



DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
1849 C Street NW, LS 1000
Washington, D.C. 20240
www.blm.gov

IN REPLY REFER TO:
9683 (350)P
Survey Manual Notes - 1

November 15, 2002

Memorandum

To: Bureau of Land Management Cadastral Surveyors

From: Bob Dahl

Subject: Next Edition of the Manual of Surveying Instructions

Please review the attachment and provide me with any thing else you believe should be included. The document is a compilation of the input from the State Offices when asked by the Cadastral Survey Survey Manual Committee to identify what is obsolete, incorrect or missing in the 1973 Manual. The Committee did not filter the input received. The Committee did not render any opinion regarding this input. I think this information will help identify areas of the current edition of the Manual that should be looked at. Later you will have an opportunity to revise and extend your remarks. But for now, I am looking for brief notations.

One of the things I am doing is attempting to identify what was in the 1973 edition which will not be in the next edition, what was not in the 1973 edition that should be in the next edition, and what is in the 1973 edition and should be in the next edition but needs to be changed. I think the State Offices have done a good job identifying portions of the Manual in these categories, however I wanted you all to have one more crack at it. I am of the opinion the majority of the content in the 1973 edition will be in the next edition.

Process

In addition, I want to take this opportunity to communicate with you about the production of the next edition of the Manual of Instructions for the Survey of the Public Lands of the United States. It is still very early in the process and it is my intent to try and balance progress with providing you and others with information about the stages of the job. I

will be striving for a balance between my understanding, gathering, compiling, and formulating information, with your interest and input.

Your contributions will make the next edition the best it can be. However, I will be unable to both work on this job, and absorb your comments in areas I am at present not focusing on. Therefore, I ask for your understanding. It is my intent to make you aware of the specific issues I am working on, so you can provide timely remarks. I will keep you informed of my current focus and you can provide your contribution at the most effective moment.

For Your Information

Here are some items on which I am also currently focusing:

- 1) Look for office space compatible with this job. The office will be in the Washington, D.C. area.
- 2) Develop an outline of each step, with names of key players, through the distribution of the next edition. I am trying to prevent having to back track because something/someone was missed at the beginning. I would welcome an outline for the whole or portion(s) of the job from you at this time.
- 3) Communicate with WO Directives and Public Affairs, the Bureau Printer, and Printed Materials Distribution Services to determine each of their roles.
- 4) Inform myself of the role, of the U.S. Government Printing Office in this process.
- 5) Communicate with American Congress on Surveying and Mapping Editors of the Surveying and Land Information Science Journal and Bulletin, and with the ACSM Conference Managers. These publications probably will have some information regarding this BLM effort. The Conference could be the time and place for a presentation regarding the next edition of the Survey Manual.
- 6) For a general summary of this next Manual edition process I sent an e-mail to all of you on October 29, 2002: Subject - Regarding Outreach for New Edition of the DOI/BLM Manual of Surveying Instructions.

If you have something to contribute please do so by e-mail directly to me. My staff consists of me, myself and I. Please give consideration to the fact that my staff has demonstrated severe limitations when asked to recall documents and ideas sent further back in time than just in the recent past. I hope to provide you soon with a more formalized system to track process and organize input.

Attachment

November 15, 2002 - Obsolete, Incorrect and Missing: 1973 Edition of the Survey Manual
Cadastral Survey Survey Manual Committee
Compilation of feedback from State Offices

October 29, 1998

Rule 1- Use and apply common sense at all times.

Obsolete

Chapter 1, Section:

1-8 Manual Supplements: Obsolete, may need to be less specific in order to remain relevant i.e. new supplements or deletions make section incorrect.

Clarify Manual Supplement status. Recommend they be deleted unless those supplements are being re-compiled.

Chapter 2:

Is obsolete due to advances in technology, but undoubtedly technically correct. Could be eliminated for the most part in a rewrite, but does not of itself make a rewrite necessary.

(all) Methods of Survey: Obsolete, entire chapter needs to be evaluated. Chapter is dated by technology, may be more appropriate as historical review of methods used rather than on current & likely to be outdated techniques in use today.

Section:

2-1 to 73 Eliminate entire section. These principles can be found in pertinent surveying texts. Replace with general statement that accepted practices of the industry should be applied.

2-2 Obsolete - The Steel Tape is no longer the commonly accepted tool of measurement, even though it is still used. Update this section to include EDM and GPS.

2-3 Obsolete - Drop stadia section all together.

2-4 Obsolete - Drop subtense bar section.

2-6 Obsolete - Refer to historical use of Triangulation and its general demise because of technology.

- 2-8 Obsolete/Missing - Give history of photogrammetry use by BLM but eliminate detail of 2-8 through 2-16. History of Photogrammetry with meanders in Alaska and water boundary research would be helpful.

- 2-18 Obsolete - No longer require the notation of Magnetic Declination in Field Notes and Plat of new survey work.

- 2-20 to 73 Obsolete - Drop detail on celestial observations. Refer to Technical Bulletin by CA White and geodesy treatises on large scale Cadastral Surveys. Reference software available but stress importance of knowing basics.

- 2-74 to 81 Retain as is.

- 2-82 & 83 Rewrite section to reflect acceptance and use of current and possible future versions of state plane and geodetic models.

Chapter 3, Section:

- 3-1 to 125 Retain as is.

- 3-46 Near Obsolete - See comments at 3-124.
Tables of Latitude & Departure and Closing Error: Obsolete in use of tables of latitude and departures and 1/1280 closure.

- 3-50 and 3-52 Near Obsolete - Is blazing still necessary? If so shouldn't we be marking the line a little closer than within 50 links of the line? See 3-125.

- 3-124 Near Obsolete - Closure limits need to be defined in different terms. Ratio of error to length of perimeter is being replaced by positional error in modern survey calculations. The FGDC is addressing this issue as well.
Limits of Closure: obsolete, consider positional limits of individual points rather than "ratio of the length."

- 3-126 Summary of Objects to be Noted etc.: Obsolete, revise in context of relevant statutes, present technologies, and needs.

- 3-126 & 127 Modify to eliminate features that can be found on other products such as USGS quad sheets. Revisit requirements and purpose of original survey products.

Chapter 4, Section:

- 4-1 to 6 Retain as is.

- 4-82 Marks on Special Purpose Monuments: obsolete, revise & add geographic control monuments.

Chapter 5, Section:

5-1 to 8 Retain as is.

5-10 to 15 Retain as is.

5-17 Retain as is.

5-30 to 33 Retain as is.

5-37 to 40 & 42 Retain as is.

Chapter 6:

Resurveys: Obsolete, this chapter needs major revision or developed as a separate supplement to existing Manual. Resurveys constitute majority of PLSS workload of public & private surveyors. Past memoranda & selected case studies need to be incorporated. "Independent Resurvey" sections need to be carefully expounded upon based upon latest case law and experience. Add resurvey of resurveys, corrective dependent resurveys.

Sections:

6-1 to 26 Retain as is.

6-30 to 56 Retain as is.

Chapter 7, Section:

7-1 to 11 Retain as is.

7-13 to 45 Retain as is.

7-46 to 99 Special Surveys-Water Boundaries: Obsolete, needs revision to reflect current case law and BLM memoranda. Need to include case studies.

7-95 to 99 Retain as is.

7-100 to 104 Eliminate - no longer valid. Other sources are available in better detail than we can provide.

Chapter 8, Section:

8-12 Obsolete - Remove requirement for observing the magnetic declination. While important to know declination of older surveys this is no longer of significant value in new surveys.

8-15 Retain as is.

8-17 Delete.

8-19 to 21 Retain as is.

Chapter 9, Section:

9-1 Retain as is.

9-3 to 6 Retain as is.

9-8 Retain as is.

9-10 Eliminate - this doesn't need to be specified here. Refer to rule number 1.

9-11 Obsolete - Original plat size should be changed to 18x24 so original is the same size as the duplicate size requirements at ESO.

9-12 Eliminate.

9-13 to 23 Retain as is.

9-24 to 55 Eliminate. Retain examples of lettering styles on pages 200 and 201.

9-56 to 61 Retain as is.

9-64 Eliminate. This information is common sense and customer service that need not be manualized.

9-65 Delete last sentence.

9-66 to 69 Retain as is.

9-72 to 9-75 Retain as is.

9-77 to 111 Retain as is.

Chapter 10:

Pending sentiment in Congress may make this chapter obsolete. If that occurs prior to any Manual rewrite, this chapter can be eliminated.

Section:

10-10 to 12 Retain as is.

10-14 to 65 Retain as is.

Appendix I: Adjustment of the Solar Unit

For the most part obsolete, could be left out of a new Manual - although its inclusion in the 1973 Manual is not a substantial reason for a rewrite.

Eliminate.

Obsolete, delete.

Obsolete - Remove Adjustment of Solar Unit and replace with dissertation of history of how lines were run, equipment used (including solar unit) and background on the contract era surveys in a way that does not diminish the record but provides the private sector and 1373's to follow us some insight from what we have learned. Discussion is needed on offline ties that may or may not have been run, were all the corners set?, traversing roads or ridges that was done in some cases and topography that may or may not fit calls on the plat. This discussion has to be done very carefully without weakening the standing of official records as prima face evidence. Maybe the most important part of the contract era discussion could be noting that even the most suspicious contractors did do some good work and that you have to take the approach going in that it was done by the book.

Appendix II: Sample Field Notes

Excess example of original work.

Needs modern examples.

General:

Need to eliminate from any Manual or Supplement reference to use of certain technologies whether the technology is a pen size, measurement tool, total station, or GPS. We can plot without pens, measure without steel tapes, acquire azimuth without solar instruments, collect coordinates without GPS (we may not even need satellites in future to do what GPS now does), calculate without using tables, or document with out paper.

October 29, 1998

Incorrect

Chapter 1:

Substantially correct, current with regard to Statutes. Only if it is determined a rewrite is necessary should it be updated to reflect current case law or organization.

Section:

- 1-2 This section should be tied to 1-4.
- 1-12 Navigable Waters: Incorrect, "Sovereignty is in the individual states." See Choctaw Nation v Oklahoma 397 U.S. 620.
- 1-19 Subsequent Legislation: Incorrect, last paragraph.
- 1-22 Restructure of Denver Service Center - eliminate or reflect changes.
Organization: Incorrect.
- 1-23 Public Land States: Incorrect, re: location of records.

Chapter 3:

Substantially correct as is; nothing so erroneous as to cause a rewrite on its own merit.

Section:

- 3-6 Incorrect - Update coordinates for initial points.
Initial Points: incorrect longitude @ St Stephens.
- 3-26 Incorrect - 14' limit should be reevaluated to see if still applicable in light of modern equipment.
- 3-70 Incorrect - Should be modified in lieu of WO IM 90-319 on state boundaries.
- 3-85 to 92 Subdivision of Sections: Incorrect, needs revision per reengineering guidance.

Chapter 4:

Monumentation has changed since the 1973 Manual, but the use of other materials can be accounted for in the Special Instructions. Could be made generic in the case of a rewrite.

Section:

- 4-7 Corner Material: incorrect, revise regulation monument data.

Replace with general statement that refers to present accepted monument specifications.

- 4-8 Eliminate stones as use for establishing or replacing original monuments.
- 4-9 to 14 References to iron post needs to be updated to reflect standard monument.
- 4-15 Update to reflect current policy (previous instruction memo outlined policy). Address on-line vs. off-line positions.

Chapter 5:

These chapters are substantially correct and only MINOR changes in language (reasonable doubt) and case law (omitted lands and islands) should be made in any attempt at a rewrite.

Methods of control are practically referred to as 1 point, 2, point and 3 point control. These should be explained and referred to consistently.

Section:

- 5-9 Incorrect - Revise beyond reasonable doubt verbiage to preponderance of evidence language from recent IBLA cases.
Modify or preferably eliminate the "beyond reasonable doubt" rule. Also check rest of manual for this language and modify or eliminate.
- 5-16 Reasonable doubt - see 5-9 comments. Clarify use of topography in restoration of corners. Increase judgement factor of the surveyor on the ground.
- 5-19 Incorrect - Need to revise to reflect current WO policy (IM 90-319) on state boundaries giving limited authority where needed to determine the boundaries of public lands.

Rewrite to allow the reestablishment of corners on state lines that were missing and position determined in the course of a resurvey against the state line. Refer to old instruction memo on the subject.
- 5-20 Incorrect - Revise italic statement to reflect recent IBLA cases.
"Reasonable doubt." See comments 5-9.
- 5-34 Soften language "all" and "will" to allow for exceptions that this language seems to prevent. Use language such as normally, generally, or something similar.
- 5-35 Misspelling of "alignment" at last word of paragraph 1 on p.137.
- 5-43 to 47 The term "Secondary methods" may be misleading. These methods refer to non rectangular applications and would be the primary method for use in these instances.

Chapter 6:

These chapters are substantially correct and only MINOR changes in language (reasonable doubt) and case law (omitted lands and islands) should be made in any attempt at a rewrite.

Section:

6-18 Incorrect - R.S. 2372 was repealed by PL 94-579 (FLPMA).

Chapter 7:

These chapters are substantially correct and only MINOR changes in language (reasonable doubt) and case law (omitted lands and islands) should be made in any attempt at a rewrite.

Section:

7-12 Contradiction with reengineering IM that allows discretion in setting certain controlling subdivision corners.

Section 8, Section:

8-1 Define field notes as written record of evidence found and reported. Particular format should be de-emphasized so as not to exclude plat only or other product formats we are now using or may use in the future.

8-1 to 10 Emphasis is on township as the basic unit of work. While this is still valid and records filing are based on that, we note that many projects are on a much smaller portion of the township unit.

8-11 Review abbreviation table for additions or deletions.

8-12 #8 Optional item. Other reengineering refinements may need to be reflected in this field note session. Changes in this section need to be correlated with language in section 3-126.

8-14 The italicized text is no longer a new requirement.

8-16 Specific rules may be conflicting or incomplete when compared to reengineering decisions. Rules need to be modified, expanded or generalized.

8-18 Allow for different formats.

Chapter 9, Section:

9-2 Revise 2nd paragraph to reflect present approval process, make a generic statement of proper approving official, or delete.
Incorrect - Needs revision as a result of plat approval delegation to the states.

- 9-7 Revision needed to reflect updated sample plat. No reference needed to 1947 specimen.
- 9-9 Revise to de-emphasize mapping features. Many states do not include this detail that is available on USGS quad sheets and from other sources.
- 9-11 Insure plat size conforms to practice.
- 9-62 to 63 Need to revise to reflect present practice.
Incorrect - The triplicate original plat is no longer prepared. There also has been departure from the photo process of preparing the duplicate original plat.
- 9-70 Reflect reengineering options of feet for all plats.
- 9-71 Delegated to Cadastral Chief in each state office.
- 9-76 Paragraph 2 ... accepted **for** the Director, ...

Appendix II: Sample Field Notes

Incorrect - Page 240 - T. 13 N., R. 24 N. should read T. 13 N., R. 24 E.

General:

Title should be consistent on cover and where used within on title page or elsewhere.

October 29, 1998

Missing

Chapter 1, Section:

- 1-1 Citation to Al White's History of Rectangular System.
- 1-2 Needs fortification of the art of decision making on original evidence. Survey measurement is an art and a science.
- 1-19 Delegation of approval authority to the State Offices needs to be explained.
- 1-22 Update to describe instructions issued by the Cadastral Chiefs in each state office.

Chapter 2, Section:

- 2-5 Missing - Elaborate on traversing, accentuating true line affording the surveyor opportunity to picking up original evidence.
- 2-7 Missing - Keep historical reference to electronic telemetry use but update to present use of GPS.
- 2-8 Obsolete/Missing - Give history of photogrammetry use by BLM but eliminate detail of 2-8 through 2-16. History of Photogrammetry with meanders in Alaska and water boundary research would be helpful.
- 2-19 Missing - Add GPS to methods of establishing direction.
- 2-74 Missing - Link closer with 2-83 to contrast problems between mean bearings and basis of bearings used in plane surveying. An E-W 1/4 corner set on line in a true bearing world would have different bearings going in and out of it in a plane world. Even though BLM surveyors understand these principles the private sector struggles with it and some better examples might help.
- 2-75 to 78 Missing - Explain as done in 73 Manual but elaborate the explanation is more for historical understanding of how lines were run in the past. Add that new software and instrumentation bring about same results using same principles.
- 2-80 Missing - Historically reference the Red Book but explain about CMM and RTK software basically replacing the red book.
- 2-81 Missing - Update to reference other sources besides the red book.
- 2-82 Missing - This would be a good place to discuss Geodata, especially coordinates, how they are used for mapping purposes and how they can be used for surveying purposes.

Use of coordinates for the restoration of lost corners should be reserved for later in the Manual.

Chapter 3, Section:

- 3-11 Missing - Revise determination of true latitudinal curve to reflect calculation methods in addition to solar, tangent and secant.
- 3-21 Missing - Establishment of temporary points on random lines may no longer be necessary because of new equipment. For instance with GPS the position of the objective corner is easily determined without a random line and the true line can be determined with that information. Add new methods.
- 3-23 Missing - Add that the field notes should contain a prefacing statement of how GPS was used, similar to the prefacing statement about random lines.
- 3-55 Missing - This section could be enhanced to include how GPS relates to random and true lines, and whether it discontinues need for the random line.
- 3-88 Missing - Both arithmetic mean and weighted mean should be discussed as how each one over the other may be preferential in protecting the plat.
- 3-105 Missing - Needs clarification. Often necessary to go to 47 Manual for guidance.

Chapter 4, Section:

- 4-8 Allow substantial, well marked stone to stay rather than replace it with an arguably inferior monument.
- 4-16 to 114 Retain as is. Consider statement to allow for adding Township and Range marking to minor subdivision corners. Consider adding section to discuss adding date to previous caps. Address private caps as well (prohibit marking private caps.)
- 4-38 Missing - Some States now mark Township and Range on 1/16ths. If this is to continue then flexibility to do so should be noted.
- 4-82 Marks on Special Purpose Monuments: obsolete, revise & add geographic control monuments.

Chapter 5, Section:

- 5-18 Add 1/16 corners to corners controlled by line trees to conform to instruction memo on the subject.

- 5-25 to 28 & Figure 70 This method is valid when operating on true bearings. Distortion encountered while using grid bearings on a coordinate system may introduce errors and thus different results if all factors are not accounted for.
- 5-29 Missing - With the three point control and two point control guidance, it should be clarified that the record distance referred to is the record latitude or departure for that distance.
Clarify when to use cardinal equivalents (of the record distance) and when to use record distance itself.
- 5-35 Missing - Some feel that a junior corner found on the line of senior survey may become senior in subsequent survey, even though there is not extensive obliteration of the line. This procedure should either be supported or discouraged in this section to end the debate.
Adopt Oregon proposal for adoption of closing corners being set after a resurvey locates them on line.
- 5-36 Clear up the fact that a resurvey makes an irregular boundary procedures for future resurveys. This is stated in the second column on p. 137 but should be emphasized more. Provide a better explanation with example for this process (similar to the Grant boundary example later in the chapter.
- 5-41 Missing - An attempt should be made to clarify the crossing closing corner vs. point of intersection issue. Although it doesn't appear to be a legal issue it remains a how do you mark it /name it issue.
Would need to conform to any changes made regarding suggestion made in 5-35.

Page 143, Figure 73 Missing distance between points G and H.

Chapter 6:

Resurveys: Past memoranda & selected case studies need to be incorporated.
"Independent Resurvey" sections need to be carefully expounded upon based upon latest case law and experience. Add resurvey of resurveys, corrective dependent resurveys.

This chapter should have Chapter 5 incorporated within it since you don't have Restoration of Lost or Obliterated corners unless you have a resurvey. Chapter 6 under represents the Dependent Resurvey. 4 1/2 pages are devoted to Independent Resurveys and while only 1 1/2 are devoted to dependent resurveys. All of us agree that a cookbook can't be written but more guidance is definitely needed. Are 1/16s of maximum control that are found offline, or not at distance position, junior corners? Needs more discussion of acceptance/rejection issues. Discussion of when coordinates may be used as the best available evidence of a corner position is needed. Resurveys of Resurveys needs thorough discussion. Corrective survey needs to be addressed in this chapter also.

Section:

6-27 One, two and three point control are referenced but have no explanation previously.

6-28&29 Strengthen language to encourage specific addressing of acceptance **and rejection** of private corners in the survey record. Both 6-28 and 6-29 refer to documenting acceptance of local corners but not to rejection of same.

6-29 to 6-56 Retain as is.

Chapter 7, Section:

7-7 Missing - Many states are designating areas of non-public land as lots in cases where they are about to be acquired by the federal government. A discussion of which cases this should or should not be done is needed.

7-8 to 15 Missing - Should be under Chapter 6 Resurveys.

7-12 Missing - Many of the states are doing things a little different than the explicit wording of this section. Needs to be revised or we need to follow the direction provided by the existing wording.

7-47 to 99 Missing - Needs update of court cases since 1973.

7-46 to 94 Recommend Riparian specialist update according to newer court precedents. Also address the case of a resurvey of an area that had previously been surveyed with partition lines established - provide instructions on continuation or extension of new partition lines. Address in greater detail: re-emergence and omitted island issues.

7-46 to 99 Special Surveys-Water Boundaries: obsolete, needs revision to reflect current case law and BLM memoranda. Need to include case studies.

Chapter 9:

Note: Further additions are recommended to denote acceptability and guidelines for use of non-official records to be used in the making or verification of supplemental plats.

Section:

9- ? Missing - Needs discussion on both protraction diagrams and amended protraction diagrams.

9-65 to 75 Missing - More is needed on supplemental plats. Needs discussion of what is acceptable records for use in preparation.

9-84 to 111 Missing - As in chapter 6, Dependent Resurvey Plats has very little on requirements as compared to Independent Resurvey Plats. More discussion is needed on corner symbols, field notes on plats, etc.

Chapter 10:

Missing - This chapter needs to be followed with discussion about the retracement or dependent resurvey of Mineral Surveys.

Section:

10-13 Verify whether a single discovery, particularly in a blanket deposit, can be used for multiple claims when combined with modern exploration techniques. If this is the case, it needs to be reflected in this section.

Appendix II: Sample Field Notes

Section ok to leave as an example of one way to do notes. Should allow for other formats per state differences and reengineering.

Missing - Update field note examples to show more subdivision of section examples and some of the more difficult acceptance/rejection statement. Some more recent metes-and-bounds examples and Independent Resurveys would be helpful too.

Missing - Revise sample plats to 6 plats showing some of the more current situations faced in today's dependent resurveys.

Plat 1 Original Survey

Plat 2 Dependent Resurvey, including subdivision of sections

Plat 3 Independent Resurvey

Plat 4 Supplemental Plat

Plat 5 Amended Protraction Diagram

Plat 6 Mineral Survey

General:

Missing from 1973 Manual or Needed in revised Manual or supplemental publication: Chapter on "Measurement Analysis", Chapter on use of coordinates to establish/reestablish positions, Chapter on Amended Protraction Diagrams, Chapter on Remonumentation {without resurvey}.

Any rewrite should be undertaken only after we have carefully selected the proper person for the editor. We then need to give that person both the authority and responsibility for producing the final product within a reasonable time frame (12-18 months) and be very clear about the process of input and the procedure for acceptance. We suggest that unless 10 out of 12 offices disagree with an item, that it be accepted as written by the editor.

Comprehensive index should be available. Design using electronic version to allow searches.