

UNITED STATES DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
COLORADO STATE OFFICE  
2850 YOUNGFIELD STREET  
LAKEWOOD, COLORADO 80215-7076

In Reply Refer To:  
WO-720/CO-940  
9608

JUN 11 1992

To: Cadastral Survey Chiefs  
From: Marlin G. Livermore, Land Surveyor  
Subject: Plan for Updating the *Manual of Surveying Instructions, 1973*

DD: 7/1/92

The Chief, Division of Cadastral Survey (WO-720), requested that I distribute the attached Plan for Rewriting Manual of Surveying Instructions, 1973 to all Cadastral Survey Chiefs for their review and comments.

The time schedule requires confirmation of individual work assignments by the end of the first week in July. Therefore, all comments and suggestions for changes on assignments should be sent to me by July 1. Other comments about recommended changes **should not be forwarded** until the leaders for updates have been selected. At that point, the comments should be forwarded to them with a copy to me.

As stated in the closing statements of the plan:

"The recommendations for participants are contingent on several factors including the willingness of each individual and their offices to participate in the rewrite. Additional or alternate recommendations for participants are welcomed. The recommendations in the report are subjective based on a combination of limited knowledge of the expertise in various offices with an attempt to balance workload among individuals and offices to minimize the impact on individuals' and their offices' normal activities. I also believe, have attempted to, and strongly urge each office participate in the rewrite. This will ensure a wide are of expertise and minimize disagreements during the revision process."

I am looking forward to receiving all the offices' comments on assignments by the first of July and additional specific comments as the revision process begins. If you have questions about this memorandum, please contact me at FTS 303-239-3852.

Attachment



MAY 18 1993

To: All Cad Chiefs

From: Director, Office of Cadastral Survey

Subject: Manual, 73 Rewrite Team Member List

The following named individuals were designated in the manual rewrite as chapter team members on June 8, 1992 (Reference One). If there are any additions or deletions please advise Doug Wilcox at 703-440-1691 or by FAX at 703-440-1687.

<u>CHAPTER</u>	<u>TEAM MEMBER</u>	<u>REVIEWER</u>
I. The General Plan Status-final draft received /	Skip Robinson(CA) Steve Beyerlein(NM) Dan Webb(ES) John Nelson(CA)*	
II. Methods of Survey Status-draft partially done <i>Jim will supply final draft 6/1/93 + tel. on</i>	Skip Robinson Mike Gardner(OR) Jerry Wahl(ES) * Homer Gilson(CO)	
III. Original Rectangular System Surveys Status-final draft received /	Skip Robinson George Oviatt(AK) Bill Oliver(AR)* Dan Webb Mark Smirnov(ID)	
IV. Monumentation Status-draft partially done	<del>Diek Case(ST)*</del>	L. Gilbert(ES) *
V. Resurveys Status-final draft received /	Dale Wilson(AZ)* Jim McCavitt(CA)	G. Oviatt M. Workman(UT) C. Rodine(ES) D. Berry(OR) K. Ravnikar(ES)
VI. Evidence Status-final draft received /	Dale Wilson* Jim McCavitt Lin Livermore(WO)	K. Ravnikar M. Workman G. Oviatt C. Rodine D. Berry
VII. Restoration of Lost Corners Status-final draft received /	Mark Smirnov Jerry Knight(ID) Steve Parish(NU) Alaska-Townsites	

*Draft w/ ID and IX  
M. O. June.*

*Long Evans (GR)  
Rick Tawney (OR)*

VIII. Field Notes

Status-no draft received

Dave Nelson(CA)\* J. Wahl  
Gary Quiatt(ID) B.L. Gilbert  
Dennis Bland(AZ)  
~~Jan Berry Rick Tawney (OR)~~  
~~Kasper Schaff(MT)~~  
(Retired)

*Info  
to  
Review*

IX. Plats

Status-no draft received

Same as VIII Same as VIII

X. Mineral Surveys

Status-final draft received

~~Kasper Schaff~~  
Gary Gibson(CO)\*  
Gary Quiatt

Appendix II

Status-no draft received

Gary Gibson\*  
~~Kasper Schaff~~

\* Team Lead

Reference: "Plan for Rewriting Manual of Surveying Instructions, 1973.", Marlin Livermore(W0720) May 1992

*Douglas Wilson, Acting*

MAY 3 1993

Memorandum

To: All Cadastral Chiefs

From: Director, Office of Cadastral Survey (ES915)

Subject: Manual (73') Rewrite Status Report #1

This memorandum is Manual (73') Rewrite status report #1 dated May 3, 1993.

Project Coordination

The first phase of this project, was managed by Lin Livermore under the authority of W0720. We thank Lin for his dedication and vision in setting up this project. Lin retired on February 28, 1993. Doug Wilcox has transferred to ES915 from SC678, and he is now the editor for this project.

Project Progress

The second phase is to report the project's progress. Lin Livermore sent a memo on June 11, 1992 to the Cadastral Survey Chiefs of a plan for the rewrite of this manual. This plan is the only plan we have for this project, and we support it. We hope that the Cadastral Chiefs will continue to support this rewrite effort. The following is the progress to date.

Lin provided to the editor, prior to his retirement, draft chapters I, II, III, V, VI, VII, and X. The missing chapters are IV, VIII, and IX. In addition, the Lin plan recommended that Appendix II be rewritten and to date it has not been received by the editor. The plan made recommendations as to chapter team leads, authors, and reviewers. There are no plans at present to change any of these recommendations, but we are open to suggestions. We support these recommendations and encourage the cadastral chiefs to provide the time necessary to the writers and reviewers so that they may accomplish their portion of this important work.

Project Needs

The third phase is to explain the writing that needs to be done by the rewrite teams in order to complete this project. These needs were extracted from the Lin Plan recommendations and are as follows:

#### Chapter IV- Monumentation

Dick Case (SC) has agreed to write this chapter, and we request Louis Gilbert(ES) to review Dick's writing and then submit a final draft chapter to the editor. Please assemble the material in the format of a Manual Section Handbook with printing across the entire page. Submit it on a floppy disk in version WP 5.1 format. We welcome this contribution from Dick.

#### Chapter VIII- Notes

There has been some chapter team lead changes from the original recommendations made in the Lin Plan for this rewrite team. Dave Nelson (CA 942) has emerged as team lead. We support this team interaction and encourage his team members Gary Oviatt(ID ), Dennis Bland(WY), Jerry Wahl(ES) and Louis Gilbert(ES) to assist him by providing the necessary rewrite materials. Dave should submit the final draft chapter in the same format described for Chapter IV.

#### Chapter IX- Plats

This chapter is also the responsibility of the team members of Chapter VIII. We would ask that the team members share the load of the rewrite responsibility with Dave Nelson by having a member "volunteer" as team lead for this chapter. This would expedite the rewrite process. Please advise the editor of the name of the chapter lead as soon as it is known. When this chapter is rewritten, please provide the draft chapter material on a floppy disk in the format of Chapter IV.

#### Appendix II- Sample Field Notes

The Lin Plan recommended rewriting this part of the manual using a new style, but did not explain what that style should be. We believe that this is an issue for the team to decide and not the editor. It is recommended that Kasper Schaff(MT) and Gary Gibson(CO) collaborate in the rewrite of this appendix and renumber it I. We realize that Kap has retired, but are hopeful that he will continue to assist us with the manual rewrite as well as the 9600 Manual review. Please advise the editor when the team lead is known and provide the draft appendix to the editor on a floppy disk in the format of Chapter IV.

## Summary

We realize how difficult it is for busy people to devote their time to this project, but we also realize that our Manual, 73 is now over 20 years old and is badly in need of revision. We ask the Cadastral Branch Chiefs for their assistance in making it possible for the Chapter and Appendix rewrite authors and reviewers to complete their assignments so that this project can be successfully concluded as soon as possible. The Lin Plan schedule was to have a draft manual available for review by May 1, 1993, and we do not want to have this important project delayed any more than is absolutely necessary.

If you have any questions, please contact the editor by phone at 703-440-1663/1691 or by FAX at 703-440-1687.

WO-720  
9608  
June 5, 1992

TO: Chief, Division of Cadstral Surveys (WO-720)

FROM: Marlin Livermore

SUBJECT: Plan for Updating the *Manual of Surveying Instructions, 1973*.

Enclosed is the *Plan for Undating the Manual of Surveying Instructions, 1973*. The plan includes Appendix I, a recommended schedule for completion of the rewrite and Appendix II, an expanded plan consisting of detailed specific recommended changes with justifications for the changes.

A handwritten signature in cursive script, reading "Marlin Livermore". The signature is written in dark ink and is positioned in the lower right quadrant of the page.

# PLAN FOR REWRITING MANUAL OF SURVEYING INSTRUCTIONS, 1973

May 1992  
Prepared by Marlin Livermore

## INTRODUCTION

This plan for rewriting the *Manual* consists of a chapter-by-chapter overview of major areas requiring revision. Recommended revisions are based on comments from various individuals and the State Offices.

The report includes recommendations for individual assignments to work on specific areas. Appendix I is a proposed schedule for the project. Appendix II is an expansion of this report with specific recommended changes supported by justifications for the recommendations.

Extensive comments on modifications were provided by Dale Wilson, Wyoming State Office, John and Dave Nelson, California State Office, and Bob Dahl, Oregon State Office. Several offices combined comments; therefore, individual sources are unknown. Recognition is hereby given, with my personal appreciation, for all comments and contributions.

Not surprising, many recommendations were repeated time and again, reflecting areas where, I believe, most surveyors would agree revisions are necessary.

The recommended revisions are not all encompassing, detailed, nor justified in this report. Individuals interested in more detailed descriptions and justifications for the recommendations should refer to Appendix II which provides specific details and is for the purpose of initiating the process of updating. In addition, many additional needs for revision will surface as we begin to implement the plan.

## RECOMMENDED UPDATES AND INDIVIDUAL ASSIGNMENTS

### Chapter I

There are four major areas needing revisions in this chapter:

1. Scope of Authority of the Manual: Precedence established by direct and implied statutory authority, supported by case law and authenticated by practice, prescribes that Manual procedures be applied on surveys of all federal interests and Indian lands. This scope of authority should be reflected throughout Chapter I.
2. Manual Supplements: The section on Manual supplements is outdated.
3. Section on Public Lands Include all Federal Lands: The section on public lands should be titled Federal Lands and include definitions and the source of federal ownership of acquired and reacquired lands.
4. Statutory Authority Updated: The sections on Statutes are outdated.

Recommended participants:



John Nelson (CA), lead,<sup>1</sup>  
Steve Byerlien (NM).

All participants comment on present and make additional recommendations.

## Chapter II

Major revisions include removing all technical procedures involving measurements, the use of specific equipment, and defining what unit measurements we will use in the official record. Rewriting the portions on the geodesy of cadastral surveys and adding or expanding information on supplemental plats and protraction diagrams will be required.

1. Units of measurements: What units of measurement should we use; suggestions include meters, feet, or chains. Skip Robinson is working on a report on this issue.
2. Technical Text Book Procedures: Eliminate sections 2-2 through 2-14, and 2-15, 2-16, and 2-18 through 2-73. These sections discuss technical procedures that are commonly located in surveying textbooks. The *Manual* is not and should not be intended to be a textbook on the technical procedures of measurements.
3. The Geodesy of Large Scale Surveys: Totally rewrite sections 2-74 through 2-83 The Geodesy of Large-Scale Surveys. This should be written to explain curvature, convergency, and use of coordinate systems in the PLSS, including formulas for surveyors to determine convergency. Recommend Jerry Wahl draft this portion. Emphasis should be placed on clarity of writing and simplicity in explanations relative to how the curved surface of the earth is related to the process of executing cadastral surveys. All references to textbook-type technical procedures and types of equipment or measuring systems should be eliminated.
4. Protraction Diagrams: Add sections on protraction diagrams.<sup>2</sup> With GPS we now have the ability to adopt Oregon's suggestion to develop protraction diagrams that will be fixed in position except for the outboundaries. We should use Oregon's suggested methods. Skip Robinson agreed to make a report on protraction diagrams and the use of tracts in cancelled areas.
5. Supplemental Plats: Add sections based on Mike Gardner's forthcoming report on supplemental plats. We cannot justify executing expensive field work to reacquire information that is already available and can be inexpensively verified as accurate.<sup>3</sup>
6. Geographic Coordinate Data Base (GCDB): Add a section on GCDB, defining and explaining that it is a product of a cadastral survey.

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<sup>1</sup> The designated lead will be responsible for the coordination and leadership for the revisions of their respective segments throughout and until completion of the draft revision for the segment.

<sup>2</sup> See Chapter 3 for defining protraction diagrams control over executing an original survey.

<sup>3</sup> The subject of supplemental plats may also be addressed in Chapter V as a portion of the Investigations sections and in the Chapter on Plats.

Should define GCDB and its purpose in this Chapter.<sup>4</sup>

Recommended Participants:

Gilson-CO-GCDB----Lead Jerry Wahl-ESO--Geodesy  
Gardner-OR--Supplemental Plats  
Robinson-CA--Unit of measurements

All participants comment on present and make additional recommendations.

**Chapter III**

This chapter needs to be carefully reviewed with procedures reflecting modern technology and processes. All references to random and true lines need to be omitted. Accuracy standards need to be redefined. The discussion on protraction diagrams should be expanded. Alaska's unique original survey procedures should be outlined in this chapter.

1. Random and True Lines: Modern technology provides us with the means to accurately determine the positions of all previously established corners/boundaries that will affect a design of a proposed original survey. The first step in executing an original survey is to tie in all corners that will affect its design, then develop the plan of survey.
2. Protraction Diagrams: Oregon has proposed modification of the procedures we use to develop protraction diagrams. At the Branch meeting in Washington, Skip Robinson volunteered the services of the California State Office to prepare a report. We should expand the instructions on preparation of protraction diagrams based on the information provided in the report.
3. Alaskan Surveys: The unique procedures used in Alaska's original surveys should be included in this chapter.

Recommended Participants:

Bill Olver (AR)--Lead

Note: Skip and George have offered their office's expertise.  
Skip Robinson (CA--Protraction Diagrams  
George Oviatt (AL)--Original surveys in Alaska

All participants should comment on present and make additional recommendations.

**Chapter IV**

Replace the section on specifying corner materials with a chart. Need a section providing guidelines for procedures for remonumenting non-Bureau monuments, under what conditions, and notification requirements.

1. Recommended Corner Materials Chart:

<u>TYPE</u>	<u>MATERIAL</u>	<u>SIZE</u>	<u>CAP</u>	<u>RECOMMENDED USAGE</u>
PIPE	STAINLESS	2 1/2X30"	BRASS	THE STANDARD REGULATION MONUMENT
PIPE	ALUMINUM	2 1/2X30"	BRASS	ONLY UNDER PROPER SOIL

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<sup>4</sup> May want to discuss GCDB in Chapter X as part of plat drafting process.

## CONDITIONS.

2. Remonumentation of Non-Bureau Corners: New section defining under which conditions and when and what notice is necessary before we remonument or rehabilitate an unofficial (non-Bureau) monument.

### Recommended participants:

Gilbert-ESO--Lead

Dick Case--Charts, monument specifications.

All participants should comment on present and make additional recommendations.

### Chapters V and VI

The majority of the work we perform is guided by these two chapters. The methods and procedures being dictated by common law is and has remained constant. Words, phrases, and entire sections of these chapters have been cited and held by the courts as good law. Conservatism in changes in methods and procedures, even in changing wording is necessary. I recommend we keep changes to a minimum except the material needs to be rearranged for clarity. The arrangement of the material has created a perception that there are conflicts between the two chapters. Placing the material in a more logical sequence will eliminate the real or perceived conflicts.

Additional material needs to be added in several areas (e.g., subdivisions of sections that have been subdivided previously and several issues relative to resurveys of resurveys are contemporary and recurring).

1. Divide the two chapters into three: Evidence, Resurveys and Restoration of Lost Corners.

2. Add a section on resurveys of resurveys covering such areas as resurveys of previously subdivided sections including non-Bureau subdivisions and the use of junior corners as corners of maximum control. (Based on McCavitt report.)

### Recommended Participants:

Marlin Livermore--Lead--Rough draft of realignment and chapter on Evidence. To be reviewed by Milton R. Workman, Gary Oviatt, Corky Rodine, Dan Berry

Jim McCavitt (CA) Resurvey of resurveys.

Dale Wilson (AZ)

All participants should comment on present and make additional recommendations.

### Chapter VII:

Add section(s) describing procedures on investigations. Update townsite survey sections. Redefine required monumentation for subdivisions of sections. Expand sections on mineral segregation. Update sections on water boundaries.

1. Investigations: General guidelines on investigative procedures will assist in standardizing the process and documenting investigations.

2. Townsite Surveys: Should update townsite survey procedures to reflect Alaska's requirements.

3. Subdivision of Section Monumentation: We no longer can afford nor is it required to monument all 1/16 corners should be defined as administratively required.

4. Mineral Segregations: Should be directed at restoration of corners based on unique mineral survey evidence (e.g. ties to discovery or corners of the rectangular system, claims or location monuments.) Define when and how to restore lost corners by parallel end line method.

5. Water Boundaries updated to reflect current law and policies.

Recommended participants:

Mark Smirnoff-- Lead--Riparian  
Jerry Knight (ID)--Investigations  
Alaska--Townsite Surveys  
Steve Parrish--Mineral Surveys

All participants should comment on present and make additional recommendations.

**Chapter VIII and XI**

I recommend we investigate revamping the entire *FINAL RETURN* process. This process, without questioning its importance in ensuring cadastral surveys are properly executed, consistently requires a growing percent of cadastral's budget and often creates major delays in the approval of surveys.

1. Establish a Team:

a. Identify methods to simplify the process of preparing and reviewing final returns (e.g., the pros and cons of making the field notes into a field-orientated database format should be considered. Jack Eaves has suggested we should further develop and expand the process of placing the field notes on a plat).

b. Generically define use of CCM and other automation to assist in the field note and platting processes, keeping in mind we do not want to introduce technical material that will quickly become outdated.

c. How to update the GCDB by merging updating with the platting process.

d. Team's report due by August 1, 1992.

2. Assignments for rewrites: Identify and assignment of individuals by August 15, 1992:

a. Identify individuals to design any required changes in methods and procedures and rewrite Chapters VIII and XI.

b. Rewrite Appendix II into new format.

c. Establish completion schedules for completion for individual

assignments.<sup>5</sup>

Recommended team members:

Committee Members

Kasper Schaff--Lead

Gary Oviat  
Dave Nelson  
Alaskan representative  
Dan Berry  
Dennis Bland

Experts to assist

Jerry Wahl standing member  
to be present at all meetings

Two cartographers to be  
selected by the committee  
CMM experts from ESO/MT and etc.

Other specialists as deemed  
necessary (e.g. mineral survey  
experts)

All participants should comment on present and make additional  
recommendations.

Chapter X

Overall review to bring such things as closure, platting and field note  
requirements in line with new requirements in other chapters.

Recommended participants:

Gary Gibson-(CO)-Lead  
Kasper Schaff-(MT)

All participants should comment on present and make additional  
recommendations.

Appendix I: Delete. Justification: Solar attachment no longer used.

Appendix II: Rewrite using new style. Justification: Self-explanatory.  
Decision as to who will rewrite to be decided by work team.

Plats: Redraw or update if deemed appropriate by the team on field notes and  
plats.

**CLOSING STATEMENTS:**

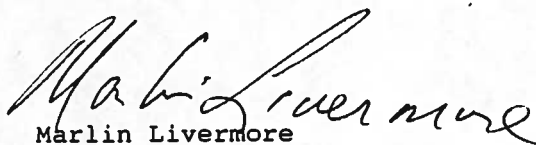
The recommendations for participants are contingent on several factors including  
the willingness of each individual and their offices to participate in the  
rewrite. Additional or alternate recommendations for participants are welcomed.  
The recommendations in this report are subjective based on a combination of my  
limited knowledge of the expertise in various offices with an attempt to balance  
workloads minimize the impact on individuals' and their offices' normal  
activities. I believe, have attempted to, and strongly urge each office  
participate in the rewrite. This will ensure a wide area of expertise and  
minimize disagreements during the revision process.

I recommend that we distribute periodical updates on the process of revision to  
all cadastral offices. Silence creates suspicion and nervousness; whereas,

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<sup>5</sup> Revamping of these chapters will require the most work. Completion of  
the first draft of the Manual rewrite by May 1992 depend on establishing and  
maintaining strict schedules on this portion.

openness will minimize rumors, the feeling that individuals or offices are being left out, and assurance that things do not run amok. In line with this recommendation, I suggest this report, with appendices, be distributed to all cadastral offices.

  
Marlin Livermore



APPENDIX II  
EXPANDED PLAN FOR *Manual*  
UPDATE  
WITH SPECIFIC RECOMMENDATIONS AND JUSTIFICATIONS

## INTRODUCTION

This plan for rewriting the *Manual* consists of a chapter-by-chapter overview of major areas requiring revision. Recommended revisions are based on comments from various individuals and the State Offices.

Extensive comments on modifications were provided by Dale Wilson, Wyoming State Office, John and Dave Nelson, California State Office, and Bob Dahl, Oregon State Office. Several offices combined comments; therefore, individual sources are unknown. Recognition is hereby given, with my personal appreciation, for all comments and contributions.

Not surprising, many recommendations were repeated time and again, reflecting areas where, I believe, most surveyors would agree revisions are necessary.

The recommended revisions are not all encompassing, however, as will be required throughout the process of rewriting, justifications for all recommended changes are provided. Of course, many additional needs for revision will surface as we begin to implement the plan for updating.

## RECOMMENDED UPDATES AND INDIVIDUAL ASSIGNMENTS

### Chapter I

#### General

There are four major areas needing revisions in this chapter:

1. Scope of Authority of the *Manual*: Precedence established by direct and implied statutory authority, supported by case law and authenticated by practice, prescribes that *Manual* procedures be applied on surveys of all federal interests and Indian lands. This scope of authority should be reflected throughout Chapter I.
2. *Manual* Supplements: The section on *Manual* supplements is outdated.
3. Section on Public Lands Include all Federal Lands: The section on public lands should be titled Federal Lands and include definitions and the source of federal ownership of acquired and reacquired lands.
4. Statutory Authority Updated: The sections on Statutes are outdated.

#### Specific recommended revisions:

1. Section 1.1: Change public lands to federal interest lands and Indian Lands.

#### Justification:

Statutory justifications: The Secretary of Interior may accept contributions for cadastral surveys performed on federally controlled or intermingled lands. FLPMA--90 stat. 2766, 43 U.S.C.1737(c). Authority to resurvey townships in which disposal exceed 50 percent of the total area upon application of owners within township, 43 U.S.C. 773. Responsibility of Federal agencies



to develop programs and measures to protect and enhance environmental quality, 42 U.S.C. 4321. Authority for the survey of Indian Lands is provided for in 25 U.S.C. 176. Most public land states, if not all, have statutes providing for the acceptance of all or portions of the *Manual* procedures when identifying boundaries defined by the Public Land Survey System (PLSS).

Common law justifications: See 43 U.S.C.A. 751, 752, 772, the various state and federal legal digests, encyclopedias and court reporters which consistently cite opinions in correlation with *Manual* procedures.

Justification through precedence: The General Land Office have officially executed reimbursable (re)surveys of non-public-federal interest lands since, at least, 1902 when Congress passed legislation providing for the General Land Office to resurvey 27 townships in California due to conflicts in the area between private surveys and original evidence, Herman H. Peterson et al, 40 I.D. 562 (1912). Other examples include, reimbursable resurveys executed along the Rio Grande Valley in 1915 or 1916 for the Bureau of Reclamation, Running Line--Recollections of Surveyors, page 37. In 1940 the General Land Office initiated work on the Missouri River Basin Project, Id., page 25, over the next 40 years tens of thousands of mile of Missouri River Basin resurveys on non-public-federal interests lands were performed.<sup>1</sup>

2. Section 1-1: Add 1973 to list of Manuals. Justification: Self explanatory.

3. Section 1-8: Update The *Manual* Supplements section. Self explanatory.

4. Section 1-9,10: Expand to include federal lands. See justification 1-1.

5. Section 1-19: Update: Include among other statutes FLPMA and 25 USC 176. Justification: Self explanatory.

Recommended participants:

John Nelson (CAL) and Steve Byerlien, (NM) to comment on present and make additional recommendations.

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<sup>1</sup> On rare occasions there are state laws that provide for procedures contrary to Manual procedures. When surveying reacquired lands it is not clear when or if conflicting state laws dominate over federal procedures. This issue needs to be resolved and addressed in the rewrite.

## Chapter II

### General:

Major revisions include removing all technical procedures involving measurements, the use of specific equipment, and defining what unit measurements we will use in the official record. Rewriting the portions on the geodesy of cadastral surveys and adding or expanding information on supplemental plats and protraction diagrams will be required.

1. Units of measurements:. What units of measurement should we use; suggestions include meters, feet, or chains. Skip Robinson is working on a report on this issue.
2. Technical Text Book Procedures: Eliminate sections 2-2 through 2-14, and 2-15, 2-16, and 2-18 through 2-73. These sections discuss technical procedures that are commonly located in surveying textbooks. The Manual is not and should not be intended to be a textbook on the technical procedures of measurements.
3. The Geodesy of Large Scale Surveys: Totally rewrite sections 2-74 through 2-83 The Geodesy of Large-Scale Surveys. This should be written to explain curvature, convergency, and use of coordinate systems in the PLSS, including formulas for surveyors to determine convergency. Recommend Jerry Wahl draft this portion. Emphasis should be placed on clarity of writing and simplicity in explanations relative to how the curved surface of the earth is related to the process of executing cadastral surveys. All references to textbook-type technical procedures and types of equipment or measuring systems should be eliminated.
4. Protraction Diagrams: Add sections on protraction diagrams.<sup>2</sup> With GPS we now have the ability to adopt Oregon's suggestion to develop protraction diagrams that will be fixed in position except for the outboundaries. We should Oregon's suggested methods. Skip Robinson agreed to make a report on protraction diagrams and the use of tracts in cancelled areas.
5. Supplemental Plats: Add sections based on Mike Gardner's forthcoming report on supplemental plats. We cannot justify executing expensive field work to reacquire information that is already available and can be inexpensively verified as accurate.<sup>3</sup>
6. Geographic Coordinate Data Base (GCDB): Add a section on GCDB, defining and explaining that it is a product of a cadastral survey. Should define GCDB and its purpose in this Chapter.<sup>4</sup>

### Recommended Participants:

Jerry Wahl-ESO--Geodesy  
Gardner-OR--Supplemental Plats  
Robinson-CA--Unit of measurements  
Gilson-CO-GCDB

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<sup>2</sup> See Chapter 3 for defining protraction diagrams control over executing an original survey.

<sup>3</sup> The subject of supplemental plats may also be addressed in Chapter V as a portion of the Investigations sections and in the Chapter on Plats.

<sup>4</sup> May want to discuss GCDB in Chapter X as part of plat drafting process.

All participants comment on present and make additional recommendations.

### Chapter III

#### General

This chapter needs to be carefully reviewed with procedures reflecting modern technology and processes. All references to random and true lines need to be omitted. Accuracy standards need to be redefined. The discussion on protraction diagrams should be expanded. Alaska's unique original survey procedures should be outlined in this chapter.

1. Random and True Lines: Modern technology provides us with the means to accurately determine the positions of all previously established corners/boundaries that will affect a design of a proposed original survey. The first step in executing an original survey is to tie in all corners that will affect its design, then develop the plan of survey.
2. Protraction Diagrams: Oregon has proposed modification of the procedures we use to develop protraction diagrams. At the Branch meeting in Washington, Skip Robinson volunteered the services of the California State Office to prepare a report. We should expand the instructions on preparation of protraction diagrams based on the information provided in the report.
3. Alaska's Surveys: The unique procedures used in Alaska's original surveys should be included in this chapter.

#### Specific recommended changes:

1. Section 3-1--Rewrite introductory paragraph to state: The methods described in this chapter constitute the specifications for executing original rectangular system surveys.

Justification: This paragraph is confusing, especially sentences 2 and 3 which provides misleading and/or unneeded information, e.g., we are executing extensive original surveys in Alaska.

2. Section 3-4-- Add: and the contents of section or subdivision of section, shall be considered to contain the exact quantity as expressed in the official record.

Justification: The existence and importance of an official and legal acreage as provided for in 43 USC 752 is not generally known and, therefore, often ignored. With the proliferation of information and computers numerous spurious acreages will be created by whoever based on whatever information that is available. Without an official acreage disputes will arise time and again in areas where acreage is a deciding monetary or decision making factor.

3. Section 3-9--The measurements, distances and directions, ascertained and reported for the survey of a principal meridian are verified through independent means and within the accuracy standards provided by the Special Instructions for the survey.

Justifications: Modern technology provides several means to verify the accuracy of measurements. Practical requirements of accuracies for surveys are contingent on several variables, (e.g. technology used, value of land, type of terrain). Imposing explicit mathematical requirements of accuracy in an area where variables should be the determining factor creates standards which are frequently too lax or too strict to be functional.

4. 3-11--Omit last sentence describing technical method of determining alignment by solar etc.

Justification: *Manual* should specify bearings are based on true meridian, how a surveyor determines the true meridian can be accomplished by many acceptable diverse methods as describe in easily accessible technical books and papers.

5. 3-20--Change second sentence to read: The total distance and bearing of the boundary is determined. If defective conditions do not exist the meridional line is established on a true line between the township corners with corners set at intervals of 40 chains measuring from the south. By...

Justification: Present technology has made the random and true procedures inefficient and obsolete.

6. 3-26--Second sentence: Therefore, the boundary will be established on a cardinal course where the alinement would require a bearing exceeding 14' of arc.

Justification see no. 5.

7. 3-27 correct for random as in 6-7--same justification. Replace taken from table 2, Standard Field Tables with---as determined by formula provided in section 2-XX.

Justification: Standard Field Tables no longer in print.

8. 3-30 rewrite to omit random method. Justification. Same as 6.

9. 3-34--Change to read--The rectangular limits should not be confused with error of closure. Justification: Clarity.

10. 3-45--Need to add section(s) on protraction diagrams. Oregon has suggested we adopt a method of developing protraction diagrams that will assure a plan of survey can be followed with the exception of the outer limits of the diagram. Skip Robinson is preparing a report. Based on the report a section(s) should be added detailing procedures for development of protraction diagrams, theirs status as a plan of surveys, and how to use them in executing original surveys.

Justification: Most original surveys are based on protraction diagrams.

11. 3-46-- See 3-124 which defines standards of accuracies.

12. Section 3-48--Second sentence: These lines have precedence in the plan of survey. Meridional lines are numbered counting from the east, initiated at the section corners on the south boundary of the township and are run northerly parallel to the governing east boundary.

Justification: Present methods and technology has made it possible to obtain an efficient and accurate survey, (resulting in the same final results--same positions for the corners and boundaries as the old step by step, one mile north, one mile east method), through approaching the survey of a township as a total entity. The plan of survey usually a protraction diagram is designed to comply with statutory requirements for regularity and to minimize the affect previously created defective conditions have on a new survey.

13. Section 3-49 Omit. See justification for 12.

14. 3-50 The last mile of a meridional line is a true line between its north and south section corners. The 1/4 section corner will be established at 40 chains distance from the south section corner.

Justification see no. 5 and 12..

15. Section 3-52--The latitudinal section lines, except in the west range of sections, are established on true bearings between their respective section corners. The 1/4 section corners are placed at midpoints on the true line.

In the west range of sections the latitudinal line is established on a true bearing between its east and west section corners. The 1/4 section corner will be established on the true line at 40 chains distance from the east section corner.

Justification: See 13.

16. Section 3-53--Omit. Justification: Information is immaterial.

17. Section 3-54--Second sentence omit which is random and true. Omit last sentence.

Justification: See 12. Accumulated error is readily detectable under plan of survey.

18. Section 3-55--Omit--Justification--section is superficial.

19. Section 3-59--Change to simply state: Where, as shown in figure 41, the north boundary is not defective in position...the first meridional line is surveyed as a true line between the corners on the south and north boundaries.

Justification: See 12 and 17.

20. Section 3-62 See 19. the first latitudinal section line is surveyed on a true bearing between the respective section corners on the east and west boundaries. See 19 for justification.

21. Section 3-71--In some instances the intersection of lines will have to be monumented for operational or litigation purposes, in which event points of intersections will be established.

Justification: Crossing closing corners were created in the 1973 *Manual* and have been controversial every since, questions remain as to proper marking and the fact that the markings can be confused with corners on the centerlines of sections. Previous to the 73 *-Manual* points of intersections were commonly monumented, serving the same function as crossing closing corners, without the confusion on markings. I suggest we go back to this simpler and seemingly non-controversial method.

22. Section 3-87--To subdivide a section into quarter sections the loci of straight lines is determined between opposite quarter section corners. The legal center of the section is the point of intersection of the lines thus determined and is the corner common to the several quarter sections.

Justification: Present survey and measuring techniques make it possible to accurately establish the loci and point of intersection of two lines mathematically and upon the ground without physically "running" the individual lines.

23. Section 3-88--it will be necessary in establishing the center lines through fractional sections to adopt mean courses, based on a weighted mean, where the section lines are not....

Computation of the weighted mean: Draw diagram and give example.

Justification: Present policy and practice.

24. Section 3-89--...the locus of center lines of the quarter section will be determined as straight lines between opposite corresponding quarter-quarter-or sixteenth-section corners on the quarter section boundaries. The intersection

of the lines determines the legal center of a quarter section.

Justification: See 22.

24. Should include three mile subdivision.

Justification: Three mile subdivision is fairly common throughout west.

25. Section 3-105-- The position of the new quarter section corner is defined by how the position of the old quarter corner on the opposite boundary is controlled. If only 1/2 mile of the opposite boundary was returned as surveyed, the new 1/4 corner will be established at the same distance as the opposite 1/4 corner. If the opposite section line was completed with both 1/2 miles returned the new 1/4 corner will be established at a proportionate distance based on the respective lengths of the opposite 1/2 miles.

Justification: Clarity. Same process.

26. Sections 3-115 through 3-123--Reviewed by riparian specialist and Alaska State Office for needed updates.

27. Section 3-124--Delete present replace with:--The measurements, distances and directions, ascertained and reported for cadastral surveys will be verified through independent means and their accuracies, thus determined, reported. A general, minimal accuracy standard for cadastral surveys will be established by the individual cadastral offices based on state-of-the-art criteria for the areas of their responsibilities. When exceptions to the general accuracy standards are deemed appropriate they will be specified in the Special Instructions.

Justifications: Modern technology provides several means to verify the accuracy of measurements. Practical requirements for accuracies of surveys are contingent on several variables, (e.g. technology used, value of land, type of terrain). Imposing explicit mathematical requirements of accuracy for all types of cadastral surveys throughout the United States in lieu of a flexible method creates a meaningless standard. The proposed change will allow the consideration of variables in determining accuracy standards resulting in meaningful standards. These standards will eliminate the oft repeated criticisms of our present maximum standard closing error.

28. 3-125(c)-- The National Environmental Act of 1969 and the increasing emphasis placed on protection of the environment by the public and the three branches of the federal government has required modifications in meeting the statutory requirements to blaze and obtain topography along true lines. In addition the U. S. geological quadrangles, other maps and the rapidly developing field of geographic information systems provides far more detail and accurate terrain, vegetation, culture, natural and soil information than can be obtained in the process of conducting a cadastral survey.

The criteria for methods and degree of marking true line and obtaining topography for surveys and resurveys will be determined by each office based on general and/or specific administrative or legal needs.

However, In executing resurveys, the surveyor must always search for and take into account all previous survey evidence including any marks or other information along a line that leads to direct evidence of the position of original lines or corners or which influences the process of the reestablishment of the positions of any lost corners.

Justification: By agreement we will be providing GCDB data to the USGS for their depiction of land lines. This will provide the required relationship between cadastral surveys and topography. The 1973 *Manual* recognized the potential for conflict between marking true line and the rising concerns for the environment. Today we have recognize environmental protection as a factor in defining our methods of surveys. Adopting methods and procedures of surveys which minimizes

the cutting of vegetation has been our most effective means of environmental protection.

In addition to protection of the environment, changes in technology and changing purposes for surveys have, in many cases, made marking true lines and recording topographic information obsolete. United States Geological topographic quadrangles depict the topography of an area much more accurate than cadastral field notes and plats can provide. The quickly developing field of geographic information systems will provide terrain, vegetation, natural and culture information far more extensive, detailed and accurate than the field notes of a cadastral survey can provide. In this conflict between modern needs and obsolete statutory requirements we need not press the issue, or concern ourselves in losing an argument over legal technicalities versus common sense, the courts will support the argument that this type of information should only when deemed necessary for administrative or legal purposes.

29. Section 3-126--See 3-125.

30. Section 3-127--delete--Justification: Requirement is obsolete.

Recommended Participants:

Note: Skip and George have offered their office's expertise.  
Skip Robinson (CA--Protraction Diagrams  
George Oviatt (AL)--Original surveys in Alaska  
Bill Olver (AR)--General Review

All participants should comment on present and make additional recommendations.

## CHAPTER IV

Replace the section on specifying corner materials with a chart. Need a section providing guidelines for procedures for remonumenting non-Bureau monuments, defining the conditional and notification requirements relative to rehabilitation.

### General

#### 1. Recommended Corner Materials Chart:

<u>TYPE</u>	<u>MATERIAL</u>	<u>SIZE</u>	<u>CAP</u>	<u>RECOMMENDED USAGE</u>
PIPE	STAINLESS	2 1/2X30"	BRASS	THE STANDARD REGULATION MONUMENT
PIPE	ALUMINUM	2 1/2X30"	BRASS	ONLY UNDER PROPER SOIL CONDITIONS.

2. Re monumentation of Non-Bureau Corners: New section defining under which conditions and when and what notice is necessary before we remonument or rehabilitate an unofficial (non-Bureau) monument.

### Specific Recommendations:

1. Section 4-4 Replace with: All official monumentation of the Public Land Survey System will be prescribed monuments.

Justification: Simplicity and clarity. There is no purpose for listing all types of corners in this section .

2. Section 4-7--Replace with chart. Justification simpler.

3. Section 4-9 Caps on monuments are marked with steel dies.

Justification: More generic and therefore covers all types of capped monuments,

4. Section 4-91--Magnets should be deposited at the base of the monument as a memorial. If for some reason a magnet is not available other types of memorials may be deposited alongside the monument....

Justification: Present policy.

### PARTICIPANTS:

#### Recommended participants:

Dick Case--Charts, monument specifications.

Gilbert-ESO--Review total chapter and write section on remonumentation of local corners

All participants should comment on present and make additional recommendations.



## CHAPTER V AND VI

### General:

The majority of the work we perform is guided by these two chapters. The methods and procedures being dictated by common law is and has remained constant. Words, phrases, and entire sections of these chapters have been cited and held by the courts as good law. Conservatism in changes in methods and procedures, even in changing wording is necessary. I recommend we keep changes to a minimum except the material needs to be rearranged for clarity. The arrangement of the material has created a perception that there are conflicts between the two chapters. Placing the material in a more logical sequence will eliminate the real or perceived conflicts.

Additional material needs to be added in several areas (e.g., subdivisions of sections that have been subdivided previously and several issues relative to resurveys of resurveys are contemporary and recurring).

1. Divide the two chapters into three: Evidence, Resurveys and Restoration of Lost Corners.
2. Add a section on resurveys of resurveys covering such areas as resurveys of previously subdivided sections including non-Bureau subdivisions and the use of junior corners as corners of maximum control. (Based on McCavitt report.)

### Specific:

1. Step 1--Realign present data. Chapters V and VI encompasses three major areas relevant to resurveys:

- A. Restoration of lost corners in Chapter V.
- B. The process of executing resurveys Chapter VI.
- C. Location, evaluation and Application of evidence in the resurvey process, Chapters V and VI, (e.g., evidence pertinent to obliterated corners.)

I propose realigning the information into:

Chapter V. Evidence Location, Evaluation and Application.

- A. Original survey evidence. Existent corner and other physical marks left by original surveyor as direct evidence of the original position.
- B. Collateral survey evidence of previous surveys. Obliterated corners. Topography, perpetuation of corner position by physical, testimonial or documentary means. Circumstantial evidence tending to prove or disprove the positions of corners.
- C. Collateral survey evidence of locally reestablished corners. Local control (6-28). Direct or circumstantial evidence of the reestablishment of a lost corners and of the procedures and care used in the reestablishment processes.
- D. Collateral survey evidence of good faith location. Bona fide rights of claimants. Direct evidence of location of boundaries by persons making a bona fide attempt to reestablish the original survey by reasonable and practical procedures under unusual circumstances, (e.g. lack of evidence of any survey being physically

placed on the ground or impossibility of locating evidence due to gross errors or extensive obliteration of the original evidence.)

E. Coordinate evidence--defining minimum criteria for acceptance.

#### Chapter VI Resurveys

A. Basically as is except for evidence portion placed in Chapter V.

B. Add resurvey of resurvey.

C. Add investigation procedures.

#### Chapter VII. Restoration of Lost corners.

A. To clarify any questions as to conflicting procedures opening statement for this Chapter will be that the procedures in this chapter only apply after all available evidence has been gathered, evaluated and given proper consideration as to its affect on the boundaries and corner positions.

B. This Chapter will concentrate on the restoration of lost corners. sections 5-1 through 5-19 to be located in the chapters on Evidence and Resurveys.

Justification: Clarity and removing perception of conflicts.

The evidence portion is woven throughout both Chapters and the scattered statements are not clearly defined as dissertations on evidence and its application. This has created much of the perception that the two chapters advocate conflicting procedures, (e.g. a clearly defined line on applying proportions to lost corners but not obliterated corners.)  
Participants.

#### Recommended Participants:

Marlin Livermore: Rough draft of realignment and chapter on Evidence. To be reviewed by Milton R. Workman, Gary Oviatt, Corky Rodine, Dan Berry

Jim McCavitt (CA) Resurvey of resurveys.

Dale Wilson (AZ)

All participants should comment on present and make additional recommendations.

## CHAPTER VII:

### General:

Add section(s) describing procedures on investigations. Update townsite survey sections. Redefine required monumentation for subdivisions of sections. Expand sections on mineral segregation. Update sections on water boundaries.

1. Investigations: General guidelines on investigative procedures will assist in standardizing the process and documenting investigations.
2. Townsite Surveys: Should update townsite survey procedures to reflect Alaska's requirements.
3. Subdivision of Section Monumentation: We no longer can afford nor is it required to monument all 1/16 corners should be defined as administratively required.
4. Mineral Segregations: Should be directed at restoration of corners based on unique mineral survey evidence (e.g. ties to discovery or corners of the rectangular system, claims or location monuments.) Define when and how to restore lost corners by parallel end line method.
5. Water Boundaries updated to reflect current law and policies.

### Specific:

1. 7-5--Tracts, Lots, parcels, and metes and bounds surveys need to clarify designations, very confusing on what should be simple choices on what you call a survey because in the past policy was to limit tracts to independent surveys in conflict with 7-5.

- A. Lot entirely within a section.
- B. Tract if invades more than one section or in area where rectangular systems does not cover.
- C. Parcel as described in 7-7.

Justification: Clarity. The limiting of tracts to independent resurveys created considerable confusion on what to call metes and bounds surveys of federal lands which invaded more than one section. I believe we should just call them tracts.

2. Section 7-12--update monumentation requirements to what is administrative necessary.

Justification: Economical: The requirement for monumentation of all 1/16 corners was based on the concept that all surveys were for the disposal of federal lands. This concept is no longer true. The reason for the requirement; has disappeared therefore the requirement should disappear. It is uneconomical in cost and time to unnecessarily monument corners.

Should include guidance on process of pushing excess and deficiencies into the last lots or portions of lots abutting against the north and west boundaries of regular townships, and the analogous boundaries of irregular townships, in the process of maintaining maximum regularity as sections are subdivided into smaller and smaller. rectangularity by position excess or deficient distances against the north and west boundaries of regular townships or the analogous boundaries of irregular townships.

3. 7-17-31 Townsite Surveys: Alaska State Office should review these sections for any needed updates.

4. 7-32 to 7-38-Small Tract Surveys--Include Forest Service small tract survey. Closure limits should be same as with all other surveys, defined by office or in Special Instructions. Monumentation should be based on administrative or legal needs. 7-37 bearing requirements should not be defined.

Justification: Accuracy and monument requirements in line with rest of *Manual*. Should formalize process for Forest Service small tract surveys.

5. Mineral Segregation Surveys. 7-39-43--needs to be expanded to provide information on special evidence encountered in mineral surveys, e.g., discovery, ties to other surveys. Discuss method of reestablishment of lost corners by keeping end lines parallel.

Justification: Identify the few areas and where mineral resurveys procedures are unique.

6. Water Boundaries 7-46-99-Update by Smirnoff.

7. Soil Classification--no longer needed--refer to Soil Conservation or other GIS.

Recommended participants:

Jerry Knight (ID)--Investigations  
Alaska--Townsite Surveys  
Steve Parrish--Mineral Surveys  
Mark Smirnoff--Riparian

All participants should comment on present and make additional recommendations.

**CHAPTER VIII AND XI**

General:

I recommend we investigate revamping the entire FINAL RETURN process. This process, without questioning its importance in ensuring cadastral surveys are properly executed, consistently requires a growing percent of cadastral's budget and often creates major delays in the approval of surveys.

1. Establish a Team:

a. Identify methods to simplify the process of preparing and reviewing final returns (e.g., the pros and cons of making the field notes into a field-orientated database format should be considered. Jack Eaves has suggested we should further develop and expand the process of placing the field notes on a plat).

b. Generically define use of CCM and other automation to assist in the field note and platting processes, keeping in mind we do not want to introduce technical material that will quickly become outdated.

c. How to update the GCDB by merging updating with the platting process.

d. Team's report due by August 1, 1992.

2. Assignments for rewrites: Identify and assignment of individuals by

August 15, 1992:

- a. Identify individuals to design any required changes in methods and procedures and rewrite Chapters VIII and XI.
- b. Rewrite Appendix II into new format.
- c. Establish completion schedules for completion for individual assignments.<sup>5</sup>

Recommended team members:

Committee Members

Gary Oviat  
Kasper Schaff  
Dave Nelson  
Alaskan representative  
Dan Berry  
Dennis Bland

Experts to assist

Jerry Wahl standing member  
to be present at all meetings

Two cartographers to be  
selected by the committee  
CMM experts from ESO/MT and etc.

Other specialists as deemed  
necessary (e.g. mineral survey  
experts)

All participants should comment on present and make additional recommendations.

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<sup>5</sup> Revamping of these chapters will require the most work. Completion of the first draft of the Manual rewrite by May 1992 depend on establishing and maintaining strict schedules on this portion.

## CHAPTER X

### General:

Overall review to bring such things as closure, platting and field note requirements in line with new requirements in other chapters.

### Recommended participants:

Kasper Schaff-(MT)  
Gary Gibson-(CO)

All participants should comment on present and make additional recommendations.

### Specific:

1. Section 10-6--Lengths of lines are returned as their true horizontal equivalents in the foot unit, the direction of the lines must be referred to the true meridian. The Office issuing the order for a mineral survey will define the accuracies required for the lengths and directions of the lines and the overall survey. The equipment and processes used to establish the true meridian must meet minimum standards to secure the required accuracies. The reviewing offices will verify that minimum accuracy requirements have been met. The mineral surveyor is required to furnish required documentation necessary for the verification.

Justification: Technology has changed and there are many acceptable processes which provides acceptable true bearing and positional accuracies.

2. Section 10-7 and 10-8 delete. Justification: Process of meridian determination described in 10-6. Magnetic bearings are no longer used in surveys except very crude location and corner search.

3. Section 10-17--All surveys must meet required accuracy standards, and the error...

Justification: In line with statements on standards for accuracies throughout rewrite.

4. Section 10-32--When... and no other monuments within two miles the geographic position of the claim must be determined within a positional tolerance defined by the office issuing the mineral order.

Justification: GPS provides a means where we can accurately tie a mineral survey "to the world". Therefore, there is no reason to establish new location monuments.

5. Section 10-35-38--Delete and replace: Corner monuments will meet the specifications outlined in Chapter 4 with the 2/1/2" diameter iron post being the standard monument.

6. Section 10-36--put in section on accessories (10-34). Justification: Need to describe necessity and process of obtaining accessories.

7. Section 10-39--repeat requirements for topography given for rewriting 3-125-126.

Justification: Same as for topography for rectangular system.

### Recommended participants:

Kasper Schaff-(MT)  
Gary Gibson-(CO)

**APPENDIX I:** Delete. Justification: Solar attachment no longer used.

**APPENDIX II:** Rewrite using new style. Justification: Self-explanatory.

**PLATS:** Redraw or update if deemed appropriate by the team on field notes and plats.