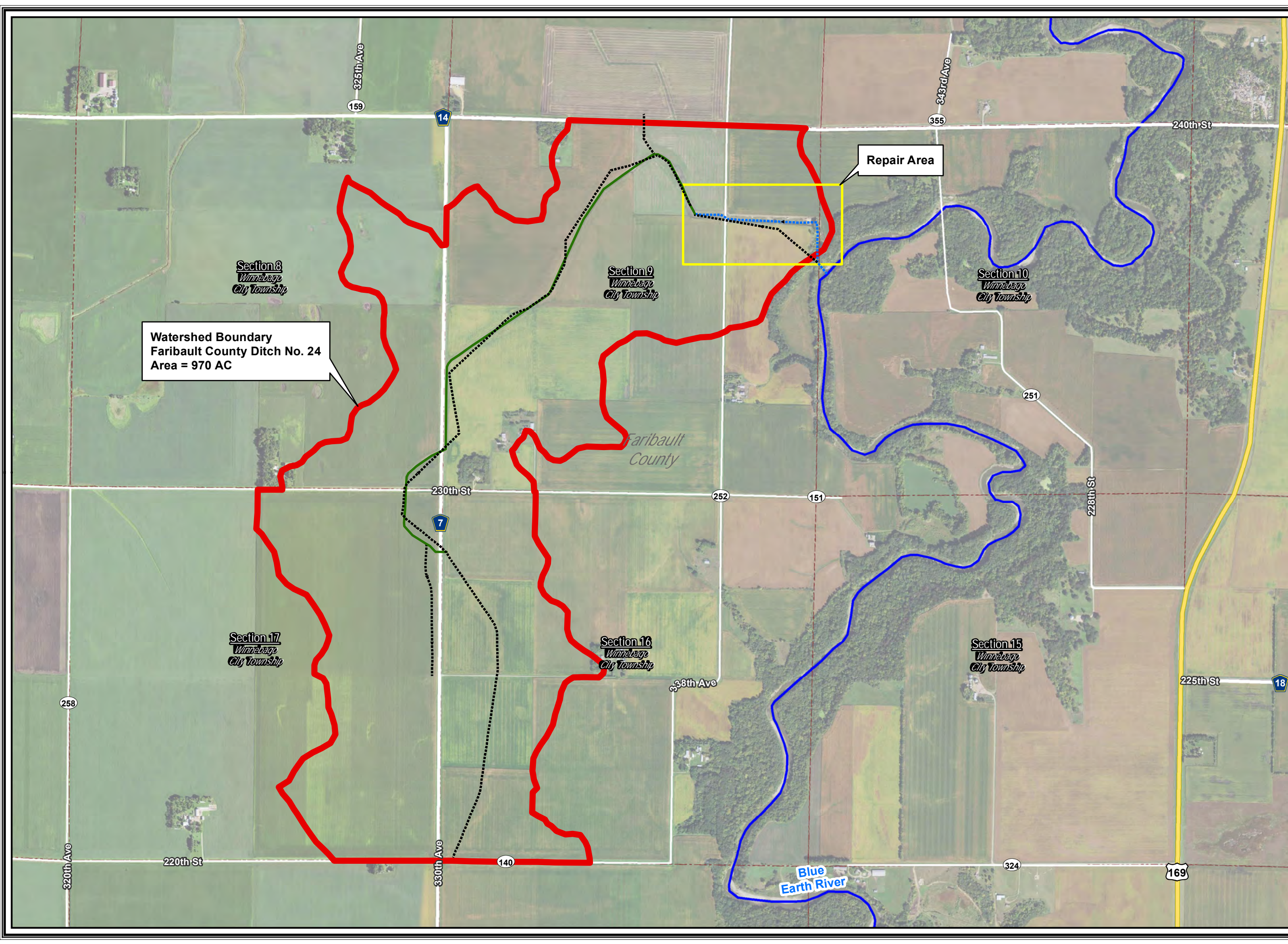
PN: 19-23499

Source:

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



0 312.5 625 1,250 Feet  
1 inch = 1,250 feet







Slough  
Locations  
County Ditch No. 24  
Faribault County,  
Minnesota  
Thursday, June 10, 2021

Legend

- OPEN CHANNEL
- Sloughs Repairs
- Slough
- Faribault Parcels

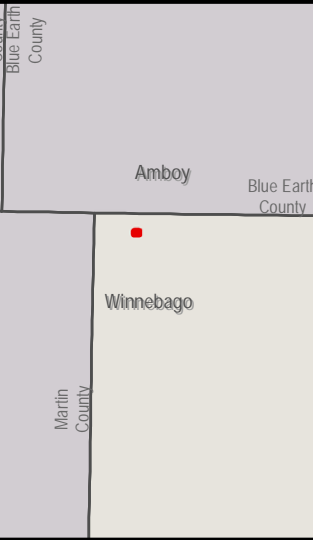
PN: 16-19087

Source:

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



0 25 50 100 Feet  
1 inch = 125 feet



CARLSON,  
CHARLES

JOHANSON,  
DOUGLAS L

JOHANSON,  
DOUGLAS L

JOHANSON,  
DOUGLAS L

COLE,LYNN

338th Ave

252

Slough #2

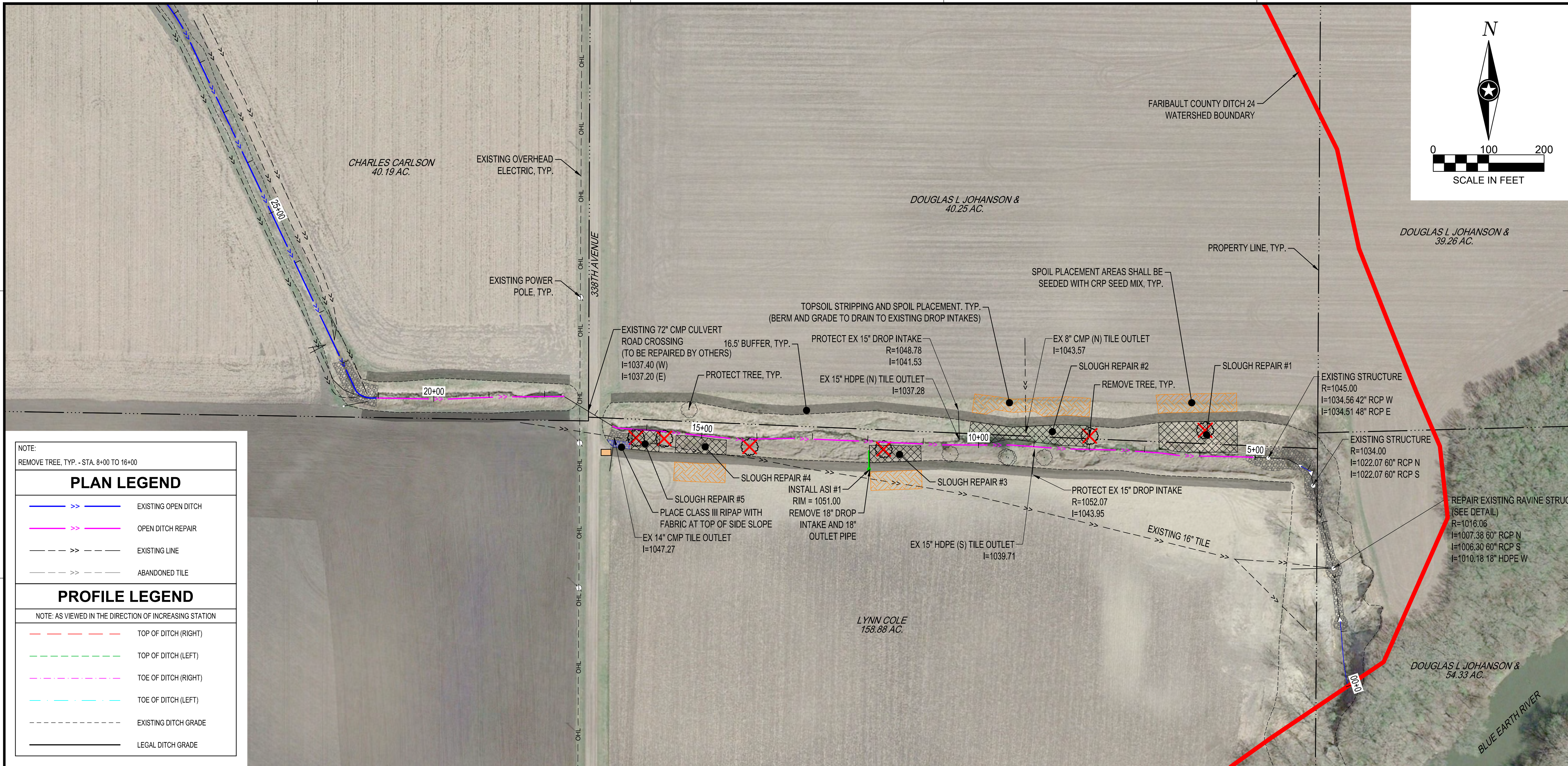
Slough #1

Slough #5

Slough #4

Slough #3





NOTE:  
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NOT APPEAR IN COLOR, THIS IS NOT AN  
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MISINTERPRETATION.

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.

**PRELIMINARY NOT  
FOR CONSTRUCTION**

DATE: \_\_\_\_\_ LIC. NO. \_\_\_\_\_

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WITHOUT PRIOR WRITTEN CONSENT.

PROJECT

## FARIBAULT COUNTY DITCH 24 REPAIR

FARIBAULT COUNTY MINNESOTA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	19-23499
FILE NAME	23499 PROJ (MAIN) - 1 42 INCH PIPE
DRAWN BY	SMW
DESIGNED BY	SMW/ MAO
REVIEWED BY	MAO
ORIGINAL ISSUE DATE	11/1/2019
CLIENT PROJECT NO.	-

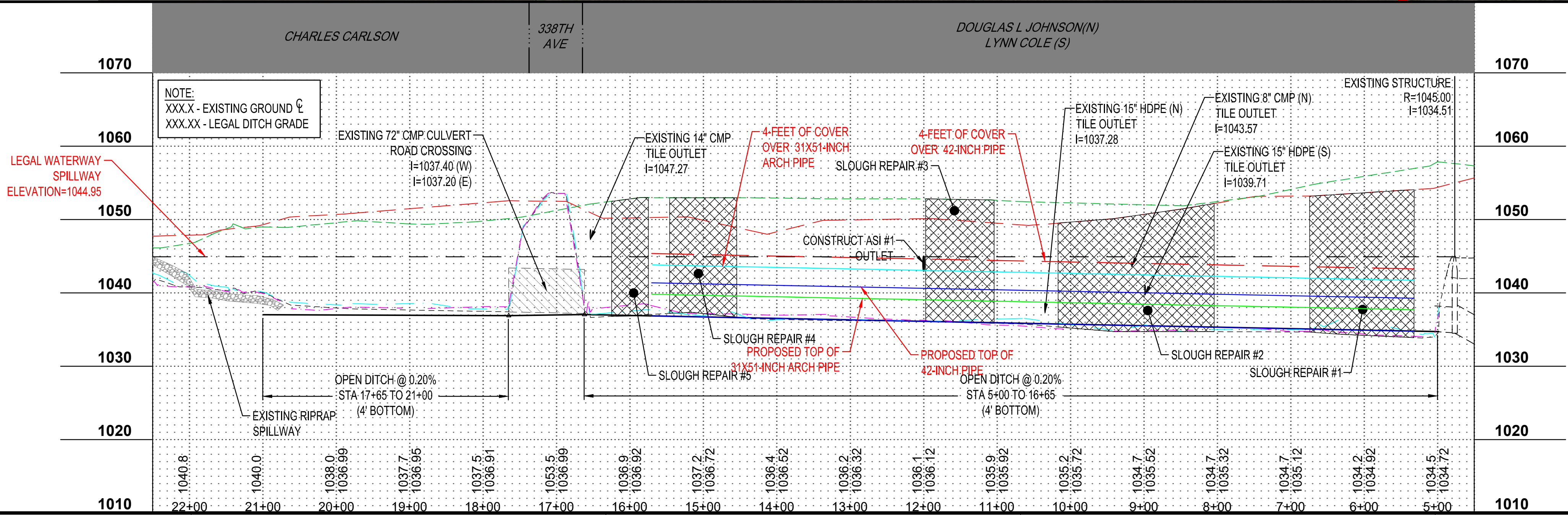
TITLE

## MAINLINE OPEN DITCH PROFILE

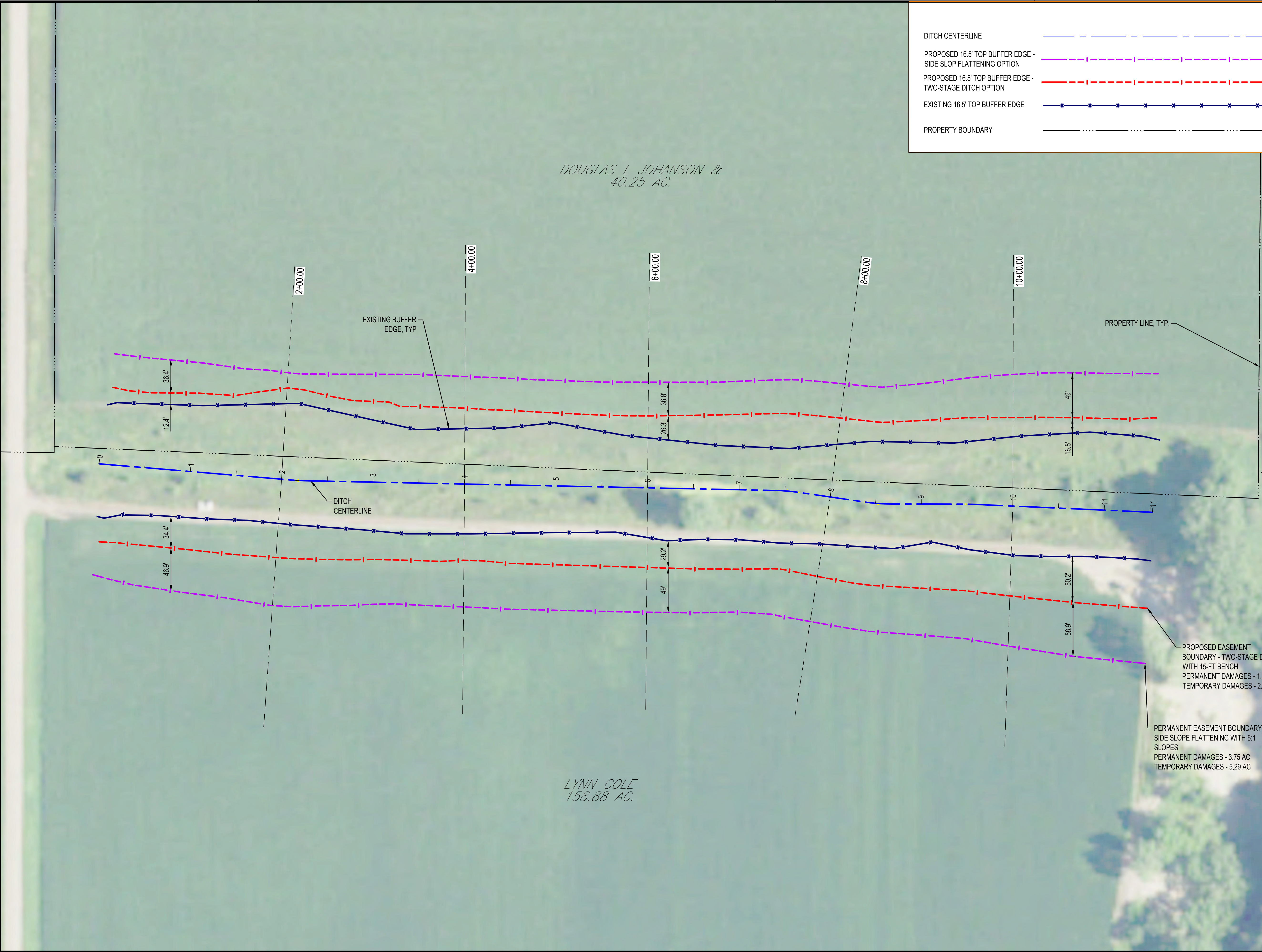
SHEET

6

OF 27







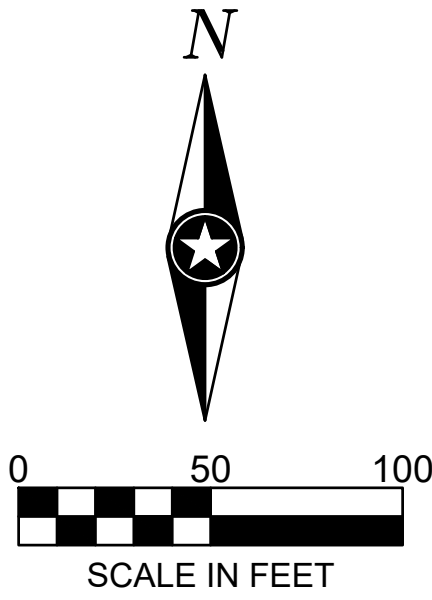
DITCH CENTERLINE

PROPOSED 16.5' TOP BUFFER EDGE -  
SIDE SLOP FLATTENING OPTION

PROPOSED 16.5' TOP BUFFER EDGE -  
TWO-STAGE DITCH OPTION

EXISTING 16.5' TOP BUFFER EDGE

PROPERTY BOUNDARY



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PROJECT

**FARIBAULT  
COUNTY DITCH NO.  
OVERALL  
WIDENING**

WINNEBAGO MINNESOTA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

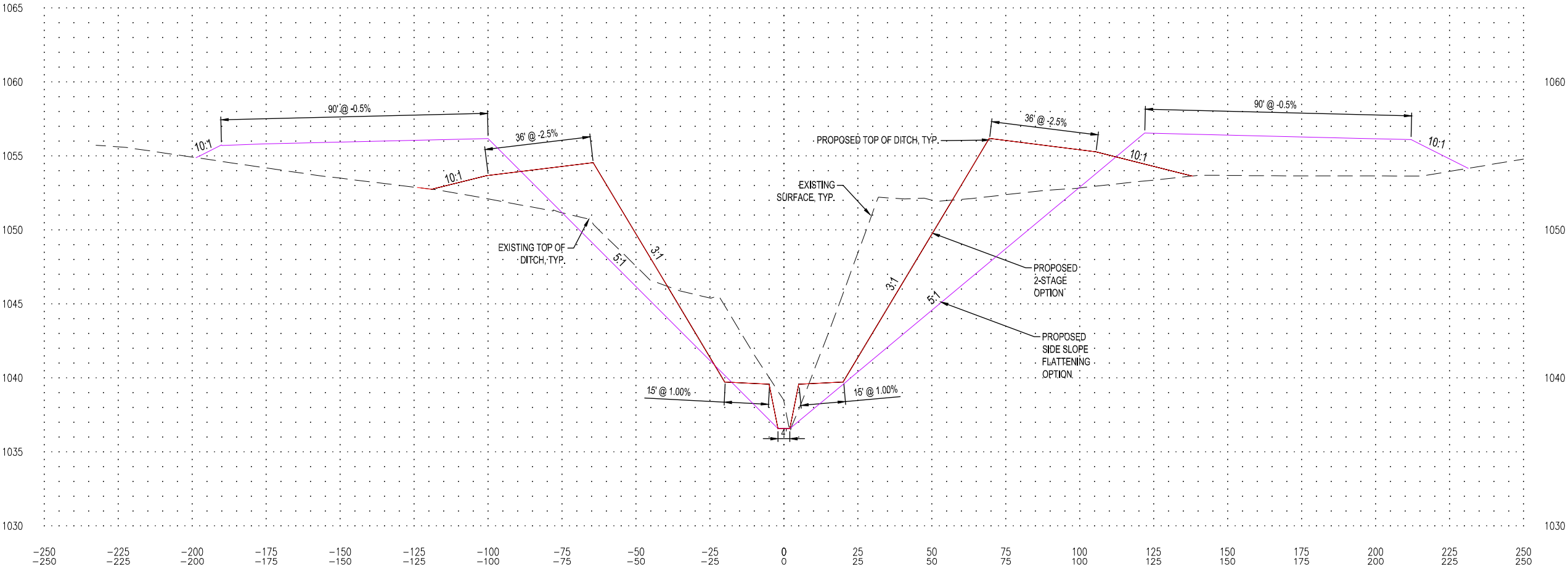
PROJECT NO.	PROJ. NO.
CAD FILE NAME	14012 ERODED DITCH TWO STAGE CORRIDOR LESS SLOPE
DRAWN BY	-
DESIGNED BY	-
REVIEWED BY	-
ORIGINAL ISSUE DATE	--/--
CLIENT PROJECT NO.	-

TITLE

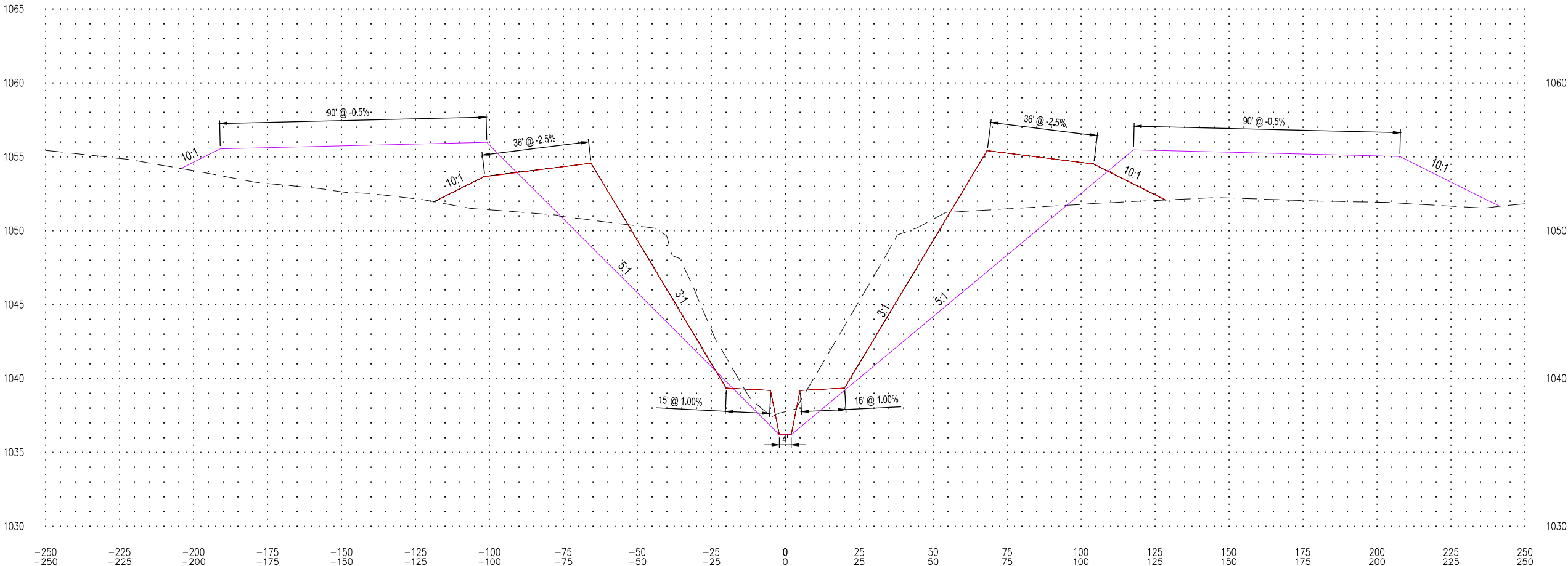
**LOCATION MAP**



2+00.00



4+00.00



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PROJECT  
**FARIBAUT COUNTY DITCH NO. 24 TWO STAGE DITCH (LESS STEEP)**

WINNEBAGO MINNESOTA

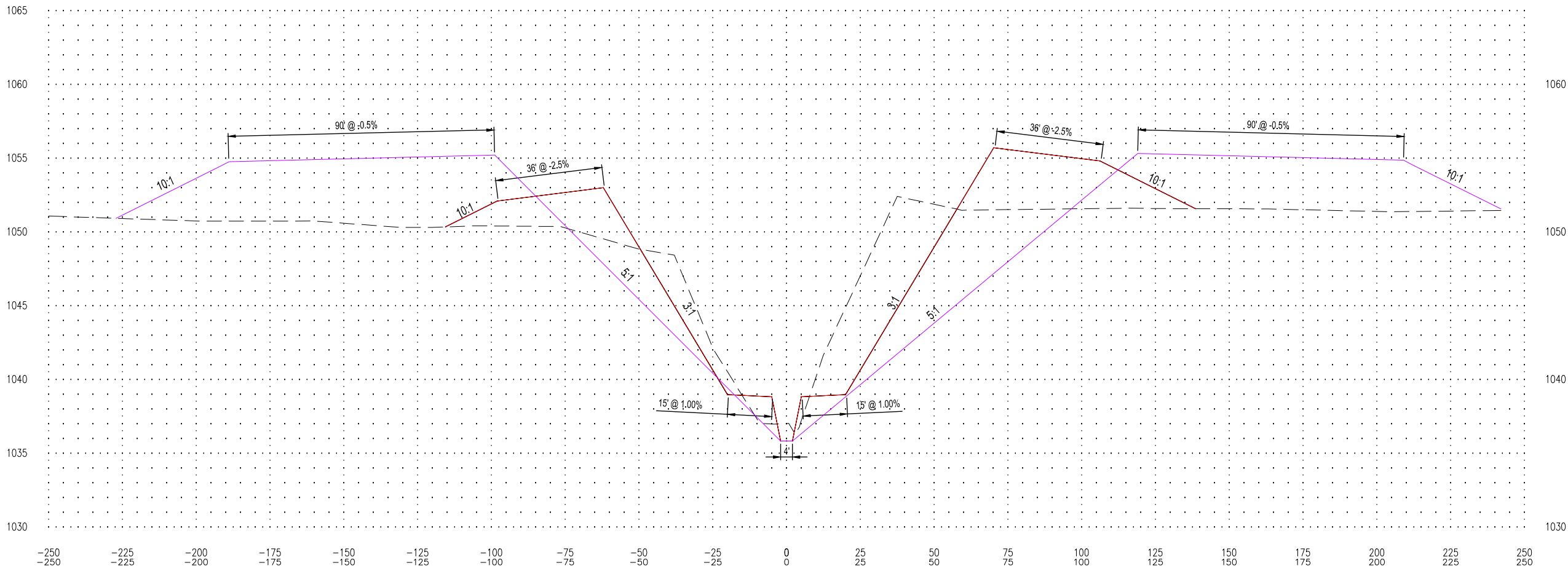
REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	14012
CAD FILE NAME	14012 ERODED DITCH TWO STAGE CORRIDOR LESS SLOPE
DRAWN BY	-
DESIGNED BY	-
REVIEWED BY	-
ORIGINAL ISSUE DATE	-/-/-
CLIENT PROJECT NO.	-

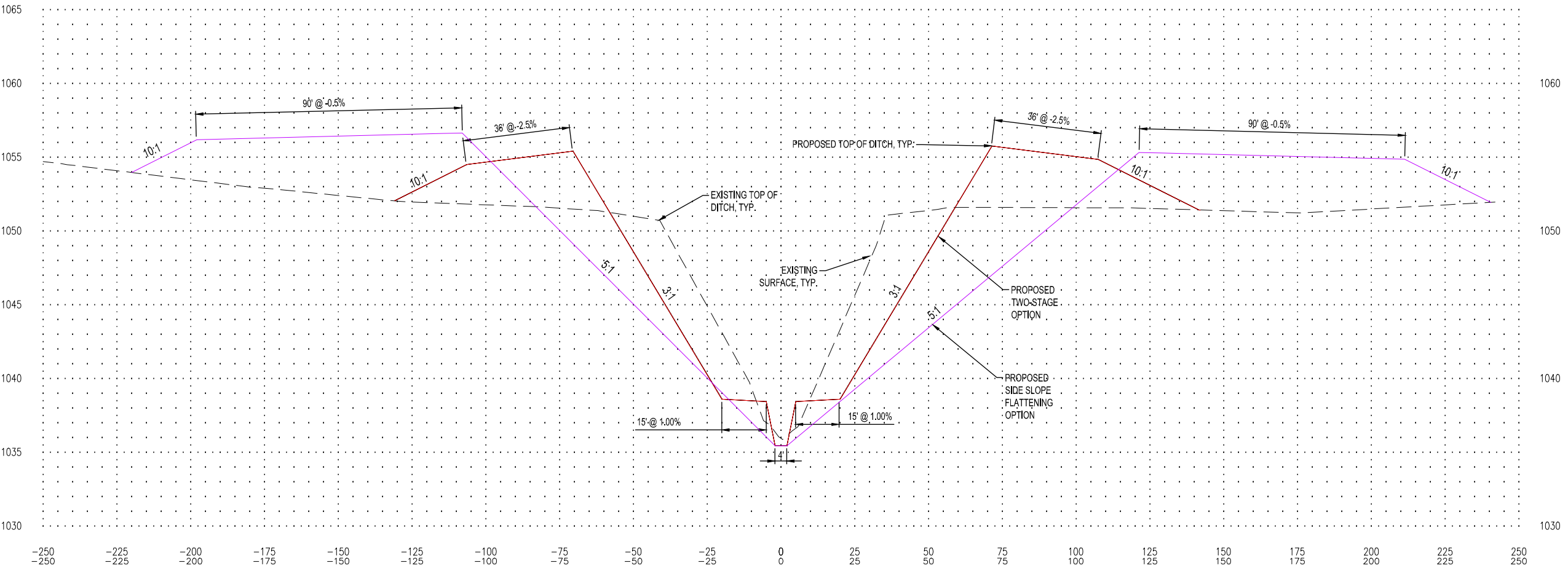
TITLE  
**CROSS SECTIONS**



6+00.00



8+00.00



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PROJECT  
**FARIBAUT COUNTY DITCH NO. 24 TWO STAGE DITCH (LESS STEEP)**

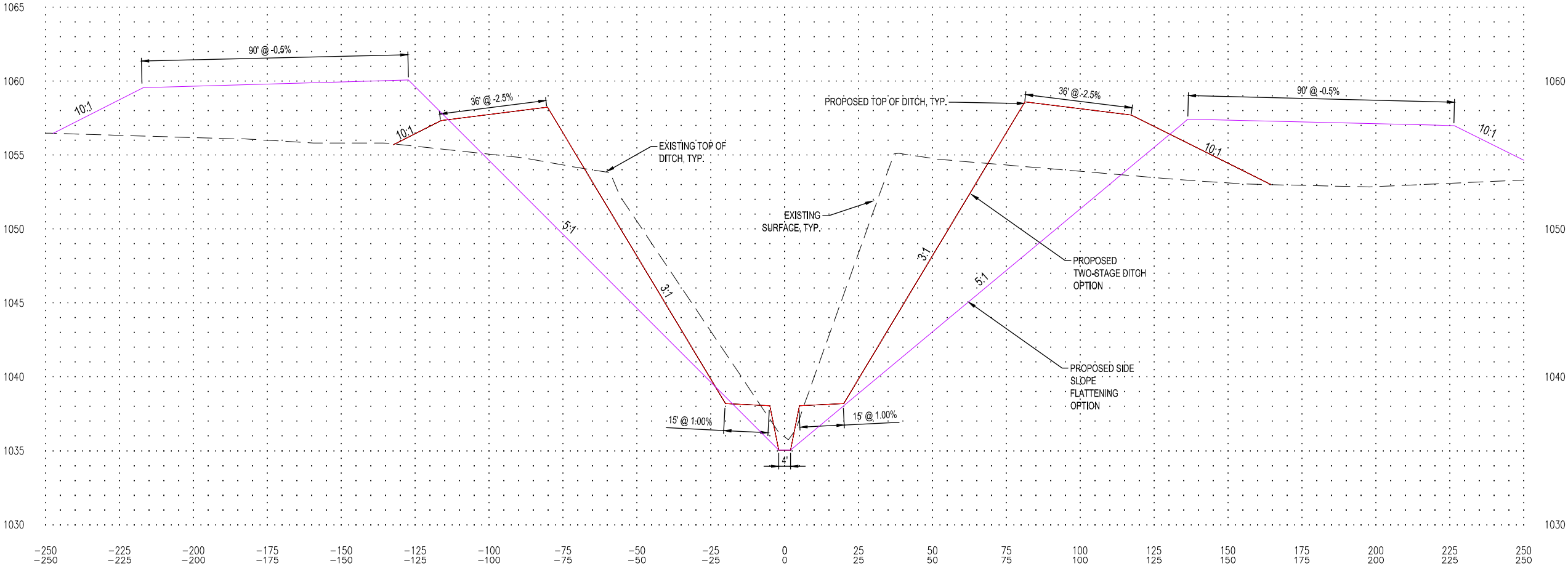
WINNEBAGO MINNESOTA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	14012
CAD FILE NAME	14012 ERODED DITCH TWO STAGE CORRIDOR LESS SLOPE
DRAWN BY	-
DESIGNED BY	-
REVIEWED BY	-
ORIGINAL ISSUE DATE	-/-/-
CLIENT PROJECT NO.	-

TITLE  
**CROSS SECTIONS**

10+00.00



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PROJECT  
**FARIBAUT  
COUNTY DITCH NO.  
24 TWO STAGE  
DITCH (LESS  
STEEP)**

WINNEBAGO MINNESOTA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	14012
CAD FILE NAME	14012 ERODED DITCH TWO STAGE CORRIDOR LESS SLOPE
DRAWN BY	-
DESIGNED BY	-
REVIEWED BY	-
ORIGINAL ISSUE DATE	-/-/-
CLIENT PROJECT NO.	-

TITLE  
**CROSS SECTIONS**



# APPENDIX D: COST ESTIMATES

**FARIBAULT COUNTY  
COUNTY DITCH No. 24**



**COST ESTIMATE SUMMARY**

Repair Option	Estimated Cost
PETITIONED REPAIR	\$ 126,105
OPTION 1: 5:1 SIDE SLOPES	\$ 324,591
OPTION 2: TWO-STAGE DITCH	\$ 206,906
OPTION 3: 31" X 51" ARCH PIPE	\$ 431,871
OPTION 3A: 42" RCP PIPE	\$ 345,824
OPTION 3B: 42" DUAL WALL PIPE	\$ 244,086





**REPAIR COST ESTIMATE**

**Slough #1**

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 1,000.00	\$ 1,000
102	COMMON EXCAVATION	CY	554	\$ 8.00	\$ 4,432
103	CLASS III RIPRAP WITH GEOTEXTILE FABRIC	CY	43	\$ 80.00	\$ 3,437
104	TOP SOIL STRIP & PLACE SPOILS	SY	540	\$ 1.00	\$ 540
105	16.5' BUFFER STRIP SEEDING (SEED MIX: BUFFER BLEND WITH TYPE 3 MULCH)	SY	266	\$ 3.50	\$ 930
106	STANDARD SIDESLOPE & BENCH SEEDING (SEED MIX: BUFFER BLEND WITH Mn DOT CATEGORY 4 EROSION CONTROL BLANKET)	SY	856	\$ 3.75	\$ 3,211
<b>TOTAL</b>					<b>\$ 13,600</b>
10% UNFORSEEN					\$ 1,360
<b>SUBTOTAL</b>					<b>\$ 14,960</b>
TEMPORARY DAMAGES		AC	0.11	\$ 650.00	\$ 72
<b>TOTAL SLOUGH #1 REPAIR COST</b>					<b>\$ 15,032</b>

**Slough #2**

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 1,000.00	\$ 1,000
102	COMMON EXCAVATION	CY	789	\$ 8.00	\$ 6,312
103	CLASS III RIPRAP WITH GEOTEXTILE FABRIC	CY	48	\$ 80.00	\$ 3,822
104	TOP SOIL STRIP & PLACE SPOILS	SY	800	\$ 1.00	\$ 800
105	16.5' BUFFER STRIP SEEDING (SEED MIX: BUFFER BLEND WITH TYPE 3 MULCH)	SY	394	\$ 3.50	\$ 1,380
106	STANDARD SIDESLOPE & BENCH SEEDING (SEED MIX: BUFFER BLEND WITH Mn DOT CATEGORY 4 EROSION CONTROL BLANKET)	SY	766	\$ 3.75	\$ 2,871
<b>TOTAL</b>					<b>\$ 16,200</b>
10% UNFORSEEN					\$ 1,620
<b>SUBTOTAL</b>					<b>\$ 17,820</b>
TEMPORARY DAMAGES		AC	0.17	\$ 650.00	\$ 107
<b>TOTAL SLOUGH #2 REPAIR COST</b>					<b>\$ 17,927</b>

**Slough #3**

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 1,000.00	\$ 1,000
102	COMMON EXCAVATION	CY	252	\$ 8.00	\$ 2,016
103	CLASS III RIPRAP WITH GEOTEXTILE FABRIC	CY	21	\$ 80.00	\$ 1,689
104	TOP SOIL STRIP & PLACE SPOILS	SY	354	\$ 1.00	\$ 354
105	16.5' BUFFER STRIP SEEDING (SEED MIX: BUFFER BLEND WITH TYPE 3 MULCH)	SY	174	\$ 3.50	\$ 610
106	STANDARD SIDESLOPE & BENCH SEEDING (SEED MIX: BUFFER BLEND WITH Mn DOT CATEGORY 4 EROSION CONTROL BLANKET)	SY	234	\$ 3.75	\$ 878
<b>TOTAL</b>					<b>\$ 6,600</b>
10% UNFORSEEN					\$ 660
<b>SUBTOTAL</b>					<b>\$ 7,260</b>
TEMPORARY DAMAGES		AC	0.07	\$ 650.00	\$ 47
<b>TOTAL SLOUGH #3 REPAIR COST</b>					<b>\$ 7,307</b>





**REPAIR COST ESTIMATE**  
**Slough #4**

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 1,000.00	\$ 1,000
102	COMMON EXCAVATION	CY	216	\$ 8.00	\$ 1,728
103	CLASS III RIPRAP WITH GEOTEXTILE FABRIC	CY	32	\$ 80.00	\$ 2,533
104	INSTALL 24-INCH ASI RISER ASSEMBLY W/TRASH GRATE	EA	1	\$ 1,529.70	\$ 1,530
105	INSTALL 24-INCH ASI OUTLET ASSEMBLY	EA	1	\$ 1,362.10	\$ 1,362
106	REMOVE EXISTING SIDE INTAKE	EA	1	\$ 250.00	\$ 250
107	TOP SOIL STRIP & PLACE SPOILS	SY	354	\$ 1.00	\$ 354
108	16.5' BUFFER STRIP SEEDING (SEED MIX: BUFFER BLEND WITH TYPE 3 MULCH)	SY	174	\$ 3.50	\$ 610
109	STANDARD SIDESLOPE & BENCH SEEDING (SEED MIX: BUFFER BLEND WITH Mn DOT CATEGORY 4 EROSION CONTROL BLANKET)	SY	195	\$ 3.75	\$ 731
<b>TOTAL</b>					<b>\$ 10,100</b>
10% UNFORSEEN					\$ 1,010
<b>SUBTOTAL</b>					<b>\$ 11,110</b>
TEMPORARY DAMAGES		AC	0.07	\$ 650.00	\$ 47
<b>TOTAL SLOUGH #4 REPAIR COST</b>					<b>\$ 11,157</b>

**Slough #5**

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 1,000.00	\$ 1,000
102	CLASS III RIPRAP WITH GEOTEXTILE FABRIC	CY	50	\$ 80.00	\$ 3,970
103	STANDARD SIDESLOPE & BENCH SEEDING (SEED MIX: BUFFER BLEND WITH Mn DOT CATEGORY 4 EROSION CONTROL BLANKET)	SY	56	\$ 3.75	\$ 208
<b>TOTAL</b>					<b>\$ 5,200</b>
10% UNFORSEEN					\$ 520
<b>SUBTOTAL</b>					<b>\$ 5,720</b>
TEMPORARY DAMAGES		AC	0.00	\$ 650.00	\$ -
<b>TOTAL SLOUGH #5 REPAIR COST</b>					<b>\$ 5,720</b>

**Tree Removals**

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 1,000.00	\$ 1,000
102	CLEAR AND GRUB TREE (OVER 6")	EA	6	\$ 417.70	\$ 2,506
<b>TOTAL</b>					<b>\$ 3,600</b>
10% UNFORSEEN					\$ 360
<b>SUBTOTAL</b>					<b>\$ 3,960</b>

**TOTAL REPAIR COST**

Slough #1	\$ 15,032
Slough #2	\$ 17,927
Slough #3	\$ 7,307
Slough #4	\$ 11,157
Slough #5	\$ 5,720
Tree Removals	\$ 3,960

COUNTY ADMINISTRATION COSTS	\$ 5,500
TOPOGRAPHIC SURVEY	\$ 9,500
REPORTS, PLANS AND SPECIFICATIONS	\$ 26,500
CONSTRUCTION STAKING AND ADMINISTRATION	\$ 23,500
<b>COMPLETE REPAIR COST</b>	<b>\$ 126,105</b>





**Proposed 5:1 Side Slope Flattening**

**5:1 FLATTENED SIDE SLOPES**

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 10,000.00	\$ 10,000
102	COMMON EXCAVATION	CY	35027	\$ 3.00	\$ 105,081
103	TOP SOIL STRIP & PLACE SPOILS	AC	9.0	\$ 5,250.00	\$ 47,457
104	16.5' BUFFER STRIP SEEDING (SEED MIX: BUFFER BLEND WITH TYPE 3 MULCH)	AC	0.9	\$ 3,450.00	\$ 3,040
105	STANDARD SIDESLOPE SEEDING (SEED MIX: BUFFER BLEND WITH TYPE 8 MULCH)	AC	3.7	\$ 3,450.40	\$ 12,770
106	INSTALL 24-INCH ASI RISER ASSEMBLY W/TRASH GRATE	EA	6	\$ 1,529.70	\$ 9,180
107	INSTALL 24-INCH ASI OUTLET ASSEMBLY	EA	6	\$ 1,362.10	\$ 8,180
108	TREE REMOVALS	LS	1	\$ 3,960.00	\$ 3,960
<b>TOTAL</b>					<b>\$ 199,668</b>
10% UNFORSEEN					\$ 19,970
<b>SUBTOTAL</b>					<b>\$ 219,638</b>
TEMPORARY DAMAGES		AC	5.29	\$ 650.00	\$ 3,450
LAND ACQUISITION/ PERMANENT DAMAGES		AC	3.75	\$ 7,500.00	\$ 28,100
COUNTY ADMINISTRATION COSTS					\$ 10,982
TOPOGRAPHIC SURVEY					\$ 2,100
REPORTS, PLANS AND SPECIFICATIONS					\$ 27,268
CONSTRUCTION STAKING & ADMINISTRATION					\$ 33,053
<b>TOTAL 5:1 FLATTENED SIDE SLOPES REPAIR COST</b>					<b>\$ 324,591</b>





**Proposed Two Stage Ditch Option (15-ft Bench)**

**TWO-STAGE DITCH**

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 10,000.00	\$ 10,000
102	COMMON EXCAVATION	CY	16796	\$ 3.00	\$ 50,387
103	TOP SOIL STRIP & PLACE SPOILS	AC	4.25	\$ 5,250.00	\$ 22,313
104	16.5' BUFFER STRIP SEEDING (SEED MIX: BUFFER BLEND WITH TYPE 3 MULCH)	AC	0.88	\$ 3,450.00	\$ 3,040
105	STANDARD SIDESLOPE SEEDING (SEED MIX: BUFFER BLEND WITH TYPE 8 MULCH)	AC	3.9	\$ 3,450.40	\$ 13,430
106	INSTALL 24-INCH ASI RISER ASSEMBLY W/TRASH GRATE	EA	6	\$ 1,529.70	\$ 9,180
107	INSTALL 24-INCH ASI OUTLET ASSEMBLY	EA	6	\$ 1,362.10	\$ 8,180
108	TREE REMOVALS	LS	1	\$ 3,960.00	\$ 3,960
<b>TOTAL</b>					<b>\$ 120,489</b>
10% UNFORSEEN					\$ 12,050
<b>SUBTOTAL</b>					<b>\$ 132,539</b>
TEMPORARY DAMAGES		AC	2.76	\$ 650.00	\$ 1,800
LAND ACQUISITION/ PERMANENT DAMAGES		AC	1.49	\$ 7,500.00	\$ 11,180
COUNTY ADMINISTRATION COSTS					\$ 6,627
TOPOGRAPHIC SURVEY					\$ 2,100
REPORTS, PLANS AND SPECIFICATIONS					\$ 27,429
CONSTRUCTION STAKING & ADMINISTRATION					\$ 25,231
<b>TOTAL TWO-STAGE DITCH REPAIR COST</b>					<b>\$ 206,906</b>





**Proposed 31" x 51" Arch RCP Pipe Option**

**31-INCH X 51-INCH RCP ARCH PIPE AND WATERWAY**

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 14,820.00	\$ 14,820
102	31-INCH X 51-INCH ARCH RCP PIPE	LF	1040	\$ 255.00	\$ 265,200
103	31-INCH X 51-INCH ARCH RCP PIPE APRON	EA	2	\$ 2,650.00	\$ 5,300
104	FILL OPEN DITCH	CY	4160	\$ 2.00	\$ 8,320
105	GRANULAR PIPE FOUNDATION	CY	241	\$ 21.60	\$ 5,200
106	CONNECT EXISTING TILE (SIZE & MATERIAL MAY VARY)	EA	5	\$ 500.00	\$ 2,500
107	CLASS III RIPRAP WITH GEOTEXTILE FABRIC	CY	150	\$ 65.80	\$ 9,870
108	WATERWAY SEEDING (SEED MIX: BUFFER BLEND WITH TYPE 8 MULCH)	AC	3.1	\$ 3,450.40	\$ 10,806
109	SLOUGH #5 REPAIR	LS	1	\$ 5,720.00	\$ 5,720
110	TREE REMOVALS	LS	1	\$ 3,960.00	\$ 3,960
<b>TOTAL</b>					<b>\$ 331,696</b>
10% UNFORSEEN					\$ 33,170
<b>SUBTOTAL</b>					<b>\$ 364,866</b>
TEMPORARY DAMAGES		AC	1.36	\$ 650.00	\$ 890
LAND ACQUISITION/ PERMANENT DAMAGES		AC	0.00	\$ 7,500.00	\$ -
COUNTY ADMINISTRATION COSTS					\$ 4,244
TOPOGRAPHIC SURVEY					\$ 3,100
REPORTS, PLANS AND SPECIFICATIONS					\$ 26,838
CONSTRUCTION STAKING & ADMINISTRATION					\$ 31,933
<b>TOTAL 31-INCH X 51-INCH RCP ARCH PIPE AND WATERWAY REPAIR COST</b>					<b>\$ 431,871</b>





**Proposed 42" RCP Pipe Option**

**42-INCH RCP PIPE AND WATERWAY**

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 11,130.00	\$ 11,130
102	42-INCH CLASS III RCP PIPE	LF	1040	\$ 185.00	\$ 192,400
103	42-INCH RCP APRON	EA	2	\$ 2,185.00	\$ 4,370
104	FILL OPEN DITCH	CY	4160	\$ 2.00	\$ 8,320
105	GRANULAR PIPE FOUNDATION	CY	231	\$ 21.60	\$ 4,992
106	CONNECT EXISTING TILE (SIZE & MATERIAL MAY VARY)	EA	5	\$ 500.00	\$ 2,500
107	CLASS III RIPRAP WITH GEOTEXTILE FABRIC	CY	150	\$ 65.80	\$ 9,870
108	WATERWAY SEEDING (SEED MIX: BUFFER BLEND WITH TYPE 8 MULCH)	AC	3.1	\$ 3,450.40	\$ 10,806
109	SLOUGH #5 REPAIR	LS	1	\$ 5,720.00	\$ 5,720
110	TREE REMOVALS	LS	1	\$ 3,960.00	\$ 3,960
<b>TOTAL</b>					<b>\$ 254,068</b>
10% UNFORSEEN					\$ 25,407
<b>SUBTOTAL</b>					<b>\$ 279,475</b>
TEMPORARY DAMAGES		AC	1.36	\$ 650.00	\$ 890
LAND ACQUISITION/ PERMANENT DAMAGES		AC	0.00	\$ 7,500.00	\$ -
COUNTY ADMINISTRATION COSTS					\$ 3,974
TOPOGRAPHIC SURVEY					\$ 3,100
REPORTS, PLANS AND SPECIFICATIONS					\$ 27,053
CONSTRUCTION STAKING & ADMINISTRATION					\$ 31,332
<b>TOTAL 42-INCH RCP PIPE AND WATERWAY REPAIR COST</b>					<b>\$ 345,824</b>





**Proposed 42" Dual Wall HDPE Pipe Option**

**42-INCH HDPE AND WATERWAY**

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 6,750.00	\$ 6,750
102	42-INCH AGRICULTURAL TILE	LF	1100	\$ 100.00	\$ 110,000
103	42-INCH RCP APRON	EA	2	\$ 2,185.00	\$ 4,370
104	FILL OPEN DITCH	CY	4400	\$ 2.00	\$ 8,800
105	GRANULAR PIPE FOUNDATION	CY	278	\$ 21.60	\$ 6,005
106	CONNECT EXISTING TILE (SIZE & MATERIAL MAY VARY)	EA	5	\$ 500.00	\$ 2,500
107	CLASS III RIPRAP WITH GEOTEXTILE FABRIC	CY	50	\$ 65.80	\$ 3,290
108	WATERWAY SEEDING (SEED MIX: BUFFER BLEND WITH TYPE 8 MULCH)	AC	3.1	\$ 3,450.40	\$ 10,806
109	SLOUGH #5 REPAIR	LS	1	\$ 5,720.00	\$ 5,720
110	TREE REMOVALS	LS	1	\$ 3,960.00	\$ 3,960
<b>TOTAL</b>					<b>\$ 162,201</b>
10% UNFORSEEN					\$ 16,220
<b>SUBTOTAL</b>					<b>\$ 178,421</b>
TEMPORARY DAMAGES		AC	1.36	\$ 650.00	\$ 890
LAND ACQUISITION/ PERMANENT DAMAGES		AC	0.00	\$ 7,500.00	\$ -
COUNTY ADMINISTRATION COSTS					\$ 3,922
TOPOGRAPHIC SURVEY					\$ 3,100
REPORTS, PLANS AND SPECIFICATIONS					\$ 27,058
CONSTRUCTION STAKING & ADMINISTRATION					\$ 30,695
<b>TOTAL 42-INCH HDPE AND WATERWAY REPAIR COST</b>					<b>\$ 244,086</b>