

Technical Memorandum

To: Jason Blommel
Stearns County Assistant Surveyor

Cc: Chad Martini
Stearns County Auditor/Treasurer

From: Chris Otterness, PE
Garrett Monson, PE
Houston Engineering, Inc.

Subject: Reestablishment of Stearns County Ditch 4
Public Drainage System Records

Date: January 17, 2019
Revised 3-18-2019

Project: 6364-008

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



1/17/19

Chris Otterness
Reg. No. 41961

Date

Introduction

The purpose of this report is to provide Stearns County with the results of the investigation and analysis of the Stearns County Ditch 4 (CD 4) public drainage system. This report contains the necessary description of alignment; cross-section; profile; hydraulic structure locations, materials, dimensions, elevations; and right-of-way of the drainage system to reestablish records as requested by the Board.

CD 4 is an open channel ditch, which serves predominantly agricultural land, located in Avon and St. Wendel Townships. CD 4 is not within the jurisdiction of an existing watershed district or water management organization. Minnesota Statute 103E.101 subd. 4a allows for the drainage authority to reestablish records if, after an investigation of drainage system records, it is found that the records establishing the alignment, cross-section, profile, or right-of-way of a drainage system are lost, destroyed or otherwise incomplete. The drainage authority may, by order, reestablish records defining the alignment; cross-section; profile; hydraulic structure locations, materials, dimensions, and elevations; and right-of-way of the drainage system which define the "As Constructed and Subsequently Improved Condition" or ACSIC. This report documents the investigation of drainage system records and physical investigation of the drainage system used by the engineer to recommend reestablished records to define the alignment, grade and geometry as necessary to

maintain the historic function of the drainage system. No other historical reviews or reviews of the as-constructed profile of this system are known to exist.

RELATIONSHIP TO DRAINAGE SYSTEM MAINTENANCE AND REPAIR

This memorandum establishes the ACSIC as the basis for future maintenance and repair of the public drainage system. A future repair report or similar document is expected to include the evaluation of alternatives relative to these systems serving as outlets for agricultural drainage and/or other land uses, and address issues related to the volume of runoff, water quality, and flooding. Normally, the repair report may include alternatives which adjust the elevation of the open channel and culverts, realign or abandon portions of the public system, or evaluate similar modifications as authorized by MS 103E and consistent with the ACSIC. The range of alternatives evaluated within a repair report is typically based in part on discussions with landowners served by the public drainage system and other interested parties.

DEFINITIONS

This memorandum defines the condition and therefore by inference the capacity (i.e. the existing flow rate in cubic feet per second) of the public drainage systems using three definitions:

As-Designed / Established Condition: The geometry of the public drainage systems as designed in 1898 including all subsequent designs for legal repairs and alterations. A repair or alteration is considered legal if formally authorized in some legal proceedings. The details of the As-designed / Established condition are relatively unknown due to the scarcity of the original design plan and profiles that identify the dimensions, lengths and grade elevations. The As-Designed / Established Condition may or may not reflect the As-Constructed and Subsequently Improved Condition and is generally shown on construction plans and engineering drawings.

As-Constructed and Subsequently Improved Condition: The geometry of the public drainage systems as constructed in 1899 including all subsequent legal repairs and alterations as well as other actions which maintain and are consistent with the general character and efficiency of the drainage systems. Often, survey data (and only rarely as-built drawings) show that the alignment, grade and geometry (i.e., cross sectional area) of the existing public drainage system is altered from the As-Designed / Established Condition. The definition of As-Constructed and Subsequently Improved Condition (ACSIC) is intended to establish the condition to which the system can legally be repaired consistent with the definition in MS 103E.701, which states:

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

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

Available records provide limited information regarding originally constructed alignment, grade (profile) and geometry (cross-section) of CD 4. Alterations to the public drainage system alignment, grade and geometry from the As-Designed / Established Condition likely resulted from the use of less accurate survey methods and construction techniques than currently exist, inaccurate culvert and crossing installation, and a need to “fit” the drainage system to the existing topography. Alterations to the public drainage system that were not performed per the requirements of MS 103E (i.e., ditch law) or its predecessors are typically not considered part of the ACSIC. However, modifications that neither obstructed or improved the system, were maintained by the public drainage authority, and relied upon by benefitted landowners, may be considered part of the ACSIC, where that alteration has been maintained for a sufficient period of time to create rights in the benefitted landowners.

Repaired Condition: The condition to which the drainage authority repairs the public drainage system. If the capacity of the Repaired Condition exceeds the ACSIC, the work is considered an improvement under MS 103E and its predecessors. The Board may decide for a variety of reasons to repair the public drainage system to some condition less than the As-Constructed and Subsequently Improved Condition.

Maintenance: There is no statutory distinction between the terms maintenance and repair. However, historically, drainage authorities have drawn a distinction between the two terms as a function of the scope of work performed for each. The primary difference between maintenance and repair, is that maintenance activities are generally completed at a select (more isolated) location or locations along portions of the public drainage system, rather than a drainage system-wide assessment, analysis, recommendation, or alteration that occurs in association with a repair proceeding. Maintenance activities are those that generally occur at a specific location or some portion of the system.

Maintenance generally includes activities such as vegetation management, the removal of open channel and tile blockages (e.g., beaver dams, sediment), the replacement of tile ruptures, the installation of tile inlets and access manholes, the replacement of portions of a tile system, the stabilization and repair of slopes and spoil material, and the removal of sediment up to the repair condition. Maintenance also includes the resetting or resizing of culverts or other crossings which were inaccurately placed and result in the obstruction of the public drainage system. Maintenance activities are usually exempt from wetland permitting requirements under the Wetland Conservation Act and Section 404 of the Clean Water Act.

Location, General Description and History of the Public Drainage System

LOCATION

The Stearns County 4 public drainage system is located in Sections 11 and 12 (of T125 R30) within the township of Avon and Sections 4, 5, 7, and 8 (of T125 R29) within the township of St. Wendel, Stearns County and generally flows from east to west. The drainage system starts approximately 1,650 feet east of 115th Ave and terminates directly into Spunk Creek. According to the drainage area that contributes to the Stearns County 4 public drainage system is approximately 2,848 acres. The drainage area is predominantly developed for agricultural land use.

HISTORY OF THE PUBLIC DRAINAGE SYSTEM

The Stearns County 4 public drainage system was established in 1898. In 1904 records indicate the ditch was repaired. No detail on the scope of repairs was available. A petition for system-wide repair of the ditch was filed and an order of approval was issued in 1952 by the Stearns County Board. Following the petition, an engineer's report was filed on December 9, 1952 with construction specifications, survey and cost estimate. The second repair was completed in 1952-1953. In 2009, the culvert under 130th Avenue was replaced. Finally, in 2017 Stearns County removed debris and dead fall from the ditch. Ditch grades were surveyed and documented in 1898, 1953, and in 2017.

EXISTING/CURRENT ALIGNMENT

This portion of the memorandum describes the current condition of the public drainage system as observed “on-the-ground” (i.e., existing) as determined by a review of the available records, field survey, aerial imagery, and other available historical evidence. CD 4 consists entirely of an open channel ditch with several culvert crossings. The stationing used to describe the alignment proceeds from upstream to downstream. **Appendix A** shows the existing and ACSIC grades and alignment.

The upstream end of the CD 4 alignment begins at Sta 0+00 on the east side of 115th Avenue. The ditch alignment then continues southwest until it crosses Highway 4 at approximate station 38+00. At 130th Avenue or approximately station 130+50 the ditch alignment begins to head west until approximately station 145+00 at which point the ditch continues northwest. The ditch alignment continues northwest through Highway 3 at approximate station 164+50 and 365th Street at approximate station 168+00. The ditch then heads west from approximate station 180+00 while meandering north and south where it again crosses 365th Street at approximate station 209+50 until approximate station 230+00 where the ditch crosses Highway 155 from whereon the ditch heads northwest. CD4 continues to head northwest until the end of the public alignment at approximate station 270+00. The channel continues as a natural, meandering stream until it outlets into Spunk Creek.

SOURCE OF SURVEY DATA USED IN THIS ASSESSMENT

Survey data was collected by Stearns County staff in the summer of 2017 to determine the existing condition of the public drainage system. All survey data collected utilizes the Stearns County Coordinate System and North American Vertical Datum 1988 (NAVD'88). (Note: Unless otherwise noted, all elevations provided herein are based on NAVD'88 vertical datum).

Analysis of Current Function in Historical Context

SYSTEM MODIFICATIONS AFFECTING FUNCTION

No significant modifications on the CD 4 public drainage system have been documented in the available records since its establishment 1898.

OBSERVED PROBLEM AREAS

The following is a summary of known problem areas identified in an inspection dated August 17th, 2017 within the drainage system from visual observations in the field, inspections, or firsthand accounts from the Stearns County Drainage Inspector:

- 1) Several culverts across the system are above the hard bottom and proposed ACSIC profiles
- 2) The culvert within the field crossing on Robert and Gerald Rudolph's property has failed.
- 3) The culvert within Leroy and Arlene Huling's Property has significant drop and is showing signs that it may be prone to failure.
- 4) The culvert located under 130th Avenue Township Road does not allow the flow due to inverts being too high.
- 5) A beaver dam was seen downstream from the end point of the ditch.
- 6) Multiple sections of the ditch are covered with heavy vegetation, however, many of these locations function properly.

RIGHT-OF-WAY

Proceedings for the original establishment of the drainage system awarded damages for the areas physically occupied by the drainage system along with an easement for the area required for construction activities such as land clearing and spoil disposal. This combination of areas constitutes the right-of-way for the drainage system and is often described as the area reasonably necessary for the drainage authority to perform its repair, maintenance, inspection obligations, along with an area of reasonable set-back to protect the drainage system. The right of way required was estimated by computing the approximate geometry of the spoil piles and the width needed for continued maintenance. The majority of the right of way is 25 feet from the top of bank of the ditch. However, there are a few locations where the ditch right of way extends to 30 feet from the top of bank, such as stations 5+00 to 20+00, 140+00 to 155+00, 175+00 to 180+00, and 250+00 to 265+00. In addition,

the ditch right of way extends to 35 feet from the top of bank from stations 155+00 to 175+00. See **Figure 2** for right of way widths and locations.

AS-CONSTRUCTED AND SUBSEQUENTLY IMPROVED GRADE AND GEOMETRY

Ideally, the grade of the ACSIC would be determined through the use of as-built drawings that identify the constructed alignment, grade and geometry. However, since as-built plans were rarely recorded for public drainage systems in the late 19th century, engineers have frequently utilized the profile drawings from the original designs in conjunction with soil borings or probes to the hard ditch bottom to determine and corroborate the ACSIC. Historic records within the engineer's report show that the ditch width is 3 feet from station 0+00 to station 36+00 and 4 feet from station 36+00 to 277+04. In addition, the ditch has a uniform side slope of 2:1.

Soil borings were reviewed for CD4. Several of the borings were determined to be inconclusive in identifying a clear interface of virgin and deposited materials. Some of these borings were in historically wet low areas including locations ranging from STA 93+00 to 130+00 where the original grade may have been below the design grade and the soil borings do not reflect the as-constructed condition. It was therefore determined that the soil borings themselves did not provide enough information. Subsequently, the 1953 repair profiles were converted to North American Vertical Datum of 1988 (NAVD 88) based on a datum adjustment of 1055.55, determined by statistical analysis of the survey of the current ditch hard bottom. Furthermore, several of the soil borings with high confidence corroborate the adjusted profile from the 1953 repair. This converted (NAVD 88) profile is used to represent the as-built grade for a majority of the system.

There are two locations where the proposed ACSIC varies from the 1953 repair profile. These are from STA 215+62 to 240+00 and downstream of STA 249+02. From STA 215+62 to 240+00 the proposed ACSIC was altered from the 1953 to simplify the number of grade breaks and reflect the as constructed elevation by drawing a "best fit" line that is supported by the hard bottom survey and culverts included in the 1953 repair and does not vary significantly from the surrounding ACSIC. This change is not expected to result in a reduction of original drainage capacity. Downstream of STA 249+02, the drainage system starts approximating a more natural channel. In this location, the 1953 repair profile is much lower than the hard bottom survey and neighboring soil borings. Therefore, a "best fit" line was again drawn that was supported by the hard bottom survey and soil borings and best represents the as-constructed condition.

REGULATORY IMPACTS

As seen in **Figure 1**, the CD 4 public drainage system contains one MnDNR listed Public Water (Unnamed Public Water Wetland #73-050W). Drainage system activities within Public Waters (below the OHW elevation) may require a permit or permissions from the DNR. The Minnesota DNR

regulates work within public waters, and generally exempts public drainage repair from a public waters work permit if they are located within an altered natural watercourse or do not substantially affect public waters. However, it appears that this Public Water may not meet the criteria of a public water listing, which is generally Type 3, 4 and 5 wetlands that are 10 or more acres in size. Based on our review of aerial photography, this PW is routinely cultivated, indicating that it more closely meets the criteria of a Type 1 or Type 2 wetland. There are no indications from aerial photography that this wetland is a Type 3, 4 or 5 wetland now or at the time of its classification as a public water (late 1970s). Therefore, this wetland was improperly classified as a public water, and we recommend Stearns County request the MnDNR to reclassify this wetland as a non-public water, in which case it would be regulated by state Wetland Conservation Act rather than Public Waters laws.

The CD 4 public drainage system runs through a series of wetland complexes, as seen in **Figure 3** Under most regulatory programs (i.e. Minnesota Wetland Conservation Act (WCA), Federal Clean Water Act (CWA); and Minnesota Public Waters Law) activities related to repair of a public drainage system, though potentially taking place within wetlands, are generally exempt from regulation, including mitigation requirements. These activities related to public drainage system maintenance and / or repair include:

- Excavation in the drainage system channel when limited to removal of sediment or debris such as trees, logs, stumps, beaver dams, blockage of culverts, and trash, provided the removal does not result in alteration of the original cross-section of the drainage system
- Removing those materials placed by beaver;
- Removing or moving materials blocking installed roadway culverts and related drainage structures; and
- Temporary or seasonal water level management activities done for the purpose of performing maintenance.

Under the CWA, all repair is exempt from regulation. Under the WCA, activities related to maintenance or repair of a public drainage system may result in wetland impacts but are exempt from replacement, which include:

- Maintenance or repair of a public drainage system which drains Type 1, 2, 6, 7, or 8 wetlands; and
- Maintenance or repair of a public drainage system which drains Type 3, 4, or 5 wetlands that have existed for 25 years or less.

Activities considered to be exempt or would result in “no-loss”, do not require the preparation of wetland replacement plans under the WCA. Though not required, in these cases it may be prudent for the drainage authority to apply to the Local Government Unit (LGU) for a no-loss or exemption decision prior to proceeding with the repair activity. The LGU for this location is Stearns County.

Several public drainage system repair activities may result in wetland impacts that are not exempt under the WCA and would likely require wetland replacement. These activities include, but are not limited to:

- Maintenance or repair of a public drainage system which drains Type 3, 4, or 5 wetlands that have existed for more than 25 years; and
- Maintenance or repair of a public drainage system not authorized by the drainage authority.

Because the CD 4 public drainage system intersects several Type 3, 4 and 5 wetlands, modifications to the public drainage system grade may require a permit application with a replacement plan or an application for a no-loss determination. Further review, including a field observation, is recommended before drainage system repairs are completed.

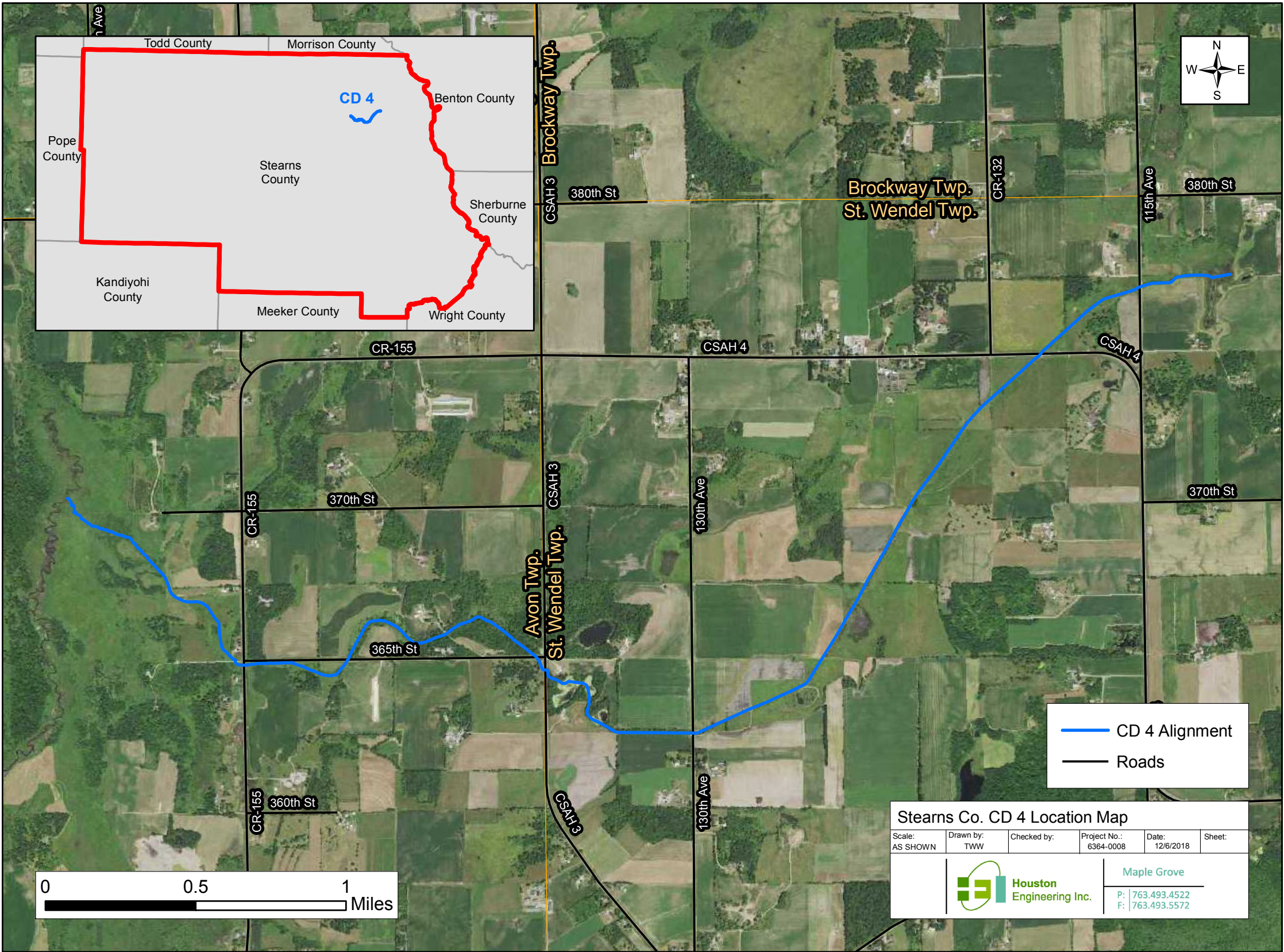
RECOMMENDATIONS

The Engineer recommends that the Drainage Authority schedule, notice and hold a public hearing, and consider adopting corrected records consistent with this report. The corrected drainage system records should be based on the alignment, grade, and geometry described within this historical review. The alignment, grade, and geometry is, in the Opinion of the Engineer, necessary to reestablish the historic function of the legal drainage system to be the basis for maintenance and repair of the public drainage systems. We further recommend that the alignment, grade and geometry of the ACSIC be submitted to the Minnesota Department of Natural Resources.

AVAILABLE INFORMATION/HISTORIC RECORDS

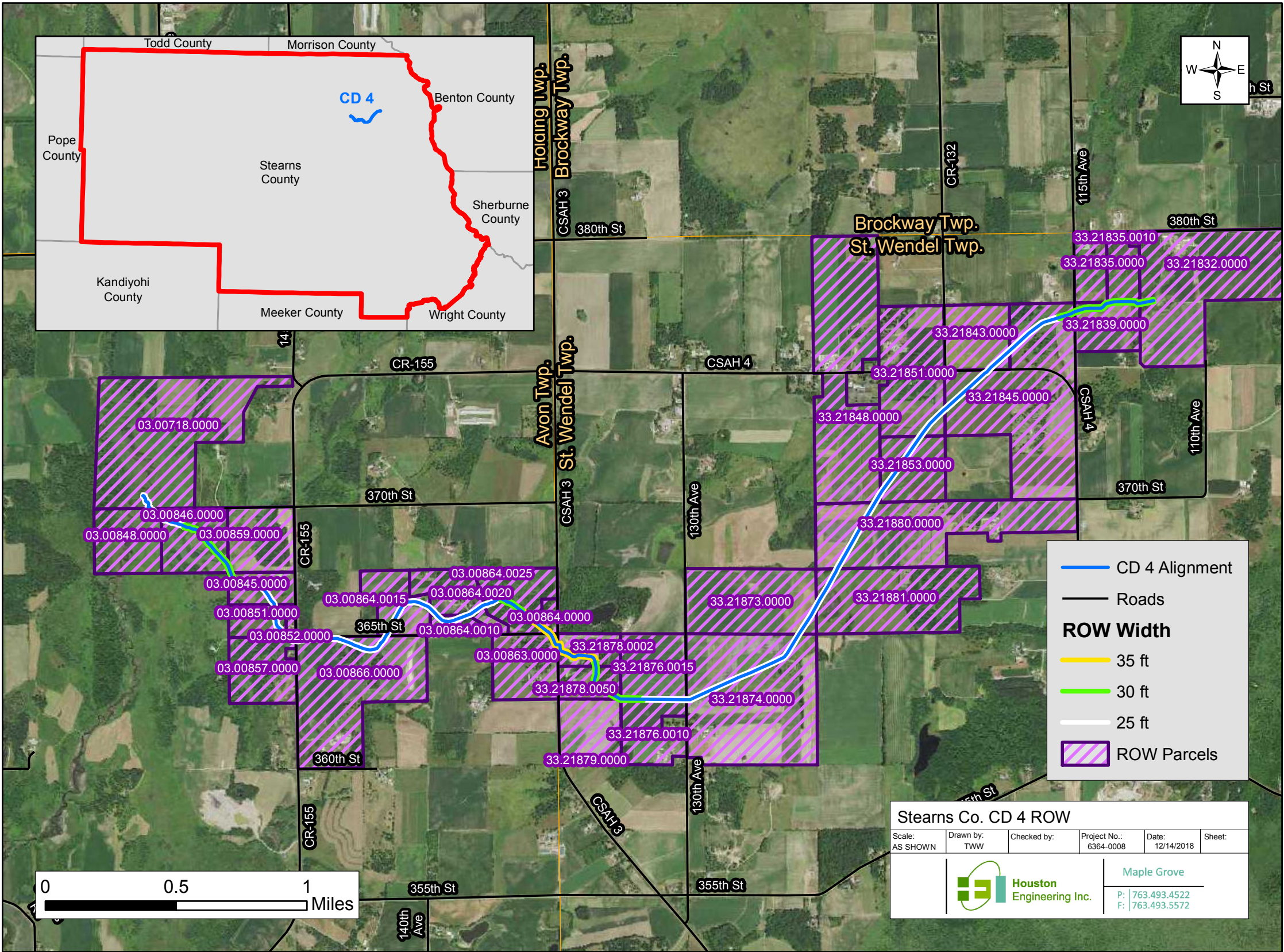
Historic records for the CD 4 public drainage system are available from the County digital records. The following documents have been specifically utilized or referenced for this report:

- 1898 St Wendel Avon Ditch Profile
- 1952-53 Engineer's Report
- CD4 Profile 1953
- Ditch Inspection CD04 2017



— CD 4 Alignment
— Roads

Stearns Co. CD 4 Location Map					
Scale: AS SHOWN	Drawn by: TWW	Checked by:	Project No.: 6364-0008	Date: 12/6/2018	Sheet:
 Houston Engineering Inc.			Maple Grove		
			P: 763.493.4522 F: 763.493.5572		



— CD 4 Alignment
— Roads

ROW Width

— 35 ft
— 30 ft
— 25 ft

▨ ROW Parcels

Stearns Co. CD 4 ROW

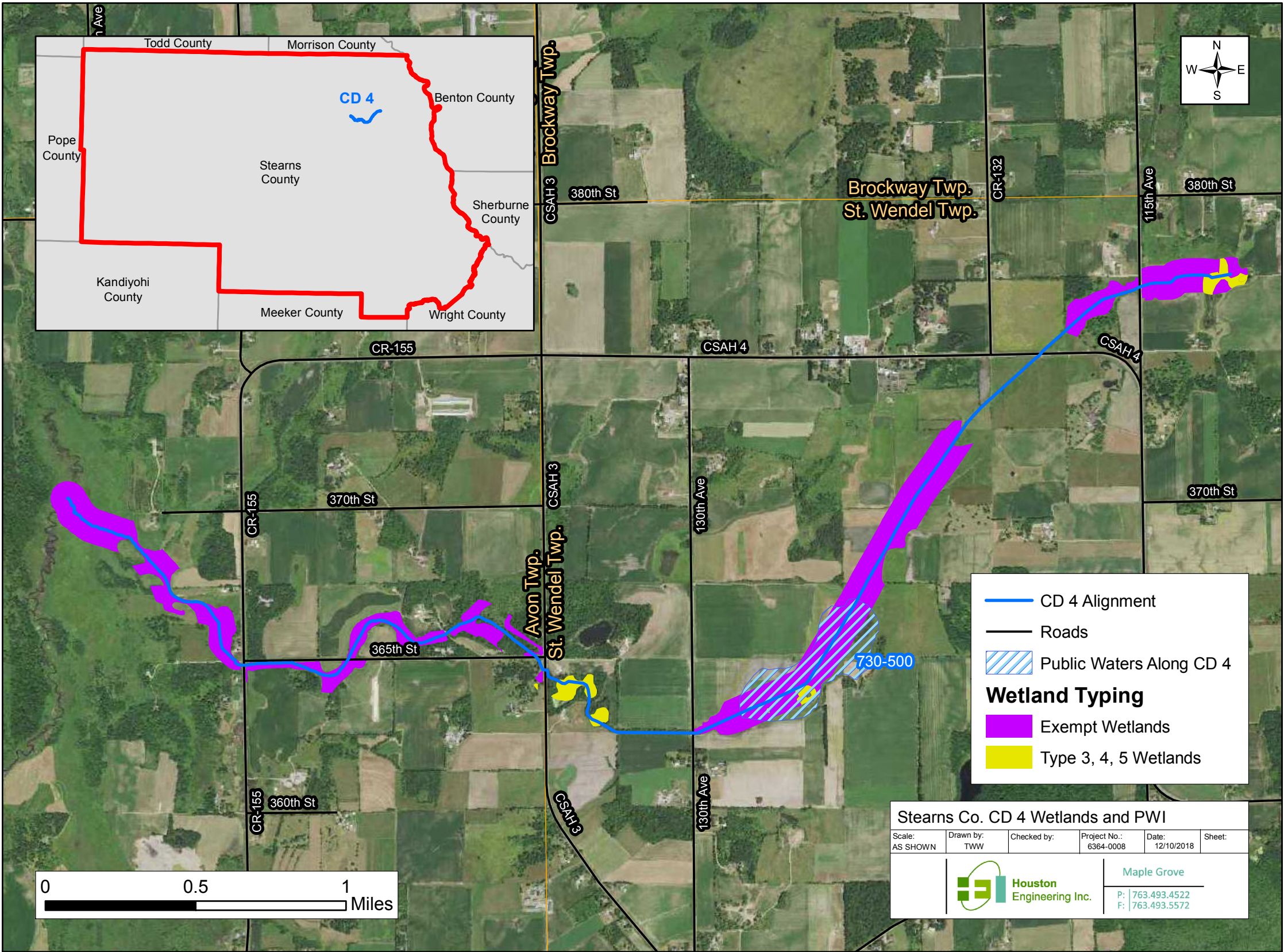
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Houston Engineering Inc.

Maple Grove

P: 763.493.4522
F: 763.493.5572



— CD 4 Alignment
— Roads
▨ Public Waters Along CD 4

Wetland Typing

■ Exempt Wetlands
■ Type 3, 4, 5 Wetlands

Stearns Co. CD 4 Wetlands and PWI

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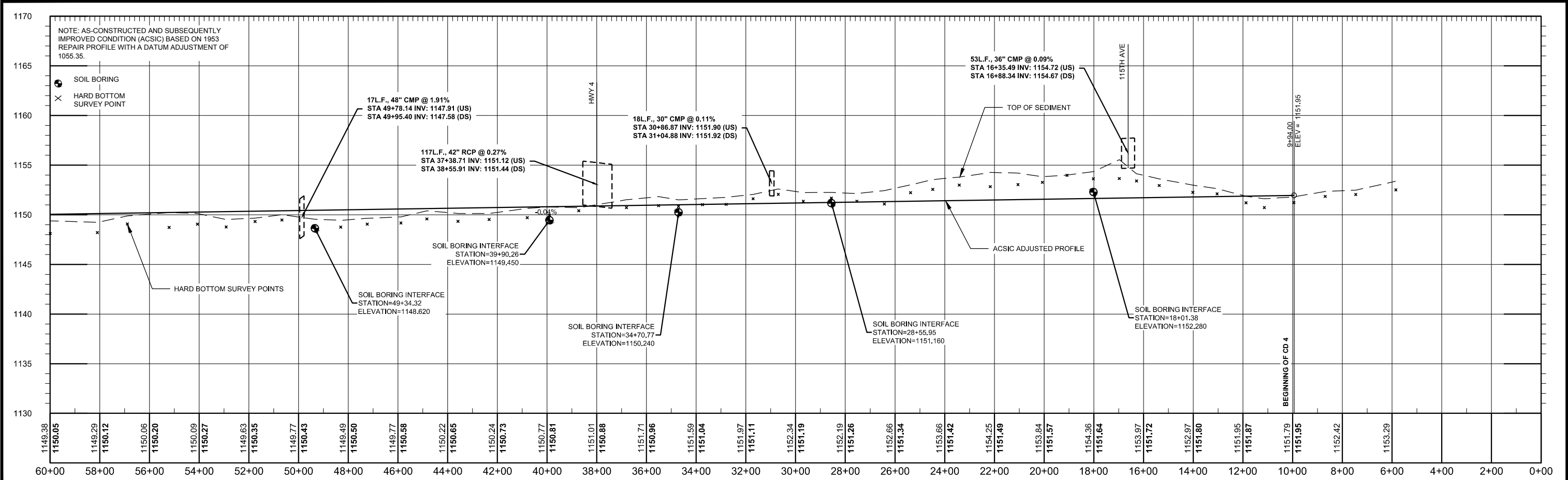
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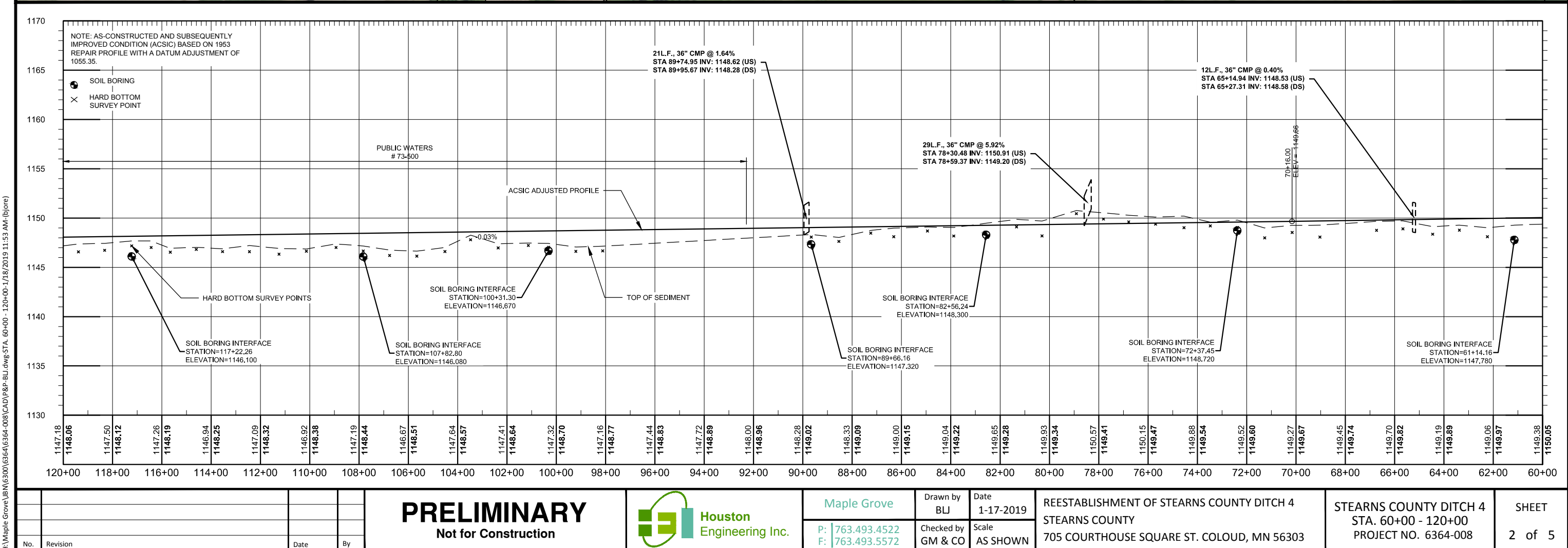
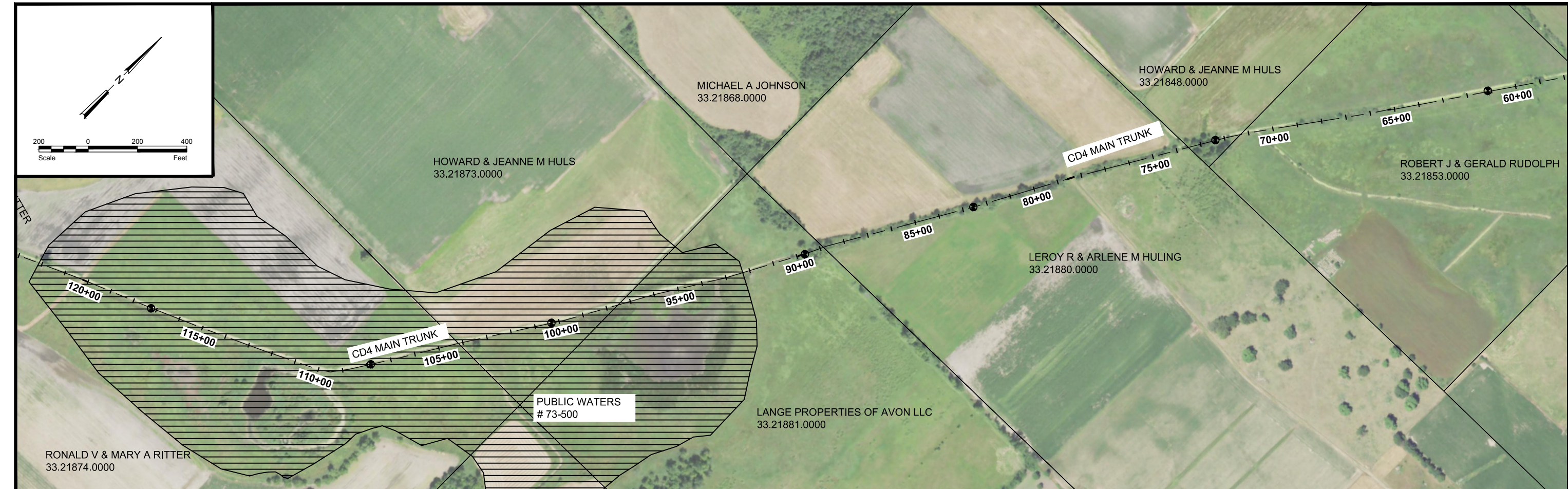
Appendix A

Plans and Profiles

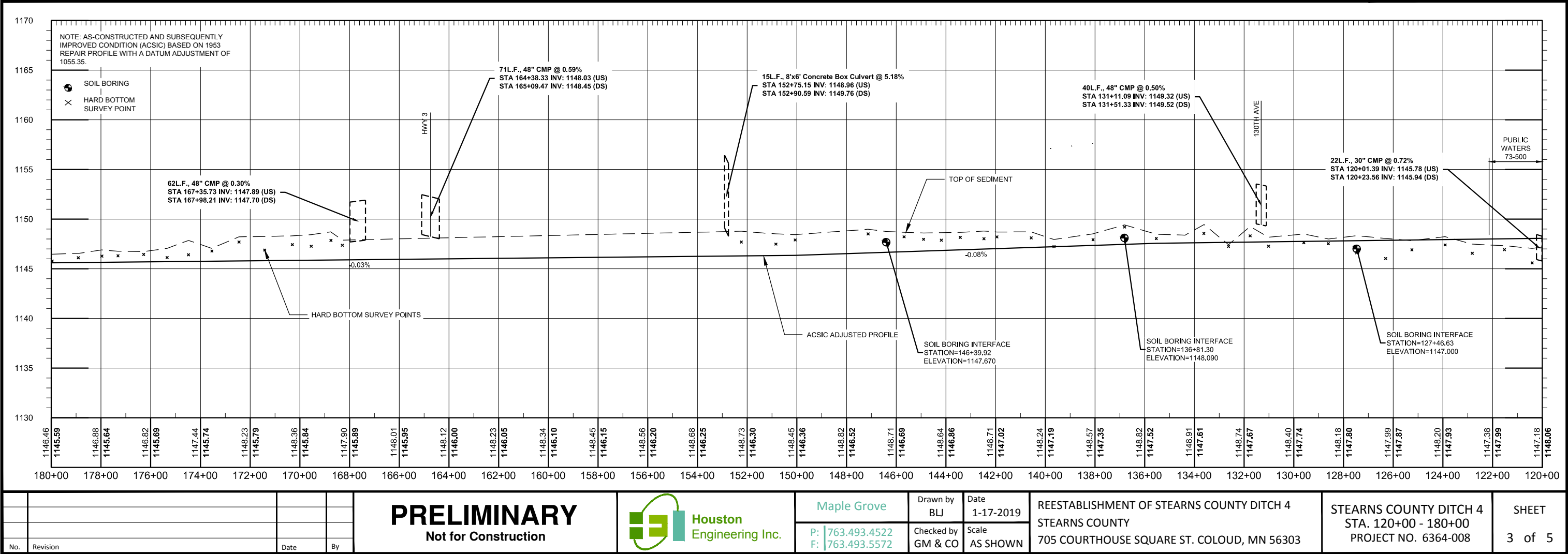


		PRELIMINARY Not for Construction			Maple Grove	Drawn by BLJ	Date 1-17-2019	REESTABLISHMENT OF STEARNS COUNTY DITCH 4 STEARNS COUNTY 705 COURTHOUSE SQUARE ST. COLOUD, MN 56303	STEARNS COUNTY DITCH 4 STA. 0+00 - 60+00 PROJECT NO. 6364-008	SHEET 1 of 5
No.	Revision	Date	By		P: 763.493.4522 F: 763.493.5572	Checked by GM & CO	Scale AS SHOWN			

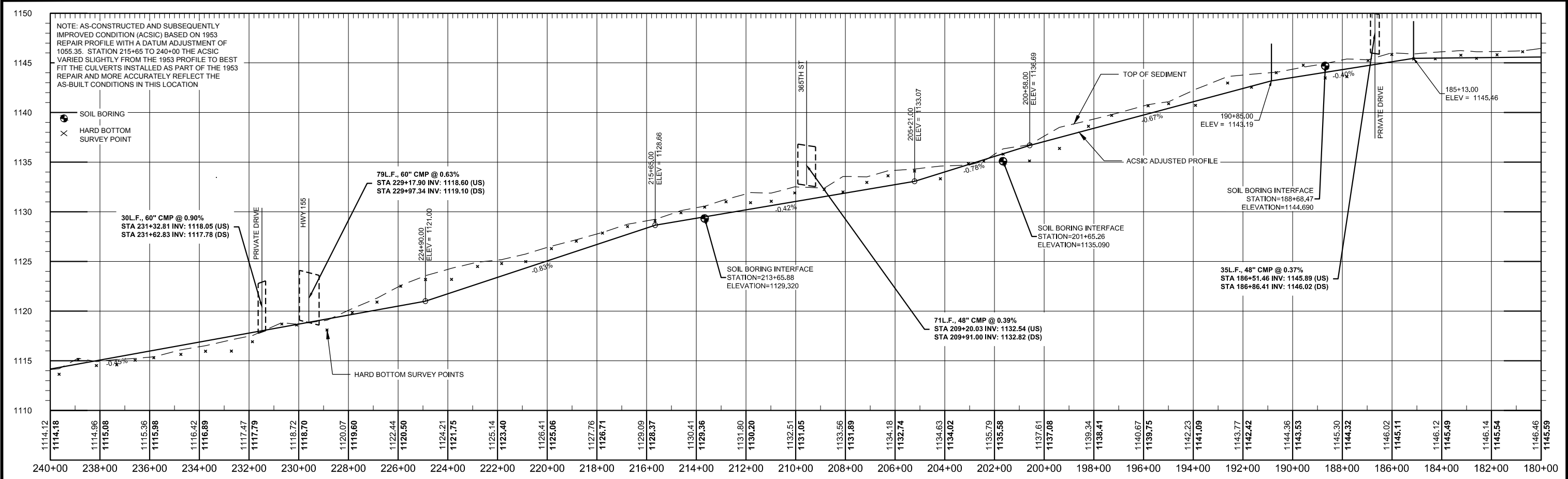
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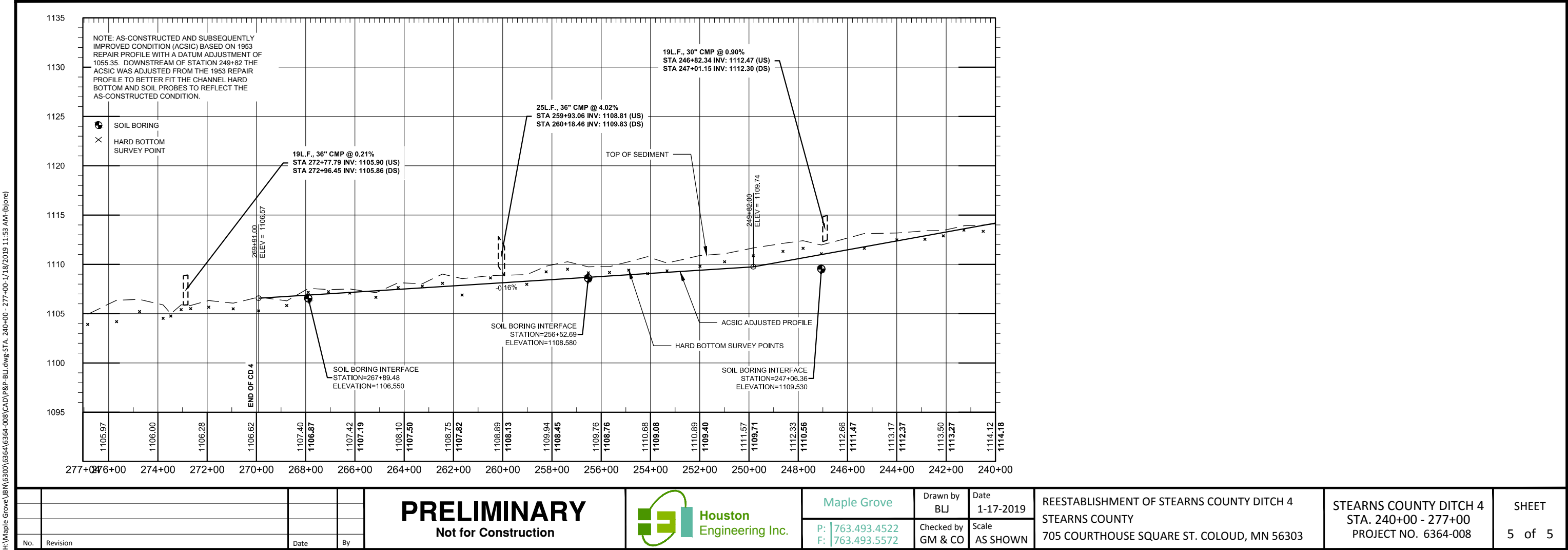
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No.		Revision	Date	By

PRELIMINARY Not for Construction			Maple Grove P: 763.493.4522 F: 763.493.5572	Drawn by BLJ Checked by GM & CO	Date 1-17-2019 Scale AS SHOWN	REESTABLISHMENT OF STEARNS COUNTY DITCH 4 STEARNS COUNTY 705 COURTHOUSE SQUARE ST. COLOUD, MN 56303	STEARNS COUNTY DITCH 4 STA. 180+00 - 240+00 PROJECT NO. 6364-008	SHEET 4 of 5
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