Western Regional Survey Conference 2022

Measurement Documentation: *Field Notes*

Jerry Mahun, PLS
jerry.mahun@gmail.com
715-896-3178
jerrymahun.com

The Geoholics
Field note Fundamentals: How to Prepare them & What to Include

A. What

Written record of field:
- Measurements
- Conditions
- Equipment
- Personnel

} Error Sources

- Ancillary information
  - Sketches
  - Corrective notes
  - Description
  - Etc

A. What

Why written notes in the day of digital data collection?

- They're slow to compile
- Cumbersome in the field
- Survey process slows to a snail's pace
- Less efficient data collection
- Less data "mass"
- Penmanship is a lost art
- They take up a lot of storage space
- Etc

Lots of reasons/excuses

A. What

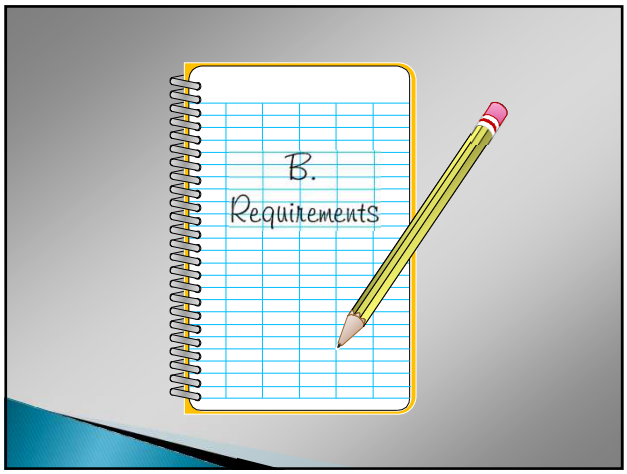
On the other hand…

- For new technician
  - Reinforces procedure
  - Measurement visualization
- More effective capture for some info types
  - Descriptions; sketches
  - Evidence recordation; signed parol statements
- Flexibility
  - Digital data collection may not accommodate special situations
- Permanent field operations record
  - Can last forever with simple care
  - Alterations more difficult to conceal

A. What

On the other hand…

- They are the original measurements and conditions
  - "Follow in the footsteps"
  - Quality assessment
- And…
  - No software compatibility issues



B. Requirements

Field notes should be stand-alone
- Minimal explanation necessary

Data might be used by third party.
- User should be able to understand
  - How the data was collected
  - By whom
  - Under what conditions
- To asses their quality

B. Requirements

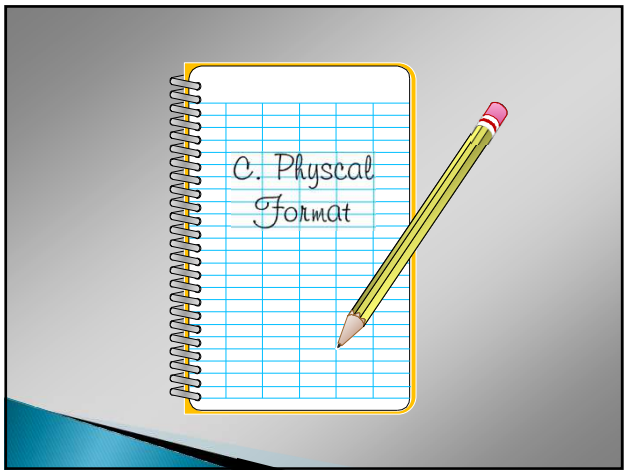
Field notes must be:

Complete: all measurement and support data included
- The good, the bad, and the ugly

Accurate: true record with no "filtering"

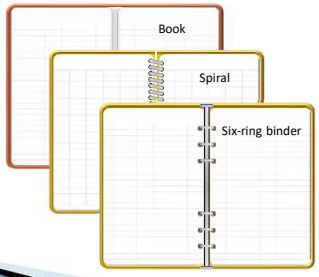
Understandable: for a knowledgeable user

Unaltered: data must not be obscured nor unjustifiably modified.



C. Physical Format

1. Field Book Types
   - Book Bound – hard & soft cover
   - Spiral bound – soft cover
   - Binder – hard & semi-hard cover

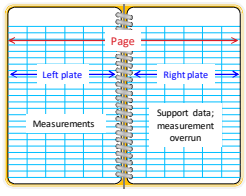


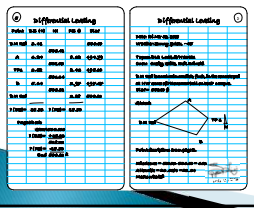
C. Physical Format

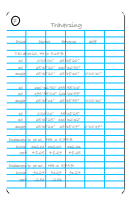
2. Page and Plate
   - Page: book opened flat

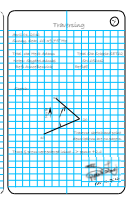
   Plates:
   - Left – measurements
   - Right – support data

   Page = Left plate + Right plate



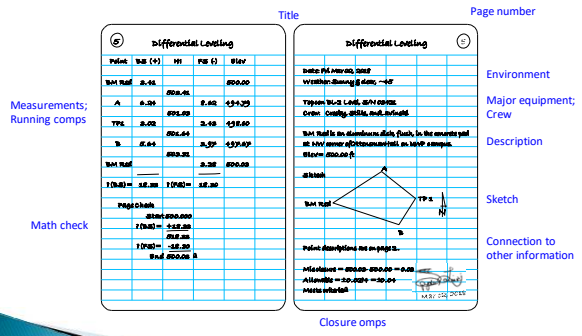






C. Physical Format

2. Page and Plate

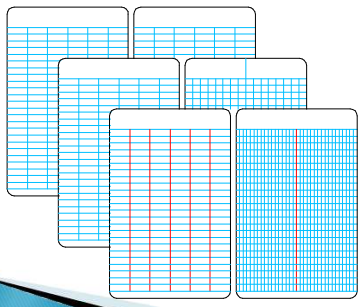


C. Physical Format

3. Plate Styles

Multiple variations depending on application.

Format flexibility.



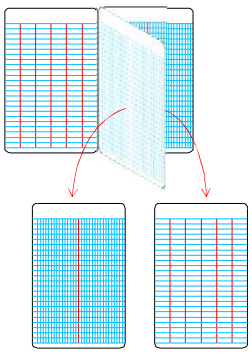
C. Physical Format

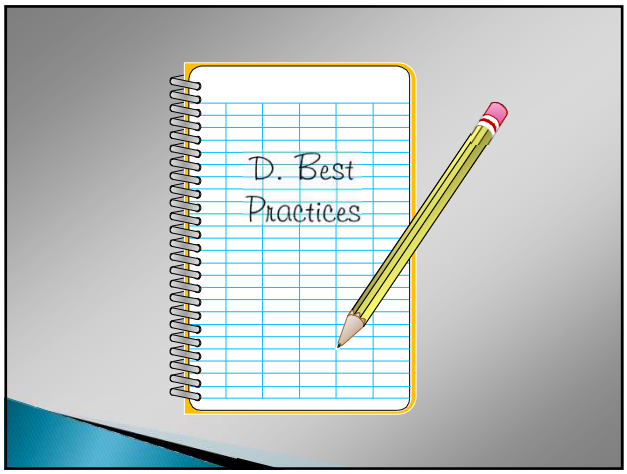
3. Plate Styles

Front and back of leaf can be different.

Bound book has uniform style throughout.

Binder book can have mixed styles.

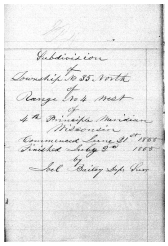


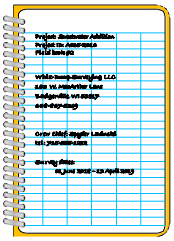


D. Best Practices

1. Field book Setup

   a. Title Page: Project or Job



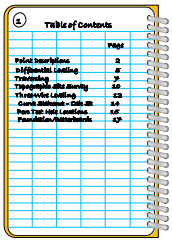


D. Best Practices

1. Field book Setup

   a. Title Page: Project or Job

   b. Table of Contents
      Page numbers of projects added as completed.



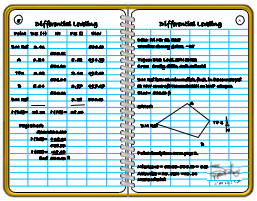
D. Best Practices

1. Field book Setup

   a. Title Page: Project or Job

   b. Table of Contents

   c. Use consistent page format
      Use format that ensures complete data capture.



D. Best Practices

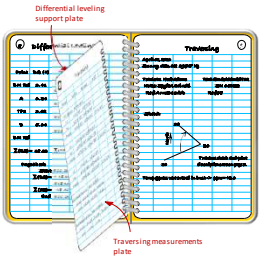
1. Field book Setup

   a. Title Page: Project or Job

   b. Table of Contents

   c. Use consistent page format

   d. Do not remove pages or plates
      Original data alteration.
      Left plate is back of previous right vice versa.

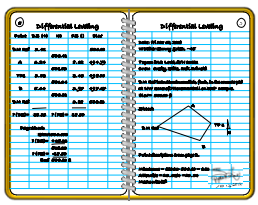


D. Best Practices

2. Taking Notes
   Small writing surface, lousy conditions, and sometimes it's ***cold***.

   a. Use pencil with hard sharp lead
      Paper has tighter bond – ink and pencil lead smears.
      4H generally good compromise.
        Use dry thumb smear test
      Mechanical pencil 0.5 mm

   b. Legibility
      Printed, not written.
      Slow & deliberate.

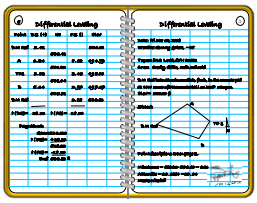


D. Best Practices

2. Taking Notes

c. Page and Plate Titles
- Identifies project
- Use for Table of Contents

d. Record immediately
- Write down each measurement, warts and all.
- Do not preselect what will be saved.

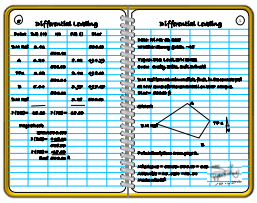


D. Best Practices

2. Taking Notes

e. Reasonable & Consistent Accuracy
- Reflect equipment resolution
- Do not imply unsupported accuracy.

- Do not degrade leaving out space holders.
  - 135°00'00" not 135°
  - 125.00 not 125
  - 0.51 not .51
- Review significant figures

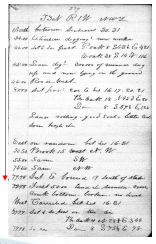


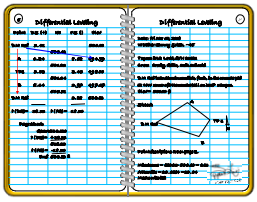
D. Best Practices

2. Taking Notes

f. Layout reflects measurement order
- Top-down, left-right

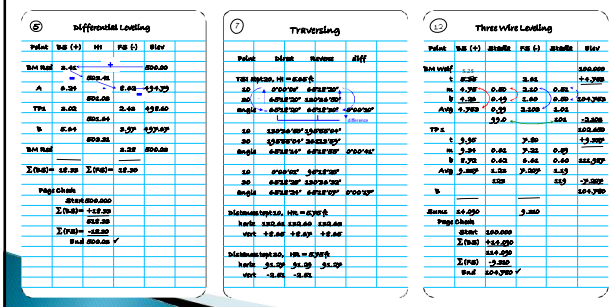
Systematic measurement and recording.





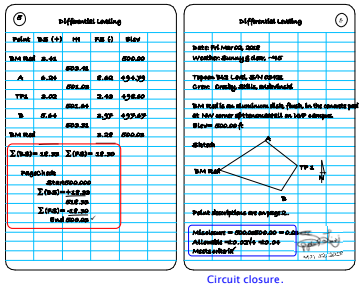
D. Best Practices

2. Taking Notes
   g. Running Calculations:
      identify or isolate errors
      check intermediate results



D. Best Practices

2. Taking Notes
   h. Math checks
      Usually performed at end of a page or project.

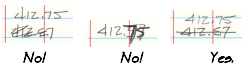


Page check: Verification for page comps.

Circuit closure.

D. Best Practices

2. Taking Notes
   i. Correcting recording mistakes
      Single-strike through incorrectly recorded value.



Not Not Yes

DO NOT ERASE!

Surveyor's field notes in pencil are generally admissible as evidence in court.

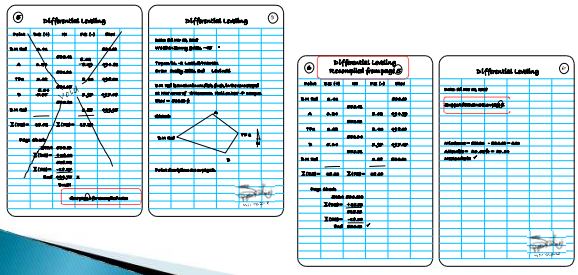
BUT

Data alteration can affect credibility of entire field book.

Tough habit to break.

D. Best Practices

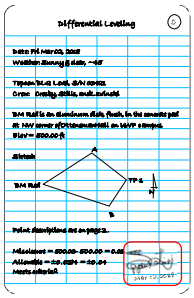
2. Taking Notes
   i. Correcting recording mistakes
      Multiple mistakes
         Void entire page
         Recompile on new page
         Each page should identify the other

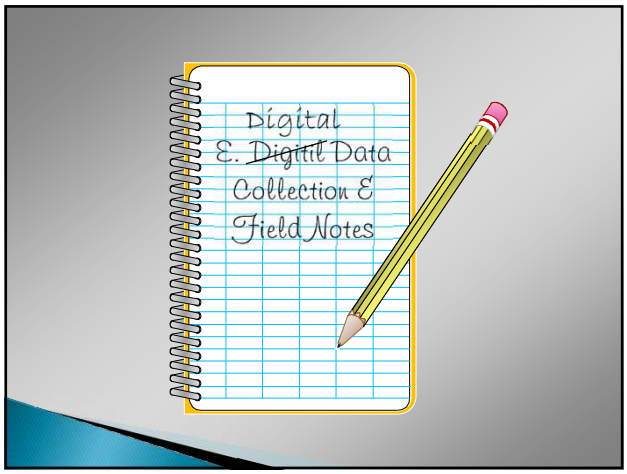


D. Best Practices

2. Taking Notes
   i. Sign and date
      Each page on completion.

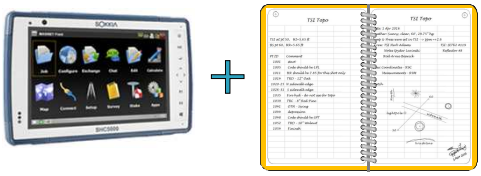
         Data completeness
         Data validity





E. Digital Data Collection & Field Notes

Augmentation not Replacement

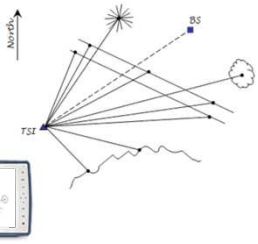


E. Digital Data Collection & Field Notes

Example: Topographic survey.

Data collectors simplify:
- field setup
- measurement
- reductions

Once set up, operator
- point
- press a button
- enter a feature code.



Data collector does the rest, even creating the map.

E. Digital Data Collection & Field Notes

Example: Topographic survey.

~~Two~~ Three common errors:
- Using an incorrect feature code
- Instrument setup is disturbed
- Wrong control points

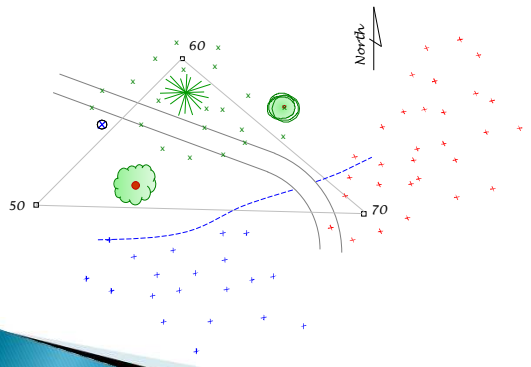
Editing a feature code may or may not be simple.

Disturbed instrument set up and
Using wrong control points

} May not be apparent until combined with other data later.

E. Digital Data Collection & Field Notes

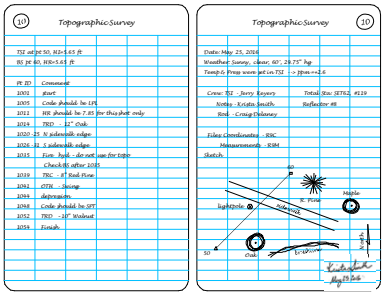
Example: Topographic survey.



E. Digital Data Collection & Field Notes

Example: Topographic survey.

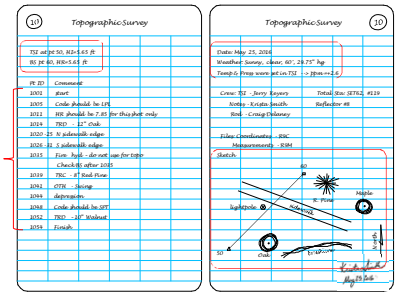
Augmenting field notes

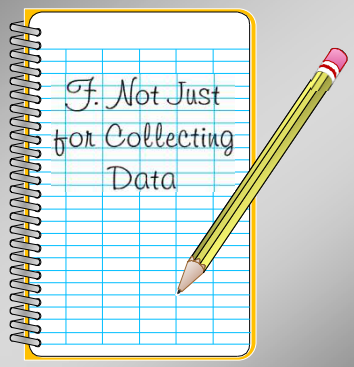


E. Digital Data Collection & Field Notes

Example: Topographic survey.

Augmenting field notes





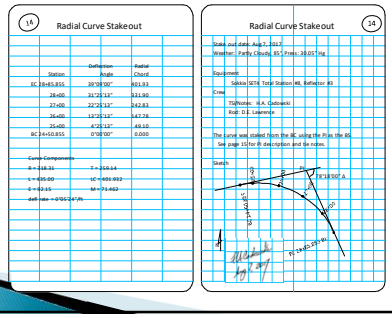
F. Not Just for Collecting Data

Traditional infrastructure stake out operations

Still common in construction related projects.

Example: Curve Stakeout

Why is the curve table upside down?



14 Radial Curve Stakeout

Station	Deflection Angle	Radial Chord
EC 28+85.855	39°09'00"	401.93
28+00	31°25'13"	331.90
27+00	22°25'13"	242.83
26+00	13°25'13"	147.78
25+00	4°25'13"	49.10
BC 24+50.855	0°00'00"	0.000

Curve Components

R = 218.31 T = 259.14

L = 435.00 LC = 401.932

S = 62.15 M = 71.462

defl rate = 0°05'24"/ft

Radial Curve Stakeout 14

Stake out date: Aug 7, 2017

Weather: Partly Cloudy, 85°, Press: 30.05" Hg

Equipment

Sokkia SET4 Total Station #8, Reflector #3

Crew

TSchooter: H.A. Cadowski

Rod: D.L. Lawrence

The curve was stated from the BC using the PI as the BS

See page 15 for PI description and tie notes.

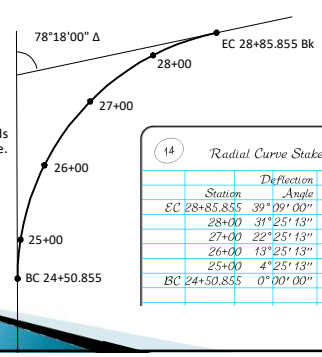
Sketch

F. Not Just for Collecting Data

Traditional infrastructure stake out operations

Example: Curve Stakeout

Visually corresponds to the curve.



14 *Radial Curve Stakeout*

Station	Deflection Angle	Radial Chord
EC 28+85.855	39°09'00"	401.93
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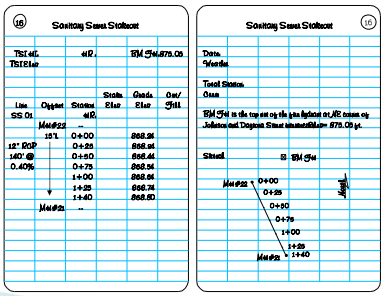
BC 24+50.855	0°00'00"	0.000

F. Not Just for Collecting Data

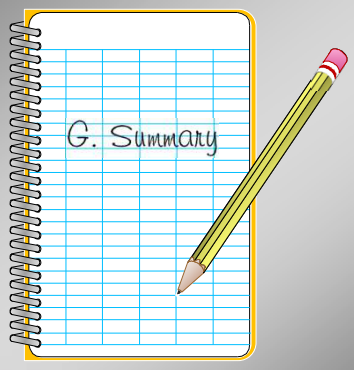
Traditional infrastructure stake out operations

Example: Sanitary Sewer Stakeout

Part of the field notes are precomputed, part completed in the field.



G. Summary



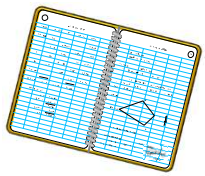
G. Summary

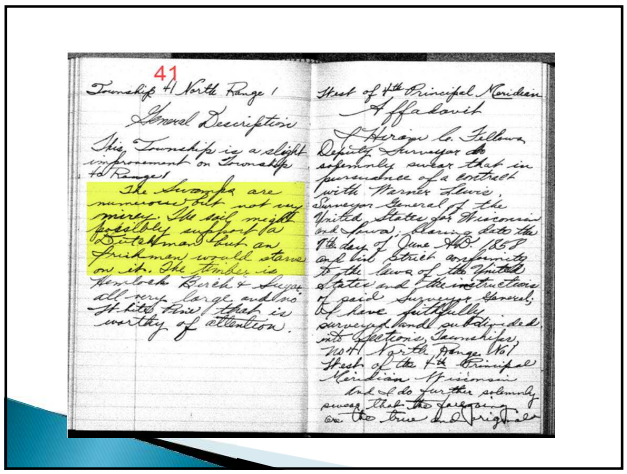
Although prevalent data collection and staking technology is digital, there is still a role for field notes.

Field notes are:

- highly adaptable to different situations.
- compatible with any software, hardware, and instrument platform.

Good augmentation tools for digital collectors.




41

Township 41 North Range 1

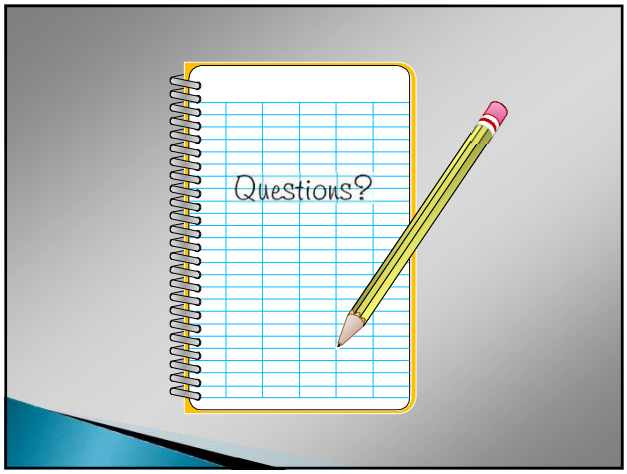
General Description

This Township is a slight improvement on Township 40 Range 1

The Swamps are numerous but not very mirey. The soil might possibly support a Dutchman but an Irishman would starve on it. The timber is Hemlock Birch & Sugar all very large and no White Pine that is worthy of attention.

West of 4th Principal Meridian

Affadavit

I Hiram C. Fellows Deputy Surveyor do solemnly swear that in pursuance of a contract with Warner Lewis, Surveyor General of the United States for Wisconsin and Iowa, bearing date the 9th day of June A.D. 1858 and in strict conformity to the laws of the United States and the instructions of said Surveyor General; I have faithfully surveyed and subdivided into Sections, Township No 41 North Range No 1 West of the 4th Principal Meridian Wisconsin

And I do further solemnly swear that the foregoing are the true and original