

Preliminary Engineer's Report

Judicial Ditch No. 4 Improvement

Faribault County and Martin County, Minnesota

Date: February 21st, 2020

ISG Project No.: 17-20105

REPORT FOR:
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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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Judicial Ditch No. 4 –Faribault and Martin County
Martin County and Faribault County, Minnesota

Engineer's Project Number: 17-20105

Dated this 21th day of February, 2020

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EXECUTIVE SUMMARY

A petition was submitted to the Joint Drainage Authority requesting an improvement to a portion of the Judicial Ditch No. 4 (JD 4) public drainage system. Judicial Ditch No. 4 has a watershed of approximately 2,770 acres consisting of gently rolling agricultural land. The system was constructed in 1914 with multiple improvements and repairs done since with the most recent being in 2016. ISG prepared a feasibility report for landowners within the drainage system which then progressed into meeting with the all landowners within the drainage system and Faribault County staff. Concluding the meetings, landowners and county, agreed that there was a general concern with the system's ability to drain portions of the watershed due to tile capacity issues along with failing tile issues specifically along the mainline tile. Landowners also stated that the western portion of the system that is drained by Branch B ditch is operating adequately and is not in need of repair or an improvement at this time. A petition for an improvement along the mainline tile was then prepared to address the major failing tile issues along the mainline tile.

The 20-inch mainline tile that was petitioned to improve had an originally designed drainage coefficient of 0.05 in/day. Shortly after original construction, a 20-inch supplemental mainline tile was constructed to take relief off the mainline from Branch E. This improved the mainline tile capacity to 0.08 in/day. The supplemental main which drains portions of Branch E had an original drainage coefficient of 0.07 in/day and was improved to 0.22 in/day.

The proposed projects extents focus on the Main ditch and the mainline tile, with the proposal including to deepen approximately 1,800 LF of ditch and install approximately 6,455 LF of tile ranging from 42-inch to 36-inch tile generally following the existing main tile alignment. This will improve the drainage coefficient to 0.50 in/day for all areas upstream of the mainline tile. The tile will be sized to drain the mainline, supplementary mainline, Branch E, and the supplementary Branch E tiles. A storage pond is recommended and suggested to be located between CSAH 16 and the railroad tracks in the SW $\frac{1}{4}$ of the NE $\frac{1}{4}$ of Section 7 in Jo Daviess Township. At this location, the pond is most cost effect to offset increased peak flows from the improved mainline tile. Other options can be explored in the future for storage based on landowner input.

There are two alternative options for improvement that differ in how to accomplish minimizing increased flows at the outlet of the system while not backing up water in the mainline tile upstream. Option 1 design includes installing a 3 acre pond with a 42-inch tile outlet and Option 2 includes installing a 4 acre pond with a 36-inch tile outlet in order to achieve these parameters.

The preliminary estimated construction cost for Faribault- Martin Joint County Judicial Ditch No. 4 Improvement option 1 to deepen the main ditch is approximately \$76,223 and \$725,194 to improve the Main tile. The storage basin is approximately \$411,445 to purchase the property, excavate the pond, and grade out the pond spoils. The preliminary estimated construction cost for Option 2 Improvement is approximately \$76,223 to deepen the open ditch and \$687,336 to improve the Main tile. The storage basin is approximately \$544,207 to purchase the property, excavate the pond, and grade out the pond spoils. The total project cost for Option 1 and Option 2 is approximately \$1,262,839 and \$1,351,702 respectively.

PETITION + ORDER

Petition Summary

A Petition was received by the Faribault County Auditor on behalf of the Faribault County and Martin County Joint Board on May 1, 2020. The petitioners requested that Faribault and Martin County Joint Judicial Ditch No. 4 be improved, specifically the mainline tile from its outfall into the JD 4 open ditch, upstream to CSAH 1. A copy of the Petition including a map is in Appendix B.

Order Summary

On 5/21/2020 the Faribault County and Martin County Joint Board Joint Board, in regular session, made an Order related to the Petition in which it appointed ISG the engineer for the project. It did not order anything beyond what was stated in the Petition. A copy of the signed Order has been placed in Appendix B.

SYSTEM WATERSHED

Location

Judicial Ditch No. 4 is located in Sections 5-9, 17, and 18 of Jo Daviess Township in Faribault County and Sections 1, 12, and 13 in Pleasant Prairie Township in Martin County. The main ditch runs generally SE from its end in Section 7 of Jo Daviess Township to its outlet, Judicial Ditch No. 2 (Martin-Faribault) in the NW $\frac{1}{4}$ of the NE $\frac{1}{4}$ of Section 18 of Jo Daviess Township in Martin County. According to the historical DNR Public Waters Inventory Map, the DNR Buffer Map, and the GIS version of the Public Waters Inventory Map, neither JD 4 nor JD 2 have public water status.

The State of Minnesota owns approximately 268 acres throughout the eastern half of the watershed. There are also approximately 165 acres of land in the Board of Water and Soil Resources (BWSR) Reinvest in Minnesota (RIM) easement program. See Public Waters, Public and Conservation Lands Map in Appendix C. All of this land is located outside of the project boundary.

Watershed Description

The JD 4 System drains 2,770 acres characterized by a gently rolling agricultural landscape and an elevation difference of approximately 46 feet. According to the National Wetland Inventory, JD 4 has multiple wetlands within its watershed. While the project boundaries will not directly impact any wetlands, the proposed improvement includes increasing the drainage capacity of the public tile just west of DNR property which will provide an overall better outlet. However, wetland impacts are still dependent on the tile capacity in those areas.

The predominant hydrologic soil type in the system's watershed is type "C/D", according to the Natural Resources Conservation Service (NCRS) Web Soil Survey. This classification "C" represents the drained condition with type "D" represents the undrained condition. The soils consist of silty clay loam soils that, when adequately drained, are prime for farmland.

See Appendix C for maps depicting the watershed's location, digital elevation, land use, hydrologic soils, unified soil classification, and Level 1 Wetland Delineation.

HISTORY

Original System

According to materials supplied by Faribault and Martin County, Judicial Ditch No. 4 was established on 1912, with construction in 1914. The JD 4 system originally was an all tile system consisting of approximately 80,850 feet of mainline and branch tile ranging in size from 6 to 20-inches.

Subsequent Proceedings

ESTABLISHMENTS AND IMPROVEMENTS

In 1917 a portion of the mainline was improved from tile to open ditch. This improvement replaced approximately 1,800 linear feet of 20-inch tile along the mainline tile upstream from its outfall into JD 2. The ditch had a 4-foot bottom width, with 1.5:1 side slopes and the 20-inch tile was removed and reinstalled as the supplemental mainline. A portion of both Branch B and Branch B.1 tile was also replaced with ditch. The Branch B improvement replaced tile from its outlet into the main ditch, upstream approximately 2,230 linear feet to the junction with the Branch B.1 alignment. The ditch then continued into the Branch B.1 alignment, upstream approximately 3,150 linear feet just east of the Martin and Faribault County border. This is the current outlet for the Branch B.1 tile into the Branch B.1 ditch. Branch B and Branch B.1 ditch had the same cross section design; a 4-foot bottom width and 1.5:1 side slopes. The tile along the main, Branch B, and Branch B.1 that was turned into ditch was salvaged and reinstalled next to the original mainline tile and Branch E tile. These tile branches were called Main Supplemental and Branch E Supplemental.

In 1955, Branch D was extended, along with the establishment of Branch D4 and D5 tile. Branch D was extended approximately 1,400 linear feet along US-16. Branch D4 Construction consisted of 750 linear feet of 6-inch tile and Branch D5 construction consisted of 550 linear feet of 6-inch tile.

REPAIRS

Maintenance records indicate that JD 4 was cleaned in 1952. The repair work consisted of cleaning the main ditch for its entire length (1,800 linear feet) at a slope of 0.08%. Branch B and Branch B.1 ditch were also cleaned at a slope of 0.06% as well as installing a 48-inch CMP field crossing at Station 32+00 along Branch B.1 ditch.

In 1960, an investigation was completed on the mainline tile and reveal significant deterioration of the mainline tile and an improvement was recommend by the engineer as the legal capacities would only provide a small relief of drainage. In 1966, a repair to replace the entire mainline tile consisting of installing approximately 14,900 linear feet of tile ranging from 20-inch to 8-inch was developed. However the repair was dismissed after it was determined that a replacement would provide little additional relief as the mainline tile is undersized to adequately drain the watershed.

In 2018, Branch K tile was repaired. This repair included rerouting Branch K, which originally traveled northeast from the NE $\frac{1}{4}$ of the SE $\frac{1}{4}$ in Section 7 of Jo Daviess Township to its outlet in the mainline tile in the SW $\frac{1}{4}$ of the SW $\frac{1}{4}$ in Section 5 of Jo Daviess Township. The reroute included installing 8-inch tile from the upstream end, directly west where it connected to the mainline tile in the NE $\frac{1}{4}$ of the NE $\frac{1}{4}$ in Section 7 of Jo Daviess Township. The capacities and elevations of Branch K were designed to match the original designed capacities however the depth of the tile altered as the alignment changed.

There have also been other tile repairs due to washouts and broken tile segments that did not require full repair plans.

EARLY COORDINATION

Prior to the Petition for the present drainage project a feasibility study was performed to determine what the potential costs could be as well as review the practicability of the conceptual design. Multiple meetings were held with landowners and Faribault County staff in attendance to discuss improvement options in the fall of 2018 and in the spring of 2019. The landowners agreed that the system contains tile that is old and deteriorating. They also stated that their main goal was to fix the most pressing issues now and move down the priority list later. The landowners used the information from the feasibility study to create the petition. ISG has also met with the DNR to review the wildlife management area in the watershed. It was decided to meet again once models were further developed to discuss potential outcomes of the project. DNR also discussed property that they own on JD 4 east of CSAH 1 in Faribault County outside the present project area and the potential to increase storage and add additional property to the wildlife management areas.

INVESTIGATION OF EXTERNAL SOURCES OF FUNDING AND TECHNICAL ASSISTANCE

Section 103E.015, Subd. 1a of the Drainage Code requires that an investigation of external sources of funding and technical assistance be conducted prior to the order approving the preliminary engineer's report or petitioned repair report. The funding can be used for wetland preservation or restoration or creation of water quality improvements, flood control, or alternative measures (per Section 103E.015, Subd. 1, clause (2)). The sources of funding authorized under this Section can be used outside the benefited area, but must be used in the watershed of the system.

An initial investigation of external sources of funding and technical assistance for JD 4 was conducted by ISG on behalf of the Faribault County and Martin County Joint Board. ISG has had preliminary meetings with both the Faribault Soil and Water Conservation District (SWCD) as well as the landowners in an effort to locate potential areas for implementation of storage, wetland restoration, and other multipurpose drainage management practices in the JD4 watershed. (See MDM plan and Map in Appendix D). The investigation of sources of external funds will continue as the project moves forward and will include BWSR MDM grants, the Greater Blue Earth River Basin Alliance, and other MDM grants.

PRESENT CONDITION OF SYSTEM BY OBSERVATION AND ANALYSIS

Present Condition of Drainage Infrastructure

The ditch's present condition was obtained using soil borings, a recent topo survey, and multiple site-observation visits. Table 1 was created based on the results of those efforts.

TABLE 1. OPEN DITCHES

Ditch Description	Location	ACSIC Cross Section	Existing Cross Section	Condition	Concerns
Main	Section 7 of Jo Daviess Township to Section 18 of Jo Daviess Township	Bot: 4'; Side Slopes: 1.5:1	Bot: 4'; Side Slopes: 1.5:1	Fair	Sediment accumulation, Vegetation, sloughing, gully erosion



Figure 1: Sediment in Main Ditch in the SW ¼ in Section 7 of Jo Daviess Township

Figures 2 and 3 show drone areas of the mainline tile petitioned for improvement. As shown, there are significant drowned out areas and flooding that occurs routinely with extended drain out periods.



Figure 2: Flooded Property along Main tile in the NE ¼ in Section 7 of Jo Daviess Township



Figure 3: Crop Damage along Main tile in the SE ¼ in Section 6 of Jo Daviess Township

Depicted in Figure 4 is a DNR Wildlife Management Area (Lake Guckeen) which has wetlands that are included in the National Wetland Inventory. There are two parcels of land on the south east side of the area shown that are in RIM easements managed by the Minnesota Board of Water and Soil Resources. The WMA has a second parcel that is in the very southeast portion of the JD 4 watershed. The mainline tile continues through these areas but it is failing east of CSAH 1. The deteriorated tile has led to significant standing water in the wetlands and to overtopping and flooding of roads. The DNR is aware of the current situation and has stated in discussion that they are in favor of the water as long as it does not harm neighbors. Future discussion with the DNR will occur as the project moves forward to analyze storage opportunities. See *Public Lands, Conservation Lands, Public Waters Map* in Appendix C



Figure 4: State of Minnesota WMA in the SW ¼, Section 5 of Jo Daviess Township

System Capacity

The present capacity was compared to the As Constructed or Subsequently Improved Condition (ACSIC), when both were known. The following tables summarize the hydraulic analysis of the Faribault County and Martin County Joint JD 4 in the As Constructed or Subsequently Improved Condition (ACSIC). The capacities listed in Table 2 reference the capacity of agricultural drainage which is expressed as a drainage coefficient (CD) and is defined as the depth of water over the entire area of the upstream watershed that a tile or ditch can drain in a 24-hour period (inches per day (in/day)). For a system like JD 4, drainage coefficients of 0.375 in/day to 0.50 in/day for tile are recommended for today's drainage needs.

TABLE 2. TILE CAPACITIES

Area	ACSIC Size (in)	ACSIC Slope (%)	Drainage Area (Acres)	ACSIC Drainage Coefficient (in/day)	From Sta.	To Sta.
Main Line	20	0.12%	1521.8	0.08	0+00	5+00
	20	0.04%	1378.5	0.05	19+00	26+75
	18	0.11%	905.9	0.09	26+75	29+00
	16	0.04%	904.3	0.04	29+00	34+00
	16	0.08%	739.7	0.07	64+00	66+50

Nature of the Outlet

Section 103E.245 PRELIMINARY SURVEY AND PRELIMINARY SURVEY REPORT. Subdivision 1. Survey, Paragraph (4) states: "if the proposed drainage project requires construction of an open channel, examine the nature and capacity of the outlet and any necessary extension."

The outlet for Judicial Ditch 4 is Judicial Ditch No. 2 (Martin-Faribault) ditch with their junction located in NW ¼ of the NE ¼ of Section 18, Jo Daviess Township, Faribault County, MN. Judicial Ditch No. 2, also called Little Badger Creek is on the 2020 MPCA Draft Impaired Waters inventory for Benthic macroinvertebrates bio assessments, as well as fish bio assessments between 345th Ave to Badger Cr. JD 4 will have no impact on this portion of the public water, as it outflows approximately 4 miles upstream of the identified reach of Badger Creek. The survey, site visits, and drone footage show the JD 4 outlet, JD 2, to be in good condition; no major signs of sloughing or erosion. However, there are areas of sediment vegetation in the ditch bottom indicating that it needs to be cleaned in areas.

STATUTE REQUIRED + SUGGESTED EFFORTS

Project Necessity

After due consideration of the Petition and present condition of the Judicial Ditch 4 mainline tile both observationally and by analysis, it is the opinion of the Engineer that it is necessary to improve the conditions along the mainline tile portion of the system west of CSAH 1. The existing conditions of the mainline tile are failing and are also well below today's standards for agricultural drainage.

Environmental, Land Use, and Multipurpose Water Management Considerations (Section 103E.015, Subd. 1)

The Drainage Code requires that the Drainage Authority assess the necessity and feasibility of a drainage project in relation to the environmental, land use, and multipurpose water management criteria of Section 103E.015, Subd. 1. To assist in providing thoroughness and clarity, the law will be used as the outline for this portion of the report.

103E.015 CONSIDERATIONS BEFORE DRAINAGE WORK IS DONE.

Subdivision 1. Environmental, land use, and multipurpose water management criteria. Before establishing a drainage project, the drainage authority must consider each of the following criteria:

(1) private and public benefits and costs of the proposed drainage project;

The improved drainage system will replace failing infrastructure and meet today's farming needs for agricultural drainage.

The proposed project will redesign the hydraulics of the mainline to create a more efficient drainage system for the mainline tile. This will decrease the duration of flooding across the petitioned area by increasing the tile capacity which reduces the potential for crop loss and increase crop productivity. With the addition of the storage pond, peak flow rate increases are offset, creating a more efficient drainage system while protecting the outlet downstream.

Since the present project is on a public drainage system the financial cost will be borne by the benefitted landowners. The only costs that might be paid by the public would be those that are provided through grants or loans.

Storage is recommend for this project as it will protect public and private roads from flood damage. It will also provide protection from increased flooding in downstream waters and adjacent lands and, improve water quality while improving the drainage for benefitted landowners.

(2) alternative measures, including measures identified in applicable state-approved and locally adopted water management plans, to:

The following water management plans were consulted to see what alternative measures might be applicable to the proposed drainage project:

Multipurpose Drainage Management Plan (MDMP)

(i) Faribault County Local Water Management Plan, 2018 – 2027 conserve, allocate, and use drainage waters for agriculture, stream flow augmentation, or other beneficial uses;

Neither of the cited plans have any alternative measures dealing with this category of actions.

(ii) reduce downstream peak flows and flooding;

Both plans suggest quantity reduction where it is possible.

(iii) provide adequate drainage system capacity;

Both plans have adequate drainage as a goal but always in relation to multipurpose management of drainage waters.

(iv) reduce erosion and sedimentation; and

Both plans focus on reduction of erosion and sediment transport.

(v) protect or improve water quality;

Both plans focus on Best Management Practices that reduce transport and increase treatment of nutrients and pollutants.

(3) the present and anticipated land use within the drainage project or system, including compatibility of the project with local land use plans;

The present land use of the system is primarily agricultural and there are no changes of land use anticipated. The only changes to land use would be where the storage pond would be constructed and land would be converted from agricultural land to stormwater detention.

(4) current and potential flooding characteristics of property in the drainage project or system and downstream for 5-, 10-, 25-, and 50-year flood events, including adequacy of the outlet for the drainage project;

The present condition and proposed improvement conditions were modeled utilizing XP SWMM. XP SWMM is a fully dynamic modeling software that combines 1-dimensional flow calculations (open channel, pipe flow, etc.) with 2-dimensional (floodplain, overland flow, etc.) to better analyze difficult hydrologic and hydraulic conditions. The 1D aspect incorporates land use, soil type, topography, hydraulic structures, and other hydraulic components associated with 1D flow. The 2D model incorporates land use, soil type, topography, and the associated 2D components to simulate overland and floodplain flow associated with the triggered runoff from a watershed.

Design storms and rainfall data used to generate the NRCS 24-hour Type II rainfall distributions for the project area were obtained from the National Oceanic and Atmospheric Administration's (NOAA's) Atlas 14 precipitation frequency estimates. Runoff calculations in the model were performed using the NRCS TR-55 method. Curve numbers for the project area were determined using GIS soil and land use data. A model was developed for the 2-, 5-, 10-, 25-, 50- and 100-year rainfall events.

The models showed that peak flow rates would generally increase across the drainage system in response to the use of larger drainage infrastructure when additional storage was not included. However, the proposed improvement includes a temporary storage pond that will offset peak flow increases to the outlet and make the drainage system more hydraulically efficient. The models also indicated that overall peak flood elevations, flood duration, and overall flood extents throughout the improved watershed areas would decrease.

After further analysis related to the adequacy of the outlet, it was concluded that the outlet did not have sufficient capacity to receive significant increased peak flows generated by the improvement. It will be necessary include some form of storage within the improved watershed to offset increased peak flow rates to assure that that JD 2 is an adequate outlet. Detailed definition of the storage used on the project can be found in the Proposed Project section of this report.

Detailed modeling results and discussions related to the Hydrologic and Hydraulic (H and H) analysis of System and Adequacy of the Outlet can be found in Appendix F.

(5) the effects of the proposed drainage project on wetlands;

Drainage projects must comply with a variety of state and federal wetland regulations: USACOE 404, Minnesota Wetland Conservation Act, and USDA Swampbuster.

A Level 1 wetland delineation was completed for the entire JD 4 watershed to indicate areas where potential wetland exists. There were no wetlands identified that will be directly impacted by the construction of the JD4 improvement. Only non-perforated solid dual wall pipe or concrete pipe with watertight connections will be used in the improvement. No improvements to lateral drainage tiles are proposed with this improvement, therefore no wetland drainage is anticipated.

(6) the effects of the proposed drainage project on water quality;

Water quality issues pertinent to drainage projects can include erosion and sediment transport potential (during and after), and non-point pollution (e.g. nutrients, pesticides, and bacteria), etc. After checking available TMDL information and the MPCA Impaired Waters listing, it was concluded that there are no water quality issues on or within 1 mile downstream of the proposed project. The proposed storage pond will match or decrease flowrate out of the system compared to the existing conditions which will decrease sediment transport. The added detention will also provide sediment and nutrient trapping which increases overall quality of water exiting JD 4. The sediment trap in the proposed storage pond will retain sediment, keeping it from going downstream with proper maintenance. A MDM plan is included in Appendix D for other potential water quality practices across the watershed.

(7) the effects of the proposed drainage project on fish and wildlife resources;

According to the DNR *Watershed Health Assessment Framework* (<https://arcgis.dnr.state.mn.us/ewr/whaf2/>) and other sources, the environmental quality of the JD 4's watershed is average to just above average as it is assessed for both aquatic and terrestrial animals. While fish may be found in the downstream reaches of the JD2, (Little Badger Creek) it is not a high quality fishery. No assessments have been done on the Little Badger Creek west of 345th Ave. While there may be some increased sediment transport due to ditch cleaning, it will be limited and temporary. There will be no permanent effect on aquatic habitat.

Upland animal populations are limited to small game animals and deer, with the DNR WMA and BWSR managed RIM easements in the east side of the JD 4 watershed showing the most diversity. Since no work is planned within or upstream of these areas there should be no impact to upland animal habitat.

Through a review of MNDNR's Biological Survey of Native Plant Communities and Rare Species map for Faribault and Martin County, a high quality prairie from the native plant community has been identified within the watershed in the SE ¼ of NE ¼ in Section 7 of Jo Daviess Township. This area is not in the scope of the proposed project and will not be affected.

According to the USFWS's Endangered Species List, the northern long eared bat, a threatened species, can be found in Faribault County. However, its primary habitat is caves along rivers. There will be no impact to the bat population from the proposed improvement.

(8) the effects of the proposed drainage project on shallow groundwater availability, distribution, and use; and

There is no anticipated effect of the proposed project on shallow groundwater, the project should only impact the soil saturation levels.

(9) the overall environmental impact of all the above criteria.

The project will have negligible environmental impact as there are no major land use changes, wetland impacts, fish and wildlife habit changes or any adverse effects to water quality. With the addition of the storage pond, water quality will be maintained or improved as the detention will decrease downstream peak flow rates, trap sediment and nutrients, and provide an area for wildlife habitat.

Statement of Necessity and Feasibility, Section 103E.015, Subd. 1,

After assessing the necessity and feasibility of this drainage project on behalf of the Faribault County and Martin County Joint Board in relation to the environmental, land use, and multipurpose water management criteria of Section 103E.015, Subd. 1, the engineer judges the proposed project to be both necessary and feasible.

Substantial Affect on Public Waters

Review of the Public Waters Historical and GIS maps, and the Buffer Map resulted in finding no Public Waters for 4 miles downstream of the drainage project. Since there will be no substantial effect on Public Waters, no Public Waters work permit will be required.

PROPOSED PROJECT

The following project has been proposed in response to the Petition with due regard to the results of the Preliminary Survey:

Project Design Parameters

While alternatives will be analyzed, there are certain things that will, by necessity, characterize any configuration of the proposed drainage project.

COEFFICIENT OF DRAINAGE

The capacity of agricultural drainage is expressed as a drainage coefficient which is defined as the depth of water over the entire area of the upstream watershed that a tile or ditch can drain in a 24-hour period (inches per day (in/day)). For a system like JD 4, drainage coefficients of 0.375 in/day to 0.50 in/day for tile and 1.0 in/day for ditches are recommended with timing further influencing design.

SYSTEM DEPTH

The depth of JD 4 is controlled by three criteria: 1. Provide a minimum of five feet of cover in low spots along public tile alignments, 2. Increase ditch or tile grades to improve capacity, and 3. Provide deeper outlets for private tile.

EROSION CONTROL

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

Permanent erosion control will consist of riprap around all tile outlets into ditches and ponds (including surge basins) as necessary. Seeding and erosion control blanket will be placed on all disrupted areas around road crossings. All disturbed vegetation throughout the project will be reseeded with the appropriate seed mix and mulch.

A Storm Water Pollution Prevention Plan will be developed before final construction plans are complete and a National Pollution Discharge and Elimination System (NPDES) permit application will be filed before construction.

TILE AND CONNECTION MATERIALS

All public tile is solid non-perforated dual wall HDPE or RCP pipe. All connections are required to be watertight per ISG's specifications.

TILE REPLACEMENT AND CONNECTIONS

When tiles are replaced, whether through repair or improvement proceedings, the replaced tiles are left in the ground and are segmented. The segments are then used as headers for private tiles. Segments are connected to the replacement tile at property lines and before the tile outlets. The replaced tile will be the responsibility of the landowner into the future. See connection detail on Sheet 5 in the Preliminary Plans.

Project Components

Systems can be all ditch, all tile, or a combination of the two. Each project will, therefore, have its own list of components. Judicial Ditch No. 4 will have the following components:

DITCHES

This drainage project proposes to improve the main ditch by deepening the ditch at a 0.04% grade in order to gain adequate depth for the mainline tile. Deepening the ditch at a 0.04% grade over the entire length of the ditch from the outlet upstream to the main tile outlet into the ditch will gain approximately 2.5 feet of depth for the mainline tile.

TILE

This drainage project has two alternative tile design options that will each provide adequate drainage to the Judicial Ditch 4 system. Both Options 1 and 2 will increase the tile capacity through the mainline from the outlet in the Main ditch upstream to the West of CSAH 1 generally following the existing alignment. Both options include installing approximately 3,810 LF of 42-inch tile and 1,055 LF of 36-inch tile upstream of the proposed pond. The difference between Option 1 and 2 are the tile capacities downstream of the proposed pond.

OPTION 1

Option 1 includes installing approximately 1,415 LF of 42-inch tile downstream of the proposed 3-acre pond. Table 3 provides a comparison between the original design capacities vs the proposed option 1 capacities.

TABLE 3. OPTION 1 TILE CAPACITIES

Area	ACSIC Size (in)	Proposed Size (in)	ACSIC Slope (%)	Proposed Slope (%)	Drainage Area (Acres)	ACSIC Drainage Coefficient (in/day)	Proposed Drainage Coefficient (in/day)	From Sta.	To Sta.
Main Line	20	42	0.12%	0.08%	1891.1	0.06	0.36	0+00	5+00
	20	42	0.04%	0.06%	1718.5	0.04	0.34	5+00	9+00
	20	42	0.02%	0.06%	1717.6	0.03	0.34	9+00	14+00
	Proposed Pond								
	20	42	0.09%	0.12%	1709.9	0.06	0.49	14+00	19+00
	20	42	0.04%	0.12%	1705.4	0.04	0.49	19+00	26+75
	18	42	0.11%	0.06%	1171.3	0.07	0.50	26+75	29+00
	16	42	0.04%	0.06%	904.3	0.04	0.65	29+00	34+00
	16	42	0.03%	0.06%	899.0	0.04	0.65	34+00	39+00
	16	42	0.07%	0.06%	844.8	0.06	0.70	39+00	44+00
	16	42	0.05%	0.06%	842.3	0.05	0.70	44+00	54+00
	16	36	0.06%	0.06%	760.4	0.06	0.51	54+00	59+00
	16	36	0.03%	0.06%	757.0	0.04	0.52	59+00	64+00
	16	36	0.08%	0.06%	739.7	0.07	0.53	64+00	66+50

All drainage capacities upstream of the proposed storage pond were sized to meet the 0.50 in/day drainage coefficient standard. However, downstream of the pond the proposed drainage capacity was reduced to a 3/8 in/day drainage coefficient. This was done for several reasons. The tile downstream of the pond merely serves as a pipe outlet for the pond and minimal existing public and private tiles are connected in this location. Therefore the tile was sized more as a pond outlet and was designed to optimize storage volume, pipe capacity, and overall costs. For this type of design, the decrease in drainage capacity is negligible to areas upstream of the storage pond.

OPTION 2

Option 2 includes installing approximately 1,415 LF of 36-inch tile downstream of the proposed pond. Table 4 provides a comparison between the original design capacities vs the proposed capacities. In Option 2, the pond size is increased to 4-acres and the tile size is reduced downstream of the pond out-letting into the Main ditch in order to reduce peak flows in the ditch and further downstream. By placing the pond upstream of the ditch, the overall capacity of the downstream tile can be reduced without backing up the system. Similar to Option 1, the tile downstream of the pond merely serves as an outlet pipe to the pond. The Option 2 design is similar in upstream hydraulics to Option 1 even through the drainage coefficient is well below the 0.50 in/day recommendation.

TABLE 4. OPTION 2 TILE CAPACITIES

Area	ACSIC Size (in)	Proposed Size (in)	ACSIC Slope (%)	Proposed Slope (%)	Drainage Area (Acres)	ACSIC Drainage Coefficient (in/day)	Proposed Drainage Coefficient (in/day)	From Sta.	To Sta.
Main Line	20	36	0.12%	0.08%	1891.1	0.06	0.24	0+00	5+00
	20	36	0.04%	0.06%	1718.5	0.04	0.23	5+00	9+00
	20	36	0.02%	0.06%	1717.6	0.03	0.23	9+00	14+00
	Proposed Pond								
	20	42	0.09%	0.12%	1709.9	0.06	0.49	14+00	19+00
	20	42	0.04%	0.12%	1705.4	0.04	0.49	19+00	26+75
	18	42	0.11%	0.06%	1171.3	0.07	0.50	26+75	29+00
	16	42	0.04%	0.06%	904.3	0.04	0.65	29+00	34+00
	16	42	0.03%	0.06%	899.0	0.04	0.65	34+00	39+00
	16	42	0.07%	0.06%	844.8	0.06	0.70	39+00	44+00
	16	42	0.05%	0.06%	842.3	0.05	0.70	44+00	54+00
	16	36	0.06%	0.06%	760.4	0.06	0.51	54+00	59+00
	16	36	0.03%	0.06%	757.0	0.04	0.52	59+00	64+00
	16	36	0.08%	0.06%	739.7	0.07	0.53	64+00	66+50

DROP INLET

A drop inlet is a structure used along a tile to aid in televising tile, accessing the tile to check for sediment accumulation, and draining surface water. They are installed periodically along tile alignments, generally in low areas and/or on each side of road crossings. They are also placed at property lines and as replacements for existing drop intakes.

Standard drop inlets are designed to provide surface drainage through slotted intakes during low flow events. The slots are cut in each rib from 10-inches above grade to as much as 4-feet below grade (surrounded with rock in order to promote sedimentation and infiltration). During high flow events, a standard surface inlet trash rack provides an overflow in order to prevent extensive flooding.

When located in a road ditch, water quality inlets may be provided in lieu of a standard drop inlet. Water quality inlets are designed to provide surface drainage infiltration through a washed rock filter during low flow events. This allows for increased settling of sediment and provides an opportunity for nutrient uptake prior to surface runoff entering the tile system. An integrated slotted (or perforated) intake provides an overflow during high flow events, preventing extensive flooding similar to a standard drop intake. With the existing mainline and branch tile lines remaining in place, the new mainlines and branch tiles may not be constructed through the lowest point of road ditches or fields. To assure proper drainage, water quality intakes will be offset into these low areas.

STORAGE

Deepening the main ditch will also provide a second benefit, it will provide an extra 2.5 feet of storage to the pond without impeding flows for the main tile upstream of the proposed pond.

Drainage improvements can increase peak flow rates, change timing of flows, and increase flooding downstream. Storage is recommended for the present project to mitigate these effects. A preliminary location has been selected based on the cost effectiveness of the hydraulics, however alternative locations can be analyzed in the future as recommended by the Drainage Authority and landowners.

There are three types of storage that can be used on a public drainage system: 1. On-ditch storage where the ditch is expanded (widened) and the resulting pond is controlled by a reduced size culvert or control structure. 2. On-tile storage where the tile is removed within the pond. This pond type is controlled by a structure as well. 3. Off-ditch storage where the pond is constructed to one side of the ditch. The storage pond designed for the JD 4 drainage system utilized on tile storage where the upstream tile will outlet into the pond for temporary storage. The pond will then outlet back into the buried tile downstream of the pond to the outlet into the open ditch.

Alternatives

There are two alternatives being considered for improving JD 4. Known as Option 1 and Option 2, they differ only by how they incorporate storage to reduce peak flows in the JD 4 ditch and its Outlet, JD 2. Both Options propose to use on-tile storage located between CSAH 16 and the railroad tracks in the SW ¼ of the NE ¼ of Section 7 in Jo Daviess Township. In both cases the area of the pond has been reduced because the JD 4 ditch has been deepened. In both cases the proposed pond will allow for a temporary storage. In Option 1 the peak flowrate will increase by less than 5% through the 100-yr event and in Option 2 the peak flowrates will decrease through the 50-yr storm event when compared to the original design flowrates into the ditch without backing up water in the Main tile upstream. Given the JD 4 main open ditch is proposed to be flattened out to gain depth, the overall capacity of the ditch slightly decreases which decreases the outletting peak flow rates into JD 2. However the XP SWMM model showed negligible effects on flooding in this area as a result of the flattened ditch.

OPTION 1

This improvement option incorporates a 3 acre pond with approximately 36 Ac-ft of storage. The 3-ac pond with the 42-inch tile outlet will draw down the upstream mainline tile and will not increase peak flows above 5% at the outlet. The increase in 5% of peak flow rates is allowable at the outlet as these increases are only noticed under large rainfall events. The location will also allow for expansion of the pond if further improvements are petitioned pertaining to the Main tile or Branch E tile upstream of the pond.

OPTION 2

This improvement option incorporates a 4 acre pond with approximately 60 Ac-ft of storage. The 4-ac pond with the 36-inch tile outlet will draw down the upstream mainline tile will decrease peak flows through the 50-yr storm event at the outlet. The location will also allow for expansion of the pond if further improvements are petitioned pertaining to the Main tile or Branch E tile upstream of the pond.

Separable Maintenance

When proposing to do an improvement and a separable portion of a larger system is in need of repair, the drainage statute, Section 103E.215, Subd. 6, allows the separation of the cost of repair from the cost of the improvement project. Separable maintenance can be applied to the portions of the existing system that will be replaced or improved by the proposed project. For clarity the preliminary cost estimates for the present project have been summarized with separable maintenance for each alternative in Tables 6 and 7. Separable maintenance for this project is applicable given the condition of the existing tile and its inability to convey flow as originally designed.

Preliminary Cost Estimates

The primary cost estimate has been compiled using 2018-2019 unit price bids from ISG's recent projects that have characteristics similar to the proposed project. It should be noted that ISG bids all culvert crossings with reinforced concrete pipe only. Per Minnesota statute, the road authority is charged with the duty of maintaining the crossing of drainage systems. Therefore, costs are included as such within the preliminary cost estimates to the county and township road authority for tile crossings at CSAH 2 and 310th Street. Cost estimates assume boring tile under paved county roads and open cutting gravel township roads.

OPTION 1

The preliminary estimated construction cost for Option 1 Improvement is approximately \$76,223 to deepen the open ditch and \$725,194 to improve the Main tile. The storage basin is approximately \$411,445 to purchase the property, excavate the pond, and grade out the pond spoils. It is estimated that the separable maintenance cost for the project is approximately \$71,341 for open ditch work and \$371,220 for tile repair. Detailed cost estimates of the potential repair and improvement costs have been included in Appendix G and summarized below in Table 5.

TABLE 5. OPTION 1 - PROPOSED IMPROVEMENT COST SUMMARY

Area	Separable Maintenance	Improvement Cost	Net Cost
Main Open Ditch	\$ 71,341	\$ 76,223	\$ 4,882
Main Tile	\$ 371,220	\$ -	\$ (371,220)
Upstream of Pond- Main tile	\$ -	\$ 574,191	\$ 574,191
Downstream of Pond- 42-inch Main tile	\$ -	\$ 151,003	\$ 151,003
3.0 AC Storage Pond	\$ -	\$ 411,445	\$ 411,445
Subtotal without Road Crossings	\$ 442,561	\$ 1,212,862	\$ 770,301
Road Authority Cost	\$ 34,929	\$ 34,929	\$ -
Damages Paid To Road Authority	\$ 4,677	\$ 32,577	\$ 27,900
Total	\$ 482,167	\$ 1,280,368	\$ 798,201
Subtotal Landowner Costs			\$ 1,245,439
Net Costs			\$ 798,201
Redetermination of Benefits Costs			\$ 17,400
Permanent Damages (Buffer Strip Acquisition)			\$ -
Total Project Costs for Landowners			\$ 1,262,839

OPTION 2

The preliminary estimated construction cost for Option 2 Improvement is approximately \$76,223 to deepen the open ditch and \$687,336 to improve the Main tile. The storage basin is approximately \$544,207 to purchase the property, excavate the pond, and grade out the pond spoils. It is estimated that the separable maintenance cost for the project is approximately \$71,341 for open ditch work and \$371,220 for tile repair. Detailed cost estimates of the potential repair and improvement costs have been included in Appendix G and summarized below in Table 6.

TABLE 6. OPTION 2 - PROPOSED IMPROVEMENT COST SUMMARY

Area	Separable Maintenance	Improvement Cost	Net Cost
Main Open Ditch	\$ 71,341	\$ 76,223	\$ 4,882
Main Tile	\$ 371,220	\$ -	\$ (371,220)
Upstream of Pond- Main tile	\$ -	\$ 574,191	\$ 574,191
Downstream of Pond- 36-inch Main tile	\$ -	\$ 113,145	\$ 113,145
4.0 AC Storage Pond	\$ -	\$ 544,207	\$ 544,207
Subtotal without Road Crossings	\$ 442,561	\$ 1,307,767	\$ 865,206
Road Authority Cost	\$ 34,929	\$ 34,929	\$ -
Damages Paid To Road Authority	\$ 4,677	\$ 26,535	\$ 21,859
Total	\$ 482,167	\$ 1,369,231	\$ 887,064
Subtotal Landowner Costs			\$ 1,334,302
Net Costs			\$ 887,064
Redetermination of Benefits Costs			\$ 17,400
Permanent Damages (Buffer Strip Acquisition)			\$ -
Total Project Costs for Landowners			\$ 1,351,702

The preliminary costs estimates for both options are considered practicable and feasible for an improvement of this size.

SUMMARY OF FINDINGS, CONCLUSIONS + RECOMMENDATIONS

After reviewing the present Judicial Ditch No. 4 system and considering conversations with landowners, it was found that the present mainline tile does not function as originally designed and it does not have capacity to adequately drain the surrounding farmland.

The proposed improvement includes deepening the Main ditch as well as improve the tile along the mainline tile alignment from the outlet, upstream to the West of CSAH 1. In order to both increase the capacity of the mainline tile and not increase flowrates out of JD 4, a storage pond is recommend. Two options have been proposed at this point of the project and were based on the most cost effective options. Other locations for storage can be considered, however may not be the most cost effective given the hydraulics of the JD 4 system.

Hydraulic and hydrologic modeling shows a decrease of flows in the 2-yr storm event and increase flows by less than 5% for the 5- 100-yr storm events. In option 2 the hydraulic and hydrologic modeling shows a decrease in flows through the 50-yr storm event and an increase of 1% in the 100-yr storm event. Based on these computations, the proposed flow rates with the improvement have and adequate outlet capacity with the inclusion of the storage pond.

In accordance with Section 103E.245, Subd. 1: Whereas the engineer has examined the petition and order and conducted a preliminary survey and, whereas the engineer has found the proposed drainage project to be necessary due to problems found and clarified during the survey, and whereas the engineer has determined the proposed drainage project is necessary and feasible with reference to the environmental, land use, and multipurpose water management criteria in section 103E.015, subdivision 1 and, whereas the engineer determined that the proposed drainage project *does not* substantially affect Public Waters, and whereas the engineer has examined the nature and capacity of the outlet, therefore the engineer recommends the proposed project (or alternative) to the Drainage Authority for preliminary approval.

Since the engineer finds the proposed drainage project in the petition is feasible and complies with the environmental, land use, and multipurpose water management criteria in section 103E.015, Subdivision 1, the engineer has in accordance with Section 103E.245, Subd. 4 included a set of preliminary plans of the drainage project in Appendix A.

PRELIMINARY PLANS

The Preliminary Plans are provided in Appendix A in keeping with Section 103E.245, Subd. 4. They are preliminary plans and are therefore unsigned as signed construction plans are not required at this phase of the project.

Appendix A: Preliminary Plans

FARIBAULT & MARTIN COUNTY JUDICAL DITCH No. 4 IMPROVEMENT



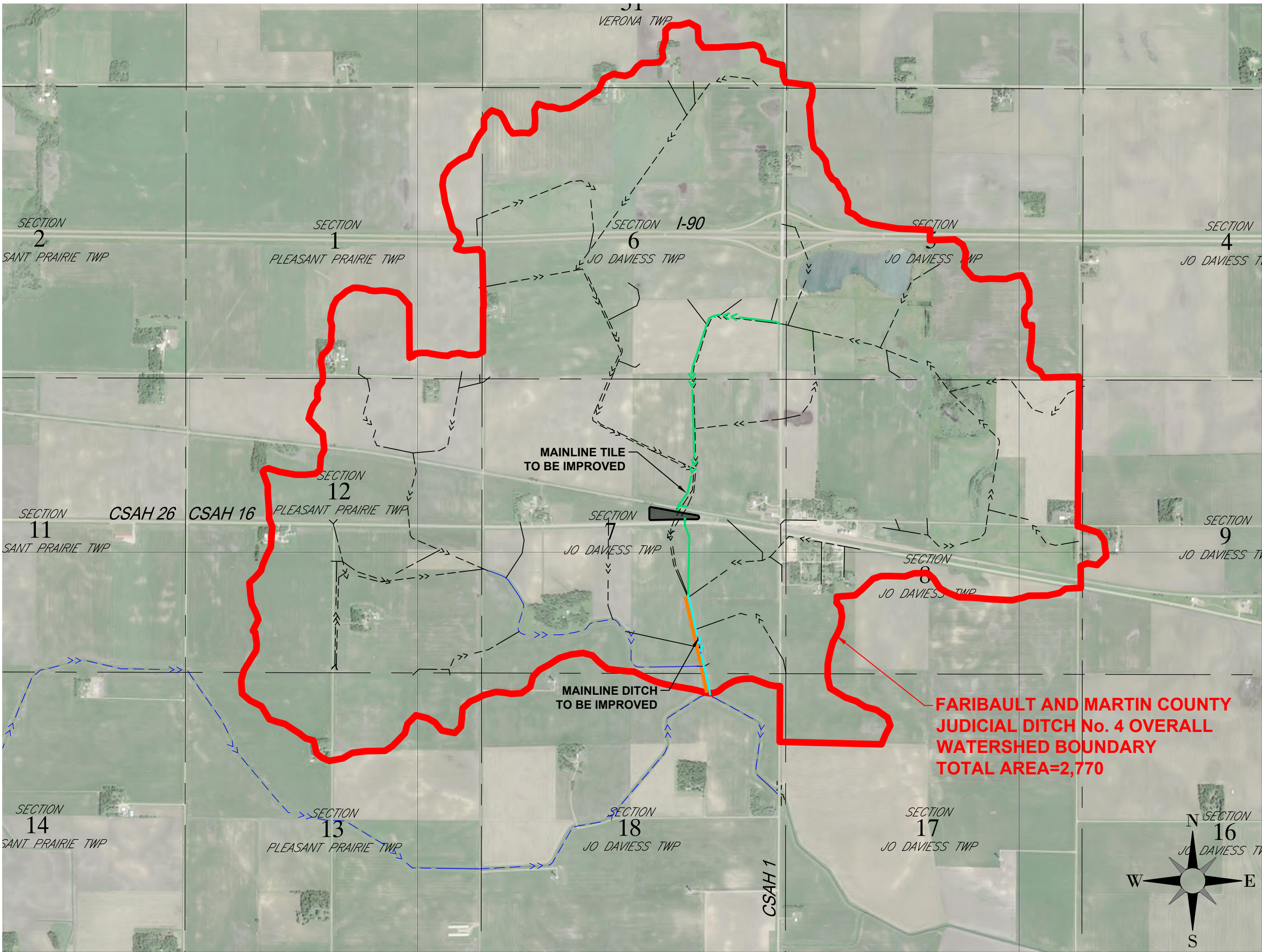
JO DAVIESS TWP & PLEASANT TWP, MINNESOTA

ISG PROJECT # 17-20105

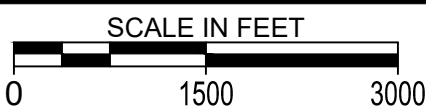
PRELIMINARY PLANS

LEGEND

EXISTING	
	CITY LIMITS
	SECTION LINE
	QUARTER SECTION LINE
	RIGHT OF WAY LINE
	PROPERTY / LOTLINE
	EASEMENT LINE
	ACCESS CONTROL
	WATER EDGE
	WETLAND BOUNDARY
	WETLAND / MARSH
	FENCE LINE
	CULVERT
	STORM SEWER
	SANITARY SEWER
	SANITARY SEWER FORCEMAIN
	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
	MANHOLE/STRUCTURE
	CATCH BASIN
	HYDRANT
	VALVE
	CURB STOP
	POWER POLE
	UTILITY PEDESTAL / CABINET
PROPOSED	
	LOT LINE
	RIGHT OF WAY
	EASEMENT
	CULVERT
	STORM SEWER
	STORM SEWER (PIPE WIDTH)
	SANITARY SEWER
	SANITARY SEWER (PIPE WIDTH)
	WATER
	GAS
	OVERHEAD ELECTRIC
	UNDERGROUND ELECTRIC
	UNDERGROUND TV
	CONTOUR
	MANHOLE
	CATCH BASIN
	HYDRANT
	VALVE



LOCATION MAP



SHEET INDEX

- 1 TITLE
- 2 NOTES AND QUANTITIES
- 3 DETAILS
- 4 DETAILS
- 5 DETAILS
- 6 DETAILS
- 7 EXISTING WATERSHED
- 8 OVERALL PROPOSED WATERSHED
- 9 MAINLINE OPEN DITCH PLAN & PROFILE
- 10 MAINLINE TILE PLAN & PROFILE 00+00 to 25+50
- 11 MAINLINE TILE PLAN & PROFILE 25+50 to 51+50
- 12 MAINLINE TILE PLAN & PROFILE 51+50 to 65+00
- 13 MAIN DITCH CROSS SECTIONS
- 14 MAIN DITCH CROSS SECTIONS
- 15 MAIN DITCH CROSS SECTIONS

NOTE:
THE CLARITY OF THESE PLANS DEPEND
UPON COLOR COPIES. IF THIS TEXT DOES
NOT APPEAR IN COLOR, THIS IS NOT AN
ORIGINAL PLAN SET AND MAY RESULT IN
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
STATE OF MINNESOTA.

**PRELIMINARY NOT
FOR CONSTRUCTION**

DATE _____ LIC. NO. _____
THIS DOCUMENT IS THE PROPERTY OF I & S GROUP,
INC. AND MAY NOT BE USED, COPIED OR DUPLICATED
WITHOUT PRIOR WRITTEN CONSENT.

PROJECT

**FARIBAULT &
MARTIN COUNTY**

**JUDICAL DITCH No.
4 IMPROVEMENT**

JO DAVIESS TWP & PLEASANT TWP MINNESOTA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	17-20105
FILE NAME	20105 TITLE
DRAWN BY	LME
DESIGNED BY	JMD
REVIEWED BY	MAO
ORIGINAL ISSUE DATE	11-1-19
CLIENT PROJECT NO.	-

TITLE

TITLE

SHEET

1

OF 15

PROJECT INDEX:

OWNER:

**FARIBAULT COUNTY JOINT
DRAINAGE AUTHORITY**

**415 S GROVE STREET SUITE 8
BLUE EARTH, MN
PH: 507.526.2388**

PROJECT

ADDRESS / LOCATION:

**JO DAVIESS TWP
SECTIONS 5, 6, 7, 8, 9, 17, 18
VERONA TWP -SECTION 31
FARIBAULT COUNTY, MINNESOTA**

PLEASANT TWP

**SECTIONS 1, 12, 13
MARTIN 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@GSINC.COM**

SPECIFICATIONS REFERENCE

ALL CONSTRUCTION SHALL COMPLY WITH THE COUNTY OF
FARIBAULT 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=1108.39

**1.5 MILES NORTH OF GUCKEEN, 0.5 MILE
NORTH ALONG COUNTY ROAD 1 FROM THE
JUNCTION OF COUNTY ROAD 1 AND
INTERSTATE HIGHWAY 90, THEN 0.2 MILE
WEST ON COUNTY ROAD 8, 23.5 FEET SOUTH
OF COUNTY ROAD 8, 68.5 FEET
WEST-NORTHWEST OF A POWER POLE, 3.1
FEET NORTH OF A WITNESS POST.**

TOPOGRAPHIC SURVEY

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

GENERAL SITE NOTES:

1. DROP INTAKES WILL BE PAID FOR BY EACH AND NO ADDITIONAL COMPENSATION WILL BE MADE FOR IN-FIELD ELEVATIONS THAT VARY FROM THE PLANS. CUT INTAKES TO 8" ABOVE GRADE. MINOR SHAPING AROUND DROP INTAKES AND CULVERT INLETS SHALL BE INCIDENTAL TO THESE RESPECTIVE PAY ITEMS. INTAKE CAPS MAY BE SUBSTITUTED FOR TRASH GRATES IN AREAS THAT WILL NOT TAKE SURFACE FLOW, AS DETERMINED BY THE ENGINEER.
2. AT CROSSINGS OF EXISTING TILE, ONLY THE UPSTREAM SIDE NEED BE CONNECTED, UNLESS OTHERWISE NOTED. EACH CROSSING WILL BE PAID FOR AS ONE CONNECTION. ALL BENDS, TEES, AND OTHER FITTINGS NECESSARY FOR CONNECTION SHALL BE INCIDENTAL TO CONNECTION BID ITEM.
3. UNLESS OTHERWISE NOTED, ALL HDPE BENDS AND FITTINGS SHALL BE INCIDENTAL TO THE TILE PAY ITEMS, AND MUST BE BANDED, WRAPPED IN FABRIC AND SURROUNDED WITH CRUSHED ROCK.
4. UNLESS OTHERWISE NOTED, CONTRACTOR SHALL LIMIT CONSTRUCTION ACTIVITY TO WITHIN A 100-FOOT WIDE SWATH ALONG PROPOSED TILE ALIGNMENTS AND 33-FOOT ALONG EXISTING OPEN DITCH. THE SWATH NEED NOT BE CENTERED ON THE TILE. ALL ACCESS ROADS SHOULD FOLLOW THE PROPOSED ALIGNMENTS. THE SWATH SHALL NOT DISTURB ANY NON-AGRICULTURAL PRIVATE PROPERTY. DISTURBANCE THROUGH ROAD CROSSINGS, ROAD DITCHES, AND GRASS BUFFERS SHALL BE LIMITED TO THE WIDTH OF A TRENCH NECESSARY FOR SAFE CONSTRUCTION PRACTICES, AND MUST BE RESEEDED WHERE NEEDED.
5. UNLESS SPECIFICALLY NOTED, HDPE AND RCP WILL BE THE ONLY ACCEPTABLE MATERIALS FOR ALL PROPOSED BURIED TILE. REFER TO SPECIFICATIONS FOR PROPER INSTALLATION REQUIREMENTS.
6. ALL EFFORTS SHALL BE MADE DURING CONSTRUCTION TO SEPARATE SOIL TYPES. TOPSOIL SHALL BE REPLACED BACK ON TOP OF COMPACTED BACKFILL AND TOP TWO (2) FEET SHALL BE LEFT UNCOMPACTED AS MUCH AS POSSIBLE. EXCAVATED SPOILS SHALL BE SPREAD EVENLY IN CONSTRUCTION AREA AS TO NOT IMPEDE DRAINAGE. ALL EFFORTS SHALL BE MADE TO KEEP TOPSOIL ON TOP & SEPARATED AND MUST BE CHISEL PLOWED FOLLOWING CONSTRUCTION.
7. DURING CONSTRUCTION, CONTRACTOR SHALL MAINTAIN A DRAINAGE OUTLET FOR THE ENTIRE JD SYSTEM.
8. ALL PRIVATE TILE CONNECTIONS SHALL BE DONE WITH INSERTA TEE CONNECTIONS OR APPROVED EQUAL. CONNECTING TILE SHALL MATCH EXISTING TYPE, SIZE AND SLOPE. (P.E. TILE WILL BE ALLOWED FOR CONC. & CLAY TILE CONNECTIONS)
9. VERIFY LOCATIONS AND ELEVATIONS OF EXISTING TILE PRIOR TO CONSTRUCTION.
10. ALL ROAD SIGNAGE, COORDINATION, AND TRAFFIC CONTROL SIGNAGE SHALL BE INCIDENTAL TO GRAVEL ROAD RESTORATIONS.
11. EXISTING BRANCH CONNECTIONS SHALL BE CONSTRUCTED ONE SIZE BIGGER THAN EXISTING, UNLESS OTHERWISE SPECIFIED, WITH DUAL WALL HDPE AND APPROPRIATE FITTINGS. (SINGLE WALL P.E. TILE WILL NOT BE ALLOWED)
12. IN AREAS WHERE CROSS CONNECT IS CALLED OUT, EACH CONNECTION INCLUDES 30 LF OF SPECIFIED TILE, CONNECTION TO THE PROPOSED MAINLINE, AND CONNECTION TO THE EXISTING MAINLINE AND/OR BRANCH.
13. ANY EXISTING DITCH TILES IN OPEN DITCH, INCLUDING ANY NOT ON PLANS, SHALL BE REPAIRED WITH RIPRAP, GEOTEXTILE FABRIC, RODENT GUARD, AND 20 LF OF SPECIFIED PIPE SIZE WHERE NEEDED. (SEE DETAIL AG121)
14. ALL OPEN DITCH FIELD CROSSINGS & ROAD CROSSINGS SHALL BE CONSTRUCTED WITH CLASS III RCP, WITH LAST THREE JOINTS TIED, UNLESS OTHERWISE NOTED. CMP FIELD CROSSING MUST BE 12-GAUGE SPIRAL CORRUGATED METAL PIPE.
15. ANY DEWATERING FOR THE PROJECT IS INCIDENTAL.
16. PLACE ALL SPOILS FROM DITCH CLEANING & EXCAVATION IN THE AREAS SPECIFIED ON THE PLANS. SPOILS MAY BE PLACED ON EITHER SIDE OF THE DITCH WITHIN THE GRASSED BUFFER AREA UNLESS OTHERWISE DETERMINED BY THE ENGINEER OR PRIVATE LANDOWNER AFTER SPECIFIED AREAS HAVE BEEN FILLED. SPOIL LEVELING/GRADING IS INCIDENTAL TO OPEN DITCH CLEANING AND EXCAVATION.
17. TOPSOIL/ORGANIC MATERIAL FROM OPEN DITCH AREA SHALL BE STRIPPED BEFORE OPEN DITCH EXCAVATION TO BE REUSED IN NEW OPEN DITCH AND IS INCIDENTAL TO THE OPEN DITCH EXCAVATION.
18. AREAS WHERE A 16.5' GRASS STRIP DOES NOT EXIST OR HAS BEEN DISTURBED DURING CONSTRUCTION SHALL BE SEEDED AFTER ALL WORK HAS BEEN COMPLETED IN THAT AREA, & SHALL COMPLY TO SPECIFICATIONS OUTLINED IN THE SPEC BOOK. THESE AREAS WILL BE DETERMINED BY THE ENGINEER. ALL DISTURBED GRASS AREAS SHALL BE RESEEDED.
19. MISC. TREE CLEARING OUTSIDE OF CALLED OUT AREAS ON THE PLANS SHALL BE INCIDENTAL TO NORMAL DITCH CLEANING.

GENERAL TILE INSTALLATION NOTES:

1. DURING CONSTRUCTION, CONTRACTOR SHALL MAINTAIN A DRAINAGE OUTLET FOR THE ENTIRE JD 4 PROJECT AREA.
2. ALL PIPE DIMENSIONS REFERENCED IN THE PLANS REFER TO THE INSIDE DIAMETER.
3. ALL ROAD SIGNAGE, COORDINATION, AND TRAFFIC CONTROL SIGNAGE SHALL BE INCIDENTAL TO ROAD RESTORATIONS.
4. ALL DEWATERING FOR THE PROJECT IS INCIDENTAL.
5. UNLESS OTHERWISE NOTED, CONTRACTOR SHALL LIMIT CONSTRUCTION ACTIVITY TO WITHIN A 100-FOOT WIDE SWATH ALONG PROPOSED TILE ALIGNMENTS FOR 24" TILE OR LESS, AND A 150-FOOT SWATH ALONG PROPOSED TILE ALIGNMENTS FOR TILES LARGER THAN 24". THE SWATH NEED NOT BE CENTERED ON THE PROPOSED TILE ALIGNMENT. ALL ACCESS ROADS SHOULD FOLLOW THE PROPOSED ALIGNMENTS. THE SWATH SHALL NOT DISTURB ANY NON-AGRICULTURAL PRIVATE PROPERTY. DISTURBANCE THROUGH ROAD CROSSINGS, ROAD DITCHES, AND GRASS BUFFERS SHALL BE LIMITED TO THE WIDTH OF A TRENCH NECESSARY FOR SAFE CONSTRUCTION PRACTICES, AND MUST BE RE-SEEDED WHERE NEEDED.
6. ALL EFFORTS SHALL BE MADE DURING CONSTRUCTION TO SEPARATE SOIL TYPES. BACKFILL SHALL BE COMPACTED PRIOR TO PLACEMENT OF TOPSOIL, EXCEPT THE TOP TWO (2) FEET, FOR WHICH COMPACTION SHALL BE MINIMIZED TO THE EXTENT POSSIBLE. TOPSOIL SHALL BE PLACED TO A MINIMUM DEPTH OF 6", OR UNIFORM TO THE TOPSOIL DEPTH OF THE SURROUNDING AREA. EXCAVATED SPOILS SHALL BE SPREAD EVENLY IN CONSTRUCTION AREA AS TO NOT IMPEDE DRAINAGE. ALL EFFORTS SHALL BE MADE TO KEEP TOPSOIL ON TOP AND SEPARATED. NO TOPSOIL SHALL BE PLACED IN THE TRENCH BELOW 2' FROM EXISTING GROUND UNLESS APPROVED BY THE ENGINEER.
7. ALL SPOIL LEVELING, GRADING, AND RESTORATION OF DISTURBED AREAS SHALL BE IN ACCORDANCE TO THE CONTRACT DOCUMENTS AND SHALL BE INCIDENTAL TO THE WORK.
8. MISCELLANEOUS TREE CLEARING SHALL BE INCIDENTAL TO TILE INSTALLATION.
9. ALL PIPE BEDDING AND ENCASEMENT IS INCIDENTAL TO STANDARD TILE INSTALLATION. REFER TO SPECIFICATIONS FOR DEFINITIONS. FOUNDATION MATERIAL SHALL BE USED IF UNSUITABLE OR UNSTABLE SOILS ARE PRESENT. THE USE OF FOUNDATION MATERIAL SHALL BE APPROVED BY THE ENGINEER BEFORE PLACEMENT.
10. UNLESS OTHERWISE NOTED, ALL HDPE BENDS AND FITTINGS SHALL BE INCIDENTAL TO THE TILE PAY ITEMS, MUST BE BANDED, WRAPPED IN FABRIC, AND SURROUNDED WITH CRUSHED ROCK.
11. ALL TILE ENDS MUST BE CAPPED TO NOT TAKE SEDIMENT UNLESS ANOTHER TILE (PRIVATE OR PUBLIC) IS CONNECTED INTO THE PROPOSED TILE. CAPPING SHALL BE INCIDENTAL TO TILE INSTALLATION.
12. ALL BENDS LARGER THAN 11.25° MUST BE CONSTRUCTED AS PRE-FABRICATED BENDS. ANY BENDS LARGER THAN 45° MUST BE CONSTRUCTED WITH MULTIPLE BENDS WITH AT LEAST 10 FEET IN BETWEEN EACH BEND.
13. UNLESS SPECIFICALLY NOTED, HDPE AND RCP WILL BE THE ONLY ACCEPTABLE MATERIALS FOR ALL PROPOSED BURIED TILE. REFER TO SPECIFICATIONS FOR PROPER INSTALLATION REQUIREMENTS.
14. VERIFY EXISTING TILE LOCATIONS AND ELEVATIONS PRIOR TO CONSTRUCTION, PAID FOR AS TILE INVESTIGATION. ANY ALIGNMENT CHANGES MADE DUE TO TILE INVESTIGATION SHALL BE APPROVED BY THE ENGINEER DURING CONSTRUCTION. ALL EFFORTS WILL BE MADE TO UTILIZE THE SAME FITTINGS AS DESIGNED AND CONTRACTOR SHALL BE COMPENSATED FOR ADDITIONAL BENDS AND FITTINGS, IF NEEDED.
15. DROP INTAKES WILL BE PAID FOR BY EACH AND NO ADDITIONAL COMPENSATION WILL BE MADE FOR IN-FIELD ELEVATIONS THAT VARY FROM THE PLANS. MINOR SHAPING AROUND DROP INTAKES AND CULVERT INLETS SHALL BE INCIDENTAL TO THEIR RESPECTIVE PAY ITEMS.
16. DROP INTAKES THAT ARE NOT INTENDED TO TAKE SURFACE FLOW MAY BE CAPPED, AS DETERMINED BY THE ENGINEER. INTAKES MAY BE CUT DOWN AND BURIED AFTER FINAL TELEVISION, PER LANDOWNER REQUEST, AND WILL BE PAID FOR AS "CAP DROP INTAKE".
17. DROP INTAKES THAT ARE DESIGNED TO BE ON PROPERTY LINES SHALL BE ADJUSTED IN THE FIELD TO MATCH ACTUAL LOCATION OF PROPERTY LINE.
18. AT CROSSINGS OF EXISTING TILE, ONLY THE UPSTREAM SIDE NEED BE CONNECTED, UNLESS OTHERWISE DEEMED NECESSARY. EACH CROSSING WILL BE PAID FOR AS ONE CONNECTION. ALL BENDS, TEES, CONNECTING TILE, AND OTHER FITTINGS NECESSARY FOR CONNECTION SHALL BE INCIDENTAL TO CONNECTION BID ITEM.
19. ALL TILE CONNECTIONS MUST BE CONNECTED ON THE SIDE OF THE RECEIVING PIPE. TILE CONNECTIONS CANNOT BE MADE COMPLETELY VERTICAL TO PIPE.
20. EXISTING BRANCH CONNECTIONS SHALL BE CONSTRUCTED ONE SIZE LARGER THAN THE EXISTING SIZE, UNLESS OTHERWISE SPECIFIED, WITH DUAL WALL HDPE AND APPROPRIATE FITTINGS. (SINGLE WALL PE TILE WILL NOT BE ALLOWED)
21. ALL PRIVATE TILE CONNECTIONS SHALL BE CONSTRUCTED WITH INSERTA-TEE CONNECTIONS OR APPROVED EQUAL, WHERE POSSIBLE. CONNECTING TILE SHALL MATCH EXISTING SIZE AND SLOPE. (PE TILE WILL BE ALLOWED FOR PRIVATE TILE CONNECTIONS ONLY)

TOTAL ESTIMATED QUANTITIES- OPTION 1			
Item Code	Item	Unit	Estimated Quantity
2021.501	MOBILIZATION	LS	1
2021.601	TILE INVESTIGATION	HR	31
2101.511	TREE CLEARING AND GRUBBING	AC	0.2
2105.603	DITCH DEEPENING (4' WIDE DITCH BOTTOM)	LF	1815
2106.501	COMMON EXCAVATION	CY	122632
2106.501	TOP SOIL STRIP & PLACE SPOILS	AC	30.4
2451.509	GRANULAR PIPE FOUNDATION	CY	843
2502.541	INSTALL 12-INCH PERFORATED TILE (WATER QUALITY INLET)	LF	240
2503.603	42-INCH AGRICULTURAL TILE	LF	5225
2503.603	36-INCH AGRICULTURAL TILE	LF	1055
2506.502	FURNISH & INSTALL WATER QUALITY INLET	EA	8
2506.502	INSTALL DROP INTAKE (18-INCH)	EA	9
2506.502	CAP DROP INTAKE (18-INCH)	EA	3
2506.502	INSTALL 12-INCH ASI RISER ASSEMBLY W/TRASH GRATE	EA	4
2506.502	INSTALL 12-INCH ASI RISER ASSEMBLY W/STANDARD HICKENBOTTOM	EA	4
2506.502	CLASS III RIPRAP WITH GEOTEXTILE FABRIC (FOR ASIRO)	CY	120
2506.516	INSTALL STRUCTURE S-1 WITH GALVANIZED GRATE	LS	2
2506.602	CONNECT EXISTING TILE (SIZE & MATERIAL MAY VARY)	EA	42
2506.603	48-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1
2506.603	42-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	3
2506.603	36-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1
2506.603	24-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	2
2506.603	18-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1
2506.603	12-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1
2506.603	8-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1
2506.603	6-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1
2511.501	CLASS III RIPRAP WITH GEOTEXTILE FABRIC	CY	100
2550.603	BORE 42-INCH TILE	LF	140
2550.603	BORE 36-INCH TILE	LF	80
2575.501	16.5' BUFFER STRIP SEEDING (SEED MIX: BUFFER BLEND WITH TYPE 3 MULCH)	AC	3.38
2575.501	STANDARD SIDE SLOPE SEEDING (SEED MIX: BUFFER BLEND WITH TYPE 8 MULCH)	AC	3.73
2575.541	BUFFER STRIP MOWING	AC	6.76
2575.545	WEED SPRAYING	AC	10.49

TOTAL ESTIMATED QUANTITIES- OPTION 2			
Item Code	Item	Unit	Estimated Quantity
2021.501	MOBILIZATION	LS	1
2021.601	TILE INVESTIGATION	HR	31
2101.511	TREE CLEARING AND GRUBBING	AC	0.2
2105.603	DITCH DEEPENING (4' WIDE DITCH BOTTOM)	LF	1815
2106.501	COMMON EXCAVATION	CY	122632
2106.501	TOP SOIL STRIP & PLACE SPOILS	AC	30.4
2451.509	GRANULAR PIPE FOUNDATION	CY	842.6
2502.541	INSTALL 12-INCH PERFORATED TILE (WATER QUALITY INLET)	LF	240
2503.603	42-INCH AGRICULTURAL TILE	LF	3810
2503.603	36-INCH AGRICULTURAL TILE	LF	2470
2506.502	FURNISH & INSTALL WATER QUALITY INLET	EA	8
2506.502	INSTALL DROP INTAKE (18-INCH)	EA	9
2506.502	CAP DROP INTAKE (18-INCH)	EA	3
2506.502	INSTALL 12-INCH ASI RISER ASSEMBLY W/TRASH GRATE	EA	4
2506.502	INSTALL 12-INCH ASI RISER ASSEMBLY W/STANDARD HICKENBOTTOM	EA	4
2506.502	CLASS III RIPRAP WITH GEOTEXTILE FABRIC (FOR ASIRO)	CY	120
2506.516	INSTALL STRUCTURE S-1 WITH GALVANIZED GRATE	LS	2
2506.602	CONNECT EXISTING TILE (SIZE & MATERIAL MAY VARY)	EA	42
2506.603	48-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1
2506.603	42-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	3
2506.603	36-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1
2506.603	24-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	2
2506.603	18-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1
2506.603	12-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1
2506.603	8-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1
2506.603	6-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1
2511.501	CLASS III RIPRAP WITH GEOTEXTILE FABRIC	CY	100
2550.603	BORE 42-INCH TILE	LF	140
2550.603	BORE 36-INCH TILE	LF	80
2575.501	16.5' BUFFER STRIP SEEDING (SEED MIX: BUFFER BLEND WITH TYPE 3 MULCH)	AC	3.38
2575.501	STANDARD SIDE SLOPE SEEDING (SEED MIX: BUFFER BLEND WITH TYPE 8 MULCH)	AC	3.73
2575.541	BUFFER STRIP MOWING	AC	6.76
2575.545	WEED SPRAYING	AC	10.49



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PROJECT

FARIBAULT &
MARTIN COUNTY

JUDICAL DITCH No.
4 IMPROVEMENT

JO DAVIESS TWP & PLEASANT TWP MINNESOTA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	17-20105
FILE NAME	20105 TITLE
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DESIGNED BY	JMD
REVIEWED BY	MAO
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CLIENT PROJECT NO.	-

TITLE

NOTES AND
QUANTITIES

SHEET



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CLIENT PROJECT NO.	-

TITLE

DETAILS

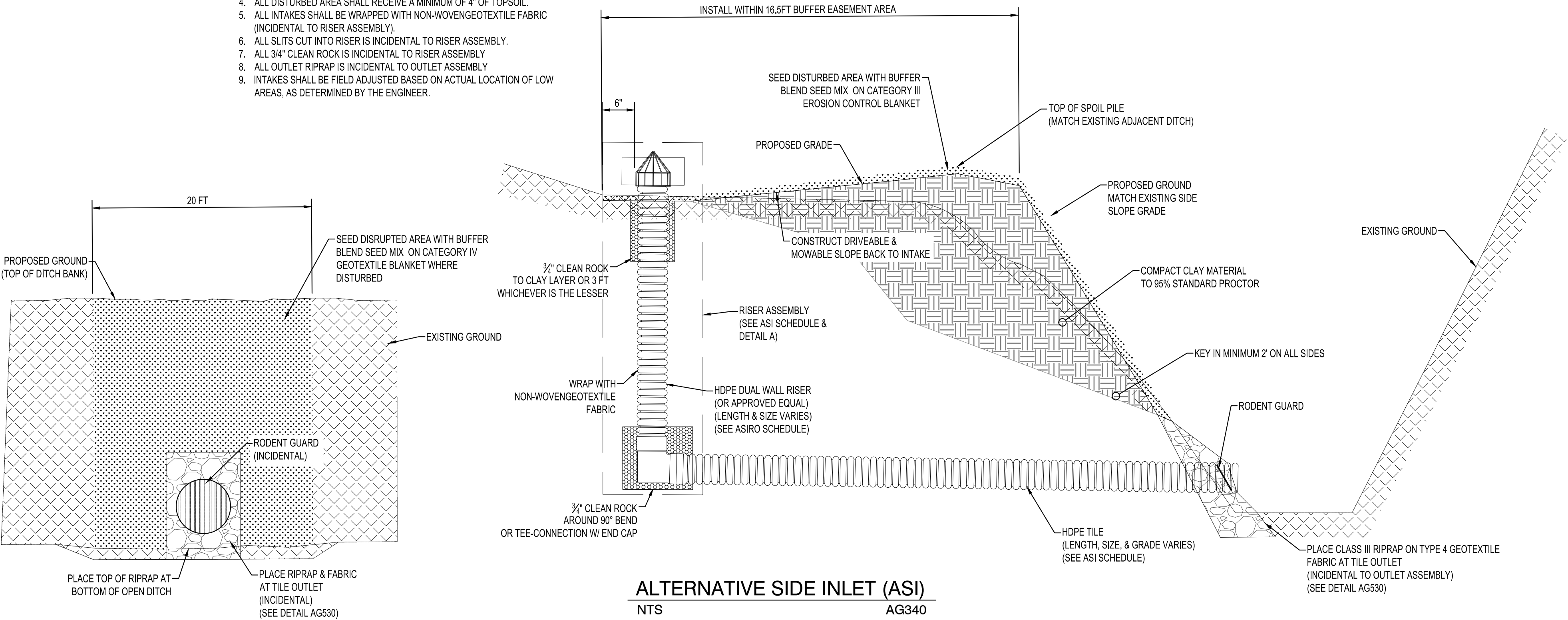
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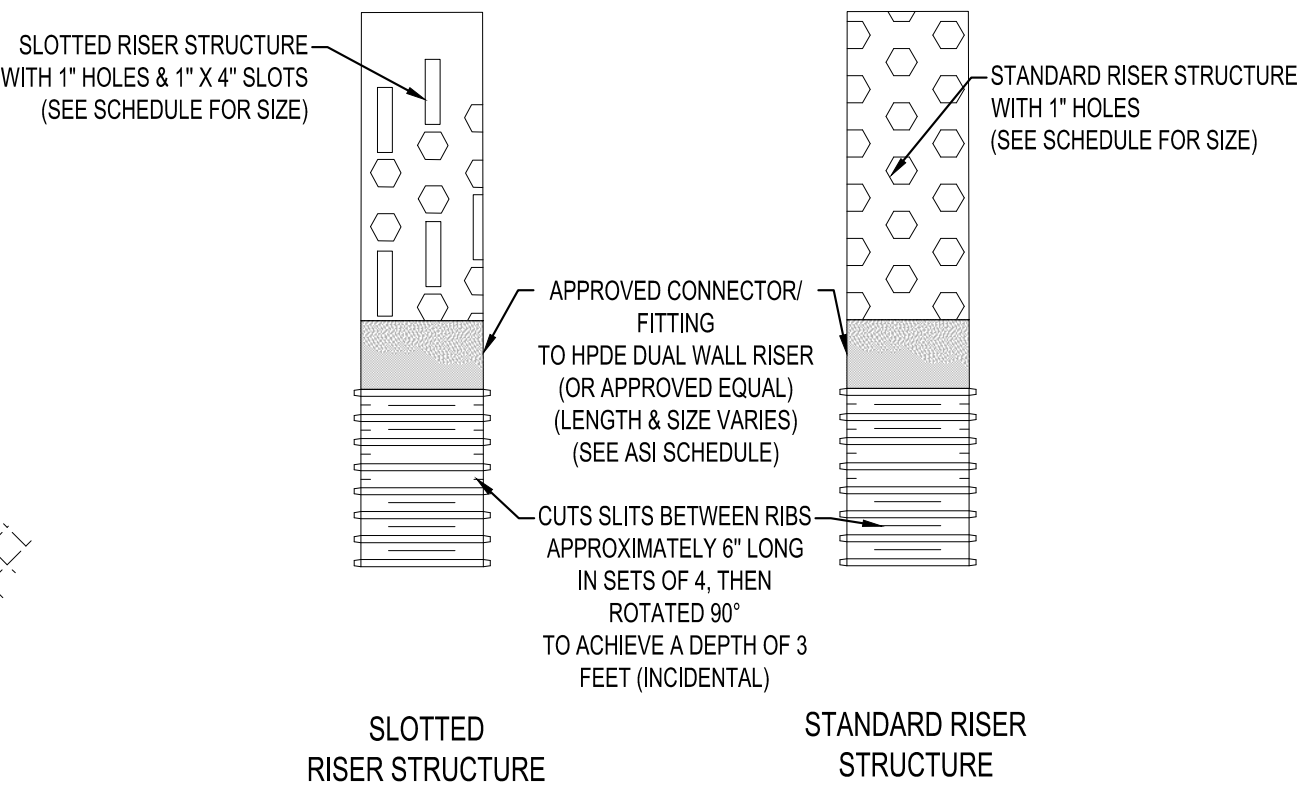
NOTES:

1. INTAKE TYPE & TILE SIZE VARIES PER ASI (SEE SCHEDULE).
2. RISER ASSEMBLY SHALL BE BID SEPARATE THAN OUTLET ASSEMBLY.
3. ALL DISRUPTED AREAS WITHIN BUFFER EASEMENT SHALL BE SEEDED WITH BUFFER BLEND SEED MIX ON CATEGORY III EROSION CONTROL BLANKET.
4. ALL DISTURBED AREA SHALL RECEIVE A MINIMUM OF 4" OF TOPSOIL.
5. ALL INTAKES SHALL BE WRAPPED WITH NON-WOVENGEOTEXTILE FABRIC (INCIDENTAL TO RISER ASSEMBLY).
6. ALL SLITS CUT INTO RISER IS INCIDENTAL TO RISER ASSEMBLY.
7. ALL 3/4" CLEAN ROCK IS INCIDENTAL TO RISER ASSEMBLY.
8. ALL OUTLET RIPRAP IS INCIDENTAL TO OUTLET ASSEMBLY.
9. INTAKES SHALL BE FIELD ADJUSTED BASED ON ACTUAL LOCATION OF LOW AREAS, AS DETERMINED BY THE ENGINEER.

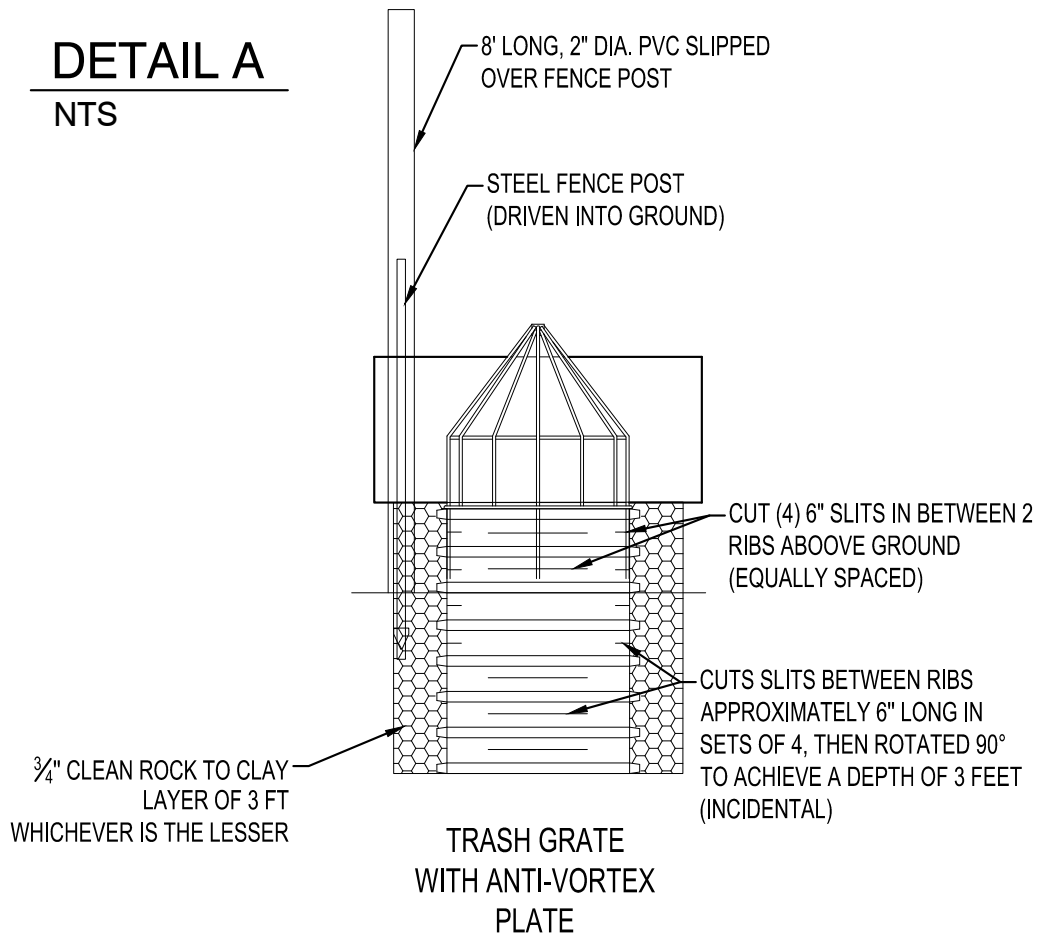


PROFILE FROM OPEN DITCH
NTS

ALTERNATIVE SIDE INLET (ASI)
NTS AG340

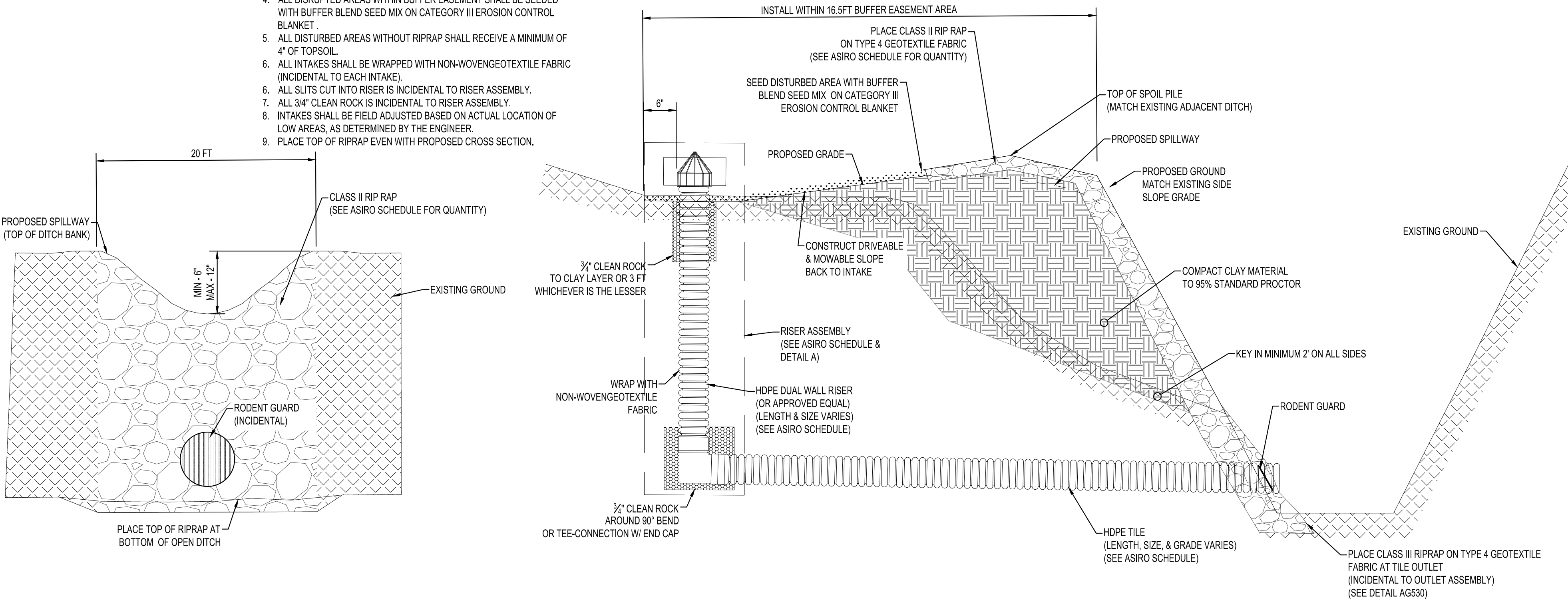


DETAIL A
NTS



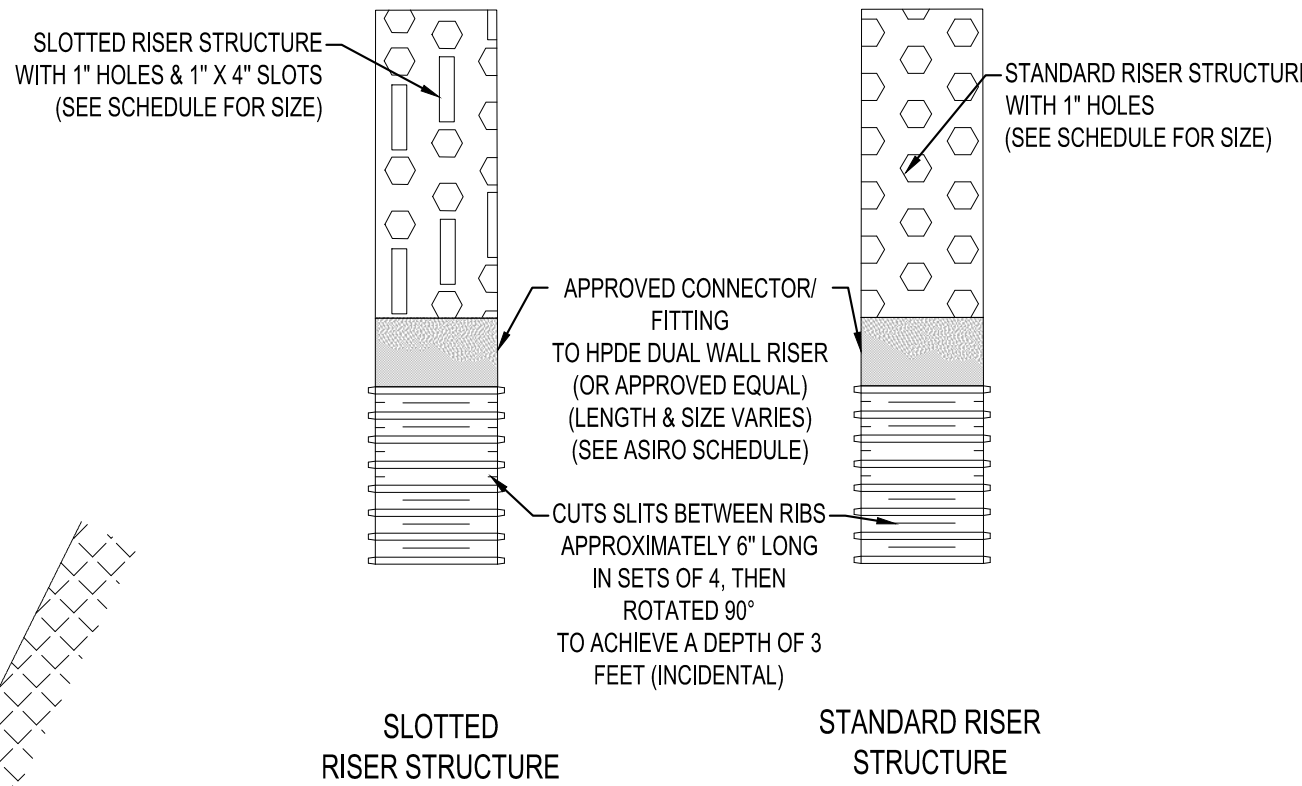
NOTES:

1. INTAKE TYPE & TILE SIZE VARIES PER ASI (SEE SCHEDULE).
2. RISER ASSEMBLY SHALL BE BID SEPARATE THAN OUTLET ASSEMBLY & RIPRAP.
3. RIPRAP SHALL BE BID SEPARATE THAN OUTLET & RISER ASSEMBLIES.
4. ALL DISRUPTED AREAS WITHIN BUFFER EASEMENT SHALL BE SEEDED WITH BUFFER BLEND SEED MIX ON CATEGORY III EROSION CONTROL BLANKET.
5. ALL DISTURBED AREAS WITHOUT RIPRAP SHALL RECEIVE A MINIMUM OF 4" OF TOPSOIL.
6. ALL INTAKES SHALL BE WRAPPED WITH NON-WOVENGEOTEXTILE FABRIC (INCIDENTAL TO EACH INTAKE).
7. ALL SLITS CUT INTO RISER IS INCIDENTAL TO RISER ASSEMBLY.
8. ALL 3/4" CLEAN ROCK IS INCIDENTAL TO RISER ASSEMBLY.
9. INTAKES SHALL BE FIELD ADJUSTED BASED ON ACTUAL LOCATION OF LOW AREAS, AS DETERMINED BY THE ENGINEER.
10. PLACE TOP OF RIPRAP EVEN WITH PROPOSED CROSS SECTION.

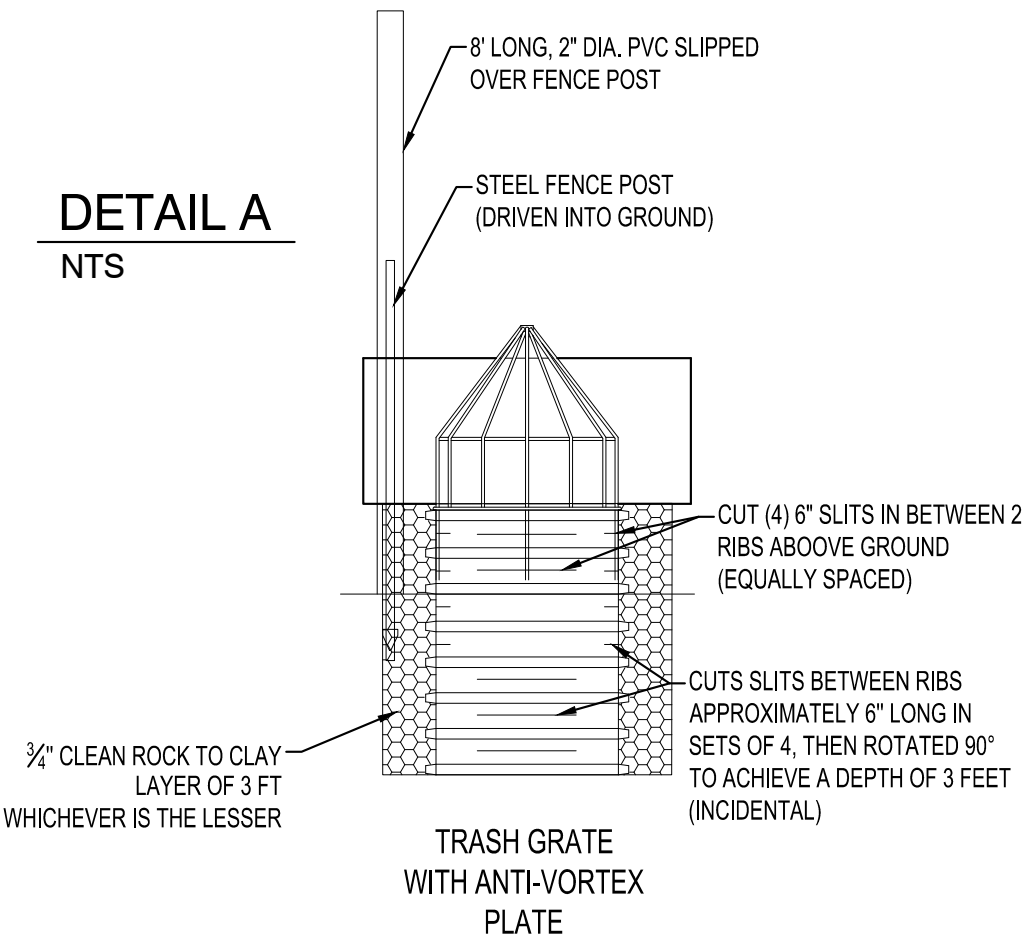


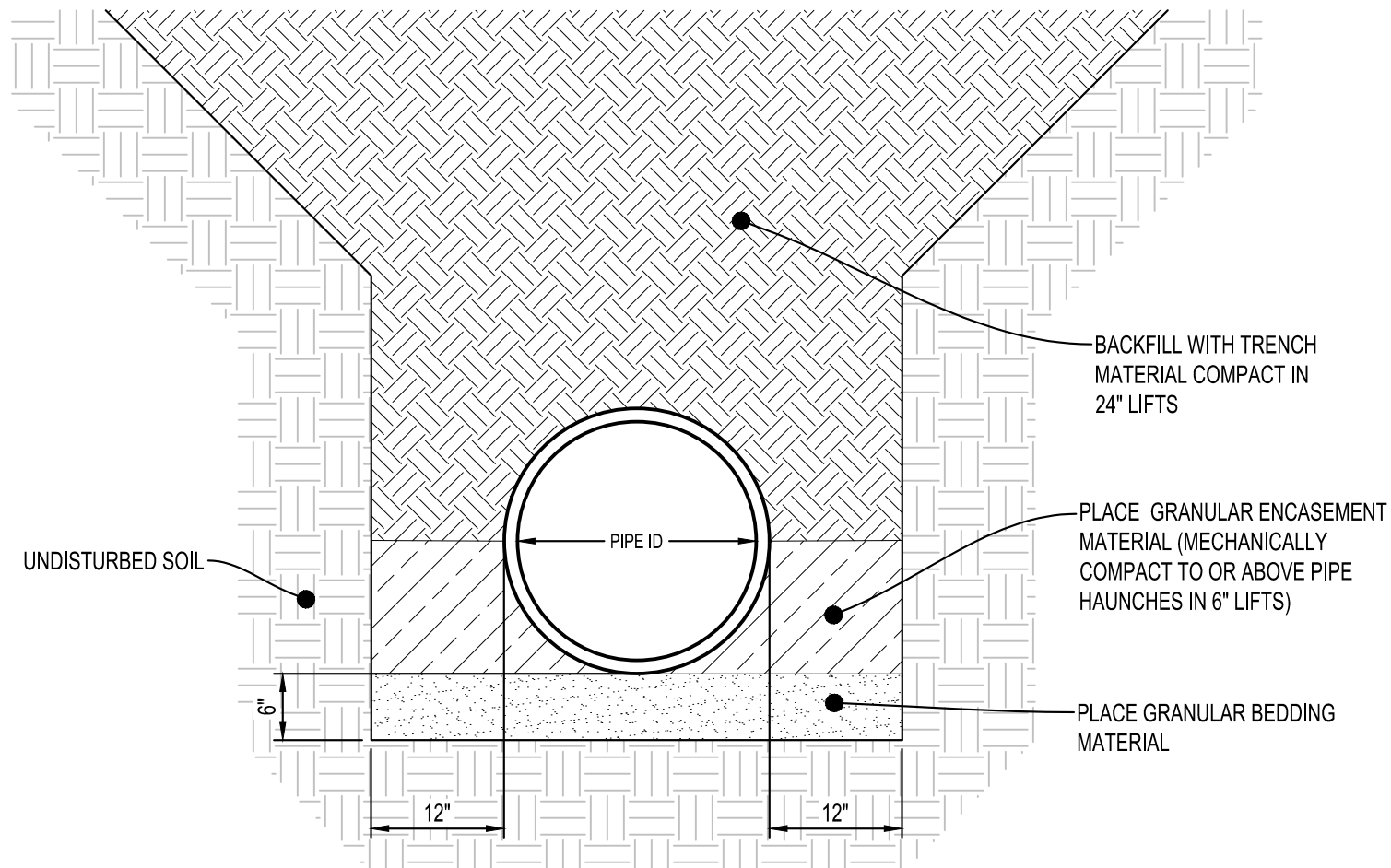
PROFILE FROM OPEN DITCH
NTS

ALTERNATIVE SIDE INLET WITH RIPRAP OVERFLOW (ASIRO)
NTS AG350



DETAIL A
NTS



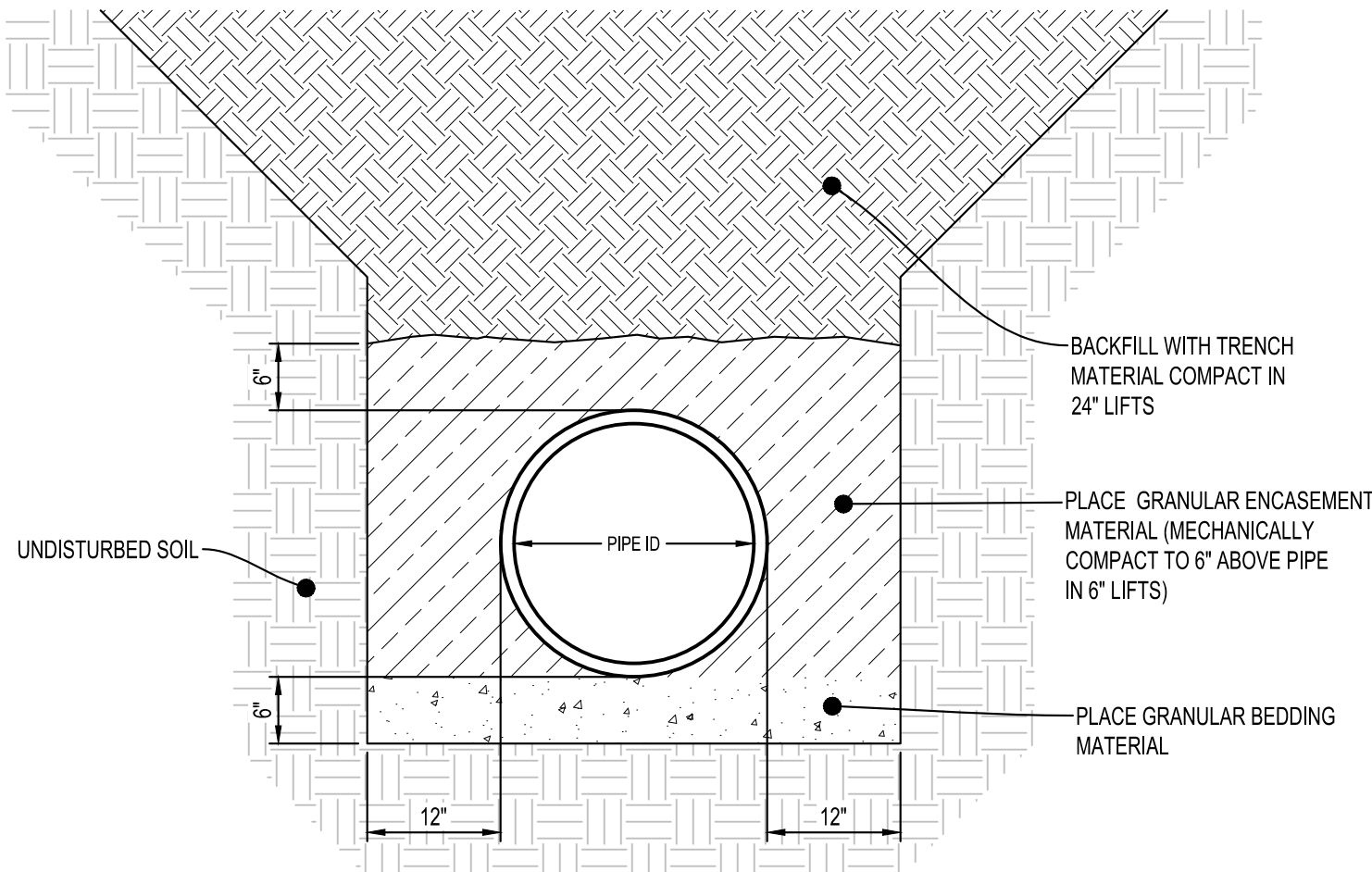


NOTE:

GRANULAR BEDDING, GRANULAR ENCASEMENT, AND BACKFILL SHALL BE INCIDENTAL TO CONSTRUCTION

**RCP FLAT BOTTOM
TRENCH BEDDING**

NTS AG100

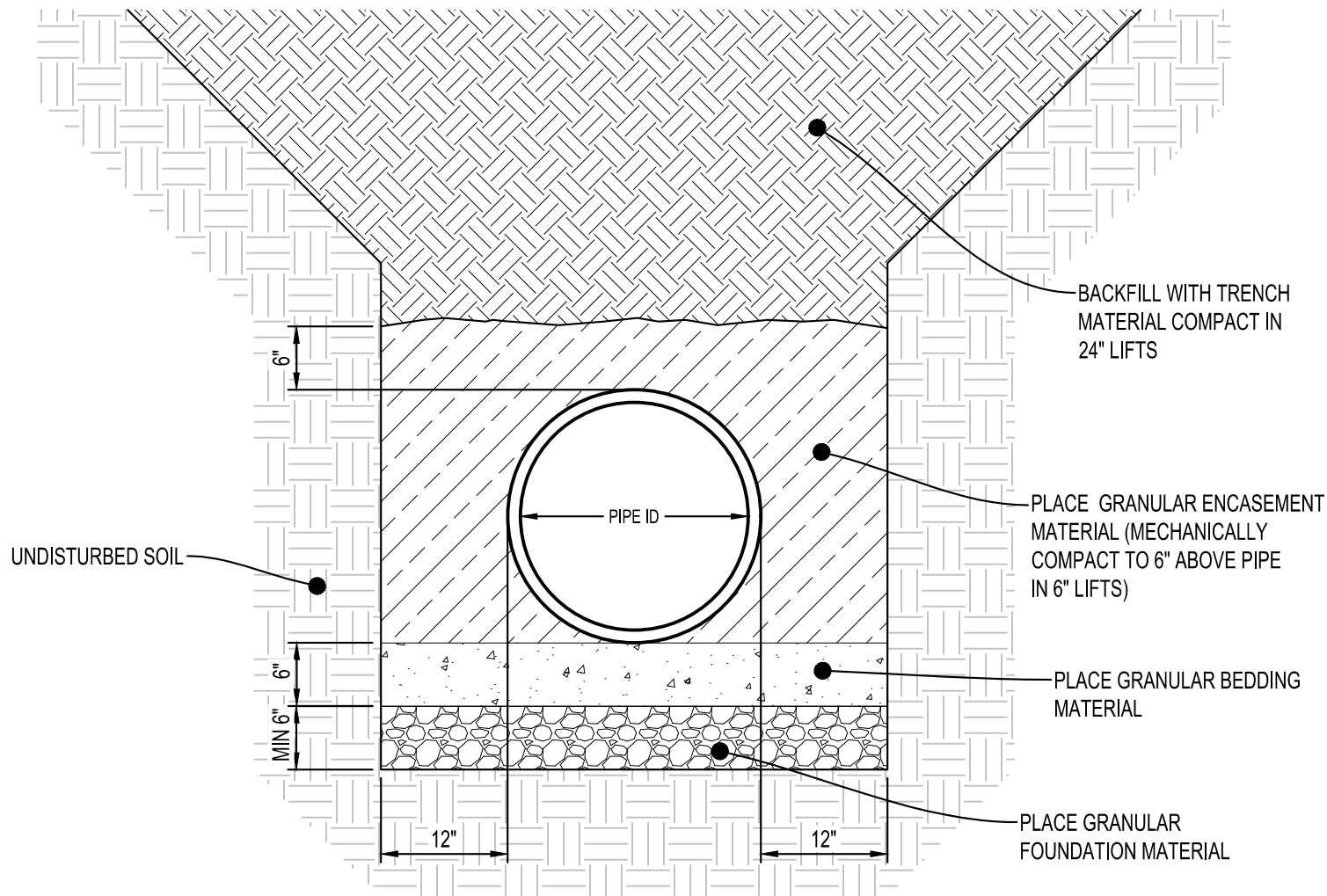


NOTE:

GRANULAR BEDDING, GRANULAR ENCASEMENT, AND BACKFILL SHALL BE INCIDENTAL TO CONSTRUCTION

**HDPE FLAT BOTTOM
TRENCH BEDDING**

NTS AG105



NOTE:

GRANULAR BEDDING, GRANULAR ENCASEMENT, AND BACKFILL SHALL BE INCIDENTAL TO CONSTRUCTION
GRANULAR FOUNDATION BELOW THE PIPE PAID FOR BY CUBIC YARD ONLY WHERE NEEDED AND APPROVED BY ENGINEER

**FLAT BOTTOM TRENCH
WITH GRANULAR FOUNDATION**

NTS AG110

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PROJECT

**FARIBAULT &
MARTIN COUNTY**

**JUDICAL DITCH No.
4 IMPROVEMENT**

JO DAVIESS TWP & PLEASANT TWP MINNESOTA

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DRAWN BY	LME
DESIGNED BY	JMD
REVIEWED BY	MAO
ORIGINAL ISSUE DATE	11-1-17
CLIENT PROJECT NO.	-

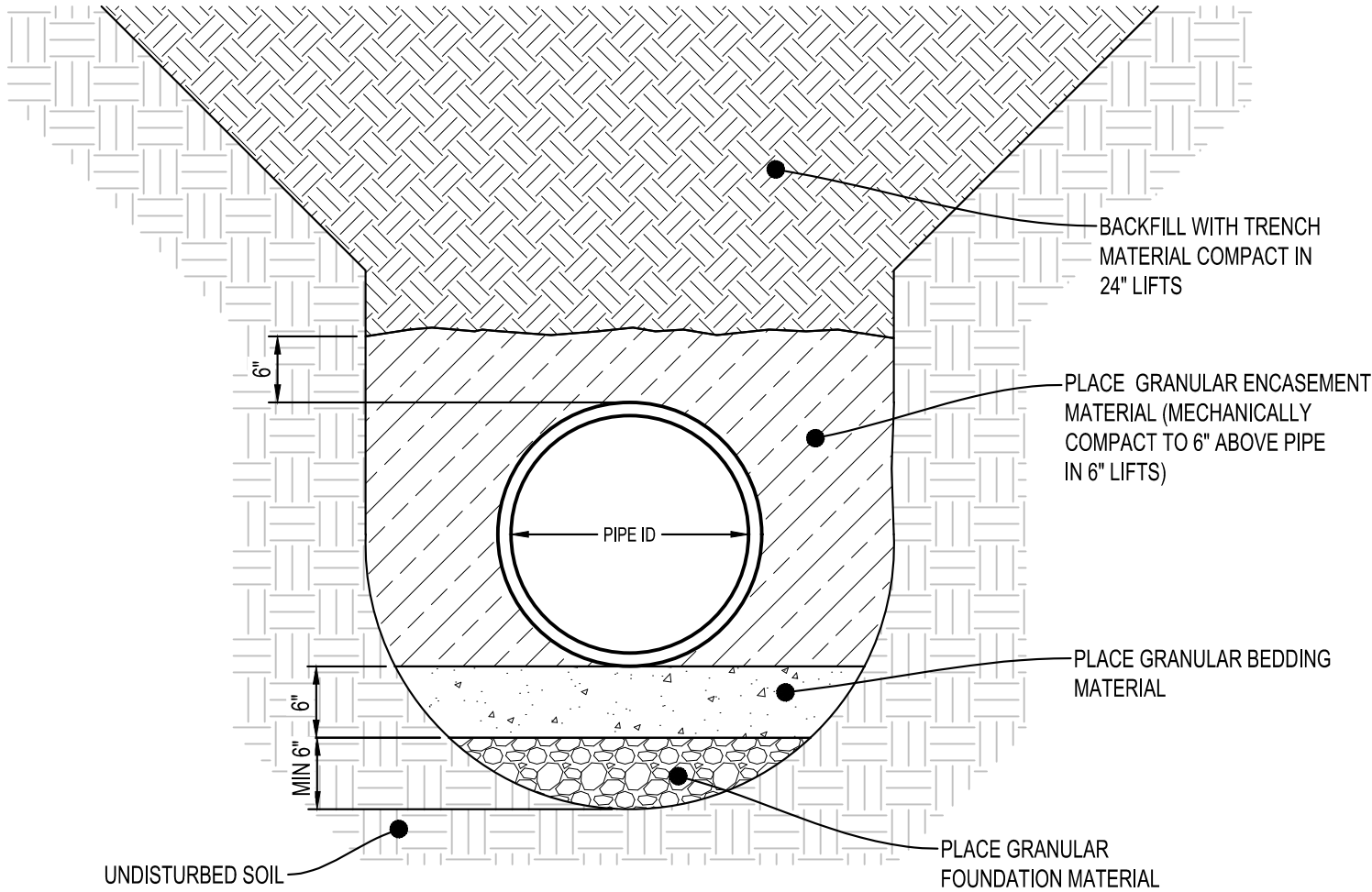
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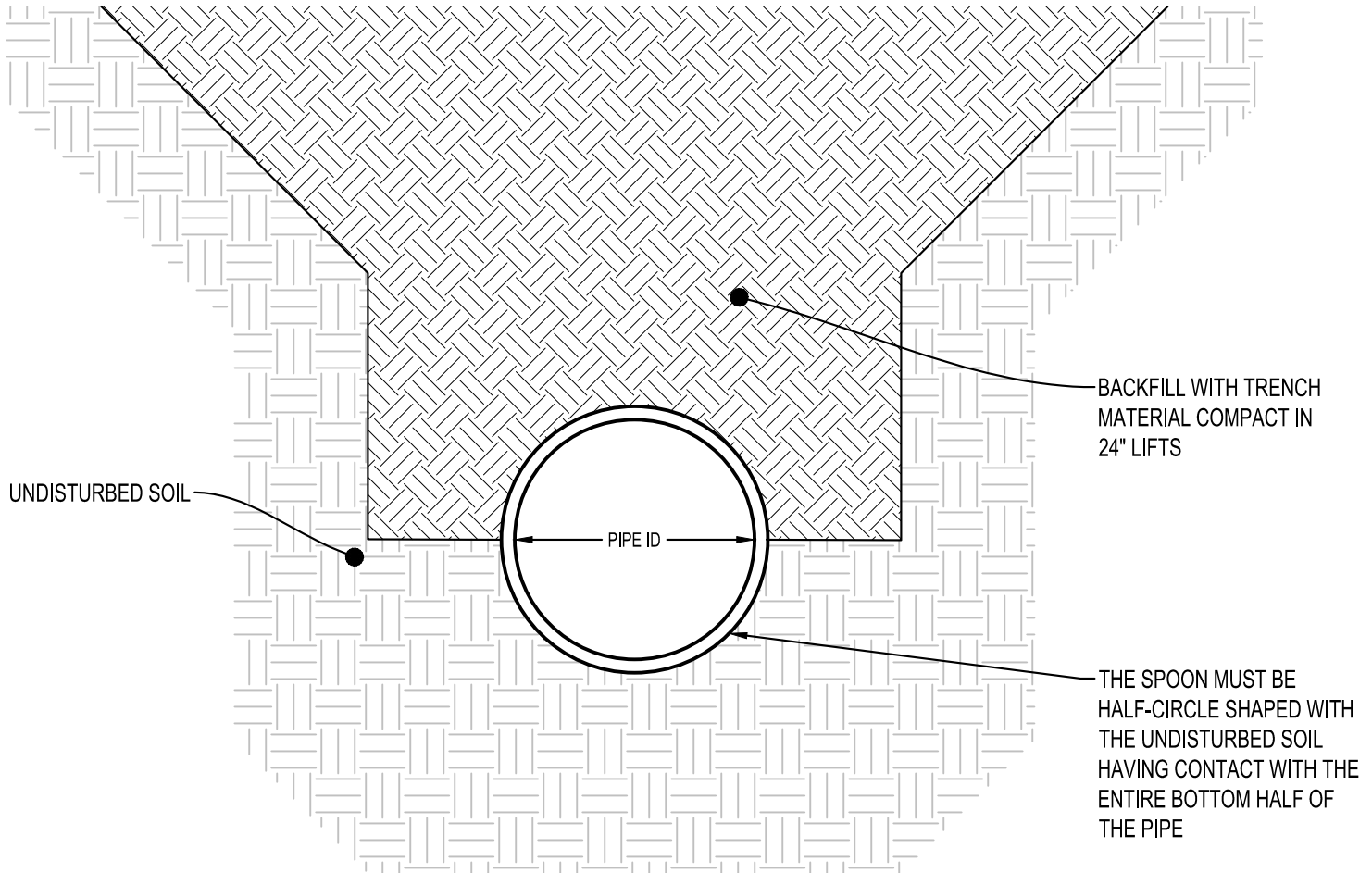


NOTE:

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GRANULAR FOUNDATION BELOW THE PIPE PAID FOR BY CUBIC YARD ONLY WHERE NEEDED AND APPROVED BY ENGINEER

**SPOON TRENCH
WITH GRANULAR FOUNDATION**

NTS AG115

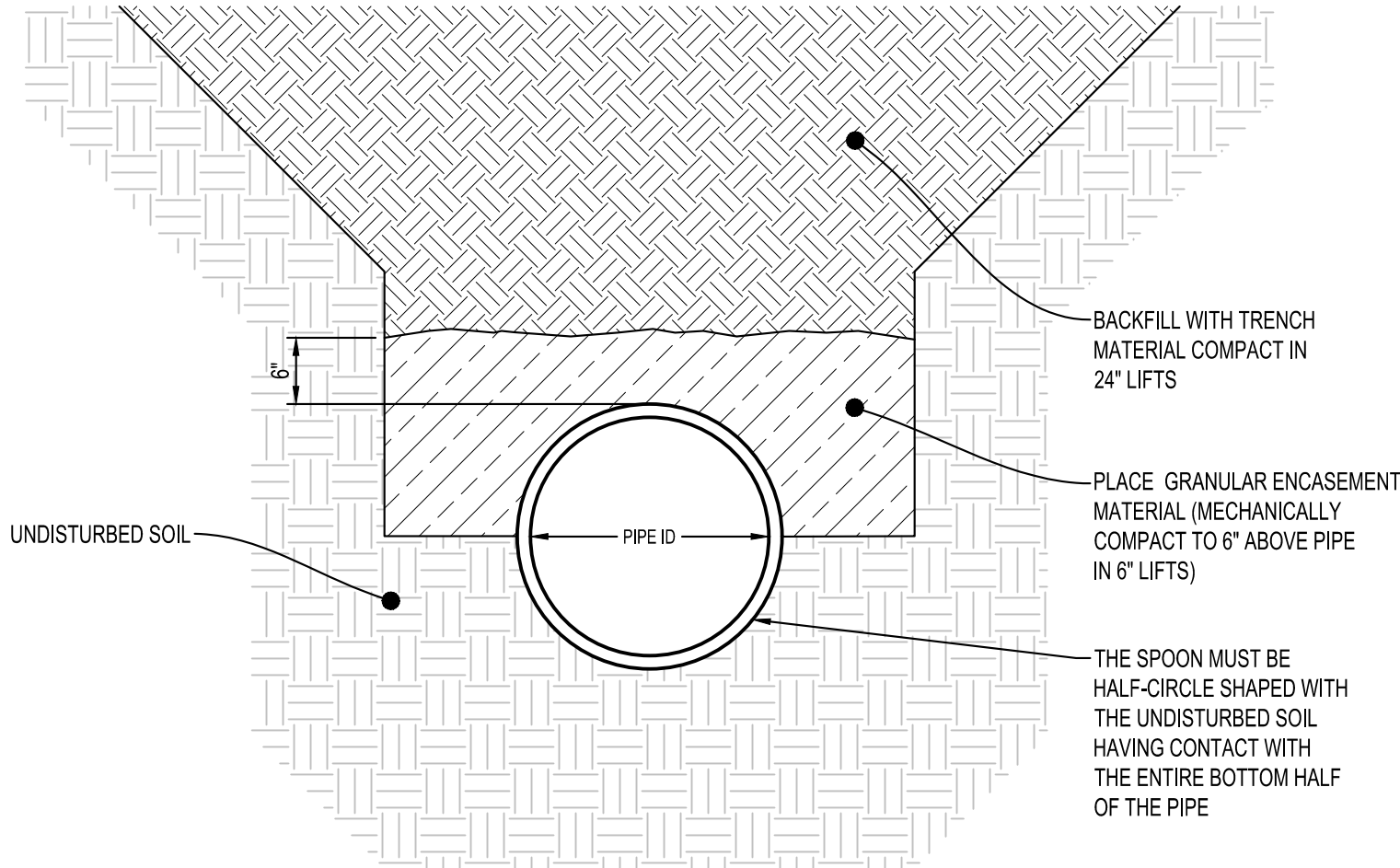


NOTE:

BACKFILL SHALL BE INCIDENTAL TO CONSTRUCTION
SPOON DIMENSIONS SHALL COMPLY WITH PIPE MANUFACTURER SPECIFICATIONS

**RCP SPOON
TRENCH BEDDING**

NTS AG120

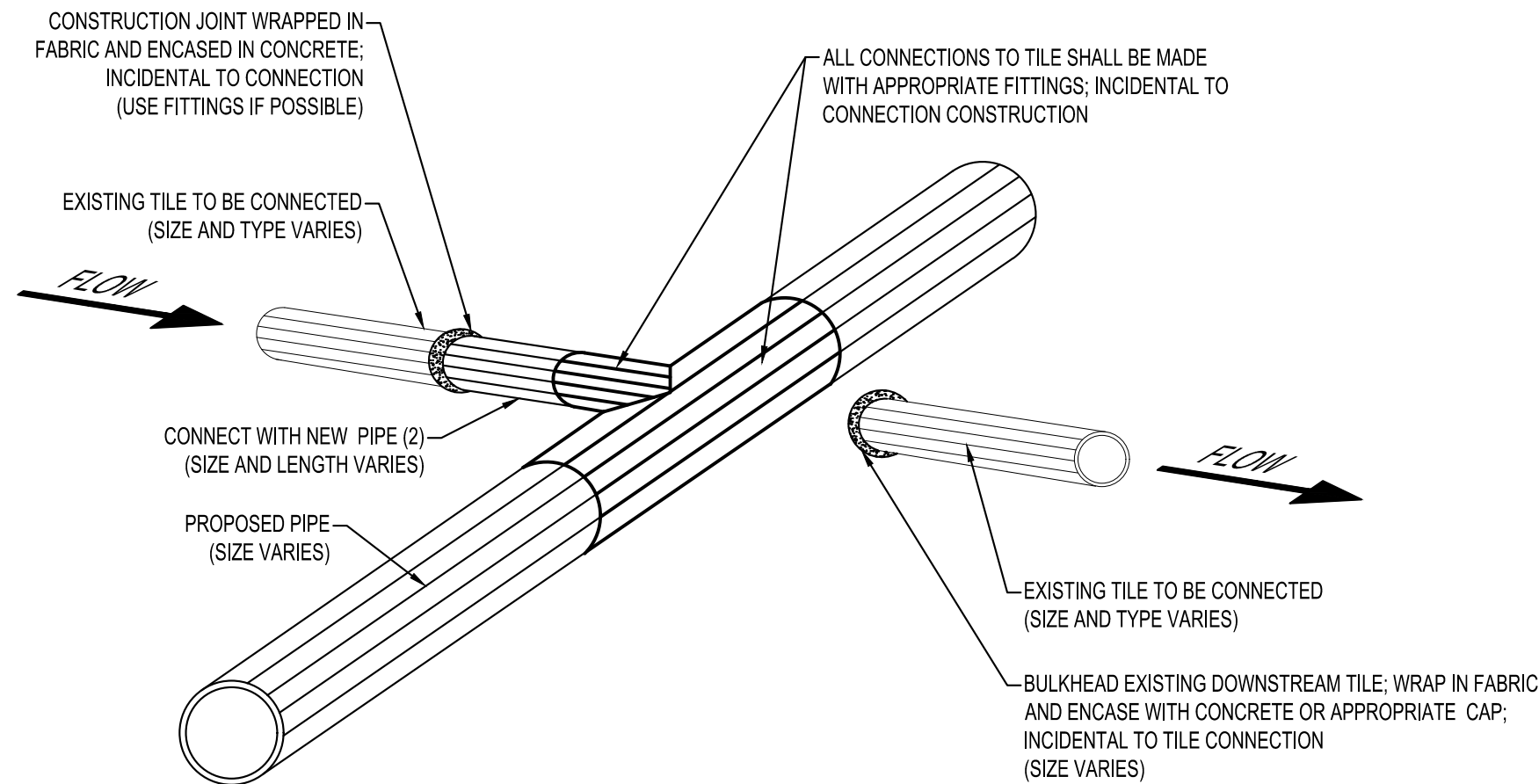


NOTE:

GRANULAR ENCASEMENT, AND BACKFILL SHALL BE INCIDENTAL TO CONSTRUCTION
SPOON DIMENSIONS SHALL COMPLY WITH PIPE MANUFACTURER SPECIFICATIONS

**HDPE SPOON
TRENCH BEDDING**

NTS AG125

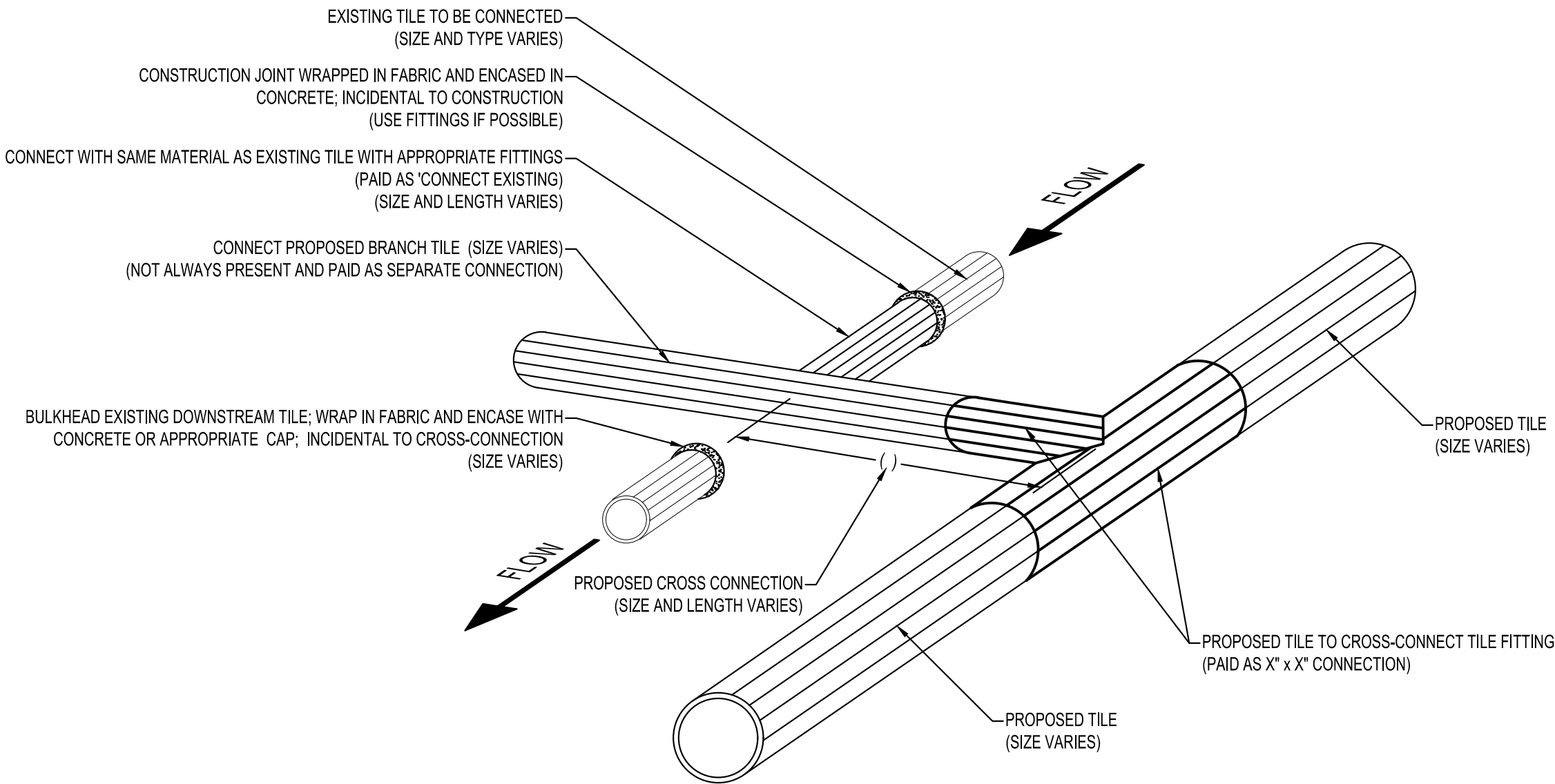


NOTE:

ALL TILE CONNECTIONS SHALL BE CONSTRUCTED WITH APPROPRIATE FITTINGS (INCIDENTAL TO CONNECTION)

ALL TILE CONNECTIONS SHALL NOT BE INSTALLED COMPLETELY VERTICAL FROM TOP OF PIPE AND SHALL BE PLACED SLIGHTLY OFF OF VERTICAL, WHERE ELEVATIONS ALLOW.

CONNECT TO EXISTING TILE
NTS AG200



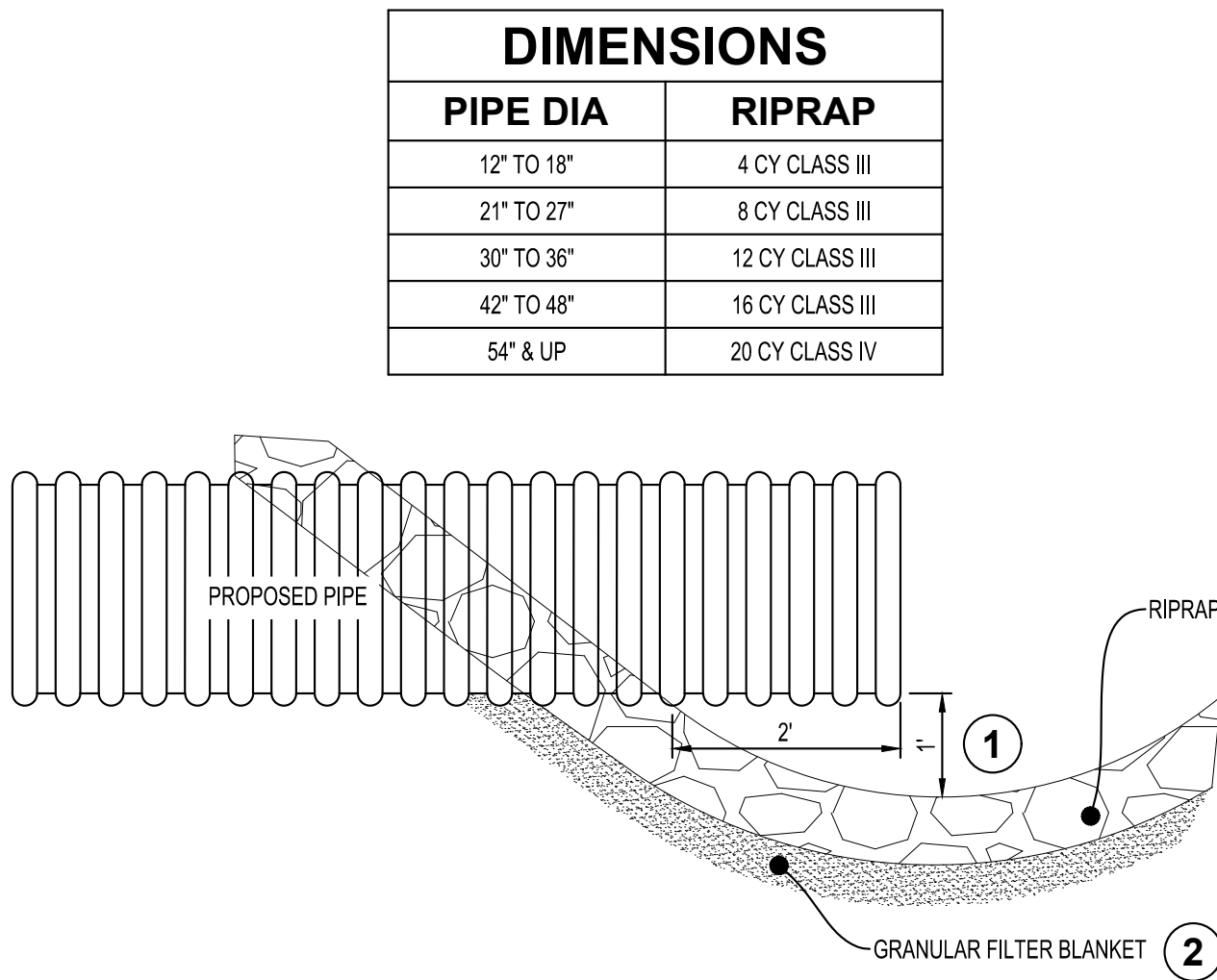
NOTES:

CROSS-CONNECT SHALL BE PAID FOR AS THREE (3) BID ITEMS: 'CONNECTION TO EXISTING TILE', 'LINEAR FOOTAGE OF NEW TILE', AND 'CONNECTION TO PROPOSED TILE'.

CLAY OR CONCRETE TILE SHALL BE CONNECTED BY INSTALLING DUAL WALL OVER OR INSIDE EXISTING TILE AND CONSTRUCTION JOINT INSTALLED WITH FABRIC

ALL TILE CONNECTIONS SHALL NOT BE INSTALLED COMPLETELY VERTICAL FROM TOP OF PIPE AND SHALL BE PLACED SLIGHTLY OFF OF VERTICAL, WHERE ELEVATIONS ALLOW.

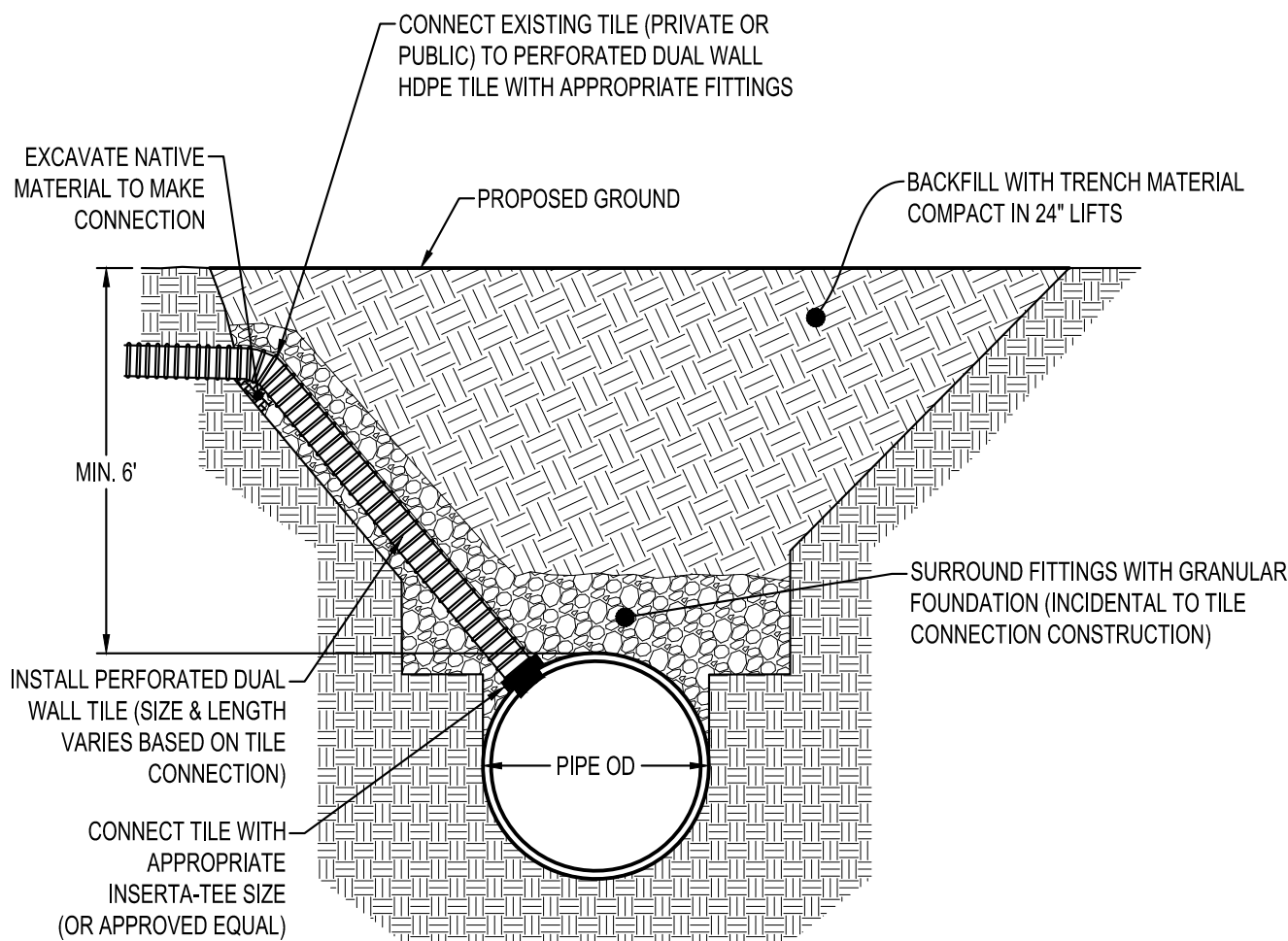
CROSS-CONNECT TO EXISTING TILE
NTS AG210



NOTES:

- 1' MIN. ABOVE RIPRAP. FOR PIPES GREATER THAN OR EQUAL TO 30", USE 1.5' - 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



NOTES:

TILE LENGTH SHALL BE INCIDENTAL TO TILE CONNECTION

INSERTA-TEE (OR APPROVED EQUAL) SHALL BE INCIDENTAL TO TILE CONNECTION

DEEP TILE CONNECTION DETAIL
NTS AG240



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FARIBAUT & MARTIN COUNTY

JUDICAL DITCH No. 4 IMPROVEMENT

JO DAVIESS TWP & PLEASANT TWP MINNESOTA

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DATE	DESCRIPTION	BY

PROJECT NO.	17-20105
FILE NAME	20105 DETAILS
DRAWN BY	LME
DESIGNED BY	JMD
REVIEWED BY	MAO
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DETAILS

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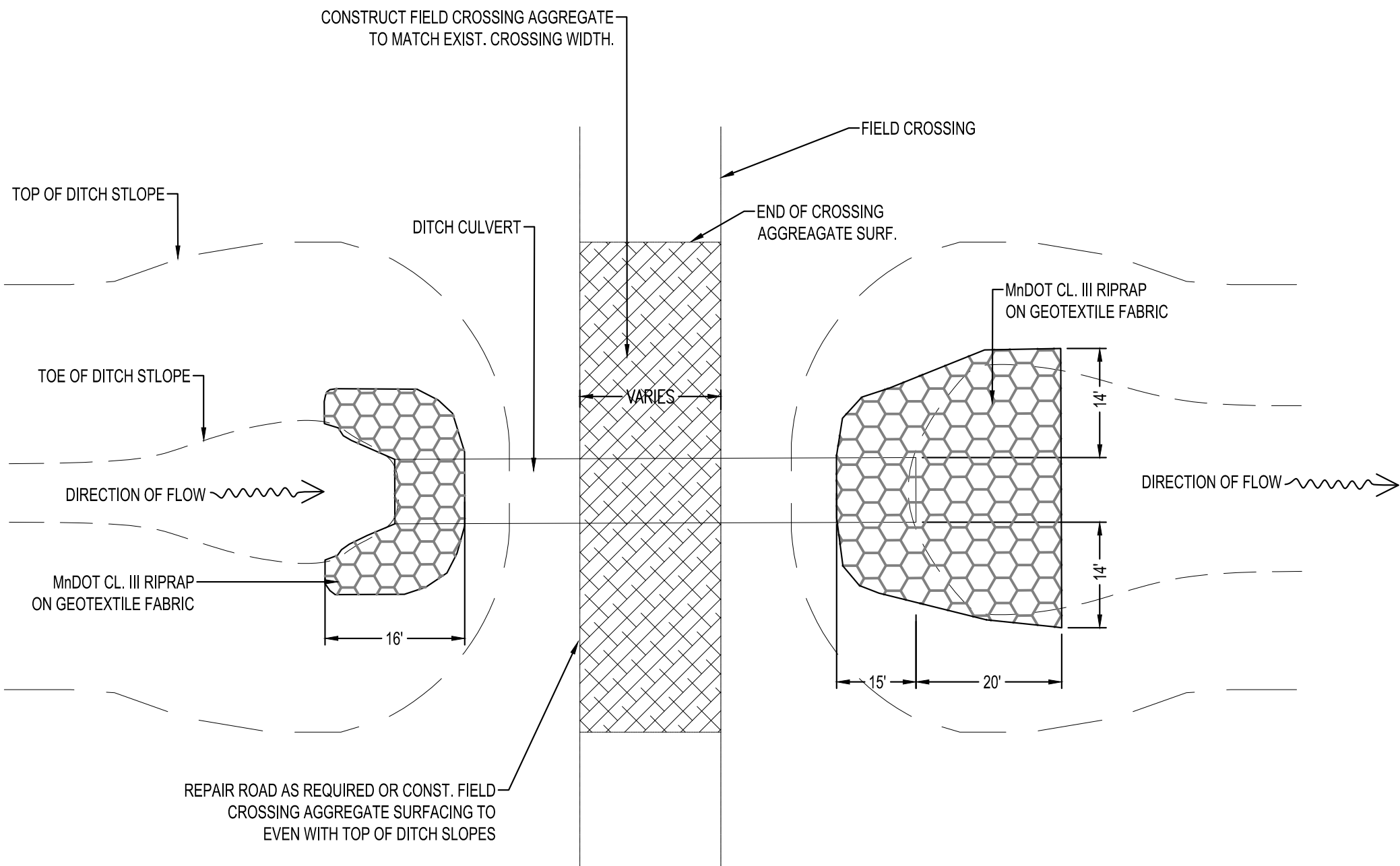
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DETAILS

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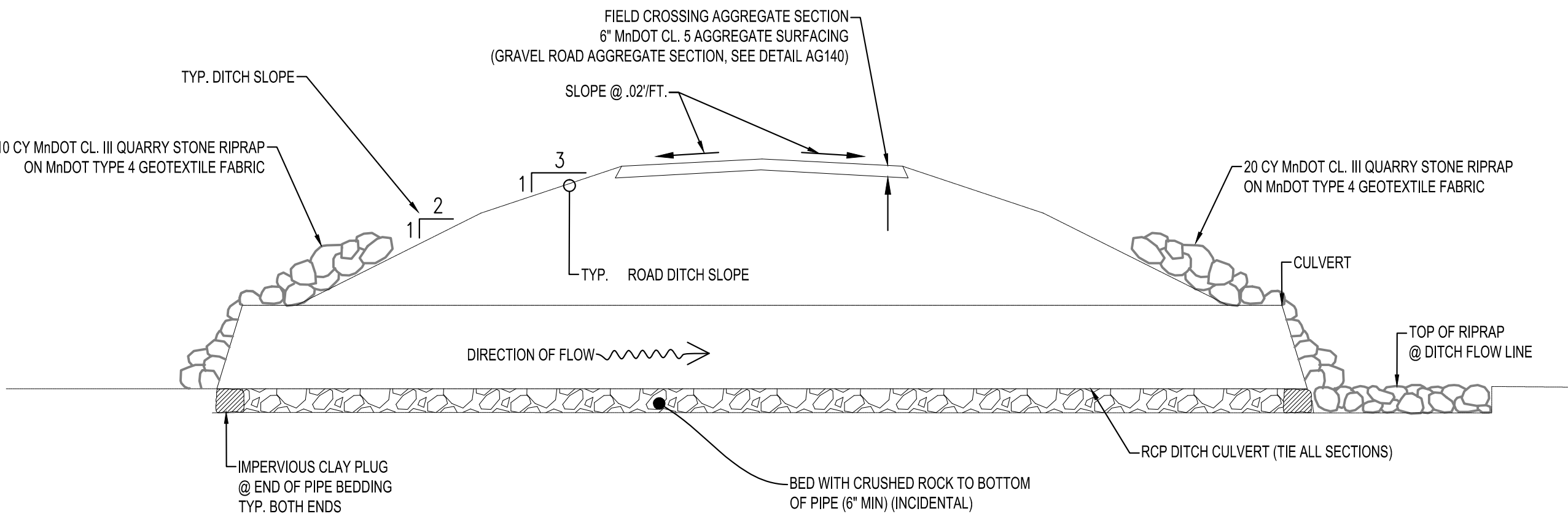
OF 15



TYPICAL FIELD CROSSING

NTS

- NOTES:
1. OPEN DITCH CULVERTS MUST BE WATERTIGHT, GASKETED, AND TONGUE AND GROOVE DESIGN. CONFORM TO MnDOT 3006F.
 2. SEE TYPICAL ROAD SECTION DETAIL (AG140)
 3. GRAVEL ROAD RESTORATION PAID SEPARATE TO CULVERT RESTORATION.
 4. AGGREGATE SURFACE IS INCIDENTAL TO CROSSING OR ROAD RESTORATION.
 5. TIE ALL RCP PIPE SECTIONS (INCIDENTAL TO CROSSING)

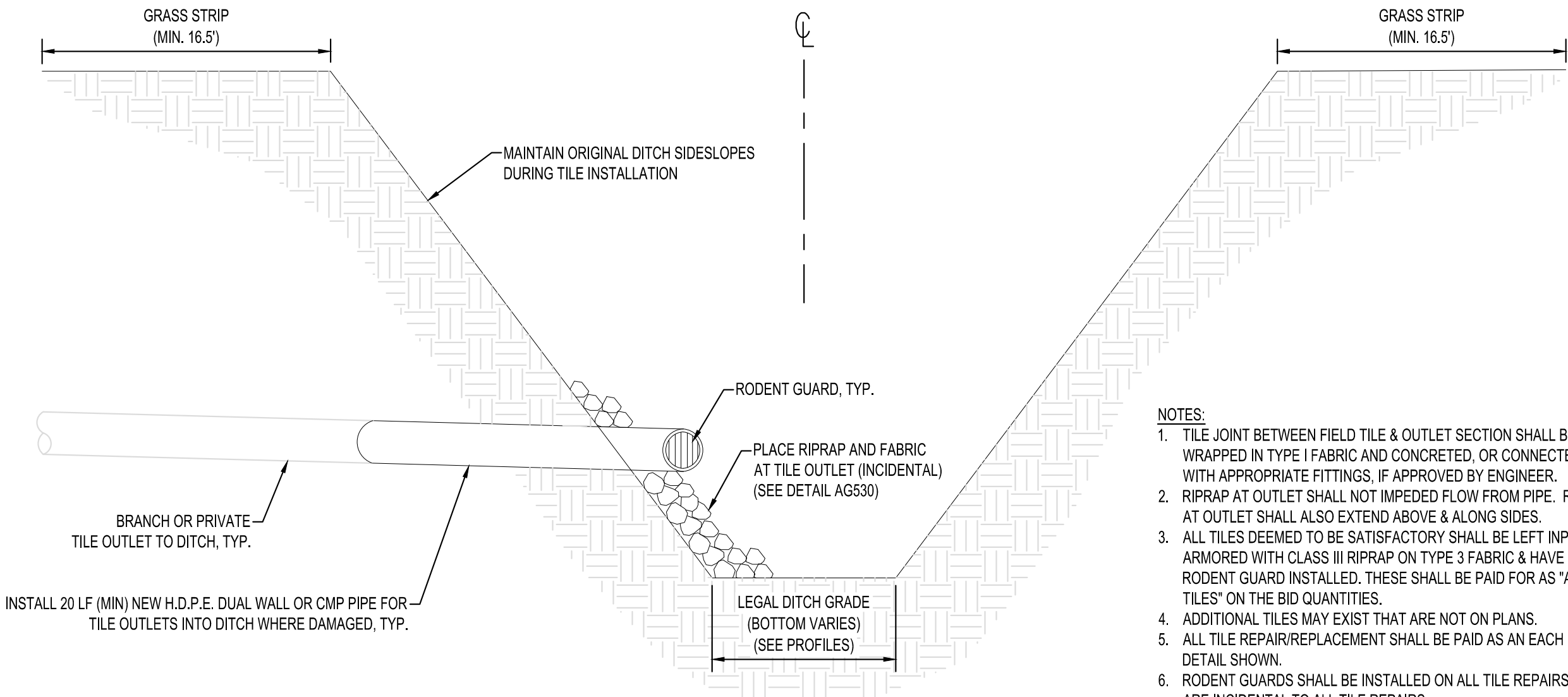


TYPICAL GRAVEL ROAD AND FIELD CROSSING SECTION

NTS

AG610

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

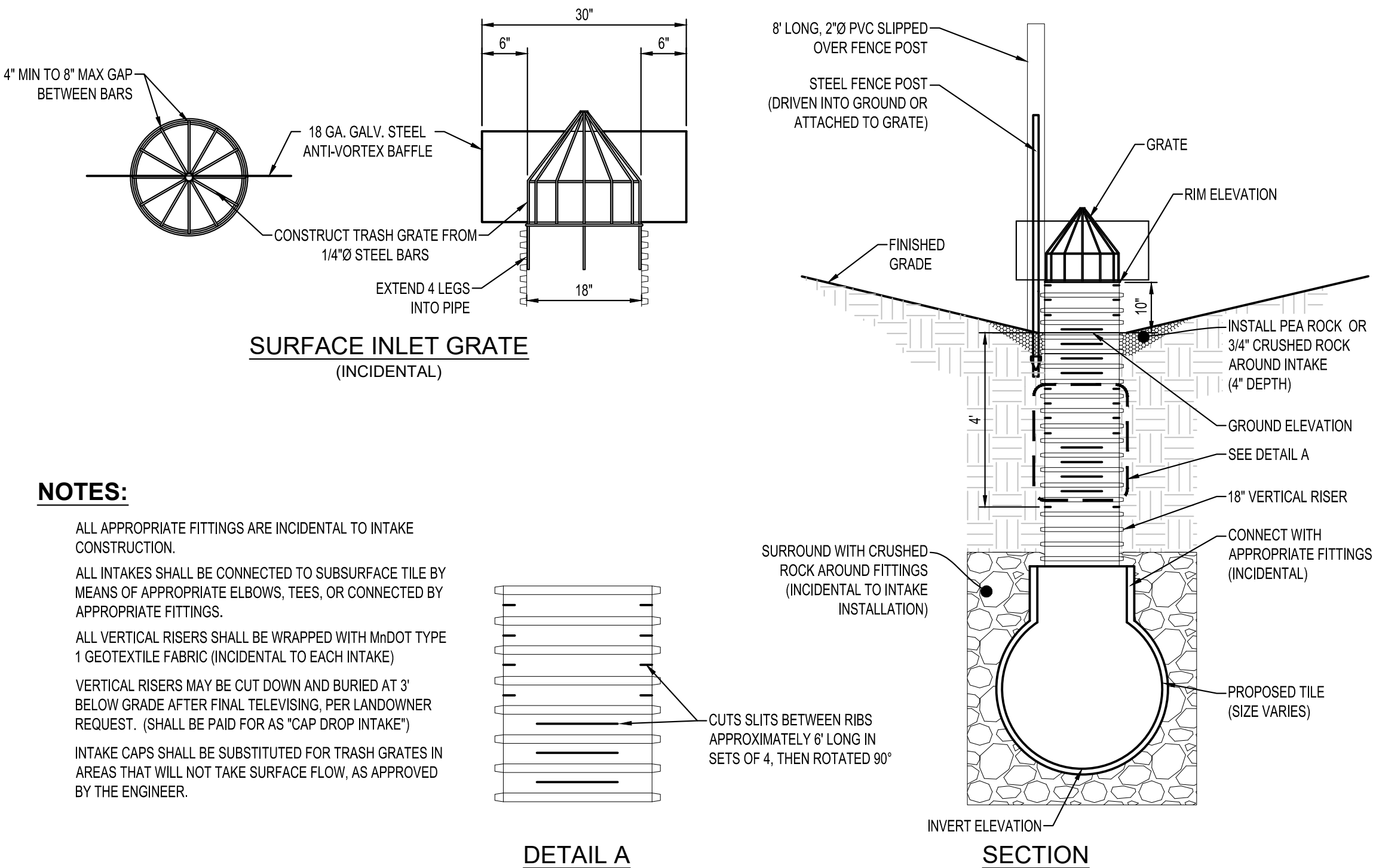


TYPICAL TILE OUTLET REPAIR

NTS

AG440

- NOTES:
1. TILE JOINT BETWEEN FIELD TILE & OUTLET SECTION SHALL BE WRAPPED IN TYPE I FABRIC AND CONCRETED, OR CONNECTED WITH APPROPRIATE FITTINGS, IF APPROVED BY ENGINEER.
 2. RIPRAP AT OUTLET SHALL NOT IMPEDED FLOW FROM PIPE. RIPRAP AT OUTLET SHALL ALSO EXTEND ABOVE & ALONG SIDES.
 3. ALL TILES DEEMED TO BE 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 "ARMOR TILES" ON THE BID QUANTITIES.
 4. ADDITIONAL TILES MAY EXIST THAT ARE NOT ON PLANS.
 5. ALL TILE REPAIR/REPLACEMENT SHALL BE PAID AS AN EACH PER DETAIL SHOWN.
 6. RODENT GUARDS SHALL BE INSTALLED ON ALL TILE REPAIRS, AND ARE INCIDENTAL TO ALL TILE REPAIRS.



**SURFACE INLET GRATE
(INCIDENTAL)**

NOTES:

- ALL APPROPRIATE FITTINGS ARE INCIDENTAL TO INTAKE CONSTRUCTION.
- ALL INTAKES SHALL BE CONNECTED TO SUBSURFACE TILE BY MEANS OF APPROPRIATE ELBOWS, TEES, OR CONNECTED BY APPROPRIATE FITTINGS.
- ALL VERTICAL RISERS SHALL BE WRAPPED WITH MnDOT TYPE 1 GEOTEXTILE FABRIC (INCIDENTAL TO EACH INTAKE)
- VERTICAL RISERS MAY BE CUT DOWN AND BURIED AT 3' BELOW GRADE AFTER FINAL TELEVISION, PER LANDOWNER REQUEST. (SHALL BE PAID FOR AS "CAP DROP INTAKE")
- INTAKE CAPS SHALL BE SUBSTITUTED FOR TRASH GRATES IN AREAS THAT WILL NOT TAKE SURFACE FLOW, AS APPROVED BY THE ENGINEER.

DETAIL A

DROP INTAKE

NTS

AG320



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PROJECT

FARIBAUT & MARTIN COUNTY

JUDICAL DITCH No. 4 IMPROVEMENT

JO DAVIESS TWP & PLEASANT TWP MINNESOTA

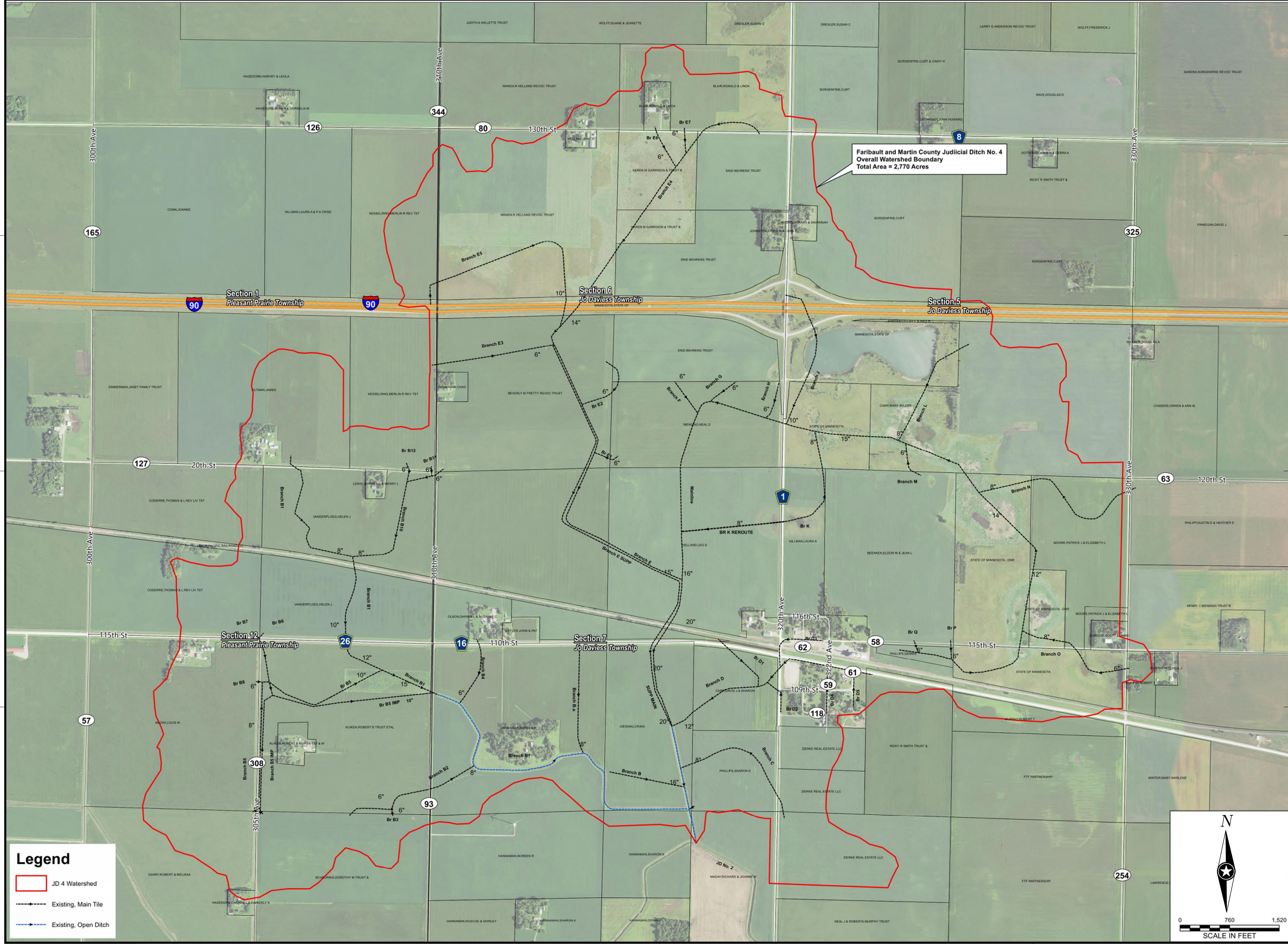
REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	17-20105
FILE NAME	20105 WATERSHED
DRAWN BY	LME
DESIGNED BY	JMD
REVIEWED BY	MAO
ORIGINAL ISSUE DATE	11-1-17
CLIENT PROJECT NO.	-

TITLE

EXISTING WATERSHED

SHEET

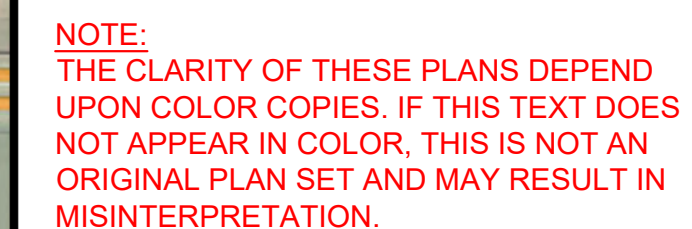


Legend

JD 4 Watershed

Existing, Main Tile

Existing, Open Ditch



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PROJECT

JUDICAL DITCH No 4 IMPROVEMENT

JO DAVIESS TWP & PLEASANT TWP MINNESOTA

[illegible]

PROJECT NO.	17-20105
FILE NAME	20105 WATERSHED
DRAWN BY	LME
DESIGNED BY	JMD
REVIEWED BY	MAO
ORIGINAL ISSUE DATE	--/--/--
CLIENT PROJECT NO.	-

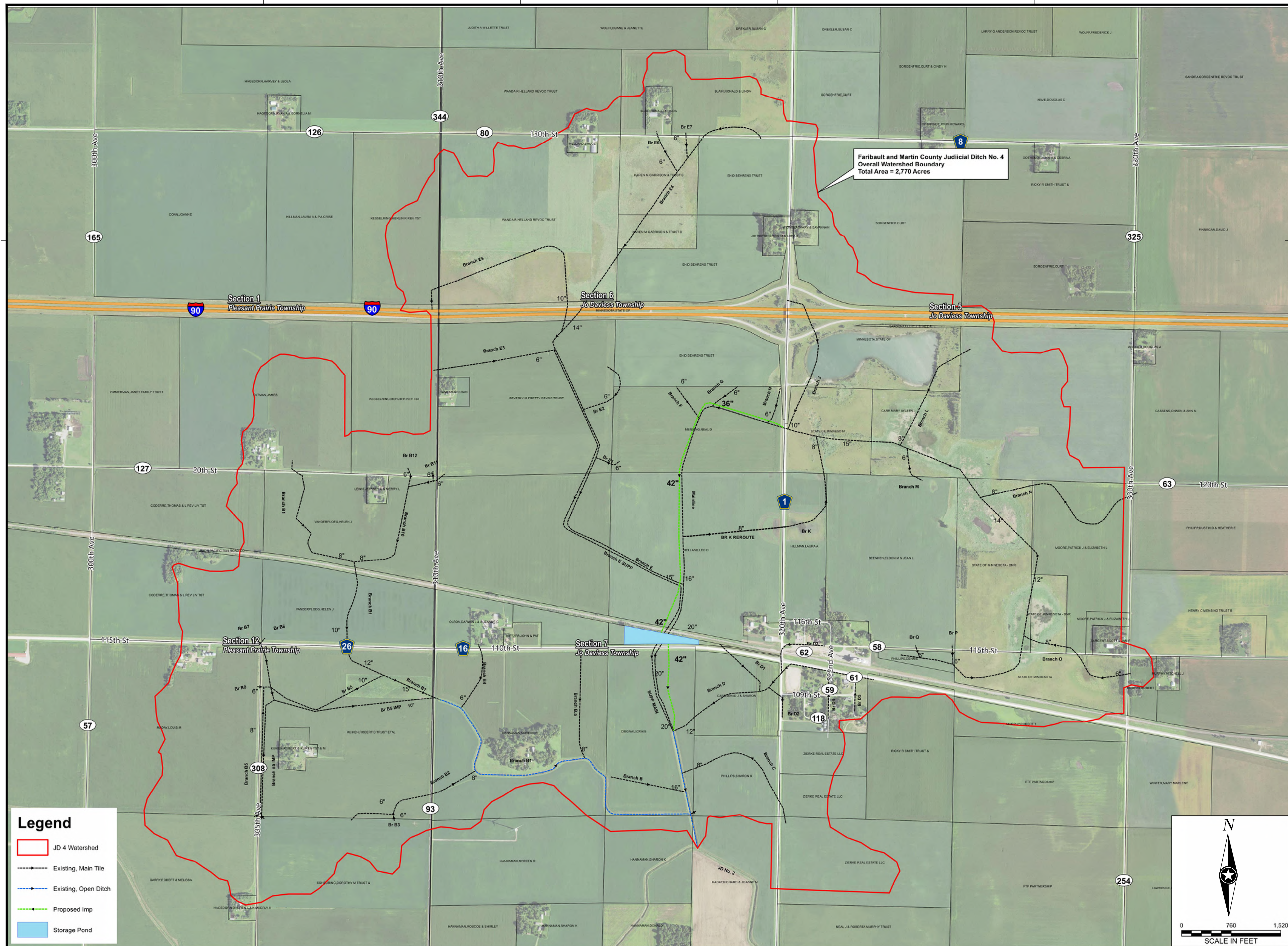
TITTLE

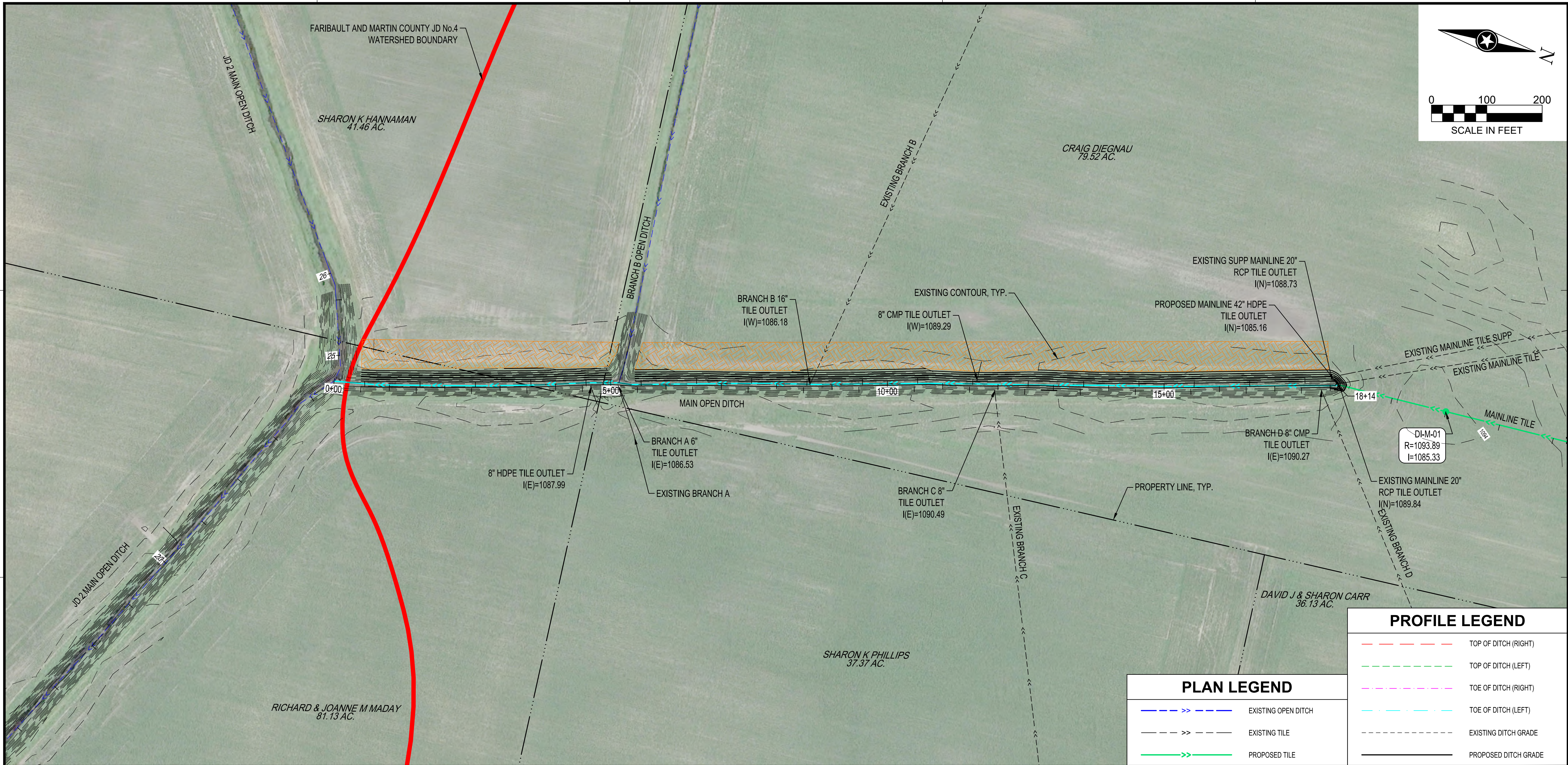
OVERALL PROPOSED WATERSHED

SHEET

8

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PROJECT

**FARIBAULT &
MARTIN COUNTY**
**JUDICAL DITCH No.
4 IMPROVEMENT**

JO DAVIESS TWP & PLEASANT TWP MINNESOTA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

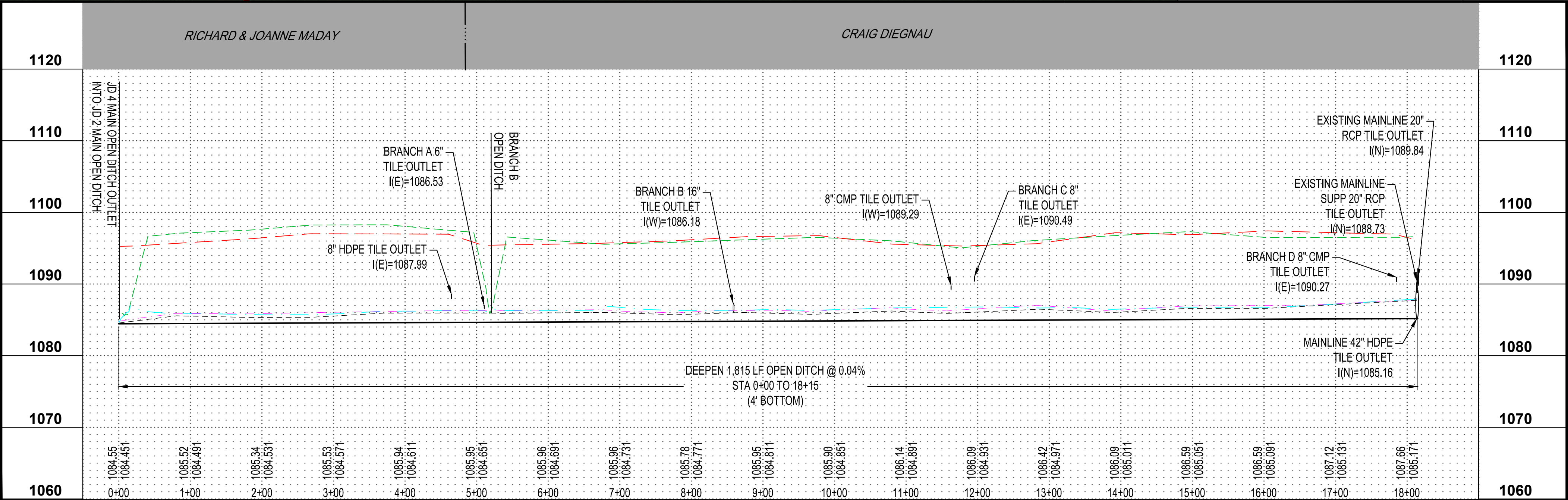
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FILE NAME	20105 PROF (MAIN OPEN DITCH)-1
DRAWN BY	LME
DESIGNED BY	JMD
REVIEWED BY	MAO
ORIGINAL ISSUE DATE	11-1-17
CLIENT PROJECT NO.	-

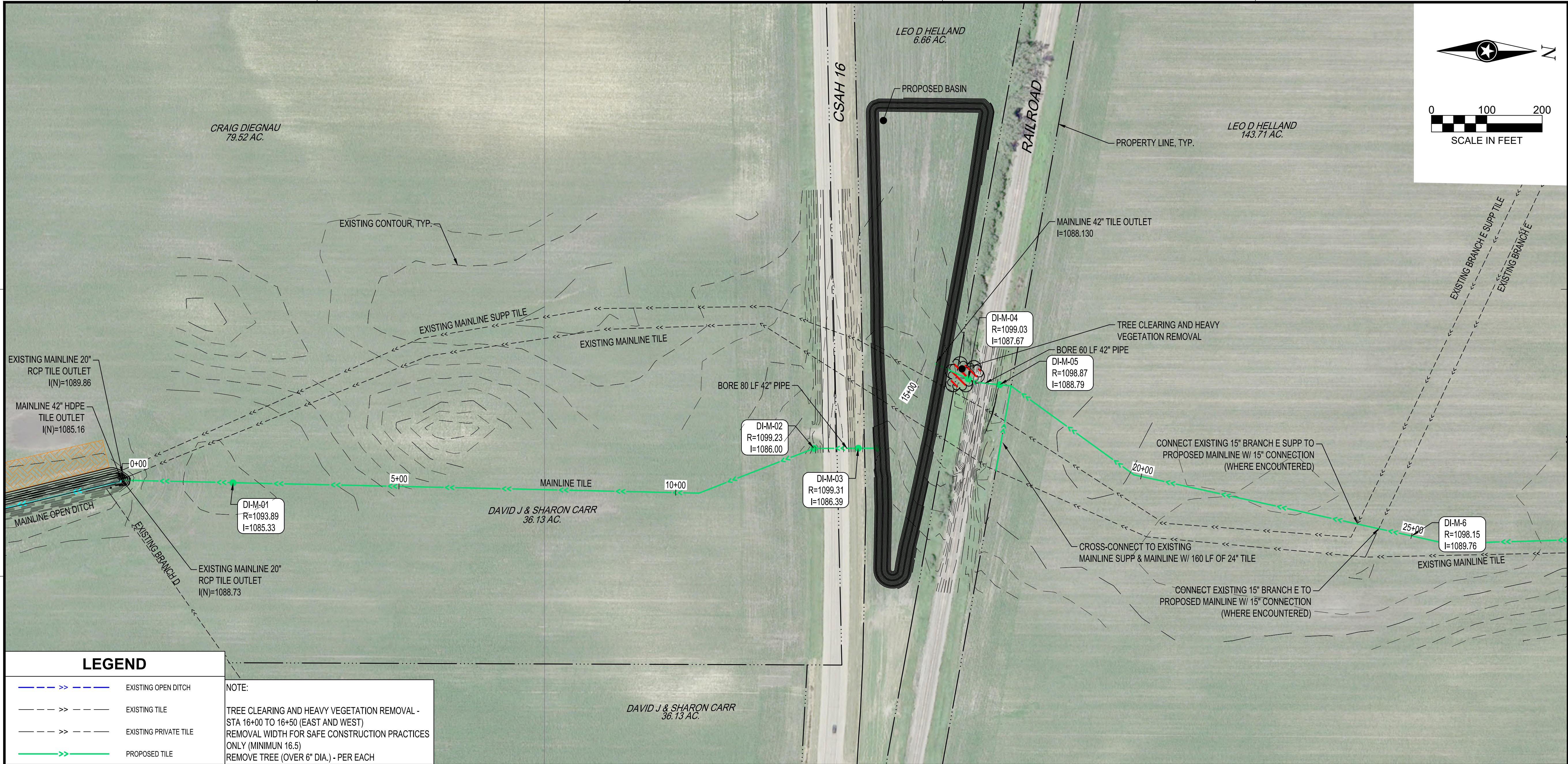
TITLE
**MAINLINE OPEN
DITCH PLAN &
PROFILE**

SHEET

PLAN LEGEND	
	EXISTING OPEN DITCH
	EXISTING TILE
	PROPOSED TILE

PROFILE LEGEND	
	TOP OF DITCH (RIGHT)
	TOP OF DITCH (LEFT)
	TOE OF DITCH (RIGHT)
	TOE OF DITCH (LEFT)
	EXISTING DITCH GRADE
	PROPOSED DITCH GRADE





LEGEND

- EXISTING OPEN DITCH
- EXISTING TILE
- EXISTING PRIVATE TILE
- PROPOSED TILE

NOTE:
TREE CLEARING AND HEAVY VEGETATION REMOVAL - STA 16+00 TO 16+50 (EAST AND WEST)
REMOVAL WIDTH FOR SAFE CONSTRUCTION PRACTICES ONLY (MINIMUM 16.5)
REMOVE TREE (OVER 6" DIA.) - PER EACH

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PROJECT

FARIBAULT & MARTIN COUNTY

JUDICIAL DITCH No. 4 IMPROVEMENT

JO DAVIESS TWP & PLEASANT TWP MINNESOTA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	17-20105
FILE NAME	20105 PROF (MAINLINE)
DRAWN BY	LME
DESIGNED BY	JMD
REVIEWED BY	MAO
ORIGINAL ISSUE DATE	11-1-17
CLIENT PROJECT NO.	-

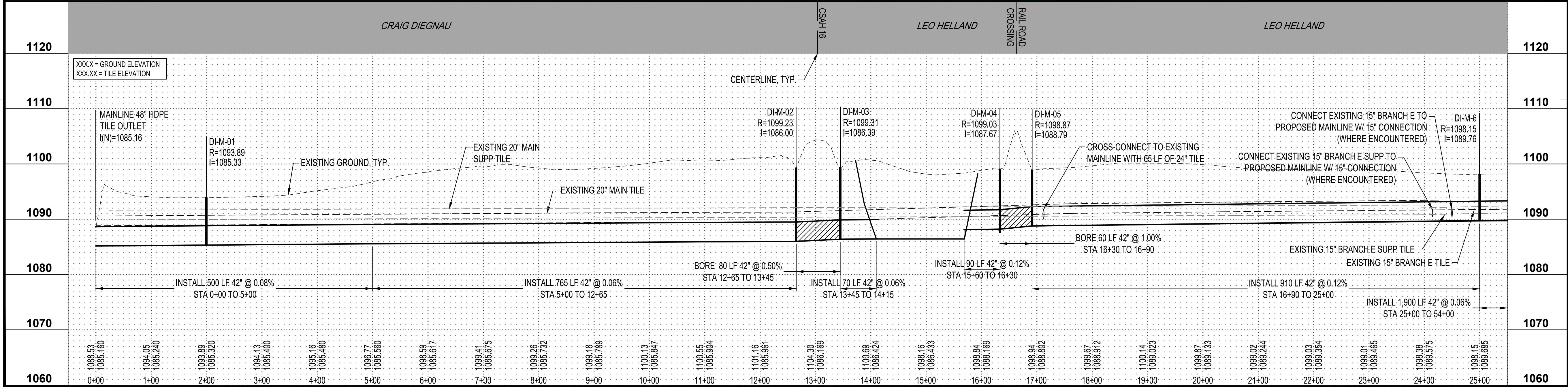
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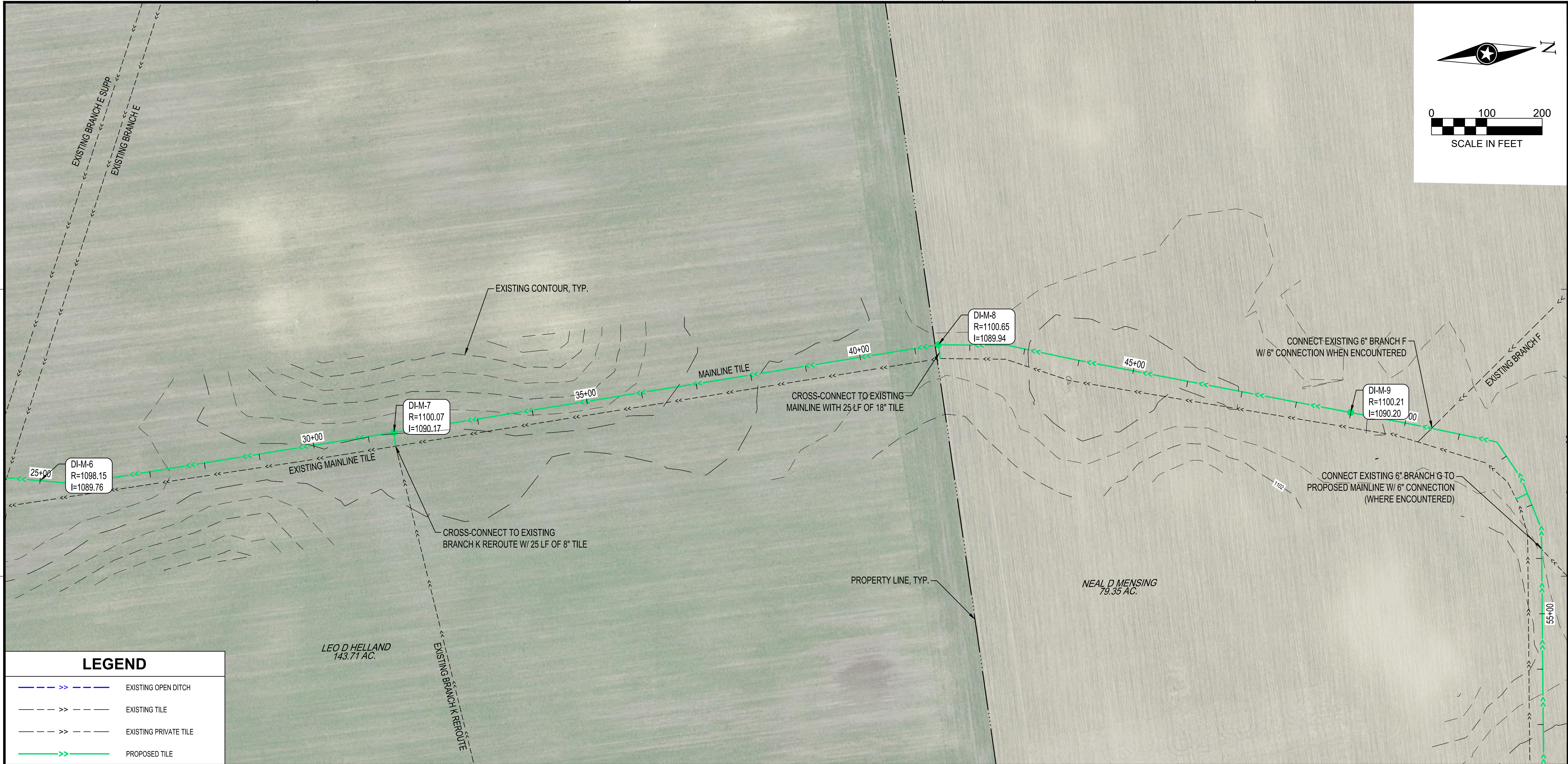
MAINLINE TILE PLAN & PROFILE

00+00 to 25+50

SHEET

10 OF 15





SCALE IN FEET

ISG

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PROJECT

**FARIBAUT &
MARTIN COUNTY**

**JUDICAL DITCH No.
4 IMPROVEMENT**

JO DAVIESS TWP & PLEASANT TWP MINNESOTA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	17-20105
FILE NAME	20105 PROF (MAINLINE)
DRAWN BY	LME
DESIGNED BY	JMD
REVIEWED BY	MAO
ORIGINAL ISSUE DATE	11-1-17
CLIENT PROJECT NO.	-

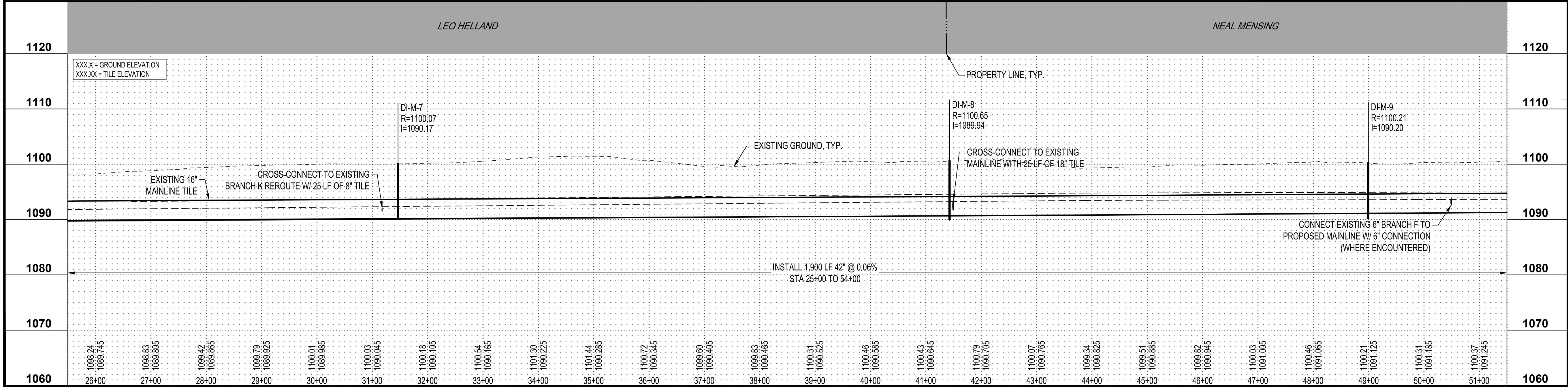
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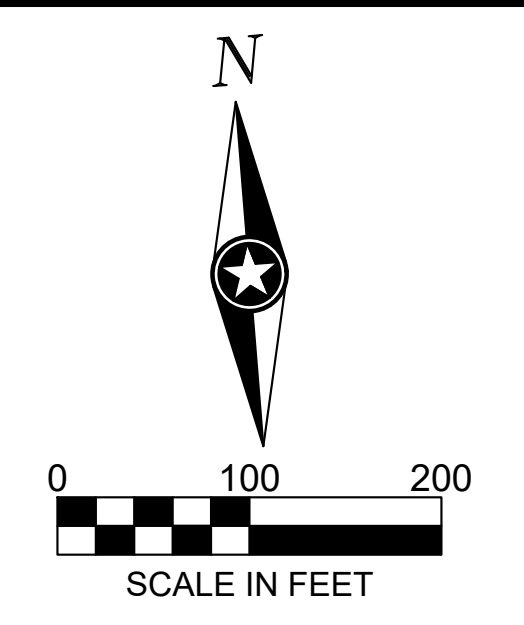
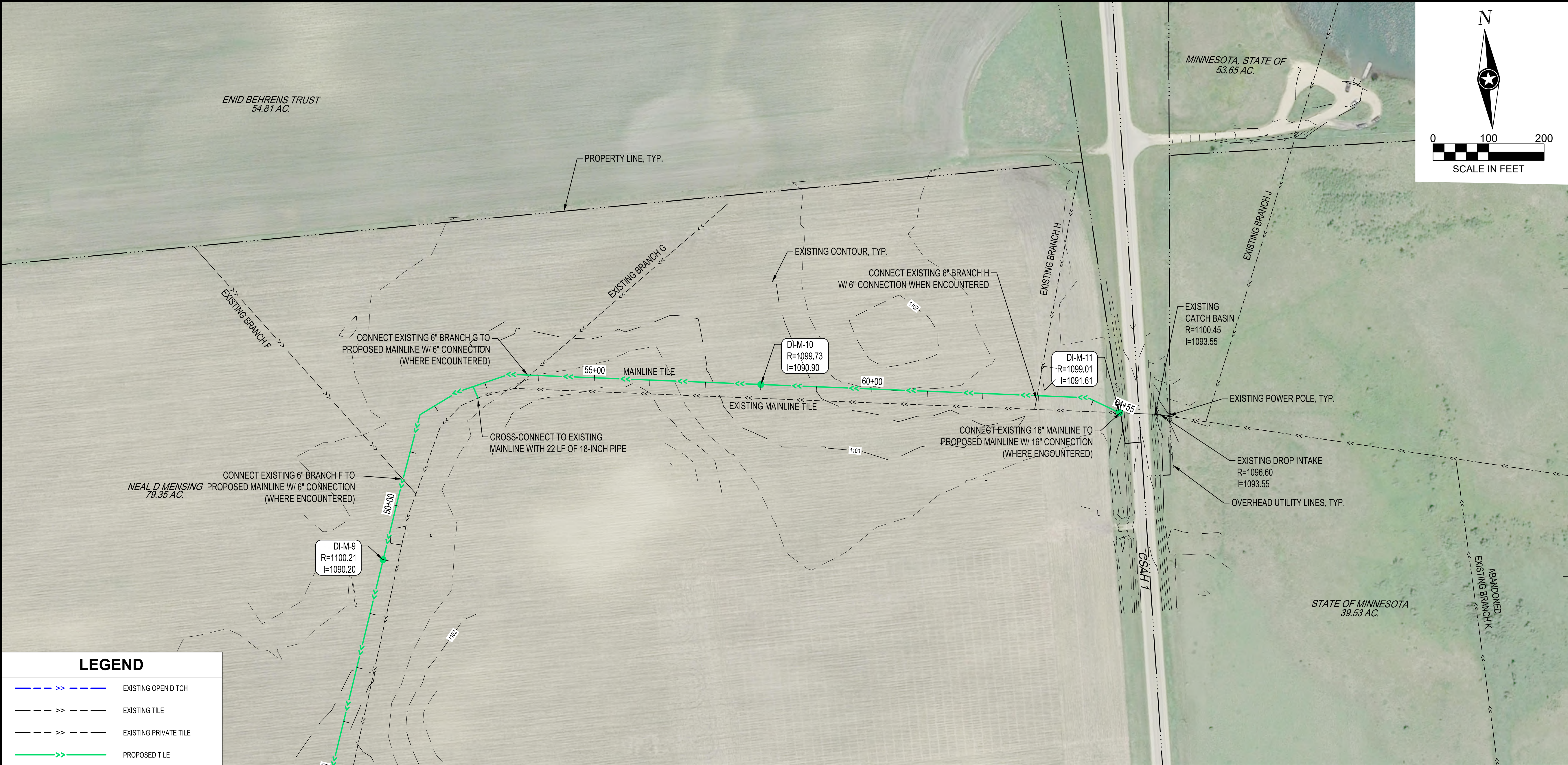
**MAINLINE TILE
PLAN & PROFILE
25+50 to 51+50**

SHEET

11

OF 15





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PROJECT
**FARIBAUT &
MARTIN COUNTY**
**JUDICAL DITCH No.
4 IMPROVEMENT**

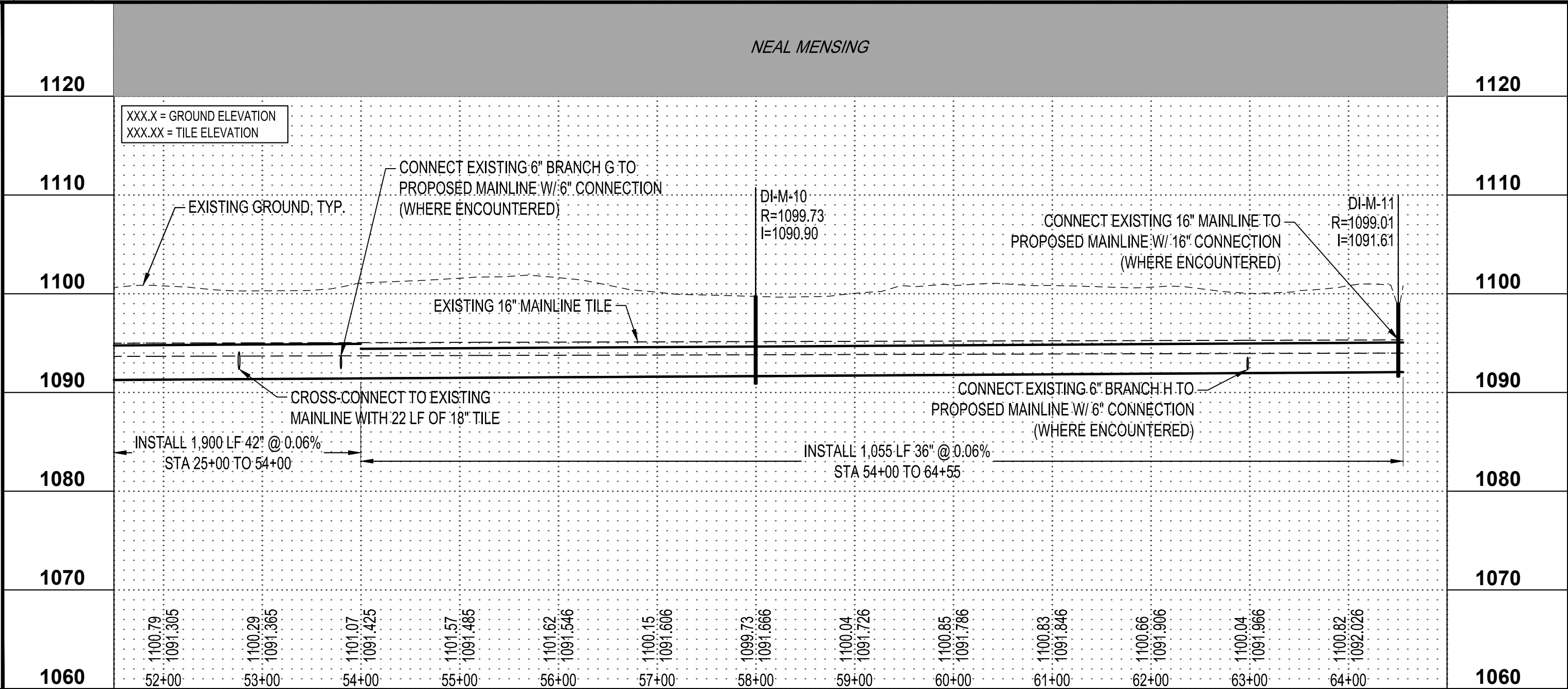
JO DAVIESS TWP & PLEASANT TWP MINNESOTA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	17-20105
FILE NAME	20105 PROF (MAINLINE)
DRAWN BY	LME
DESIGNED BY	JMD
REVIEWED BY	MAO
ORIGINAL ISSUE DATE	11-1-17
CLIENT PROJECT NO.	-

TITLE
**MAINLINE TILE
PLAN & PROFILE
51+50 to 65+00**

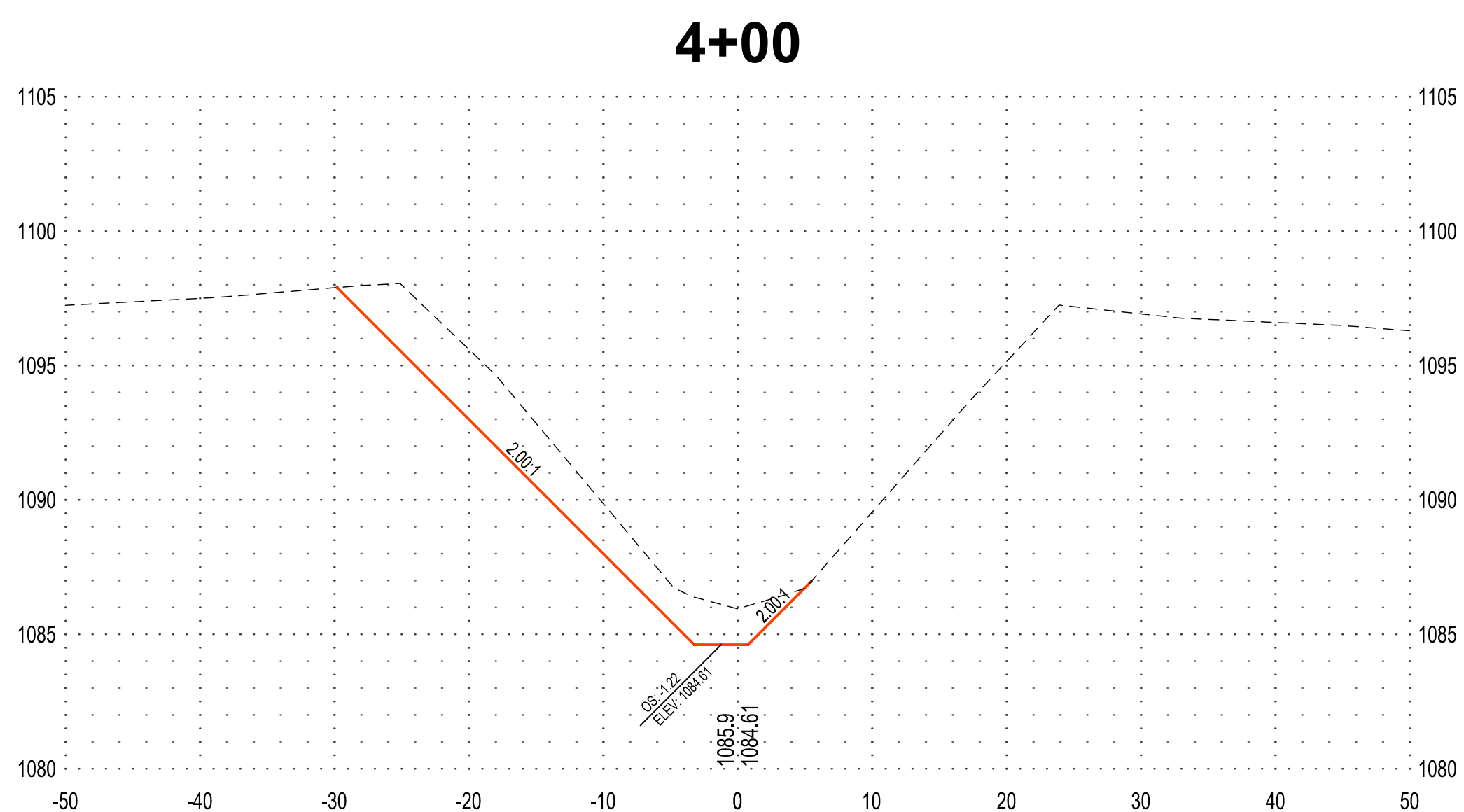
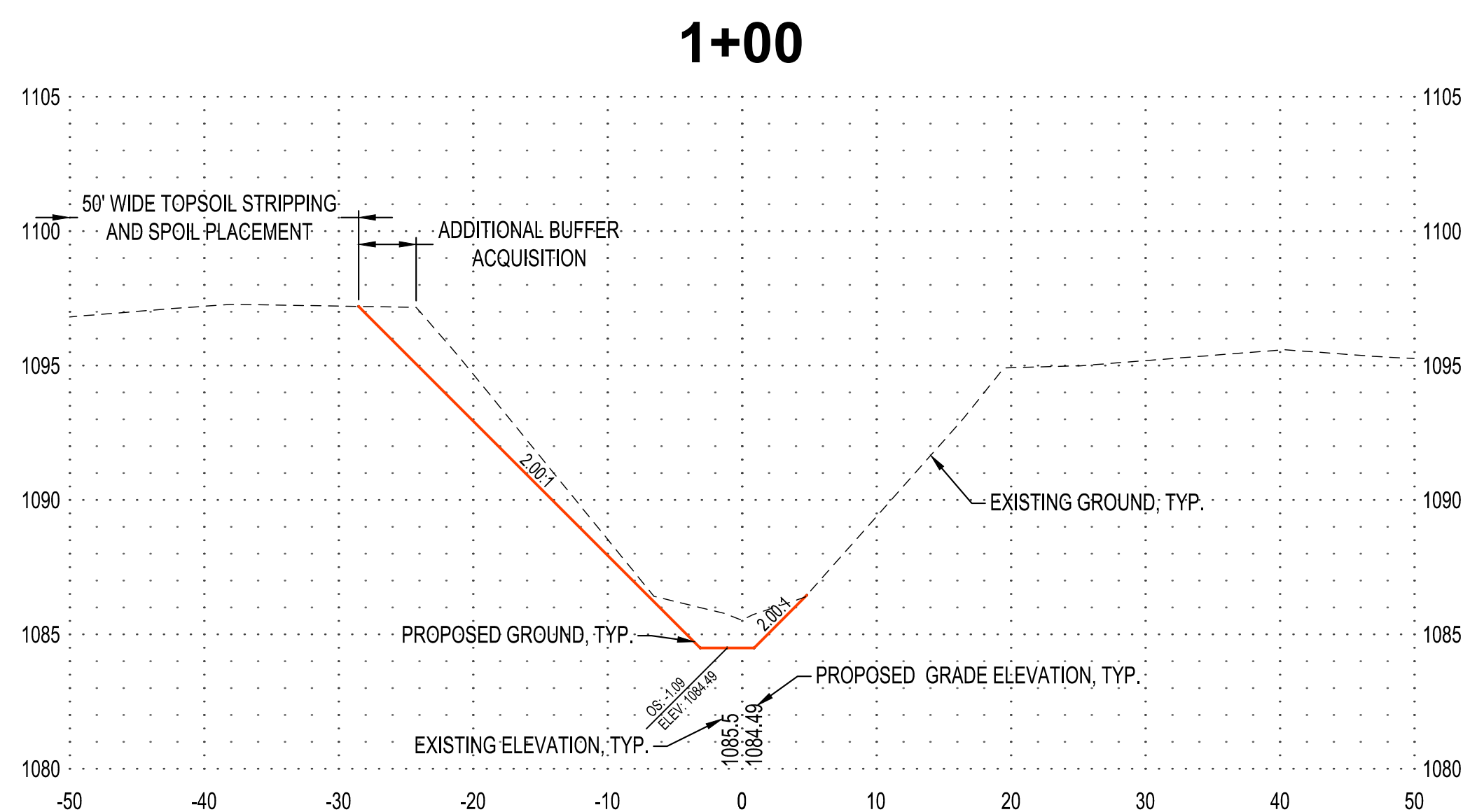
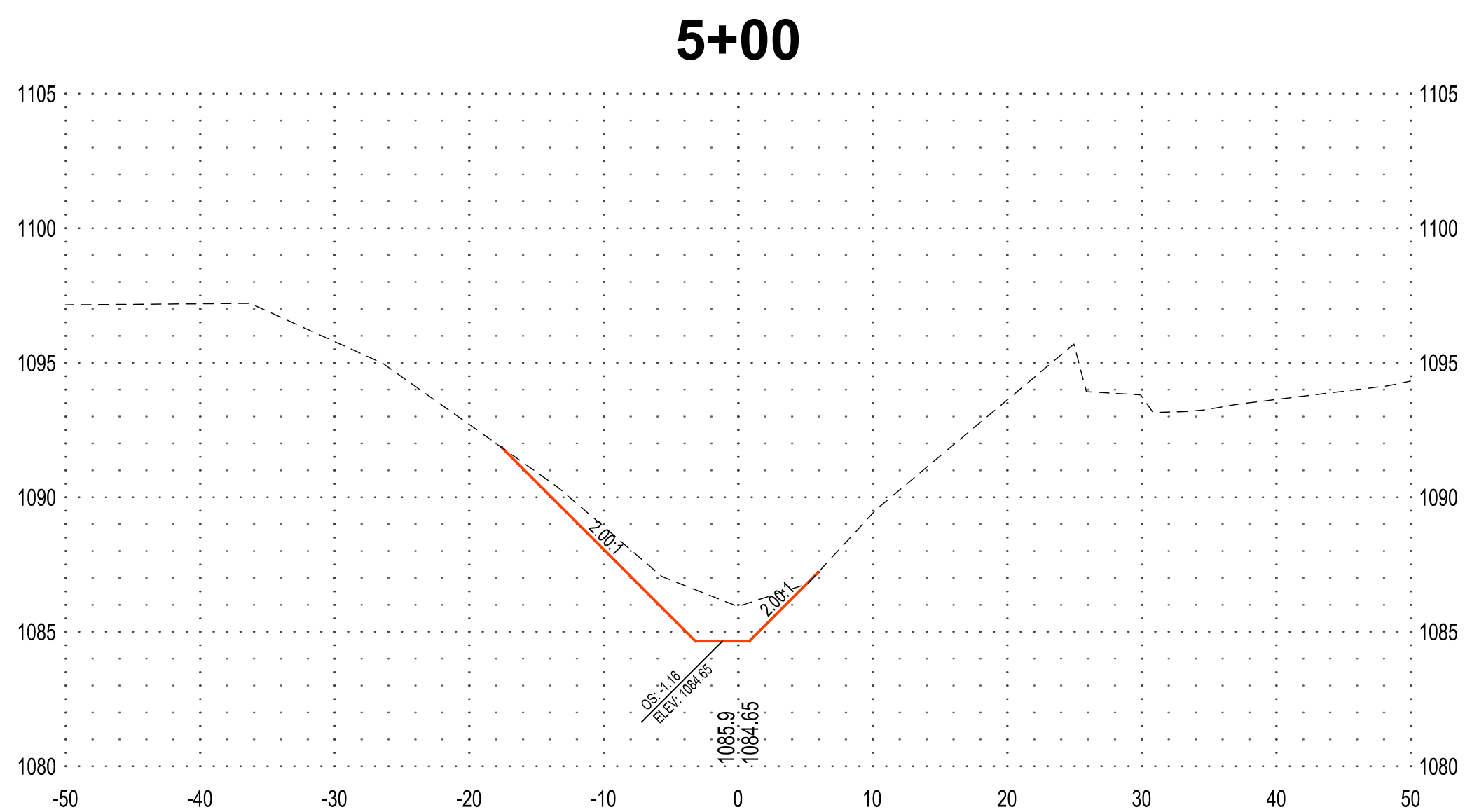
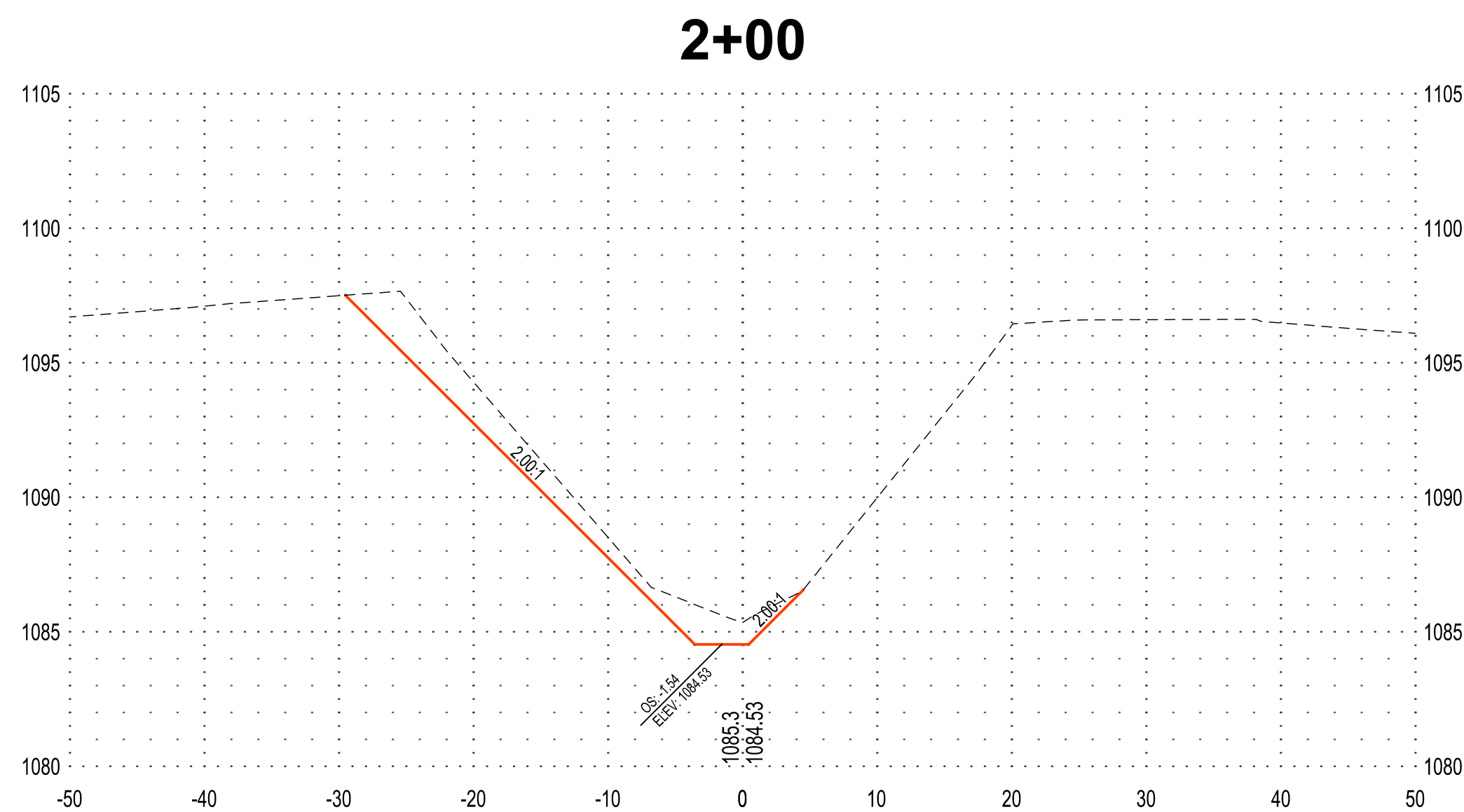
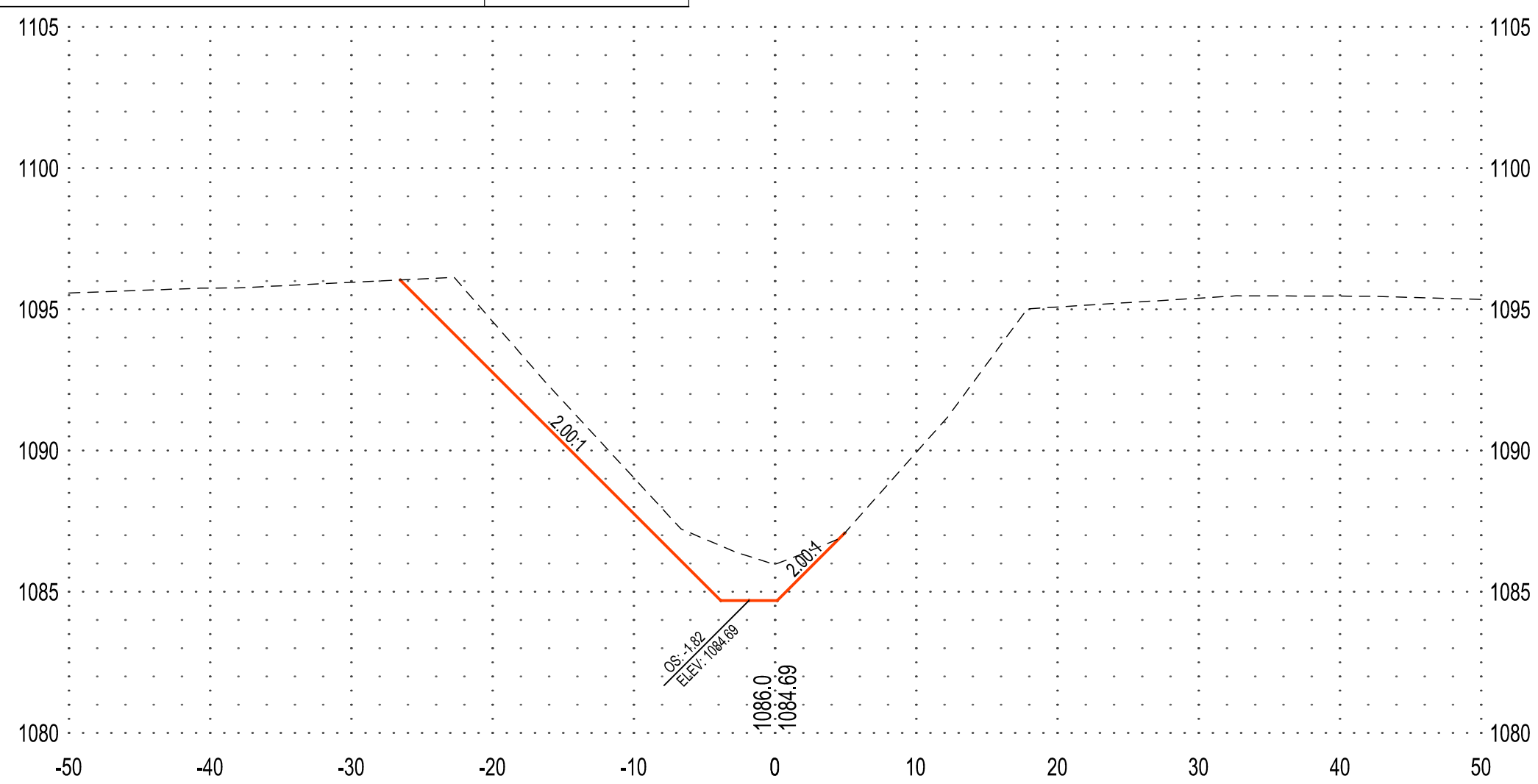
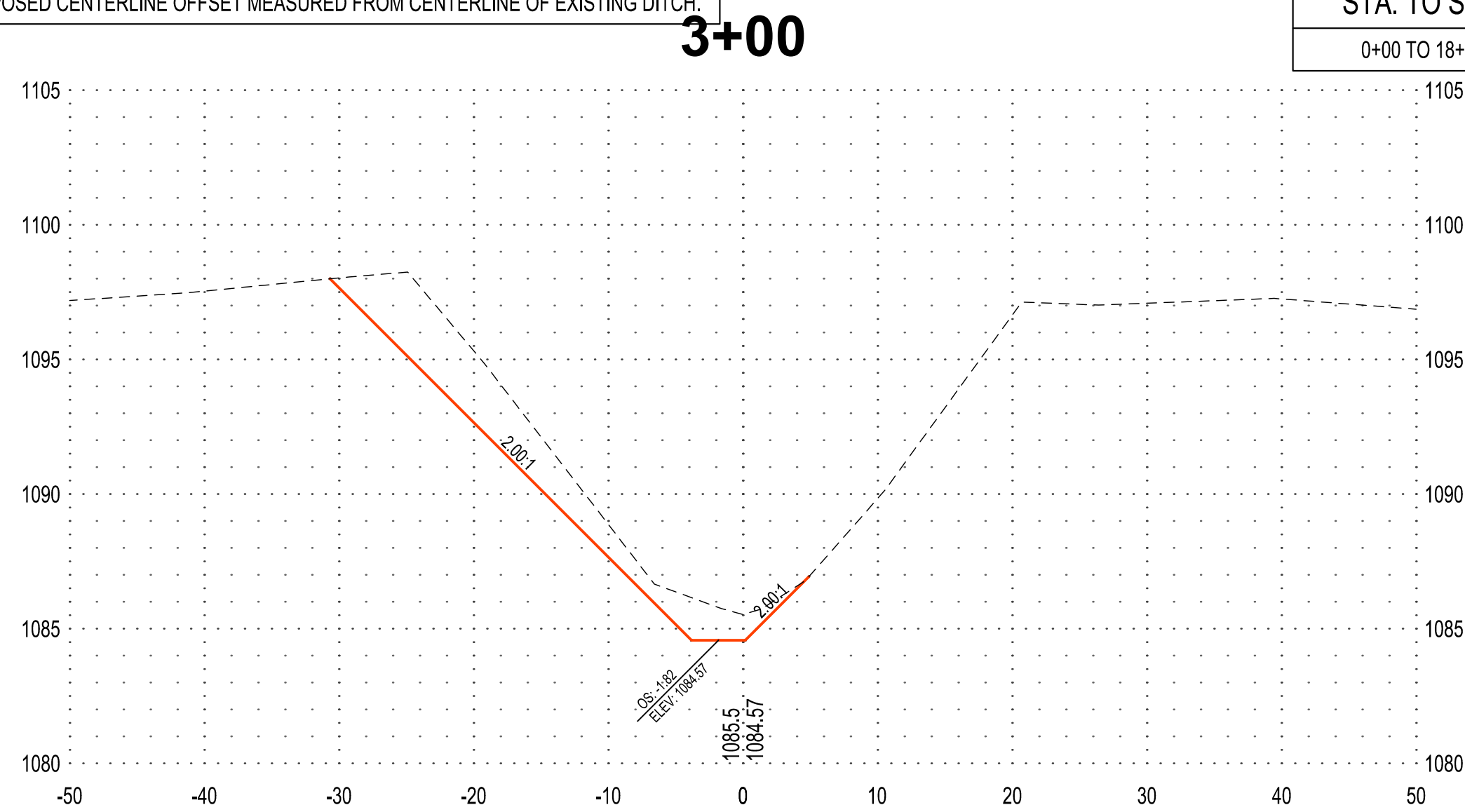
LEGEND	
	EXISTING OPEN DITCH
	EXISTING TILE
	EXISTING PRIVATE TILE
	PROPOSED TILE



CROSS SECTIONS AS VIEWED IN THE DIRECTION OF INCREASING STATIONING.
PROPOSED CENTERLINE OFFSET MEASURED FROM CENTERLINE OF EXISTING DITCH.

STA. TO STA.	OPEN DITCH TYPE/ BOTTOM WIDTH	GRADE
0+00 TO 18+00	STANDARD OPEN DITCH/ 4' BOTTOM & 2:1 SIDESLOPES	0.04%

6+00



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PROJECT

**FARIBAULT &
MARTIN COUNTY**

JUDICAL DITCH No. 4 IMPROVEMENT

JO DAVIESS TWP & PLEASANT TWP MINNESOTA

[illegible]

PROJECT NO.	17-20105
FILE NAME	20105 DITCH CROSS SECTIONS
DRAWN BY	---
DESIGNED BY	---
REVIEWED BY	---
ORIGINAL ISSUE DATE	-/-/-
CLIENT PROJECT NO.	-

TITLE

MAIN DITCH CROSS SECTIONS

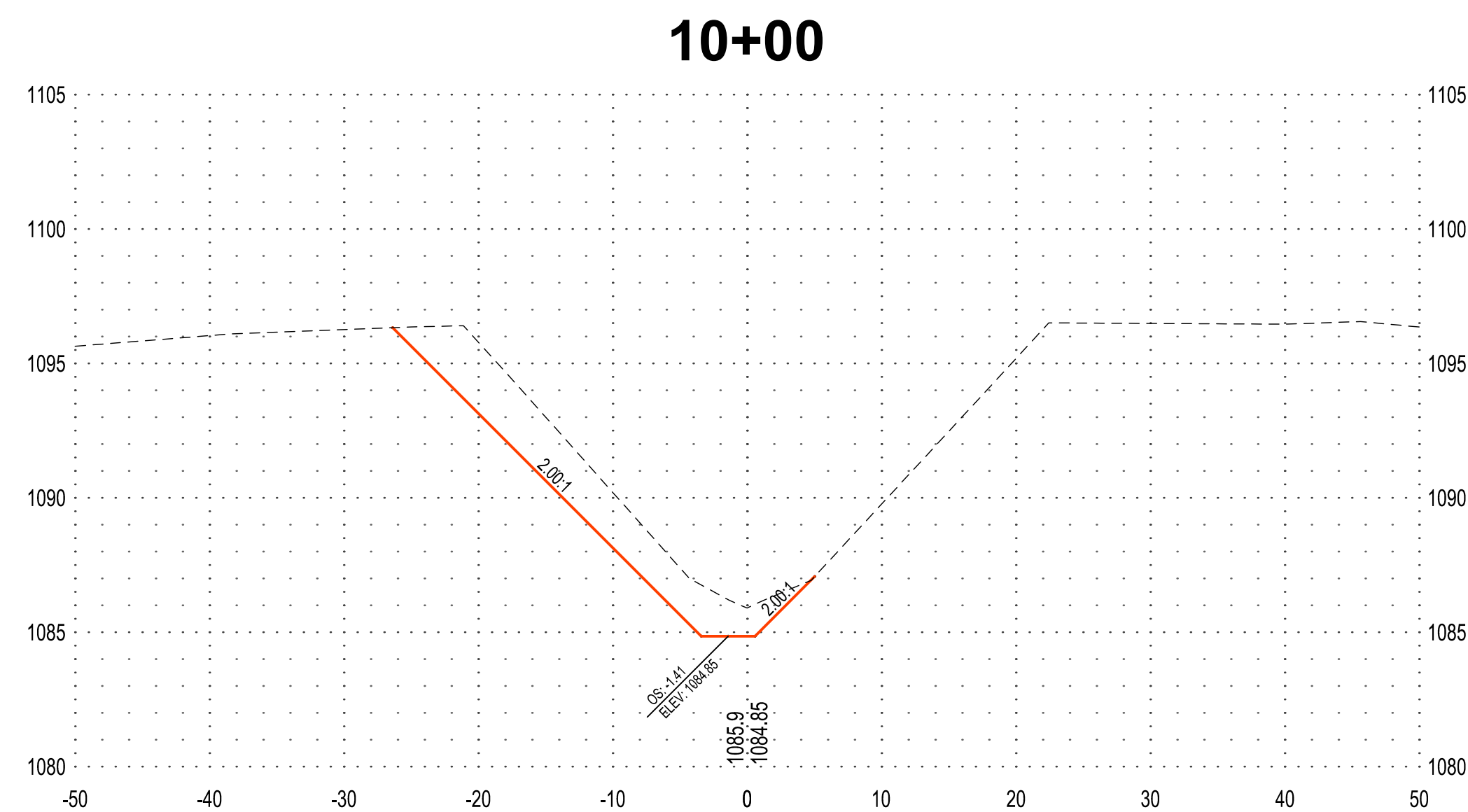
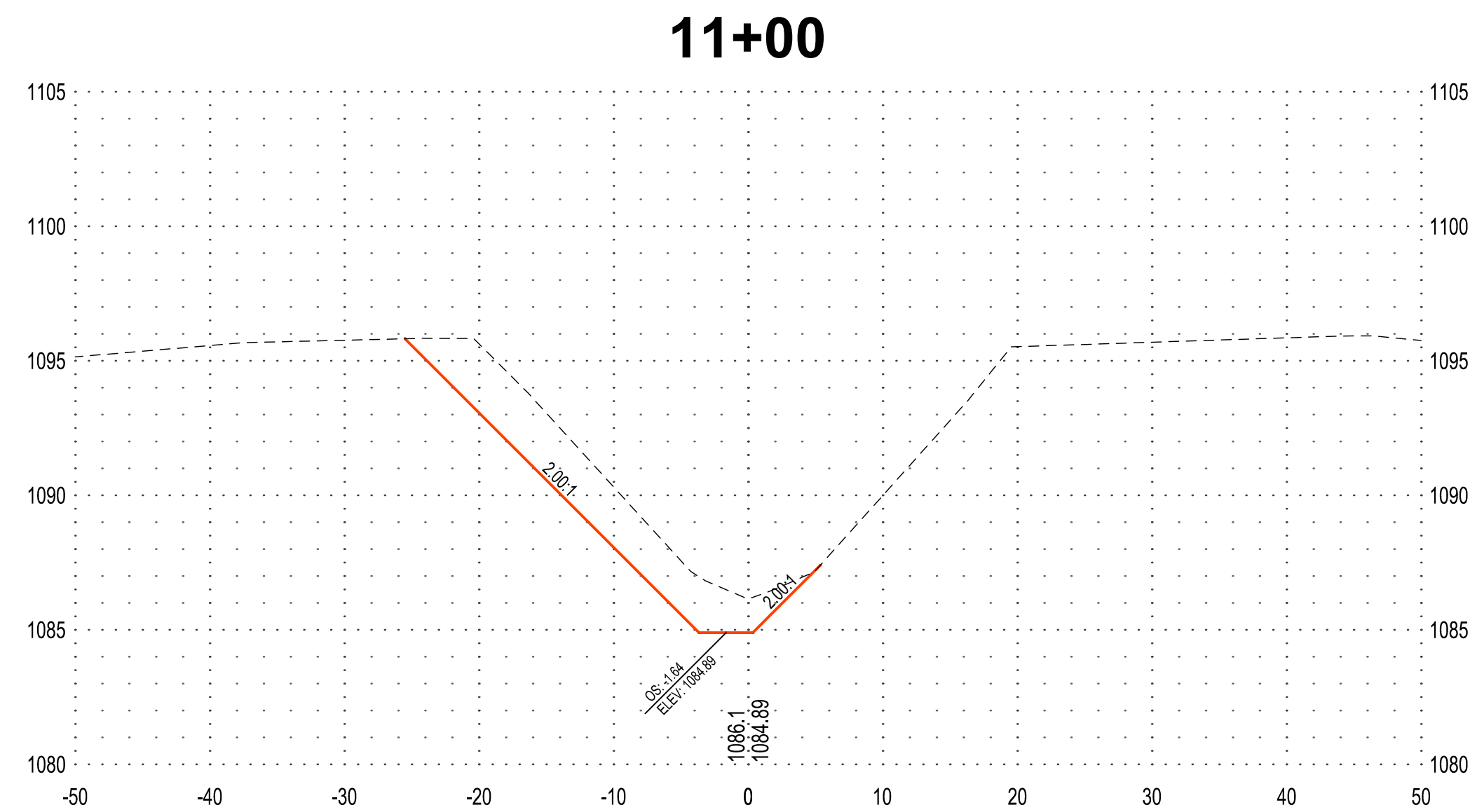
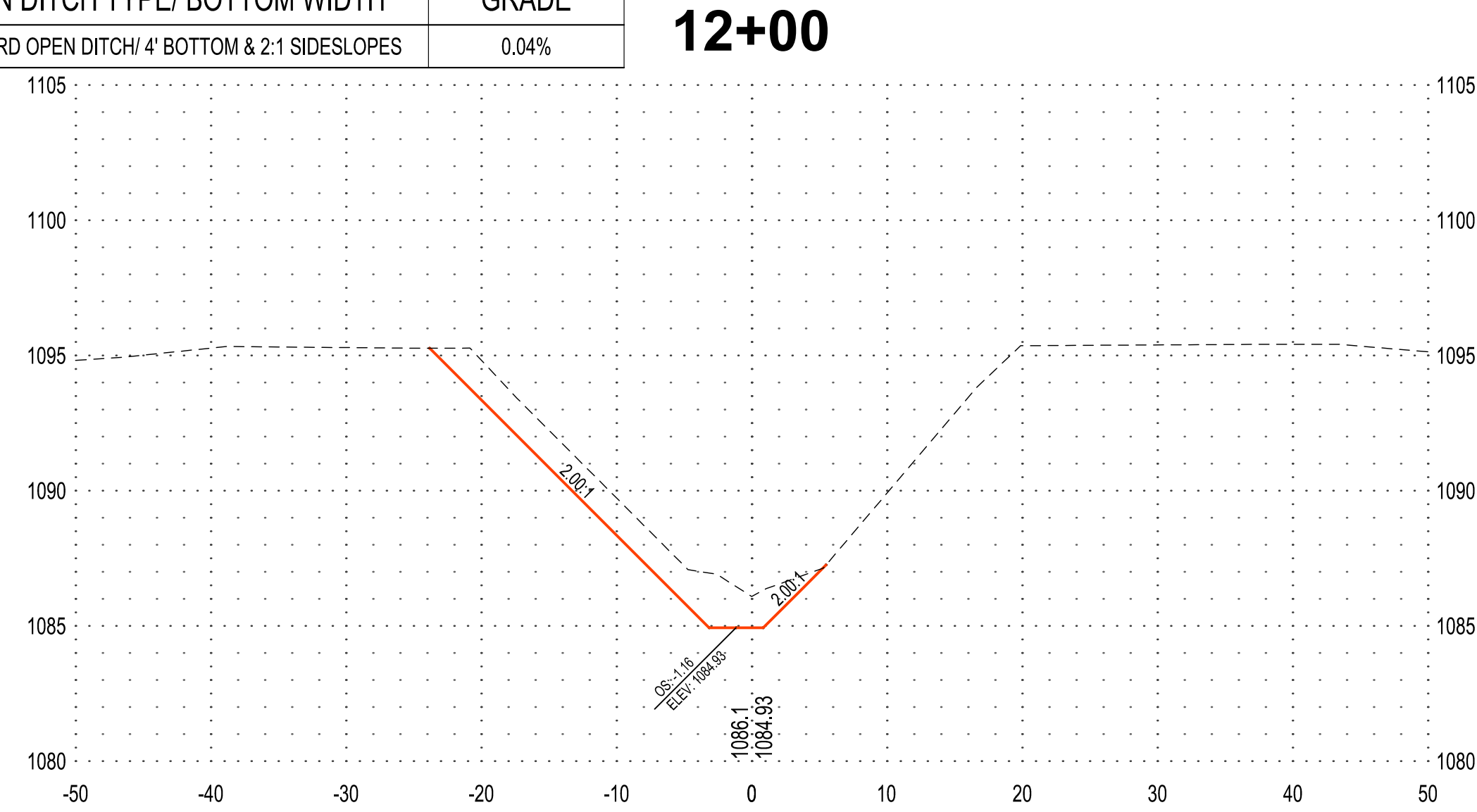
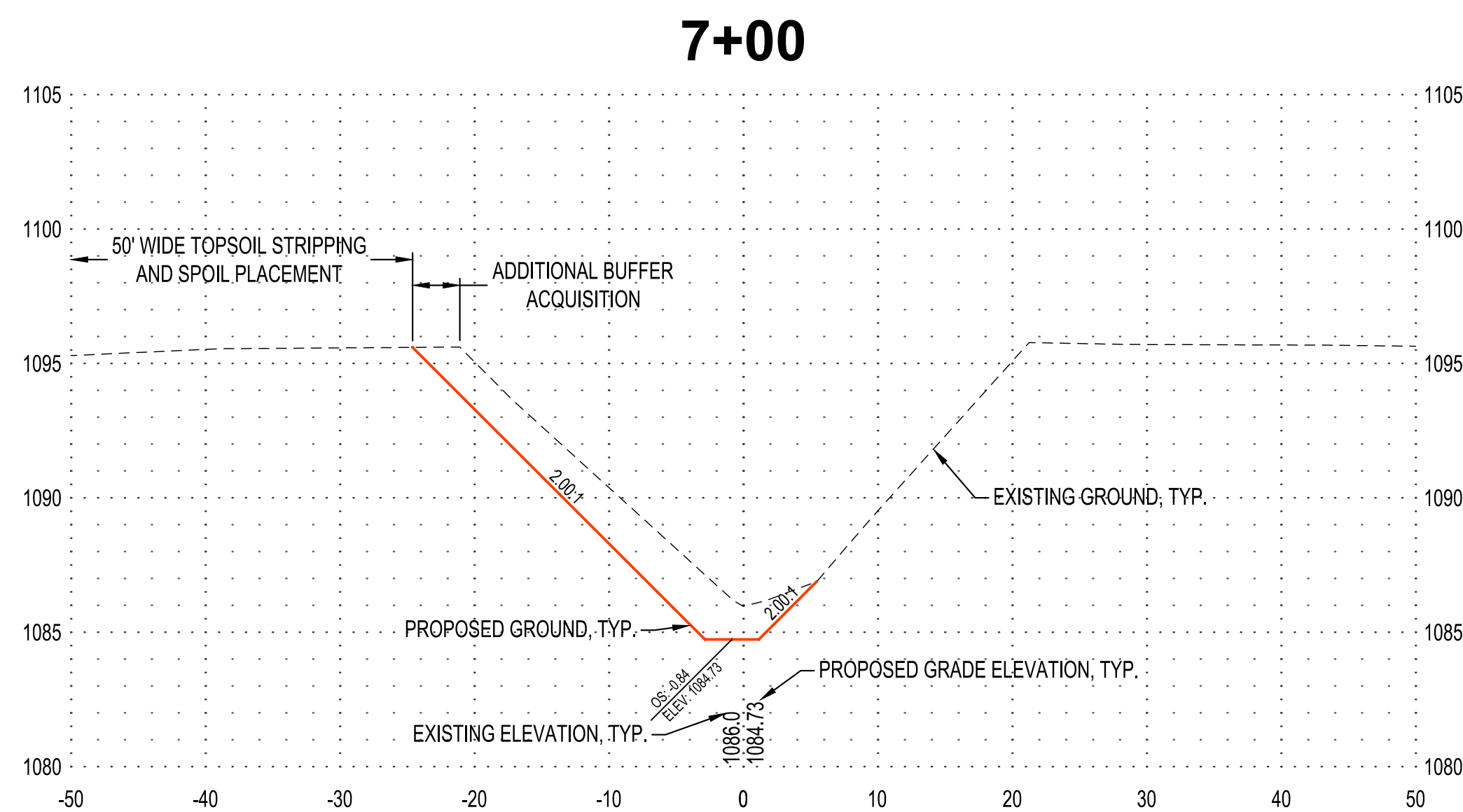
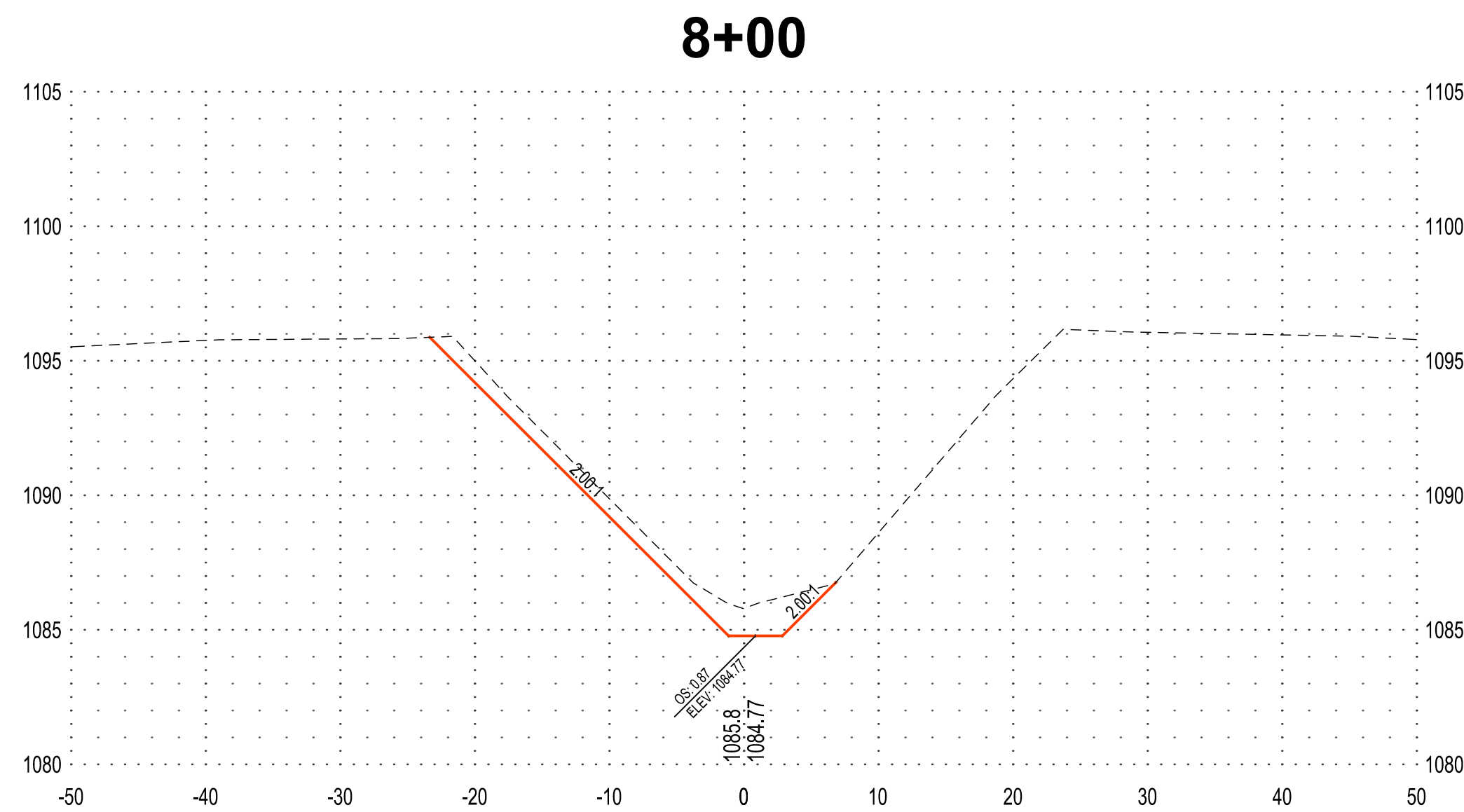
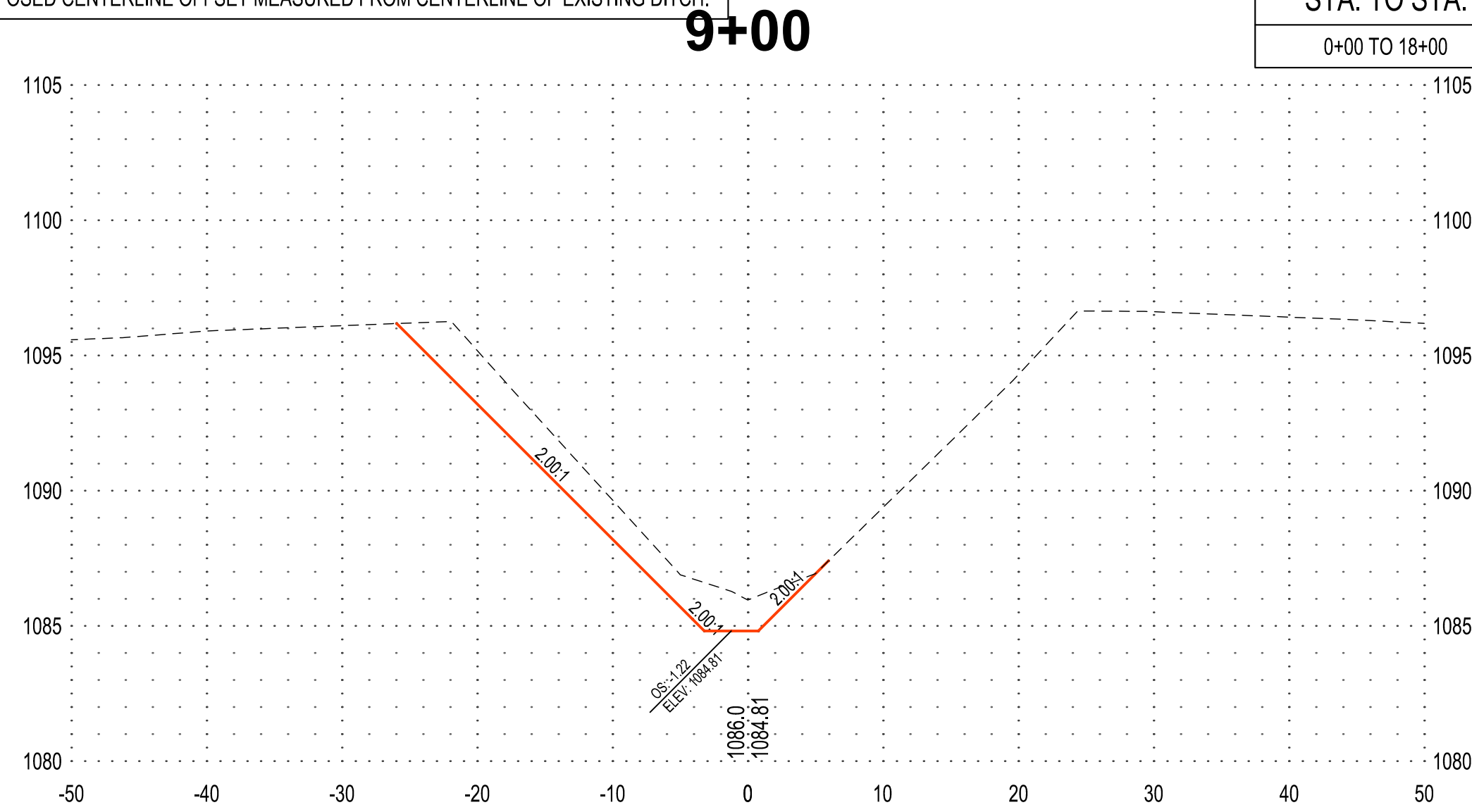
SHEET

13

OF 15

CROSS SECTIONS AS VIEWED IN THE DIRECTION OF INCREASING STATIONING.
PROPOSED CENTERLINE OFFSET MEASURED FROM CENTERLINE OF EXISTING DITCH.

STA. TO STA.	OPEN DITCH TYPE/ BOTTOM WIDTH	GRADE
0+00 TO 18+00	STANDARD OPEN DITCH/ 4' BOTTOM & 2:1 SIDESLOPES	0.04%



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PROJECT

**FARIBAULT &
MARTIN COUNTY**

JUDICAL DITCH No. 4 IMPROVEMENT

JO DAVIESS TWP & PLEASANT TWP MINNESOTA

[illegible]

PROJECT NO.	17-20105
FILE NAME	20105 DITCH CROSS SECTIONS
DRAWN BY	---
DESIGNED BY	---
REVIEWED BY	---
ORIGINAL ISSUE DATE	--/--/--
CLIENT PROJECT NO.	-

TITLE

MAIN DITCH CROSS SECTIONS

SHEET

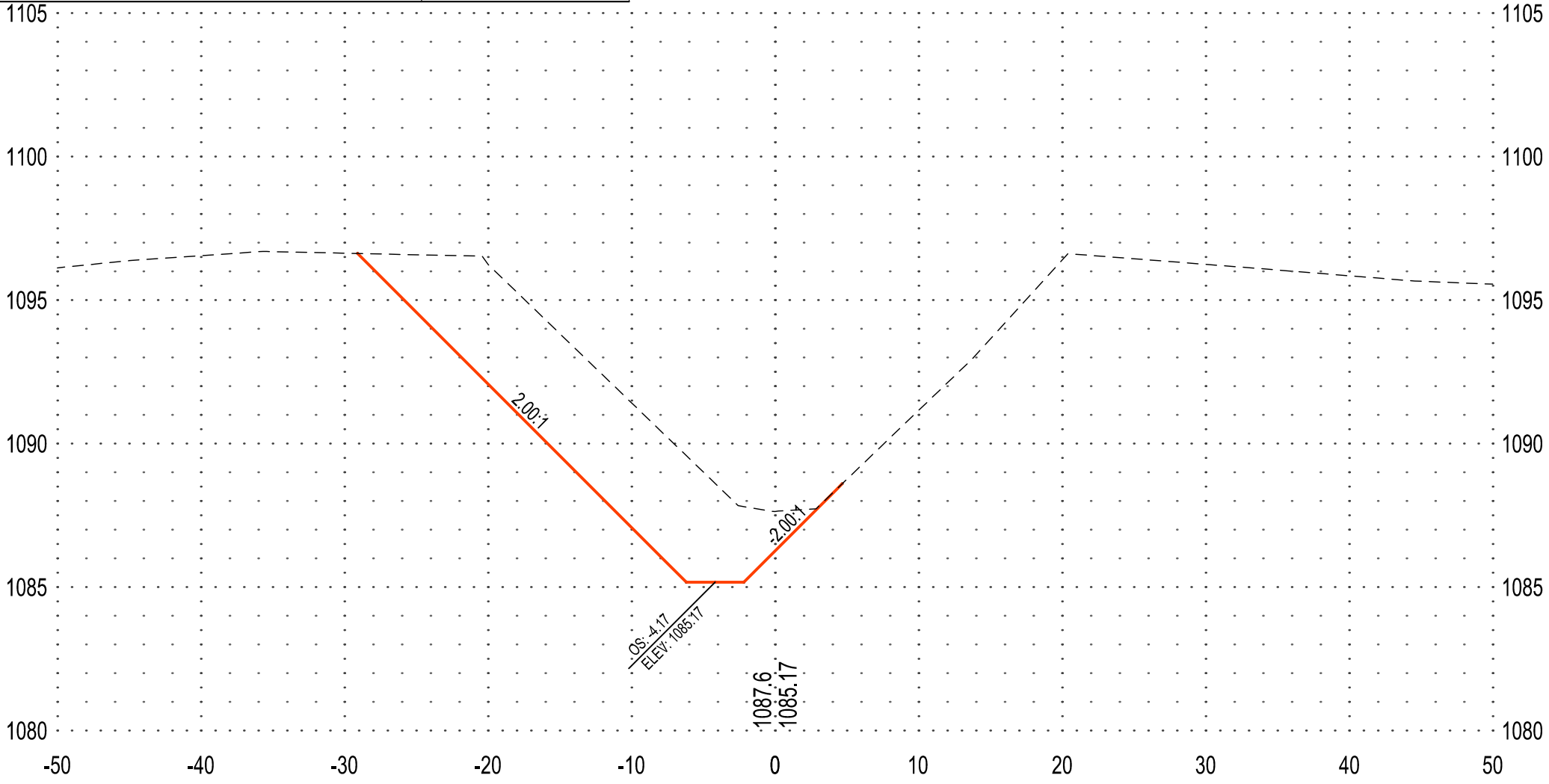
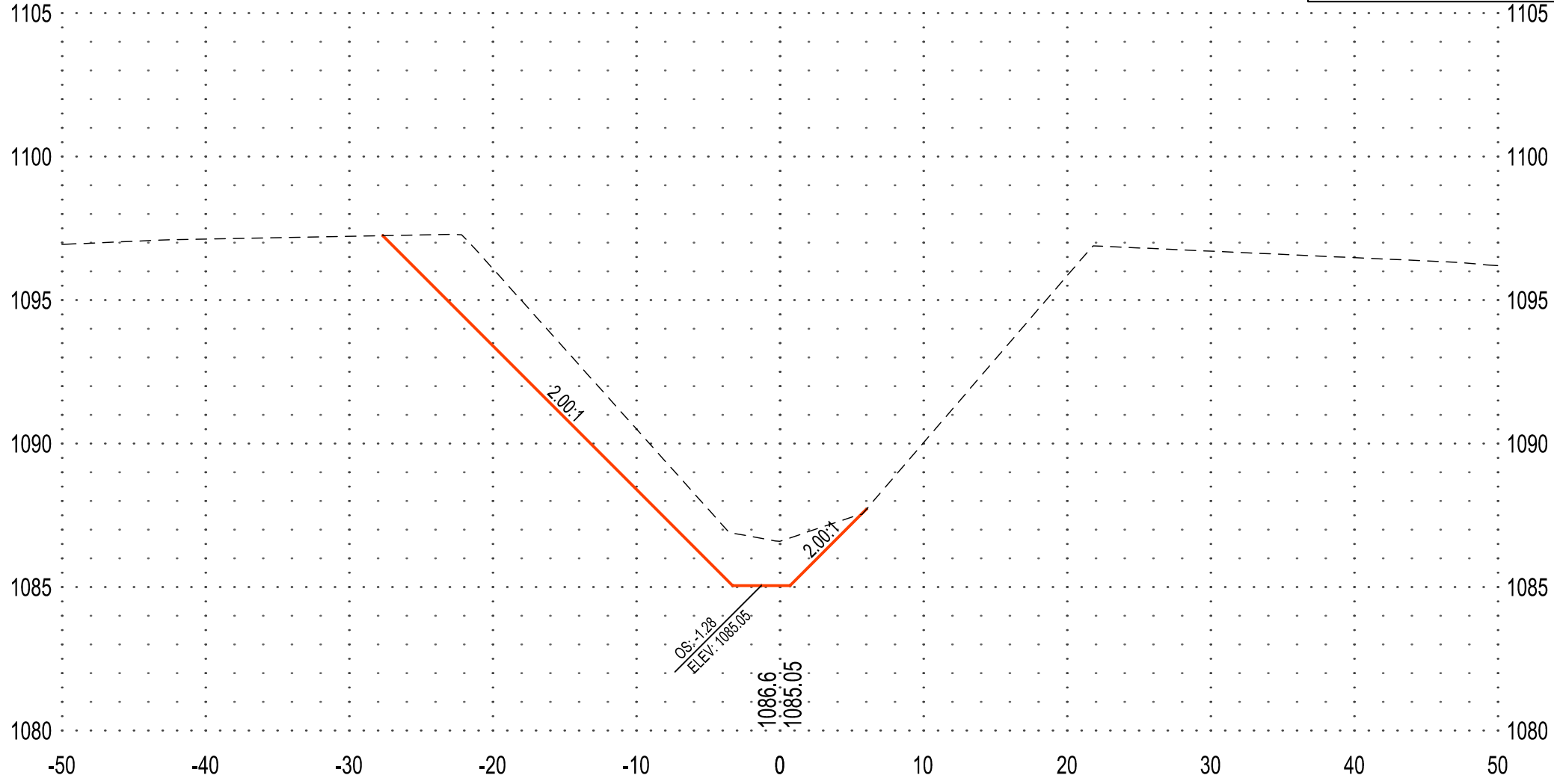
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OF 15

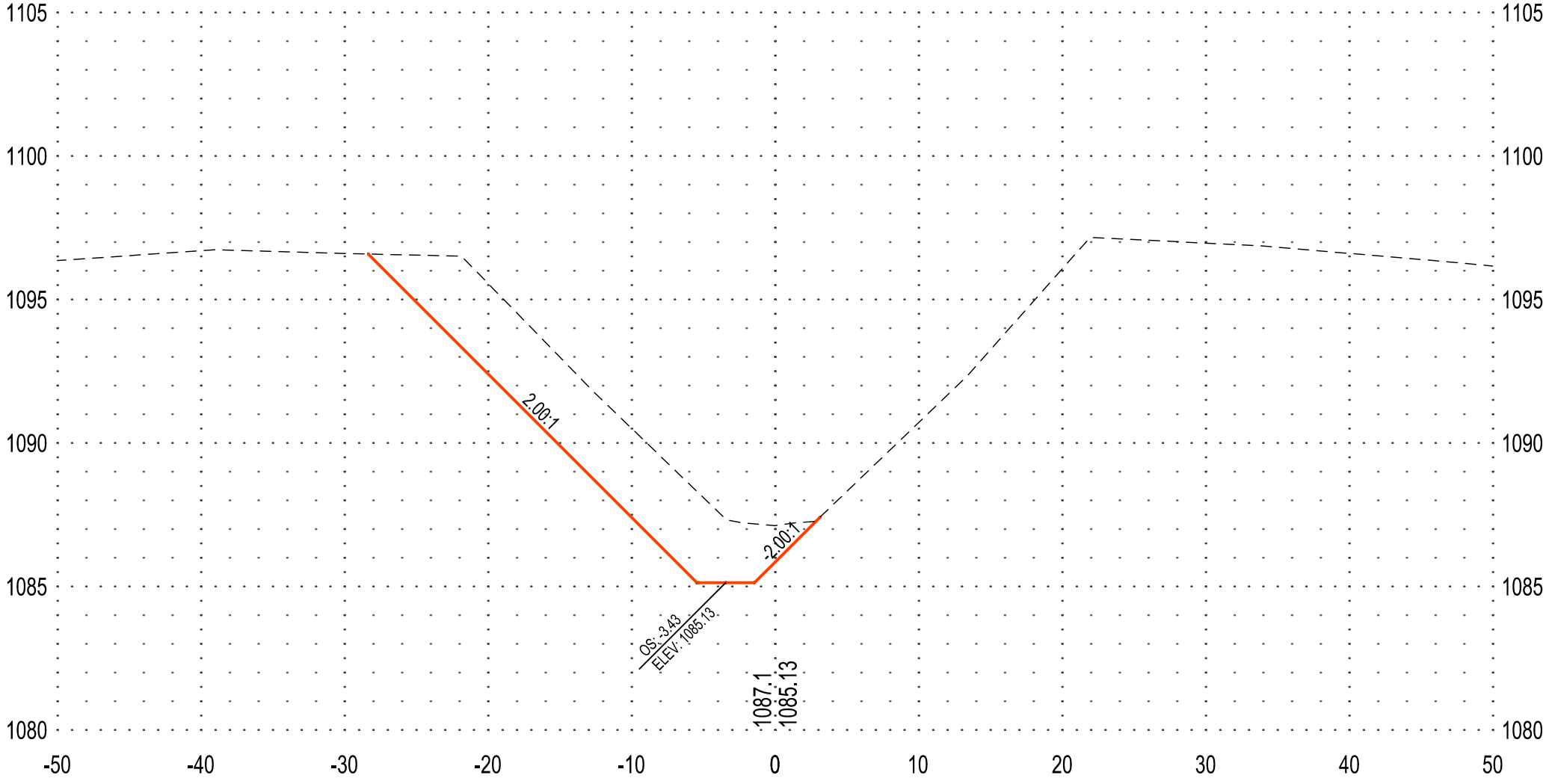
NOTE:
CROSS SECTIONS AS VIEWED IN THE DIRECTION OF INCREASING STATIONING.
PROPOSED CENTERLINE OFFSET MEASURED FROM CENTERLINE OF EXISTING DITCH.

DITCH IMPROVEMENT LEGEND		
STA. TO STA.	OPEN DITCH TYPE/ BOTTOM WIDTH	GRADE
0+00 TO 18+00	STANDARD OPEN DITCH/ 4' BOTTOM & 2:1 SIDESLOPES	0.04%

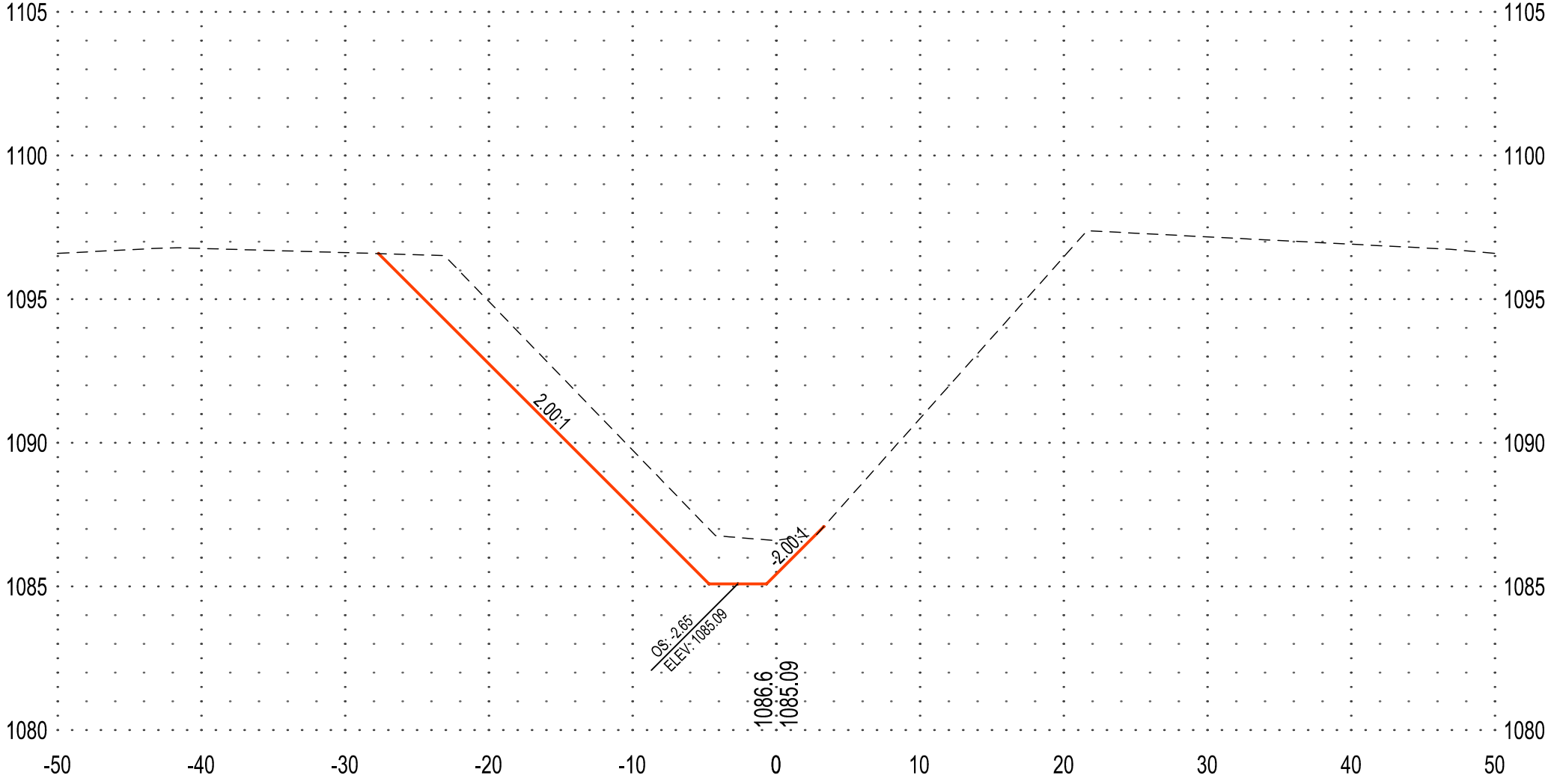
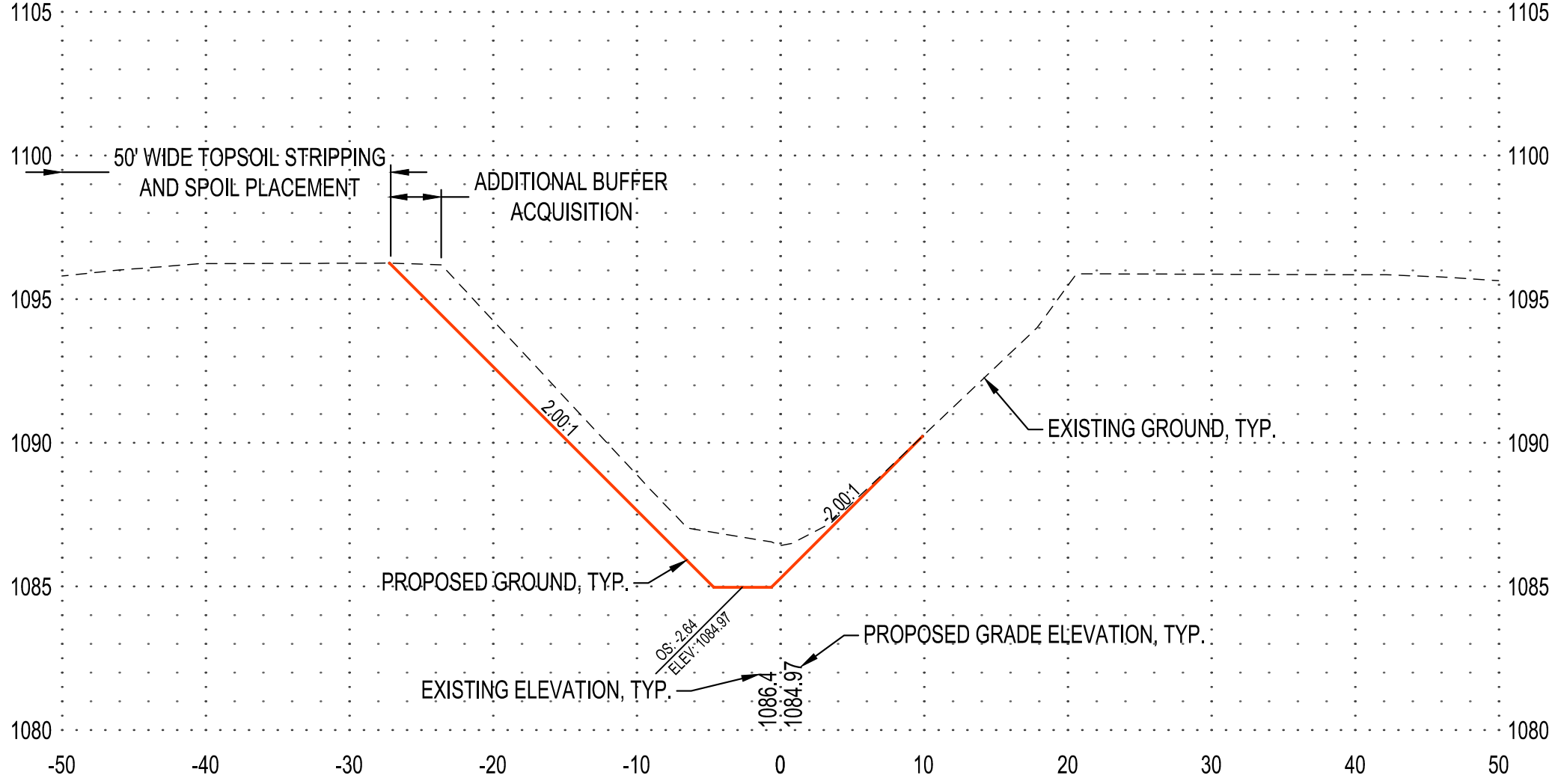
17+95



17+00



16+00



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PROJECT
**FARIBAUT &
MARTIN COUNTY**

**JUDICAL DITCH No.
4 IMPROVEMENT**

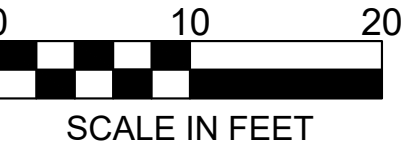
JO DAVIESS TWP & PLEASANT TWP MINNESOTA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	17-20105
FILE NAME	20105 DITCH CROSS SECTIONS
DRAWN BY	---
DESIGNED BY	---
REVIEWED BY	---
ORIGINAL ISSUE DATE	--/--
CLIENT PROJECT NO.	-

TITLE
**MAIN DITCH
CROSS SECTIONS**

SHEET
15
OF 15



Appendix B: Petition + Order



Wendland Sellers Law Office

ATTORNEYS AT LAW

BRUCE E. SELLERS
SELLERS@WENDLANDLAW.COM

BLUE EARTH OFFICE:
825 EAST SECOND STREET
P.O. BOX 247
BLUE EARTH, MN 56013
TELEPHONE: (507) 526-2196
FAX: (507) 526-3065

MAPLETON OFFICE:
101 SMITH STREET NE
MAPLETON, MN 56065
TELEPHONE: (507) 524-4110

REPLY TO BLUE EARTH OFFICE

May 1, 2019

Mr. John Thompson
Faribault County Auditor
Faribault County Courthouse
PO Box 130
Blue Earth, MN 56013

RE: Petition for Improvement of Faribault County Judicial Ditch No. 4
Our File No.: 3468.01

Dear Mr. Thompson:

Our office represents the Petitioners for the proposed improvement to Faribault County Judicial Ditch No. 4 ("J.D. 4" or "the system"). Enclosed please find the following:

1. Petition for Improvement of Faribault County Judicial Ditch No. 4 ("Petition") which includes the signatures of Neal D. & Brenda Mensing;
2. A Map referred to and incorporated as "Exhibit A" depicting the delineation of the watershed boundary as well as the starting point and general course and terminus of the proposed improvement project, which adequately satisfies the requirement under Minn. Stat. §103.215, subd. 4(c)(3); and
3. Surety Bond ("Bond") in the face amount of \$50,000 payable to the Drainage Authority of Faribault County Judicial Ditch No. 4.

You will note that the Petition specifically relates to a portion of the Mainline subsurface tile. All information used to determine the delineation of the J.D. 4 watershed boundary, as depicted on Exhibit A, were obtained from I+S Group using the geographic information from the Surface Water Hydrology Atlas from Minnesota State University-Mankato, current Geographical Information Systems software, and records from Faribault County.

Pursuant to Minn. Stat. §103E.215, Subd. 4(a), a petition is considered to be adequate if it is signed by: (1) at least 26% of the owners of the property affected by the proposed improvements; OR (2) at least 26% of the owners of the property that the proposed improvement passes over; OR (3) the owners of at least 26%

* Qualified Neutral under Rule 114 of Minnesota General Rules of Practice

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• PRIVATE/PUBLIC DRAINAGE • PERSONAL INJURY • CORPORATE/BUSINESS • CONTRACTS • FAMILY LAW

of the property area affected by the proposed improvement; OR (4) the owners of at least 26% of the property area that the proposed improvement passes over.

The scope of the proposed improvement project borders, touches, or is underneath the path of a total property area consisting of approximately 197.37 acres, and I have submitted a petition signed by a Petitioner owning a total of approximately 78.23 acres (39.6%) of the property area that the proposed improvement passes over.

Therefore, I believe the petition satisfies the requirements of Minn. Stat. §103E.215, Subd. 4(a) by containing signatures of the owners of at least 26 percent of the property area that the proposed improvement passes over.

Mark Origer & Chuck Brandel, civil engineers with I+S Group, have been involved with this proposed improvement project from the initial stages. At the request of the Petitioners, I+S Group provided the preliminary review and feasibility study to Petitioners for their review and consideration, and that information was used to assist them with their decision to move forward with this Petition. As such, for the sake of convenience and expense, the Petitioners would request that I+S Group be appointed as engineers for the proposed improvement project.

Please contact me at your earliest convenience if you have further questions, require further information, or believe there are issues that need to be addressed prior to acceptance of the Petition. Thank you in advance for your consideration and prompt attention with this matter.

Sincerely yours,

WENDLAND SELLERS LAW OFFICE



Bruce E. Sellers
FOR THE FIRM

Enc.

**PETITION FOR AN IMPROVEMENT OF
FARIBAULT COUNTY JUDICIAL DITCH NO. 4**

TO THE FARIBAULT COUNTY BOARD OF COMMISSIONERS AS DRAINAGE
AUTHORITY IN RELATION TO FARIBAULT COUNTY JUDICIAL DITCH NO. 4

The Petitioner herein respectfully represent:

WHEREAS, this Petition relates to the mainline subsurface tile ("Mainline") of Faribault County Judicial Ditch No. 4 located in Section 7 of Jo Davies Township, with the intention of improving the system by increasing the drainage capacity; and

WHEREAS, this Petition is signed by at least 26% of the owners of the property affected by the proposed improvements; and

WHEREAS, the system consists of open ditch and subsurface tile with insufficient capacity or requiring enlarging to furnish sufficient capacity. Petitioner proposes enlarging a portion of the Mainline to furnish sufficient capacity of the system; and

WHEREAS, the starting point, general course and terminus of the proposed improvement project for the system is depicted on Exhibit A which is attached hereto for reference; and

WHEREAS, Petitioner further request that the engineer be specifically ordered to determine and offer alternative proposals for the consideration of the Drainage Authority which relate to the improvement of the drain capacity of the system that the engineer deems feasible, if any, including repairs to the current mainline open ditch, mainline and lateral subsurface tiles, and alternative outlets, if any; and

WHEREAS, Petitioner provides herewith a cash bond in the face amount of \$50,000 payable to the Drainage Authority of Faribault County Judicial Ditch No. 4, said bond conditioned to pay the costs incurred if the proceeding are dismissed or a contract is not awarded to allow the costs incurred to exceed the amount of the bond and that they will cause additional bond to be filed if it appears that the costs exceed the amount of the bond; and

WHEREAS, Petitioner has been informed and understands that they may not withdraw as a Petitioner at any time after this Petition is accepted by the Drainage Authority. Petitioner further acknowledges that if the proposed drainage project is not constructed, they are liable to the Drainage Authority for all of the costs incurred including engineering, legal and miscellaneous fees and expenses in relation to this Petition as outlined under Minnesota Statutes 103E; and

WHEREAS, Petitioner asserts that the proposed Improvement Project will benefit and be useful to the public and will promote the public health; and

WHEREAS, Petitioner recognizes that water storage benefits the entire system and requests that the engineer appointed by the Drainage Authority consider water storage designs into the Improvement Project. Petitioners further requests and will support actively seeking outside funding for said water storage; and

WHEREAS, Petitioner requests, pursuant to Minn. Stat. §103E.215, subd. 6, that separable maintenance be used for those locations where existing tiles are being replaced with open ditch and/or new tile. Petitioner requests that the appointed project engineer be ordered to determine a proportionate share of life span based on the existing condition versus the tiles original designed capacity. It is recommended by Petitioner that the separable maintenance to be paid by the entire system is that percentage of the in-place tile whose life span capacity has been used and that the improvement pay for that percentage of the tile, life span or capacity that still is in repair. The Petitioner, as landowner, is requesting that a percentage be paid as separable maintenance by the entire system and a percentage be paid for by the improvement benefits as determined by the appointed project engineer and viewers; and

WHEREAS, a separable part of the drainage system may need repair. The engineer appointed by the Drainage Authority is asked to include in detailed survey report and statement showing the proportionate estimated cost of the proposed improvement required to repair the separable part of the existing system and the estimated proportionate share of the cost of the added work required for the improvement; and

WHEREAS, the names and addresses of owners of the property area that the Improvement passes over is depicted on the attached Exhibit A are as follows:

Tract 1 Owner/Address:	State of Minnesota DNR-Division of Land & Minerals Attn: Tax Specialist P.O. Box 45 500 Lafayette Rd. St. Paul, MN 55155
---------------------------	---

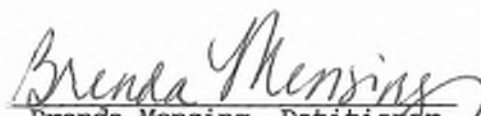
Tract 1 Owner/Address:	State of Minnesota
---------------------------	--------------------

Tract 1 Owner/Address:	Neal D. Mensing 14136 365 th Ave. Blue Earth, MN 56013
---------------------------	---

Tract 1 Owner/Address:	Leo D. Helland, et al. c/o Bruce Helland 31394 130 th St. Winnebago, MN 56098
Tract 2 Owner/Address:	Neal D. Mensing 14136 365 th Ave. Blue Earth, MN 56013
Tract 2 Owner/Address:	Leo D. Helland, et al. c/o Bruce Helland 31394 130 th St. Winnebago, MN 56098
Tract 3 Owner/Address:	Leo D. Helland, et al. c/o Bruce Helland 31394 130 th St. Winnebago, MN 56098
Tract 4 Owner/Address:	Leo D. Helland, et al. c/o Bruce Helland 31394 130 th St. Winnebago, MN 56098
Tract 5 Owner/Address:	Craig Diegnau 10 Forgotten Lake Rd. Fairmont, MN 56031
Tract 5 Owner/Address:	Noreen M. Hannaman, et al. 132 Welcome Ave. Mankato, MN 56001

NOW THEREFORE, Petitioner requests the Faribault County Auditor present this Petition to the Faribault County Board of Commissioners (after examined by legal counsel), acting as the drainage authority for Faribault County Judicial Ditch No. 4, for the appointment of Chuck Brandel, I+S Group, or, in the alternative, another engineer skilled in public drainage matters, to examine the proposed work.


Neal D. Mensing, Petitioner


Brenda Mensing, Petitioner


Bruce E. Sellers
Attorney for Petitioners
Wendland Sellers Law Office
825 East Second Street
P.O. Box 247
Blue Earth, MN 56013
507-526-2196

This petition is prepared by:
Bruce E. Sellers, Attorney at Law
Wendland Sellers Bromeland, P.A.
825 East Second Street, P.O. Box 247
Blue Earth, MN 56013
507-526-2196

Received this 8th
day of May 2019

Faribault County Auditor
By _____ Deputy



Bond No. 66325700
SURETY BOND
Public Official, License or
Permit Bonds and Probate Bonds

SURETY BOND

KNOW ALL MEN BY THESE PRESENTS

That we, Neal Mensing and Faribault County Judicial Ditch Number 4 landowners/petitioners, as Principal, and the
Auto-Owners Insurance Company, a corporation organized under the laws of the State of
Michigan, and having its principal office at Lansing, Michigan, as Surety, are held and firmly bound unto
Drainage Authority of Faribault County in the penal sum of (\$ 50,000.00)
Fifty Thousand and 00/100 Dollars,

lawful money of the United States of America, for which payment, well and truly to be made, we jointly and severally bind
ourselves, our successors, administrators and assigns, firmly by these presents.

SIGNED, SEALED, and DATED this 18th day of April, 2019.

WHEREAS the aforesaid Principal has petitioned to proceed in the matter of the improvements part of the main and its branches
(If a Public Official Bond insert "been elected or appointed (name) for the terms beginning (date) and ending (date)")
of Faribault County Judicial Ditch 4. Said petition is being addressed before the Board of Commissioners Drainage Authority of
(If a License or Permit Bond insert "been granted a license or permit as (name business) by the said Obligor for the period of one year from (date)")
Faribault County pursuant to Minnesota Statutes 103E.215 with respect to a petition for improvement. (#1)
(If a Probate Bond insert "been appointed [Executor, Administrator, Guardian, Conservator] of the estate of (name of deceased, minor or incompetent)")

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the aforesaid Principal shall
pay all cost and expenses which may be incurred in case the proceedings herein are dismissed for any reason and no contract is
(If a Public Official Bond insert "faithfully perform the duties of said office")
entered into for the construction of such improvement as proposed in the petition. Petitioners covenant they will not allow the costs
(If a License or Permit Bond insert "comply with the laws of the aforesaid Obligor governing said License or Permit")
incurred to exceed the amount of the bond submitted herewith. Being part of a County Ditch the improvement will be a public (#2)
Principal as (Guardian, Administrator, Conservator, Executor, etc.) will faithfully discharge the duties of their trust as Fiduciary of the person and/or estate in this matter according to law.

Then this obligation shall be void, otherwise to remain in full force and effect.

PROVIDED: That the liability of the Surety shall in no event exceed the penalty of this Bond.

the petitioners acknowledge that they have been informed and understand that they may not withdraw as a petitioner at any time
(If no further conditions insert "no further conditions")
once this petition is filed. The petitioners understand that if the proposed drainage proceedings are dismissed each of them is
responsible for the payment of all costs incurred. The Surety may terminate this bond at any time by giving thirty (30) days written
notice of cancellation to both the Obligor and the Principal.

Neal Mensing and Faribault County Judicial Ditch Number 4 landowners/petitioners

Neal Mensing
Principal

Auto-Owners
Surety

By Attorney-in-Fact
Attorney-in-Fact



BOND NUMBER 66325700, Neal Mensing and Faribault County Judicial Ditch 4

#1 This bond may be automatically renewed for additional terms by Continuation Certificate issued by the Surety.

#2 utility. If a contract is entered into for the construction of such improvement the petitioners acknowledge that they have been informed and understand that they may not withdraw as petitioner at any time once this petition is filed. The petitioners understand that if the proposed drainage proceedings are dismissed each of them is responsible for the payments of all costs incurred. The Surety may terminate this bond at any time by giving thirty (30) as written notice of cancellation to both the Obligee and the Principal.

DATE AND ATTACH TO ORIGINAL BOND
AUTO-OWNERS INSURANCE COMPANY

LANSING, MICHIGAN
POWER OF ATTORNEY

NO. 66325700

KNOW ALL MEN BY THESE PRESENTS: That the AUTO-OWNERS INSURANCE COMPANY AT LANSING, MICHIGAN, a Michigan Corporation, having its principal office at Lansing, County of Eaton, State of Michigan, adopted the following Resolution by the directors of the Company on January 27, 1971, to wit:

"RESOLVED, That the President or any Vice President or Secretary or Assistant Secretary of the Company shall have the power and authority to appoint Attorneys-in-fact, and to authorize them to execute on behalf of the Company, and attach the seal of the Company thereto, bonds and undertakings, recognizances, contracts of indemnity, and other writings obligatory in the nature thereof. Signatures of officers and seal of Company imprinted on such powers of attorney by facsimile shall have same force and effect as if manually affixed. Said officers may at any time remove and revoke the authority of any such appointee."

Does hereby constitute and appoint CHAD W OSTERMANN

its true and lawful attorney(s)-in-fact, to execute, seal and deliver for and on its behalf as surety, any and all bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof, and the execution of such instrument(s) shall be as binding upon the AUTO-OWNERS INSURANCE COMPANY AT LANSING, MICHIGAN as fully and amply, to all intents and purposes, as if the same had been duly executed and acknowledged by its regularly elected officers at its principal office.

IN WITNESS WHEREOF, the AUTO-OWNERS INSURANCE COMPANY AT LANSING, MICHIGAN, has caused this to be signed by its authorized officer this 1st day of August, 2016.

Denise Williams

Denise Williams Senior Vice President

STATE OF MICHIGAN } ss.
COUNTY OF EATON }

On this 1st day of August, 2016, before me personally came Denise Williams, to me known, who being duly sworn, did depose and say that they are Denise Williams, Senior Vice President of AUTO-OWNERS INSURANCE COMPANY, the corporation described in and which executed the above instrument, that they know the seal of said corporation, that the seal affixed to said instrument is such Corporate Seal, and that they received said instrument on behalf of the corporation by authority of their office pursuant to a Resolution of the Board of Directors of said corporation.

My commission expires March 10, 2022.

Susan E. Thelsen
Susan E. Thelsen

Notary Public



STATE OF MICHIGAN } ss.
COUNTY OF EATON }

I, the undersigned First Vice President, Secretary and General Counsel of AUTO-OWNERS INSURANCE COMPANY, do hereby certify that the authority to issue a power of attorney as outlined in the above board of directors resolution remains in full force and effect as written and has not been revoked and the resolution as set forth is now in force.

Signed and sealed at Lansing, Michigan. Dated this 18th day of April, 2019.

William F. Woodbury
William F. Woodbury, First Vice President, Secretary and General Counsel





EXECUTION REPORT
(Detach and return with a copy of original bond.)

NO. 66325700

Agency Name M & M INSURANCE AGENCY LLC

Agency Code 06-0636-00

Name of Principal NEAL MENSING AND FARIBAULT COUNTY JUDICIAL DITCH #4 PE

Effective Date 04/18/2019

Mailing Address 14136 365TH AVE, BLUE EARTH, MN 56013-903

Premium Charge \$1,080.00

Name of Obligor DRAINAGE AUTHORITY OF FARIBAULT COUNTY

Amount of Bond \$50,000.00

Address of Obligor PO BOX 130, BLUE EARTH, MN 56013-0130

Type of Bond License/Permit

COMPLETE AND ATTACH ALL PAPERS UNDER THIS REPORT THE SAME DAY THE BOND IS SIGNED

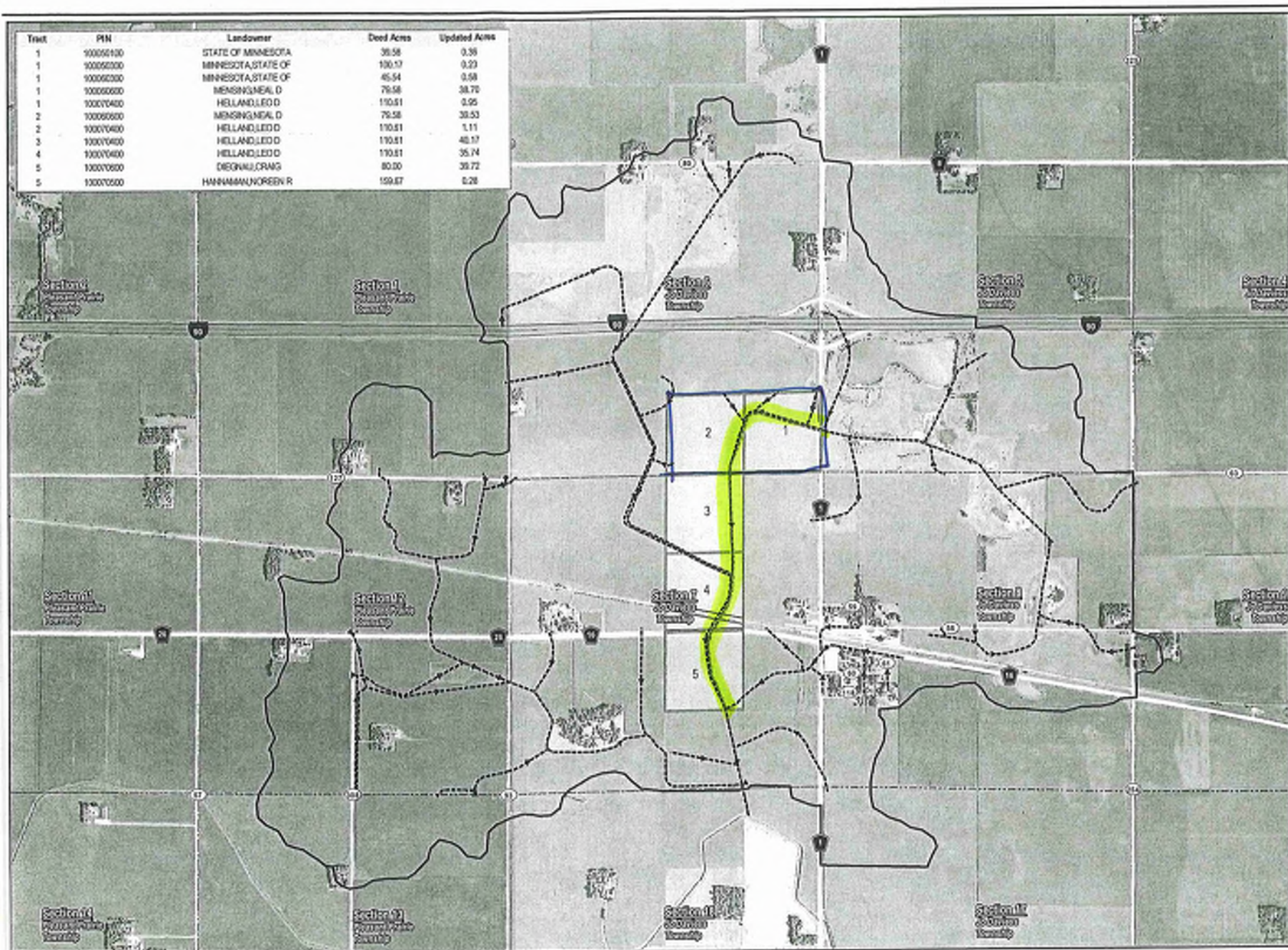
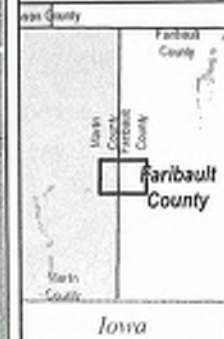


Exhibit A
Judicial Ditch
No. 4 Improvement
Intersecting Parcels
Within 40s
Faribault County,
Minnesota
Wednesday, April 10, 2019

- Legend
- Imp. Option 4
 - Existing, Main Tile
 - Existing, Open Ditch
 - Intersect 40s
 - Intersect Parcels Within 40s
 - JD 4 Watershed
 - Township, Range
 - Sections

PN: 17-20105
Source:
Aerial Photograph of Faribault County, 2018
Topography of Faribault County, 1920 (1918)
Parcel of Faribault County, 2018 (2018)
Lands (2018), July 2018
Map Sheet (2018), July 2018
County (2018), July 2018
P. 50 (2018) (2018)

Scale: 1" = 1,000 feet



Tract	PIN	Landowner	Deed Acres	Updated Acres
1	100050100	STATE OF MINNESOTA	39.58	0.35
1	100050300	MINNESOTA, STATE OF	100.17	0.23
1	100060300	MINNESOTA, STATE OF	45.54	0.58
1	100060600	MENSING, NEAL D	79.58	38.70
1	100070400	HELLAND, LEO D	110.61	0.95
2	100060600	MENSING, NEAL D	79.58	39.53
2	100070400	HELLAND, LEO D	110.61	1.11
3	100070400	HELLAND, LEO D	110.61	40.17
4	100070400	HELLAND, LEO D	110.61	35.74
5	100070600	DIEGNAU, CRAIG	80.00	39.72
5	100070500	HANNAMAN, NOREEN R	159.67	0.28

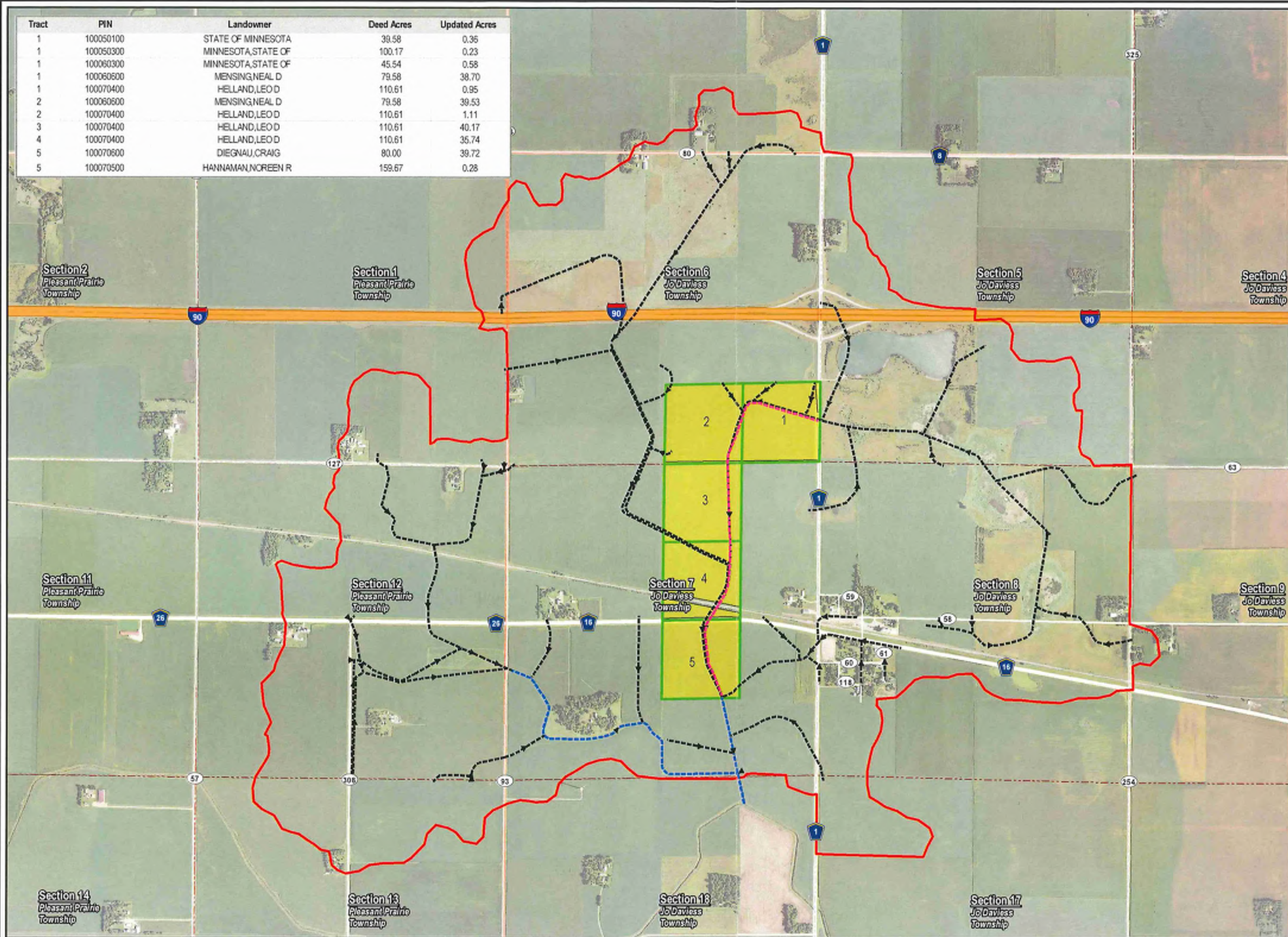
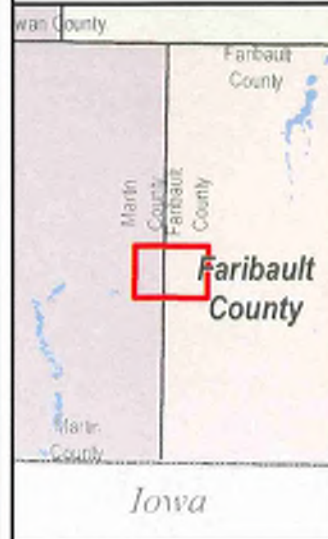


Exhibit A
Judicial Ditch
No. 4 Improvement
Intersecting Parcels
Within 40s
 Faribault County,
 Minnesota
 Wednesday, April 10, 2019

- Legend**
- Imp. Option 4
 - Existing, Main Tile
 - Existing, Open Ditch
 - Intersect 40s
 - Intersect Parcels Within 40s
 - JD 4 Watershed
 - Township, Range
 - Sections

PN: 17-20105
 Source:
 Orthophotograph (Faribault County, 2016)
 Tile Ditch (Faribault County, 11/21/2015)
 Parcels (Faribault County, 2/4/2016)
 Lakes (MN DNR, July, 2008)
 Major Streams (MN DNR, July 2008)
 Counties (MN DNR, July 2012)
 PLSS (MinGeo/USGS)
 N
 W E
 S
 0 375 750 1,500
 Feet
 1 inch = 1,500 feet



STATE OF MINNESOTA
Before the
FARIBAULT AND MARTIN COUNTIES
SITTING AS THE DRAINAGE AUTHORITY FOR
Judicial Ditch #4

In the Matter of:

**the Petition to Improve Judicial Ditch
#4**

PRELIMINARY FINDINGS AND ORDER

The Joint Faribault and Martin Counties Board of Commissioners, sitting as the drainage authority for Judicial Ditch #4, convened on May 21st, 2019, at 11:45am at the Board Room at the Faribault County Courthouse 415 North Main Street Blue Earth, Minnesota. Based on the record and proceedings, Commissioner Loveall moved, seconded by Commissioner Roper to adopt the following Findings and Order:

Findings:

1. On May 8, 2019, petitioners Neal D. Mensing and Brenda Mensing filed a petition to improve Judicial Ditch 4 Faribault and Martin Counties pursuant to Minnesota Statute § 103E.215.
2. A bond in the amount of \$50,000 payable to the Drainage Authority of Faribault County has been filed concurrently with the petition. The bond is of adequate surety and has been approved by the Kurt Deter, drainage authority attorney. The bond is conditioned to pay the costs incurred if the proceedings are dismissed.
3. The petition conforms with the requirements of Minnesota Statute § 103E.215.
4. Pursuant to Minnesota Statute § 103E.215 Subd. 5, the petition requires appointment of an engineer to investigate the effect of the proposed improvement and file a report of findings with the drainage authority.
5. Petitioners have requested that engineers for ISG be appointed as engineer for the project.
6. The Joint Drainage Board is the drainage authority for Judicial Ditch 4 Faribault and Martin Counties.

Order:

Based on the foregoing findings and the entire record of proceedings before the Joint Drainage Board, the Board, acting as the drainage authority for Judicial Ditch 4, hereby orders as follows:

- A. The petition is hereby accepted.
- B. Charles Brandel, ISG, is hereby appointed to investigate the effect of the proposed improvement defined in the petition and file a report of findings with the Faribault County Auditor-Treasurer.
- C. The engineer shall subscribe to an oath to faithfully perform the assigned duties in the best manner possible and file a bond in the amount of \$5,000 with the Faribault County Auditor-Treasurer. The bond shall be subject to approval by the Faribault County Auditor-Treasurer. The bond shall be conditioned to pay any person or the drainage authority for damages and injuries resulting from negligence of the engineer while the engineer is acting in the proceedings or construction and provide that the engineer will diligently and honestly perform the engineer's duties.
- D. Upon the filing of the report of findings, the Faribault County Auditor-Treasurer shall promptly notify the Board which will, in consultation with the Auditor-Treasurer, set a time, by order, not more than 30 days after the date of the order, for a hearing on the engineer's report of findings. The Auditors of both counties shall provide notice of the public hearing on the report of findings in accordance with Minn. Stat. § 103E.215.

After discussion, the Board Chair called the question. The question was on the adoption of the foregoing findings and order, and there were 3 yeas, 0 nays, 2 absent, and 0 abstentions as follows:

	Yea	Nay	Absent	Abstain
Tom Loveall	☒	☐	☐	☐
John Roper	☒	☐	☐	☐
Greg Young	☒	☐	☐	☐
Elliot Belgard	☐	☐	☒	☐
Tom Mahoney	☐	☐	☒	☐

Upon vote, the Chair declared the motion passed and the Findings and Order adopted.



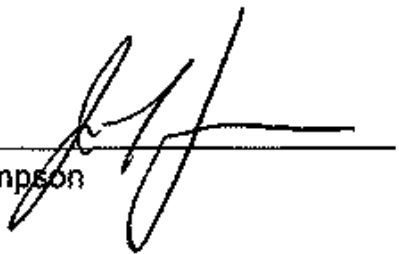
Greg Young, Chairperson

Dated: 5/21/19

* * * * *

I, John Thompson, Faribault County Auditor, do hereby certify that I have compared the above motion; findings and order with the original thereof as the same appears of record and on file with the Joint Faribault and Martin Counties Drainage Authority and find the same to be a true and correct transcript thereof. The above order was filed with me, Faribault County Auditor, on May 21, 2019.

IN TESTIMONY WHEREOF, I hereunto set my hand this
21st day of May, 2019.

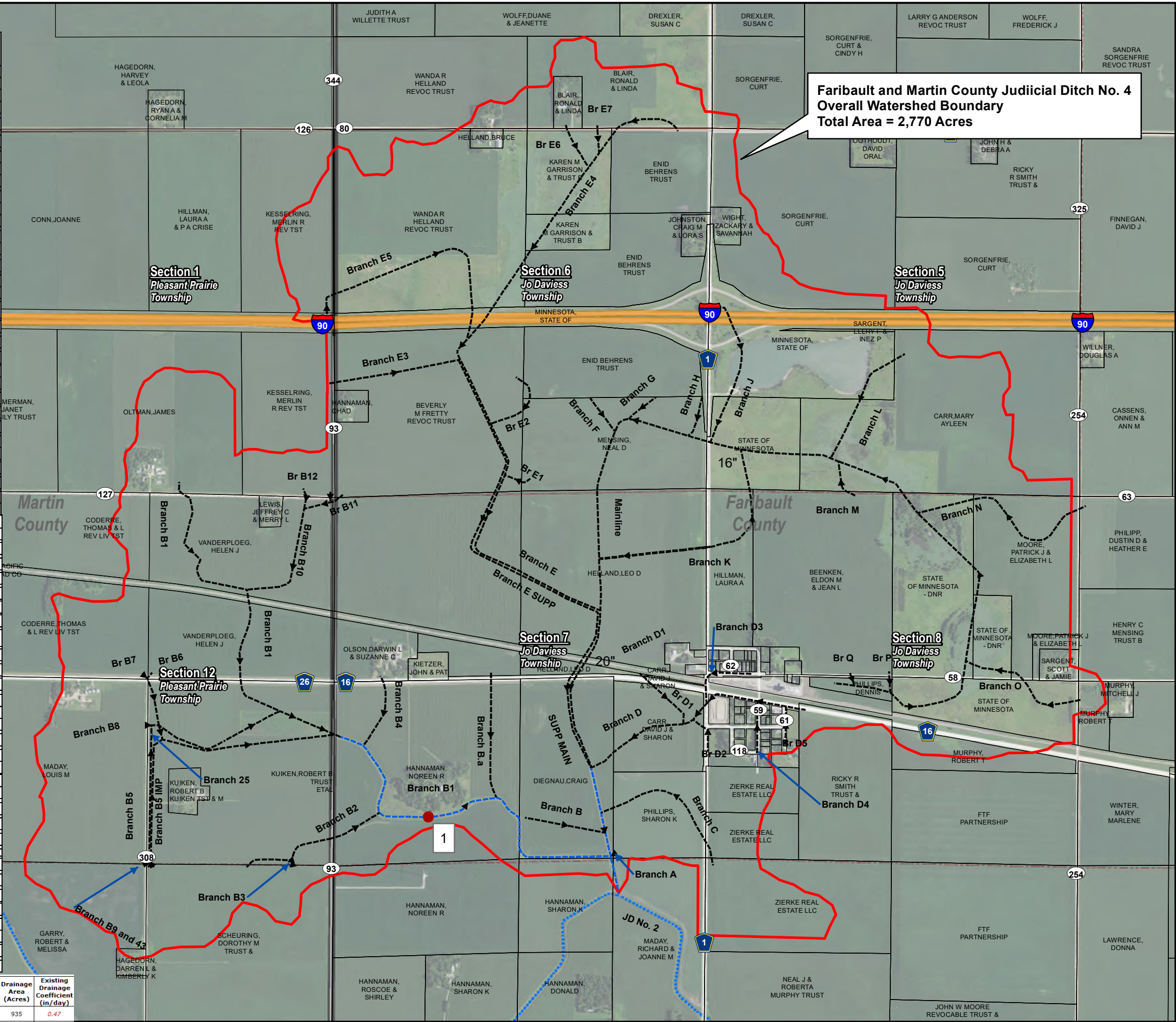


John Thompson

Appendix C: Maps

Area	Existing Size (in)	Existing Slope (%)	Drainage Area (Acres)	Existing Drainage Coefficient (in/day)
Main Line	20	0.12%	1521.8	0.08
	20	0.09%	1383.0	0.07
	16	0.08%	739.7	0.07
	12	0.70%	60.9	0.65
Supp Main	20	0.04%	307.7	0.22
Branch A	6	0.20%	12.7	0.47
Branch B	16	0.05%	30.9	1.33
Branch B.a	8	0.05%	95.4	0.07
Branch B.a	8	0.05%	29.8	0.22
Branch B. 1	15	0.05%	605.9	0.06
	10	0.40%	276.1	0.12
	8	0.20%	71.6	0.18
Branch B. 2	8	0.10%	133.4	0.07
	8	0.20%	94.9	0.14
Branch B. 3	6	1.00%	10.7	1.25
Branch B. 4	6	0.20%	46.5	0.13
Branch B. 4	6	1.00%	27.9	0.48
Branch B. 5 IMP	10	0.10%	102.7	0.16
B.5 Existing	10	0.10%	196.7	0.08
Branch 25	10	0.10%	0.5	33.07
Branch 43	10	1.00%	29.0	1.80
Branch B. 6	8	0.20%	29.2	0.44
	8	0.50%	21.5	0.95
Branch B. 7	6	0.20%	21.0	0.29
Branch B. 8	6	1.00%	100.2	0.13
Branch B. 9	6	0.50%	44.6	0.21
Branch B. 10	8	0.10%	88.0	0.10
	6	0.20%	53.8	0.11
Branch B. 11	6	0.20%	43.8	0.14
Branch B. 12	6	0.20%	2.8	2.17
Branch C	8	0.10%	127.3	0.07
	8	0.20%	79.5	0.16
Branch D	12	0.20%	124.0	0.31
	8	0.10%	71.3	0.13
Branch D. 1	6	0.10%	14.0	0.30
Branch D. 2	6	0.50%	4.6	2.06
Branch D. 3	8	0.10%	16.1	0.57
Branch D. 4	6	0.30%	5.1	1.44
Branch D. 5	6	0.30%	3.1	2.36
Branch E	15	0.10%	451.5	0.11
Branch E Supp	15	0.10%	265.4	0.18
Branch E. 1	6	0.20%	9.4	0.64
Branch E. 2	6	0.10%	20.1	0.21
Branch E. 3	6	0.20%	139.1	0.04
Branch E. 4	14	0.05%	392.6	0.07
	12	0.05%	288.0	0.07
	8	0.05%	75.9	0.08
	8	0.10%	7.7	0.55
Branch E. 5	10	0.05%	100.9	0.12
Branch E. 6	6	0.10%	12.4	0.34
Branch E. 6	6	0.10%	7.7	0.55
Branch E. 7	6	0.20%	15.5	0.39
Branch E. 7	6	0.65%	14.9	0.73
Branch F	6	0.10%	19.6	0.22
Branch G	6	0.10%	44.1	0.10
Branch H	6	0.10%	11.7	0.36
Branch J	10	0.10%	58.0	0.29
Branch K	8	0.20%	114.2	0.11
Branch L	8	0.10%	89.5	0.10
Branch M	6	0.10%	22.8	0.19
Branch N	8	0.20%	91.8	0.14
Branch O	8	0.10%	37.0	0.25
Branch O	6	0.10%	28.2	0.15
Branch P	6	0.20%	17.7	0.34
Branch Q	6	0.50%	17.3	0.55

Crossing #	Location	Existing Type	Existing Material	Existing Size (in)	Existing Slope (%)	Drainage Area (Acres)	Existing Drainage Coefficient (in/day)
1	FIELD CROSSING	ROUND CULVERT	CMP	48	0.06%	935	0.47

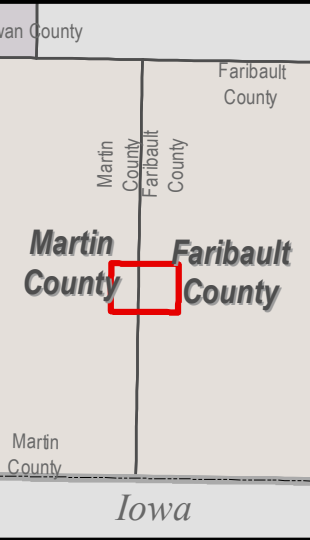


Existing Watershed Map
Faribault and Martin County, Minnesota
Monday, February 10, 2020

- Legend**
- JD 4 Watershed
 - Culverts
 - Existing, Main Tile
 - Existing, Open Ditch
 - Martin_Parcles
 - Faribault_Parcles

PN: 17-20105
Source:
Orthophotograph (Faribault County, 2016)
Tile/Ditch ((Faribault County, 11/21/2016)
Parcels ((Faribault County, 2/4/2016)
Lakes (MN DNR, July, 2008)
Major Stream (MN DNR, July 2008)
Counties (MN DNR, July 2013)
PLSS (MnGeo/USGS)

0 345 690 1,380 Feet
1 inch = 1,400 feet





Public Waters Map

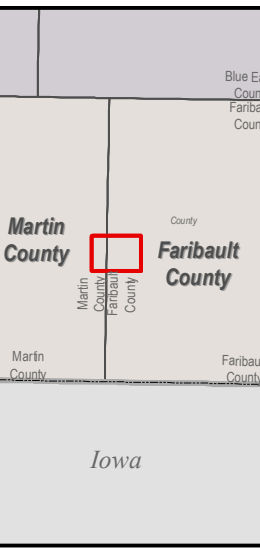
Judicial Ditch No. 4
Faribault and Martin County,
Minnesota
Wednesday, February 19, 2020

- Legend**
- JD 4 Watershed
 - Existing System**
 - Existing, Main Tile
 - Existing, Open Ditch
 - DNR Public Water

Orthophotograph (MnGeo WMS, 2015)
Tile/Ditch (Faribault County, 12/14/2016)
Parcels (Faribault County, 8/22/2016)
Lakes (MN DNR, July, 2008)
Major Stream (MN DNR, July 2008)
Counties (MN DNR, July 2013)
PLSS (MnGeo/USGS)



0 375 750 1,500
Feet
1 inch = 1,500 feet



Judicial Ditch No. 4
Overall Watershed Boundary
Total Area= 2,770 Acres

Section 1
Pleasant Prairie
Township

Section 6
Jo Daviess
Township

Section 5
Jo Daviess
Township

Section 4
Jo Daviess
Township

Section 12
Pleasant Prairie
Township

Section 7
Jo Daviess
Township

Section 8
Jo Daviess
Township

Section 9
Jo Daviess
Township

Section 13
Pleasant Prairie
Township

Section 18
Jo Daviess
Township

Section 17
Jo Daviess
Township

- Legend**
- DNR Native Plant Communities**
NPC
- UPs23a - Mesic Prairie (Southern)



**Digital
Elevation Map**
Faribault and Martin County,
Minnesota
Wednesday, February 19, 2020

- Legend**
- JD 4 Watershed
 - Culverts
 - Existing, Main Tile
 - Existing, Open Ditch
- DEM Value**
- High : 1131.56
 - Low : 1085.04

- Martin_Parcels
- Faribault_Parcels

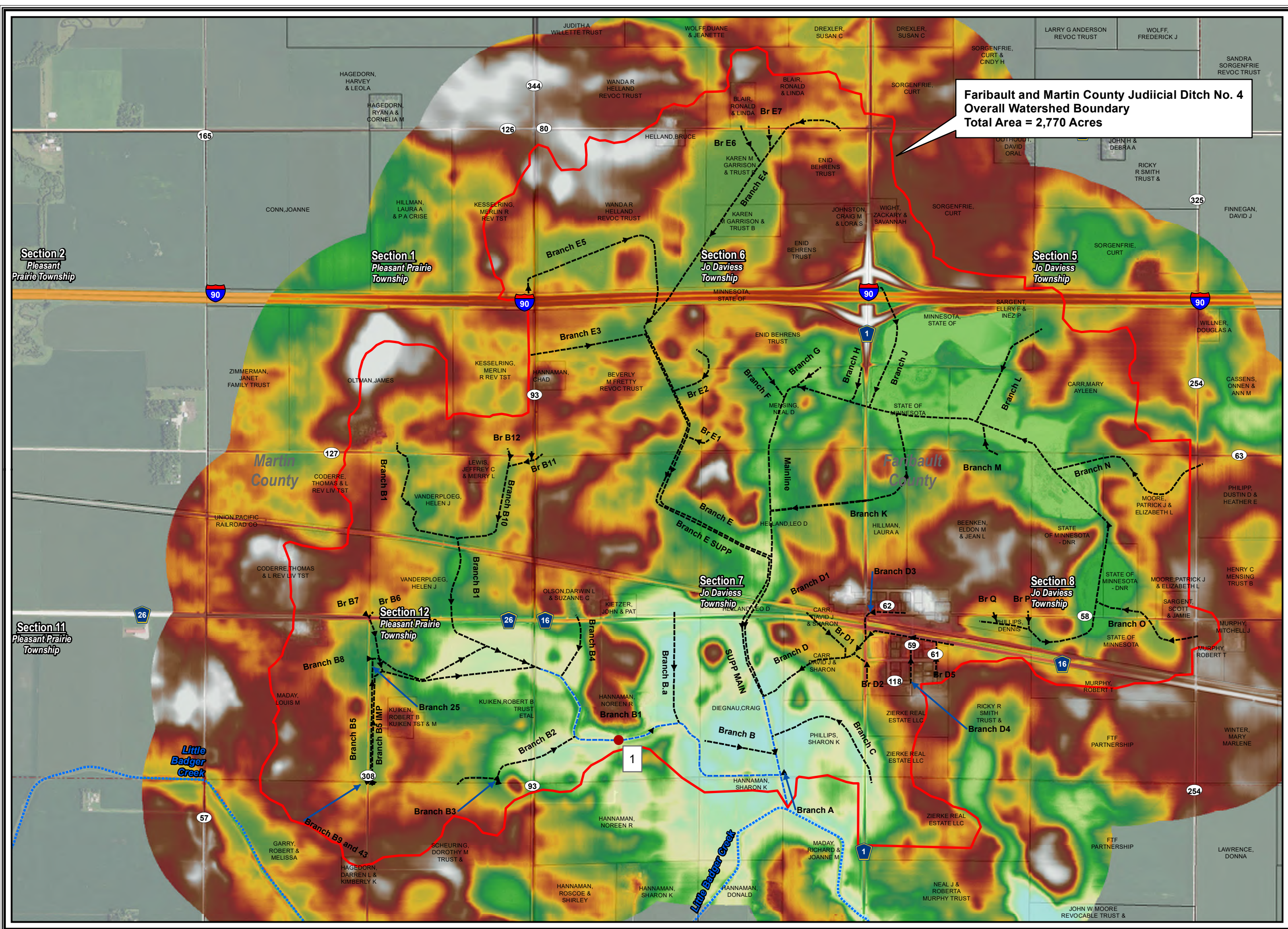
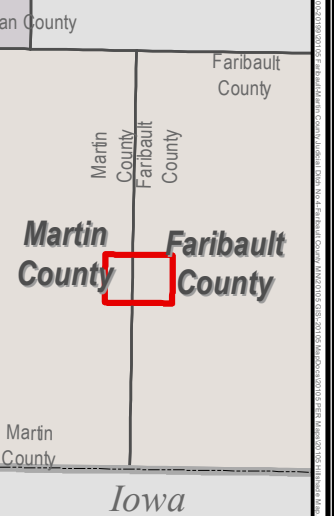
PN: 17-20105

Source:

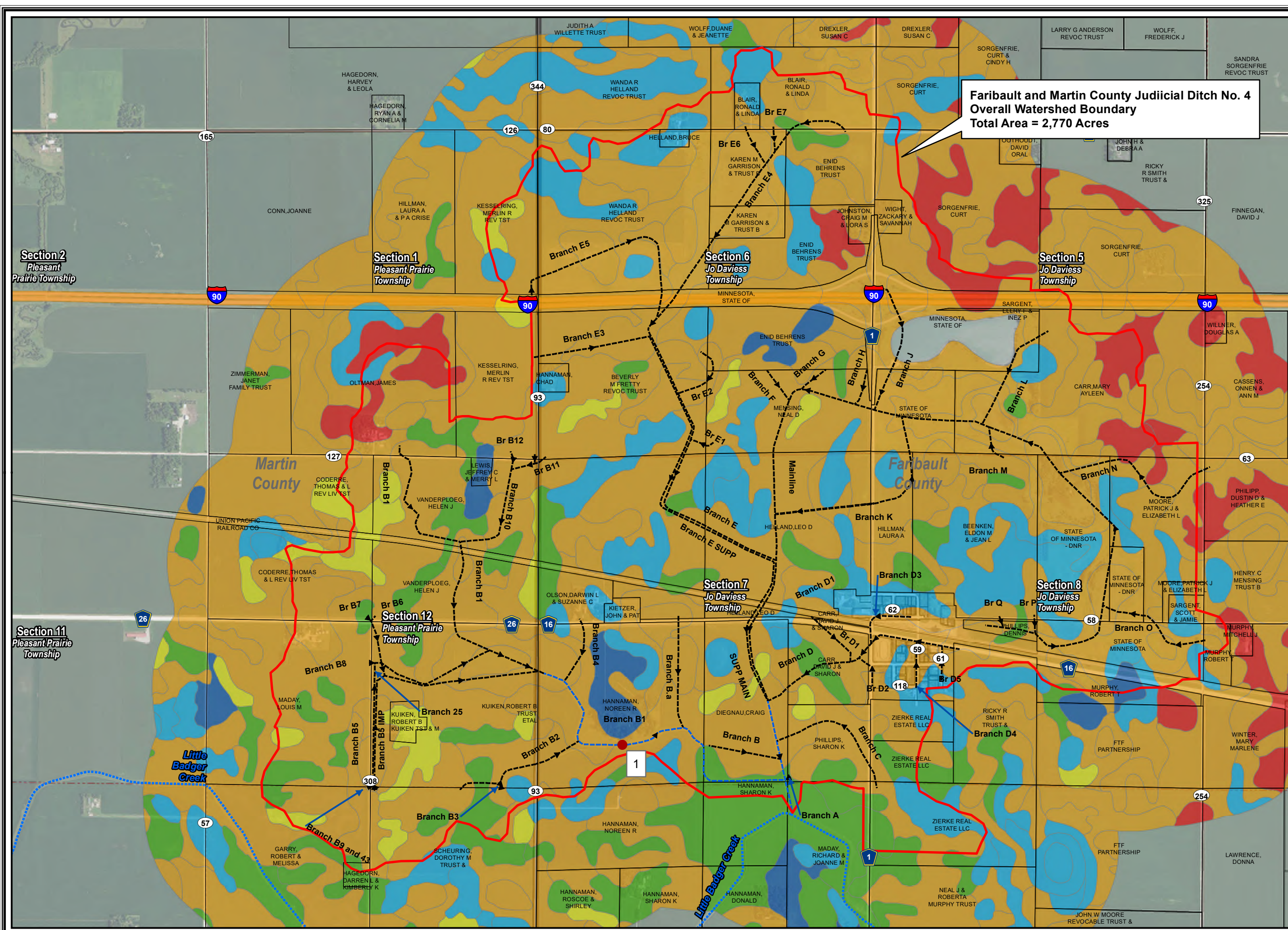
Orthophotograph (Faribault County, 2016)
Tile/Ditch ((Faribault County, 11/21/2016)
Parcels ((Faribault County, 2/4/2016)
Lakes (MN DNR, July, 2008)
Major Stream (MN DNR, July 2008)
Counties (MN DNR, July 2013)
PLSS (MnGeo/USGS)



0 350 700 1,400 Feet
1 inch = 1,400 feet



Faribault and Martin County Judicial Ditch No. 4
Overall Watershed Boundary
Total Area = 2,770 Acres



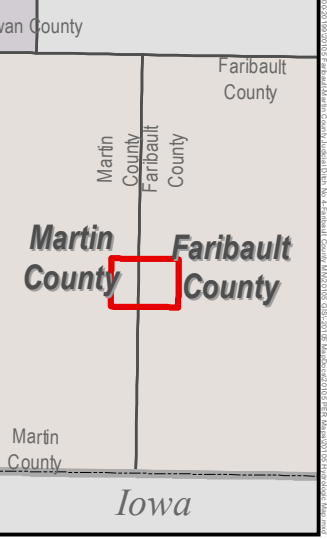
Hydrologic Soil Map

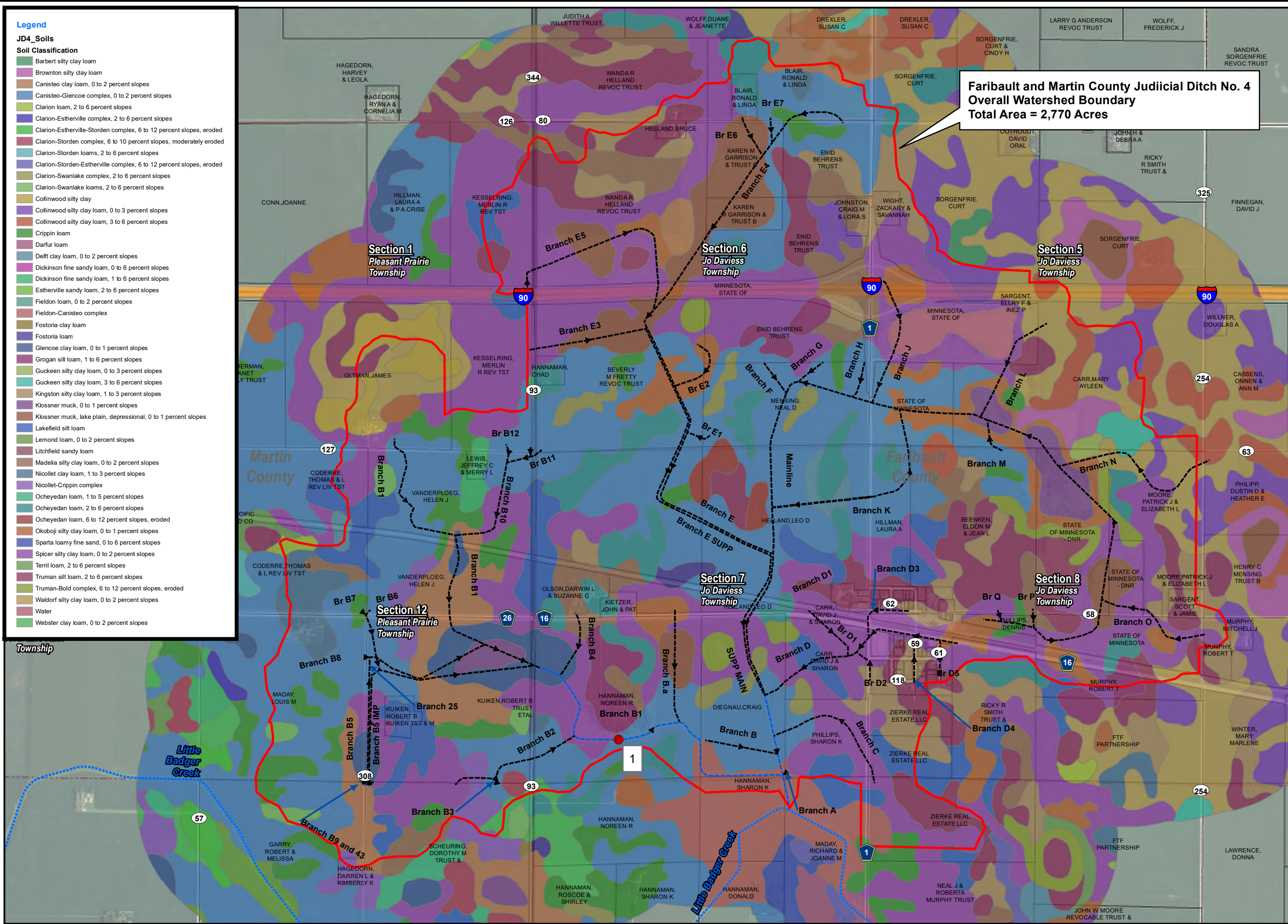
Faribault and Martin County, Minnesota
Monday, February 10, 2020

- Legend**
- JD 4 Watershed
 - Culverts
 - Existing, Main Tile
 - Existing, Open Ditch
 - Martin_Parcels
 - Faribault_Parcels
 - Hydrologic Soil Group**
 - A
 - B
 - B/D
 - C
 - C/D
 - D

PN: 17-20105
Source:
Orthophotograph (Faribault County, 2016)
Tile/Ditch ((Faribault County, 11/21/2016)
Parcels ((Faribault County, 2/4/2016)
Lakes (MN DNR, July, 2008)
Major Stream (MN DNR, July 2008)
Counties (MN DNR, July 2013)
PLSS (MnGeo/USGS)

0 350 700 1,400 Feet
1 inch = 1,400 feet





ISG

Soil Classification Map

Faribault and Martin County,
Minnesota
Monday, February 10, 2020

Legend

-  JD 4 Watershed
 Culverts
 Existing, Main Tile
 Existing, Open Ditch
 Martin_Parcels
 Faribault Parcels

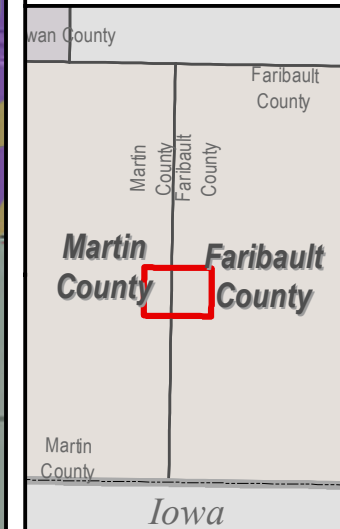
PN: 17-20105

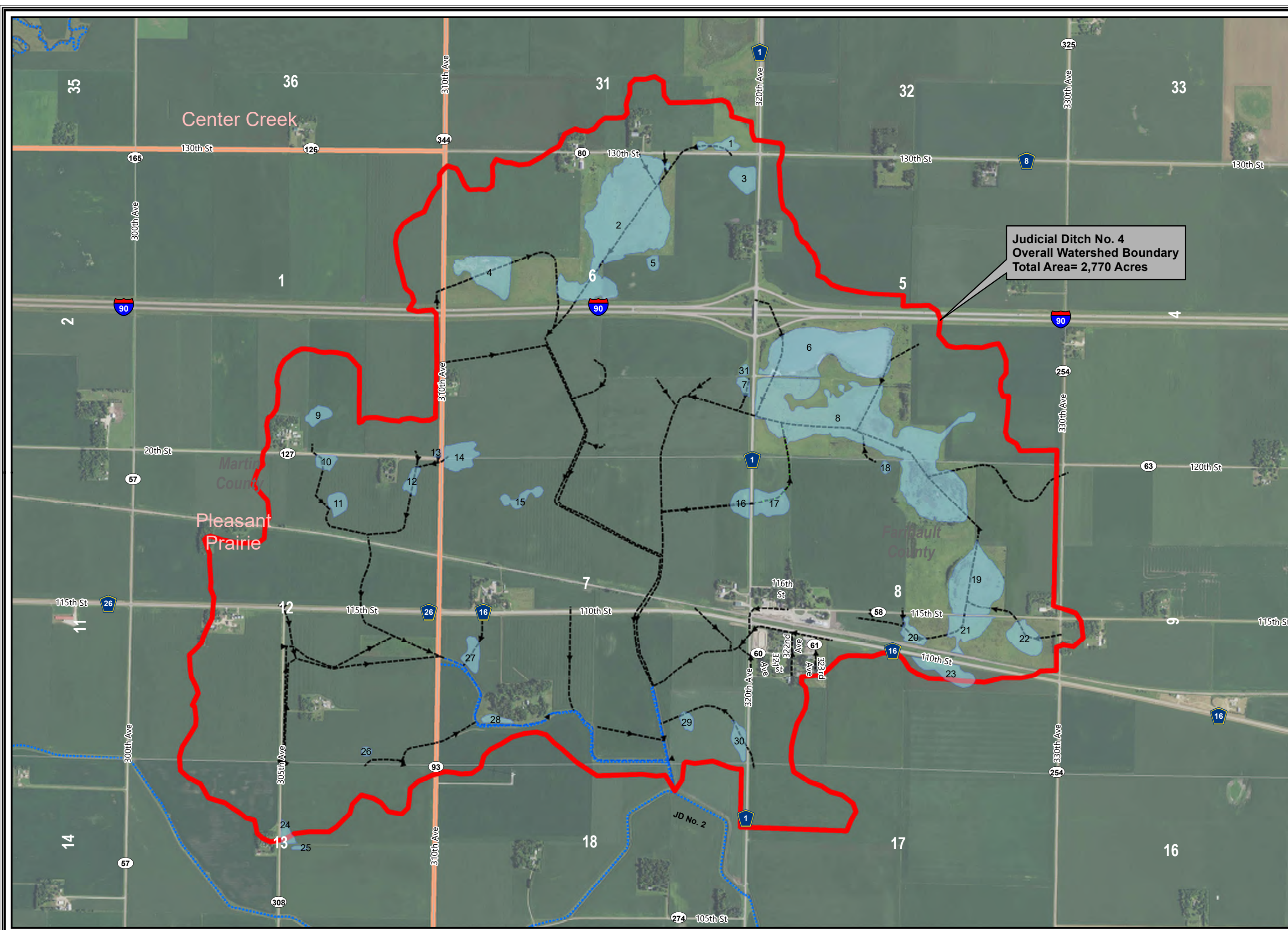
Source:

Orthophotograph (Faribault County, 2016)
 Tile/Ditch ((Faribault County, 11/21/2016)
 Parcels ((Faribault County, 2/4/2016)
 Lakes (MN DNR, July, 2008)
 Major Stream (MN DNR, July 2008)
 Counties (MN DNR, July 2013)
 PLSS (MnGeo/USGS)



0 345 690 1,380
 Feet
 1 inch = 1,400 feet

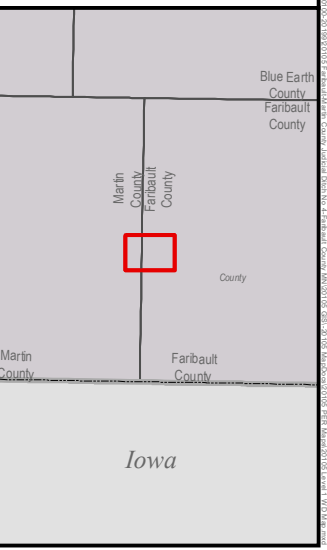
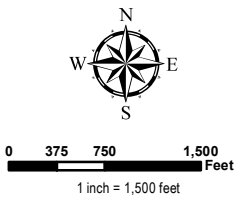


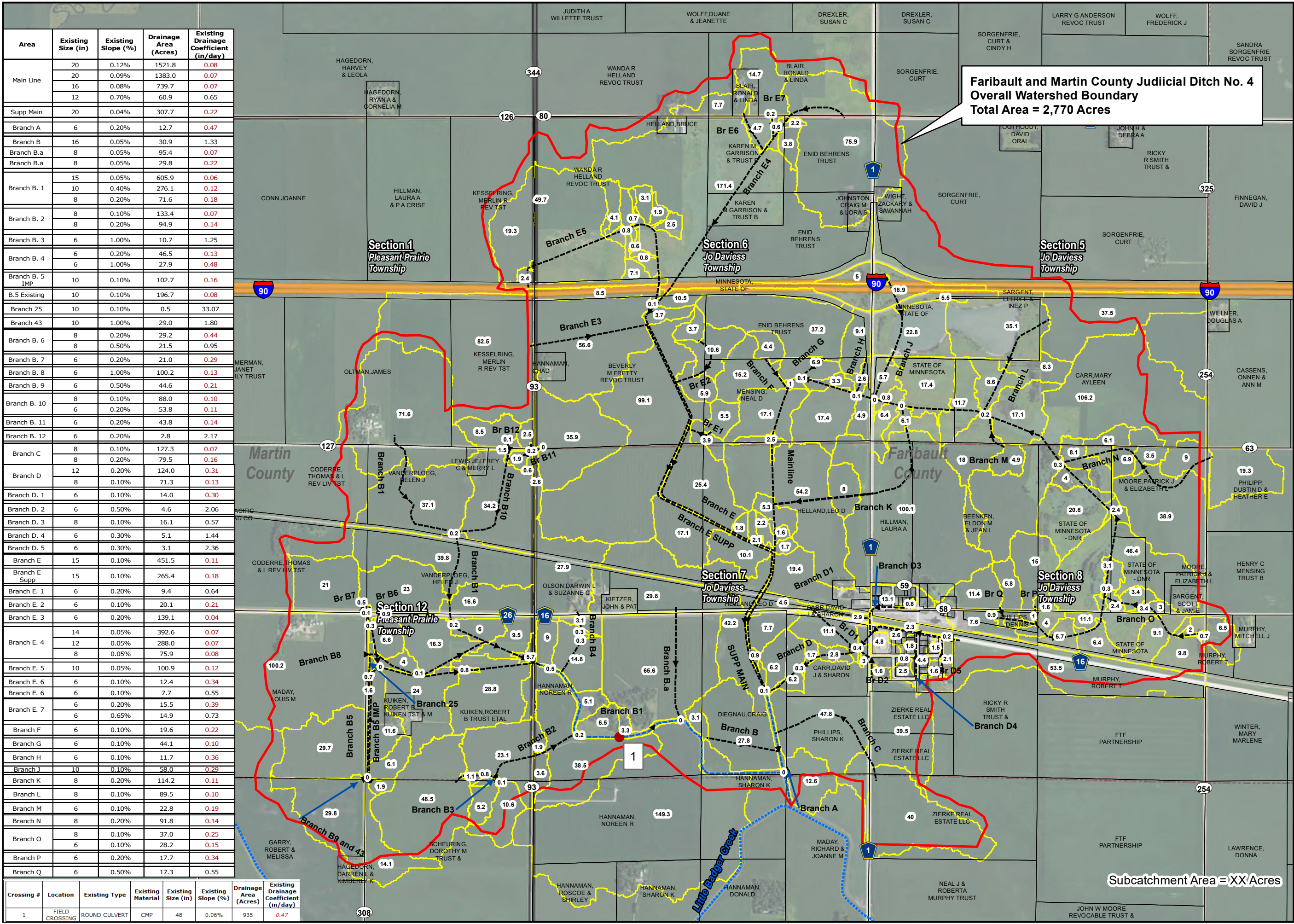


Level 1 Wetland Delineation Map
Judicial Ditch No. 4
Faribault and Martin County,
Minnesota
Tuesday, February 18, 2020

- Legend**
- JD 4 Watershed
 - Potential Wetlands
 - Existing, Main Tile
 - Existing, Open Ditch
 - Abandoned Tile

Orthophotograph (MnGeo WMS, 2015)
Tile/Ditch (Faribault County, 12/14/2016)
Parcels Faribault County, 8/22/2016)
Lakes (MN DNR, July, 2008)
Major Stream (MN DNR, July 2008)
Counties (MN DNR, July 2013)
PLSS (MnGeo/USGS)





Area	Existing Size (in)	Existing Slope (%)	Drainage Area (Acres)	Existing Drainage Coefficient (in/day)
Main Line	20	0.12%	1521.8	0.08
	20	0.09%	1383.0	0.07
	16	0.08%	739.7	0.07
	12	0.70%	60.9	0.65
Supp Main	20	0.04%	307.7	0.22
Branch A	6	0.20%	12.7	0.47
Branch B	16	0.05%	30.9	1.33
Branch B.a	8	0.05%	95.4	0.07
Branch B.a	8	0.05%	29.8	0.22
Branch B. 1	15	0.05%	605.9	0.06
	10	0.40%	276.1	0.12
	8	0.20%	71.6	0.18
Branch B. 2	8	0.10%	133.4	0.07
	8	0.20%	94.9	0.14
Branch B. 3	6	1.00%	10.7	1.25
Branch B. 4	6	0.20%	46.5	0.13
Branch B. 4	6	1.00%	27.9	0.48
Branch B. 5 IMP	10	0.10%	102.7	0.16
B.5 Existing	10	0.10%	196.7	0.08
Branch 25	10	0.10%	0.5	33.07
Branch 43	10	1.00%	29.0	1.80
Branch B. 6	8	0.20%	29.2	0.44
	8	0.50%	21.5	0.95
Branch B. 7	6	0.20%	21.0	0.29
Branch B. 8	6	1.00%	100.2	0.13
Branch B. 9	6	0.50%	44.6	0.21
Branch B. 10	8	0.10%	88.0	0.10
	6	0.20%	53.8	0.11
Branch B. 11	6	0.20%	43.8	0.14
Branch B. 12	6	0.20%	2.8	2.17
Branch C	8	0.10%	127.3	0.07
	8	0.20%	79.5	0.16
Branch D	12	0.20%	124.0	0.31
	8	0.10%	71.3	0.13
Branch D. 1	6	0.10%	14.0	0.30
Branch D. 2	6	0.50%	4.6	2.06
Branch D. 3	8	0.10%	16.1	0.57
Branch D. 4	6	0.30%	5.1	1.44
Branch D. 5	6	0.30%	3.1	2.36
Branch E	15	0.10%	451.5	0.11
Branch E Supp	15	0.10%	265.4	0.18
Branch E. 1	6	0.20%	9.4	0.64
Branch E. 2	6	0.10%	20.1	0.21
Branch E. 3	6	0.20%	139.1	0.04
Branch E. 4	14	0.05%	392.6	0.07
	12	0.05%	288.0	0.07
	8	0.05%	75.9	0.08
	6	0.10%	100.9	0.12
Branch E. 6	6	0.10%	12.4	0.34
Branch E. 6	6	0.10%	7.7	0.55
Branch E. 7	6	0.20%	15.5	0.39
Branch E. 7	6	0.65%	14.9	0.73
Branch F	6	0.10%	19.6	0.22
Branch G	6	0.10%	44.1	0.10
Branch H	6	0.10%	11.7	0.36
Branch J	10	0.10%	58.0	0.29
Branch K	8	0.20%	114.2	0.11
Branch L	8	0.10%	89.5	0.10
Branch M	6	0.10%	22.8	0.19
Branch N	8	0.20%	91.8	0.14
Branch O	8	0.10%	37.0	0.25
Branch O	6	0.10%	28.2	0.15
Branch P	6	0.20%	17.7	0.34
Branch Q	6	0.50%	17.3	0.55

Crossing #	Location	Existing Type	Existing Material	Existing Size (in)	Existing Slope (%)	Drainage Area (Acres)	Existing Drainage Coefficient (in/day)
1	FIELD CROSSING	ROUND CULVERT	CMP	48	0.06%	935	0.47

Subcatchment Map

Faribault and Martin County, Minnesota
Tuesday, February 18, 2020

Legend

- JD 4 Watershed
- Culverts
- Existing, Main Tile
- Existing, Open Ditch
- CatchmentPoly
- Martin_Parcels
- Faribault_Parcels

PN: 17-20105
Source:
Orthophotograph (Faribault County, 2016)
Tile/Ditch ((Faribault County, 11/21/2016)
Parcels ((Faribault County, 2/4/2016)
Lakes (MN DNR, July, 2008)
Major Stream (MN DNR, July 2008)
Counties (MN DNR, July 2013)
PLSS (MnGeo/USGS)

Appendix D: Multipurpose Drainage Management

Multi-Purpose Drainage Management Plan

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 ditch improvement project 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.

Potential locations for additional BMPs are shown on the Multi-Purpose Drainage Management map in this Appendix. 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). 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.

Currently, this project proposes to use Alternative Tile Inlets which we call Water Quality Inlets in all public road ditches. In addition, a 3-acre storage pond is recommended to be implemented as part of the improvement project. Potential locations for these and additional BMPs are shown on the *Multi-Purpose Drainage Management Map* and will be proposed to landowners. Furthermore; additional water quality measures can be implemented with this project if requested.

Appendix E: Drainage Calculations

**FARIBAULT COUNTY
JUDICIAL DITCH No. 04
January 22, 2019**



XP SWMM FLOWRATE EXISTING VS PRO OPTION 1 TABLE

Location	Conveyence	2-yr			5-yr			10-yr			25-yr			50-yr			100-yr		
		Existing (cfs)	Proposed (cfs)	% Change	Existing (cfs)	Proposed (cfs)	% Change	Existing (cfs)	Proposed (cfs)	% Change	Existing (cfs)	Proposed (cfs)	% Change	Existing (cfs)	Proposed (cfs)	% Change	Existing (cfs)	Proposed (cfs)	% Change
Downstream of Judicial Ditch No. 2 Ditch Junction	Ditch	116.77	114.47	-2%	161.14	165.19	3%	211.26	218.32	3%	292.87	305.81	4%	363.99	381.55	5%	446.03	467.57	5%
	Overflow	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A
	Total	116.77	114.47	-2%	161.14	165.19	3%	211.26	218.32	3%	292.87	305.81	4%	363.99	381.55	5%	446.03	467.57	5%
JD 4 Ditch Outlet	Ditch	114.14	112.09	-2%	157.24	161.37	3%	205.71	212.77	3%	284.71	297.76	5%	353.48	371.03	5%	433.05	454.58	5%
	Overflow	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A
	Total	114.14	112.09	-2%	157.24	161.37	3%	205.71	212.77	3%	284.71	297.76	5%	353.48	371.03	5%	433.05	454.58	5%
Main tile into JD 4 Ditch	Buried Tile	11.19	39.72	255%	10.91	53.61	391%	10.68	60.13	463%	10.55	67.84	543%	10.53	74.65	609%	10.62	79.08	645%
	Buried Tile	10.86	N/A	N/A	11.20	N/A	N/A	13.20	N/A	N/A	14.57	N/A	N/A	14.78	N/A	N/A	14.82	N/A	N/A
	Overflow	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A
	Total	22.05	39.72	80%	22.11	53.61	143%	23.88	60.13	152%	25.12	67.84	170%	25.31	74.65	195%	25.44	79.08	211%
Main tile Outlet of Pond	Buried Tile	11.19	49.68	344%	12.05	51.94	331%	13.15	54.71	316%	14.16	55.19	290%	14.94	63.59	326%	15.52	62.78	304%
	Buried Tile	10.01	N/A	N/A	11.68	N/A	N/A	14.14	N/A	N/A	15.42	N/A	N/A	16.38	N/A	N/A	16.91	N/A	N/A
	Overflow	0.00	0.00	N/A	0.00	0.00	N/A	12.78	0.00	-100%	46.02	0.00	-100%	66.52	0.00	-100%	86.13	0.47	-99%
	Total	21.21	49.68	134%	23.73	51.94	119%	40.06	54.71	37%	75.60	55.19	-27%	97.84	63.59	-35%	118.56	63.25	-47%
Main tile Intlet of Pond	Buried Tile	11.19	75.08	571%	12.05	100.58	734%	13.15	108.68	727%	14.16	118.33	736%	14.94	121.25	712%	15.52	121.63	684%
	Buried Tile	9.82	N/A	N/A	10.80	N/A	N/A	13.43	N/A	N/A	14.49	N/A	N/A	15.27	N/A	N/A	15.97	N/A	N/A
	Overflow	1.80	0.00	-100%	7.74	0.00	-100%	22.95	0.00	-100%	60.40	0.00	-100%	88.91	26.99	-70%	119.20	56.00	-53%
	Total	22.81	75.08	229%	30.60	100.58	229%	49.52	108.68	119%	89.05	118.33	33%	119.12	148.24	24%	150.70	177.63	18%
Main tile - Helland-Mensing Propoerty Line	Buried Tile	1.26	26.50	2010%	1.54	33.29	2057%	1.32	32.26	2342%	1.52	29.20	1816%	1.50	25.94	1634%	1.49	26.31	1666%
	Overflow	8.11	0.00	-100%	19.65	0.00	-100%	32.19	9.44	-71%	52.63	30.10	-43%	71.04	50.75	-29%	92.90	79.63	-14%
	Total	9.37	26.50	183%	21.19	33.29	57%	33.51	41.71	24%	54.16	59.29	9%	72.54	76.68	6%	94.39	105.95	12%
Main tile- Mensing Property	Buried Tile	-1.26	16.91	-1446%	1.17	23.24	1892%	-0.91	25.18	-2867%	1.10	24.21	2095%	1.09	22.00	1911%	1.09	25.47	2239%
	Overflow	11.78	0.01	-100%	17.19	0.01	-100%	22.50	0.01	-100%	31.07	1.90	-94%	39.92	8.64	-78%	53.20	13.93	-74%
	Total	10.53	16.92	61%	18.36	23.25	27%	21.59	25.19	17%	32.17	26.11	-19%	41.02	30.64	-25%	54.29	39.40	-27%
Main tile- Mensing-CSAH 1 Property Line	Buried Tile	-1.18	1.93	-263%	-2.50	-5.31	113%	-1.29	-8.46	557%	-2.73	-11.02	304%	-2.80	-12.28	339%	-2.89	-11.95	313%
	Overflow	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A
	Total	-1.18	1.93	-263%	-2.50	-5.31	113%	-1.29	-8.46	557%	-2.73	-11.02	304%	-2.80	-12.28	339%	-2.89	-11.95	313%
Branch E Outlet	Buried Tile	3.19	3.42	7%	3.33	3.41	3%	3.50	3.43	-2%	3.45	3.50	2%	3.46	3.48	0%	3.49	3.54	1%
	Overflow	15.71	0.57	-96%	30.36	1.60	-95%	41.98	6.90	-84%	59.83	25.25	-58%	84.69	48.54	-43%	130.16	127.47	-2%
	Total	18.90	4.00	-79%	33.68	5.01	-85%	45.47	10.33	-77%	63.28	28.76	-55%	88.15	52.02	-41%	133.65	131.01	-2%
Branch E Supp Outlet	Buried Tile	6.31	7.29	16%	6.06	7.28	20%	6.11	7.30	19%	6.13	7.31	19%	6.14	7.31	19%	6.15	7.31	19%
	Overflow	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A
	Total	6.31	7.29	16%	6.06	7.28	20%	6.11	7.30	19%	6.13	7.31	19%	6.14	7.31	19%	6.15	7.31	19%
Denotes peak flows less than or equal to existing																			

**FARIBAULT COUNTY
JUDICIAL DITCH No. 04
January 22, 2019**



XP SWMM ELEVATION EXISTING VS PRO OPTION 1 TABLE

[illegible]

**FARIBAULT COUNTY
JUDICIAL DITCH No. 04
January 22, 2019**



XP SWMM FLOWRATE EXISTING VS PRO OPTION 2 TABLE

Location	Conveyence	2-yr			5-yr			10-yr			25-yr			50-yr			100-yr		
		Existing (cfs)	Proposed (cfs)	% Change	Existing (cfs)	Proposed (cfs)	% Change	Existing (cfs)	Proposed (cfs)	% Change	Existing (cfs)	Proposed (cfs)	% Change	Existing (cfs)	Proposed (cfs)	% Change	Existing (cfs)	Proposed (cfs)	% Change
Downstream of Judicial Ditch No. 2 Ditch Junction	Ditch	116.77	100.60	-14%	161.14	148.23	-8%	211.26	200.48	-5%	292.87	286.77	-2%	363.99	362.04	-1%	446.03	448.39	1%
	Overflow	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A
	Total	116.77	100.60	-14%	161.14	148.23	-8%	211.26	200.48	-5%	292.87	286.77	-2%	363.99	362.04	-1%	446.03	448.39	1%
JD 4 Ditch Outlet	Ditch	114.14	98.26	-14%	157.24	144.87	-8%	205.71	195.02	-5%	284.71	278.60	-2%	353.48	351.53	-1%	433.05	435.40	1%
	Overflow	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A
	Total	114.14	98.26	-14%	157.24	144.87	-8%	205.71	195.02	-5%	284.71	278.60	-2%	353.48	351.53	-1%	433.05	435.40	1%
Main tile into JD 4 Ditch	Buried Tile	11.19	28.61	156%	10.91	37.03	239%	10.68	43.17	304%	10.55	49.38	368%	10.53	51.71	391%	10.62	53.29	402%
	Buried Tile	10.86	N/A	N/A	11.20	N/A	N/A	13.20	N/A	N/A	14.57	N/A	N/A	14.78	N/A	N/A	14.82	N/A	N/A
	Overflow	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A
	Total	22.05	28.61	30%	22.11	37.03	68%	23.88	43.17	81%	25.12	49.38	97%	25.31	51.71	104%	25.44	53.29	110%
Main tile Outlet of Pond	Buried Tile	11.19	33.36	198%	12.05	35.66	196%	13.15	46.00	250%	14.16	44.93	217%	14.94	47.21	216%	15.52	49.55	219%
	Buried Tile	10.01	N/A	N/A	11.68	N/A	N/A	14.14	N/A	N/A	15.42	N/A	N/A	16.38	N/A	N/A	16.91	N/A	N/A
	Overflow	0.00	0.00	N/A	0.00	0.00	N/A	12.78	0.00	-100%	46.02	0.00	-100%	66.52	0.00	-100%	86.13	0.00	-100%
	Total	21.21	33.36	57%	23.73	35.66	50%	40.06	46.00	15%	75.60	44.93	-41%	97.84	47.21	-52%	118.56	49.55	-58%
Main tile Intlet of Pond	Buried Tile	11.19	74.57	566%	12.05	101.98	746%	13.15	113.72	765%	14.16	131.62	830%	14.94	138.50	827%	15.52	156.63	909%
	Buried Tile	9.82	N/A	N/A	10.80	N/A	N/A	13.43	N/A	N/A	14.49	N/A	N/A	15.27	N/A	N/A	15.97	N/A	N/A
	Overflow	1.80	0.00	-100%	7.74	0.00	-100%	22.95	0.00	-100%	60.40	0.00	-100%	88.91	22.08	-75%	119.20	43.87	-63%
	Total	22.81	74.57	227%	30.60	101.98	233%	49.52	113.72	130%	89.05	131.62	48%	119.12	160.58	35%	150.70	200.50	33%
Main tile - Helland-Mensing Propoerty Line	Buried Tile	-1.86	26.44	-1525%	1.54	34.26	2120%	1.32	33.00	2398%	1.52	26.47	1637%	1.50	23.39	1464%	1.49	22.96	1441%
	Overflow	8.11	0.00	-100%	19.65	0.00	-100%	32.19	7.32	-77%	52.63	27.37	-48%	71.04	49.96	-30%	92.90	81.45	-12%
	Total	6.26	26.44	323%	21.19	34.26	62%	33.51	40.32	20%	54.16	53.84	-1%	72.54	73.35	1%	94.39	104.41	11%
Main tile- Mensing Property	Buried Tile	-1.26	16.77	-1435%	1.17	23.81	1941%	-0.91	23.04	-2632%	1.10	17.83	1517%	1.09	18.06	1551%	1.09	20.59	1790%
	Overflow	11.78	0.01	-100%	17.19	0.01	-100%	22.50	0.01	-100%	31.07	4.59	-85%	39.92	11.27	-72%	53.20	21.45	-60%
	Total	10.53	16.78	59%	18.36	23.83	30%	21.59	23.05	7%	32.17	22.42	-30%	41.02	29.33	-28%	54.29	42.04	-23%
Main tile- Mensing-CSAH 1 Property Line	Buried Tile	-1.18	1.92	-263%	-2.50	-5.40	116%	-1.29	-7.34	470%	-2.73	-11.02	304%	-2.80	-12.29	339%	-2.89	-11.12	285%
	Overflow	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A
	Total	-1.18	1.92	-263%	-2.50	-5.40	116%	-1.29	-7.34	470%	-2.73	-11.02	304%	-2.80	-12.29	339%	-2.89	-11.12	285%
Branch E Outlet	Buried Tile	3.19	3.41	7%	3.33	3.41	2%	3.50	3.42	-2%	3.45	3.41	-1%	3.46	3.40	-2%	3.49	3.46	-1%
	Overflow	15.71	0.24	-98%	30.36	1.25	-96%	41.98	5.24	-88%	59.83	17.00	-72%	84.69	38.42	-55%	113.16	107.72	-5%
	Total	18.90	3.65	-81%	33.68	4.65	-86%	45.47	8.66	-81%	63.28	20.41	-68%	88.15	41.82	-53%	116.65	111.19	-5%
Branch E Supp Outlet	Buried Tile	6.31	7.44	18%	6.06	7.39	22%	6.11	7.38	21%	6.13	7.41	21%	6.14	7.40	21%	6.15	7.39	20%
	Overflow	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A
	Total	6.31	7.44	18%	6.06	7.39	22%	6.11	7.38	21%	6.13	7.41	21%	6.14	7.40	21%	6.15	7.39	20%
Denotes peak flows less than or equal to existing																			

[illegible]



XP SWMM FLOWRATE EXISTING VS PRO OPTION 1 WITH BR E IMP TABLE

Location	Conveyence	2-yr			5-yr			10-yr			25-yr			50-yr			100-yr		
		Existing (cfs)	Proposed (cfs)	% Change	Existing (cfs)	Proposed (cfs)	% Change	Existing (cfs)	Proposed (cfs)	% Change	Existing (cfs)	Proposed (cfs)	% Change	Existing (cfs)	Proposed (cfs)	% Change	Existing (cfs)	Proposed (cfs)	% Change
Downstream of Judicial Ditch No. 2 Ditch Junction	Ditch	116.77	122.52	5%	161.14	169.07	5%	211.26	222.01	5%	292.87	309.42	6%	363.99	385.43	6%	446.03	470.85	6%
	Overflow	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A
	Total	116.77	122.52	5%	161.14	169.07	5%	211.26	222.01	5%	292.87	309.42	6%	363.99	385.43	6%	446.03	470.85	6%
JD 4 Ditch Outlet	Ditch	114.14	120.27	5%	157.24	165.17	5%	205.71	216.42	5%	284.71	301.17	6%	353.48	375.02	6%	433.05	457.83	6%
	Overflow	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A
	Total	114.14	120.27	5%	157.24	165.17	5%	205.71	216.42	5%	284.71	301.17	6%	353.48	375.02	6%	433.05	457.83	6%
Main tile into JD 4 Ditch	Buried Tile	11.19	52.20	366%	10.91	61.45	463%	10.68	66.56	523%	10.55	73.25	595%	10.53	77.29	634%	10.62	79.65	650%
	Buried Tile	10.86	N/A	N/A	11.20	N/A	N/A	13.20	N/A	N/A	14.57	N/A	N/A	14.78	N/A	N/A	14.82	N/A	N/A
	Overflow	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A
	Total	22.05	52.20	137%	22.11	61.45	178%	23.88	66.56	179%	25.12	73.25	192%	25.31	77.29	205%	25.44	79.65	213%
Main tile Outlet of Pond	Buried Tile	11.19	53.48	378%	12.05	63.96	431%	13.15	63.85	386%	14.16	58.72	315%	14.94	66.10	342%	15.52	59.24	282%
	Buried Tile	10.01	N/A	N/A	11.68	N/A	N/A	14.14	N/A	N/A	15.42	N/A	N/A	16.38	N/A	N/A	16.91	N/A	N/A
	Overflow	0.00	0.00	N/A	0.00	0.00	N/A	12.78	0.00	-100%	46.02	0.00	-100%	66.52	0.56	-99%	86.13	3.11	-96%
	Total	21.21	53.48	152%	23.73	63.96	170%	40.06	63.85	59%	75.60	58.72	-22%	97.84	66.65	-32%	118.56	62.36	-47%
Main tile Intlet of Pond	Buried Tile	11.19	99.18	786%	12.05	107.37	791%	13.15	115.01	775%	14.16	118.53	737%	14.94	131.11	778%	15.52	144.16	829%
	Buried Tile	9.82	N/A	N/A	10.80	N/A	N/A	13.43	N/A	N/A	14.49	N/A	N/A	15.27	N/A	N/A	15.97	N/A	N/A
	Overflow	1.80	0.00	-100%	7.74	0.00	-100%	22.95	0.00	-100%	60.40	22.52	-63%	88.91	45.05	-49%	119.20	98.79	-17%
	Total	22.81	99.18	335%	30.60	107.37	251%	49.52	115.01	132%	89.05	141.05	58%	119.12	176.16	48%	150.70	242.95	61%
Main tile - Helland-Mensing Propoerty Line	Buried Tile	1.26	24.97	1888%	1.54	23.27	1408%	1.32	21.81	1551%	1.52	21.93	1339%	1.50	21.10	1311%	1.49	20.18	1254%
	Overflow	8.11	0.00	-100%	19.65	3.96	-80%	32.19	12.78	-60%	52.63	33.73	-36%	71.04	54.87	-23%	92.90	82.48	-11%
	Total	9.37	24.97	167%	21.19	27.24	29%	33.51	34.59	3%	54.16	55.66	3%	72.54	75.97	5%	94.39	102.66	9%
Main tile- Mensing Property	Buried Tile	1.26	13.44	970%	1.17	14.83	1171%	0.91	16.88	1755%	1.10	19.36	1655%	1.09	20.50	1774%	1.09	25.12	2207%
	Overflow	11.78	0.01	-100%	17.19	0.01	-100%	22.50	0.01	-100%	31.07	2.77	-91%	39.92	9.40	-76%	53.20	13.80	-74%
	Total	13.04	13.45	3%	18.36	14.84	-19%	23.41	16.89	-28%	32.17	22.13	-31%	41.02	29.90	-27%	54.29	38.93	-28%
Main tile- Mensing-CSAH 1 Property Line	Buried Tile	1.18	1.93	63%	1.29	1.93	49%	1.29	1.93	49%	1.29	1.93	49%	1.29	1.93	49%	1.29	1.93	49%
	Overflow	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A
	Total	1.18	1.93	63%	1.29	1.93	49%	1.29	1.93	49%	1.29	1.93	49%	1.29	1.93	49%	1.29	1.93	49%
Branch E Outlet	Buried Tile	3.19	43.71	1271%	3.33	44.27	1230%	3.50	44.54	1174%	3.45	44.36	1187%	3.46	43.95	1169%	3.49	43.16	1137%
	Buried Tile	6.31	N/A	N/A	6.06	N/A	N/A	6.11	N/A	N/A	6.13	N/A	N/A	6.14	N/A	N/A	6.15	N/A	N/A
	Overflow	15.71	0.76	-95%	30.36	8.78	-71%	41.98	17.07	-59%	59.83	34.60	-42%	84.69	56.81	-33%	130.16	112.07	-14%
	Total	25.21	44.47	76%	39.74	53.05	33%	51.58	61.62	19%	69.41	78.96	14%	94.29	100.77	7%	139.80	155.23	11%

Denotes peak flows less than or
equal to existing

**FARIBAULT COUNTY
JUDICIAL DITCH No. 04
January 30, 2020**



XP SWMM ELEVATION EXISTING VS PRO OPTION 1 WITH BR E IMP TABLE

[illegible]



XP SWMM FLOWRATE EXISTING VS PRO OPTION 2 WITH BR E IMP TABLE

Location	Conveyence	2-yr			5-yr			10-yr			25-yr			50-yr			100-yr		
		Existing (cfs)	Proposed (cfs)	% Change	Existing (cfs)	Proposed (cfs)	% Change	Existing (cfs)	Proposed (cfs)	% Change	Existing (cfs)	Proposed (cfs)	% Change	Existing (cfs)	Proposed (cfs)	% Change	Existing (cfs)	Proposed (cfs)	% Change
Downstream of Judicial Ditch No. 2 Ditch Junction	Ditch	116.77	106.20	-9%	161.14	151.20	-6%	211.26	203.30	-4%	292.87	289.27	-1%	363.99	364.56	0%	446.03	451.38	1%
	Overflow	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A
	Total	116.77	106.20	-9%	161.14	151.20	-6%	211.26	203.30	-4%	292.87	289.27	-1%	363.99	364.56	0%	446.03	451.38	1%
JD 4 Ditch Outlet	Ditch	114.14	103.82	-9%	157.24	147.33	-6%	205.71	197.73	-4%	284.71	281.05	-1%	353.48	354.05	0%	433.05	438.41	1%
	Overflow	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A
	Total	114.14	103.82	-9%	157.24	147.33	-6%	205.71	197.73	-4%	284.71	281.05	-1%	353.48	354.05	0%	433.05	438.41	1%
Main tile into JD 4 Ditch	Buried Tile	11.19	36.57	227%	10.91	43.22	296%	10.68	48.18	351%	10.55	51.64	390%	10.53	52.33	397%	10.62	54.52	413%
	Buried Tile	10.86	N/A	N/A	11.20	N/A	N/A	13.20	N/A	N/A	14.57	N/A	N/A	14.78	N/A	N/A	14.82	N/A	N/A
	Overflow	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A
	Total	22.05	36.57	66%	22.11	43.22	95%	23.88	48.18	102%	25.12	51.64	106%	25.31	52.33	107%	25.44	54.52	114%
Main tile Outlet of Pond	Buried Tile	11.19	49.50	342%	12.05	46.25	284%	13.15	46.43	253%	14.16	56.78	301%	14.94	40.51	171%	15.52	47.27	205%
	Buried Tile	10.01	N/A	N/A	11.68	N/A	N/A	14.14	N/A	N/A	15.42	N/A	N/A	16.38	N/A	N/A	16.91	N/A	N/A
	Overflow	0.00	0.00	N/A	0.00	0.00	N/A	12.78	0.00	-100%	46.02	0.00	-100%	66.52	0.56	-99%	86.13	3.11	-96%
	Total	21.21	49.50	133%	23.73	46.25	95%	40.06	46.43	16%	75.60	56.78	-25%	97.84	41.07	-58%	118.56	50.39	-58%
Main tile Intlet of Pond	Buried Tile	11.19	99.45	789%	12.05	108.67	802%	13.15	119.14	806%	14.16	126.35	792%	14.94	127.64	754%	15.52	142.41	817%
	Buried Tile	9.82	N/A	N/A	10.80	N/A	N/A	13.43	N/A	N/A	14.49	N/A	N/A	15.27	N/A	N/A	15.97	N/A	N/A
	Overflow	1.80	0.00	-100%	7.74	0.00	-100%	22.95	0.00	-100%	60.40	22.52	-63%	88.91	45.05	-49%	119.20	98.79	-17%
	Total	22.81	99.45	336%	30.60	108.67	255%	49.52	119.14	141%	89.05	148.86	67%	119.12	172.69	45%	150.70	241.20	60%
Main tile - Helland-Mensing Propoerty Line	Buried Tile	1.26	26.63	2020%	1.54	24.90	1514%	1.32	22.53	1606%	1.52	22.64	1385%	1.50	22.05	1374%	1.49	22.01	1377%
	Overflow	8.11	0.00	-100%	19.65	3.96	-80%	32.19	12.78	-60%	52.63	33.73	-36%	71.04	54.87	-23%	92.90	82.48	-11%
	Total	9.37	26.63	184%	21.19	28.86	36%	33.51	35.31	5%	54.16	56.37	4%	72.54	76.91	6%	94.39	104.48	11%
Main tile- Mensing Property	Buried Tile	1.26	14.40	1046%	1.17	16.23	1291%	0.91	16.86	1752%	1.10	19.37	1656%	1.09	20.57	1780%	1.09	25.16	2210%
	Overflow	11.78	0.01	-100%	17.19	0.01	-100%	22.50	0.01	-100%	31.07	2.77	-91%	39.92	9.40	-76%	53.20	13.80	-74%
	Total	13.04	14.40	10%	18.36	16.25	-12%	23.41	16.86	-28%	32.17	22.14	-31%	41.02	29.96	-27%	54.29	38.96	-28%
Main tile- Mensing-CSAH 1 Property Line	Buried Tile	1.18	1.93	64%	1.29	1.93	50%	1.29	1.93	50%	1.29	1.93	50%	1.29	1.93	50%	1.29	1.93	50%
	Overflow	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A
	Total	1.18	1.93	64%	1.29	1.93	50%	1.29	1.93	50%	1.29	1.93	50%	1.29	1.93	50%	1.29	1.93	50%
Branch E Outlet	Buried Tile	3.19	43.71	1271%	3.33	44.27	1230%	3.50	44.54	1174%	3.45	44.36	1187%	3.46	44.00	1170%	3.49	43.23	1139%
	Buried Tile	6.31	N/A	N/A	6.06	N/A	N/A	6.11	N/A	N/A	6.13	N/A	N/A	6.14	N/A	N/A	6.15	N/A	N/A
	Overflow	15.71	0.76	-95%	30.36	8.78	-71%	41.98	17.07	-59%	59.83	34.60	-42%	84.69	56.81	-33%	130.16	112.07	-14%
	Total	25.21	44.47	76%	39.74	53.05	33%	51.58	61.62	19%	69.41	78.96	14%	94.29	100.81	7%	139.80	155.30	11%

Denotes peak flows less than or equal to existing

**FARIBAULT COUNTY
JUDICIAL DITCH No. 04
January 30, 2020**



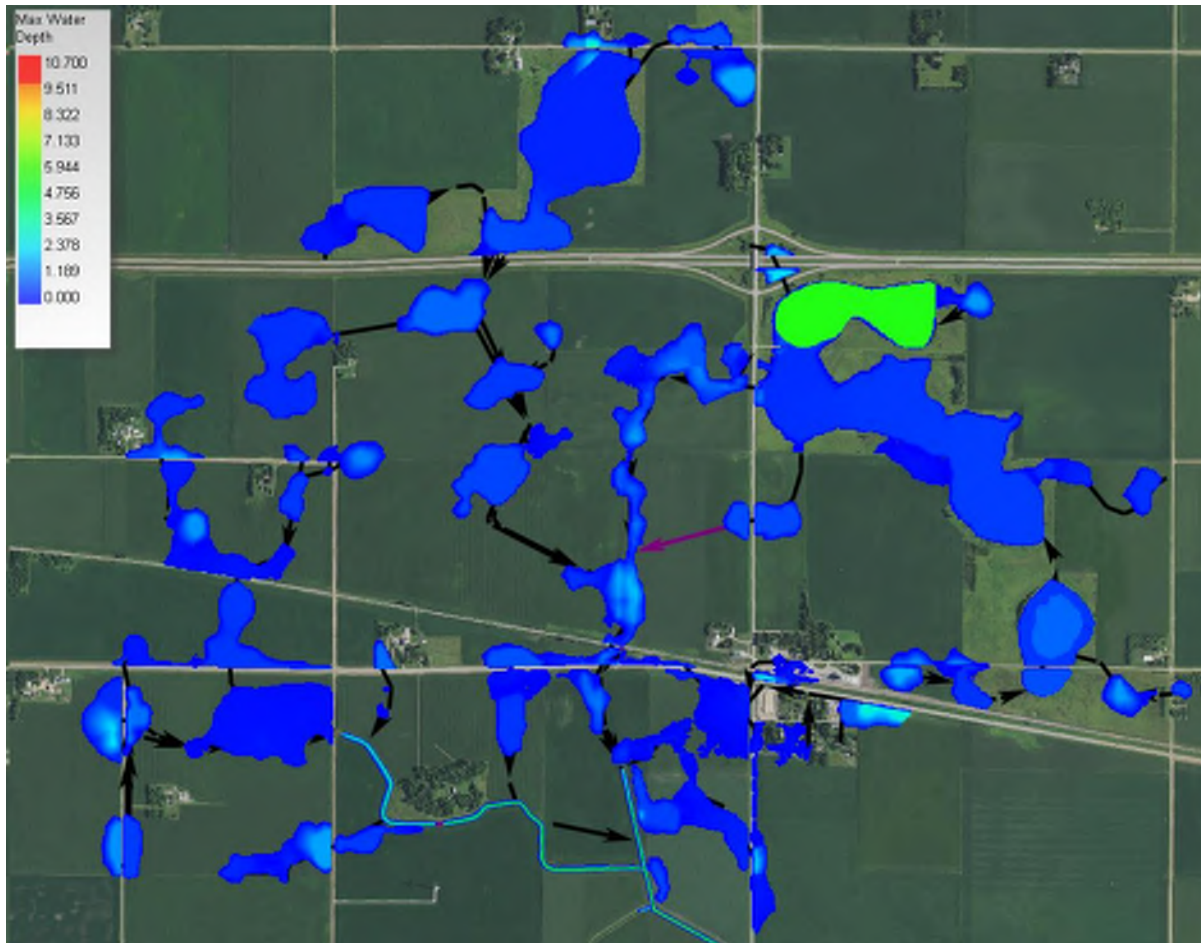
XP SWMM ELEVATION EXISTING VS PRO OPTION 2 WITH BR E IMP TABLE

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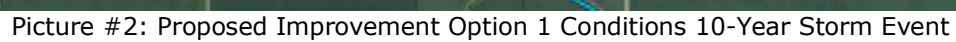
Appendix F: Modeling With Maps

PROJECT NAME	Faribault and Martin Joint JD No. 4
PROJECT NO.	20105
STORM EVENT	10-YEAR

ISG

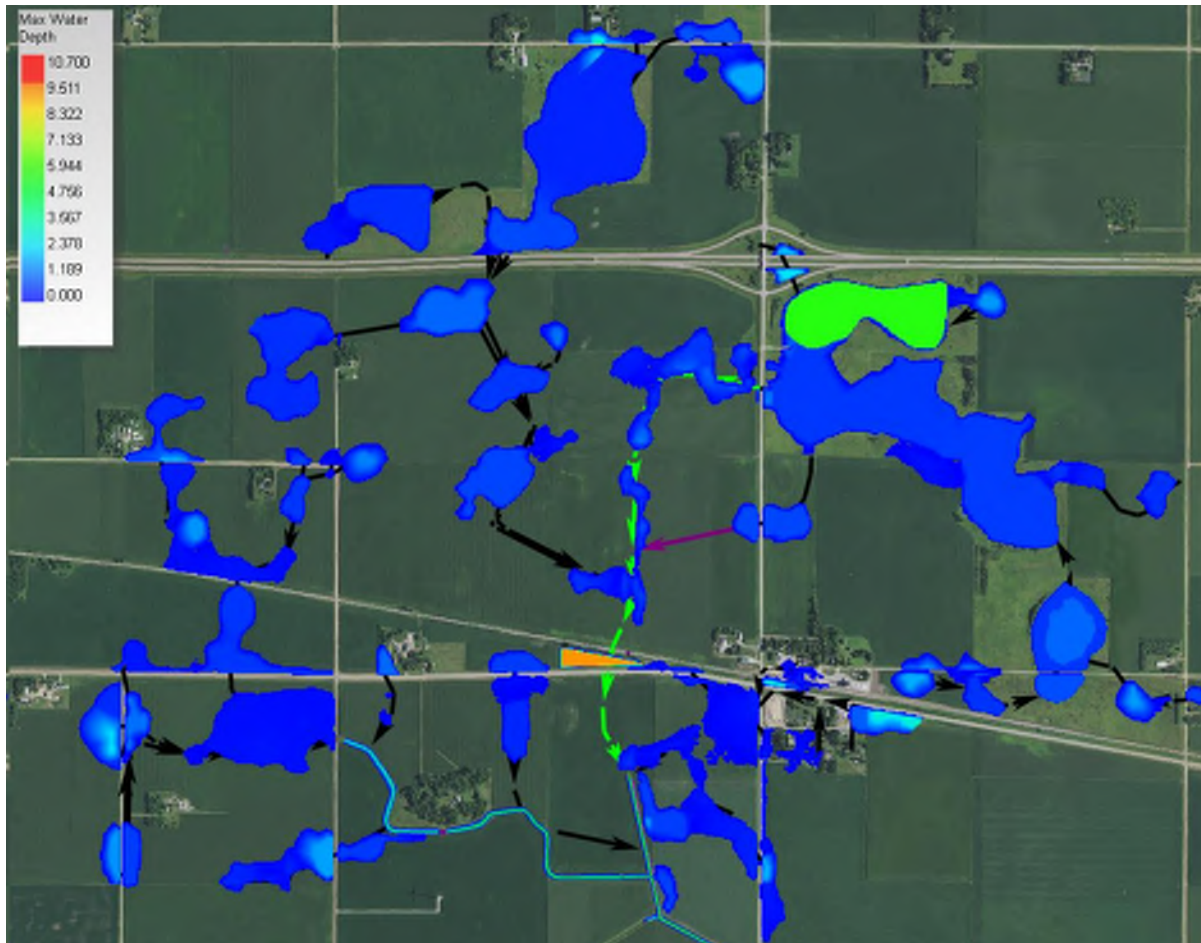


Picture #1: Present Conditions 10-Year Storm Event



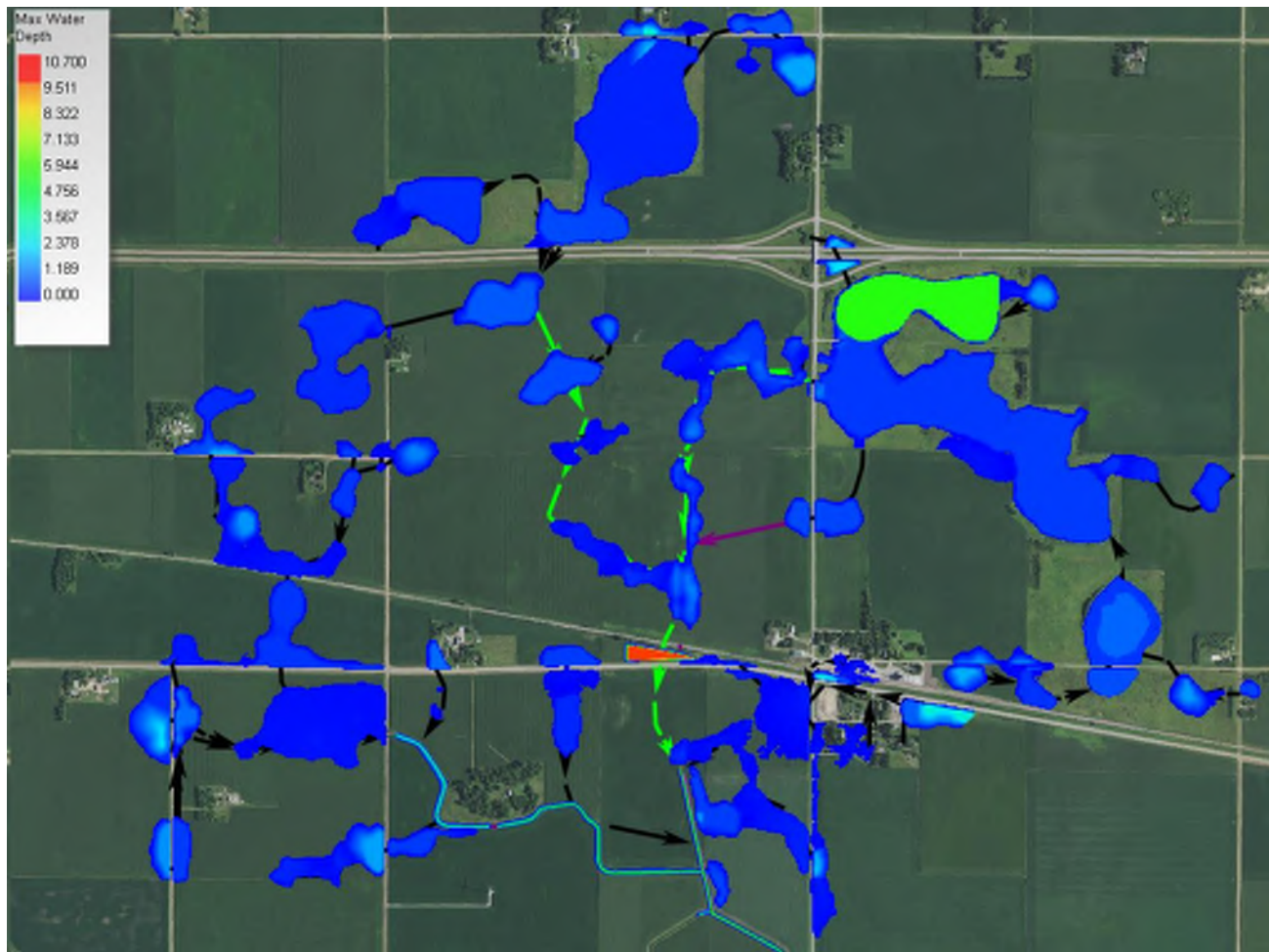
PROJECT NAME	<u>Faribault and Martin Joint JD No. 4</u>
PROJECT NO.	<u>20105</u>
STORM EVENT	<u>10-YEAR</u>

ISG



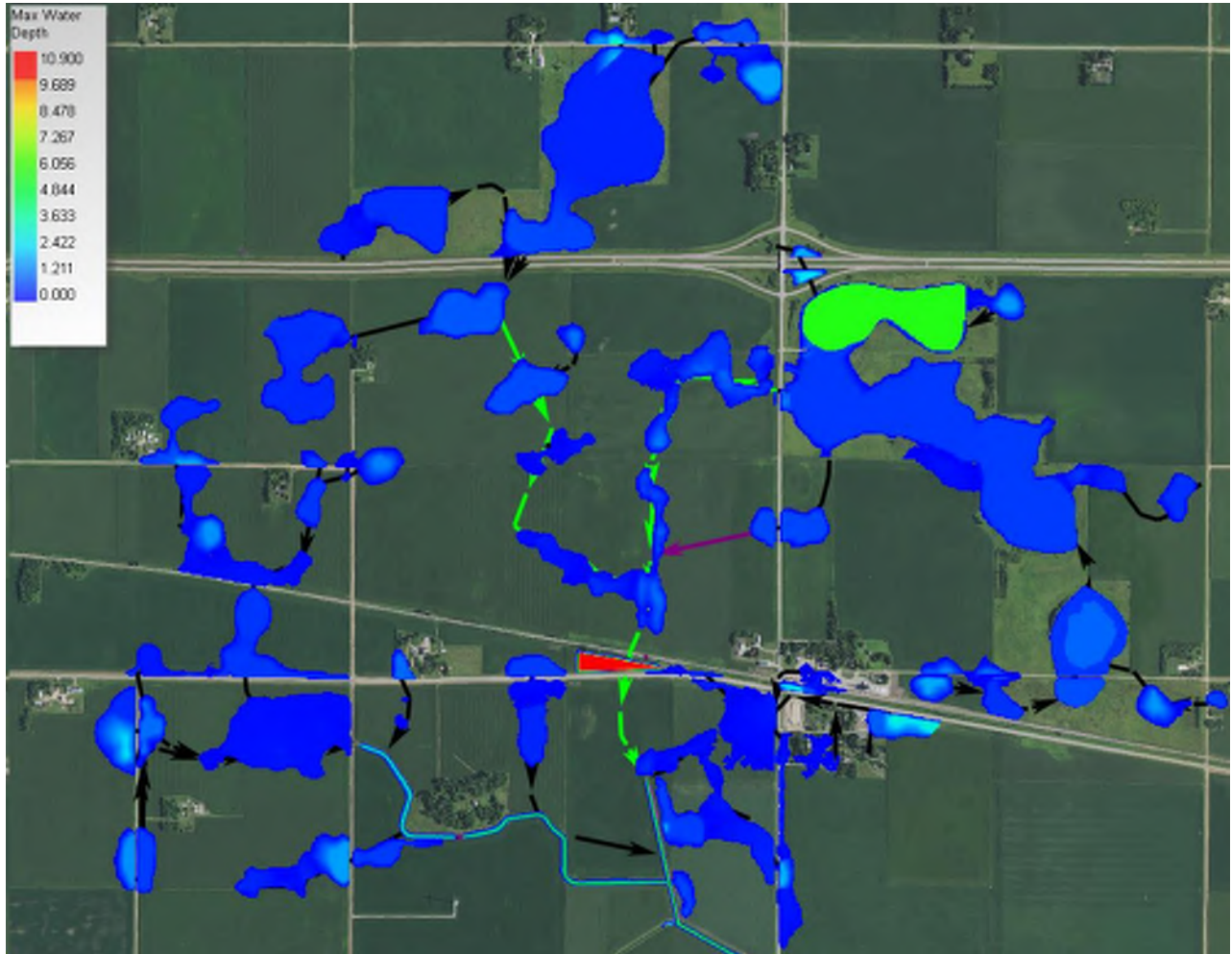
Picture #3: Proposed Improvement Option 2 Conditions 10-Year Storm Event

PROJECT NAME	Faribault and Martin Joint JD No. 4
PROJECT NO.	20105
STORM EVENT	10-YEAR



Picture #4: Proposed Option 1 with Br E Improvement 10-Year Storm Event

PROJECT NAME	<u>Faribault and Martin Joint JD No. 4</u>
PROJECT NO.	<u>20105</u>
STORM EVENT	<u>10-YEAR</u>



Picture #5: Proposed Option 2 with Br E Improvement 10-Year Storm Event

Appendix G: Preliminary Cost Estimates

**FARIBAULT COUNTY
JUDICIAL DITCH No. 4**

ISG

PROPOSED IMPROVEMENT COST SUMMARY

Area	Separable Maintenance	Improvement Cost	Net Cost
Main Open Ditch	\$ 71,341	\$ 76,223	\$ 4,882
Main Tile	\$ 371,220	\$ -	\$ (371,220)
Upstream of Pond- Main tile	\$ -	\$ 574,191	\$ 574,191
Downstream of Pond- 42-inch Main	\$ -	\$ 151,003	\$ 151,003
3.0 AC Storage Pond	\$ -	\$ 411,445	\$ 411,445
Subtotal without Road Crossings	\$ 442,561	\$ 1,212,862	\$ 770,301
Road Authority Cost	\$ 34,929	\$ 34,929	\$ -
Damages Paid To Road Authority	\$ 4,677	\$ 32,577	\$ 27,900
Total	\$ 482,167	\$ 1,280,368	\$ 798,201
Subtotal Landowner Costs			\$ 1,245,439
Net Costs			\$ 798,201
Redetermination of Benefits Costs			\$ 17,400
Permanent Damages (Buffer Strip Acquisition)			\$ -
Total Project Costs for Landowners			\$ 1,262,839

PROPOSED IMPROVEMENT COST SUMMARY

Area	Separable Maintenance	Improvement Cost	Net Cost
Main Open Ditch	\$ 71,341	\$ 76,223	\$ 4,882
Main Tile	\$ 371,220	\$ -	\$ (371,220)
Upstream of Pond- Main tile	\$ -	\$ 574,191	\$ 574,191
Downstream of Pond- 36-inch Main	\$ -	\$ 113,145	\$ 113,145
4.0 AC Storage Pond	\$ -	\$ 544,207	\$ 544,207
Subtotal without Road Crossings	\$ 442,561	\$ 1,307,767	\$ 865,206
Road Authority Cost	\$ 34,929	\$ 34,929	\$ -
Damages Paid To Road Authority	\$ 4,677	\$ 26,535	\$ 21,859
Total	\$ 482,167	\$ 1,369,231	\$ 887,064
Subtotal Landowner Costs			\$ 1,334,302
Net Costs			\$ 887,064
Redetermination of Benefits Costs			\$ 17,400
Permanent Damages (Buffer Strip Acquisition)			\$ -
Total Project Costs for Landowners			\$ 1,351,702

SEPARABLE MAINTENANCE (REPAIR)

Main Open Ditch

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 2,000.00	\$ 2,000
102	DITCH CLEANING (4' WIDE DITCH BOTTOM)	LF	1815	\$ 2.90	\$ 5,264
103	24-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	2	\$ 1,658.60	\$ 3,317
104	18-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1	\$ 1,427.20	\$ 1,427
105	12-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1	\$ 1,094.00	\$ 1,094
106	8-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1	\$ 970.20	\$ 970
107	6-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1	\$ 782.10	\$ 782
108	INSTALL 12-INCH ASI RISER ASSEMBLY W/TRASH GRATE	EA	4	\$ 1,165.70	\$ 4,663
109	INSTALL 12-INCH ASI RISER ASSEMBLY W/STANDARD	EA	4	\$ 1,741.90	\$ 6,968
110	CLASS III RIPRAP WITH GEOTEXTILE FABRIC (FOR ASIRO)	CY	120	\$ 78.40	\$ 9,408
111	16.5' BUFFER STRIP SEEDING (SEED MIX: BUFFER BLEND WITH TYPE 3 MULCH)	AC	1.38	\$ 1,368.20	\$ 1,888
112	STANDARD SIDE SLOPE SEEDING (SEED MIX: BUFFER BLEND WITH TYPE 8 MULCH)	AC	0.84	\$ 2,958.50	\$ 2,485
113	BUFFER STRIP MOWING	AC	2.76	\$ 195.50	\$ 540
114	WEED SPRAYING	AC	3.60	\$ 331.30	\$ 1,193
TOTAL					\$ 42,000
10% UNFORESEEN					\$ 4,200
SUBTOTAL					\$ 46,200
TEMPORARY DAMAGES		AC	1.38	\$ 650.00	\$ 894
COUNTY ADMINISTRATION COSTS					\$ 2,310
TOPOGRAPHIC SURVEY					\$ 2,235
REPORTS, PLANS AND SPECIFICATIONS					\$ 12,582
CONSTRUCTION STAKING & ADMINISTRATION					\$ 7,120
TOTAL MAIN OPEN DITCH REPAIR COST					\$ 71,341

SEPARABLE MAINTENANCE (REPAIR)

Main Tile

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 10,670.00	\$ 10,670
102	TILE INVESTIGATION	HR	24	\$ 130.60	\$ 3,134
103	24-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1	\$ 1,658.60	\$ 1,659
104	24-INCH AGRICULTURAL TILE	LF	2675	\$ 32.70	\$ 87,473
105	18-INCH AGRICULTURAL TILE	LF	3855	\$ 22.50	\$ 86,738
106	BORE 24-INCH TILE	LF	60	\$ 290.00	\$ 17,400
107	CONNECT EXISTING 15-INCH TILE	EA	3	\$ 697.40	\$ 2,092
108	CONNECT EXISTING 6-INCH TILE	EA	2	\$ 377.90	\$ 756
109	18-INCH CROSS-CONNECT W/30 LF OF SPECIFIED PIPE	EA	3	\$ 1,605.60	\$ 4,817
110	TREE CLEARING AND GRUBBING	AC	0.2	\$ 732.20	\$ 168
111	GRANULAR PIPE FOUNDATION	CY	488	\$ 24.30	\$ 11,866
112	INSTALL DROP INTAKE (18-INCH)	EA	7	\$ 988.50	\$ 6,920
113	CAP DROP INTAKE (18-INCH)	EA	2	\$ 224.70	\$ 449
114	CONNECT EXISTING TILE (SIZE & MATERIAL MAY VARY)	EA	27	\$ 500.00	\$ 13,500
TOTAL					\$ 247,700
10% UNFORESEEN					\$ 24,770
SUBTOTAL					\$ 272,470
TEMPORARY DAMAGES		AC	14.99	\$ 650.00	\$ 9,744
COUNTY ADMINISTRATION COSTS					\$ 13,624
TOPOGRAPHIC SURVEY					\$ 8,163
REPORTS, PLANS AND SPECIFICATIONS					\$ 39,972
CONSTRUCTION STAKING & ADMINISTRATION					\$ 27,247
TOTAL MAIN TILE REPAIR COST					\$ 371,220

TOTAL REPAIR COST

		Main Open Ditch	\$ 71,341
		Main Tile	\$ 371,220
COMPLETE REPAIR COST			\$ 442,561

PROPOSED OPTION #1 IMPROVEMENT

Main Open Ditch

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 2,000.00	\$ 2,000
102	DITCH DEEPENING (4' WIDE DITCH BOTTOM)	LF	1815	\$ 3.00	\$ 5,445
103	24-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	2	\$ 1,658.60	\$ 3,317
104	18-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1	\$ 1,427.20	\$ 1,427
105	12-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1	\$ 1,094.00	\$ 1,094
106	8-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1	\$ 970.20	\$ 970
107	6-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1	\$ 782.10	\$ 782
108	INSTALL 12-INCH ASI RISER ASSEMBLY W/TRASH GRATE	EA	4	\$ 1,165.70	\$ 4,663
	INSTALL 12-INCH ASI RISER ASSEMBLY W/STANDARD	EA	4	\$ 1,741.90	\$ 6,968
	CLASS III RIPRAP WITH GEOTEXTILE FABRIC (FOR ASI RO)	CY	120	\$ 78.40	\$ 9,408
108	16.5' BUFFER STRIP SEEDING (SEED MIX: BUFFER BLEND WITH TYPE 3 MULCH)	AC	1.38	\$ 1,368.20	\$ 1,888
109	STANDARD SIDE SLOPE SEEDING (SEED MIX: BUFFER BLEND WITH TYPE 8 MULCH)	AC	0.84	\$ 2,958.50	\$ 2,485
110	BUFFER STRIP MOWING	AC	2.76	\$ 195.50	\$ 540
111	WEED SPRAYING	AC	3.6	\$ 331.30	\$ 1,193
TOTAL					\$ 42,180
10% UNFORESEEN					\$ 4,218
SUBTOTAL					\$ 46,398
	TEMPORARY DAMAGES	AC	0.00	\$ 650.00	\$ -
	LAND ACQUISITION/ PERMANENT DAMAGES	AC	0.63	\$ 6,500.00	\$ 4,063
COUNTY ADMINISTRATION COSTS					\$ 2,320
TOPOGRAPHIC SURVEY					\$ 2,235
REPORTS, PLANS AND SPECIFICATIONS					\$ 13,568
CONSTRUCTION STAKING & ADMINISTRATION					\$ 7,640
TOTAL MAIN OPEN DITCH IMPROVEMENT COST					\$ 76,223

PROPOSED OPTION #1 IMPROVEMENT

Upstream of Pond- Main tile

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 17,170.00	\$ 17,170
102	TILE INVESTIGATION	HR	25	\$ 130.60	\$ 3,265
103	42-INCH AGRICULTURAL TILE	LF	3810	\$ 63.50	\$ 241,935
104	36-INCH AGRICULTURAL TILE	LF	1055	\$ 45.40	\$ 47,897
105	24-INCH AGRICULTURAL TILE	LF	130	\$ 32.70	\$ 4,251
106	BORE 42-INCH TILE	LF	60	\$ 530.00	\$ 31,800
107	42-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1	\$ 2,459.30	\$ 2,459
108	CONNECT EXISTING 18-INCH TILE	EA	1	\$ 876.80	\$ 877
109	CONNECT EXISTING 15-INCH TILE	EA	2	\$ 697.40	\$ 1,395
110	CONNECT EXISTING 6-INCH TILE	EA	2	\$ 377.90	\$ 756
111	24-INCH CROSS-CONNECT W/30 LF OF SPECIFIED PIPE	EA	1	\$ 2,334.20	\$ 2,334
112	18-INCH CROSS-CONNECT W/30 LF OF SPECIFIED PIPE	EA	3	\$ 1,605.60	\$ 4,817
113	TREE CLEARING AND GRUBBING	AC	0.2	\$ 732.20	\$ 168
114	FURNISH & INSTALL WATER QUALITY INLET	EA	4	\$ 1,152.60	\$ 4,610
115	INSTALL 12-INCH PERFORATED TILE (WATER QUALITY INLET)	LF	120	\$ 13.00	\$ 1,560
116	GRANULAR PIPE FOUNDATION	CY	541	\$ 24.30	\$ 13,152
117	INSTALL DROP INTAKE (18-INCH)	EA	5	\$ 988.50	\$ 4,943
118	CAP DROP INTAKE (18-INCH)	EA	1	\$ 224.70	\$ 225
119	CONNECT EXISTING TILE (SIZE & MATERIAL MAY VARY)	EA	30	\$ 500.00	\$ 15,000
TOTAL					\$ 398,613
10% UNFORESEEN					\$ 39,861
SUBTOTAL					\$ 438,474
TEMPORARY DAMAGES		AC	17.05	\$ 650.00	\$ 11,083
COUNTY ADMINISTRATION COSTS					\$ 21,924
TOPOGRAPHIC SURVEY					\$ 6,244
REPORTS, PLANS AND SPECIFICATIONS					\$ 52,617
CONSTRUCTION STAKING & ADMINISTRATION					\$ 43,848
TOTAL UPSTREAM OF POND- MAIN TILE IMPROVEMENT COST					\$ 574,191

Downstream of Pond- 42-inch Main tile

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 4,510.00	\$ 4,510
102	TILE INVESTIGATION	HR	3	\$ 130.60	\$ 392
103	42-INCH AGRICULTURAL TILE	LF	1415	\$ 63.50	\$ 89,853
104	INSTALL 12-INCH PERFORATED TILE	LF	60	\$ 13.00	\$ 780
105	GRANULAR PIPE FOUNDATION	CY	157	\$ 24.30	\$ 3,821
106	INSTALL DROP INTAKE (18-INCH)	EA	2	\$ 988.50	\$ 1,977
107	CAP DROP INTAKE (18-INCH)	EA	1	\$ 224.70	\$ 225
108	CONNECT EXISTING TILE (SIZE & MATERIAL MAY VARY)	EA	6	\$ 500.00	\$ 3,000
TOTAL					\$ 104,557
10% UNFORESEEN					\$ 10,456
SUBTOTAL					\$ 115,012
TEMPORARY DAMAGES		AC	4.87	\$ 650.00	\$ 3,167
COUNTY ADMINISTRATION COSTS					\$ 5,751
TOPOGRAPHIC SURVEY					\$ 1,769
REPORTS, PLANS AND SPECIFICATIONS					\$ 13,802
CONSTRUCTION STAKING & ADMINISTRATION					\$ 11,502
TOTAL DOWNSTREAM OF POND- 42-INCH MAIN TILE IMPROVEMENT COST					\$ 151,003

PROPOSED OPTION #1 IMPROVEMENT

3.0 AC Storage Pond

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 12,000.00	\$ 12,000
102	COMMON EXCAVATION	CY	51540	\$ 3.40	\$ 175,236
103	TOP SOIL STRIP & PLACE SPOILS	AC	12.78	\$ 4,010.00	\$ 51,242
104	42-INCH TILE OUTLET	EA	1	\$ 2,459.30	\$ 2,459
105	INSTALL STRUCTURE S-1 WITH GALVANIZED GRATE	LS	1	\$ 14,462.30	\$ 14,462
106	CLASS III RIPRAP WITH GEOTEXTILE FABRIC	CY	50	\$ 75.90	\$ 3,795
107	16.5' BUFFER STRIP SEEDING	AC	1	\$ 1,368.20	\$ 1,368
108	STANDARD SIDE SLOPE SEEDING	AC	1.45	\$ 2,958.50	\$ 4,275
109	BUFFER STRIP MOWING	AC	2	\$ 195.50	\$ 391
110	WEED SPRAYING	AC	3.45	\$ 331.30	\$ 1,141
TOTAL					\$ 266,370
10% UNFORESEEN					\$ 26,637
SUBTOTAL					\$ 293,007
TEMPORARY DAMAGES		AC	14.00	\$ 650.00	\$ 9,100
LAND ACQUISITION/ PERMANENT DAMAGES		AC	4.65	\$ 6,500.00	\$ 30,225
COUNTY ADMINISTRATION COSTS					\$ 14,651
TOPOGRAPHIC SURVEY					\$ -
REPORTS, PLANS AND SPECIFICATIONS					\$ 35,161
CONSTRUCTION STAKING & ADMINISTRATION					\$ 29,301
TOTAL 3.0 AC STORAGE POND IMPROVEMENT COST					\$ 411,445

TOTAL IMPROVEMENT COST-OPT 1

Main Open Ditch	\$ 76,223
Upstream of Pond- Main tile	\$ 574,191
Downstream of Pond- 42-inch Main tile	\$ 151,003
3.0 AC Storage Pond	\$ 411,445
COMPLETE IMPROVEMENT COST	\$ 1,212,862

PROPOSED OPTION #2 IMPROVEMENT

Main Open Ditch

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 2,000.00	\$ 2,000
102	DITCH DEEPENING (4' WIDE DITCH BOTTOM)	LF	1815	\$ 3.00	\$ 5,445
103	24-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	2	\$ 1,658.60	\$ 3,317
104	18-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1	\$ 1,427.20	\$ 1,427
105	12-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1	\$ 1,094.00	\$ 1,094
106	8-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1	\$ 970.20	\$ 970
107	6-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1	\$ 782.10	\$ 782
108	INSTALL 12-INCH ASI RISER ASSEMBLY W/TRASH GRATE	EA	4	\$ 1,165.70	\$ 4,663
	INSTALL 12-INCH ASI RISER ASSEMBLY W/STANDARD	EA	4	\$ 1,741.90	\$ 6,968
	CLASS III RIPRAP WITH GEOTEXTILE FABRIC (FOR ASIRO)	CY	120	\$ 78.40	\$ 9,408
108	16.5' BUFFER STRIP SEEDING (SEED MIX: BUFFER BLEND WITH TYPE 3 MULCH)	AC	1.38	\$ 1,368.20	\$ 1,888
109	STANDARD SIDE SLOPE SEEDING (SEED MIX: BUFFER BLEND WITH TYPE 8 MULCH)	AC	0.84	\$ 2,958.50	\$ 2,485
110	BUFFER STRIP MOWING	AC	2.76	\$ 195.50	\$ 540
111	WEED SPRAYING	AC	3.6	\$ 331.30	\$ 1,193
TOTAL					\$ 42,180
10% UNFORESEEN					\$ 4,218
SUBTOTAL					\$ 46,398
	TEMPORARY DAMAGES	AC	0.00	\$ 650.00	\$ -
	LAND ACQUISITION/ PERMANENT DAMAGES	AC	0.63	\$ 6,500.00	\$ 4,063
COUNTY ADMINISTRATION COSTS					\$ 2,320
TOPOGRAPHIC SURVEY					\$ 2,235
REPORTS, PLANS AND SPECIFICATIONS					\$ 13,568
CONSTRUCTION STAKING & ADMINISTRATION					\$ 7,640
TOTAL MAIN OPEN DITCH IMPROVEMENT COST					\$ 76,223

PROPOSED OPTION #2 IMPROVEMENT

Upstream of Pond- Main tile

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 17,170.00	\$ 17,170
102	TILE INVESTIGATION	HR	25	\$ 130.60	\$ 3,265
103	42-INCH AGRICULTURAL TILE	LF	3810	\$ 63.50	\$ 241,935
104	36-INCH AGRICULTURAL TILE	LF	1055	\$ 45.40	\$ 47,897
105	24-INCH AGRICULTURAL TILE	LF	130	\$ 32.70	\$ 4,251
106	BORE 42-INCH TILE	LF	60	\$ 530.00	\$ 31,800
107	42-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1	\$ 2,459.30	\$ 2,459
108	CONNECT EXISTING 18-INCH TILE	EA	1	\$ 876.80	\$ 877
109	CONNECT EXISTING 15-INCH TILE	EA	2	\$ 697.40	\$ 1,395
110	CONNECT EXISTING 6-INCH TILE	EA	2	\$ 377.90	\$ 756
111	24-INCH CROSS-CONNECT W/30 LF OF SPECIFIED PIPE	EA	1	\$ 2,334.20	\$ 2,334
112	18-INCH CROSS-CONNECT W/30 LF OF SPECIFIED PIPE	EA	3	\$ 1,605.60	\$ 4,817
113	TREE CLEARING AND GRUBBING	AC	0.2	\$ 732.20	\$ 168
114	FURNISH & INSTALL WATER QUALITY INLET	EA	4	\$ 1,152.60	\$ 4,610
115	INSTALL 12-INCH PERFORATED TILE (WATER QUALITY INLET)	LF	120	\$ 13.00	\$ 1,560
116	GRANULAR PIPE FOUNDATION	CY	541	\$ 24.30	\$ 13,152
117	INSTALL DROP INTAKE (18-INCH)	EA	5	\$ 988.50	\$ 4,943
118	CAP DROP INTAKE (18-INCH)	EA	1	\$ 224.70	\$ 225
119	CONNECT EXISTING TILE (SIZE & MATERIAL MAY VARY)	EA	30	\$ 500.00	\$ 15,000
TOTAL					\$ 398,613
10% UNFORESEEN					\$ 39,861
SUBTOTAL					\$ 438,474
TEMPORARY DAMAGES		AC	17.05	\$ 650.00	\$ 11,083
COUNTY ADMINISTRATION COSTS					\$ 21,924
TOPOGRAPHIC SURVEY					\$ 6,244
REPORTS, PLANS AND SPECIFICATIONS					\$ 52,617
CONSTRUCTION STAKING & ADMINISTRATION					\$ 43,848
TOTAL UPSTREAM OF POND- MAIN TILE IMPROVEMENT COST					\$ 574,191

Downstream of Pond- 36-inch Main tile

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 3,340.00	\$ 3,340
102	TILE INVESTIGATION	HR	3	\$ 130.60	\$ 392
103	36-INCH AGRICULTURAL TILE	LF	1415	\$ 45.40	\$ 64,241
104	INSTALL 12-INCH PERFORATED TILE	LF	60	\$ 13.00	\$ 780
105	GRANULAR PIPE FOUNDATION	CY	144	\$ 24.30	\$ 3,502
106	INSTALL DROP INTAKE (18-INCH)	EA	2	\$ 988.50	\$ 1,977
107	CAP DROP INTAKE (18-INCH)	EA	1	\$ 224.70	\$ 225
108	CONNECT EXISTING TILE (SIZE & MATERIAL MAY VARY)	EA	6	\$ 500.00	\$ 3,000
TOTAL					\$ 77,457
10% UNFORESEEN					\$ 7,746
SUBTOTAL					\$ 85,202
TEMPORARY DAMAGES		AC	4.87	\$ 650.00	\$ 3,167
COUNTY ADMINISTRATION COSTS					\$ 4,261
TOPOGRAPHIC SURVEY					\$ 1,769
REPORTS, PLANS AND SPECIFICATIONS					\$ 10,225
CONSTRUCTION STAKING & ADMINISTRATION					\$ 8,521
TOTAL DOWNSTREAM OF POND- 36-INCH MAIN TILE IMPROVEMENT COST					\$ 113,145



PROPOSED OPTION #2 IMPROVEMENT

4.0 AC Storage Pond

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 16,000.00	\$ 16,000
102	COMMON EXCAVATION	CY	71092	\$ 3.40	\$ 241,713
103	TOP SOIL STRIP & PLACE SPOILS	AC	17.63	\$ 4,010.00	\$ 70,681
104	42-INCH TILE OUTLET (20 LF OF PIPE & RIPRAP ON GEOTEXTILE FABRIC)	EA	1	\$ 2,459.30	\$ 2,459
105	CLASS III RIPRAP WITH GEOTEXTILE FABRIC	CY	50	\$ 75.90	\$ 3,795
106	INSTALL STRUCTURE S-1 WITH GALVANIZED GRATE	LS	1	\$ 14,462.30	\$ 14,462
107	16.5' BUFFER STRIP SEEDING (SEED MIX: BUFFER BLEND WITH TYPE 3 MULCH)	AC	1	\$ 1,368.20	\$ 1,368
108	STANDARD SIDE SLOPE SEEDING (SEED MIX: BUFFER BLEND WITH TYPE 8 MULCH)	AC	1.45	\$ 2,958.50	\$ 4,275
109	BUFFER STRIP MOWING	AC	2	\$ 195.50	\$ 391
110	WEED SPRAYING	AC	3.45	\$ 331.30	\$ 1,141
TOTAL					\$ 356,286
10% UNFORESEEN					\$ 35,629
SUBTOTAL					\$ 391,914
TEMPORARY DAMAGES		AC	15.00	\$ 650.00	\$ 9,750
LAND ACQUISITION/ PERMANENT DAMAGES		AC	5.65	\$ 6,500.00	\$ 36,725
COUNTY ADMINISTRATION COSTS					\$ 19,596
TOPOGRAPHIC SURVEY					\$ -
REPORTS, PLANS AND SPECIFICATIONS					\$ 47,030
CONSTRUCTION STAKING & ADMINISTRATION					\$ 39,192
TOTAL 4.0 AC STORAGE POND IMPROVEMENT COST					\$ 544,207

TOTAL IMPROVEMENT COST-OPT 2

Main Open Ditch	\$ 76,223
Upstream of Pond- Main tile	\$ 574,191
Downstream of Pond- 36-inch Main tile	\$ 113,145
4.0 AC Storage Pond	\$ 544,207

COMPLETE IMPROVEMENT COST	\$ 1,307,767
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FARIBAULT COUNTY
JUDICIAL DITCH No. 4
February 6, 2020



ROAD CROSSING SUMMARY

Crossing	Road Authority	Repair Cost With Road	Repair Cost Without Road	Improvement Cost	Road Authority Cost (Difference of Repair Cost With Road and Repair Cost Without Road)	Damages Paid To Road Authority (Difference of Improvement Cost and Road Authority Cost)
Mainline Tile- Option 1						
CSAH 16	STATE	\$ 39,606	\$ 4,677	\$ 67,506	\$ 34,929	\$ 32,577
Mainline Tile- Option 2						
CSAH 16	STATE	\$ 39,606	\$ 4,677	\$ 61,465	\$ 34,929	\$ 26,535
TOTAL-Option 1		\$ 39,606	\$ 4,677	\$ 67,506	\$ 34,929	\$ 32,577
TOTAL-Option 2		\$ 39,606	\$ 4,677	\$ 61,465	\$ 34,929	\$ 26,535
STATE ROAD AUTHORITY- OPTION 1 TOTAL		\$ 39,606	\$ 4,677	\$ 67,506	\$ 34,929	\$ 32,577
STATE ROAD AUTHORITY - OPTION 2 TOTAL		\$ 39,606	\$ 4,677	\$ 61,465	\$ 34,929	\$ 26,535



ROAD CROSSINGS

MAINLINE TILE- OPTION 1 REPAIR COST WITH ROAD - CSAH 16

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 1,300.00	\$ 1,300
102	BORE 24-INCH TILE	LF	80	\$ 290.00	\$ 23,200
103	OPEN CUT & RESTORE GRAVEL ROAD OR DRIVEWAY	EA	1	\$ 1,710.30	\$ 1,710
104	INSTALL DROP INTAKE (18-INCH)	EA	2	\$ 988.50	\$ 1,977
TOTAL					\$ 28,187
10% CONTINGENCY					\$ 2,819
SUBTOTAL					\$ 31,006
COUNTY ADMINISTRATION COSTS					\$ 1,600
REPORTS, PLANS AND SPECIFICATIONS					\$ 3,800
CONSTRUCTION STAKING & ADMINISTRATION					\$ 3,200
ESTIMATED MAINLINE TILE- OPTION 1 REPAIR COST WITH ROAD - CSAH 16					\$ 39,606

MAINLINE TILE- OPTION 1 REPAIR COST WITHOUT ROAD - CSAH 16

Item No.	Item	Unit	Quantity	Unit Price	Amount
201	MOBILIZATION	LS	1	\$ 200.00	\$ 200
202	24-INCH AGRICULTURAL TILE	LF	80	\$ 32.70	\$ 2,616
203	CONNECT EXISTING TILE (SIZE & MATERIAL MAY VARY)	EA	2	\$ 500.00	\$ 1,000
TOTAL					\$ 3,816
10% CONTINGENCY					\$ 382
SUBTOTAL					\$ 4,198
TEMPORARY DAMAGES		AC	0.28	\$ 650.00	\$ 179
COUNTY ADMINISTRATION COSTS					\$ 100
REPORTS, PLANS AND SPECIFICATIONS					\$ 100
CONSTRUCTION STAKING & ADMINISTRATION					\$ 100
ESTIMATED MAINLINE TILE- OPTION 1 REPAIR COST WITHOUT ROAD - CSAH 16					\$ 4,677

MAINLINE TILE- OPTION 1 IMPROVEMENT COST - CSAH 16

Item No.	Item	Unit	Quantity	Unit Price	Amount
301	MOBILIZATION	LS	1	\$ 2,100.00	\$ 2,100
302	BORE 42-INCH TILE	LF	80	\$ 530.00	\$ 42,400
303	OPEN CUT & RESTORE GRAVEL ROAD OR DRIVEWAY	EA	1	\$ 1,710.30	\$ 1,710
304	INSTALL DROP INTAKE (18-INCH)	EA	2	\$ 988.50	\$ 1,977
TOTAL					\$ 48,187
10% CONTINGENCY					\$ 4,819
SUBTOTAL					\$ 53,006
COUNTY ADMINISTRATION COSTS					\$ 2,700
REPORTS, PLANS AND SPECIFICATIONS					\$ 6,400
CONSTRUCTION STAKING & ADMINISTRATION					\$ 5,400
ESTIMATED MAINLINE TILE- OPTION 1 IMPROVEMENT COST - CSAH 16					\$ 67,506



ROAD CROSSINGS

MAINLINE TILE- OPTION 2 REPAIR COST WITH ROAD - CSAH 16

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	\$ 1,300.00	\$ 1,300
102	BORE 24-INCH TILE	LF	80	\$ 290.00	\$ 23,200
103	OPEN CUT & RESTORE GRAVEL ROAD OR DRIVEWAY	EA	1	\$ 1,710.30	\$ 1,710
104	INSTALL DROP INTAKE (18-INCH)	EA	2	\$ 988.50	\$ 1,977
TOTAL					\$ 28,187
10% CONTINGENCY					\$ 2,819
SUBTOTAL					\$ 31,006
COUNTY ADMINISTRATION COSTS					\$ 1,600
REPORTS, PLANS AND SPECIFICATIONS					\$ 3,800
CONSTRUCTION STAKING & ADMINISTRATION					\$ 3,200
ESTIMATED MAINLINE TILE- OPTION 2 REPAIR COST WITH ROAD - CSAH 16					\$ 39,606

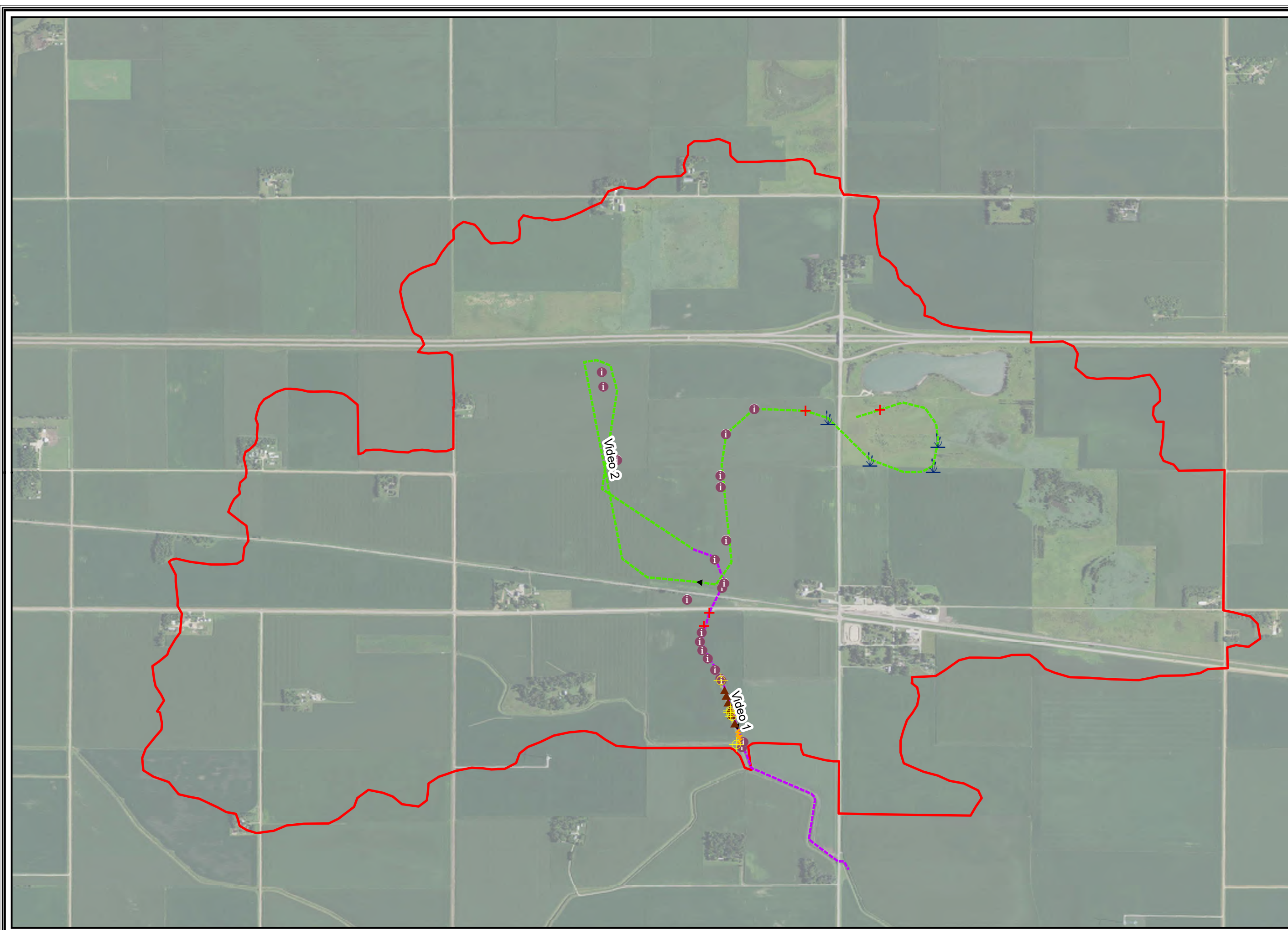
MAINLINE TILE- OPTION 2 REPAIR COST WITHOUT ROAD - CSAH 16

Item No.	Item	Unit	Quantity	Unit Price	Amount
201	MOBILIZATION	LS	1	\$ 200.00	\$ 200
202	24-INCH AGRICULTURAL TILE	LF	80	\$ 32.70	\$ 2,616
203	CONNECT EXISTING TILE (SIZE & MATERIAL MAY VARY)	EA	2	\$ 500.00	\$ 1,000
TOTAL					\$ 3,816
10% CONTINGENCY					\$ 382
SUBTOTAL					\$ 4,198
TEMPORARY DAMAGES		AC	0.28	\$ 650.00	\$ 179
COUNTY ADMINISTRATION COSTS					\$ 100
REPORTS, PLANS AND SPECIFICATIONS					\$ 100
CONSTRUCTION STAKING & ADMINISTRATION					\$ 100
ESTIMATED MAINLINE TILE- OPTION 2 REPAIR COST WITHOUT ROAD - CSAH 16					\$ 4,677

MAINLINE TILE- OPTION 2 IMPROVEMENT COST - CSAH 16

Item No.	Item	Unit	Quantity	Unit Price	Amount
301	MOBILIZATION	LS	1	\$ 1,900.00	\$ 1,900
302	BORE 36-INCH TILE	LF	80	\$ 500.00	\$ 40,000
303	INSTALL DROP INTAKE (18-INCH)	EA	2	\$ 988.50	\$ 1,977
TOTAL					\$ 43,877
10% CONTINGENCY					\$ 4,388
SUBTOTAL					\$ 48,265
COUNTY ADMINISTRATION COSTS					\$ 2,500
REPORTS, PLANS AND SPECIFICATIONS					\$ 5,800
CONSTRUCTION STAKING & ADMINISTRATION					\$ 4,900
ESTIMATED MAINLINE TILE- OPTION 2 IMPROVEMENT COST - CSAH 16					\$ 61,465

Appendix H: Drone Photos



**Drone
Map**
Judicial Ditch No 4
Faribault-
Martin County,
Minnesota
Thursday, January 30, 2020

Legend

Drone Video

- Video 1
- Video 2
- Crossing
- Other
- Sediment
- Slough
- Tile Outlet
- Wetland

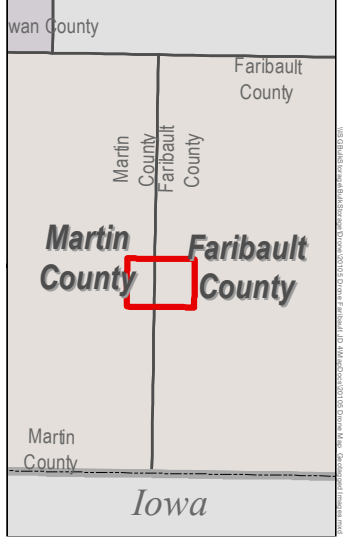
PN: 17-20105

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)



0 412.5 825 1,650 Feet
1 inch = 1,667 feet



PROJECT NAME	<u>Faribault-Martin County Joint JD 4</u>
PROJECT NO.	<u>20105</u>
REVIEWED DATE	<u>1/30/20</u>
DRONE FLIGHT DATE	<u>10/16/19</u>



Picture #1: Crop Damage along Mainline Tile in Section 12 of Baker Township



Picture #2: Crop Damages/ DNR property along Mainline Tile in Section 12 of Baker Township

PROJECT NAME	<u>Faribault-Martin County Joint JD 4</u>
PROJECT NO.	<u>20105</u>
REVIEWED DATE	<u>1/30/20</u>
DRONE FLIGHT DATE	<u>10/16/19</u>



Picture #3: Vegetation in Main Ditch in the SW ¼ in Section 7 of Jo Daviess Township



Picture #4: Vegetation in Main Ditch in the SW ¼ in Section 7 of Jo Daviess Township

PROJECT NAME	<u>Faribault-Martin County Joint JD 4</u>
PROJECT NO.	<u>20105</u>
REVIEWED DATE	<u>1/30/20</u>
DRONE FLIGHT DATE	<u>10/16/19</u>



Picture #5: Proposed Storage Location in NE ¼ in Section 7 of Jo Daviess Township



Picture #6: State of Minnesota WMA In the SW ¼ in Section 5 of Jo Daviess Township