

General Methodology for Determining As-Constructed and Subsequently Improved Condition (ACSIC)



RCWD Board Workshop
February 12, 2024

Purpose of Workshops

- Workshop #1: Provide an understanding of how ACSIC's are determined state-wide
- Workshop #2: Provide an understanding of how this methodology was utilized in RCWD and specifically on ACD 10-22-32

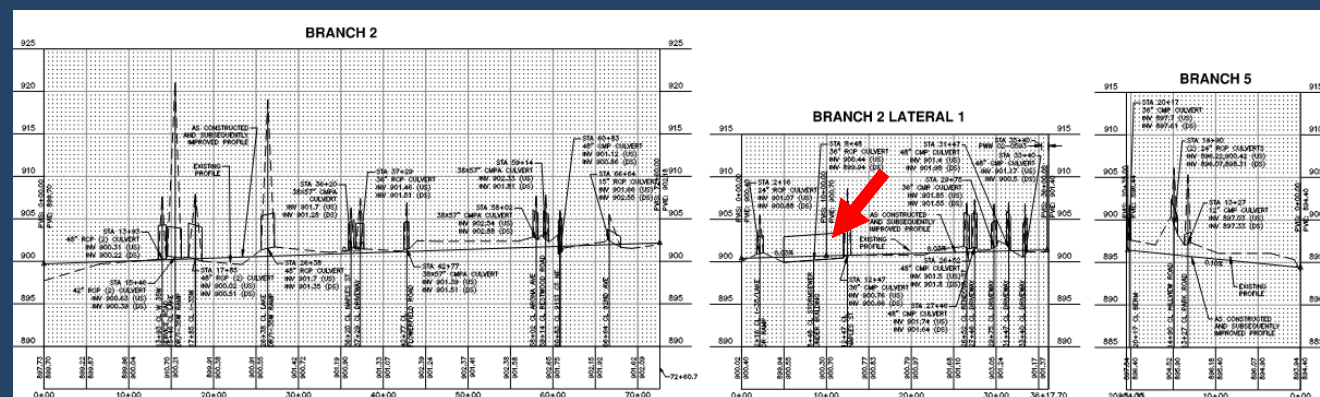
These workshops are NOT:

- An attempt by consultant/staff to prove prior conclusions
- A reopening of the drainage proceedings

(Note: Board may reopen proceedings when new information, not previously considered, brings into question the adopted ACSIC)

What is the ACSIC and Why is It Important?

- As-Constructed (as-built) condition
- Includes alignment, profile (grade), x-section, and right-of-way
- Basis for maximum repair (M.S. 103E.701 Subd. 1)
- Includes improvement/modification under M.S. 103E and predecessors
- Does not generally include modifications outside of M.S. 103E (but some exceptions)
- Is not the as-designed condition (though as-designed condition can inform)
- Is not a decision/policy
- ACSIC is a factual condition (repeatable & scientific basis)

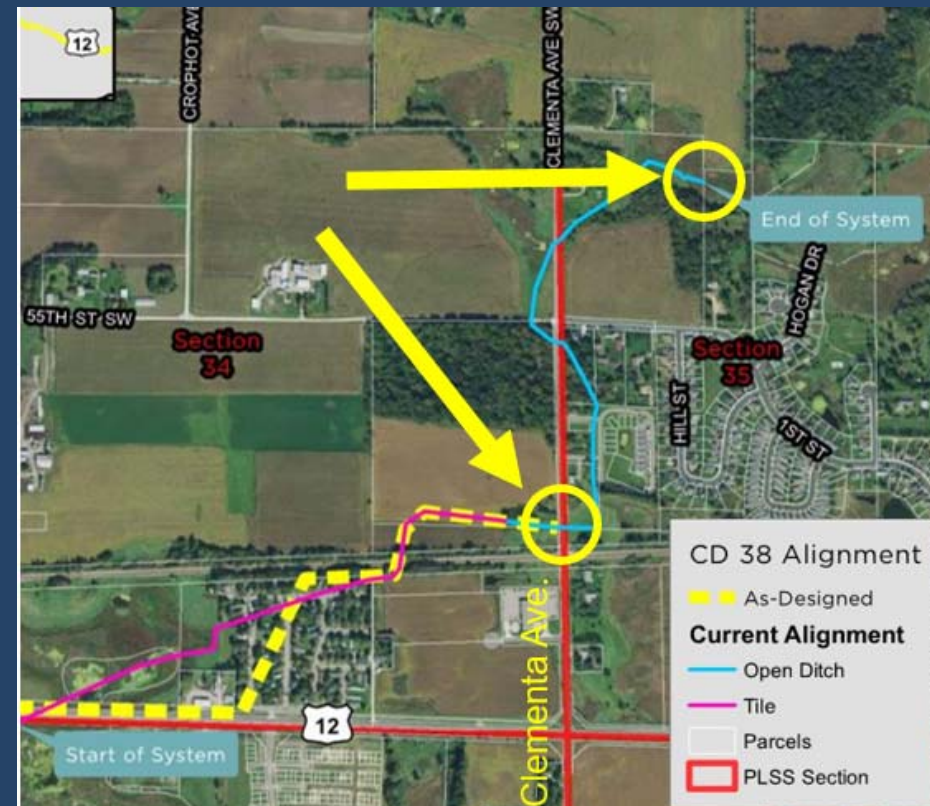


General Process for Determining ACSIC Profile

1. Determine as-built (ACSIC) and As-Designed Alignment
 - Basis for As-Designed/ACSIC profile

Relevant Documents

- Historic maps
- Establishment documents
- Aerial photography
- LiDAR topography



General Process for Determining ACSIC Profile

2. Field Survey

Relevant Information

- Channel bottom (200' spacing)
- Cross-sections (1,000' spacing)
- Soil borings/soil probes (1,000' spacing)
- Culverts and roadways

3. Map survey data in CAD



General Process for Determining ACSIC Profile

4. Review historic documents and identify relevant information

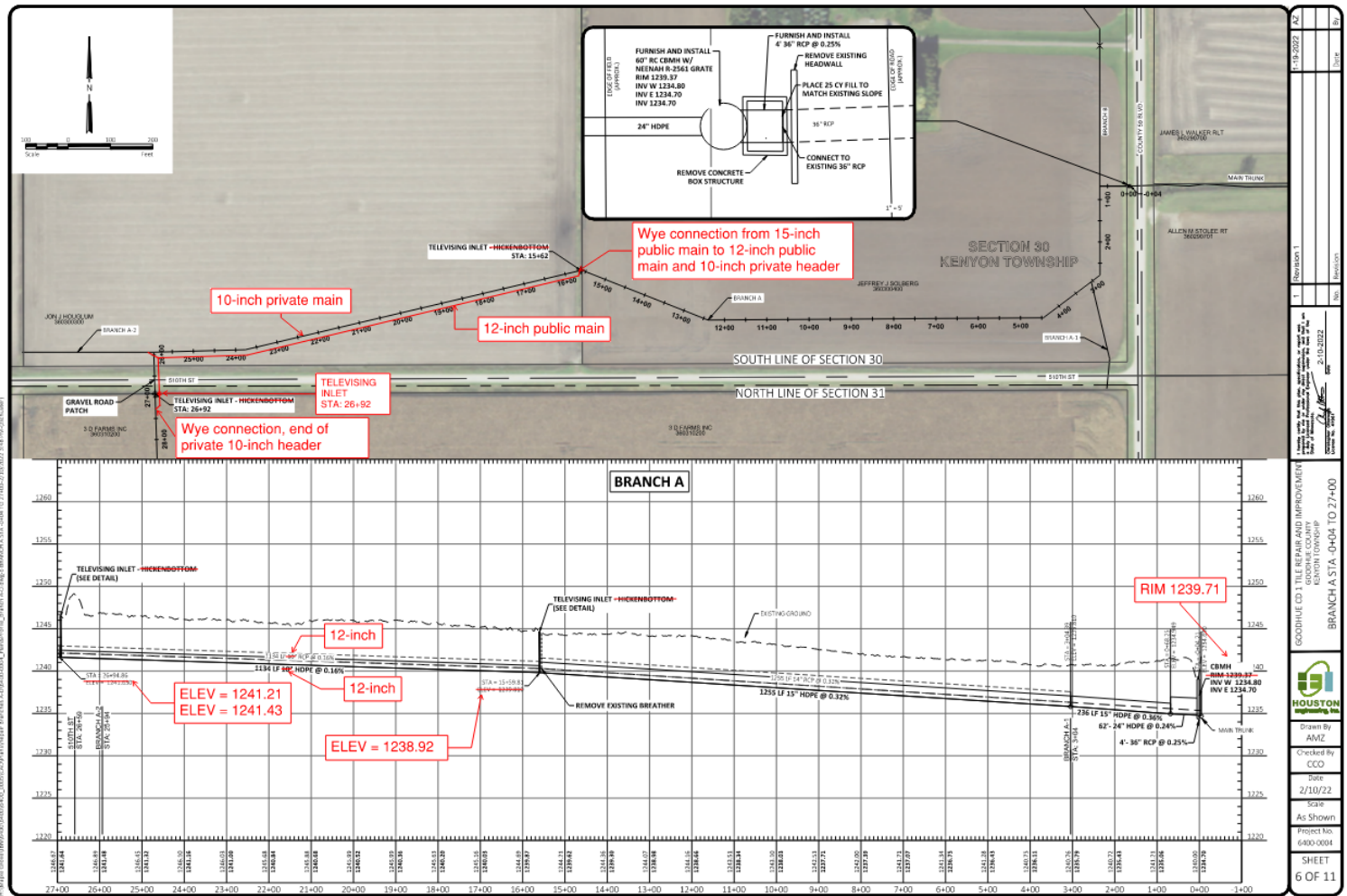
Relevant Documents – Establishment & Improvement

- As-built drawings (Rare!)
- As-designed profile drawings
- As-designed cut depths

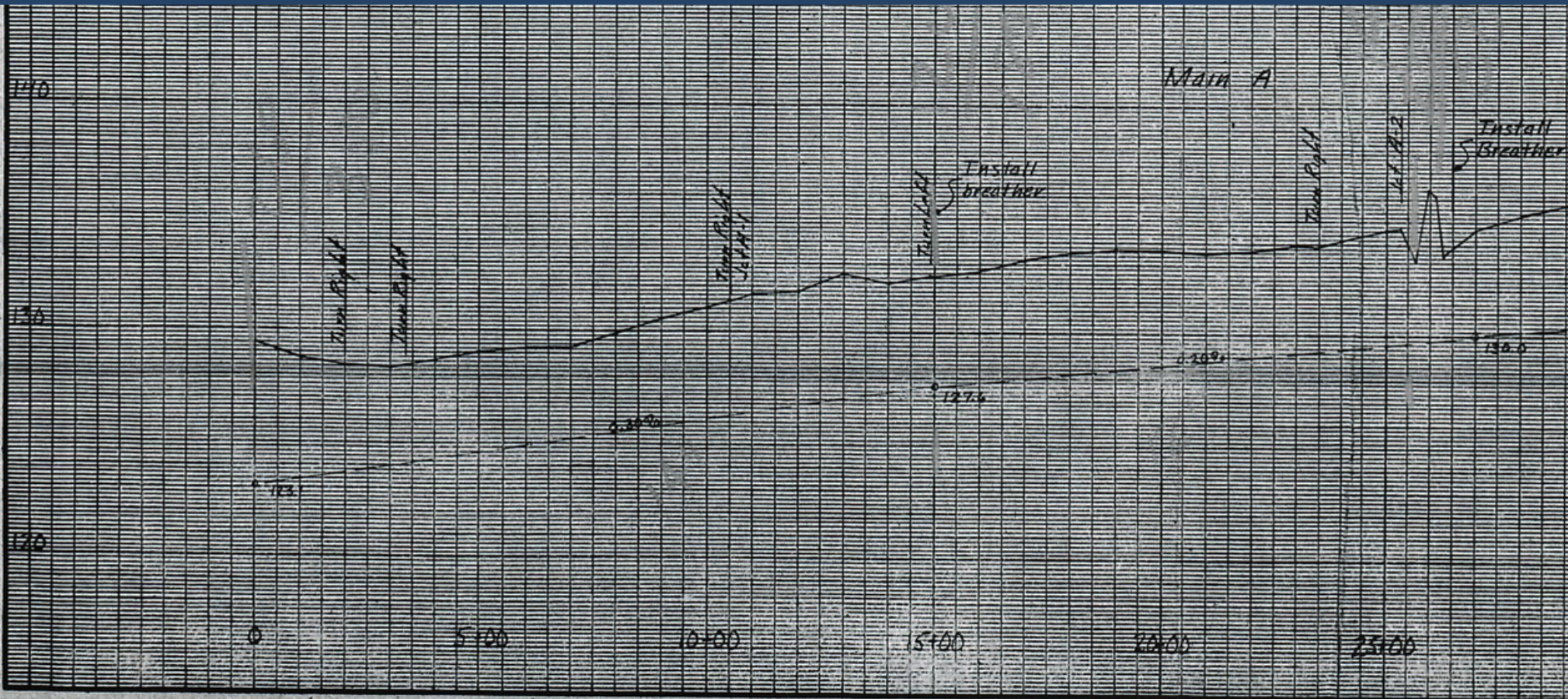
Relevant Documents – Other 103E Actions

- Repairs
- Inspection Reports
- Realignment/Impoundment/Abandonment

Example Relevant Documents – As-Builts



Example Relevant Documents – Historic Profile



Example Relevant Documents – Cut Depths

No. 2562 Engineer's Report in Ditch Proceedings.

For Sale by Miller-Davis Printing Co., Mfg. Stationers, Minneapolis.

EXHIBIT 2 OF ENGINEER'S REPORT IN DITCH PROCEEDINGS.

Showing Estimated Depth of Cut, Width, No. of Cubic Yards Removed and Cost of Same, in Main Ditch No. 24

SECTION	(1) DEPTH OF CUT	(2) WIDTH OF CUT AT BOTTOM	(3) WIDTH OF CUT AT TOP	(4) NO. OF CUBIC YARDS TO BE REMOVED	(5) Estimated Cost Per Cubic Yard:		(6) Character of Other Expenses, Including Preliminary Expenses And Expense of Inspecting Work Until Completed With Total Per Section	(7) Total Estimated Cost per Section	
					\$	CTS.		\$	CTS.
Between Stake No. 0	3.20 ft	1.5 ft	7.90 ft			0 15			
and Stake No. 1	1.92 "	"	5.34 "	38.50		"			5 77
Between Stake No. 2	1.37 "	"	4.24 "	19.26		"			2 89
and Stake No. 3	1.32 "	"	4.14 "	14.26		"			2 14
Between Stake No. 4	1.07 "	"	3.64 "	11.85		"			1 78
and Stake No. 5	1.22 "	"	3.94 "	11.29		"			1 69
Between Stake No. 6	1.37 "	"	4.24 "	13.34		"			2 00
and Stake No. 7	1.65 "	"	4.80 "	16.84		"			2 53
Between Stake No. 8	1.60 "	"	4.70 "	18.73		"			2 81
and Stake No. 9	1.55 "	"	4.60 "	17.86		"			2 68
Between Stake No. 10	1.50 "	"	4.50 "	17.18		"			2 58
and Stake No. 11	2.20 "	"	5.90 "	22.96		"			3 44
Between Stake No. 12	2.15 "	"	5.80 "	29.73		"			4 46
and Stake No. 13	2.00 "	"	5.50 "	27.38		"			4 11
Between Stake No. 14	2.60 "	"	6.70 "	32.37		"	A bridge or culvert	40 00	4 85
and Stake No. 15	2.44 "	"	6.38 "	37.52		"			5 63
Between Stake No. 16	2.24 "	"	5.98 "	33.31		"			4 99
and Stake No. 17	2.44 "	"	6.38 "	33.31		"			4 99
Between Stake No. 18	3.44 "	"	8.38 "	48.36		"			7 25
and Stake No.				444.05				40 00	6 6 60

Total Estimated Cost of Whole Work, \$

WD
RSHED DISTRICT

Example Relevant Documents – Other

RESOLUTION 2006-10

RICE CREEK WATERSHED DISTRICT
BOARD OF MANAGERS

FINDINGS and ORDER DIRECTING PARTIAL ABANDONMENT
OF ANOKA COUNTY DITCH 55
WITHIN the CITY of CENTERVILLE

Manager Leroux offered the following Resolution and moved its adoption,
seconded by Manager Hake.

FINDINGS

1. The Rice Creek Watershed District is the drainage authority for the Anoka County Ditch 55 (ACD 55) system.

2. On May 2, 2006, in conjunction with work under RCWD Permit 06-052, the Anoka County Transportation Department ("Petitioner") filed with the RCWD a petition to abandon that portion of ACD 55 from the northern boundary of CSAH 14 (Main Street) south a distance of 760 feet, more or less, to the northern terminus of the portion of ACD 55 to be realigned by the City of Centerville pursuant to RCWD

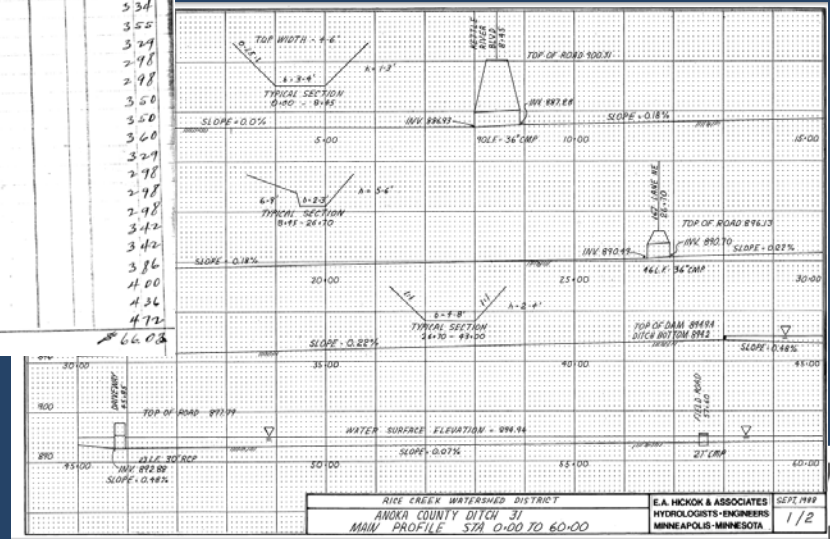
Between Stake No. 6	2.6	
and Stake No. 7	2.9	
Between Stake No. 8	2.7	
and Stake No. 9	2.8	
Between Stake No. 10	2.6	
and Stake No. 11	2.5	
Between Stake No. 12	2.7	
and Stake No. 13	2.5	
Between Stake No. 14	2.9	
and Stake No. 15	2.5	
Between Stake No. 16	2.9	
and Stake No. 17	2.7	
Between Stake No. 18	2.9	
and Stake No. 19	2.8	

Main Street 50'

ENGINEER'S REPORT IN DITCH PROCEEDINGS

Cubic Yards Removed and Cost of Same, in *Anoka County* Ditch No. *31*

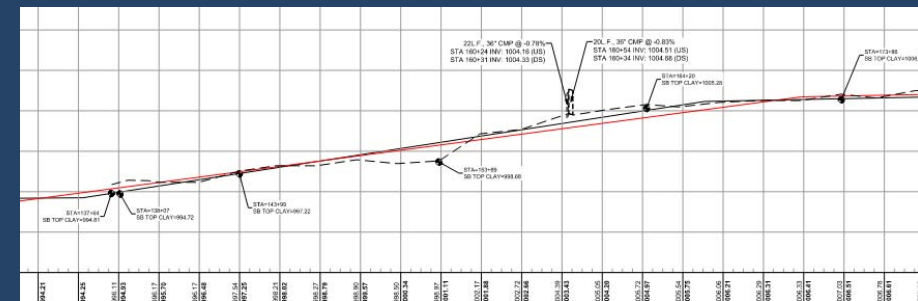
CUT OR FILL	(3) WIDTH OF CUT AT TOP	(4) NO. OF OTHER YARDS TO BE REMOVED		(5) ESTIMATED COST PER CUBIC YARD	(6) CHARACTER OF OTHER EXPOSURE, INCLUDING PRELIMINARY EXPENSES AND REPAIRS OF EXISTING WORKS (LIST OVERLAPPING WITH TOTAL FOR SECTION)	(7) ESTIMATED COST PER CUBIC YARD
		On 415' to 440'	On 440' to 500'			
	7.0	12.6	27.3	12		328
	7.0	14.1	27.8			534
	7.2	14.8	24.6			555
	7.4	19.6	27.4			529
	7.0	19.6	24.8			298
	7.2	19.6	24.8			350
	7.8	20.4	29.2			350
	7.4	20.4	29.2			360
	7.6	19.6	30.0			329
	7.2	19.6	27.1			298
	7.0	19.6	24.8			298
	7.4	19.6	24.8			298
	7.0	19.6	24.8			342
	7.8	18.5	28.5			342
	7.0	18.5	28.5			386
	7.8	14.8	32.2			100
	7.4	16.3	35.3			436
	7.8	13.3	36.3			472
	7.6	13.3	31.3			66.03
550.0						



General Process for Determining ACSIC Profile

5. Compare boring elevations to historic profile*
 - Datum Conversion: Difference between historic plan datum/benchmark (unknown) and sea level
 - Initial guess = average difference between boring and historic profile elevations
6. Plot adjusted as-designed profile using datum conversion

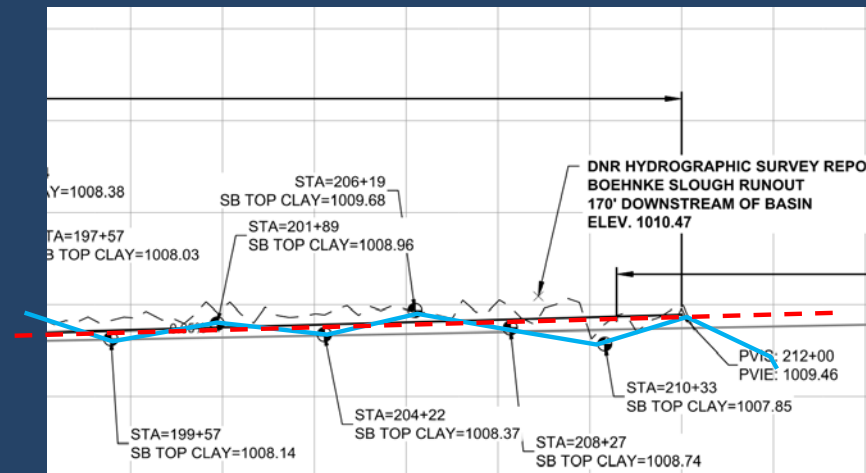
Branch	Historic STA	Historic Elevation	Probe Elevation	Difference
CD4	0+00	N.A.	N.A.	N.A.
CD4	5+00	96.8	N.A.	N.A.
CD4	10+00	96.6	1151.22	1054.62
CD4	15+00	96.4	1152.94	1056.55
CD4	20+00	96.2	1153.26	1057.06
CD4	25+00	96	1152.22	1056.23
CD4	30+00	95.8	1151.35	1055.54
CD4	35+00	95.6	1150.83	1055.22
CD4	40+00	95.4	1149.96	1054.56
CD4	45+00	95.2	1149.58	1054.37
CD4	50+00	95	1148.71	1053.68



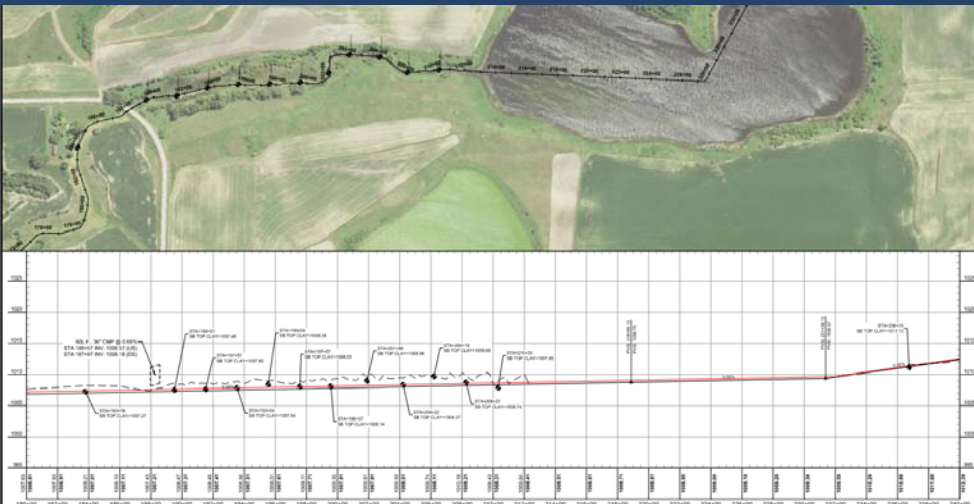
*If one exists

General Process for Determining ACSIC Profile

7. Check for correlation between adjusted as-design profile and soil borings
 - A. Good correlation throughout*
 - Proceed to Step 8
 - B. Good correlation on portion
 - Recompute datum conversion on smaller segment
 - C. Locations of poor correlation (or no design profile)
 - Create a “trendline” (best fit) through borings
 - Not “dot-to-dot”generalize

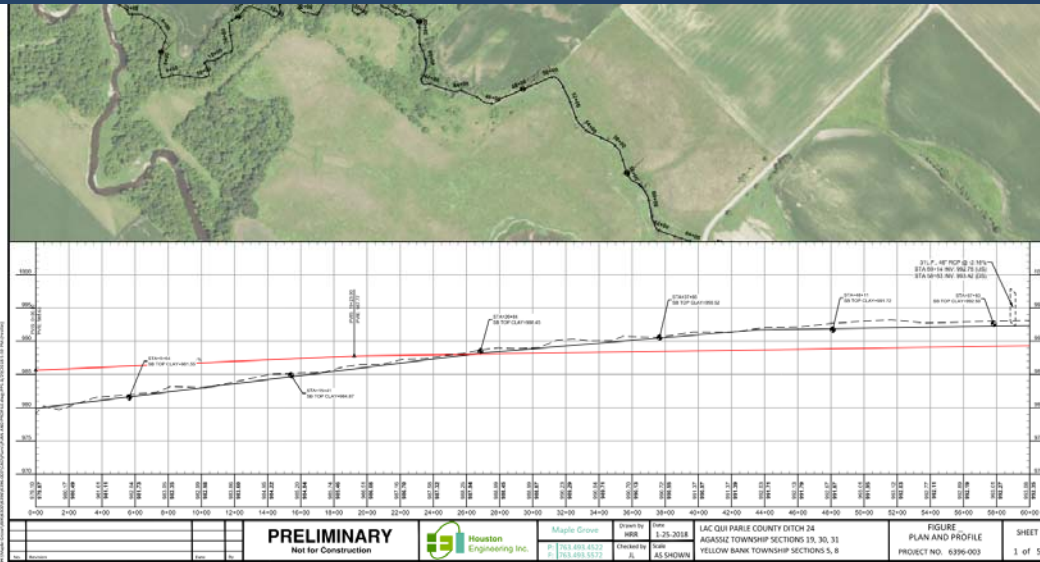


Do the As-Designed Profile “Fit”?



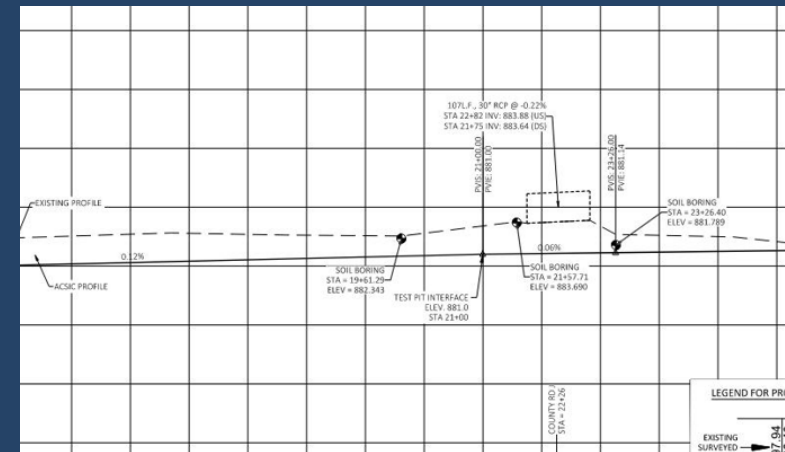
Good Correlation

Poor Correlation



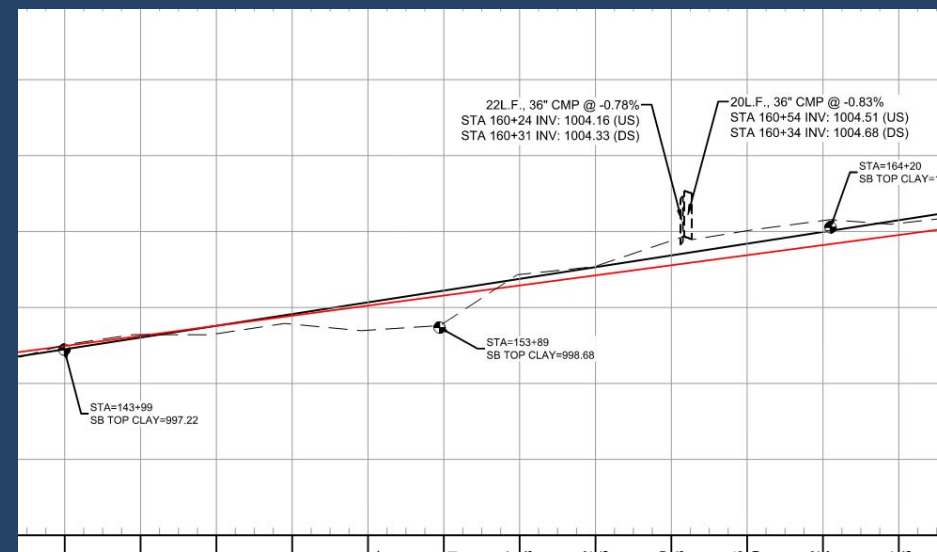
General Process for Determining ACSIC Profile

8. Consider other collected data
9. Identify “outliers” (borings substantially above/below profile and “breaks in logic” (e.g. negative slope, elevation not matching at branch intersections)
 - Can these be reconciled?
 - If not, obtain additional data:
 - Test pits
 - Additional borings
 - Revisiting documents



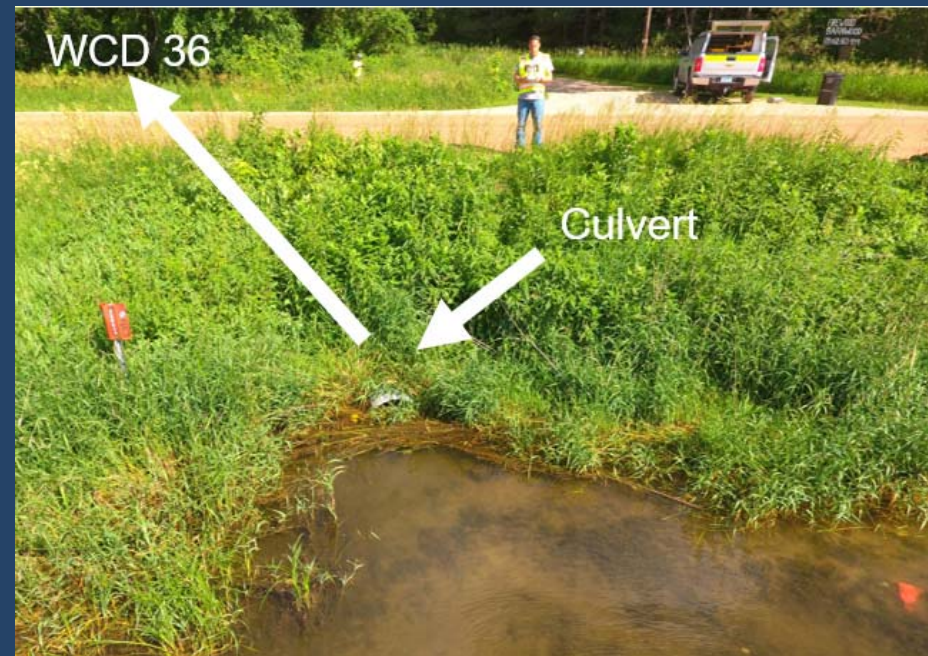
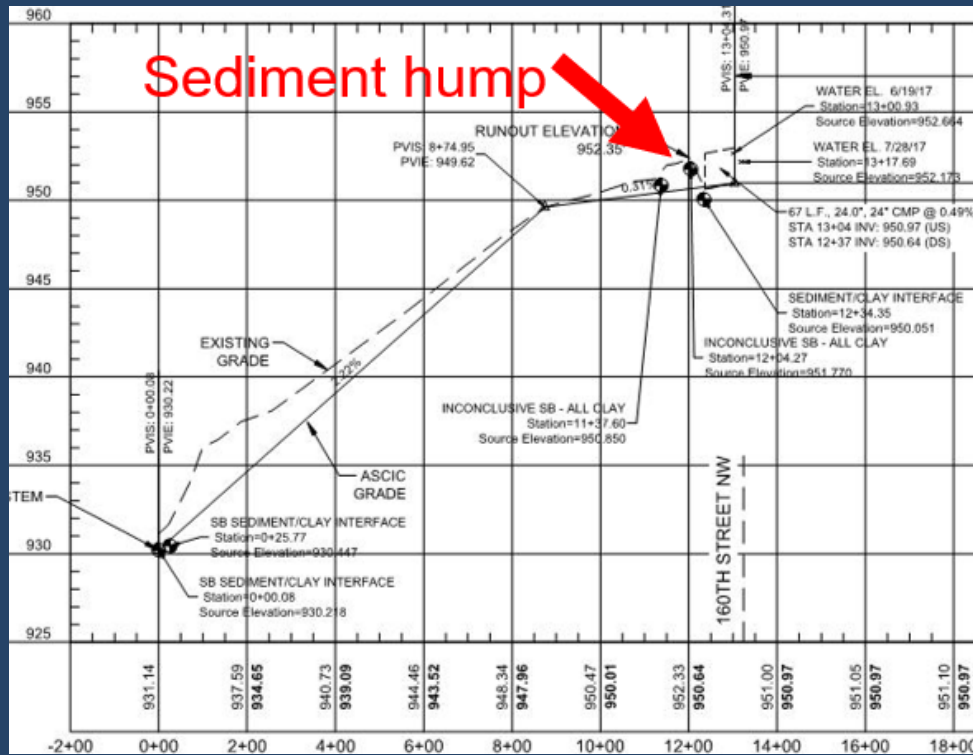
Why a Single Boring/Probe/Test Pit May Not Be Reflective of ACSIC

- Not in center of channel
- Bank sloughing
- Scour
- Over-excavation
- Settlement/subsidence
- Precision/accuracy
- ACSIC didn't reach "hardpan"



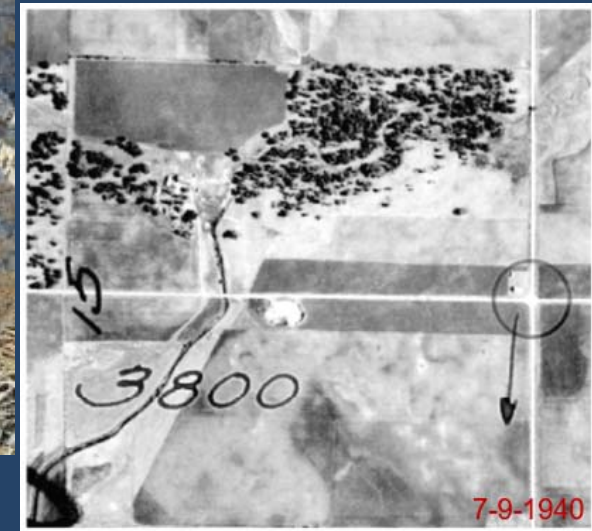
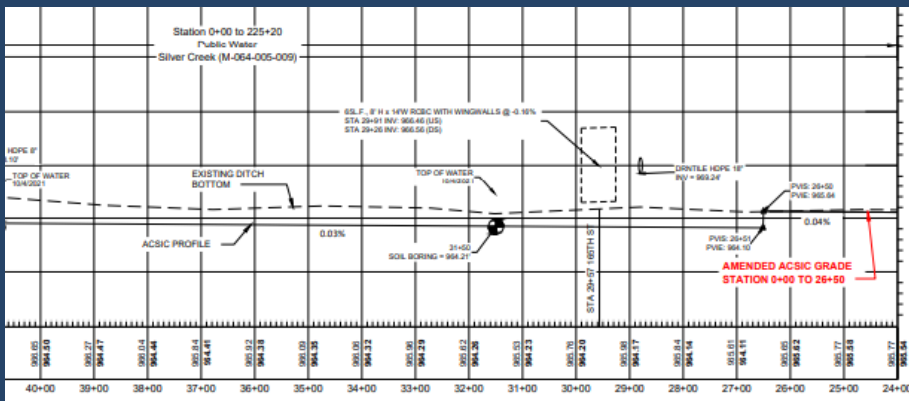
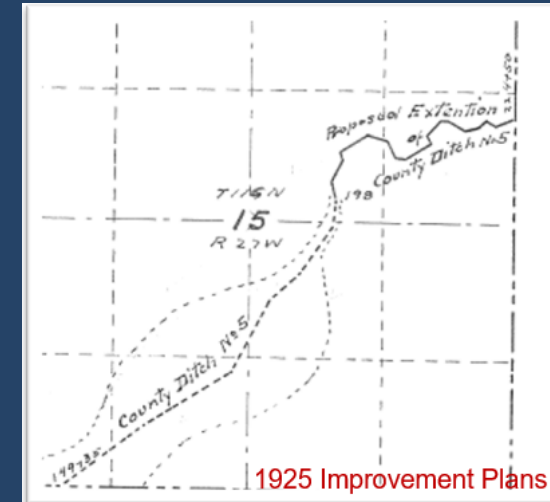
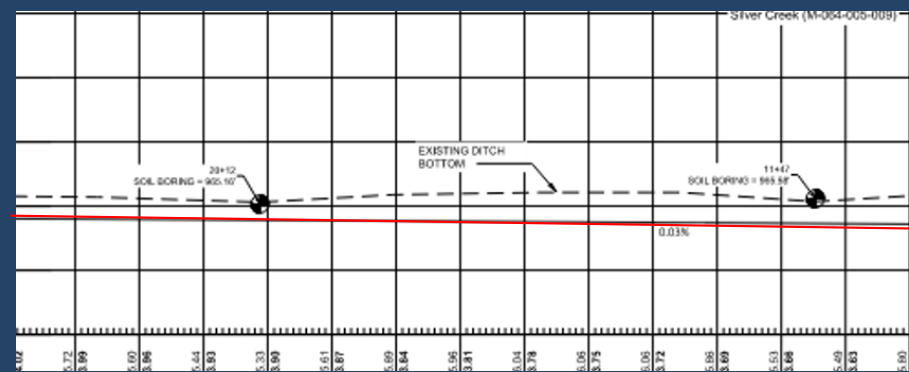
Example - Outlier

Wright County Ditch 36 – channel sloughing



Example – Break in Logic

McLeod County Ditch 5 – improvement



7-9-1940

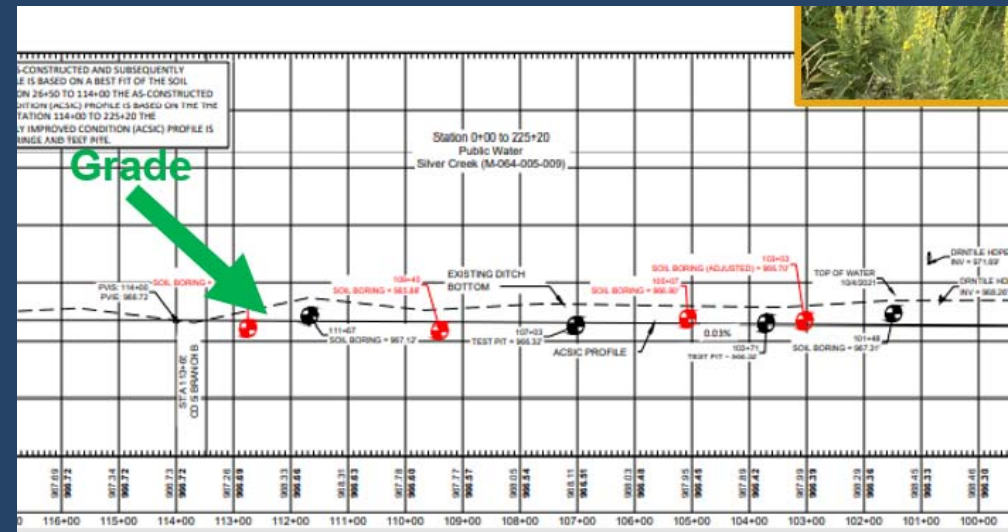
General Process for Determining ACSIC Profile

10. Internal (HEI) review*

11. External review*

- Drainage authority staff
- DNR
- Public
- Drainage authority board

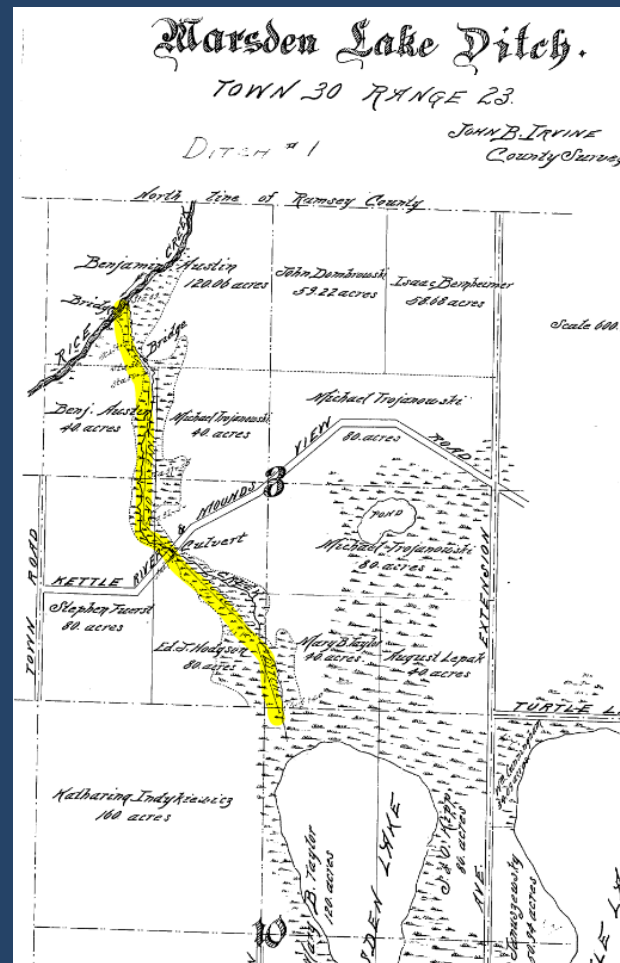
**Any unresolved concerns require revisiting prior steps*



How This Methodology is Used

Test Case: RCD 1

1. Alignment
2. Survey
3. Mapping
4. Historic Docs
5. Compare Elevations
6. Plot as-designed profile
7. Check Correlation
8. Consider other data
9. Identify Outliers
10. Internal review
11. External review



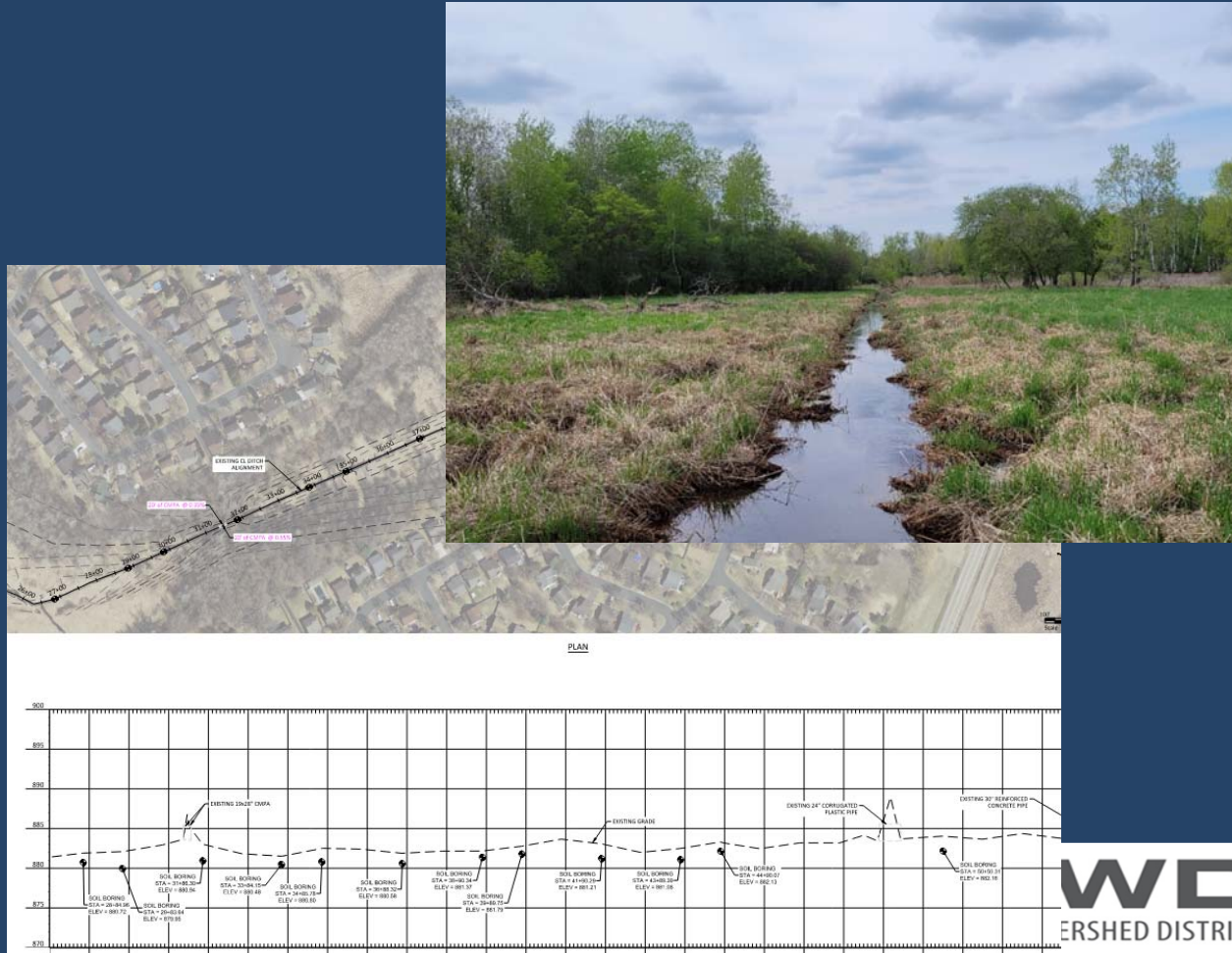
1938 Photo



How This Methodology is Used

Test Case: RCD 1

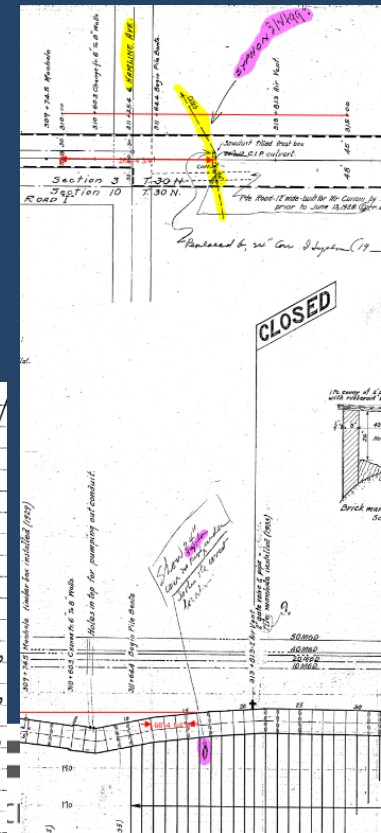
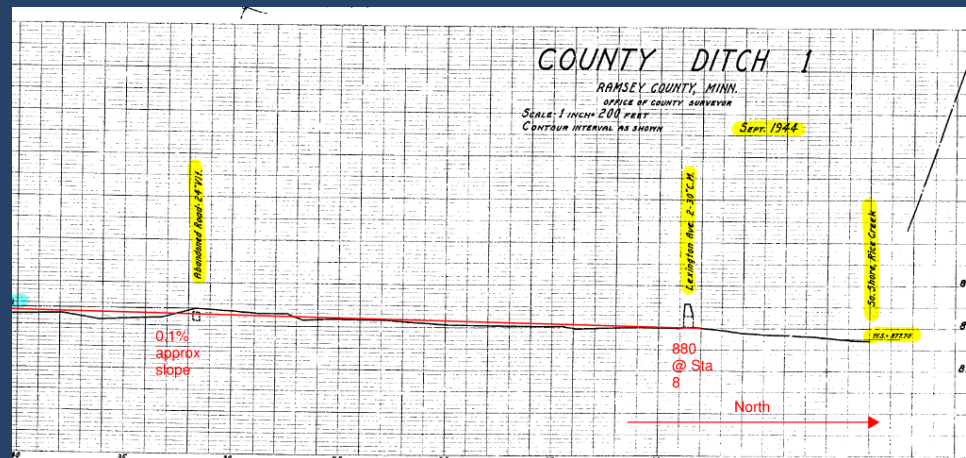
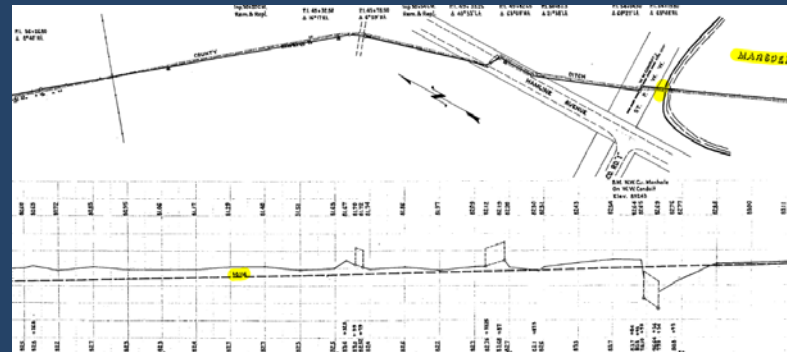
1. *Alignment*
2. **Survey**
3. **Mapping**
4. *Historic Docs*
5. *Compare Elevations*
6. *Plot as-designed profile*
7. *Check Correlation*
8. *Consider other data*
9. *Identify Outliers*
10. *Internal review*
11. *External review*



How This Methodology is Used

Test Case: RCD 1

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How This Methodology is Used

Test Case: RCD 1

1. *Alignment*

2. *Survey*

3. *Mapping*

4. *Historic Docs*

5. **Compare Elevations**

6. **Plot as-designed profile**

7. **Check Correlation**

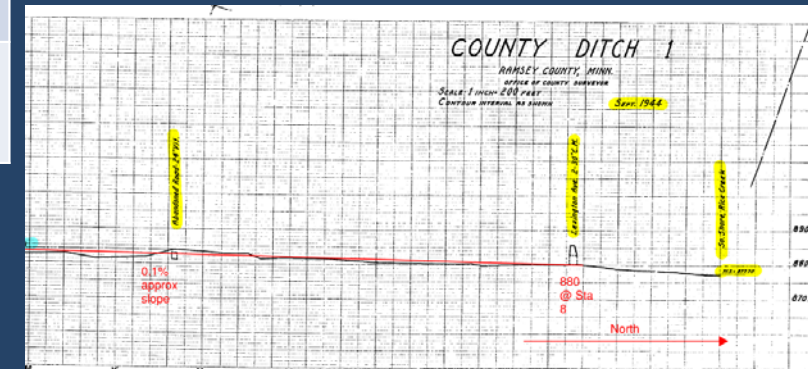
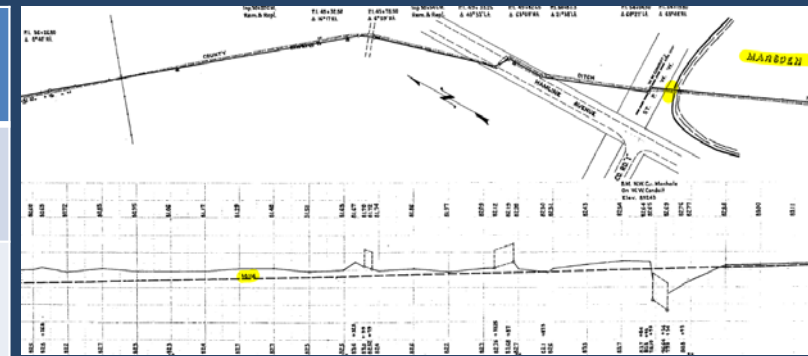
8. *Consider other data*

9. *Identify Outliers*

10. *Internal review*

11. *External review*

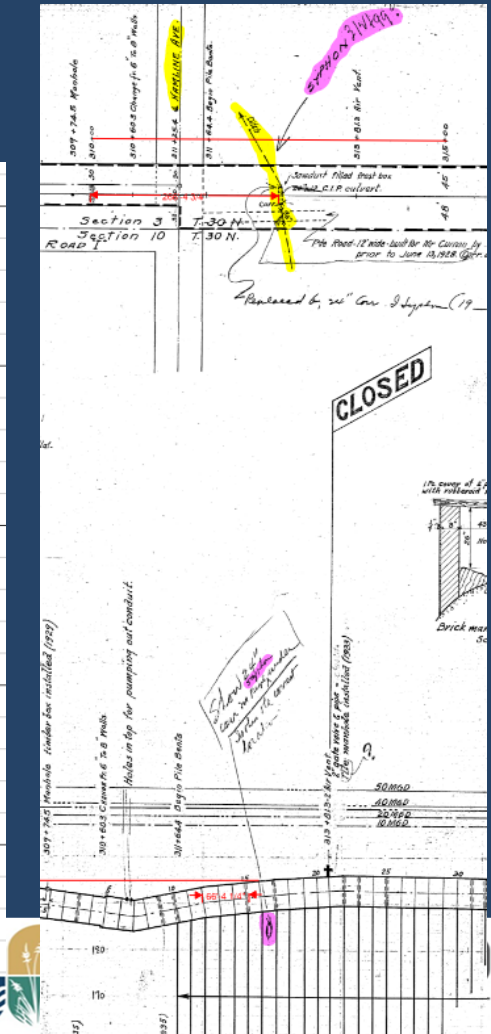
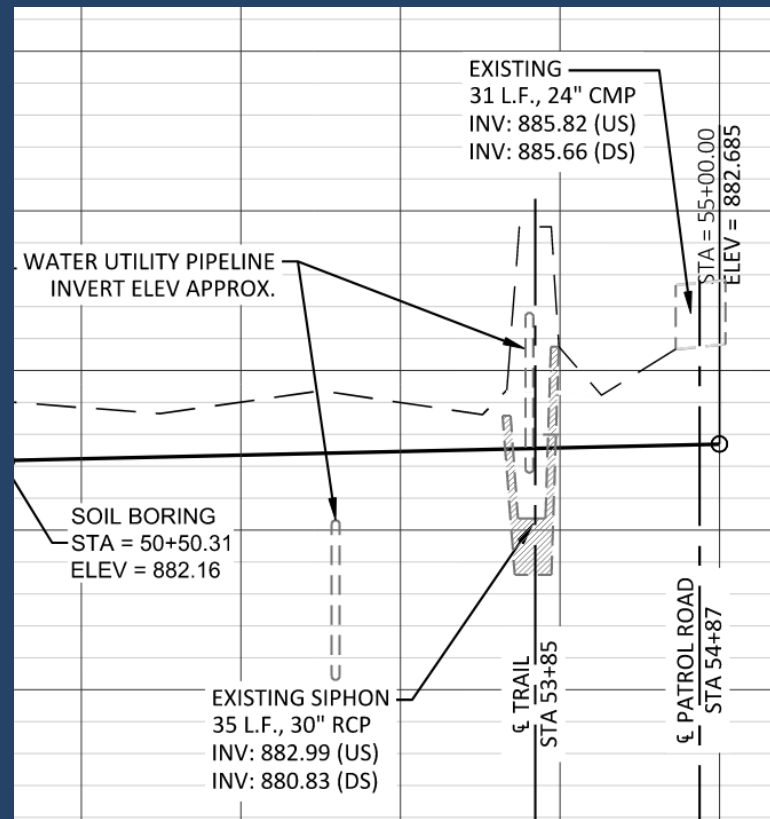
Source	Grade
1940 Repair	0.1% (est).
1985 Inspection Report	0.1%
Mid-80's repair	0.114%
2023 Borings	0.116%



How This Methodology is Used

Test Case: RCD 1

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11. **External review**



RCWD Example – Critical Data

System	Critical Data Components in ACSIC Determination
ACD 31	Test pits and as-designed profile
ARJD 1	Soil borings and as-designed profile
RCD 2	Ditch improvement profile and soil borings
RCD 8	Soil borings, test pits, and impoundment plan
RCD 4	Soil borings and culvert elevations

Workshop #1 Takeaways

- Every system is different. Weighing of evidence varies by type and extent of available data.
- Process needs to be as objective and repeatable as feasible.
- Engineer must use multiple lines of evidence. There will be conflicting data. Cannot rely on a single point of data.
- Evaluation Standard: What is the profile with the greatest weight of evidence
- Judgement calls by the Engineer are required

