# Technical Memorandum

**To:** Merissa Lore, Ditch Inspector
Faribault County

**From:** Joe Lewis, PE
Houston Engineering, Inc.

**Subject:** Judicial Ditch 2F Repair Project

**Date:** February 27, 2020

**Project:** 6255-0014

## INTRODUCTION

Faribault Judicial Ditch 2F (JD 2F) is located in Sections 12, 13, 24 and 25 of Prescott Township and Sections 7, 18, 19, 20, 21, 28, 29 and 30 of Barber Township. Faribault County requested Houston Engineering (HEI) to perform a field and aerial drone survey, prepare plan and profile drawings from the field survey, and develop a repair report. The purpose of this repair report is to provide an overview of drainage conditions, determine the As Constructed and Subsequently Improved Condition (ACSIC), analyze potential repair alternatives, and provide an opinion of probable cost to repair JD 2F. Additionally, in- and near-channel sources of sediment loading were identified from the field survey along the JD2F open channel and along a private open channel ditch lateral. The capacity of Branch K of JD2F was also determined and compared against typical drainage system design criteria.

## LOCATION OF THE PUBLIC DRAINAGE SYSTEM

The JD 2F public drainage system, shown in **Figure 1,** is located approximately 2 miles south of the City of Delavan in Faribault County. The portion of JD 2F requested for review is the Main Trunk open channel, located in Sections 12 and 13 of Prescott Township (T103, R27W) and Sections 18 and 19 of Barber Township (T103, R26W), which is the most downstream portion of the system. Many lateral tile lines, both public and private, enter the JD2F open channel, and their condition is not evaluated in this report. The proposed repair segment, 14,000 feet in length, begins at the outlet of the Main Trunk in Section 12 of Prescott Township and continues upstream to the south and east ending in Section 19 of Barber Township. The system outlets directly to Rice Creek. The drainage area that contributes runoff to the system is approximately 5,301 acres (8.28 square miles) and is located in Sections 12, 13, 24, and 25 of Prescott Township and Sections 7, 17, 18, 19, 20, 21, 28, 29, 30, and 31 of Barber Township. The drainage area consists predominantly of agricultural (row crop) land use with some rural residential and roadway areas.

End JDF2 Main Trunk Open Channel

Start JDF2 Main Trunk Open Channel

Rice Creek

MAIN

Branch G

Branch G-1

Branch H

Branch J

Branch F-1

Branch F

Branch F-2

Branch L

Branch L-1

Branch L-2

Branch N

Branch O

Branch P

Branch K-2

Branch K-3

Branch K-5

Branch K-7

Branch K-6

Branch K-10

Branch K-9

Branch K-12

Branch K-11

Branch K-14

Branch K-15

Branch K-16

Branch K

Branch Q

Branch R

Branch U

Branch AUX S-1

Branch AUX S-2

Branch AUX MAINTR

Branch S-3

Branch S

Branch S-4

Branch T

Branch T-3

Branch X

Branch S-9

Branch S

Branch AUX S-6

Branch AUX S-5

Branch S-6

Branch S-8

Branch S-5

Section 10

Section 11

Section 12

Section 7

Section 8

Section 13

Section 14

Section 15

Section 18

Section 17

Section 22

Section 23

Section 24

Section 19

Section 20

Section 21

Section 22

Section 26

Section 27

Section 25

Section 30

Section 29

Section 28

Section 27

Section 36

Section 31

Section 32

170th St

160th St

150th St

140th St

415th Ave

440th Ave

450th Ave

11

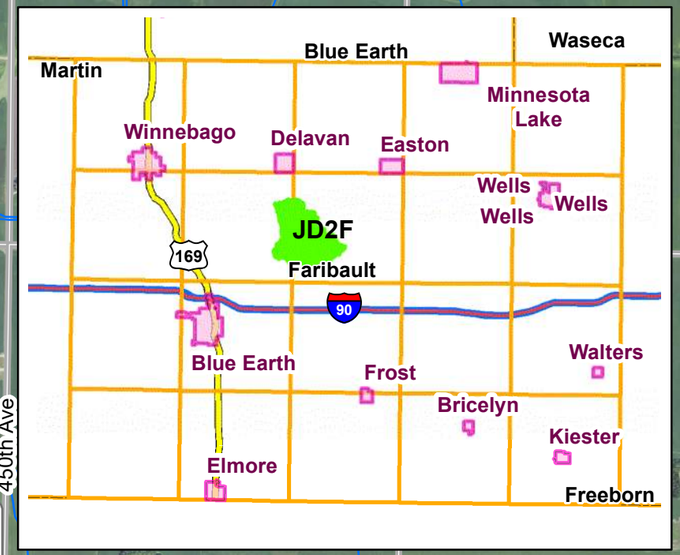
13

108

109

T103N-R27W Prescott

T103N-R26W Barber




## Legend

- Approximate Drainage Area of JD 2F

**JD 2F Alignment**

- Open Channel
- Tile
- Other Drainage Systems or Watercourses

0 0.5 1 Miles

N W E S

Figure 1 - JD 2F Location

| Scale: | Drawn by: | Checked by: | Project No.: | Date: | Sheet: |
|---|---|---|---|---|---|
| AS SHOWN | AS | JL | 6255-0014 | 2/27/2020 | 1 of 1 |

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## FIELD AND DRONE SURVEY

Survey data, including ground photos and topographic elevations, was collected in November 2019 to determine the existing condition of the repair segment. Numerous tile outlets that enter the repair segment were surveyed, but no other survey of the tile portions of the system was completed with the exception of Branch K. Cross section and culvert survey was taken for the private ditch that runs alongside the Branch K tile. All survey data collected utilizes the Faribault County Coordinate System and North American Vertical Datum 1988 (NAVD88). (Note: Unless otherwise noted, all elevations provided herein are based on NAVD88 vertical datum). Site photos of key features are shown in **Attachment A**. A drone survey was performed in November of 2019, which collected aerial video footage and photos. The footage was filmed northwest to southeast along the JD 2F ditch. Select drone photos are included in this memo as **Attachment B** to highlight the current conditions. The full video is being provided to Faribault County staff as a separate attachment.

## AS CONSTRUCTED AND SUBSEQUENTLY IMPROVED CONDITION PROFILE

The As Constructed and Subsequently Improved Condition (ACSIC) profile was determined from analyzing historical plans and from soil borings collected during the field survey. The soil borings identified the elevation of the interface between sediment (generally organic) soils and native (generally clay) soils, which are an indication of the historic channel bottom as originally constructed or subsequently improved. A historical 1950 improvement design profile was available but references a local datum. A comparison of the soil borings and historical design profile indicated that a datum adjustment factor of 918.44 yielded a strong correlation for much of the open channel length. **Table 1** shows a comparison summary of the soil borings and historical design profiles.

At the very upstream and downstream segments of the open channel, the datum adjusted design profile deviated from the soil borings. Specifically, soil borings collected at stations 3+57 and 13+57 at the downstream end are 2.49-feet and 2.34-feet, respectively, below the historical design profile after being modified by the datum adjustment factor, showing that this segment was most likely excavated deeper when constructed to match the outlet elevation Between stations 0+00 and 23+79, the ACSIC profile was adjusted to better fit the two soil borings and the existing culvert invert at 170$^{th}$ Street.

At station 136+18 near the upstream end of the main trunk open channel, a soil boring is 1.91-feet above the datum adjusted historical design profile, showing that this segment was has likely accumulated a large amount of coarse sediment and the bottom of the original channel was not detected in the soil boring. **Attachment C** contains plan-profile drawings showing the ACSIC and current profiles and soil borings.

**Table 1**: Comparison of 1950 Improvement Design Profile to 2019 Soil Borings

| Station | Soil Boring Elevation | 1950 Profile Elevation: Local Datum | 1950 Profile Elevation* | Deviation from Datum Adjustment |
|---|---|---|---|---|
| 3+57** | 1055.96 | 140.01 | 1058.45 | 2.49 |
| 13+57** | 1056.91 | 140.81 | 1059.25 | 2.34 |
| 25+59 | 1059.18 | 141.78 | 1060.21 | 1.03 |
| 35+06 | 1060.67 | 142.58 | 1061.01 | 0.34 |
| 47+08 | 1061.73 | 143.49 | 1061.93 | 0.20 |
| 66+04 | 1064.06 | 145.01 | 1063.45 | -0.61 |
| 76+72 | 1065.01 | 145.87 | 1064.30 | -0.71 |
| 87+01 | 1065.33 | 146.70 | 1065.13 | -0.20 |
| 97+13 | 1066.37 | 147.50 | 1065.93 | -0.44 |
| 107+08 | 1066.79 | 148.35 | 1066.79 | 0.00 |
| 118+05 | 1066.95 | 149.17 | 1067.61 | 0.66 |
| 126+07 | 1068.53 | 149.81 | 1068.25 | -0.28 |
| 136+18** | 1070.97 | 150.62 | 1069.06 | -1.91 |

* Adjusted to NAVD88 using datum adjustment of 918.44

** Denotes outlier greater than 1 standard deviation from average difference between improvement design and soil boring elevation

## CURRENT CONDITION

### *OPEN CHANNEL DITCH PROFILE AND CROSS SECTION*

The field survey data, drone video and photos were used to determine the condition of the open channel ditch. The drone survey corroborated the results of the field survey and provided a bird's eye view to accompany field survey points and photos. Based on the survey information, the JD 2F open channel has accumulated sediment in excess of 0.5-foot above the ACSIC for much of its length. The depth of accumulated sediment can be seen on the plan-profile drawings in **Attachment C.** Additionally, there are many locations where the channel bottom has been partially blocked by sediment accumulation (mid-channel sediment deposition), but the channel invert is only slightly above the ACSIC. See photo 2 in **Attachment B** for an example. The reduction in flow area across the channel section reduces capacity leading to elevated water levels in the channel.

Additionally, there is bank sloughing along a few isolated portions of the open channel. Bank sloughing leads to a widening of the channel and deposition of sediment in the channel over time

impacting the function of the drainage system and contributes to the degradation of water quality downstream. The locations of bank sloughing are shown on **Figure 2**.

### *TILE OUTLETS*

There are multiple locations where existing tile outlets or side inlets are in disrepair which create bank erosion issues and allow sediment to enter the open channel. These locations include both outlets for tile branches on the public drainage system and private tile outlets. **Figure 2** shows a map of the locations.

### *SIDE INLETS*

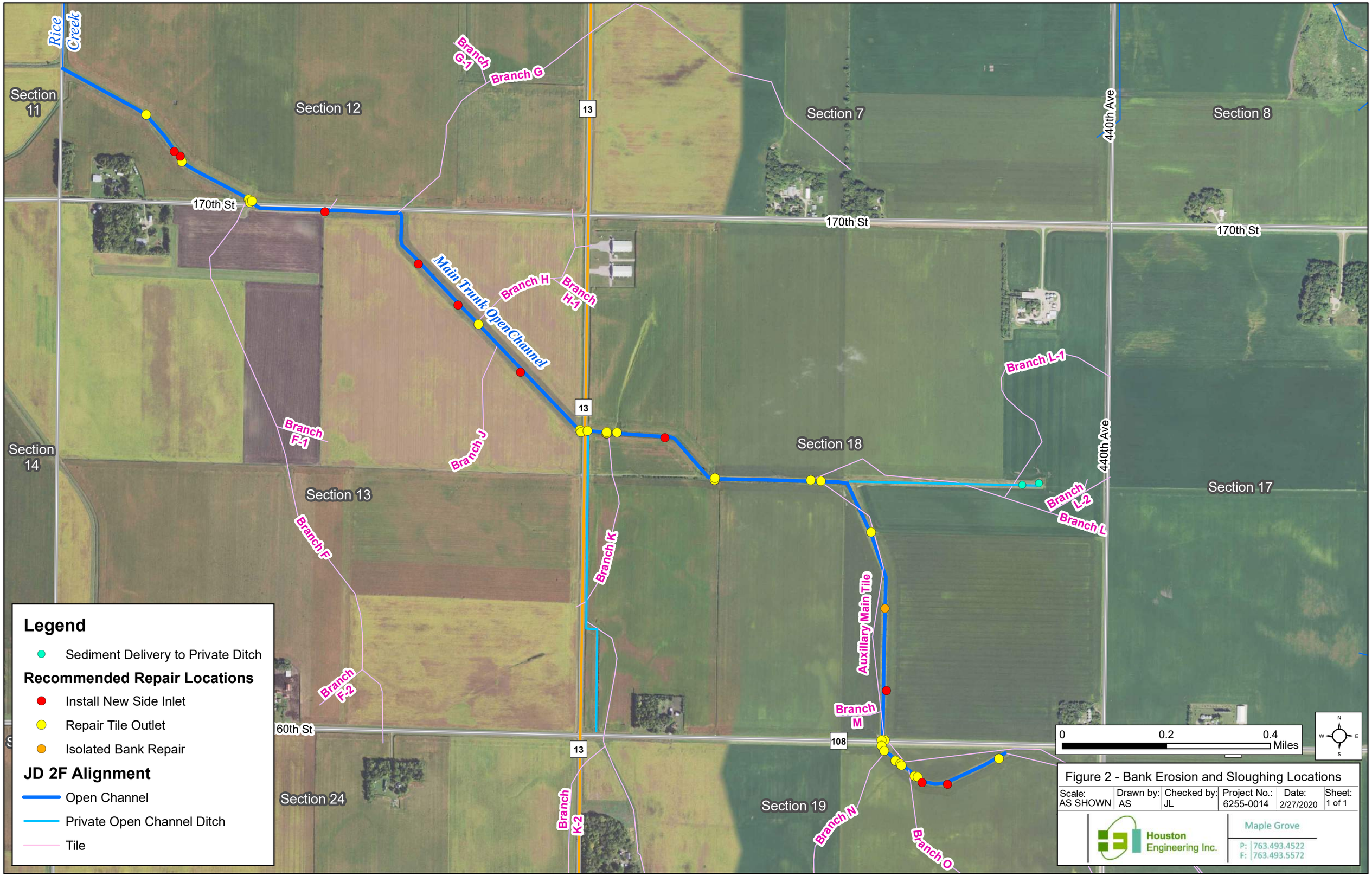
There are also multiple locations where bank erosion is occurring due to concentrated surface flow entering the open channel from adjacent fields. These locations are adding sediment to the ditch which is reducing the functionality of the ditch and reducing downstream water quality. **Figure 2** shows a map of the locations. Installation of side inlets will limit bank erosion and decrease sediment from entering the channel, thereby reducing the frequency of future maintenance.

### *CULVERTS*

Several culverts are above the ACSIC profile determined by soil borings. In total, JD 2F has five culverts crossings and they are listed in **Table 2**. Culvert inverts at several crossings are elevated significantly higher than the ACSIC profile. The capacity of each crossing was calculated to confirm sufficient adequacy and is also shown in **Table 2**.

**Table 2:** Judicial Ditch 2F Culverts

| Crossing | Station | Existing Crossing | Exg. Inv. & ACSIC Comparison | Condition Notes | Drainage Coefficient (inches/day) |
|---|---|---|---|---|---|
| **170th Street** | 24+75 | 83” x 128” CMPA | +0.1-feet | | 2.06 |
| **Field Crossing** | 40+62 | 72-inch CMP | +0.3-feet | | 1.00 |
| **430th Avenue / CR 13** | 69+51 | 60-inch CMP | +1.6-feet | | 1.08 |
| **160th Street** | 125+18 | 48-inch CMP | +0.9-feet | Downstream culvert end is damaged. | 0.85 |
| **Field Crossing** | 139+72 | 48-inch CMP | | Limited amount of open channel ditch upstream of the crossing. Downstream end of pipe is damaged and partially blocked with debris. | 3.27 |


Rice Creek
Branch G-1
Branch G
Section 11
Section 12
13
Section 7
440th Ave
Section 8
170th St
170th St
170th St
Main Trunk Open Channel
Branch H
Branch H-1
Branch L-1
Branch F-1
Branch J
Section 14
Section 13
Section 18
Section 17
Branch L-2
Branch L
Branch F
Branch K
Auxillary Main Tile
Branch F-2
Branch M
60th St
108
13
Section 24
Branch K-2
Section 19
Branch N
Branch O
Legend
Sediment Delivery to Private Ditch
Recommended Repair Locations
Install New Side Inlet
Repair Tile Outlet
Isolated Bank Repair
JD 2F Alignment
Open Channel
Private Open Channel Ditch
Tile
0
0.2
0.4
Miles
N
W
E
S
Figure 2 - Bank Erosion and Sloughing Locations
Scale: AS SHOWN
Drawn by: AS
Checked by: JL
Project No.: 6255-0014
Date: 2/27/2020
Sheet: 1 of 1
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## PROPOSED REPAIR

The goal of the proposed repair is to restore JD 2F to its ACSIC function and stabilize the open channel banks to reduce the amount of sediment entering JD 2F, protecting its long-term function. The best way to achieve this is to remove accumulated sediment from the open channel to the engineer's recommended ACSIC profile elevations, modify culvert crossings, install erosion control measures and implement channel bank stability measures where necessary. The following sections provide further details on the individual components of a recommended repair.

### *OPEN CHANNEL EXCAVATION*

The proposed repair profiles are indicated as the ACSIC profile shown in **Attachment C**. The current channel bottom of the ditch is higher than the ACSIC profile due to sediment accumulation and is partially blocking the cross sectional area along most of the length of JD2F. Accumulated sediment in the channel bottom should be excavated, placed at the top of the ditch bank, and leveled. A 1950 improvement profile drawing specifies a typical cross section with the dimensions of a 6-foot bottom width and 1.5:1 side slopes from station 0+00 to 97+40 and 4-foot bottom width and 1.5:1 side slopes from station 97+40 to 140+10. To be consistent with the definition of "repair" under Minnesota Statute 103E, excavation of the channel bottom should not exceed the specified 6-foot or 4-foot width and should be consistent with the ACSIC grade identified in **Attachment C**.

### *CULVERT CROSSINGS*

Several culverts are recommended to be replaced based primarily on their invert elevations but also their condition. **Table 3** below lists the recommendation for each crossing.

**Table 3:** JD 2F Culvert Repair Recommendations

| Crossing | Station | Existing Crossing | Repair Recommendation |
|---|---|---|---|
| **170th Street** | 23+79 | 83" x 128" CMPA | None |
| **Field Crossing** | 39+66 | 72-inch CMP | None |
| **430th Ave / CR 13** | 68+54 | 72-inch CMP | Replace with 72-inch CMP at ACSIC |
| **160th Street** | 124+22 | 48-inch CMP | Replace with 48-inch CPP at ACSIC |
| **Field Crossing** | 138+75 | 48-inch CMP | None. The need for this field crossing is unclear as it's within 100-feet of the end of open channel. Recommend coordinating with the landowner to remove rather than replace. |

### *TILE OUTLETS AND SIDE INLETS*

Bank erosion occurring from tile outlets, side inlets and surface flow also need to be addressed. Specifically, rip rap is recommended to be installed at the outlets to prevent further erosion. Furthermore, where the tile pipe has deteriorated to a condition where it may fail in the near future, it is recommended that the last 20-feet of pipe be replaced with Corrugated Plastic Pipe (CPP) of equivalent size. This will extend the life of the tile and decrease the likelihood that a failed outlet will impact upstream drainage. Furthermore, we recommend that a drop side inlet be installed at locations where erosion is being caused by surface flow into the channel from adjacent fields.

### *BANK REPAIR*

Forthcoming repairs should include work to address the sloughing banks to ensure long-term and reliable drainage function. Given the isolated nature and mild severity of bank instability issues observed during field survey, the side slopes should be reconstructed with minor resloping to a 2:1 side slope during the repair, and vegetation should be rapidly reestablished by seeding and installing erosion control blanket or hydromulch. An additional option with this approach is to install riprap to protect the toe and thereby prevent bank sloughing further up the bank slope.

When excavating the sediment, it is critical that the Contractor avoid disturbance of ditch banks, and restore a “rounded” bottom to the ditch rather than sharp-edged or “square” bottom. This will decrease the frequency of slope failures occurring subsequent to the repair. However, following these practices will not eliminate all slope failures from occurring, and we anticipate that additional locations along the open channel will require follow-up maintenance 1-2 years following the repair.

Beyond in-channel measures described above, other off-channel opportunities may exist to reduce peak flows and runoff volumes in the open channel and lessen the potential for continued channel bank instability. These opportunities include practices to capture and store runoff or in-field management practices to reduce runoff volumes. Upon request, additional analysis may be completed to measure their feasibility and effectiveness.

## REGULATORY CONSIDERATIONS

Based on an offsite review of the JD 2F public drainage system and adjacent lands, it does not appear that the area contains any wetland resources that would be regulated under state or federal laws. Below is a general discussion of regulatory considerations for drainage projects containing wetlands and state Public Water resources.

### Wetlands

Discharges of dredge or fill material into federally regulated wetlands for the purpose of maintenance of drainage ditches is exempt from CWA Section 404 permitting requirements. USACE Regulatory Guidance Letter No. 07-02, dated July 4, 2007, defines “maintenance of drainage ditches” to include excavating accumulated sediments back to the original contours and culvert replacement, where the original function and capacity is not increased (consistent with the definition of repair in MS

103E.701). Since the proposed repairs do not include improvements to the system (above and beyond the ACSIC) the work is exempt from federal CWA permitting requirements.

Under the state Wetland Conservation Act, repairs to public drainage systems, as defined by MS 103E.701, carry exemptions for impacts resulting from the maintenance or repair of existing public drainage systems, if conducted by the authorized Drainage Authority under MN Statues 103E. An exception to this exemption is impact to a Type 3, 4, and 5 wetland (including shallow marshes, deep marshes, and open water communities) that has existed for more than 25 years before the proposed impact. Consequently, mitigation obligations for drainage system repair projects (that are maintenance or repair, not improvements) are only for any impacts to Type 3, 4, or 5 wetlands. The proposed repairs do not affect Type 3,4, or 5 wetlands, and therefor are exempt from WCA mitigation requirements.

### Public Waters

No Public Waters are near the JD 2F open channel ditch.

## PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COST

A Preliminary Opinion of Probable Construction Cost (POPCC) of $199,580 was developed for the repair project and includes a 20% contingency. The repair alternative costs includes open channel excavation, replacement of culverts, bank sloughing repairs, tile outlet replacement, and installation of erosion control measures.

A detailed cost table is included in **Appendix D**. The cost estimates provided above assume culvert replacements will be completed by the drainage authority as a single project, using open cut methods. The costs for these crossings then could be billed back to the roadway authority. Alternatively, the roadway authorities (Faribault County and the township) could elect to complete the culvert replacements themselves.

## OTHER DRAINAGE SYSTEM MANAGMEMENT ISSUES

In addition to assessing the condition of the main channel, several other factors affecting the drainage system's performance were investigated. This included evaluating a private open channel lateral ditch for sediment sources and estimating the ACSIC capacity of the Branch K tile. The evaluation of each item is described in the following paragraphs.

### *PRIVATE OPEN CHANNEL DITCH IN SECTION 18 OF BARBER TOWNSHIP*

A private open channel ditch enters the JD 2F Main Trunk at station 97+00 and continues for 1,200 feet to the east. It generally follows the tile alignment of Branch L. The private channel along with Branch L drain approximately 300 acres in total. County staff requested that the channel be evaluated as a potential source of sediment into the JD 2F Main Trunk open channel.

Drone video was collected over the channel to visually identify any evidence that excessive amounts of sediment is entering the private channel and ultimately JD 2F. Several side inlets are visible and appear to sediment sources into the private channel. At the very upstream (east) end of the channel, there are two shallow surface drains that enter the channel via side inlets. Below each side inlet, the channel has noticeably denser vegetation and less water, and upstream of each side inlet there was noticeably deeper water depths in the channel. See Photos 7 and 8 in **Attachment B**. This indicates that sediment has accumulated in the private open channel. However, field survey and drone imagery does not indicate sediment is entering the JD 2F channel from the private open channel at greater levels than the overall length of the JD 2F channel. It is still recommended that the implementation of measures to reduce sediment loading from the private channel be investigated further. A critical component to implementation of such measures is the willingness of landowners to collaborate with the Drainage Authority.

### *BRANCH K CAPACITY*

JD 2F Branch K is a tile that enters the open channel Main Trunk at station 71+10. County staff requested that the capacity of Branch K be reviewed. The Branch K capacity was calculated in terms of a drainage coefficient (inches/day) to determine the level of drainage function it was designed to provide for the Branch K drainage area. A private open channel ditch, generally parallel to Branch K from 160th St. to its outlet, provides additional drainage capacity.

The drainage area of Branch K is approximately 1,765 acres which is nearly 40% of the drainage area of JD 2F at its CR 13 / 430th Avenue crossing. The 1950 improvement plans show Branch K tile is 18-inches in diameter at its outlet. The design slope was not available in the historic documents but is estimated to have a slope of 0.25%. Based on the pipe dimensions and upstream area, Branch K capacity is calculated to have a 0.1-inch drainage coefficient. Branch K, like many systems designed and constructed a long time ago, has a smaller drainage coefficient compared to drainage systems designed and installed today. This is consistent with the findings of the 1969 Bolton and Menk report on the most upstream section of Branch K. The ACSIC of Branch K is below current design standards (typically 0.5-inch drainage coefficient) and incapable of containing drainage flow during even moderate rainfalls. In addition to the limited capacity of the Branch K tile, the tile outlet was submerged during field survey which would further reduce drainage performance. See Photo 4 in **Attachment B.**

## RECOMMENDATION

To restore the function of the JD 2F public drainage system to the condition as it was originally constructed, we recommend the County complete a full repair of the open channel portions of the system to the ACSIC profile as depicted in **Attachment C,** including culvert replacement, tile outlet repairs, bank erosion repairs and isolated sloughing repairs as described above. We conclude that the proposed repairs are necessary to meet the current and future drainage needs, and that the repairs are in the best interest of the property owners.

Detailed construction plans, bid documents, and specifications will need to be prepared subsequent to the County establishing and ordering a repair project. The County retains the decision whether to accept, reject or modify the Engineer's Recommendation.

## CERTIFICATION

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

Joseph Lewis
MN Reg, No 46215

## LIST OF ATTACHMENTS

Attachment A: Field Survey Photographs
Attachment B: Drone Flight Photographs
Attachment C: Preliminary Construction Plans
Attachment D: Detailed Preliminary Opinion of Probable Construction Cost

# ATTACHMENT A – FIELD SURVEY PHOTOGRAPHS

**Field Survey Photograph 1:** Eroded Bank at Station 45+50

**Field Survey Photograph 2:** Broken 12” CMP at Station 95+69

**Field Survey Photograph 3:** Bank Sloughing at Station 112+00

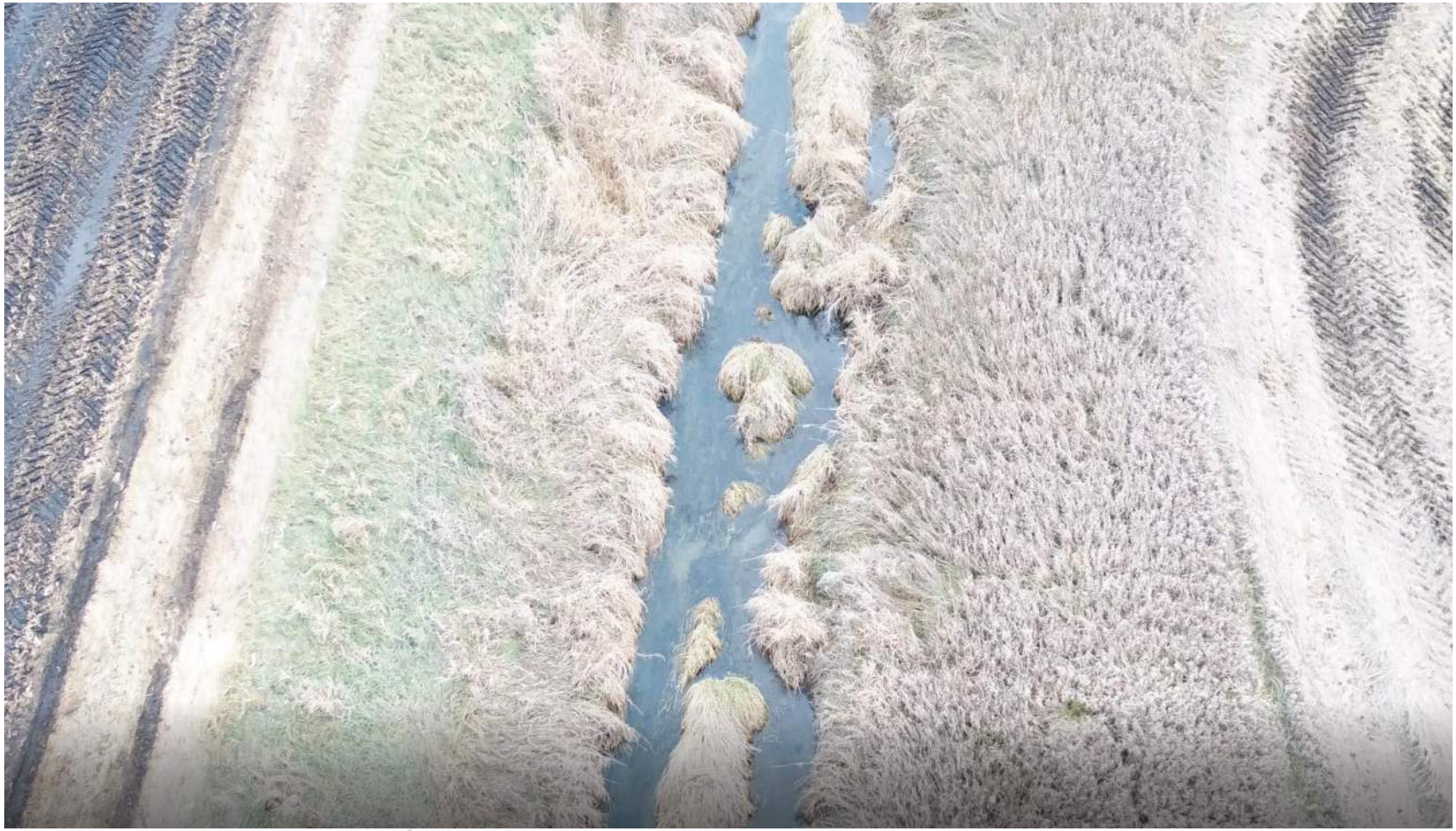
**Field Survey Photograph 4:** Bent 48” CMP Culvert at Station 125+18

**Field Survey Photograph 5:** Flow Coming Straight Up from Tile in Private Ditch alongside Branch K

**Field Survey Photograph 6:** Tree and Other Obstructions in Center of Private Ditch alongside Branch K

# ATTACHMENT B – DRONE SURVEY PHOTOGRAPHS

**Drone Survey Photograph 1:** Bank Erosion at Station 15+00



**Drone Survey Photograph 2:** Major Sediment Build-Up in Channel at Station 23+00

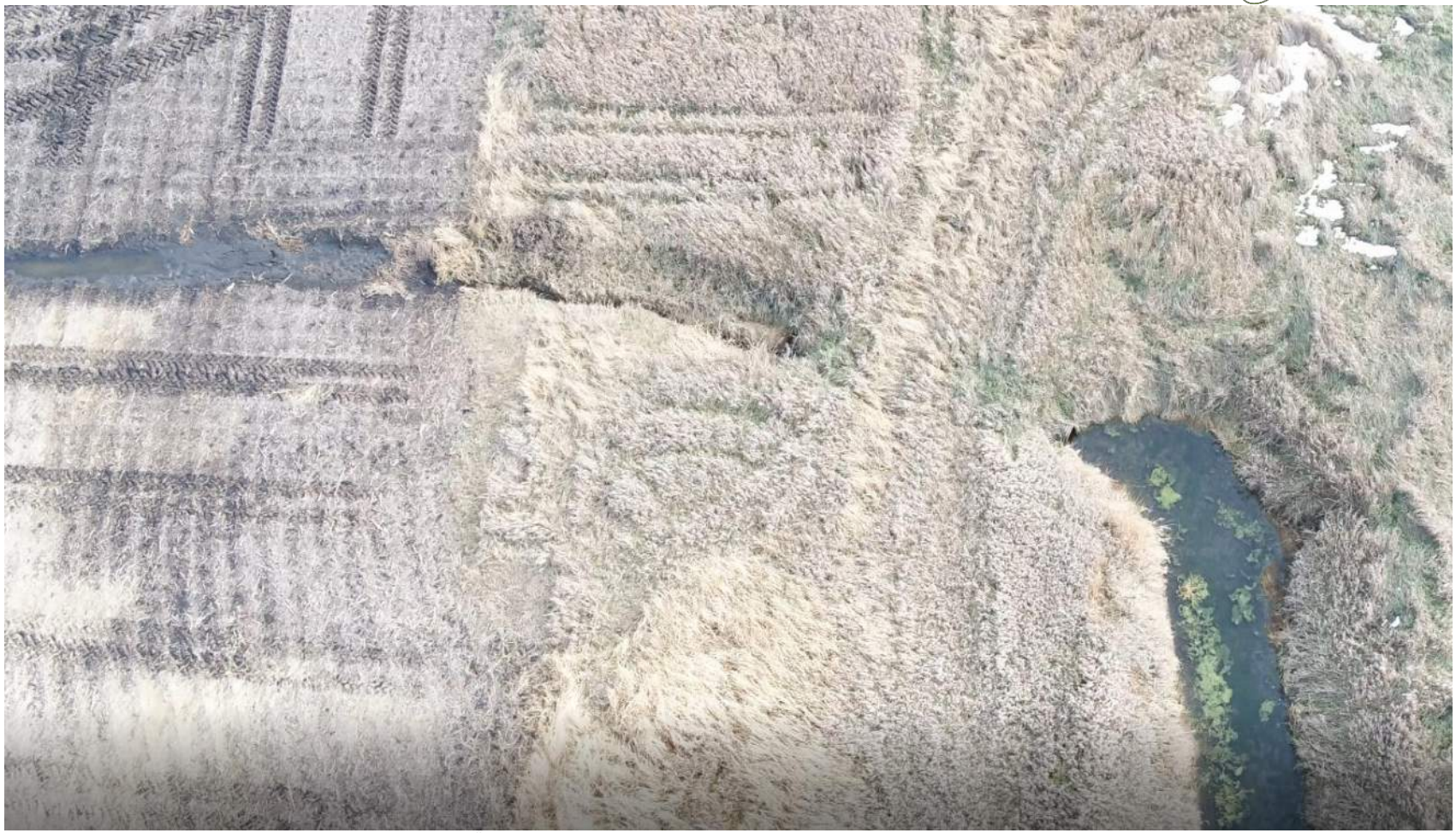
**Drone Survey Photograph 3:** Collapsed Tile and Erosion at Station 45+50

**Drone Survey Photograph 4:** Submerged Tile Outlet from Branch K at Station 72+00

**Drone Survey Photograph 5:** Sediment in Channel due to Bank Sloughing at Station 113+00

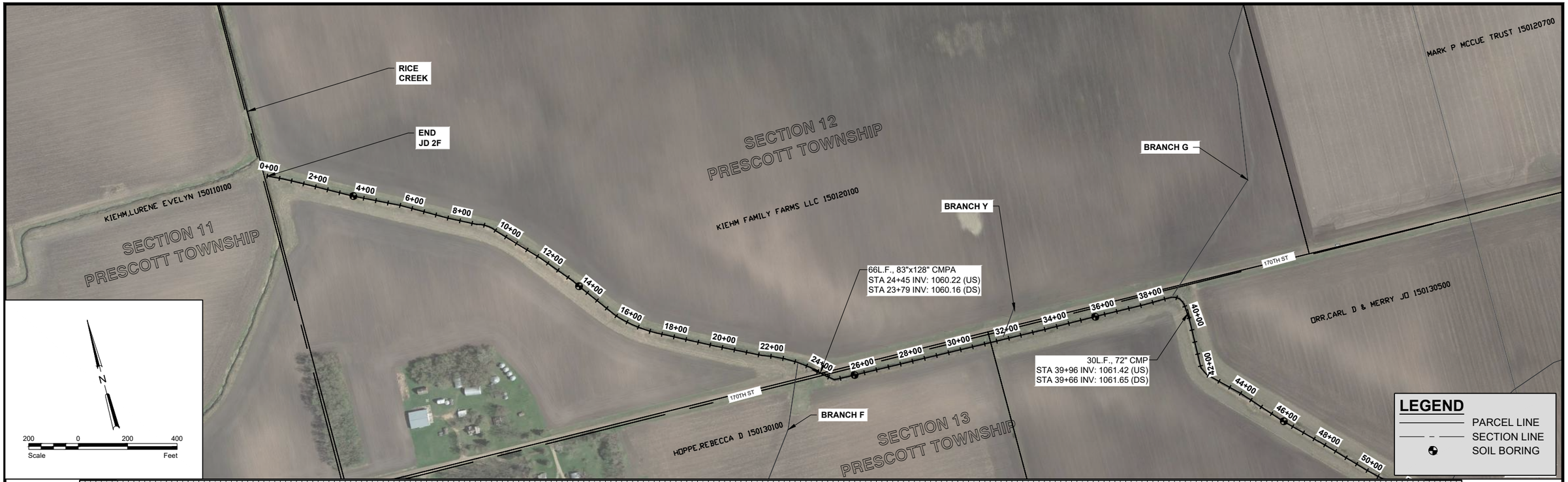
**Drone Survey Photograph 6:** Private Ditch alongside Branch K

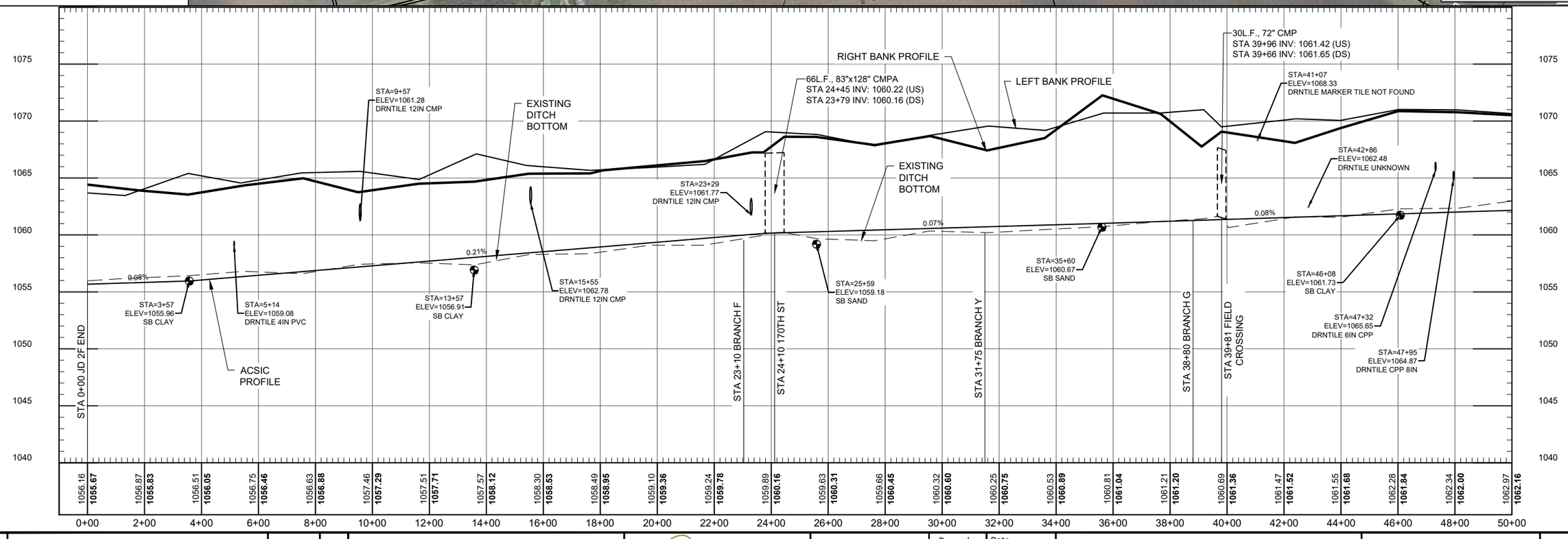
**Drone Survey Photograph 7:** Sediment Entering Private East-West Ditch in Section 18 of Barber Township via Side Inlet Pipe



**Drone Survey Photograph 8:** Sediment Entering Upstream End of Private East-West Ditch in Section 18 Barber Township

# ATTACHMENT C – PLAN-PROFILE DRAWINGS

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FARIBAULT JUDICIAL DITCH 2F
PRESCOTT TWP SECTIONS 12 AND 13 AND BARBER TWP
SECTIONS 18 AND 19, FARIBAULT COUNTY

PLAN AND PROFILE
PROJECT NO. 6255-0014

SHEET
1 of 6

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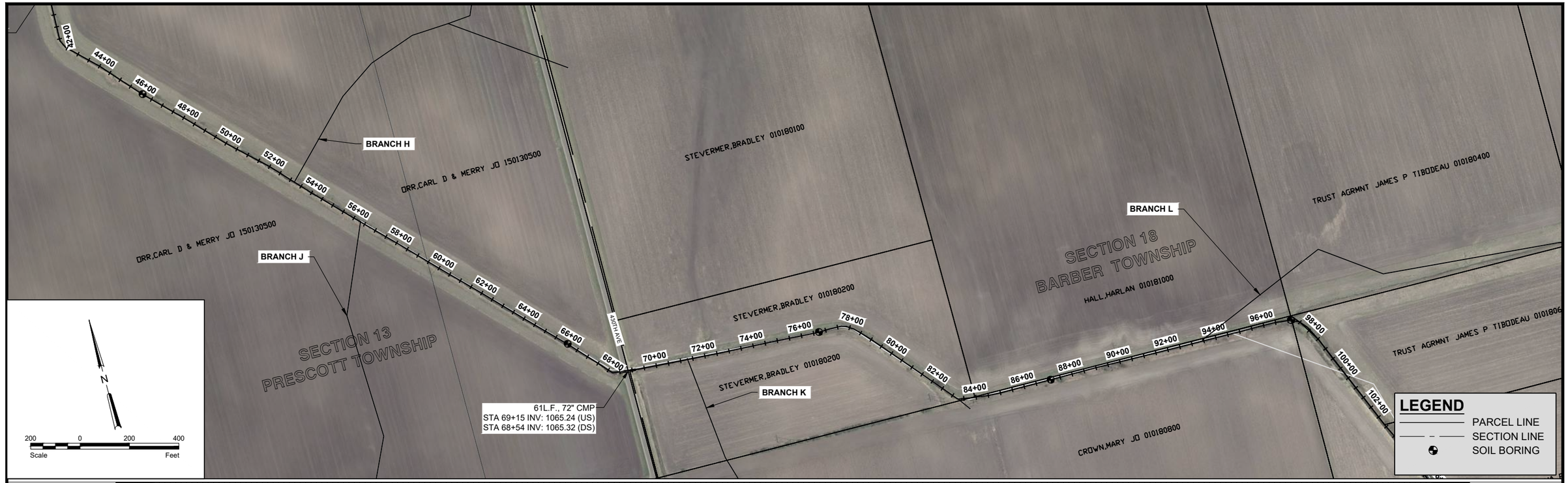


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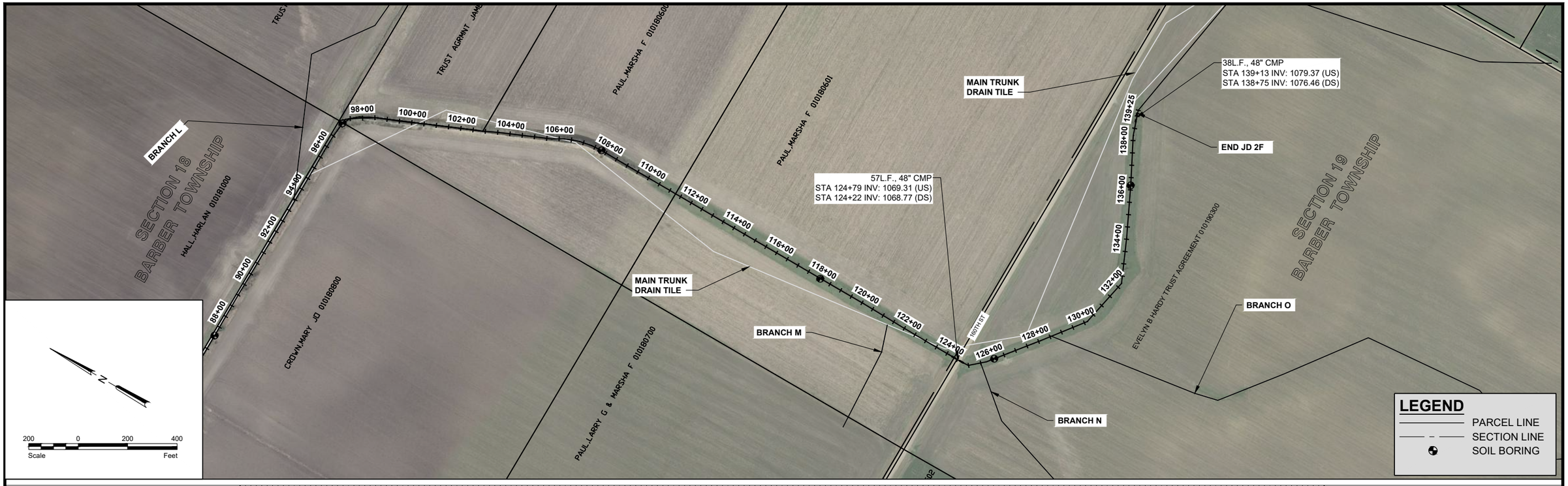
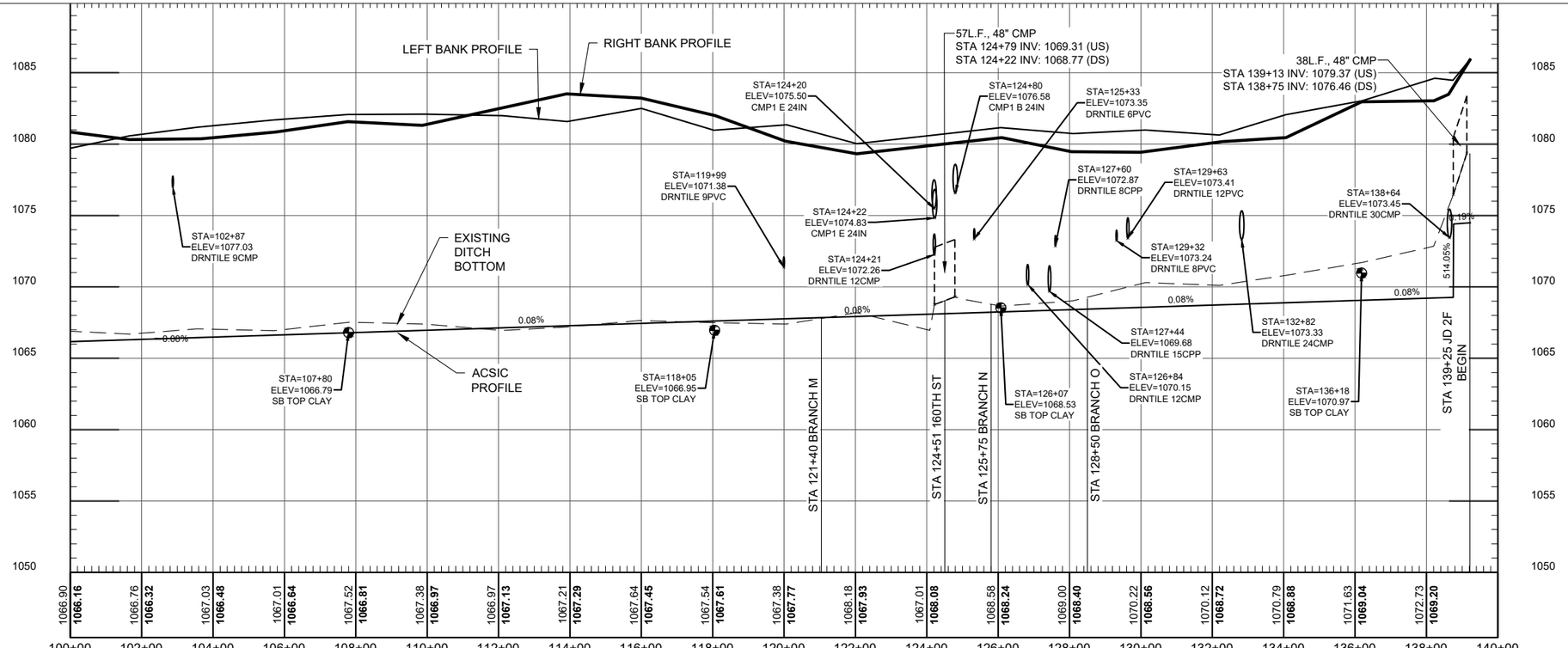
FARIBAULT JUDICIAL DITCH 2F
PRESCOTT TWP SECTIONS 12 AND 13 AND BARBER TWP
SECTIONS 18 AND 19, FARIBAULT COUNTY

PLAN AND PROFILE

PROJECT NO. 6255-0014

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**PRELIMINARY**
**Not for Construction**


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FARIBAULT JUDICIAL DITCH 2F
PRESCOTT TWP SECTIONS 12 AND 13 AND BARBER TWP
SECTIONS 18 AND 19, FARIBAULT COUNTY

PLAN AND PROFILE

PROJECT NO. 6255-0014

SHEET 3 of 6

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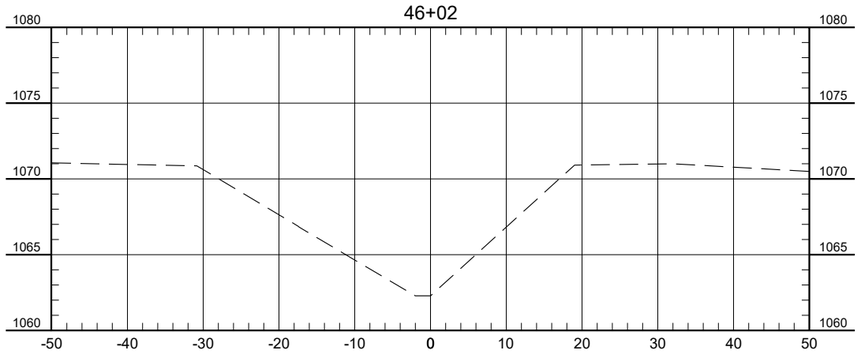


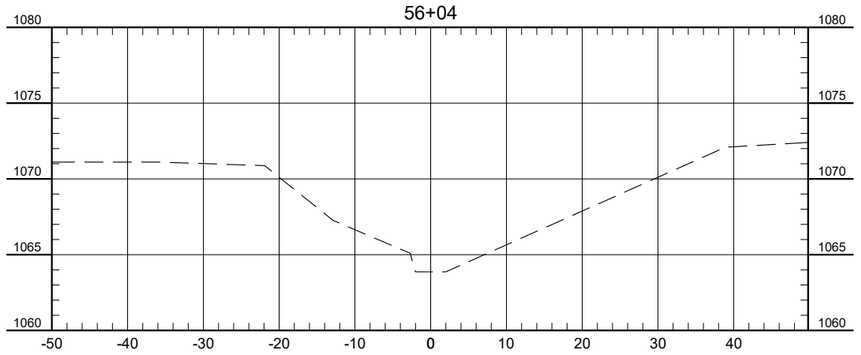


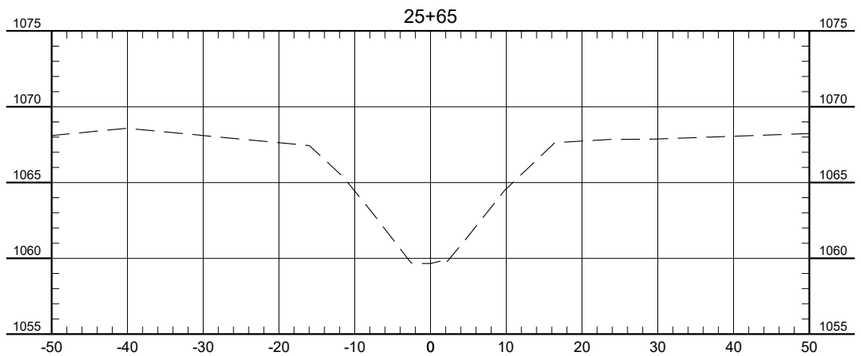


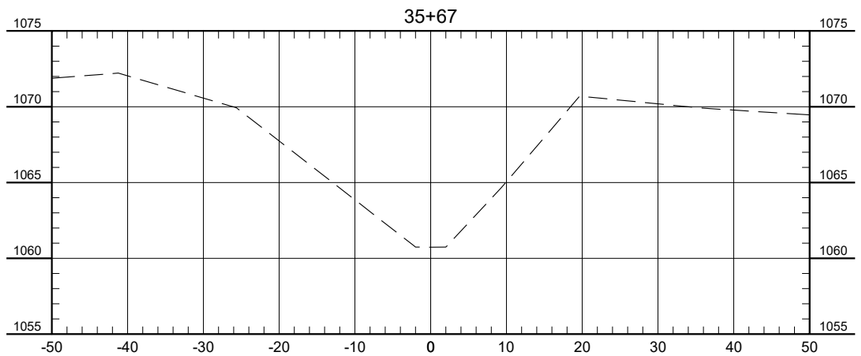


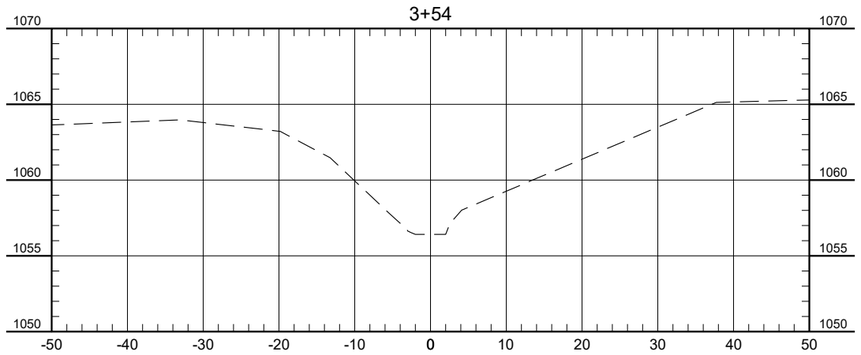


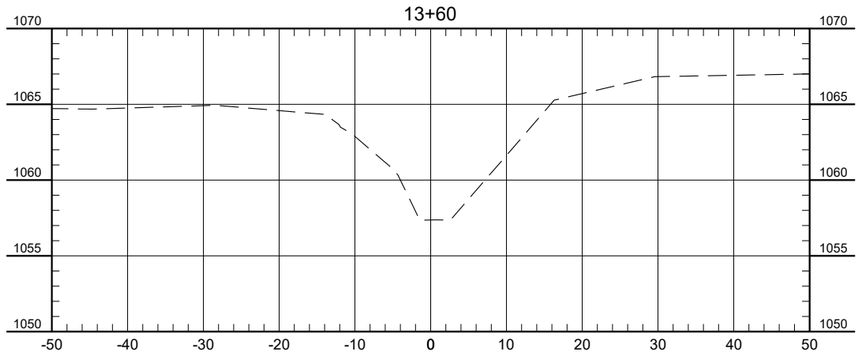


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| No. | Revision | Date | By |
|---|---|---|---|
| | | | |

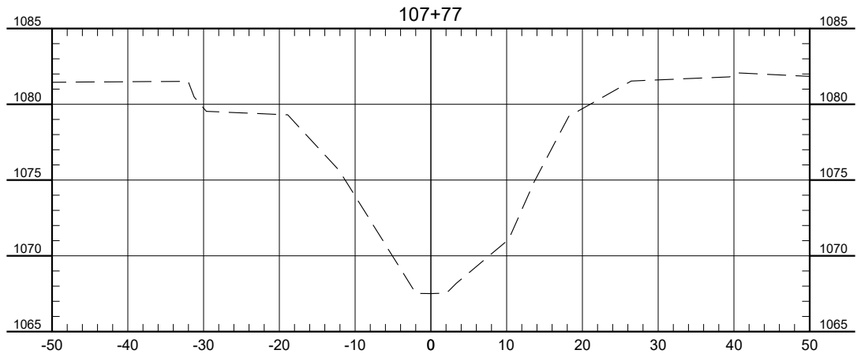
**PRELIMINARY**
**Not for Construction**

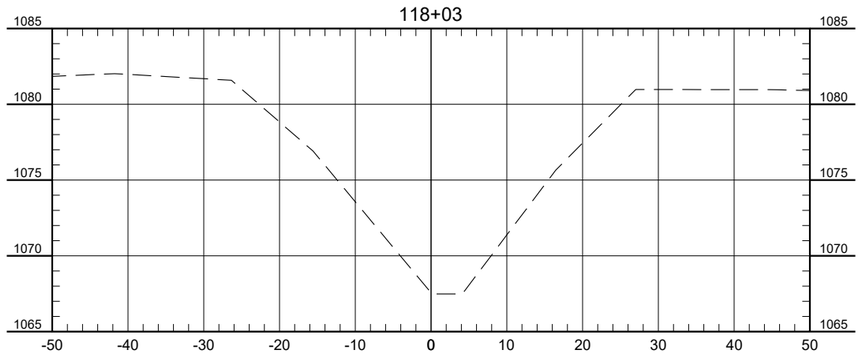
HOUSTON ENGINEERING INC.
Maple Grove
P: 763.493.4522
F: 763.493.5572

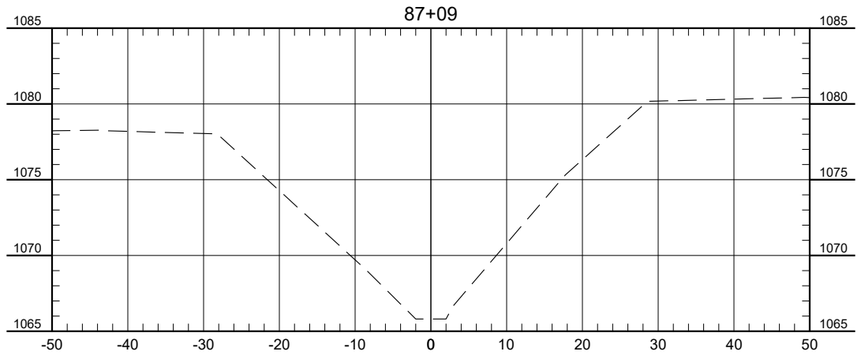
| Drawn by | Date |
|---|---|
| PAS | 2-28-2020 |
| Checked by | Scale |
| JAL | AS SHOWN |

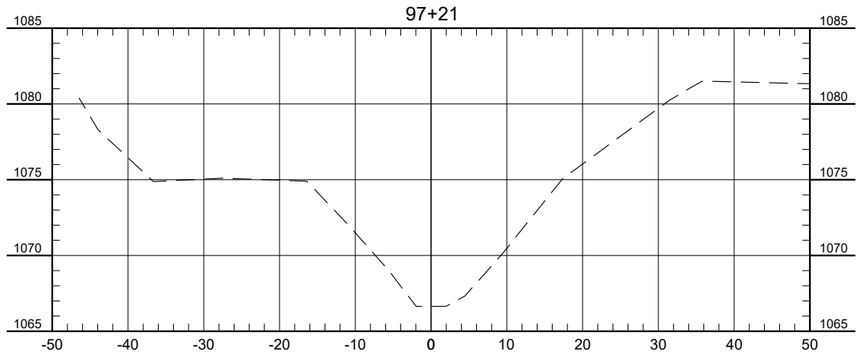
FARIBAULT JUDICIAL DITCH 2F
PRESCOTT TWP SECTIONS 12 AND 13 AND BARBER TWP
SECTIONS 18 AND 19, FARIBAULT COUNTY

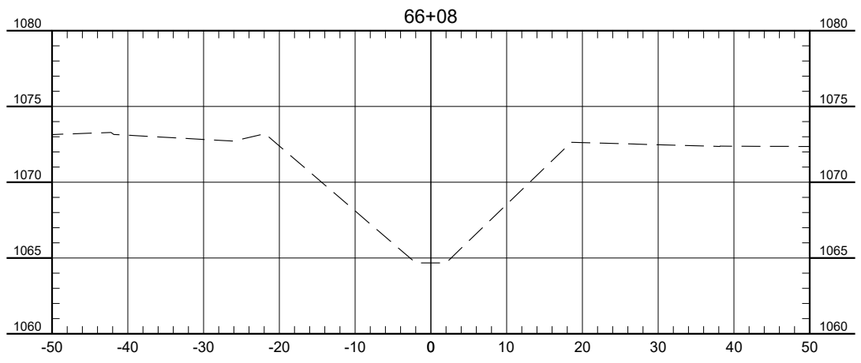
CROSS SECTIONS
PROJECT NO. 6255-0014

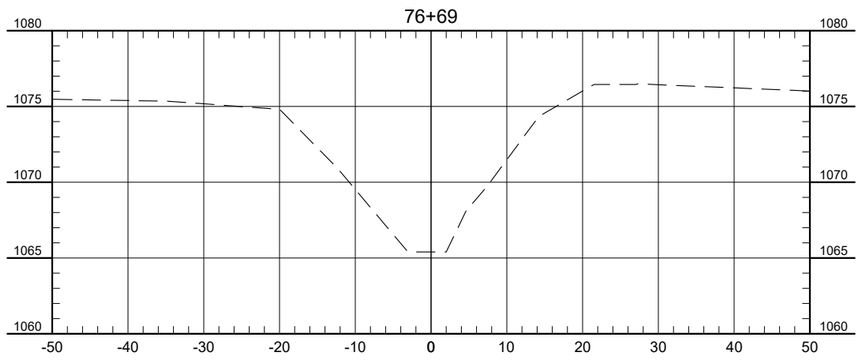
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F: 763.493.5572

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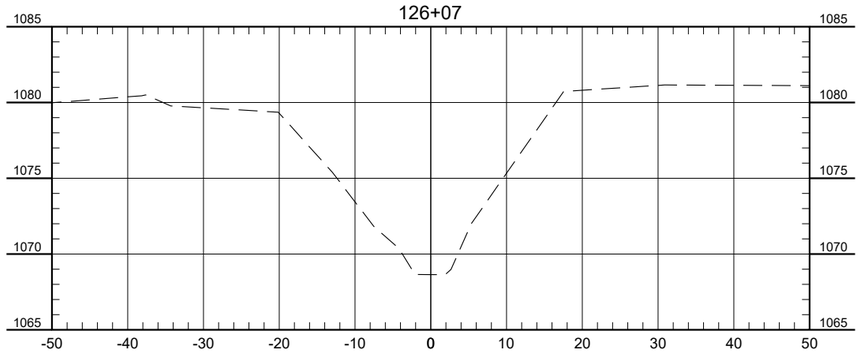
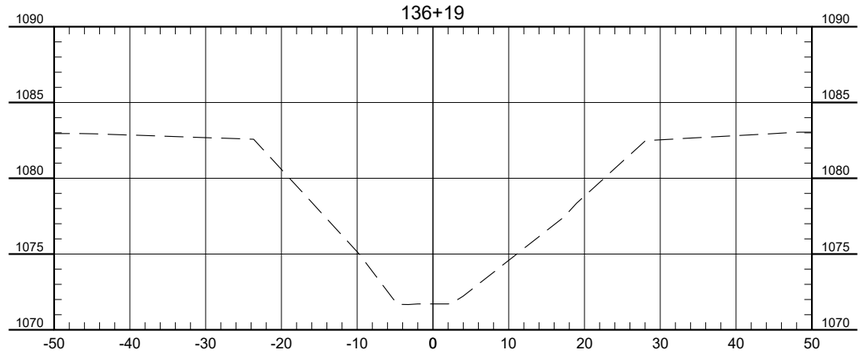
FARIBAULT JUDICIAL DITCH 2F
PRESCOTT TWP SECTIONS 12 AND 13 AND BARBER TWP
SECTIONS 18 AND 19, FARIBAULT COUNTY

CROSS SECTIONS
PROJECT NO. 6255-0014

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FARIBAULT JUDICIAL DITCH 2F
PRESCOTT TWP SECTIONS 12 AND 13 AND BARBER TWP
SECTIONS 18 AND 19, FARIBAULT COUNTY

CROSS SECTIONS

PROJECT NO. 6255-0014

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6 of 6

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# ATTACHMENT D – DETAILED PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COST

**OPINION OF PROBABLE COST:**
**FARIBAULT JUDICIAL DITCH 2F REPAIR**
**FARIBAULT COUNTY**

**SECTION 12 AND 13 PRESCOTT TOWNSHIP AND SECTION 18 AND 19 BARBER TOWNSHIP**
**FARIBAULT COUNTY, MINNESOTA**

February 27, 2020

| Item | Item Description | Unit | Quantity | Unit Price | Total Price |
|---|---|---|---|---|---|
| | Mobilization | Lump Sum | 1 | $ 10,000.00 | $ 10,000.00 |
| | Traffic Control | Lump Sum | 1 | $ 2,000.00 | $ 2,000.00 |
| | Clearing | Lump Sum | 1 | $ 2,000.00 | $ 2,000.00 |
| | Open Channel Excavation | Lin. Ft. | 13,900 | $ 3.00 | $ 41,700.00 |
| | 48-inch CPP | Lin. Ft. | 60 | $ 100.00 | $ 6,000.00 |
| | 72-inch CMP | Lin. Ft. | 80 | $ 140.00 | $ 11,200.00 |
| | Gravel Roadway Patch | Each | 1 | $ 1,200.00 | $ 1,200.00 |
| | Bituminous Roadway Patch | Each | 1 | $ 8,000.00 | $ 8,000.00 |
| | Water Quality Drop Inlet - Diameter Varies | Each | 10 | $ 1,800.00 | $ 18,000.00 |
| | Stabilize Tile Outlet - Riprap | Each | 28 | $ 1,000.00 | $ 28,000.00 |
| | Replace Tile Outlet Pipe - Diameter Varies between 6-15 inches | Each | 15 | $ 750.00 | $ 11,250.00 |
| | Replace Tile Outlet Pipe - Diameter Varies between 18-30 inches | Each | 5 | $ 1,250.00 | $ 6,250.00 |
| | Silt Fence | Lin. Ft. | 100 | $ 5.00 | $ 500.00 |
| | Excavator/Dozer Hours | Hours | 8 | $ 225.00 | $ 1,800.00 |
| | Seeding and Mulch - Spoil Area | Acre | 8 | $ 1,000.00 | $ 8,000.00 |
| | Channel Reshaping | Lin. Ft. | 500 | $ 10.00 | $ 5,000.00 |
| | Erosion Control Blanket | Sq. Yds | 2000 | $ 2.50 | $ 5,000.00 |
| | **Construction Sub-total** | | | | **$ 165,900.00** |
| | 20% Construction Contingency | | | | $ 33,180.00 |
| | Temporary Damages | | | | $ 500.00 |
| | **TOTAL OPINION OF PROBABLE CONSTRUCTION COST** | | | | **$199,580.00** |