FIELD SURVEYS PLAT & FIELD NOTES GUIDELINES

INTRODUCTORY STATEMENT

May 1, 2012

This book is for internal use only and is geared toward the "entry level" Land Surveyor in Alaska.

These guidelines provide detailed instructions necessary to carry out the specific and the not-so-specific direction outlined in the Manual of Surveying Instructions (2009), (hereinafter referred to as the <u>Manual</u>) and other written and unwritten policies and procedures. These guidelines are not intended and do NOT replace or supersede the <u>Manual</u>.

As many of you are aware, there is a relatively new Manual of Surveying Instructions. If you have a survey that you are conducting which references the 1973 Manual of Surveying Instructions or an older one, then you are to abide by that particular Manual, even though it is year(s) beyond 2009 that you are conducting the survey.

These Guidelines are subject to revision, usually annually. Feedback from all users is invited in order to keep this guide as accurate, up to date, and as useful as possible.

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CHAPTER I. FIELD SURVEY PROCEDURES

A. PRIOR TO THE FIELD SURVEY

- 1. Special Instructions and Plan of Survey
 - a. Pre-field scrutiny involves careful study of the proposed survey project (special instructions), and must be completed in advance of travel to the field. Rough draft copies of the plans should be obtained in advance when final copies of special instructions and plans of survey are not timely.
 - A survey must be assigned to a surveyor via the Assignment Instructions, which must be dated after the approval of the special instructions. Supplemental or amended special instructions arising due to the nature of the assigned work, should be dated (not necessarily approved) prior to the completion of the field work.
 - c. The survey must be assigned to a surveyor via the Assignment Instructions, which must be dated prior to the commencement of the survey, and subsequent to the approval of the special instructions. (i.e. Do not go to the field without approved special instructions!) Supplemental or amended special instructions which are required due to issues that arise from the assigned survey field work, should be dated, although not necessarily approved, prior to the field survey completion date.
 - d. The supporting documents (request for survey, Master Title Plats, maps, plats, etc.) should be thoroughly studied to the extent that you would derive the same set of special instructions had you been the instructions writer.
 - e. The Department of Community and Regional Affairs (DCRA) community profile maps and photographs are a good source for orientation to many Alaska communities.

http://commerce.alaska.gov/dca/profiles/profile-maps.htm

http://www.dced.state.alaska.gov/dcra/DCRA_Mapping/

2. Pre-Field Survey Conference

Meetings to resolve or clarify ambiguities and intent of the survey instructions should be held with all the affected parties. This may include personnel from the Field Office, Conveyances, Special Instructions, Survey Review, and customers whom are benefiting or are affected by the survey. Enough lead time should be allowed in scheduling meetings in order that any changes in the special instructions can be implemented before the field work commences.

3. <u>Survey Notification</u>

- a. Any landowner that may be affected by your survey should be formally notified in writing of the upcoming survey work. In certain situations, especially if the survey is or could be controversial, the notification should be by certified mail. Copies of all correspondence and return receipts should be placed in the survey file.
- b. Not only is it proper to provide notification, but the landowner may be able to provide valuable knowledge regarding unrecorded survey work and logistics for working in the area.
- c. The following are some of the more typical landowners to be notified:
 - -Conservation System Unit managers:

*		
NPS, FWS, FS		
NPS		
NPS		
FWS		
FS		
BLM		
-Native village and Native regional corporations		
-		

4. Responsibilities

It is each party's responsibility to keep the other "team" members informed of decisions that affect them. This can be accomplished through meetings or ideally formal correspondence. It is important to DOCUMENT all decisions. This documentation should ultimately be placed in the survey file.

5. Soda or Hot Springs

If the field surveyor finds soda or hot springs on a Native Allotment, and the springs were not mentioned in the request for survey, the surveyor must contact the Division of Conveyances to determine if the applicant's use and occupancy of the lands predates March 11, 1911. If use and occupancy started after this date, the hot springs usually are surveyed and segregated from the Native Allotment.

6. <u>Master Title Plats (MTP's)</u>

A current master title plat (MTP) covering the area you are surveying should always be reviewed to ensure that you are surveying the proper boundary in the proper location. The surveyor should have a complete and thorough understanding of the MTP. It is also important to note the status of the land you are surveying and the adjoining lands- patented, interim conveyed (IC) to a Native corporation, tentatively approved (TA) to the State of Alaska, etc.

7. Survey Records

There may be various survey records that are imperative to be aware of, as they may significantly affect your survey. Following are some typical sources of records that one should be aware of.

a. BLM

- (1) Official Records
 - (a) These are the only "official" records. They may incorporate other survey work (private, state, or other government) and when the BLM record is approved, all that was incorporated into the BLM record becomes "official".
 - (b) Although a survey may have been physically performed by the BLM, until it is approved, the federal interest lands which were the subject of the survey, are still classed as unsurveyed. These unapproved surveys may be utilized in your survey. A statement is placed in the history of surveys recognizing that the survey is unapproved as of this time.
 - (c) Digital records and those without official signatures are NOT "official" records.
 - (d) Coal surveys are not very common, but be aware that coal surveys have been given U.S. Survey Nos. Some of these U.S. Survey Nos. are identical to non-coal U.S. Surveys. (Be aware!) Patented coal surveys are on the MTP's. Unpatented coal surveys are not on the MTP and are treated as if they are canceled although they are not officially cancelled.

(e) Surveys performed by BLM to accommodate lands selected under

ANCSA, sec. 14(c) are (unfortunately) not normally official surveys, as they are not officially filed with BLM. They are only recorded in the applicable recording district. These types of surveys are commonly referred to as "ANCSA 14(c) surveys". Commencing with surveys performed under the 2009 Manual, they are now to be official surveys.

(f) Original plats and notes:

National Archives & Records Admin. Pacific Alaska Region (Anchorage) 654 W. 3rd, Anch., AK 99501-2145 271-2441 (M-F 8 to 4) <u>archives@alaska.nara.gov</u>

- (2) Supporting Data
 - (a) Survey files/ group files
 - (b) Patents & deeds in the vicinity
 - (c) Aerial photographs (old & new to give a historical perspective)
 - (d) U.S.G.S. quadrangle maps (old & new to give a historical

perspective)

- (e) Master title plats (MTP's)
- (f) Acts of Congress & Public Land Orders (PLO's)
- (g) The "request for survey" (the paper requesting Cadastral to perform the survey)
- b. Canceled Surveys (federal)

Canceled surveys may have survey information (ties, recovered corners, etc.) that can be useful for your survey. These "records" are not always easily found. Places to look for canceled surveys:

- Internal server where approved plats are located, see "Canceled Surveys"

- MTP's
- References from nearby surveys
- District sheets
- Protraction diagrams
- Historical Indexes (HI's)

- c. Other Federal Agencies
 - (1) National Geodetic Survey (NGS)

Control station information maintained by NGS and can be found at:

http://www.ngs.noaa.gov/datasheet.html

(2) Bureau of Indian Affairs (BIA) (907) 271-1612

The BIA often employs surveyors to survey trust or restricted lands. Sometimes the survey is only filed at BIA. Sometimes they are recorded.

- (3) Corp of Engineers, Survey section, (907) 552-2207
- (4) Forest Service

Chugach	Anchorage	(907) 271-2500
Tongass	Ketchikan	(907) 228-6340
Tongass	Petersburg	(907) 772-5832

- (5) National Park Service, (907) 644-3428
- (6) Alaska Resource Library and Information Services (ARLIS)

Historical maps and information <u>www.arlis.org</u>

- d. State of Alaska Agencies
 - (1) Department of Natural Resources (DNR)

These records can be found at:

http://www.dnr.state.ak.us/cgi-bin/lris/landrecords

- (a) Alaska State Land Survey (ASLS) These are typically small metes and bounds surveys
- (b) Alaska State Cadastral Survey (ASCS) These are typically "rectangular survey system" type surveys
- (c) Alaska Tidelands Survey (ATS) These are typically surveys on the tidelands (submerged lands) below or at the line of mean high tide.
- (d) Control Survey (CS)
- (2) Department of Community and Regional Affairs (DCRA)

Often plats will be referenced in the various village/ community profiles, especially in reference to the utility information. The assigned village/ community engineer may have additional information. See appendix for listing.

Also reference may be made to private plats at:

http://commerce.alaska.gov/dca/profiles/profile-maps.htm

(3) Department of Transportation and Public Facilities (DOTPF)

The right-of-ways of DOTPF roads can normally be determined from:

(a) DOTPF right-of-way plans or maps

(b) DOTPF construction plans

(c) DOTPF yellow chamfered concrete pillars

DOTPF contacts:

Headquarters (Juneau) 3132 Channel Dr., Juneau, AK 99801 465-2985 800-467-6955

http://www.dot.state.ak.us/sereg/surveydata/

Northern Region (Fairbanks)

2301 Peger Rd., Fairbanks, AK 99709-5316					
451-5419	800-475-2464				
Survey	451-5450	Scott.sexton@alaska.gov			
ROW	451-5423	Johnf.b <u>ennett@alaska.gov</u>			

Central Region (Anchorage)

269-0700	800-770-526	53
Survey	269-0556	Bob.keiner@alaska.gov
As-built Plans	269-0780	Karen.puff@alaska.gov
Historical	276-2883	Tony.boneta@alaska.gov

Southeast Region (Juneau)

6860 Glacier Highway, Juneau, AK 99801-7909						
465-4540	800-575-45	40				
Survey	465-4491	Tim.reed@alaska.gov				
ROW	465-4541	Rob.murphy@alaska.gov				
ROW	465-4541	Thomas.keopple@alaska.gov				

- e. Private surveys
 - In 1973, State law required private surveys to be stamped only by a licensed Land Surveyor. A Civil Engineer stamp was no longer permissible.
 - (2) In 1986 it became a State law to submit a Monument Record of any survey monument that is set, although many private surveys before this date ARE recorded and many private surveys after this date are NOT recorded.
 - (3) Platting Authorities

Borough Planning Commission- First & second class boroughs

City Planning Commission- City in unorganized borough or third class borough

State of Alaska- Unorganized borough and remainder of State

(4) Recording Districts

Alaska is divided into 34 recording districts. Many recording districts have their offices combined in one location. See appendix for a listing of the districts and the contact information. Computerized records only go back to about 1972.

www.dnr.state.ak.us/ssd/recoff/search.cfm

"Recordings" are permanent public records. "Filings" are NOT permanent public records.

(5) Private Land Surveyors registration numbers <u>www.dced.state.ak.us/occ/</u>

Note: The Board is "AEL" and the License type is "L" To find expired licenses call: Last names starting with A-K 465-2540 Last names starting with L-Z 465-2691

f. Miscellaneous

Railroads, utility companies, mining companies, aerial photography firms, etc. often have pertinent information.

8. Private/ State Surveys

a.General

(1)Before being used in the issuance of a BLM patent, private or State surveys must be "accepted" by BLM if they are to be utilized. This is

typically accomplished by incorporating the non-federal record into a

BLM record that subsequently becomes approved by BLM.

- (2) A private or State survey that has no effect (i.e. not controlling) on a conveyance or federal boundary, should not be shown on the BLM plat, although a cor. may be tied and if so, is placed only in the field notes. Any rejected (unaccepted) corner must be tied and again, is placed only in the field notes and not on the plat drawing.
- (3) A private survey may be utilized to obtained closures after office verification of its correctness. Field verification is not necessarily required.
 - b.Acceptance of State Surveys
- (1) Official State survey records should be utilized whenever possible in compiling the information shown on rectangular survey plat(s), subject to the following conditions:
 - (i) If the State survey is entirely within and surrounded by lands under State title, the platted data may be accepted without field verification.

- (ii) If the State survey borders a title interest other than the State's, the survey may only be accepted when determined to have been performed to BLM specifications.
- (iii) A combination of BLM and State records for the area being described must meet rectangular limits and closure requirements as described in the <u>Manual</u>.
- (2) When accepted, the State survey will be shown on the BLM rectangular survey plat and further identified by the title and recordation number of the survey. Any reference to acreage or bearings and distances will reflect record information (converted to BLM standard or equivalent).
- c. Title Recovery Surveys

Officially accepted U.S. Surveys or occasionally rectangular surveys are used to accommodate title recovery parcels located on State/ private lands.

d. Private Surveys

It is now acceptable to utilize private survey records without any retracement provided they meet the criteria in the <u>Manual</u>, Sec. 9-98 Also see "Corner Acceptance" in the "Field Investigations, Retracements, and Resurveys" chapter.

B. PROTRACTION DIAGRAMS/U.S.-CANADIAN BORDER

1. Protraction Diagrams

When computing protracted positions ("all points") for a rectangular project, a check should be made of the positions given on the protraction diagrams to ensure that an error is not carried into the field work.

2. U.S.-Canadian Border

Surveys and resurveys of lands along the United States-Canadian Boundary should be in accordance with the Washington Office memorandum dated May 9, 1979, summarized as follows:

By Presidential proclamations dated June 15, 1908, and May 3, 1912, all unpatented, unappropriated public lands lying within 60 feet of the international boundary between the United States and Canada were withdrawn and set aside as a public reservation.

The following procedures for monumentation and plat preparation should be employed when surveys or resurveys of lands adjacent to the boundary are executed.

- a. During an original survey, closing corners will be established and monumented where surveyed lines intersect the international boundary. No monuments will be established on the 60-foot reservation line unless the purpose of the survey mandates the marking of the reservation line.
- b. The international boundary may be retraced. Any lost corners (requiring a dependent resurvey) are not authorized to be re-established by BLM as BLM does not have the authority to grant.
- c. The 60-foot reservation will be lotted and identified as a public reservation on the plat. The plat memorandum will contain a statement indicating that the width of the 60-foot reservation is not subject to change by retracement or resurvey.
- d. During a dependent resurvey, normal practice should be followed as far as practical. In those cases where the original survey did not lot and identify the 60-foot public reservation, the dependent resurvey should do so if no private claims would be adversely affected. The same procedures for monumentation and plat preparation, as prescribed herein for original surveys, should be followed.

C. TITLE RECOVERY SURVEYS

1. General

If the BLM inadvertently patents a piece of land prior to segregating and surveying a valid inholding, typically the title must be recovered by the government. The title recovery will be accomplished by surveying an official federal survey, typically a metes and bounds U.S. Survey.

Valid Native allotment claims on State patented land are referred to as "Aquilar Surveys" and require specific stipulations to be followed. Also see Chap III. Aquilar Surveys

2. Procedures

- a. If an approved U.S. Survey straddles a surveyed rectangular boundary, a supplemental plat will be created lotting the survey if the U.S. Survey was adequately tied to the rectangular <u>and</u> the State concurs. If both parties agree that the record information is not adequate to create a supplemental plat, the BLM will return to the field, retrace the necessary rectangular lines, set corners, and lot the U.S. Survey.
- b. If a parcel straddles a surveyed rectangular boundary between State patent and State Tentative Approval (TA), BLM will retrace the surveyed rectangular boundary, survey the portion of the parcel falling on lands patented to the State as a U.S. Survey lot and the portion falling on TA'd lands as another U.S. Survey lot, and set the intersection corners.
- c. If a parcel straddles a surveyed rectangular boundary where one side is TA'd and the other has been conveyed by Interim Conveyance to an ANCSA corporation, or remains in federal ownership, BLM will retrace the surveyed rectangular boundary, survey the parcel as a U.S. Survey, set corners at intersection, and lot the U.S. Survey.
- d. If a parcel appears to straddle an <u>unsurveyed</u> rectangular boundary, BLM will survey the parcel as a U.S. Survey. The rectangular boundary will be surveyed in the future when it is scheduled. When the township or section line is surveyed, BLM will set corners at intersection and lot the U.S. Survey if title recovery is still pending.

D. SURVEYING "PATENTED" LANDS

- 1. Surveying "patented" lands
 - a. There must be a federal interest for us to survey any "patented" land.
 - Land may be patented and the government is considering acquiring the land.
 - The government may be a trustee in the land.
 - The government may be responsible for restricted deed land.

- b. If there is a federal interest, new subdivisions, new lottings, new acreages, etc. may be performed but it is best not to change the land identifiers if possible as normally there is an original deed that will be clouded if there is a new description. Always check with the land owner/ representative first.
- 2. Monumenting patented lands
 - a. If monuments are required between different patented lands, they should only be set where the original plat indicates a monument could have been set. The boundary line should be surveyed and all calls on the line should be made. (esp. water bodies) There should be no partition lines, no remeanders, no new acreage, and no new lotting. Blank lines are run across accreted lands. A plat and carefully worded field notes describing the lines surveyed and corners established should be created.
 - b. Because of riparian rights, set monuments only where the original plat indicates a monument could have been set. In other words, if a "corner position" originally fell in water and the water body has accreted, relicted, etc., where now that computed corner position is upland, the corner should not be monumented, as a corner that was originally not there can not now appear. If the monument were to be set, it may define accreted land erroneously.
 - c. Be sure to understand the orders in your special instructions as to whether you are surveying the boundaries of the patent or only monumenting the corners of the patent.
 - d. Certain lands (e.g. Indian Trust Lands), the government is authorized to survey to the extent requested by BIA as long as there is a federal interest. This may involve returning new acreages, identifying accretions, erosions, or relictions. Consult with BIA first.

3. "<u>Aguilar Surveys</u>"

a. These are Native allotment claims that had the land erroneously patented to the State of Alaska. <u>Ethel Aguilar, et al v. United States of America</u> requires the government to recover and reconvey title and survey these

Native allotments according to specific procedures.

- b. They are typically surveyed as federal U.S. Surveys and NOT as State A.S.L.S. surveys as was done in the past.
- c. Check the land status of your survey when surveying a Native allotment. If it is patented to the State it is probably an "Aguilar Survey" you are performing.
- d. Native allotment claims on ANCSA patented land will be surveyed as federal U.S. Surveys. ANCSA has provisions and provides authority to survey. Although, the ANCSA land owner <u>must</u> give concurrence to survey the Native allotment.
- e. There are specific platting requirements for "Aguilar Surveys". See Chapter III, Platting, in the "Misc. section.

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E. <u>SURVEY PROCEDURES</u>

1. Closure

- a. Generally, the limit of closure for all surveys executed in Alaska is now 1:4000 (townsites are 1:5000), provided that the limit of closure in either latitude or departure is not less than 1:2828. See Sec. 3-215 of the <u>Manual</u>. However, if there is a need for greater accuracy in the work to be performed, it will be specified in the special instructions. Also, the approving authority may raise the value depending on the value of the land, records to be closed against, and the local practice.
- b. Only "closed figures" may have errors of closures. A line in itself does not have a "closure." Line(s) may have "limits." See Secs. 3-27 to 3-36,

of the Manual.

- c. When a new survey abuts an existing survey, the closure of the new survey must be analyzed. Additional retracement or resurvey is not to be performed when acceptable closures can be obtained using the record of existing surveys. When an existing survey is subdivided, it is necessary to compute closure for all and only the federal interest lots or aliquot parts created, thus the final plat must be contemplated.
- d. The 2009 Manual now provides for the limited utilization of private records to obtain closure. See Manual secs. 9-92, 9-98, and 9-99.
- e. Also see "Field Investigations, Retracements, and Resurveys" in this chapter, for limits of closure when a new bearing and distance is to be returned on a previously surveyed line.

2. Precision

- a. Cadastral surveyors should maintain a degree of precision as high as justified by the <u>Manual</u> and special instructions. The most efficient surveyor is not the one who is extremely precise but is the one who surveys with sufficient precision and accuracy to serve the purpose of the survey without waste of time or money.
- b. Where the survey (e.g. townsites) dictates a higher precision than the nearest minute and the nearest link or when a higher degree of precision can be obtained without additional cost, then employment of appropriate

methods and instruments are encouraged.

3. Adjustments

Field measured bearings and distances are not utilized (adjusted) only in the following circumstances:

- When "holding the record" on a retraced line.
- Traversing subdivisional lines when subdividing a 1/16 section.
- Surveying a portion of a section.
- Subdividing a previously surveyed section when not all the section subdivisional lines are described.

4. Accuracy

If random lines or temporary survey positions are used and a "corner move" is made to the true point, the following should be observed at a minimum:

- a. A magnetic hand compass with the proper declination, if < 3 lks.
- b. A minimum 6 in. diam. compass with a least read of $\frac{1}{2}$ degree and mounted on a tripod or staff, if < 1 chain.
- c. Theodolite, transit, or GNSS, if >1 chain.
- d. Distances should be obtained with a steel tape, EDM, or GNSS if > 3 lks. A cloth tape is acceptable for distances < 3 lks.
- 5. Global Navigation Satellite Systems (GNSS)
 - a. Geographic positions to be reported utilizing GNSS should be performed in accordance with the BLM publication <u>Standards for the Positional</u> <u>Accuracy of Cadastral Surveys When Using Global Navigation Satellite</u> <u>Systems (GNSS)</u>, dated February 23, 2009.
 - b. All control networks utilizing GNSS should have at least 3 vectors (solutions).
 - c. All positioned corners utilizing GNSS (set and recovered) should have at

least 2 vectors (solutions).

F. ORIGINAL RECTANGULAR SURVEYS AND TOWNSHIP SUBDIVISION

1. General

- a. When land has been patented under the rectangular system, traditional <u>Manual</u> procedures will control further subdivision.
- b. When surveying townships that are within public lands, State tentative approval, or ANCSA interim conveyance, the following guidelines will be used for original rectangular surveys and in subdividing previously surveyed townships. It should be acknowledged that all of these guidelines may not be applicable to all possible survey situations. Every situation should be thoroughly studied and evaluated based on its own set of circumstances.
- c. All corners established on township subdivisional and township lines will be set on the latitudinal curve.
- d. All corners established on subdivision of section lines will be on the latitudinal curve.
- 2. Original Rectangular Surveys
 - a. Rectangular surveys for State and Native selected lands will continue to be surveyed and platted on their exterior boundaries on a township-bytownship basis. Only the exterior boundaries of the area requested, on a township by township basis, will be surveyed without any interior subdivision thereof. An exception to this is when the State has two adjoining selections under different authorities, i.e. Community Grant, Mental Health, or General Purpose lands. Each type of selection should be surveyed separately. Monumentation is required at angle points and at intervals of approximately two miles on straight lines.

- A small angle break along two section lines of a couple of degrees or even less at a section corner does NOT need to be monumented to satisfy a State or Native land selection survey requirement of "all angle points must be monumented."
- c. Intersecting (crossing) lines, typically on overlapping mineral surveys, shall not be monumented unless required to satisfy a monumentation interval requirement. These intersection points are not what ANCSA intended when it states to monument "all angle points",
- d. A corner of minimum control (not a crossing closing corner) should not be monumented unless required to satisfy a monumentation interval requirement. (e.g. a rectangular survey line crossing a U.S. Survey)
- e. Even if the selection extends beyond the township, the township line(s) within the selection will be surveyed. Acreage will not be returned for areas closed by protracted township lines. (All bounds of a surveyed area must be surveyed or have been surveyed.)
- f. Monumentation shall be required at both ends of a township line that is not a selection boundary. A two-mile monumentation interval is also required.
- g. If a section line between two monumented (set or recovered) section corners is 1 mile or less, then the line will be returned as surveyed, provided no additional field work is required. (e.g. intersected surveys or intervening corners)
- h. In order to get your original ANCSA or State township survey related to the National Spatial Reference System (NSRS) when utilizing a protraction diagram based on NAD27 coordinates, there are different possible procedures depending upon the area you are working at and the size of the project. There is no "one best method." Prior to going to the field, you should NADCON your control in the area and see how it "fits." Following are some possible field procedures:
 - Tie representative NAD27 control over the project area. Evaluate for an average shift between NAD27 and NAD83. Apply this "average shift" into your GNSS software

- (2.) NADCON the protraction diagram NAD27 coordinates to NAD83. Set the township corners at these NAD83 positions. Determine your township boundary line bearings and distances. Place all the error in the last mile to the north and west on the township boundary lines.
- (3.) A variation of the previous- Perform this on a larger scale of 16 townships based on baselines and principal meridians.
- (4.) Select a township in the central portion of the project and NADCON its NAD27 position to NAD83. From this point, project protracted bearings and distances throughout the project.
- (5.) NADCON every corner position.

3. Extension Surveys

- a. When surveying original rectangular, abutting existing rectangular surveys, one must consider what the original land selection was based on. esp. protraction
- b. An attempt to get back to protracted positions should be made as soon as practicable, not necessarily as soon as possible. Generally, the method resulting in the most regular sections should be used.

4. Township Completion Surveys (ANCSA only)

When only part of a township is selected, that portion of the township that would normally remain as unsurveyed land, should be surveyed and reported as such. Only the minimum monumentation and meandering to accomplish this requirement is necessary. When applying this standard, exercise extreme caution. The following minimum criteria should be used to determine the cost versus benefit for <u>each</u> partially selected township within the group.

- a. If the probabilities of additional land selections within a township are unlikely because the selecting party is close to reaching full entitlement or any other reason, the unsurveyed land should remain as such.
- b. If surveying the unselected land would add an amount approaching 10% to the cost of surveying the township, the additional work should not be done. This guideline is dependent on the amount of work performed within an individual township and should be applied with appropriate economies of scale.

5. Unmonumented "paper platted" surveys

- a. These types of surveys, usually encompassing many townships, have no monuments, no field survey, and are typically defined by latitudes and longitudes on the plat, along with an acreage in parenthesis for each township.
- b. If the latitude and longitude agree with the protraction diagram value, these surveys should be monumented and surveyed the same as original survey methods.
- c. Also see 'Labeling Township Boundaries" in the Field Survey Plat Preparation chapter.

G. SUBDIVISION

- 1. Types of Subdivisions
 - a. Rectangular Survey
 - Townships can be comprised of sections, tracts, or parcels.
 - Sections can be subdivided into aliquot parts or lots.
 Aliquot part descriptions in a surveyed section do not require survey.
 - Tracts are not subdivided normally.
 - Parcels are not subdivided normally.
 - Lots can be subdivided into lots or aliquot parts.
 - b. U.S. Survey
 - U.S. Surveys can be comprised of lots, blocks, tracts, or parcels.
 - Parcels are not subdivided normally.
 - Tracts can be comprised of lots or blocks.
 - Blocks can be subdivided into lots.
 - Lots can be subdivided into lots.
 - c. Parcels

Parcels are typically utilized to identify non-public land, such as submerged land or accreted land.

Acquired (or re-acquired) land is typically identified by "lots".

2. <u>Subdividing Previously Surveyed Townships</u>

- a. Where no surveyed or surveyed-by-protraction section lines are shown on an approved plat, the subdivision of the township will be executed as an extension survey or as a completion survey as defined in Chapter 3 of the <u>Manual</u>.
- b. In a surveyed and approved township that has been subdivided by protracted section lines, there are generally two options when the township requires subdivision by survey.
 - (1) Re-establishment of unmonumented corner positions
 - (a) The lands contained in a certain section of the original survey and the lands contained in the corresponding section of the dependent resurvey are identical. See <u>Manual</u> sec. 5-10. The officially accepted plat must be the basis for subsequent township subdivision. If there is no evidence of subsequent survey work, the corner positions should be proportioned based on the accepted plat.
 - (b) The proportioning method should be used to protect any land conveyances that have been made by patent, quitclaim deed,

State Tentative Approval (TA), ANCSA Interim Conveyance (IC), or if there are any other acquired rights referenced to the accepted rectangular survey.

- (c) All controlling township corners of the township being subdivided should be monumented.
- (d) When determining protracted section corner positions on the interior of the township:
 - (1) At the intersection of a surveyed line and a protracted line, the position normally should be controlled from corners on the surveyed line only.
 - (2) At the intersection of protracted lines, the position should be re-established using proportionate measurement.
 - (3) Proportion across any water whether a dashed line crosses

the water body or not.

Although one should generally not proportion across tidal inlets, bays, and bayous or most large, named, non-flowing water bodies. It is acceptable to proportion across tidal streams.

- (e) When determining section corner positions on the exterior of the township:
 - (1) Any theoretical section corner positions on a surveyed line (solid or dashed) whether a distance is given to them or an overall distance is given over the section corner position, should be determined and utilized for control for any township subdivision.
 - (2) If a tie is shown across tidal inlets, bays, and bayous or most large, named, non-flowing water bodies, generally theoretical points should not be determined across them.
- (2) Cancellation

Where the amount of resurvey work required becomes extensive and *no public or private land transfers have occurred*, the township plat can be suspended and subsequently canceled in whole or in part upon

approval of a "new" plat. Suspension and cancellation of any plat should be thoroughly considered with all ramifications studied and proceeded with as a last resort.

Upon suspension, any new survey work will be accomplished in accordance with the <u>Manual</u>, Chapter 3, as if the land was in "unsurveyed status." Most if not all of the original survey monuments should and would be normally incorporated into the new work.

c. When subdividing a township that was surveyed by protraction (no monuments set on the interior and sometimes the exterior), all controlling township corners of the township being subdivided, should be monumented.

- 3. <u>Section Subdivision</u>
 - a. General

The determination and monumentation of only those subdivision of section lines and corners, respectively, within the quarter section which define the boundaries of federal interest lands is allowed under proper conditions where they do not compromise the integrity and quality of the survey.

- b. Procedures
 - (1) The Acts of February 11, 1805, and April 5, 1832, describe the procedures for section subdivision.
 - (2) Sections are subdivided using a constant bearing between

monuments on the latitudinal curve.

- (3) The N-S and E-W centerlines should be returned as surveyed in traditional (1/2 mile monumentation) sections.
- (4) In subdividing sections to define the boundaries of Federal Interest Lands, the use of indirect measurement techniques is allowable provided prudent surveying practices are utilized and sufficient accuracy is attained to ensure the survey is within the prescribed limits of closure. Subdivision of sections determined by computation will follow traditional <u>Manual</u> procedures. It is not necessary to traverse the section lines along which proportioning computations will occur, although this procedure still requires the search, recovery and evaluation of all evidence that may affect the survey- the onus is on the surveyor.
- (5) Other methods of determining relative positions of controlling corners may be used provided they give a sufficient degree of accuracy. These methods may include circuitous traverse routes, inertial measurement methods, or the use of the Global Navigation Satellite Systems (GNSS).
- (6) In previously surveyed sections with ½ mile monumentation, first read 3-86 of the <u>Manual</u>, although generally monument:
 - (a) The boundaries of the federal interest lands.
 - (b) The center $\frac{1}{4}$ if it is controlling.
 - (c) The $\frac{1}{4}$ corners controlling federal interest lands if the center $\frac{1}{4}$ is established.
 - (d) Meander corners, section corners, and township corners controlling federal interest lands should <u>not</u> be monumented if re-restablished, although they should be rehabilitated or remonumented if they are in poor condition.
 - (e) Additional monumentation is at the discretion of the requesting agency.
- (7) Remonument or rehabilitate any corner used as control for reestablishing federal interest corners if not up to minimum standards as outlined later in this chapter under "Field Investigations, Retracements, and Resurveys."

- c. Fractional Sections
 - (1) If any ¹/₄ corner is not previously fixed or cannot be fixed (i.e. not called for in the notes or shown on the plat) it is fractional.
 - (2) Weighted (proportionate to the line length) mean bearings are used to determine the centerline bearing where the opposite ¹/₄ corner does not exist. Arithmetic mean bearings are not used.

4. U.S. Survey Subdivision

- a. All monuments visited and used for a subdivision of a U.S. Survey should be remarked to reflect the new corner/ lot designation, as opposed to designating them. This is now the corner for which the new survey stands and of which the new plat represents.
- b. Corners not visited, but required for closure or to define the area that you are surveying, may be designated in the record as to what they represent.

H. TRUE LINE, TOPOGRAPHY, CURVES

- 1. True Line & Blazing
 - a. The surveyor will be guided by the <u>Manual</u> and special instructions as to whether and how TRUE LINE is to be run and if it needs to be marked and blazed.

Any "trueline" that is physically cut, with the land owner's permission, should be blazed.

Generally, the "true line" should always be cut between any witnessed meander corners and the true point.

- b. Protracted lines (esp. protracted section lines) are not survey lines, but merely a "contemplated plan" for future subdivision. This is not to say they should be ignored, because they are often defining the extent of acreages which may need to be protected.
- 2. Topographic Items
 - a. The topographic information collected should be considered as to the usefulness of it in finding the corner in the future or reestablishing it should it become lost.

Utility lines and similar are useful in the future for establishing or contemplating easements or right-of-ways. Topographic calls can also be useful in aerial photography applications.

b. Distances to all major changes in the character of the terrain, vegetation, ascents and descents on the line, or any unique features within 5 chains of the corner on line should be recorded. Any features within a 3 chain radius of the corner should be recorded, especially if no on-line topography was obtained.

Outer edges/banks of topography (e.g. lakes or streams) should be obtained if the feature is within the 5 chain limit of a corner, but the outer edge/ bank extends beyond it.

Do not hesitate to draw a sketch, especially where there are extensive topographic calls or unusual situations or there is any doubt about interpretation.

- c. Items of topography to be measured in the field are given in Sec. 3-223 of the <u>Manual</u>. General method of calls is as follows:
 - roads, railroads, power lines, etc., are generally measured to the centerline, <u>bear</u> two ways from point of intersection; names, widths, and composition are recorded.
- streams, creeks, nonmeanderable rivers, etc., generally measured to centerline, <u>course</u> in direction of flow; names, widths, and depths are also recorded.
- river banks or lake banks, ridges, etc., <u>bear</u> in two directions from point of intersection or meander corner; names, widths, and heights are also recorded. In regard to rivers, when facing downstream the left bank is on the left and the right bank is on the right.
- spurs <u>slope</u> in one direction.
- ravines, rills, gullies, ditches, intermittent streams, etc., <u>drain</u> in direction of flow; width and depth may also be recorded if appropriate.
- stagnant sloughs with no apparent direction of flow <u>bear</u> in two directions from point of intersection.
- d. Directions of slopes, courses of streams, etc., should be measured in the field using surveying terminology rather than as points of the mariner's compass, i.e. N. 22 ¹/₂° E. instead of NNE.
- e. Distances to all streams, lakes, ponds, etc., must be measured in the field. Record the actual distance; any rounding can occur during record preparation.

3. <u>Curves</u>

a. The field data returned for a survey having an arc or chord definition curve (railroad, highway, etc.) as part of the boundary should include the long

chord bearing and distance, radius, arc length, type (circular or spiral) and direction of curve (right or left). The central angle is optional. Normally, the arc of the curve is the actual boundary.

- b. The <u>Manual</u> requires that all angle points of a metes and bounds survey be monumented (See Section 4-4 of the <u>Manual</u>); this includes <u>all</u> PCs, PTs, PCCs, POCs, etc., on a curve boundary. If the monumentation requirement becomes "excessive," auxiliary monuments with no accessories should be used in lieu of some of the regulation "principle" monuments.
- c. If monuments exist for a DOTPF highway, the centerline may be at midpoint between the road shoulders, mid-point of the pavement, or mid-point between monuments. An analysis of the DOTPF records (plans and asbuilts) is necessary.

I. CORNER MONUMENTS, ACCESSORIES, AND REFERENCE MONUMENTS

1. Monument Characteristics

- a. A monument is a physical structure which marks the location of a corner point. The term "corner" is often used in the same sense, although more properly it is a point determined by the survey process.
- b. The regulation "principle" monument is the 28 in. stainless steel post with brass cap as described in Sec. 4-8 of the <u>Manual</u>. The following are other acceptable "principle" monuments and should be used in the following preferential order:
 - 28 in. galvanized iron post with 3 1/4 inch brass cap
 - 3 1/4 in. diam. stemmed brass tablet (for rock)
 - A non-eroding stone (e.g. granite), well marked, and of at least

1000 cubic inches. It is important to place a magnetic memorial beneath the stone.

- 5/8 or 9/16 in. diam., 9 ft. long, stainless steel sectional drive rod with 3 ¼ inch diam. brass cap
- 3/4 in. diam., 9 ft. long, aluminum sectional drive rod with $3\frac{1}{4}$

inch diam. aluminum cap

- (1) The stemmed brass tablet is typically "cemented" in a 3/4 inch diam. drilled hole in rock and anchored with either:
 - (a) An adhesive (e.g. Hilti brand HFX #284266)
 - (b) Cement (e.g. Drylok Fast Plug or Rock-Tite) may not handle a marine environment well.
- (2) If shallow subsurface rock is encountered at the corner point, the stemmed brass cap may be driven into a 1 inch O.D. (3/4

inch I.D.) galvanized water pipe, typically 12 to 18 inches long, which is "cemented" into a 1 inch diam drill hole in the rock.

- (3) Deposit a magnet or pieces of a magnet in drill holes with stemmed brass caps.
- (4) Sectional drive rod should only be used as a last resort, and when used, it should be driven to a minimum of 8 ft. in the

ground or to the point of refusal.

- c. The following are acceptable "auxiliary" monuments and should be used in the following preferential order:
 - -9/16 ins. diam., 30 ins. long, stainless steel rod, with a magnet in the top of the rod, with brass cap, 1 $\frac{1}{2}$ ins. diam.
 - -11/16 ins. diam., 24 ins. long, galvanized iron pipe, with 3 internally driven iron rods anchoring the base, with brass cap, 2 ins. diam. (Feno)
 - 5/8 ins. diam., 30 ins. long, copper coated steel rod, with brass cap, 1 ¹/₂ ins. diam.
 - 5/8 ins. diam., 30 ins. long, rebar with alum cap, 2 ins. diam.

No accessories are normally taken for "auxiliary" monuments.

See "Monument Markings" in this section.

- d. The type of monument set should take into account the terrain, soil type, chemicals in the soil, corrosive action from salt near the ocean, and other local factors. In general, a heavier monument is more stable.
- e. Any monument set on private property should have the land owners permission.
- f. Safety- When setting monuments or establishing accessories, due consideration should be given as to whether they may become a safety hazard. (e.g. monuments protruding excessively, fence posts, or anything extending out of the ground.)

2. Monument Installation, stainless steel post

- a. Flare the monument base, 90 degrees to the base, but NEVER more. Experienced corner setters, sometimes flare the monument at a 45 degree angle and the post is pounded into the ground the final 1 or 2 inches resulting in a 90 degree angle in the end.
- b. The hole for the monument should be at least 6 inches diameter and deep enough that 25 inches of the 28 inch monument is in the ground.
 Normally, the less exposure to ultraviolet, direct sunlight, and mechanical devices, the less the monument is going to move. Heat from the sun has a tendency to conduct downward on the post resulting in freeze thaw action that will gradually heave the pipe upward.
- c. A durable article should be placed at the base of the monument. This is normally a magnet in a plastic case or sometimes glass or charcoal. It should not be attractive to bears.

Most magnets are designed to be most effective if oriented in a certain direction, which is typically with the black end of the magnet case downward.

d. Backfill the hole in the same order as the material was removed. Tamp the soil firmly. Add rocks if at all possible as they really stabilize the

monument. Typically the tundra or insulation layer is the last thing placed around the monument. Almost always you will need more fill than what you removed.

"Any monument is only as stable as its backfill."

- e. Never place trash or anything else that smells or that may be attractive to bears or other wild animals near the monument or in the hole.
- f. Obtain either a legible "rubbing" or a digital photograph of the marks on the monument cap. A hard pencil, lead bullet, etc. work well for this task.

3. Monumentation Intervals & Requirements

- a. By law and MOU, most State and Native land selection surveys require not-to-exceed a 2-mile monumentation interval and monumentation at angle points on the exterior boundaries of the selection and the interior township lines.
- b. The <u>Manual</u>, sect. 10-36, requires all angle points to be monumented on a metes and bounds survey. This would include all P.C.'s, P.T.'s, etc. on a curved boundary. Should the monumentation requirement become excessive, "auxiliary" monuments, with no accessories, should be used in lieu of some of the regulation "principle" monuments.
- c. Every monumented corner, especially referenced corners (R.M.'s) should have at least one brass capped monument.
- d. "Auxiliary" monuments are used when the monumentation density

becomes excessive or unreasonable. The special instructions will normally provide for the use of "auxiliary" monumentation when the foreseeable need arises.

- "Auxiliary" monumentation is generally used when more than one monumented lot is < 2 acres or the corner has at least 2 principal monuments within 5 chs. dist.
- (2) In a contiguous multi-lot survey (e.g. a townsite or similar), it is generally preferred to have principle monuments not to exceed 10 chs. dist.
- e. Townsites should have every street intersection monumented with a "principle" monument and the adjacent block corners monumented with "auxiliary" monuments.

If the street intersection in a townsite is not monumented, the adjoining block corners should be monumented with "principle" monuments.

- f. In the unusual event that it is required to monument between two patented parcels to satisfy a monumentation requirement, monuments should only be set where the original plat indicates a monument could have been set. The boundary line should be surveyed. There should be no partition lines, remeanders, acreages, or new lottings.
- g. Monument all terminal meander corners.
- h. Meander corners established because meanderable tidal water intersects or invades a U.S. Survey or rectangular survey (not adjoining), should not be terminal and should not be monumented; rather a tie or blank line should be made indicating a straight line passing through the meander corners from the upland corners.

Although if the tidal waterway is the primary means of access, the meander corners should be monumented.

i. Monument all non-terminal meander corners on State or ANCSA selection boundaries, although not within the selection.

- j. Non-terminal meander corners on township boundaries <u>within</u> State or ANCSA selections are not required to be monumented.
- k. If your survey line crosses a meanderable water body numerous times, only the first and last meander corners should typically be monumented. There are numerous possible scenarios, although generally one should not exceed the monumentation interval of your survey with monumented meander corners. (e.g. no more than 2 monumented meander corners in a 1/2-mile interval survey line and no more than 2 monumented meander corners in a 2-mile interval survey line.)
- 1. If a retraced line has a meander corner/ witness corner in an unsafe position due to erosion,
 - (1) Set a new monument further back on line in a new position if there are original accessories remaining and leave the original monument at the original position.
 - (2) If there are no remaining original accessories and monument destruction or loss is eminent, reset the original monument further back on line. Leave the original date and add your new date.
 - (3) Set a witness point back on line, although really does not address the actual corner position.
 - (4) Set reference monuments to the true point.
- m. Intervening searched for corners in a retracement survey do not require monumentation.
- n. Also see in this same chapter:
 "Original Rectangular Surveys and Township Subdivision" section (rectangular survey angle breaks)
 "Subdivision" section (section subdivision)
 "Field Investigations, Retracements, and Resurveys" section (Corner Recoveries)
- 4. <u>Monument Markings</u>

- a. Marks are never added to a private or other government agency monument.
- b. Normally rectangular marks are not placed on U.S. Survey monuments. If there is a need for rectangular marks, then there was probably a need for a rectangular survey.
- c. Merely recovering a monument does not necessitate adding the current date. Only if the record of the corner will be changed (new accessories, changed accessory bearing or distance, monument a different depth in the ground from rehabilitating, etc.) should a new date be added. The purpose of a new date is to alert the person recovering the monument as to the latest record.
- d. In the course of retracing a survey with meandered water frontage, where there is found to be substantial accretion or erosion, the original meander corner <u>is not</u> identical with the new meander corner. Therefore, cap markings on witness corner monuments should not reflect these corner points as being common. See the diagrams on the following pages.

If you have been instructed to survey previously surveyed land and you encounter accretion, the newly accreted land may be identified as a parcel if at all or it may not have an identifier at all. See the diagram on the following page.

- e. All monuments and especially "auxiliary" monuments in particular, should have at a minimum the identification of who set the monument (i.e. BLM), the year of survey, and the usual assortment of marks identifying the corner position. The marks may be pre-cast or added by the surveyor in the field.
- f. Prior (old) dates should never be added to a recovered or remonumented corner, except when identifying an old meander corner that has accretions in front of it.
- g. The township and range are never placed on 1/16 and lesser corners, including those on a standard parallel or guide meridian or township boundary.

- h. If a township to the north is established on a standard parallel concurrently with a township to the south with the "standard" and "closing" corners established simultaneously:
 - Do not mark CC on what might typically be the closing corner
 - Do mark SC on the standard corners.
 - Add the township, range, and section on the south side of the standard corner if they are known.
- i. Meander corners on U.S. Surveys should have the meander line mark extending both inside and outside of the survey.
- j. Townsite boundary angle points should be marked with the boundary lines, townsite initials, survey No., and the date.

Townsite street intersections should be marked with a cross, townsite initials, survey No., and the date.

Townsite "principle" monument block corners (if utilized) should be marked with the lot lines, lot number, block number, tract number (if any), townsite initials, survey number, and date.

Townsite "auxiliary" monument lot and block corners should be marked with the lot lines, block number, tract number (if any), and date.

k. Also see in this same chapter "Canceled Surveys/ Amended Monuments" section.

Monument Marking Diagram Examples

Auxiliary Meander Corner (AMC)

Rectangular monument mkd.:

WC AMC

T64N R37W



U.S. Survey monument mkd.:

WC AMC



Monument Marking Diagram Examples

USS 6173 is extant & patented



Erosion

Original WCMC monument extant (either A or B is acceptable)

A. Set another monument mkd.:



B. Add marks to extant monument:





WCMC monument lost



USS 6173 is extant & patented

U.S. Survey No. 8689 or rectangular sec. 6 is your assigned original survey

Accretion

Original WCMC monument extant (monument A & B)

A. Monument record meander corner position mkd.:



B. Monument (or witness) the partition line meander corner mkd.:



AMC **S**6 T2N R3W

2010

Monument Marking Diagram Examples

USS 6173 is extant & patented

You are assigned to resurvey U.S. Survey No. 6173 because of federal interest and have been requested to place an identifier on the accreted land

Accretion

A Monument (or witness) the record meander corner position mkd.:



B. Monument (or witness) the partition line meander corner mkd.:



2010

Monument Marking Diagram Examples Secs. 17 & 18 are extant & patented

You are assigned to resurvey sec. 17 because of federal interest and have been requested to place an identifier on the accreted land

Accretion

A Monument (or witness) the record meander corner position mkd.:



B. Monument (or witness) the partition line meander corner mkd.:



5. Accessories

- a. General
 - (1) The purpose of an accessory is to reference the position of the corner

and to assist in finding it.

- (2) Generally, all monumented corners (recovered or set) should have a minimum of one accessory. Of course, a full complement of bearing trees (2 to 4 depending on the type of corner) should always be taken. Natural accessories are preferable to artificial. Where natural accessories cannot be employed, improvise- build a mound of stone, dig pits, drive a fence post, or cement a spike or magnet into a drillhole.
- (3) If the surveyor accepts a private monument, a full complement of accessories should be taken, if the corner does not have them.
- (4) When artificial accessories are taken, it is best to not use the same material as used for the corner monument in the event portions are lost or destroyed. For example, preferably do not set an aluminum rod corner monument and then use an aluminum rod with triangle for an accessory.
- (5) When accessories (recovered or taken) are tied in, the following equipment should be used at a minimum:
 - a. A magnetic hand compass with the proper declination, if the accessory distance is < 3 lks.
 - b. A minimum 6 ins. diam. compass (with the proper declination) with a least read of $\frac{1}{2}$ degree and mounted on a tripod or staff, if < 1 chain distance.
 - c. Theodolite, transit, or GNSS, if > 1 chain distance.
 - d. Distances should be obtained with a steel tape, EDM, or GNSS if > 3 lks. A cloth tape is acceptable for distances < 3 lks.
- (6) A line should be brushed from the monument to each of the accessories to aid in corner recovery, encourage accessory recovery, and for corner stability. Remember to respect private property.

- (7) The field tablet, drop sheet, rubbing, digital recording device, etc. should contain a complete and detailed description of all action taken at the corner, including the type of monument, its diameter and length, how deep it is set in the ground and how the cap is marked. If the monument cannot be set to full depth (minimum 3/4 of its length), then the reason should be stated and a mound of stone should be raised around the monument to give it support. See sec. 4-13 of the Manual and Fig. 4-1.
- (8) It is critical that before leaving the corner a second check is made to ensure that all the necessary information has been properly recorded, including the names of the crew. As an additional check, these corner descriptions can be entered into word processing software during the field survey.
- (9) Any accessories established on private property should have the land owner's permission first.
- (10) Accessories at witness corners should normally be located further away from the true point than the monument. In other words, the monument was witnessed due to some danger; therefore ensure that the accessories are at least that same distance or more from the danger.
- (11) Accessories at closing corners should be located on the same side as the line that closes upon the senior line. In other words, "outside" of the senior survey.
- (12) Native graves, ruins, archeological sites, and other similar type features should not be utilized as accessories as federal law prohibits showing these features on the plat or calling for them in the field notes.
- (13) Accessories are not taken at "auxiliary" corner monuments (30 in. stainless steel rods, rebar, etc.)

b. Bearing Trees- General

- (1) Coniferous trees should first be blazed through the cambium layer and into the xylem, then scribed on the open flat blaze with a timber scribe. The blaze should be as narrow as possible and just long enough to take the scribing. Do not use a chain saw to create the blazes, use an axe, as the blaze should be smooth. Deciduous trees should be scribed through the bark and into the cambium and <u>not</u> blazed. This is not always possible. An exception to this would be a rough barked cottonwood tree. All marks should be on the face of the tree facing the monument.
- (2) A yellow BLM bearing tree tag, completely filled out, should be affixed to the tree at eye level with 2 nails, vertically aligned. The tag is noted in the field tablet. The tag should not be nailed snug to the tree, in order that the tree can grow without "popping" the tag off.
- (3) It is recommended to drive a spike (40d nail) into the base of the tree, perpendicular to the monument at the chaining point on the right side of the tree as you face it from the corner (right side chaining point).
- (4) Snow blazes are not a <u>Manual</u> requirement. They are suggested for use in deep snow country.
- (5) Bearings and distances are measured to the root crown center of the tree. See Sec. 4-81 to 4-84 of the <u>Manual</u>. In mineral surveys, the distance is often to the face of the blaze.
- (6) If two trees are located inside of a U.S. Survey or in the same quadrant, they should be different species. If the same species, they should be different diameters and marked differently, i.e., mark one X BT or make the full scribe marks in a different order.
- (7) All trees at witness <u>corners</u> should be marked X BT. Trees at witness <u>points</u> should be fully scribed reflecting the corner that it is, including the marks WP.
- (8) All bearing trees selected for the true point for rectangular corners, even less than 1/16 corners, should be fully scribed.

- (9) All bearing trees selected should be healthy and ideally approximately 90° apart.
- (10) When a tree is fully scribed, no X is marked on the tree.
- c. Bearing Trees- U.S. Surveys
 - (1) If available, two bearing trees should be marked for each corner, one inside and one outside the survey.
 - (2) Bearing trees inside the survey, if large enough (greater than 4 inches in diameter at breast height), should be fully scribed with the corner, lot, and survey numbers.
 - (3) All trees outside of the survey and at witness corners should be marked X BT.
 - (4) In a multi-lot survey for a corner that falls on the line of another lot, the bearing tree that falls in the other lot, should be marked with the lot and survey number. (i.e. L_S___BT)

d. Bearing Objects

- (1) Bearing objects can be rocks, bedrock outcroppings, concrete slabs, steel bridge supports, guard rails, etc.
- (2) Bearing objects should be identified in the field by a description which includes type, length, width, and height above ground, and how marked. The marks, height of the marks, and location of the marks on the bearing object should be recorded.
- (3) The bearing and distance are measured to a unique point, usually an X.
- (4) The unique mark need not be an X. A drill hole in a boulder, with a galvanized spike cemented into it, could be utilized.

- e. Magnets
 - (1) Magnets encased in white plastic cases should be used as a memorial at the base of all survey posts, alongside all sectional rod type monuments, or in the drill hole of a rod or brass tablet.
 - (2) Magnets, enclosed in a plastic case, can be useful as accessories at corners where the monuments may be tampered with or removed.
 - (3) When used as an accessory, the installation depth (recommended at 1 foot), color, bearing and distance from the corner will be recorded in the field notes.
 - (4) Placement of magnets as accessories should follow the same criteria as selecting bearing trees, that is, one in and one out of the survey on U.S. Surveys or appropriate section of rectangular surveys.
 - (5) The magnets shall be used in the following order:
 - NE quadrant = Silver
 - SE quadrant = Pink
 - SW quadrant = Blue
 - NW quadrant = Orange
 - (6) They should be inserted vertically with the black end facing down for maximum detection.
 - (7) In corner recoveries, when the monument is found and there is no question as to its location, the magnets do not have to be exhumed nor detected.
- f. Triangle Marker
 - (1) When no other accessories are available, fluorescent orange triangles bolted onto 3/4 inch diameter aluminum rods may be used as

accessories to corner points. Although used extensively in the past, they are not regarded as a suitable replacement for a mound of stone, bearing object, or other more permanent accessory.

(2) If a triangle is used as an accessory to a corner monumented with a 3/4 inch diameter aluminum rod, extra care must be taken to differentiate the corner from the triangle; for example, mound of stone around one and not the other. This will avoid confusion and aid in future corner recovery, should the top portions become destroyed.

6. <u>Reference Monuments</u>

- a. A reference monument is typically established where the true point for the corner can be occupied but can not be monumented, or where the monument would be liable to destruction, or where bearing trees or bearing objects are not available. See Sec. 4-17 of the <u>Manual</u>.
- b. The true point is always "monumented" with at least a PK nail, mkd. stone, cross, etc.
- c. Reference monuments are corner accessories. Accessories are not taken for reference monuments. All accessories taken refer to the position of the corner.
- d. Reference monument marks are described in Sec. 4-71 of the <u>Manual</u>. Also see <u>Manual</u> Appendix pages 380 and 382.
- e. Reference monuments for a U.S. Survey located within the survey are fully mkd. with RM, cor. No., Lot No., U.S. Survey No., dist. to cor., date, and arrow pointing to the cor.

Reference monuments for a U.S. Survey located outside the survey are mkd. only RM, U.S. Survey No., date, and arrow pointing to the corner.

- f. Reference monument distances should be measured in links and with the distance in links and with "lks." marked on the cap.
- g. For corner trees:
 - When the corner point is occupied by a tree or a stump, the tree or stump is marked as the corner monument in accordance with Sec.
 4-52 of the <u>Manual</u>. The <u>Manual</u> refers to sound living trees; however, the provision of these sections will apply even if the tree is

dead or nearly so or if only a stump remains. Stumps at corner positions should be marked by driving an aluminum rod, length of rebar, steel fence post, railroad spike, etc., at the corner point. Reference monuments can be utilized also and will be, if the tree is dead.

- (2) A full description of the tree or stump is always required. Root-wads are another problem; it may be impractical or impossible to establish a permanent monument at the corner point. However, the point can be marked and a reference monument, bearing trees, or bearing objects can then be taken.
- h. Also see "Controlling Intermediate Corners" sec. O.4

J. MEANDERS

- 1. General
 - a. See "Corner Monuments" section in this chapter and "Islands" section in this chapter for monumentation requirements and intervals.
 - b. Meander lines are run for the purpose of ascertaining the amount of upland area to be conveyed to a claimant. A meander line creates a boundary, although it does not define the boundary, the water body itself where it is today, is the boundary.
 - c. Nontidal water is meandered at the line of Ordinary High water (OHW) and is generally located where normal upland vegetation does not exist due to the ordinary flow of the river or water body. Also consider erosion, changes in the character of the soil, "shelving", and presence of litter or debris.

If there is still a question as to where the OHW mark is after evaluating the above factors, consider the demarcation line where the value of the soil for agricultural purposes has been destroyed.

- d. Tidal water is meandered at the line of Mean High Tide (MHT) and is generally located where the water's action at different stages marks the soil with an escarpment and the edge of vegetation. See "Tidal Water" in this section.
- e. It is quite common to obtain meander courses that are too short. It is rare that courses should be less than 1 chain. An average length of 3 to 5 chains is often reasonable. Courses 10 to 15 chains and longer are not

unheard of in rectangular surveys.

- f. When meanders are obtained photogrammetrically or from an aerial platform, the accuracy should be commensurate with the survey. This has been determined to be within 24 links on rectangular township surveys and within 12 links on projects smaller than a township of the same (well defined) point as if it was determined on the ground.
- g. All meanders must begin and end at points that have been monumented and tied by your current survey. These points can be true points, so long as their respective witness corners have been tied in.
- h. Poorly defined "lakes," larger than 50 acres, which are pools of water that collect because permafrost prevents drainage, should ONLY be meandered if the meanders are obtained photogrammetrically and there is no field investigation.
- i. If the meanders are determined at a different time during the same survey, a field check of the WCMC/ MC distance should be made with the computed distance.
- j. For general planning purposes only, the 1:63360 quad. maps show double line streams on any water bodies that are greater than 2 chains wide.

2. Nonmeanderable and Nonnavigable Water Bodies

- a. When the land claimant indicates a water body as one of the boundaries of a claim, the water body should be meandered, regardless of whether or not it meets the <u>Manual</u> minimum requirements for meanderability and/or navigability. This will recognize that riparian rights attach to the parcel and provides for an easily identifiable, natural boundary.
- b. Some discretion should be exercised when claims directly opposite each other call for the water body to be handled differently. For instance, if one claimant calls for a stream to be the boundary and another claimant on the opposite side of the stream calls for the boundary to be fixed, both sides of the stream should be meandered as the boundaries.
- c. If one claimant indicates the stream as the boundary and an adjacent, but not opposite (upstream or downstream), allotment ignores the stream (does not call for it to be a boundary or meandered), the parcels should be surveyed as described by the claimant.

3. Braided Streams

The following criteria are to be used as guidelines to aid the field surveyor in making meander line determinations for braided streams.

- a. The "ordinary high water line" of a braided stream is the line defining the area that is normally swept clean of woody-type vegetation for the most part.
- b. If the distance between the outer limits of the braided stream is less than three (3) chains wide along its entirety (within the surveyed area, which is typically a township), water will not normally be segregated; however, the width of the stream above and below the surveyed area will also be taken into consideration.
- c. Shallow (less than 18 inches deep) and intermittent streams or channels without well-defined channels or banks, such as swampy or low gradient areas will not be meandered, even when more than three (3) chains wide.
- d. A braided stream" may actually only be a series of small (less than 3 ch. wide) streams with minimal flow rates and minimal sediment load (preventing accretion) which are all located in an ancient flood plain and should <u>not</u> be meandered.
- e. A braided stream must have year round water flow (unless it's ice) to be

meandered.

- f. The flow rate, volume, and whether the channels are well or ill defined should be considered.
- g. Upland vegetated islands separated by drainages less than 1 ¹/₂ chains wide should be grouped together and shown as one island. Islands should be alternatively combined with adjacent upland land masses when separated by drainages less than 1 1/2 chains wide.
- h. Generally, if there are spruce or possibly birch trees, the "gravel bar/ island" should be meandered. Great consideration should be given to meandering alder, cottonwood, or willow covered "gravel bar/ islands". Willows can grow 6 ft. in 6 months. Pay close attention to the "Islands" section of this chapter when the island arose from the bed of the water body.
- i. Gravel, sand or cobble bars should be shown as islands only when upland vegetative cover is present.
- j. Recently receding glaciers which leave large (> 3 chs. wide) "washes" and which will re-vegetate in a few years are not meandered. Consideration should be given to the stream downstream from the recently retreated glacier.
- 4. Navigable Streams

In cases where the stream has been declared navigable, it will be meandered even when less than three (3) chains wide.

- 5. Tidal Water
 - a. All tidal water is navigable.
 - b. Tidally influenced streams less than 50 lks. wide should generally not be meandered.
 - c. Tidally influenced lakes less than 2 acres should generally not be meandered.
 - d. Connecting streams less than 50 lks. wide to tidally influenced lakes greater than 2 acres should not be meandered, although the connection will be noted in the field notes.
- 6. Anabranches

- a. An anabranch extends beyond the banks of a watercourse and has its inlet (source) and outlet (terminus) on the watercourse. Generally, they should be meandered if they are susceptible to being boated by the customary boats for that area and the main watercourse was determined navigable.
- b. If non-navigable and < 3 chs. wide, do not meander the anabranch.

7. Discrepancies Between Inholding and Rectangular Meander Records

Prior to surveying inholdings that fall within a rectangular survey, plots of existing surveys should be prepared.

- a. Inholdings within approved townships should be plotted while in the field and compared with the record meanders.
 - (1) If the record meanders are documented in field notes-The inholding meanders will be compared mathematically. This necessitates the recovery of the next meander corner upstream and downstream from the inholding survey. The record meanders should be utilized if in substantial agreement with your meanders. Only that portion of the meanders at variance with the record meanders needs to be reported.
 - (2) If the record meanders (or hydrography) are photo interpreted, but only graphically depicted, and a digital record is available-

The inholding meanders will be compared digitally with the platted record meanders. This will apply whether or not the digital record is referred to in the plat memo. This necessitates the recovery of the next meander corner upstream and downstream from the inholding survey. The record meanders should be utilized if in substantial agreement with your meanders. If an official record of the record meanders is not available (the usual case), then all of the meanders between the record meander corners should be reported.

(3) If the record meanders (or hydrography) are only graphically depicted from quadrangle maps (or from a photo interpreted line but no digital file is available)-

The record meanders will be digitized and compared with the inholding meanders. As there is no official record of the record meanders, all of the meanders between the record meander corners should be reported.

If there are record meanders with no meander corners, the record meanders should still be digitized and compared with the inholding meanders. In this latter case, only meanders up to the point that the record and present day meanders intersect need to be reported.

- (4) Of course, if some of the adjoining lands are patented, an informational traverse should be performed on the meander line if it is necessary to report them.
- b. Inholdings surveyed inside a surveyed but unapproved rectangular township should be plotted in the field and compared with any preliminary meanders of the rectangular survey that are available.
 - (1) If the rectangular meanders are tabulated in draft field notes, the inholding meanders will be compared mathematically with them.
 - (2) If a group survey is to be photo interpreted, a data plot of existing surveys will be produced, and a preliminary photo interpreted meander line will be drawn on the data plot. This will be superimposed on an orthophoto of the township and made available prior to field survey. The inholding meanders will be compared with the photo-interpreted meanders.
 - (3) If a significant shift in the meanders is apparent, a check of the

location of the inholding is warranted. Minor adjustments can be ignored in the field, since rectangular meanders can be adjusted to coincide with the inholding meanders.

(4) If significant changes have occurred in the shoreline since the date of the photography, the office will be notified for further instructions. Extensive changes may require obtaining current or new photography, while additional meandering in the field may be justified if the changes are localized.

8. Partition Lines

- a. Due regard will be afforded to bona fide rights of upland owners and the method for determining partition lines should be what most equitably distributes land in front of the affected parcel(s).
- b. In apportioning frontage along accreted land, the proportionate shoreline method is generally considered to be the most equitable. Note: The original (ancient) meander line record is adjusted (balanced) first, for closure.

Deep indentations along the new water frontage are typically smoothed out and connecting lines across headlands are used to provide equity of the water frontage.

c. An alternate method is to run the partition line normal to the median line on nonnavigable water and perpendicular to the bank on navigable water. If the meander line or bank breaks bearing, bisect the angle.

A combination of perpendiculars/ normals and proportionate shoreline methods should also be considered. It is typical to use perpendiculars/ normals where there are not clearly defined or practicable starting and ending points when proportioning the frontage.

- d. If none of the above methods are suitable, consider running the partition lines normal to the present bank and even normal to the ancient bank.
- e. Proportionate areas are rarely used.
- f. When partition lines are used, they are normally <u>not</u> extensions of record bearings (i.e. "the farmer method"), unless the land is remaining in Federal ownership.
- 9. Shorespace Frontage Restrictions
 - a. Shorespace is sometimes required to be limited especially in areas valuable for harborage, landing, and wharf purposes. Sometimes the restriction is waived although often it is not like on alternate veteran Native allotments.
 - b. Shorespace restrictions are only applicable to navigable rivers.
 - c. The shorespace is measured by the longest measurement of either the latitude or departure between consecutive meander corners on a survey with cardinal lines. On non-cardinal surveys, the shorespace should be measured along a line parallel to the subdivision or survey. Also see 43C.F.R. 2094.
 - d. Different water bodies start the shorespace measurement again.

K. ISLANDS

- 1. General
 - a. All surveyed islands will be meandered. This may be accomplished with traditional bearings and distances or with a radius or diameter.
 - b. There are no so called "size limits" as to whether an island should be surveyed. An island less than 1/100 acre can in fact be meandered.

c. Any islands, arising from the bed of a navigable water body after Statehood (Jan. 3, 1959), should <u>not</u> be surveyed, as they are not owned by the Federal government.

The surveyor should not rely solely on the U.S.G.S quadrangle maps, (which are a very good source) but must also look at historical photos, vegetation, soil conditions, physical characteristics of the land, local knowledge, etc.

If there are questions as to whether a water body greater than 3 chs. wide is navigable. A request should be made immediately for a navigability determination. See "Investigative Reports" in this chapter.

If such islands are found (and not meandered) it would be proper to note this in a memorandum to the survey file and in the plat memorandum. See "Introduction" in the Field Note Writing chapter and "Islands" and "Plat Memorandum" in the Platting chapter for related information.

The methods, analyses, and procedures utilized in determining the existence/ nonexistence of emerged islands should be documented in the survey file.

2. Monumentation Criteria

a. Prior to commencement of the field work, the project should be reviewed using all available resources (quads, aerial photos, etc.) to determine the monumentation scheme.

- b. The following are some of the criteria used to determine whether to monument an island:
 - (1) Meanders determined in the field (vs. photogrammetrically)
 - (2) High land value (e.g. timber)
 - (3) Relative size
- b. When there are numerous islands being considered for monumentation, practicality should dictate some type of limit be set, such as:
 - (1) One monument per section.
 - (2) Only islands greater than a certain size should be monumented.
 - (3) Number of AMC monuments should not exceed the upland number of monuments in the township.

L. <u>CONTROL STATIONS</u>

1. <u>Recovery</u>

- a. Control stations require a full recovery description.
- b. The description should include the name of the establishing agency, the name of the station, the type of monument, how set, and how marked. If the accessories are not at variance with the published information, they do not need to be recorded. A description and the condition of any accessories should be recorded if at variance with the published information to verify the location of the control station.
- c. All accessories will be recorded and reported for all tied BLM control stations.
- d. Recovery information for National Geodetic Survey corners is valuable information for future surveyors. The appendix has a NGS recovery form and instructions for submittal.

Recovery information may also be submitted on line at:

http://ngs.noaa.gov/FORMS_PROCESSING-cgi-bin/recvy_entry_www.prl

- e. BLM established control stations are normally marked "EC" denoting "Electronic Control"
- f. Occasionally private surveyors may set control stations. Stations marked "CMI" may denote "Control Monument-Inertial" and "CMD" may denote "Control Monument- Doppler"
- 2. Datum

All cadastral surveys will be referenced to the National Spatial Reference System (NAD83).

M. <u>TIES</u>

1. Ties in General

- a. Unless a corner or a control station is close enough to a survey corner to be an accessory (less than 5 chains), it will be treated as a tie.
- b. Noncontiguous lots of U.S. Surveys do not need to be physically tied to each other if a reliable existing record ties the lots together.
- c. Any non-rectangular survey, in a township with any portion of the township surveyed, should be tied to any monument (control Station, rectangular, or U.S. Survey) that is reliably tied to that same township.
- d. Any nonrectangular survey, in a township with no portions surveyed, should be tied to the National Spatial Reference System (NAD83).

2. Ties to Control (for position or location)

- a. Normally, a tie to a control station or to a Public Land Survey System (PLSS) corner is a method of determining the relative location of a survey although not necessarily for the establishment of a precise geographic position that is tied to the National Spatial Reference System (NAD83).
- b. Ties should be cross-checked and/or traverses should be <u>closed</u>, in both position and azimuth.

Traverses run forward and backward on the same traverse line using single distance measurements and angles obtained by closing the horizon are not acceptable and do not constitute a double check of the position of the corner.

- c. It is acceptable to tie to unapproved surveys for location purposes. An effort should be made to tie to the nearest rectangular corner. If a rectangular corner falls within the survey, it is good practice to tie it. If control stations are tied, the stations should be the same ones used in establishing the rectangular survey in the area.
- d. Do not use Army Corps of Engineer (COE) control stations as they are not typically published with the N.G.S. and are out of date and substantially inaccurate.

- e. Global Navigation Satellite Systems (GNSS) ties to rectangular or horizontal control stations are limited to the following restrictions:
 - (1) If the surveyor intends to use a horizontal control station outside the township in which the survey is located to obtain a NAD27 position, the station shall be no further than nine (9) miles distant from the survey. Not applicable to C.O.R.S. stations.
 - (2) On rectangular surveys, which require the reporting of geographic positions at two different corners, a separate GNSS session for each corner should be performed.
 - (3) The rectangular survey corner or horizontal control station shall be occupied by a GNSS receiver unless physically impractical. If an eccentric point is used, it will not be farther than one (1) chain distant unless connected by closed traverse.
 - (4) The surveyor will adhere to methods and procedures which assure at least a 1:5,000 distance-relative accuracy.
 - (5) All ties, except C.O.R.S. ties, determined by the use of GNSS will be shown in the official record.

3. <u>Ties to Location Markers</u>

a. BLM location markers no longer have to be tied for the record, but may need to be tied to accurately locate the survey.

In cases where the special instructions require deviation from the land examiner's report, the surveyor is required to follow the former; it is not necessary to include a statement in the plat memorandum and/or the introduction of the field notes describing how the survey was positioned. In lieu of this statement, if there is any possibility of someone questioning how you located the survey, a letter detailing your efforts should be submitted to the survey file.

b. Some surveys require the surveyor to establish corners identical to where some entity (like BIA) has set "stakes". In these situations, the surveyor should note whether the "stake" was found and if so, fully describe it and its disposition, all in the official record.

4. Ties to Improvements

- a. When the special instructions call for improvements to be tied, all permanent improvements should be tied. In lieu of any permanent improvements, any other less substantial improvements should be tied.
- b. If no improvements are specified to be tied, the more significant improvements should be tied on smaller metes and bounds surveys.

5. Ties to Historical and Cultural Items

In accordance with the National Historic Preservation Act, 16 U.S.C 470-470w-3, the location and character of historical resources should be withheld from the public and therefore not placed in the field notes or on the plat.
N. FIELD INVESTIGATIONS, RETRACEMENTS, and RESURVEYS

1.	Field Investigation

	a.	A Field Investigation involves any of the following:
		 Identification of existing corners and acceptable points of control (marks). <u>Manual</u> 5-14, 5-33, 9-21 (6)
		(2) Collection of testimony/ collateral evidence. <u>Manual</u> 5-33, 5-37
hatwaan		(3) Re-measurement and verification of bearings & distances
between		original corners. <u>Manual</u> 3-113, 5-14, 5-33, 5-37
to		(4) Collection of any data where an official survey is not required
10		represent the data.
	b.	An Investigative Report is normally prepared. See "Investigative Reports" section in this chapter. This Investigative Report may result in subsequent Supplemental Special Instructions and resultant additional field work.
	c.	Non-BLM surveys may be "field investigated" when authorized in
		special instructions.

2. <u>Retracement (& "Holding" the Record)</u>

- a. A Retracement involves any of the following (and may include Field Investigation procedures):
 - (1) Re-measurement and verification of bearings & distances between

original corners. Manual 3-113, 5-14, 5-33, 5-37

(2) Rehabilitation of corners (remonument & new accessories) <u>Manual 5-14</u>

(3) Setting of temporary stakes at lost cor. positions. <u>Manual</u> 5-14, 5-37, 7-4, 9-21(6)

- b. A retracement, in itself, is typically a field procedure preceding a potential resurvey, and no official record of just the retracement is generally created in this case. If no official record is created and if a need exists to preserve the retracement data, it may be filed in the survey/group file. Some retracement examples where a (complete) official record is generally not created:
 - (1) A line run to determine an index correction for survey work in the area.
 - (2) A line run to only determine an azimuth.
 - (3) A line is traversed in the field in order to find existing corners and only the corners are written-up in a record (field notes), but the lines are not (plat).

- c. If a substantial agreement exists between the retracement data and the record values, the record governs. See Sec. 3-39 of the <u>Manual.</u>
- d. The record of an approved official survey should be incorporated into a new survey without retracing the approved survey if your survey closes, although the surveyor with proper authority from the special instructions may retrace a line if there is reason to question it. The surveyor must be able to defend and justify the decision made and it must be well documented in the record. It is at the surveyor's discretion, but generally try to hold the record if the measured values are in substantial agreement with the record. A section/township must be "regular" and must have a limit of closure not to exceed 1:2828 in latitude or departure. See Secs. 3-37, 3-39, 3-34, 3-50, and 3-215 of the Manual.
- e. A retracement does not include the restoration of lost corners or the reblazing of lines.
- f. Independent azimuth determinations are required as a basis of bearing for all surveys, both original and resurveys. Retracement of record lines without a new azimuth determination is acceptable as a last resort and only during prolonged periods of inclement weather or equipment problems. Geodetic inverses of record control stations or Global Navigation Satellite Systems (GNSS) positions are acceptable.
- g. A non-BLM survey can be "retraced". See Sec 5-5 of the Manual.

- 3. Dependent Resurvey
 - a. A Dependent Resurvey involves any of the following (and may include Retracement and/or Field Investigation procedures):
 - (1) Acceptance of local cors. (on previously officially surveyed

lines)

<u>Manual</u> 5-37, 6-45

dependent cors.

(2) Proportionment of found discrepancies between inter-<u>Manual</u> 5-36, 5-38, 7-5

(3) Restoration of lost cors. Manual 5-14, 7-3

(4) Establish uncalled cors. on a previously surveyed line Manual 5-49, 9-27 (2)

(5) Official re-marking of original lines Manual 5-1, 5-36

(6) Re-establishment of original lines Man. 5-10

(7) Technical record is broadened from the retracement & properly

presented

Manual 5-1, 5-13, 5-47

- b. A dependent resurvey involves the retracement and remarking of existing survey lines. Lines are retraced <u>and</u> lost or obliterated corners are reestablished based on the original record. This also includes the monumentation of corners not previously monumented but represented in the record (intervening corners).
- c. The intent of a dependent resurvey is to reestablish the lines of the original survey in their true original position according to the best available evidence.

Sometimes, unique restoration methods may need to be employed:

- Testimony
- Short ties
- Utilization of occupation lines
- Multiple controlling features (e.g. Sec. 7-59 Manual)

If evidence supports a deviation from the general rules of proportioning, the surveyor should formally contact the office with findings and recommendations. Documentation concerning departure from normal procedures is required.

- d. Merely recovering a W.C.M.C. and determining the true point for a terminal meander corner (normally at record bearing and distance) does <u>not</u> constitute a dependent resurvey.
- e. The subdivision of a previously unsubdivided section is <u>not</u> a dependent resurvey, it is a subdivision. <u>Manual</u> 5-5
- f. The subdivision of a township with protracted sections and areas is <u>not</u> a dependent resurvey, it is a subdivision.
- g. An unapproved survey may be dependently resurveyed. The history of surveys must state the survey is unapproved.
- h. Lost corners should always be re-established between found corners. Do not proportion beyond a found monument. e.g. when a witness corner monument falls on line between its true point and another corner.
- i. Only BLM surveys can be "dependently resurveyed." Manual sec. 5-10, 5-18

4. Grant Boundary Adjustment

- a. The meanders are not used in a Grant Boundary Adjustment and are normally not used for any type of corner restoration.
- b. Lost terminal meander corners on metes and bounds surveys are NOT re-established with the Grant Boundary Adjustment method. Record bearing and distance is used

from the next extant "inland corner", which is quite often a W.C.M.C.

5. Corner Recoveries & Monumentation

a. Corners recovered in a resurvey, or tied, should be remonumented if less substantial than the minimum requirements as specified in the "Monumentation Characteristics" in this chapter for monumentation, except for 5/8 ins. diam alum. rod monuments.

If rod type primary monuments are "jacked" out of the ground more than 2 feet, they should be replaced with a standard post monument if the ground is suitable.

If post type monuments are projecting more than 7 ins., they should be rehabilitated and reset deeper in the ground or encircled with a mound of stone.

A well marked stone of at least 1000 cubic inches is acceptable.

b. Private Corner Remonumentation

There are many factors to consider when deciding whether to remonument a non-BLM corner or not, such as how long has the monument been there, stability of the ground, how deep in the ground, firmness in the ground, use by other surveyors or land owners, proximity to other corners, etc.

Although generally:

(1) At a corner that we normally would set a principle monument and it <u>is not</u> bordering federal interest lands -

A private corner well monumented with at least a rebar and a fully marked metal cap (minimum LS # and corner designation) is the minimum acceptable.

(2) At a corner that we normally would set a principle monument and <u>it is</u> on the boundary of federal interest lands -

A private corner well monumented with the equivalent of a BLM "principle" monument, with fully marked cap is the minimum acceptable.

- (3) At a corner that we normally would set an auxiliary monument-A private corner well monumented with at least a rebar and a well marked cap (minimum LS #) is the minimum acceptable.
- (4) Numerous private corners, as typically found in a multi-lot subdivision, on a line between controlling corners, do not need to be remonumented.
- c. If distant controlling corners are needed, the intervening corners do not require monumentation.
- d. For a remonumented corner, normally the recovered monument (federal, state, or private) is buried beneath or deposited inverted alongside the new monument.
- e. If stone monuments are left in place, a magnet should be buried alongside.
- f. If less than the original complement of accessories is remaining, new accessories should be taken.
- g. Any changes from the record should be noted, such as new topography, cultural features, corner location description, etc.
- h. Bearing tree tags should always be added to any trees that are tagless.
- i. In townsite surveys, only the corners bounding on federal interest lands and controlling street intersection (or adjacent block corners if the street intersection is not monumented) should be monumented.

- j. Also see "Monumentation Intervals & Requirements" in this chapter.
- k. General Corner Recovery (& Set) Checklist: (see next page) (Cut it out, laminate, & carry in the field)

- 1. Names of corner recovery crew?
- 2. Date of recovery?
- 3. <u>RECOVERED MONUMENT</u> does the data agree with the record?
 - * Do NOT state "As per record". Obtain new measurements & descriptions.
 - Material: post, pipe, rod, rebar, etc.
 - stainless, iron, PVC, alum., galvanized steel, etc. cap? brass, alum., plastic, none, etc. cap diam.
 - Diameter (O.D.) of monument?
 - Type (granite, basalt, etc.) and dimensions (L x W x H) of rocks
 - Loose or firmly set?
 - Is it leaning? Direction of lean?
 - How far projecting?

Projecting > 7 ins., rehabilitate or clearly explain why it was not? Alum rod monuments projecting > 2 ft., rehabilitated with a post?

- Corner marks written down?

- Rubbing or photograph of the cap marks taken?
- All visible marks on wood posts described and on which face mkd.?
- Stones < 1000 cubic inches replaced with a stainless steel post?
- Wood posts replaced with a stainless steel post?
- Memorials at base of post for original and remonumented corners?
- Magnet buried alongside any extant monument that does not have one?
- 4. <u>RECOVERED ACCESSORY</u> does the data agree with the record?
 - * Do NOT state "As per record". Obtain new measurements & descriptions.
 - If accessory not found, does it state that it was searched for?
 - No hand compass bearings permitted > 3 lks. See "Survey Procedures" in this chap.
 - If a staff compass was used, is the declination noted?
 - Measuring point (edge or center) to a mound of stone stated?
 - Stated whether magnet accessories where recovered or not? (not required) If recovered, state: depth, color, B&D, & disposition
 - All triangles on alum rods require full recoveries (esp. rod diam., & height)
 - All fiberglass cones require full recoveries
 - All recovered accessories must be independently measured to.
 - All recovered accessories must be fully described:
 - Bearing tree species?
 - Diam. at breast height?
 - Health? standing dead, fallen
 - Condition of blaze: fully healed, mostly healed, partially healed, open
 - Visible scribe marks?
 - Bearing objects require:
 - material, length, width, height above ground, location of marks, visible marks
 - Are pits recovered? If not found, does it state that?
 - Mounds of earth or stone must have a base and height dimension
- 5. <u>NEW/ REMONUMENTED CORNERS</u> and new accessories require complete descriptions - Is the original monument missing or in poor condition? Replace it.
 - Replacement trees obtained for dead bearing trees?
 - If none are available, so state.
 - Bearing trees and bearing objects are preferred over magnets.
 - Pits rehabilitated if necessary?
- 6. Pertinent topography obtained within a 5 ch. on line and 3 ch. radius of the corner?
- 7. Is the current date added to the BLM cap where the record has been changed?

6. Distant Accessories/ Electronic Control Stations (E.C's)

Generally, survey corners along a surveyed line will be used to re-establish lost corners. Only accessories, such as bearing trees, or other accessories that are within 5 chs. dist. will be used to re-establish cor. positions. Distant ties from E.C. stations and similar type control will normally be used secondarily to other controlling corners on surveyed lines.

7. "Stair-Step" Surveys

- a. A "stair-step" survey is when only certain lines within a township are surveyed, typically stair-stepping its way on aliquot part lines through the township. The remaining portions of the township are either surveyed by protraction down to at least the section level, surveyed as one large area, or left unsurveyed.
- b. A lost corner on a "stairstep" survey will be restored after a complete analysis of all methods of restoration is made, using the method which places the corner most near its original position and that protects any bonafide rights.
- c. For a lost corner at an angle point on the surveyed boundary of a "stairstep" survey, the following methods should be considered in the following priority:
 - (1) Two-point control is recommended in Sec. 7-14 of the <u>Manual</u> for lost rectangular corners originally established from two directions only.
 - (2) Double proportionate measurement (for section corners) is supported by protecting the acreages, if and when they are shown. (e.g. a plat with surveyed by protraction section lines with section acreages)
 - (3) The broken boundary method is supported by restoring corners based upon the same methods as used in their establishment. See Secs. 3-125 and 7-51 & 7-53 of the Manual.

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8. <u>Corner Acceptance</u>

a. The extent of corner recovery of a private or State survey to be considered for acceptance into the official record is a judgment made by the field surveyor. Not all "controlling" corners must be recovered in every situation. In other words, to accept a center quarter section corner, not all of the section quarter corners have to be recovered and tied.

- b. The <u>Manual</u> discusses acceptance of corners extensively in Chapter 6, Resurveys and Evidence. Also see "Prior to the Field Survey" section in this chapter (Private/ State surveys).
- c. The following should be considered when evaluating local (private) corners for acceptance:
 - (1) Was the corner established by a surveyor who was qualified to perform land surveys, according to local regulations?
 - (2) Is the record complete or are there ambiguities which can not satisfactorily be resolved?
 - (3) Was the corner established using proper control and proper procedures?
 - (4) Were the areas returned on the official plat protected?
 - (5) How long has the corner been in place and has it been relied upon by local landowners to define their boundaries?
 - (6) Has the corner been used by other surveyors?
 - (7) Has the corner been used in deeds to convey land?
 - (8) Are "errors" in the position minor technical differences or gross error?
 - (9) Is the federal interest land public domain, reacquired, or reconveyed?
 - (10) Can you defend your decision if challenged? On what basis?
 - (11) Is your decision to accept OR reject well documented?
- d. No marks should ever be added or changed on any non-BLM monument.

9. Intersecting Non-Rectangular Surveys

- a. When rectangular survey lines intersect the boundaries of a nonrectangular survey it is necessary to retrace the intersected boundaries in order to determine the point of intersection. The retracement values are then incorporated with the record values in order to determine a closure of <u>the rectangular area being surveyed</u>. When checking for closure, only those section(s) that enclose/ adjoin the non-rectangular survey should be used, as opposed to the entire township.
- b. The special instructions will address the extent of the retracement for closure. In some instances, it may be desirable to retrace additional lines of the non-rectangular survey for lotting purposes, in which case additional instructions and/or authority will be necessary. See Sec. 3-77 of the <u>Manual</u>.

10. Record vs. Found Survey Lines

A new bearing and distance should be returned for a surveyed line that is resurveyed when the error of closure for the <u>area surveyed</u> exceeds <u>Manual</u> limits. Lines do not have closure errors.

11. Unapproved Rectangular Surveys

a. If a survey is tied to substandard monumentation on an approved or unapproved rectangular survey, the corner should be rehabilitated or remonumented and new accessories taken, if necessary. No more additional accessories are required than originally taken. b. If the unapproved corner is "lost," it is acceptable to "reestablish" it with new special instructions issued under the original rectangular Group instructions.

O. CONTROLLING INTERMEDIATE MONUMENTS

- 1. Witness Corners
 - a. The <u>Manual</u> (Sec. 4-16) now calls for witness corners to be established within a 10 chain radius of the true point. It is preferable to set the witness corner "on line" as this greatly aids the land owner in defining their boundary line "marks" and more closely follows the spirit of the Act of February 11, 1805. If there is not a safe place for a witness corner on the survey line, a witness corner off-line within 10 chains of the true point should be used. In the absence of a safe place for a witness corner, a witness point should be established on one (or both) of the lines as close as practical to the true point.
 - b. When establishing witness corners to closing corners, the witness corner should be placed on the closing line.
 - c. One should never set a witness corner beyond the position for another corner (e.g. a section cor.) that could be monumented. Beware when section corners fall close to meander corners which are witnessed.
 - d. Corners, other than those identified in the plan-of-survey (and section corners) should not be witnessed. If the true point can not be witnessed within 10 chs., then a witness point should be established. In other words, do not monument or witness a ¼ section corner, if the plan-of-survey identified every other section corner on a straight line to be monumented.

e. Witness corners to auxiliary meander corners are marked with an arrow pointing to the true point. See the diagrams in the Monument Markings section of this Chapter.

2. <u>Re-establishment of True Points from Witness Corners</u>

An important point in re-establishing the true point from a witness corner is to follow in the foot steps of the original surveyor and determine the true point at its original position.

The following methods are generally used to re-establish the true point from a witness corner. Other methods may be used if the evidence justifies a deviation. Any deviations require a thorough and complete justification/ documentation in the official record.

- a. For off-line witness corners, the true point is reestablished at record bearing and distance.
- b. For on-line witness corners on the township boundary for corners which would normally be single proportioned such as 1/4 corners and section corners on township and range lines, the true point is proportioned between existing monuments.
- c. For witness corners on section subdivisional lines to corners on the township boundary, the true point is determined by projecting through the witness corner, record distance.
- d. For witness corners to interior section corners or township corners, line

should be projected through the witness corner, record distance, which may result in a bearing break at the true point.

- e. For witness corners on subdivision of section lines to corners on the section boundary, the true point is determined by projecting through the witness corner, record distance. e.g. W.C on E-W centerline to ¹/₄ cor.
- f. For witness corners to the center ¹/₄ or any interior section subdivisional corner, the true point is determined by projecting through the witness corner, record distance.
- g. For a terminal meander corner, the true point is established at record bearing and distance from the witness corner monument.
- h. For a witness corner to a nonriparian corner of a metes and bounds survey, the true point is established by projecting through the witness corner, record distance.

3. Witness Points

- a. Unless otherwise specified in the special instructions, witness points will be established on all lines of a metes and bounds survey that exceed 45 chains in length, regardless of the fact that a witness corner monument may exist at a point which makes the distance between monuments less than 45 chains.
- b. When there is more than one witness point on a line, the witness points should be numbered in ascending order (e.g. W.P.-1, W.P.-2) in order to differentiate between them. The numbering should be reflected on the monument and the bearing trees.
- c. When surveying a line that is mostly unmonumentable as typically happens in areas with glaciers, no more than one witness point per normal monumentation interval should be established. e.g. one witness point per 2-miles (or one between angle points) with a 2 mile monumentation interval requirement.
- d. Also see the Witness Corners section in this Chapter for when witness points should be used instead of witness corners.

4. <u>Reference Monuments</u>

a. It is recommended to not set reference monuments on a surveyed line.

b. Ordinarily reference monuments that were set on a line of the survey should not

be treated as a "mark by the original surveyor" on that line unless the contrary can be shown.

- c. Monumenting the centerline of a highway
 - (1) If there is a regulation (principle) monument at the centerline of the

highway,

establish 2 accessories.

- (2) If there is a non-regulation (non-principle) monument at the centerline (e.g. spike, nail, or rebar) establish one reference monument and one accessory.
- 5. Line Trees

Contrary to what many believe, line trees are perfectly acceptable to call, mark and record in the record.

6. <u>Closing Corners/ Corners of Minimum Control/ Intersection Corners</u>

- a. Only those corners actually established by intersection with the standard parallel rather than by protracted position shall be considered as closing corners.
- b. Closing corners on metes and bounds surveys and crossing closing corners are now referred to as intersection points and do not normally require monumentation. A careful look at land status and primarily the adequacy of the required minimum monumentation interval, will determine whether monumentation is required or not.
- c. All township and section corners on a standard parallel, referring to the townships to the south, will not be considered corners of minimum

control if they were set at protracted position and during the same survey using the same control that was used to establish the standard corners. In effect, these corners will have as much control on the standard parallel as the standard corners have. See Section 7-18 of the <u>Manual</u>.

- d. If a corner has been called and marked as a closing corner and you retrace the senior line and find the "closing corner" on the line, it is recommended that the "CC" marks be removed from the cap and the field notes state that the corner is now at the point of intersection and no longer functions as a closing corner.
- e. If a metes and bounds survey (U.S. Survey or Mineral Survey) lying across a line of the rectangular survey is executed after the rectangular survey, no rectangular crossing closing corners are normally established. However, if the metes and bounds survey is existent at the time the rectangular survey is executed, intersection corners should be established and may be monumented to satisfy a monumentation interval. If the metes and bounds survey and the rectangular survey are surveyed concurrently, the rectangular survey will establish unmonumented intersection points with the metes and bounds survey.
- f. Intersecting lines of overlapping mineral surveys should normally <u>never</u> be monumented.

P. INVESTIGATIVE REPORTS/ SURVEYS

1. General

It is important to document all actions relative to your survey. This includes all correspondence, reports, memoranda, to and from the field surveyor.

This information is important in the event that your survey must be

defended. It should show what was done and known, and why certain actions were taken in particular situations.

The surveyor's Investigative Report will become part of the official

survey file.

- 2. Situations Requiring Documentation:
 - a. The surveyors authority has been exceeded or needs to be exceeded. Typically this happens when unpredictable field conditions result in the special instructions being inapplicable. This requires a formal Investigative report.
 - b. Likelihood of the survey being protested. This requires a formal Investigative report.
 - c. Any correspondence or information exchange between the Special Instructions unit, Review unit, the office, or third parties.
 - d. If yourself, another Surveyor, or the Reviewer has any question on what you did, then it probably should have been documented.
- 3. <u>Amended/ Supplemental Special Instructions</u>
 - a. Amended special instructions are required when items in the special instructions must be <u>changed</u>. The first set is not numbered. The second set is numbered- i.e. Amended Special Instructions No. 2
 - b. Supplemental special instructions are required when work is <u>added</u> to what you are authorized to perform under your existing special instructions. The first set is not numbered. The second set is numberedi.e. Supplemental Special Instructions No. 2
 - c. If amended or supplemental instructions are required, they do not need to be dated or approved prior to completion of the field survey. Although they should have a date referenced in the amended/ supplemental instructions prior to the completion date of the field survey. This will often be the date of your investigative report.

4. Report Requirements

Generally the report should include at a minimum: (Also see Manual 5-33)

- a. Standard memoranda format with:
 - Office code and subject function No., group No., and state (upper right corner)
 - Date
 - Addressed to the individual as specified in the special instructions. This

is normally the Chief Cadastral Surveyor.

- From the assigned surveyor, with your title
- Subject should have survey/ group No., T., R., & Mer.
- b. Introduction
 - State the purpose of the report and the main points
- c. History
 - State the complete history of all prior surveys
 - State information on local surveys/ corners or lack thereof, sources, and effort put forth searching for them.
 - Any other pertinent or relevant information
- d. Body
 - Present all facts and details of the investigation
 - Land status
 - Statements of witnesses or interested land owners
 - Include all information and evidence acquired and state the reliability of it
- e. Conclusions
 - Alternate solutions and the effects of each
 - Conflicts or anticipated protests
- f. Recommendations
 - Should be clear and logical
 - Preferably supported by and referenced to the <u>Manual</u> or other authority
- g. Signature
 - Very important to be signed and dated
 - Use blue ink to differentiate the original
 - Should be the assigned and responsible surveyor
- h. Sketches/ Diagrams
 - Ideally make the same size as the report (8 $\frac{1}{2}$ x 11 ins.) for ease of reproduction
 - Best to use shading, dashes, dots as color does not reproduce handily
 - Photographs (black & white is usually adequate)
 - Include all copies of all private survey plats, statements and other data

i. Keep a copy for your records.

5. BIA Investigative Reports

- a. A narrative Investigation Report is prepared along with a Field Diagram, both of which depict BIA requested information not found in the official survey. Information from the official record may be included to lend continuity to the report.
- b. Address the report to "BIA Deputy Director Trust Services".
- c. The Investigative report should be prepared on regular (bond) paper, the same as used for the field notes.
- d. The Field Diagram is typically on a 19 x 24 inch sheet but $8\frac{1}{2} \times 11$ inch bond paper can be utilized for smaller projects. This is an attachment to the Investigative Report.
- e. Photographs are placed on $8\frac{1}{2} \times 11$ inch bond paper. This is an attachment to the Investigative Report.
- f. The Report and Field Diagram should be prepared in black and white in a PDF on a disk, along with a paper copy.
- g. Encroachments should have a perpendicular distance from the boundary line to the far point of the encroachment.
- h. Normally encroachments of utility lines, trails, roads, clearings, etc. should also have an acreage determined of the cleared area made for the encroachment. These areas are typically used for trespass compensation purposes.
- 6. Documenting the Survey File
 - a. The "survey file" is also known as the "group file". It contains all the data and correspondence prior to, during, and after the survey. It is kept indefinitely. Old survey files are eventually sent to the federal archives.
 - b. Any correspondence or information less formal than the Investigative Report should also be documented in the survey file.
 - c. Any changes made to a survey from those provided for in the special instructions, but still within the scope of the special instructions, should include

	- Date & type of communication (verbal, email, written)
	- Persons involved in the decision
	- Explanation for change
	- Any follow-up required (other surveys affected, etc.)
survey file.	d. Relevant electronic mail should be printed out and documented in the
units)	 e. Items typically found in the survey file: Request for survey Special instructions Correspondence between Conveyances Field Examiners Cadastral (Planning, Special Instructions, Review, & Field Surveys)
unito)	

f. The Field Surveyor should ensure (physically) that the pertinent documentation for the survey file, actually made it to the survey file. A copy of this documentation should also be placed in the field returns envelope

7. Affidavits

- a. It is important to document knowledge from local people when they provide information pertinent to a survey. This is typically information concerning where a corner used to be, fences, or other features defining a corner or a boundary.
- b. Documentation should include:
 - Person's name, address, and approximate age
 - Short statement as to the reason for their expertise
 - Legal description of the corner
 - Knowledge of the corner or boundary in their own words.
 - They should emphasize the physical evidence.
 - Ensure they know what they are swearing to
 - Names of others who might have knowledge of the same area
 - Signature and date
 - Notarize the signature if a notary is available
- c. The affidavit should be prepared on official field note paper for

inclusion into the official record. The surveyor should prepare the document from the local person's written or verbal statements.

- d. The affidavit should be filed:
 - The original in the official original field notes.
 - A copy in the field returns envelope.
 - A copy in the survey file.
- e. See appendix for examples.

Q. FIELD CORRECTIONS

- 1. General
 - a. A "field correction" is anytime additional field work is required after the surveyor has left the project site.
 - b. There are two types of field corrections:
 - (1) Corrections that must be accomplished prior to completing the preparation of the final records. (e.g. cor. move)
 - (2) Corrections that can wait until after the final records have been prepared. (e.g. cap marking)
 - c. All field corrections will normally be scheduled for completion with the regularly scheduled work for the following field season. Individual corrections will be evaluated on a case-by case basis and will be assigned a priority level by the Planning unit (AK-927).
 - d. When performing field corrections, monuments established or replaced will normally be marked with the original survey date. Deviations from this will be specified in the correction memorandum.
- 2. Process
 - a. When an error is found by the Field Surveyor or Reviewer, they will prepare a detailed correction memorandum stating specifically what is required to be corrected. The memorandum is sent to the Chief, Branch of Planning (AK-927).

A courtesy copy is also be sent to the Chief, Branch of Field Surveys

(AK-921), Section Chief, Field Surveys (AK-921), Chief, Survey Review (AK-925), the field survey envelope, and the survey file.

An envelope containing all the information necessary to execute the correction is submitted to the Chief, Branch of Planning (AK-927).

- b. Any other errors found, (e.g. errors in existing approved surveys), that may require rectification should be noted in the correction memorandum.
- c. The survey should continue to be processed and submitted to Review, as Review should look for any further errors.
- d. The Chief, Branch of Planning, Chief, Branch of Field Surveys, and Chief, Branch of Review should all review their courtesy copies of the correction memorandum and ensure that indeed the correction is warranted and is indeed worthy of correcting.
- e. The correction is then transmitted to Field Surveys (AK-921).
- f. The correction is formally assigned to a surveyor.
- g. After the correction is performed, the field surveyor should prepare documentation to the effect that the correction was completed. It is then submitted to Review (AK-925) and a copy of the surveyor's documentation should be sent to the survey file.
- 3. Data Required

It needs to be remembered that the surveyor that originally performed the survey is often not the same individual that will be assigned to perform the correction. Therefore, clear and detailed information about the correction is required.

The following information is required:

- a. The correction memorandum describing the necessary correction in detail; general location, Township, Range and Meridian; access (if known).
- b. A quadrangle map indicating the location of the correction, plus a field sketch, if necessary.
- c. Record survey data, control, preliminary plats, field notes, geographic positions of corners, digital data, point files, etc.

- d. Any other pertinent information that may aid in making the correction.
- e. All information will be placed in an envelope, labeled with the Group No. or U.S. Survey No., Township and Range, and general location.

R. CANCELED SURVEYS/ AMENDED MONUMENTS

1. General

- a. It is a rare event when an approved survey is canceled or monuments amended. The following procedures should be followed if you are assigned to cancel (i.e. destroy) the survey or amend it.
 - (1) Amended surveys normally have the marks "AM" and the current date added to the original monument marks, and then buried in place.
 - (2) Canceled surveys usually have the monuments destroyed leaving no evidence of the corner position.

In certain circumstances, if the monument of the cancelled survey can function as a reference monument for a subsequent survey, the original marks can be removed and the monument re-marked as a reference monument.

(3) All evidence of the accessories for an amended or canceled survey

should be

destroyed.

- (4) The disposition of all monuments and accessories should be completely recorded for inclusion in the survey file.
- (5) Canceled or amended monuments and ties to them are recorded and placed

only in the field notes and not on the plat drawing.

S. MINERAL SURVEYS

- 1. General
 - a. The "Location" of mineral claims must be surveyed/located by a registered land surveyor. The actual mineral survey must be surveyed by a Deputy Mineral Surveyor that is appointed (or "deputized") to the position by the BLM. Typically the location survey and mineral survey (often called the "patent survey") are performed by the same surveyor.
 - b. The Deputy Mineral Surveyor performs the mineral survey with special instructions issued by BLM and the survey notes and plat are reviewed and must be approved and accepted by BLM.
 - c. Mineral surveys and claims are important to the Cadastral Surveyor and typically used to:
 - (1) Segregate or exclude the mineral survey from your surveyed area.

- (2) Segregate a located but unsurveyed mineral claim from your surveyed area.
- d. Be aware that there is also a type of survey that is NOT a mineral survey, nor a rectangular survey- but a Mine Survey. They are rare. Alaska has a couple of Mine Surveys called Coal Surveys. Coal Surveys are assigned U.S. Survey Numbers.

Also see "Prior to the Field Survey, Survey Records" section in this chapter.

- e. All measurements are in feet, although if you are segregating a mineral survey from the area you are surveying, the unit of measure should be commensurate with the area returned. i.e. If your survey is returning acres, report the measurements in chains. Normally chains are reported to the 1/1000 of a chain to more nearly equal the mineral survey feet distance.
- f. Accessory distances on mineral surveys are normally to a nail in the center of an "X" on the face of the blaze. The field notes should state "to the X" if the distance is indeed to the X.
- g. Mineral surveys (both loads & placers) can and often do overlap. These intersection points are rarely if ever monumented.
- h. Patented mineral surveys can NOT be canceled.
- i. Do not assume that a mineral survey can be used to convey land. They generally can not because they are "different" than a land patent and might convey extra-lateral rights as opposed to subsurface rights.

2. Types of Mineral Surveys

- a. Lode Claims
 - (1) Created by the Act of July 26, 1866
 - (2) A mineral deposit in place. There is typically a mineral vein (or lode line) that can be mined as long as it outcrops in the claim. This results in the claim having subsurface extra-lateral rights.
 - (3) Claim size is 600 (right-angle width) x 1500 ft. End lines must be parallel.

- b. Placer Claims
 - (1) Created by the Act of July 9, 1870
 - (2) A mineral deposit in unconsolidated material. There are no subsurface extra-lateral rights.
 - (3) Claim is metes and bounds or aliquot part description. Acreage can not exceed 20 acres for each claim. Eight claims can be put together to form an Association" of up to 160 acres.
- c. Mill Sites
 - (1) Created by the Act of May 10, 1872 (The "General Mining Law")
 - (2) A site to mill the ore. Associated with lode claims.
 - (3) Metes and bounds description. Can not exceed 5 acres.
- d. Tunnel Sites
 - (1) Created by the Act of May 10, 1872 (The "General Mining Law")
 - (2) A site for a "blind lode" for "prospecting rights" only. Can not be patented.
 - (3) Claim size is 1500 (right-angle width) x 3000 ft. End lines must be parallel.

3. <u>Retracement/ Dependent Resurvey</u>

a. Placers and Millsites- lost corner restoration

There is no single best method, but generally, if there is not any significant deviation, the Grant Boundary Adjustment method is used.

- b. Lodes- lost corner restoration
 - (1) Most weight is generally given to the restoration method that maintains parallel end lines.
 - (2) Short ties (if they were actually made and not computed) are sometimes the best method.
 - (3) Record bearing and distance (& maintaining parallel end lines)
 - (4) Record angle from the end line and record distance on the side line
 - (5) Record angles from the side line and record dist. on the end lines.
 - (6) Grant Boundary
 - (7) Bearing –bearing intersect using parallel end and side lines
- c. Monument markings
 - (1) The main idea is to have a uniquely identified monument with unique marks. Some creativity may be required.
 - (2) Marks should include:
 - (a) Corner No. of claim e.g. C2
 - (b) Claim name e.g. No. 1 Below Anvil Placer Claim" would be mkd. N1BAPC

The claim name may or may not include the words "placer", "claim", or "lode". See the Mineral survey field notes certificate of approval for the proper mineral survey claim name if there is variations in the record.

(c) Mineral Survey No. e.g. MS 1373

(d) Multiple claim survey lines

If the claims overlap or numerous claim lines intersect at one point, a method utilized to distinguish the various claim lines is to make the senior claim lines longer than the junior lines on the monument cap.

CHAPTER II. FIELD NOTE WRITING

A. GENERAL GUIDELINES

1. General Responsibilities and Standardization

- a. Cadastral survey field notes are the technical, detailed written record of the survey. The basic data shown on the plat, consisting of directions and lengths of lines and areas, are based upon and supported by the field notes; the importance of properly prepared field notes cannot be too strongly emphasized. Preparing the written record is as an important part of the surveyors' duties and responsibility as the execution of the field work. Chapter IX of the Manual should be studied thoroughly by the field surveyor.
- b. Consistency is important. All of the surveys as a whole build upon and support one another and have done so for over 200 years. It is for this reason and for those that must defend our surveys in the future, a consistent format is critical for proper legal interpretation. On the contrary, due to the innumerable variation of conditions encountered in the execution of a field survey, no two surveys are alike, and variations are inevitable.
- c. The field surveyor is responsible for turning in a complete and accurate automated field note record. No major revisions or corrections should be necessary in the review process.
- d. It is essential that the field notes show all details of the survey together with a full description of the methods employed. Justification for actions that depart from general procedures should be documented in the field notes and/or placed in the official survey file. This is particularly important when it is necessary to depart from normal procedures in any part of the survey.
- e. Surveys may be written concurrently. Common lines and corners are to be totally described in ONLY one set of field notes and referenced ONLY in the other survey field notes.

2. Assignment

Assignment Instructions are issued to one or more persons or may be issued to one person with one or more persons as associates. Any of these persons <u>may</u> <u>sign</u> the Certificate of Survey individually, provided they executed the survey.

3. Formats & Paper

a. General

- (1) The field note paper is $8\frac{1}{2} \times 11$ inches.
- (2) Both the original and duplicate are bond paper, 20# 25% cotton rag.
- (3) The recommended font is New Courier 10 point, non-proportional.
- (4) The maximum number of lines on a page excluding the page title is 52. The maximum number of total lines including the page title is 59.
- (5) The original and duplicate field notes should be prepared on both sides of the paper, including the title page and index diagram.
- (6) The words "Original" and "Duplicate" should be Aerial 32 point. It is preferable to stamp the words with a rubber stamp as it further ensures that the duplicate copy is in fact a duplicate copy.
- (7) It is preferable to print the notes out twice as opposed to photocopying.

4. Abbreviations

a. Generally, only those abbreviations in Sec. 9-11 of the <u>Manual</u> should be used. Other abbreviations which are acceptable and typically used are:

alum.aluminumNAD 27North American Datum 27 (1927 Datum) or other datumsLLotBl or BlkBlock

- b. Where two or more township units are grouped in a description, the plural abbreviation "Tps." is used when the townships have the same number north or south of the base line, except when referencing a guide meridian.
 (e.g. Tps. 2 N., Rs. 2 and 3 W.)
- c. Where two or more range units are grouped in a description, the singular abbreviation "R." is used when the range has the same number east or west of the reference meridian.

(e.g. Tps. 4 and 5 N., R. 3 E.)

5. <u>Uncategorized Procedures</u>

- a. Never start a sentence with an abbreviated word, except for the quadrant reference at the beginning of a line.
- b. The terms "hereinbefore described" or "heretofore described" refer to the monument description and not the corner description. The term "hereinafter described" is normally not utilized as a corner should be completely described when it is first encountered.
- c. When describing an identical line in the body of U.S. Survey field notes, describe the line in the direction that you and the common line are going. e.g.

".... on line 1-2, identical with line 4-3,"

- d. When describing a corner that has been rehabilitated or remonumented, and the phrase "At the corner point" is used, there should be no abbreviations.
- e. If the term "bears" is used in conjunction with a cardinal direction, spell out that cardinal direction (i.e. do not abbreviate)
- f. Unlike United States Surveys being called "U.S. Surveys", mineral surveys in America are simply called "Mineral Surveys" without the U.S. preceding.
- g. The term "blank line" refers to a Public Land Survey System (PLSS) survey line which typically passes across a meanderable body of water, accreted land, or a previously established Grant or Reservation where no intermediate controlling corners are contemplated to be established.
- h. The term "fractional section" or "fractional township", either of which has one or more irregular exterior boundaries, is not used or referenced in the final records. It is merely a descriptor used in correspondence or problem resolution.
- i. "Adjacent" is close but not touching.

"Adjoining" is touching.

j. Especially when dealing with highways:

"Each side" connotes both sides.

"Either side" can be inferred to mean one side.

k. Theoretical Point- The point can not be established, as it falls in the water or other unsurveyable location; or it falls on a blank line.

Calculated Point- The point, in theory, can be established in the field. B. <u>TITLE PAGE</u> (Cover Page)

- 1. <u>Requirements</u>
 - a. The title given to a particular set of notes must be brief but complete.
 - b. For U.S. Surveys, the title must include the U.S. Survey number; the number of lots, if there is more than one; the subtitle of dependent resurvey, if applicable; the approximate distance to the nearest village, city, or other prominent geographical feature; the geographic position of a monumented corner; and Township, Range, Meridian, and State. (See Appendix)
 - c. Generally, when referring to the nearest settlement, the terms "city" and "town" will be understood and not written. The term "village" should be used if the settlement is <u>not</u> incorporated. The State of Alaska, Department of Community and Regional Affairs, has a listing of all incorporated communities which is updated annually.
 - d. For U.S. Surveys, the geographic position (NAD83 only) is stated here. None are given for rectangular surveys at this location.
 - e. Everything on the title page down to EXECUTED BY should be fully written out and capitalized (except "U.S.", "No." and "NAD 83" or other datum); the only exception is "township", "range", etc. when space is limited. Numerical figures are not spelled out.
 - f. Everything down and to the surveyors name should be center justified. The next paragraph is left justified. The commencement and completion portion is indented and left justified.
- 2. Order
 - a. For U.S. Surveys, when resurvey is involved, the current U.S. Survey is given first, then the subtitle resurvey is given.
 - b. For rectangular surveys, the title is listed in the same order of priorities as the field notes are written. The township boundaries should be referred to

the subject township, even though in the body of the notes they may be identified as the boundary of an adjacent township.

3. Dates

All title pages will have the written and approval dates of all applicable special instructions and the assignment instructions date. The latter of which must be on or after the date of the first applicable special instructions approval date. The survey should not commence before the assignment instructions date. Also, the dates on which the survey was commenced and completed are included.

C. INDEX DIAGRAM

1. Purpose

The purpose of the index diagram is to enable users of the field notes to readily obtain survey information. This is accomplished by referencing the page numbers with the survey lines on a small scale drawing.

2. Requirements

- a. All rectangular surveys must have an index diagram. It is also preferable to have an index diagram for U.S. Surveys which are of large tracts or very complex. The index should be on a sheet of 8-1/2" x 11" archivable paper, with a 1-1/2" binding margin on the left hand edge.
- b. The index diagram should be labeled at the top of the page with the U.S. Survey No. or township, range, meridian, and state. The diagram should show all of the lines surveyed with the page number on which the record (each line) begins. Meanders and other irregular lines should be drawn. Page numbers will be placed along the surveyed lines referencing the appropriate page in the field notes. It is acceptable to have the word "meanders" with the respective page numbers listed. Normally the top of the page is considered north. A north arrow is not necessary unless the top of the page is not north. No notes will be written on the index diagram. The index page is not numbered.
- c. In congested areas a second sheet with an enlargement to clarify the area may be used, or they may be listed as shown in the <u>Manual</u>, Appendix, page 376. If a second sheet is used it will not have a page number at the top.

D. INTRODUCTION

1. General

The introduction should contain pertinent information on the execution of the survey. There should be no abbreviations except U.S., No., Tr., the N. and W., NAD 83 on the geographic position, and E. for the declination.

2. <u>Content</u>

The following information should be in the introduction and in the order shown. See Sec. 9-21 of the <u>Manual</u>.

- a. The complete history of all pertinent surveys (government and private), including concurrent surveys, cancelled surveys, supplemental plats, right-of-way maps, etc., giving the full name and title of the surveyor(s), and the year(s) of survey, starting with the earliest survey. All the BLM surveys are generally listed first. It should be indicated which lines or surveys were surveyed by each surveyor. If numerous special or mineral surveys exist which do not directly pertain to the survey, a statement that numerous special or mineral surveys have been executed within the township is sufficient. It is not necessary to state when an official survey was accepted. Control station history is not given.
 - (1) If the survey is performed under a BLM Cadastral contract, the contracted surveyor's name and state registration information should be stated, like "... surveyed under contract by John Doe, Alaska registered Land Surveyor in 1984."

The Land Surveyor's registration No. is not stated as the survey is not being performed under the Land Surveyor's license
authority, but rather under BLM authority. The Land Surveyor license is important for the contract record but not the survey record.

(2) For state or private surveys, give the name of the survey, the Surveyor's name and title, registration number, for whom the survey was performed, Recording Office and District, recording date, and plat number. These surveys should follow any official surveys. Example:

> Sunnyville Subdivision, located in the southeast quarter of section 7, was surveyed by Robert A. Smith, Alaska Registered Land Surveyor No. 7539, in 1955 and recorded as Plat No. 55-865 in the Anchorage Recording District on May 1, 1955.

(3) If a utilized survey is unapproved, it will be treated for field note writing as if it was approved. The only place that the survey will be mentioned as being unapproved is in the history of surveys. The following statement is added to the history: (See Appendix)

The plat has not been accepted as of this date.

- b. A narrative statement describing the extent of surveys represented by the field notes, beginning "These field notes describe the survey of" This description must conform with the first portion of the title page.
- c. A description of unusual survey situations and special methods or equipment used. Any unusual survey situations should be reiterated when the corner is described in the field notes.
 - (1) If the land to be surveyed was originally identified by reference to NAD27 protracted positions (e.g. a protraction diagram), the protraction diagram should be referenced. Example:

The corner positions of this survey best represent the NAD27 values as depicted on the official Bureau of Land Management Protraction Diagram No. CR 9-2, approved May 13, 1960.

The corner positions of this survey best represent the NAD27 values as depicted on the State of Alaska Protraction Diagram Grid No. CR-14-3, approved by the Bureau of Land Management on May 13, 1960.

(2) Basis of positioning corners utilizing GNSS, control networks, control stations, reference stations, NADCON conversions, etc.

Example:

All measurements were determined from the Global Navigation Satellite Systems (GNSS), static relative and real time kinematic positioning techniques; no lines were brushed or marked between corners.

The meanders were obtained using the Global Navigation Satellite Systems, utilizing post processing kinematic methods, from a helicopter platform.

(3) Bearing tree tag and nail

An aluminum tag, $4 \ge 6$ ins., was nailed to the face of each bearing tree and a nail, 6 ins. long, was driven at the base of each tree on the right side chaining point, unless otherwise noted.

(4) When subdividing a section, if all of the section subdivision lines which are required to be surveyed and returned as surveyed as shown in Chapter 3 of the <u>Man</u>. are not run, the following is stated:

> All of the subdivisional lines of the section(s) were computed using proper procedures. A thorough search was made for all evidence of any intervening corners on these computed lines. Only certain lines are actually returned as surveyed.

(5) In 2-mile monumentation interval surveys which have unmonumentable corner positions, the following is stated:

An attempt was made to monument all surveyed lines at a minimum of a two-mile interval. Where the ground was too unstable to establish a permanent monument, intervening witness point monuments were established where possible.

An attempt was made to monument all surveyed lines at a minimum of a two-mile interval. No stable ground suitable for monumentation was found on the surveyed lines or within monumentation limits in this township.

(6) In surveys that previously established location markers, something similar to the following is stated:

Aluminum rods were set as location markers in 1988 by the requesting agency to identify lands to be encompassed by this

survey. Markers were found only at the positions as described in these notes/ as shown on this plat. A thorough search was made for the remaining markers and none were found.

(7) If a BLM Location Marker was utilized, the following is stated:

The BLM Location Marker was utilized to position this survey.

(8) If emerged islands exist, utilize the following:

Islands emerged from the beds of navigable waters after the date of Statehood, January 3, 1959, are not available for survey and disposal by the Secretary of the Interior. Emerged islands are depicted on the plat of survey by dashed outlines. No legal identifier or acreage is provided. These emerged islands are shown as topographic features for identification of lands in place at time of survey.

- d. A statement that the survey was executed in accordance with the specifications set forth in the <u>Manual</u> and the special instructions. This shows that the survey was properly authorized. The approval date of the special instructions should <u>not</u> be included at this point.
- e. A description of the methods used to determine the directions of lines and reference to the true meridian. Example:

The direction and length of lines were determined by Global Navigation Satellite Systems (GNSS) Real-Time Kinematic (RTK) observations and augmented by lines projected by fore and backsights with a repeating theodolite and distances measured with electronic distance measurement. The direction of each line is with reference to the true meridian. All bearings are mean bearings. All distances are horizontal distances reduced to their sea level equivalent.

- f. In the case of a dependent resurvey, a statement regarding the extent of search made for evidence of the original survey and methods used in restoring lost or obliterated corners must be included. See Sec. 9-21 (6) of the <u>Manual</u>.
- g. The latitude and longitude of a corner and a statement as to how they were determined.
 - (1) For rectangular surveys, this is usually the southeast and northwest corners of the township or lesser area surveyed. It is preferred to report positions of opposite corners of the survey and not on corners in a

straight line. Both corners should have NAD83 positions.

- (2) For non-rectangular surveys, only one corner position is required and is reported in NAD83 only. The geographic position can be given to any corner; however, it is normally given for the same corner that is tied from for control and location purposes.
- (3) The positions should be to a monumented corner.
- (4) It is permissible to tie to a corner of an unaccepted survey.
- (5) The value should be given to a precision commensurate with the method and precision used. Normally, geographic positions are shown no finer than the nearest 1/1000 of a second for NAD83 positions.
- (6) If the geographic position is based on a tie, the tie should be shown in the record, unless it is a tie to a Continuous Operating Reference Station (C.O.R.S.).
- (7) If a tie is made to a C.O.R.S. station using traditional static base line processing or N.G.S.'s Online Positioning Users Service (O.P.U.S.), the C.O.R.S. stations and their coordinates do not have to be stated.
- (8) It is preferable to report a NAD83 geographic position based on C.O.R.S. stations with an O.P.U.S. solution.
- (9) After leaving the field, if it is determined that the GNSS data collected and downloaded utilizing OPUS does not meet the accuracy standards and it is impractical to return, the actual positional accuracy will be reported.

(continued next page)

(6) When the geographic position was determined using Global Navigation Satellite Systems (GNSS) methods, the following are example statements to use:

Note: The latest solutions utilizing the latest datum definition should reference "NAD83 (2011), epoch 2010.00"

Rectangular Survey (utilizing an O.P.U.S. solution):

The geographic positions in NAD83 (2011), epoch 2010.00, for the two corners below were determined by GNSS observations utilizing the National Geodetic Survey Online Positioning Users Service (OPUS), to a *Network Accuracy* with a maximum peak-to-peak separation for each component of the computed position, of less than or equal to 0.050 meters, semi-major axis 95% error ellipse, as defined in the Bureau of Land Management's <u>Standards for the Positional Accuracy of Cadastral Surveys When Using Global Navigation Satellite Systems (GNSS), dated February 23, 2009.</u>

The southeast corner of the township is:

Latitude: 63° 00' 00.000" North, Longitude: 153°00'00.000" West (NAD83)

The northwest corner of the township is:

Latitude: 63° 04' 00.000" North, Longitude: 153°06'00.000" West (NAD83)

or

Rectangular Survey (when not utilizing an O.P.U.S. solution):

The geographic positions in NAD83 (2011), epoch 2010.00, for the two corners below were determined by GNSS observations to a *Network Accuracy* of less than or equal to 0.050 meters, semi-major axis 95 percent error ellipse, as defined in the Bureau of Land Management's <u>Standards for the Positional Accuracy of Cadastral</u> <u>Surveys When Using Global Navigation Satellite Systems (GNSS)</u>, dated February 23, 2009.

The southeast corner of the township is:

Latitude: 63° 00' 00.000" North, Longitude: 153°00'00.000" West (NAD83)

The northwest corner of the township is:

Latitude: 63° 04' 00.000" North, Longitude: 153°06'00.000" West (NAD83)

Note: The latest solutions utilizing the latest datum definition should reference "NAD83 (2011), epoch 2010.00"

Non- Rectangular Survey (utilizing an O.P.U.S. solution):

The geographic position of corner No. 1 in NAD83 (2011), epoch 2010.00, as determined by GNSS observations utilizing the National Geodetic Survey Online Positioning Users Service (OPUS), to a *Network Accuracy* with a maximum peak-to-peak separation for each component of the computed position, of less than or equal to 0.050 meters, semi-major axis 95% error ellipse, as defined in the Bureau of Land Management's <u>Standards for the Positional Accuracy of</u> Cadastral Surveys When Using Global Navigation Satellite Systems

(GNSS), dated February 23, 2009, is:

Latitude: 63° 00' 00.000" North, Longitude: 153°00'00.000" West (NAD83)

or

Non- Rectangular Survey (when not utilizing an O.P.U.S. solution):

The geographic position of corner No. 1 in NAD83 (2011), epoch 2010.00, as determined by GNSS observations, to a *Network Accuracy* of less than or equal to 0.050 meters, semi-major axis 95 percent error ellipse, as defined in the Bureau of Land Management's <u>Standards for the Positional Accuracy of Cadastral Surveys When</u> <u>Using Global Navigation Satellite Systems (GNSS)</u>, dated February 23, 2009, is:

Latitude: 63° 00' 00.000" North, Longitude: 153°00'00.000" West (NAD83)

(11) After the field survey is completed and it is discovered that the above Network Accuracy standards are not met, then the next standard level that is met should be stated, such as 0.070 meters would be reported at the next level, or 0.100 meters.

Additional levels are:

- 0.100 meters 0.200 0.500 1.000 2.000 5.000 10.000
- h. It is optional to state the mean magnetic declination and how it was determined, although it is recommended to state it, especially if it is at variance from published sources or it is observed..
 - (1) If a U.S. Geological Survey map was used in the determination, its maker, map name, date of production, and revision are shown.
 - (2) If a GNSS Receiver with software deriving the mean magnetic declination, the declination source, such as in the following can be used:

The mean magnetic declination was derived from the U.S. Department of Defense World Magnetic Model 1995.

- (3) Sectional Aeronautical Charts are another source for determining the mean magnetic declination. The chart name and date should be referenced.
- (4) If it was observed, then that fact should be stated.
- i. A statement under the heading "Preliminary Statement" can be used in the following circumstances:
 - Referring corner descriptions to the field notes from the plat. e.g.

The bearings and distances between corners are omitted from the following field notes and are shown only on the plat. Corner descriptions are referenced from the plat to the body of these notes using a letter designator.

- subdividing a survey and designating corners and/or lots
- any unusual survey procedure requiring examination

E. <u>BODY</u>

1. General

This portion of the record is mostly transcribed from the field tablets. Quadrangle maps and aerial photographs may be useful in writing the field notes. Any aids

- 2. Page Numbers, Headings, and Subheadings
 - a. Each page of the field notes will have a page number at the center top of the page, 2 spaces down from the top. The title page and index diagram are not numbered. Under the page number, each page will have a heading centered above the ruled line, except for the field assistants and certificate pages.
 - b. Page headings should be brief, and preferably contained on one line. Approved abbreviations may be used when necessary. They should refer to the notes on the first line of that page and include either the U.S. Survey Number, Lot Number, if any, and State, or type of survey, Township and Range, Meridian, and State.
 - c. Titles are also used in the middle of the page when starting the notes of a new portion of the work. A full line is drawn across the page after these titles. This new title will then become the heading for the following page.
 - d. Do not put a title at the bottom of the page if there is no entry beneath it. A particular title should only appear one time on a page. Also, if the new title of the next portion of the field notes falls at the top of the page, just use the header at the top of the page. Do not repeat the title.
 - e. In resurveys, subtitles identifying the survey work as reestablishing or superceding surveys executed by a specific surveyor in a specific year should be used. A centered half-line is drawn across the page after a subtitle. (See <u>Manual</u>, Appendix, pages 415 and 417.)
 - f. The first letter of each abbreviation or major word should be capitalized with the remainder of the word in lower case.

3. Order

- a. General
 - (1) When both resurveys and original surveys are included in a set of notes, all the resurvey work should be written first. The resurvey portion can be written up in any order and in any direction, but try to use some logic.
 - (2) All boundaries should be completed before beginning any subdivision.
 - (3) Senior lines should be written prior to junior lines.
- b. U.S. Surveys
 - (1) U.S. Survey field notes are written in the direction of numerical sequence of the corner numbers, commencing at corner No. 1. When a U.S. Survey has 2 or more noncontiguous lots, the notes of the first lot are written in their entirety (including the meanders) before the notes of the next lot are written. Ties should be given between noncontiguous lots, unless they can be tied reliably using existing records.
 - (2) The line field notes should be terminated where a common (record) boundary is encountered and picked back up when you "leave" that common (record) boundary. This will result in "gaps" in the line(s).
 - (3) The phrase "point selected" should only be used once and when at the position on a line for a corner where the true point is not monumented (witness corner). On contiguous lots of U.S. Surveys, both corners may be selected as shown in the following example:

Point selected for the witness cor. to cor. No. 1, Lot 1, identical with the point selected for the witness cor. to cor. No. 4, Lot 2, ...

and later in Lot 2, one would say the following, as both witness corners have previously been selected:

The witness cor. to cor. No. 4, Lot 2, identical with the witness cor. to cor. No. 1, Lot 1, ...

- c. Rectangular Surveys
 - (1) Notes are normally written in order of descending importance of the lines. That order is:
 - International boundaries
 - State boundaries
 - Senior grant or reservation boundaries
 - Principal meridians
 - Base lines or standard parallels
 - Guide meridians
 - Other township boundaries
 - Subdivisional section lines
 - Subdivision of section lines
 - Rectangular lot lines
 - Other auxiliary survey lines (PLO's and Two-Mile Boundaries)
 - Adjusted meander lines
 - Median, medial, and partition lines
 - Meander lines which intersect surveyed lines
 - Lake meanders
 - Island meanders
 - Tracts (non-rectangular)
 - Informational traverses

Note: Being on the outer edge of a Meridian or Base line does not affect the order.

- (2) The general order of writing regular township boundaries is:
 - South boundary from east to west
 - East boundary from south to north
 - West boundary from south to north
 - North boundary from east to west
- (3) Township Subdivision

The order of writing the notes of a township subdivision is determined by the method of subdivision. In the normal method of subdivision, from south to north, and east to west, the notes are written by tiers of sections beginning with the east tier of sections and progressing westerly. See Figure A on page II-18.

- (4) Section Subdivision
 - (a) Section subdivision lines are written for each section subdivided in numerical order beginning with the lowest numbered section. The N-S lines are written before the E-W lines. See Figure B on page II-19.
 - (b) The rectangular "stairstep" survey with subdivisional lines and subdivision of section lines are written as continuous lines for continuity.
 - (c) Section subdivision in traditional (1/2 mile monumentation) sections, normally only requires the section centerlines and the federal interest aliquot part lines written up.

II-113

II-114

FIGURE A

FIGURE B

Once the section is subdivided into quarters, any further subdivision begins in the NE 1/4 and then continued in a clockwise direction around the section or quarter section. Each 1/16 section is completely subdivided before proceeding to the next 1/16 section; likewise each 1/4 section is completely subdivided before proceeding to the next 1/4 section.

4. Writing the Line

- a. Point of Beginning
 - (1) For rectangular surveys, only one point of beginning is written in a set of field notes and begins as "Beginning at the ..." This point should always be fully identified. A complete description is given of the newly established, recovered original, or accepted corner, unless it is previously described in a concurrently surveyed township.

Subsequent starting points within the township, use the term "From . ."

The only exception to this would be when describing islands or lakes in their entirety, each island or lake would have a "Beginning at . . ."

- (2) A boundary described with an adjoining township of the same group is labeled as "surveyed concurrently" with the adjoining township. This indicates where the information for that boundary may be found.
- (3) A previously surveyed boundary that is not being resurveyed, is labeled with the Bureau surveyor's name and the date. A statement in the field notes describes the history of the previously surveyed boundaries.
- (4) If only certain townships within a group are approved, the remaining townships are not considered as concurrent surveys. The following statement will be used to describe boundaries abutting an approved township which was surveyed under the same assignment:

"Township _____, Range ____, Meridian, Alaska, was surveyed by (surveyor's name), Cadastral Surveyor, in (date), under the same assignment for Group No. XXX, Alaska."

(5) Common corners will NOT be redescribed as recovered, but will be referenced according to Sec. 9-24, of the <u>Manual</u>, i.e., "previously described in the field notes of the survey of T.__, R.__, surveyed concurrently under this group."

- (6) The U.S. Survey No. in the header should not be repeated when referring to that survey under the same header, although lot numbers on the header are repeated on surveys under that header.
- (7) When a lot of a U.S. Survey begins and ends at the same point, the notes should start "Beginning at the point for . . . " Each lot of a multilot survey can have a "Beginning at . . . "

When a lot of a U.S. Survey begins at a point other than where it ends, the notes should start "From . . . "

- b. Bearing and Distance of the Line
 - (1) After the starting point has been appropriately identified, the direction and identification of the line being surveyed follows. Cardinal directions are spelled out in full.
 - (2) Bearings to the minute and distance to the hundredth of a chain are used, except in a townsite, where the foot unit to the hundredth is used.
 - (3) The units of the distances dictates the units of area- chains for acres and feet for square footage. On the exterior boundaries of a townsite, the chain unit to 4 decimal places is given in parenthesis along with the foot unit. (Townsites reflect both acreages and square footage.)
 - (4) When resurveying (segregating) mineral surveys, the distances should be reported to the nearest 0.001 chain.
 - (5) When using the record to close your survey, the record does not have to be repeated. It is optional to state, "Thence with the record of ..." to provide continuity for the reader of the field notes.
 - (6) All reported bearings are mean bearings.
 - (7) Actual measured bearings and distances are reported with no adjustments, unless:

Retracing a previously surveyed line and it is in substantial agreement with the record and you are "holding the record".

Subdividing a 1/16 section or lesser aliquot part

Surveying a portion of a section

(8) In special circumstances the bearings and distances (and topography) may be referred to the plat and omitted from the field note record. Whether the survey was actually "run" on the ground and the amount

of topography should be taken into consideration.

c. Topography on Surveyed Lines

- (1) The character of the terrain and type of vegetation on line follows the direction and identification of the line being surveyed.
- (2) At the appropriate distances, all major changes in character of terrain, vegetation, ascents and descents along the surveyed line should be entered into the notes.
- (3) The bearings of topography and often the distance to the call should reflect the accuracy of the measurement and the nature of the call itself. Often times a distance to the nearest 5 or 10 links or more and a bearing to the nearest 5 or 10 degrees is sufficient.

The bearings should be stated starting from north and proceed clockwise.

- (4) The terms NE, SE, SW, and NW may be used. Points of the mariners compass such as SSW should not be used. When stating more than one bearing of topographic items, it is preferred to state the bearings beginning at north and proceeding clockwise.
- (5) Sloughs, streams, creeks, etc., should be prefaced with "unnamed" only when that feature is used as a boundary of the survey, if it is not already named.
- (6) Items of topography that should be called in the field notes are given in Sec. 3-223 of the <u>Manual</u>. The following are normal items of topography and how they are treated:
 - (a) Roads, railroads, powerlines, river banks or lake shores, ridges, etc., bear in two directions from the point of intersection. Roads often have names, a width (in links or chains), composition, as well as bearings. Distances to these items are understood to be to

the center unless otherwise noted.

(b) Streams, creeks, rivers, etc., have a course, in the direction of flow. Many have a name and they all have widths in links or, if wide, in chains. Depth is optional; if noted it should be reported in inches or feet. If the water body changes course at the point of intersection, the bearing upstream may be given with the term "from" preceding that bearing.

- (c) When tying water topography on a survey line, a distance to the center is understood although it may be desirable to tie each bank/shore, especially on large or irregular water bodies, in which case the appropriate bank/shore should be identified. The right or left bank is determined by facing downstream.
- (d) <u>Spurs</u> slope in one direction.
- (e) <u>Slopes</u> slope N, E, W, S, NE, SE, SW, or NW and can be gentle, moderate, steep, etc.
- (f) <u>Ridges</u> bear; some have names and some have widths.
- (g) <u>Ravines</u>, gullies, ditches, seasonal creeks, etc. drain in the direction of flow.
- (h) <u>Stagnant sloughs</u> with no apparent flow, bear in two directions. The applicable statement "no flow" or "no flow noted" or "flow indeterminate" should be entered in the notes.
- (i) <u>Bank</u> is generally associated with sloughs, ponds, rivers, creeks, lakes, lagoons, streams, ocean, etc.
- (j) <u>Edge</u> is generally associated with swamps, ponds, vegetation changes, etc.
- (k) <u>Coast</u> is the edge of the land at mean high tide.
- (1) <u>Shore</u> is defined as the submerged land that is normally covered and uncovered by the tide.
- (m) Forest can be qualified as heavy, scattered, moderate, etc.

"Second growth" forest contains timber large enough for commercial cutting and averages about 70 years old and more.

"Reprod" is reproduction forest and has trees too small for commercial cutting, small diameter, very dense, and averaging about 10 years old and less.

"Timber" is generally considered commercially valuable as saw logs.

"Trees" are generally considered not commercially valuable as saw logs.

"Forests" contain trees and timber.

(n) <u>Tundra</u> is a type of terrain; not a soil or vegetation type.

d. Ending the Line

- (1) Lines are drawn across the page at the end of each boundary of a U.S. Survey, lot, township, township line, or section. They are also drawn between the introduction, preliminary statements, and the body of the notes and at any other place it is necessary or desirable to separate one portion of the notes from another.
- (2) A centered half-line is used in resurveys after any corner (angle point) caused by a bearing break where the line was originally described with one bearing for its entire length. After the new bearing is given, a new measurement is begun.
- (3) For "stairstep" rectangular surveys, the land, soil, timber description is given only once for each mile of line written, preferably at a monument on a section line or at a section corner.

5. Simple Curves

a. Curves, on a surveyed line, are normally described as follows:

Element	<u>Unit</u>
Curve direction	right or left
Radius	chains (nearest link)
Long chord	nearest minute (30 secs. if necessary)
	& chains to nearest tenth of link
Arc length	chains to the nearest link

It is optional to state the central angle (delta), but if given it should be to the nearest degree (preferably).

No additional information should be given. If a record exists for a given curve, the record data should be incorporated into the curve if possible.

- b. The curve information (amount and values) in the field notes should be identical with that on the plat.
- c. The following is an example of describing a curve:

Thence on line 1-2, on the arc of a circular curve to the right, having a radius of 10.00 chs., through a central angle of 31° 00', long chord bears S. $30^{\circ}00'$ E., 5.475 chs. dist.

The arc length (the surveyed line) is placed in the "chains" column on the left side of the field notes.

6. Corner Descriptions

- a. General
 - (1) All corners must be fully described. This includes: corner accessories, acceptance/rejection statement, evidence evaluation, restoration method and all other relevant information.
 - (2) If a corner is being established or re-established, the term "Point for ..." is utilized. If evidence of the corner point exists, the term "The corner of ..." is utilized.
 - (3) New corners must have type of monument, size (length and diameter), depth set or driven, type of cap, and how marked, along with a complete description of all accessories. The wording used in corner descriptions, such as extends, projects, etc. should be consistent throughout the notes. See Sec. 4-6 of the <u>Manual</u>.
 - (4) Each corner should be fully described once in a set of notes. When returning to a corner previously described under a different heading, use "hereinbefore described" or "heretofore described."

If the rectangular corner (monumented or unmonumented) has been described previously in the same set of notes, it should be described as "the cor. of . . . " rather than "point for the cor. of . . . ," except when the corner is witnessed in which case "the true point for the cor. of . . . " is used. Likewise, a previously described U.S. Survey corner utilizes "Cor. No. . . . " and "True point for cor. No. . . . "

(5) When the corner designation is changed, like when a U.S. Survey is subdivided into new lots, the corners and lines of the original survey should first be described in reference to the original survey. Once originally described, then utilize the appropriate phrase:

"This cor. now becomes cor. No. . . . "

"This cor. now also becomes cor. No. . . "

"This line now becomes . . . "

"This line now also becomes . . . "

Once the corner or line has been re-described with its new cor. description, the field notes should refer only to the new description henceforth.

If there is no need to recover and/ or describe the corners, any new corner/ lot designations can be referred to the plat.

- (6) If a witness corner is set, the notes must explain why it was necessary to witness the true point.
- (7) When describing witness points, the word "selected" is preferable although not mandatory. Try to be consistent within a set of notes.
- (8) Reestablished corners <u>must state how the position was determined</u> (i.e., at proportionate distance, at midpoint, at record bearing and distance, etc.) and have a full description of the corner.
- (9) For rectangular surveys, where closing corners are established where a survey line intersects a previously fixed boundary at a point between two extant corners, a tie is always recorded from the closing corner to the nearest regular corner on the line being closed upon. If the line intersected is not surveyed concurrently, then ties are needed in both directions. A complete description of the tied corner(s) is necessary if it has not been previously described. A tied corner that is described in another concurrent survey only needs to be identified and not redescribed. The other field notes containing the description of the corner are referenced.
- (10) A surveyor should not randomly recover and perpetuate any monument not necessary to complete the survey. However, there are occasions when this situation happens. This information is generally written as the last item in the body of the field notes and in the form of a regular recovery. Bearings and distances to other corners are not recorded in the record. If this situation does occur, it (the rehabilitation of certain corners) should be incorporated into the title page, introduction, and certificate.

b. Corner Location Description

When the running line field note topography does not adequately describe a corner location, a brief paragraph following the corner description can be used.

e.g., "Located in bottom of ravine, drains SE."

Horizontal measurements to topographic items are reported in links or chains. The dimensions of the topographic feature is normally reported in links or chains, although man-made features are generally reported in inches or feet. All vertical measurements are always in inches or feet.

e.g. "Located in a draw, 2 chs. wide, 10 ft. deep, drains E.

"Located 2 chs. West of the NW cor. of a cabin, 10×10 ft., long side extends S. 10° E."

The distance to a witnessed true point is not stated in the "Corner Location Description". The distance is found in the running line field notes (if any) and on the plat.

- 7. <u>Recovered Corners</u>
 - a. State what was found and what was done. This should include a complete description of what was recovered, type and size of monument, condition, how set, height above ground, with full and complete description of the recovered corner accessories.
 - b. If an original accessory is gone at a corner, it is not necessary to state this, unless all the accessories are gone, in which case it should be stated:

"There are no remaining accessories."

c. If the original corner accessories were not found or recorded, the following statement should be used:

"The original accessories were not searched for."

- d. If the markings on the monument agree with the record, the markings should be narratively expressed as opposed to a corner marks diagram being shown.
- e. If species, bearings or distances to recovered accessories differ from the latest record, this must be shown in the notes. Recovered corner accessories must be listed in chronological order by date of establishment

if more than one surveyor visited the corner and took accessories. Magnets used as accessories do not need to be recovered if there is no doubt as to the corner position.

- f. If no monument exists at the recovered corner the notes must state how the corner point was determined.
- g. After a recovered corner to be remonumented is described or whenever the original monument is removed from the corner point (and field referenced), state "At the corner point" followed by a description of the new monument and its new accessories.
- h. For any changes to an unapproved rectangular survey "record," the changes must be addressed in a letter to the Group file. When the unapproved rectangular survey is eventually approved, it should state exactly what has transpired, that is the approved field notes should have wording similar to (for example):

"Set an alum. rod, 5/8 ins. diam., ... and remonumented with a stainless steel post during the survey of U.S. Survey No. 8689 in 1997."

i. Recovered private corners are described similarly to:

The ¹/₄ sec. cor. of secs. 6 and 7, established in 1955 by Robert L. Smith, Alaska Registered Land Surveyor No. 7539, monumented by Smith with an iron pipe, 1 in. diam., with brass cap, 2 ins. diam., mkd. ¹/₄ S6 S7 LS7539, from which bearing trees taken by Smith

- j. Acceptance/Rejection Statements
 - (1) When collateral evidence is accepted for the position of a corner which was not established in the original survey or subsequent public land survey, or when there is no remaining evidence of the corner position, an acceptance statement is absolutely necessary in the field note record.
 - (2) The following are commonly used acceptance statements:
 - (a) Where the collateral record indicates that an original corner position has been <u>perpetuated</u> by borough surveyors, private surveyors, or another local perpetuation, the following statement can be used:

"... and is accepted as a careful and faithful perpetuation of the position of the original corner."

(b) Where a corner position has been <u>reestablished</u>, the following statement can be used:

"... and is accepted as a careful and faithful reestablishment of the position of the original corner."

 (c) Where 1/16, 1/64, or other corner positions were <u>never</u> monumented in the official record but have since been monumented by borough or private surveyors, the following type of description is an example to be used:

> "... established by proportionate methods, during the survey of Smith's Subdivision, by John Smith, Alaska Registered Land Surveyor No. 000, in 1956, and is accepted as a careful and faithful determination of the position of the corner."

(d) <u>Collateral evidence</u> strictly local in nature such as fence corners or road intersections can be written as "at the intersection of two roads," or "at the end of a fence extending N. and S." The following statement may be used to complete the description

"... and is accepted as the best available evidence of the position of the original corner."

- (e) Statements naming residents as <u>witnesses</u>, e.g., "The position is accepted by T. A. Smith and J. A. Jones," must be accompanied by an affidavit attached at the end of the body of the field notes. See Appendix for examples.
- (f) Where the record evidence of a corner position indicates the position was <u>improperly established</u> or reestablished, the description may be completed by a statement similar to:

"... was established/reestablished using improper procedures and is not utilized in the course of this survey/resurvey."

- 8. Monuments
 - a. Generally, regulation 28-inch stainless steel posts are used. The special instructions may authorize other types of monuments in rare situations. The field notes should fully describe other monuments and the reason for their use in lieu of regulation monuments.
 - b. When describing the setting of monuments the length will be given in:
 - (1) inches when less than 36 inches, or
 - (2) feet and inches or fractional feet when over 3 feet in length.

Consistency throughout the notes is the key. Recovered corners should be described in their original units of measurement.

c. Drive rod monuments should be driven to a minimum depth of 8 ft. in the ground or to the point of refusal. If the drive rod monuments are driven to the point of refusal, this fact should be stated.

- d. If new marks are added to an existing monument, this fact and a description of the markings are placed after the original bearing trees/ objects. If only the date is added, this may be expressed narratively as opposed to a corner marks diagram being shown. Also see "Accessories" (in this Chapter)
- e. If no monument was set, this fact should be stated in the notes. If required to be set by the special instructions and was not, a statement indicating the reason why it was not set must be included.
- f. The disposition of all original corner monuments, if replaced, must be stated at the end of the corner description and before the location description.
- g. The following are some typical monument descriptions:

Stainless Steel Post

Set a stainless steel post, 28 ins. long, $2\frac{1}{2}$ ins. diam., 25 ins. in the ground, with brass cap mkd.

Set a stainless steel post, 28 ins. long, 2 ¹/₂ ins. diam., 20 ins. in the ground, encircled by a **mound of stone**, 3 ft. base, 6 ins. high, with brass cap, mkd.

Set a stainless steel post, 28 ins. long, 2 ¹/₂ ins. diam., 20 ins. in the ground, encircled by a **mound of stone**, 3 ft. base, to top of brass cap mkd.

Set a stainless steel post, 28 ins. long, 2 ¹/₂ ins. diam., 25 ins. in the ground, and in a **collar of stone**, 3 ft. diam., with brass cap mkd.

Rod

Drive a flanged stainless steel rod with a magnet embedded in the top, 30 ins. long, 9/16 ins. diam., 28 ins. in the ground, with brass cap, $1\frac{1}{2}$ ins. diam., mkd.

Drive a galvanized iron pipe, 24 ins. long, 11/16 ins. diam., 22 ins. in the ground, with 3 internally driven steel rods anchoring the base, with brass cap, 2 ins. diam., mkd.

Drive a rebar, 30 ins. long, $\frac{3}{4}$ ins. diam., 28 ins. in the ground, with alum. cap, 1 $\frac{1}{2}$ ins. diam., mkd.

Drive an alum. rod, 9 ft. long, ³/₄ ins. diam., 8 ft. 6 ins. in the ground, with alum. cap mkd.

Brass Tablet

Set a brass tablet, 3 $\frac{1}{4}$ ins. diam., 3 $\frac{1}{2}$ -in. stem, in the center of a rock, 4 x 5 x 2 ft. above the ground, with top mkd.

Drive a brass tablet, 3 ¹/₄ ins. diam., 3-in. stem, on a galvanized steel pipe, 16 ins. long, 1 in. diam., driven 6 ins. in a drill hole in bedrock, 8 ins. below the surface, with top, 2 ins. above the surface, mkd.

Drive a brass tablet, $3\frac{1}{4}$ ins. diam., 3-in. stem, on a galvanized steel pipe, 16 ins. long, 1 in. diam., driven 6 ins. in a drill hole in a boulder, $2 \times 3 \times 8$ ft. above the ground, with top, 2 ins. above the surface, mkd.

Drive a brass tablet, $3\frac{1}{4}$ ins. diam., 3-in. stem, on a galvanized steel pipe, 16 ins. long, 1 in. diam., driven 6 ins. in a drill hole in bedrock, 8 ins. below the surface, encircled by a **mound of stone**, 3 ft. base to top, 2 ins. above the surface, mkd.

Drive a brass tablet, 3 ¹/₄ ins. diam., 3-in. stem, on a galvanized steel pipe, 16 ins. long, 1 in. diam., driven 6 ins. in a drill hole in bedrock, 8 ins. below the surface, and in a **collar of stone**, 3 ft. diam., with top, 2 ins. above the surface, mkd.

9. Accessories

- a. General
 - (1) Statements on recovered and set "artificial" (established by the surveyor) accessories should be written in a fashion similar to a mound of stone. This includes mounds of stone, fiberglass cones, triangles, fence posts, magnets, and barrels. This does not apply to any of the above objects when used as a memorial.
 - (2) "Natural accessories" (in place when the surveyor arrives on the scene) are formatted with the indentations as for bearing trees. This includes such objects as bearing trees, rocks, telephone poles, etc.

(3) The original corner and then its original accessories are described first, followed by any rehabilitation to the monument.

If the designation of the corner is changed or added to or the corner is rehabilitated or remonumented, the new corner description marks are described after the original accessories, but before any new accessories.

If marks are added (e.g. date) that do not change the designation of the corner, these marks are described after any new accessories.

"Artificial accessories" (fence posts, magnets, mounds of stones, etc.) are generally described after the new accessories (BT's, BO's, power poles, etc.), unless the artificial accessory was used in re-establishing the corner position.

Accessories are described prior to any memorials.

- (4) It is conventional to describe the accessory and the bearing on the first text line and to begin the second text line with the distance.
- (5) Corner accessories, regardless of type, are described starting at north and going in a clockwise direction. The direction of the line being described has no effect on the proper sequence of listing accessories.

(6) Generally, accessories should be reported to the nearest ¼ degree and ½ link. Reference monuments and XBO's may be reported to the nearest minute and link.

Bearing and distance precision to accessories should take into account:

Accuracy of the measurement

Measurement mechanism (e.g. staff compass vs. transit vs. GNSS)

Accessory type (e.g. 60 in. hemlock vs. rock XBO)

Proximity to other corners (e.g. 2 miles vs. 2 chs.)

Configuration of accessories (i.e. similar location relative to the cor.)

(7) When there are no accessories, this fact should be stated, although if some of the accessories are remaining, it is not necessary to state that some of the accessories are not remaining. Be consistent throughout the notes.

- b. Bearing Trees
 - (1) Bearing trees should be described by general species, diameter in inches, at breast height, bearings to the nearest 1/4 degree from the corner point, distance in links, and how marked.
 - (2) The most common species in mainland Alaska are black spruce, white spruce, quaking aspen, balsam poplar, cottonwood, tamarack (larch), and paper birch. Typical Southeast species also include red and yellow cedar and fir. When the species is stated, the term "tree" is not needed. It is

optional to mention that a "BT tag" was affixed to the tree.

- (3) For bark scribed bearing trees, the following style is preferred: "mkd. BT in the bark" or "bark scribed ___ BT," but be consistent throughout the notes.
- (4) If a bearing tree is snow blazed, after the description of the markings, the statement "Snow-blazed." is used.
- (5) It may help future corner recoveries by identifying which portion of the tree is marked if the tree is not "normal;" that is, if the tree has <u>boles</u> arising at ground level, or <u>trunks</u> which begin above ground level when there is more than one.
- (6) Distances to recovered bearing trees of mineral surveys when measured to the face in the original record should be recorded and described as follows:
 - " . . . _ lks. to the face of the blaze, . . . "
- (7) Sometimes spikes or nails are driven into the chaining point of a bearing tree to aid in future identification and measurement; if so a phrase similar to the following is used (if a general statement for all bearing trees is not placed in the Introduction portion of the field notes):

"... with a 40 d nail driven at the right side chaining point."

- c. Bearing Objects and Rocks
 - (1) Should be described by what they are, type, dimensions, height above ground, and how marked (normally XBO). The height of the marks may be described.
 - (2) The smallest dimension is stated first and the height last.
 - (3) The bearing and distance in links is given to the center of the marked X.
- d. Reference Monuments

Reference monuments (RM's) are described by type of monument, size, depth in ground, and narrative cap markings. See Sec. 4-71 and Appendix, pages 380 and 382 of the <u>Manual</u>.

e. Triangles and Cones

Aluminum triangles and fiberglass cones, whether in a cardinal direction from the corner point or not, are normally written as follows:

Drive an alum. rod, 11 ft. 4 ins. long, ³/₄ ins. diam., 10 ft. 6 ins. in the ground, 10 lks. NE of witness cor., with an orange alum. triangular marker bolted on the top.

The original triangular marker alum. rod, ³/₄ ins. diam., firmly set, projecting 16 ins. above the ground, 10 lks. S of witness cor., with an orange alum. triangular marker bolted on top.

The original orange fiberglass cone, 25 ins. diam. base, 4 ins. diam. top, 24 ins. high, over and wired to the iron post.

f. Barrels

In the past, orange 55-gallon drums (barrels) were often placed alongside the monument. When encountered, they should generally be described following any recovered accessories, in a statement such as:

The original orange 55-gallon drum, extending 2 ft. above ground, alongside N of iron post.

g. Fence Posts

Drive a steel fence post, 6 ft. long, 3 ft. in the ground, 2 lks. N of witness cor.

Drive a steel fence post, 6 ft. long, 3 ft. in the ground, 2 lks. NW of cor. on line.

The original steel fence post, firmly set, projecting 3 ft. above the ground, 3 lks. N of witness cor.

h. Mound of Stone

A mound of stone can encompass and support a monument or it can also be an accessory, which is separate from the monument.

Mounds of stone should be described as to the diameter of its base, its

height, and its relation to the corner point. The term "cairn" is used by other agencies; the proper term for surveyors is "mound of stone." If the mound of stone is not in the standard location, the distance should be given. All distances are to the center of the mound.

Raise a mound of stone, 4 ft. base 3 ft. high, W of witness cor.

Raise a mound of stone, 4 ft. base 3 ft. high, 12 lks. E of cor.

The original mound of stone, 3 ft. base, 2 ft. high, 10 lks. W of cor.

i. Collar of Stone

Collars of stone are similar to mounds of stone except they do not have a height. The height is the height of the stone. Only the base diam. is stated.

j. Pits

Pits are dug when no other accessories are available and the ground is sufficiently firm to support pits. Examples follow:

Dig pits, 18 x 18 x 12 ins., N and S of stainless steel post, 3 ft. dist.

Dig pits, 18 x 18 x 12 ins., NE and SW of stainless steel post, on line, 3 ft. dist.

The original pits, 18 x 18 x 12 ins., 3 ft. SW and NW of post.

The original pits, 18 x 18 x 4 ins., 3 ft. SW and NW of post; redig pits to 18 x 18 x 12 ins.

There is no remaining evidence of the original pits.

k. Magnets

If the occasion arises were a magnet(s) is used as an accessory, the following is used as a guide:

A magnet, in a silver plastic case, bears N. 45° E., 10 lks. dist., buried 1 ft. below the ground.

The magnetic accessories were not searched for.

l. Memorials

Magnets, glass, or other durable material should be used as a memorial on all corners; the following is a method of stating this:

Deposit a magnet in a white plastic case at base of stainless steel post.

Deposit broken green glass at base of stainless steel post.

Deposit magnet fragments at base of galvanized steel pipe in drill hole.

Deposit magnet fragments at base of brass tablet.

Deposit a magnet in a white plastic case and the original aluminum rod with cap, 3 ft. long, inverted, at base of stainless steel post.

Deposit a magnet in a white plastic case and the remains of the original wood post, 2 ft. long, inverted, at base of stainless steel post.

10. Cultural Features (Improvements)

a. Cultural items, buildings, etc., may be used as corner accessories and entered in the record in accessory format provided they are within 5 chains of the corner point. If greater than 5 chains, the feature should be tied as follows:

From this point, the following improvements:

The SW cor. of a frame building, 12×20 ft., bears N. $53^{\circ}20'$ E., 6.20 chs. dist., long side extends East.

The most easterly cor. of a frame building, 12×12 ft. bears N. $63^{\circ}21'$ E., 8.20 chs. dist., one side bears N. 45° E.

- b. Unless the cultural feature is cardinal, it is preferred to reference the corner as the most northerly, most easterly, etc. as opposed to NE, SE, etc.
- c. The small dimension of the feature should be given first, such as "... 8 x 20 ft." If a height is given, it should be stated after the horizontal dimensions, such as "... 8 x 20 x 4 ft. high,"
- d. Irregular shaped cultural features are sometimes encountered. The following is an example of how to describe them:

The most westerly cor. of an irregular shaped house, bears S. 74°15' E., 18.25 chs. dist.; thence in a counter-clockwise direction around the house, S. 30° E., 35 ft.; thence N. 60° E., 15 ft.; thence S. 30° E., 20 ft.; thence N. 60° E., 20 ft.; thence S. 30° W., 55 ft.; thence S. 60° W., 35 ft. to the most westerly corner.

- e. The long side bearing should be commensurate with the method that it was obtained with and is typically reported to the nearest 5 degrees.Obviously, the larger the improvement, the more important the bearing. (shed vs. a school)
- f. No Native graves, old Native housing remains, or archeological features should be noted or described. This is a federal law. Also see "Accessories" in the Field Survey Chapter.

11. Meanders

- a. All meanders used in any boundary of a survey should be tabulated as per the specimen notes in the <u>Manual</u>. There is no difference between the format of rectangular or U.S. Survey meanders.
- b. When meanderable water intersects or invades a U.S. Survey or rectangular survey, a tie or blank line connecting the meander corners should be used to indicate the intent of having a continuous straight line.
- c. Many rectangular surveys in Alaska are extremely complex due to the large number of meander courses and such few monumented corners. Many times two or more meander corners are located within the same mile of line. To accurately identify these meander corners, it is preferable that a tie to the nearest corner be shown in the notes or that the meander corner be described without a doubt as to which corner it is.
- d. Meander courses are usually tabulated in double-spaced columns. When many pages are required to list them, the courses may be single-spaced on the page.
- e. The appropriate statement, "at the line of mean high tide," when meandering tidally influenced waters, or, "at the line of ordinary high water," when meandering nontidally influenced waters, should be used.

These phrases should be used only at the end of the paragraph preceding the meanders and when describing a meander corner in the running line notes.

- f. Corners of U.S. Surveys on meanderable bodies of water are described first as survey corners and then as meander corners.
- g. Special Meander Corners (SMC's) are meander corners that fall on section subdivisional lines only.
- h. Auxiliary meander corners are used to identify a point on an island or a lake when a survey line does not cross it. They are also utilized for any rectangular meander corner that does not fall on a rectangular subdivisional line or township line. They are always located on the meander line.
- i. When (re)meandering a U.S. Survey with existing rectangular meanders, see Chapt. I "Discrepancies Between Inholding and Rectangular Meander Records" for reporting requirements.

- j. If you have to adjust the record meanders because your survey line intersects it:
 - 1. Report the adjusted meanders as "remeanders" if:
 - a. Your survey does not close against them
 - b. If not in substantial agreement with the record
 - 2. Hold record meanders if in substantial agreement

12. Islands

- a. All island acreages, no matter how small, will be reported to a minimum value of 1/100 acre.
- b. Small islands may be tied to the center and described by a radius or diameter.
- c. "Islands" that have emerged from the bed of a navigable river after Statehood (Jan. 3, 1959) are NOT noted or described in the field notes. See "Islands" and "Plat Memo" in the "Platting" chapter
- d. Rectangular Survey Islands
 - (1) For townships that are "tracted", each island (not intersected by a surveyed line) is labeled with "AMC" and a tract letter, even if it located entirely within one section.

The field notes describe the island by referencing the AMC and tract letter only, and not the section.

(2) For townships that have sections identified, the islands (not intersected by a surveyed line) are identified with "AMC" and the lot number and the section number.

The field notes describe the island by referencing the AMC, lot number and section number.

In the paragraph prefacing the meanders, reference is made to all of the sections that the island falls in (although the lot No(s) are not mentioned.)
13. <u>Ties</u>

a. General

- (1) All ties should originate from the survey.
- (2) Generally, all ties should be made to/from a monument to/from a monument. If the true point is witnessed the tie should be made to the witness corner.
- (3) Ties to control stations or corners of other surveys are entered in the field notes. There should be no ties shown on the plat that are not in the field notes.
- (4) All ties, no matter how long, are now reported as mean bearings. This includes ties along surveyed lines and ties for proportioned corners along protracted section lines in townships with protracted sections.
- (5) Ties greater than 80 chains should be reported to the nearest second, such as:

"... bears N. 53°20' 45" E., 179.65 chs. dist., ... "

(6) Ties within 5 chains distance of a corner may be given in a corner accessory format. If the distance is greater than 5 chains, the tie format is the same as the format for cultural items, but is given as a separate statement before any ties to cultural items, such as:

From this point, National Geodetic Survey triangulation station "ANVIL 1952" bears N. 45°53'30" E., 120.80 chs. dist., monumented with ...

b. BLM Location Markers

When the BLM Location Marker is utilized to position the survey, a statement in the introduction of the field notes stating this fact should be included. See "Introduction" section in this Chapter

c. Control Stations

- (1) The field note description of a control station should be complete, including the establishing agency, name of station in capital letters and in quotation marks, type of monument, condition and marks.
- (2) The accessories are not normally described, (unless it is a BLM control station) and a statement such as this is used:

Referenced as shown in the published record.

- (3) The NAD83 latitude and longitude of the station are not entered in the field notes.
- (4) The date the station was established should not be in the station name unless the establishing agency placed the date in the station name.
- (6) Examples of how to describe control stations established by different agencies are as follows:
 - Bureau of Land Management Doppler control station "GEO STA 60941"
 - National Geodetic Survey triangulation control station "ANVIL 1952"
- (7) Any station values published by National Geodetic Survey will be referred to as National Geodetic Survey control stations. This applies to the Corp of Engineers, National Oceanographic and Atmospheric Administration, Dept. of Army, BLM, or any other station accepted and published by the National Geodetic Survey.

14. Dependent Resurvey

- a. It is always necessary to fully retrace a dependently resurveyed line, although only the controlling features (corners, water boundaries, topography, and other BLM and private surveys) which affect the position of the corner being (re)established, need to be reported in the field note record.
- b. When these intervening features are not required in the new field note record (because they are not controlling), the record can be accommodated by either:
 - (1) A tie along the survey line which in essence "skips over" the unneeded features.
 - (2) "Running line" field notes incorporating the control lines (connecting ties or connecting lines).
- c. A statement for each tie or control line is tailored and placed in a paragraph immediately after the tie/ label to describe the extent of the work, such as:

This control line was fully retraced and no evidence of intervening corners was found.

This control line was fully retraced and no evidence of intervening corners or points of control were found. There was no administrative need to tie record calls or topography.

This control line was fully retraced and the intervening corners were not utilized as they were not controlling. There was no administrative need to tie other record calls or topography.

This control line was fully retraced to determine the bearing and distance between monumented controlling corners. There was no administrative need to tie unmonumented corners or other calls of record.

d. Corners are established at proportionate measurement only when the corner was previously called for on the plat or in the notes and there is a distance to proportion with.

15. Referring Field Notes to the Plat

- a. When a survey is straight forward and not complex, portions of the field notes can be referred to the plat in an "abbreviated field note" format. See appendix. Also see "Introduction" (in this Chapter).
- b. Townsites and certain other surveys may refer all or a portion of the survey to the plat and omit the details from the field notes. Townsite surveys normally show only the exterior boundaries and any retracement or resurvey in the field notes with the remaining portion referred to the plat. The following paragraphs or variations of them are usually used in the body of the notes:

All details as to the subdivision into blocks, lots, and streets, bearings and lengths of lines, widths of streets, boundaries and areas of blocks and lots, interior witness corners, names of streets, and numbers of lots and blocks are carried to the plat and are omitted from this field note record.

Unless otherwise shown, all block boundaries are parallel to the adjacent street centerline.

Unless otherwise shown, all monumented street centerline intersections, points on line, and angle points are monumented with stainless steel posts, 28 ins. long, 2-1/2 ins. diam., and set 12 ins. below the ground surface, with brass cap marked with the survey number, townsite initials, tract letter, a cross for the true point, and the date.

Unless otherwise shown, all block and lot corners are monumented with a flanged stainless steel rod with a magnet embedded in the top, 30 ins. long, 9/16 ins. diam., 28 ins. in the ground, with brass cap, 1 ¹/₂ ins. diam., marked with the appropriate tract, block and lot lines, letter, and numbers.

c. When all of the survey information can be adequately described on one

plat, field notes are not necessary, and a "plat only" record should be prepared. "Plat only" preparation is covered in Chapter III.

F. GENERAL DESCRIPTION

- 1. A general description must be included in the field notes of every survey.
- 2. There should be no abbreviations except for "U.S." and "No." Numerical figures are not spelled out.
- 3. The following items are a guide to the material to be included in the general description.
 - a. The general location of the survey and its proximity to towns, reservations, etc. The distances to these locative features are to the nearest edge of the feature. The proximity of a survey in relationship to a village, city, or town, should match the description on the title page. The township(s) the survey is located in should also be stated. Following is an example:

This survey is situated on the right bank of Kwikpak Pass, approximately 14 miles northwesterly from the village of Hamilton, Alaska, within Townships 28 and 29 South, Range 29 West, Kateel River Meridian, Alaska.

- b. The general terrain with classification as to mountainous, rolling, level, tundra, etc. The range of elevations above sea level may be included.
- c. Predominate drainage(s).
- d. A description of the timber and vegetation.
- e. A description of the soil.
- f. Access to and within the survey.
- g. Any other pertinent items, including:

- Roads serving the area, the location, and type
- Permanent/seasonal residents, location and number
- Major improvements
- Mining activity
- Mineral deposits (type of mineral not necessary)
- Statements concerning the mean magnetic declination

G. FIELD ASSISTANTS

- 1. Names of field assistants, with their official civil service classification title, should be given in full with the middle initial, if any. The following are examples of field assistant titles:
 - Supervisory Land Surveyor Lead Land Surveyor Land Surveyor Student Trainee (Land Surveyor) Surveying Technician Cartographic Technician Surveying Aid Volunteer Contract Laborer
- 2. The field assistants should be listed alphabetically in descending order of classification, i.e., professional, technician, aid, etc.
- 3. If the official name is officially a junior or subsequent repeated name, use the following as a guide:

Name, jr.

Name III

H. <u>CERTIFICATE OF SURVEY</u>

- 1. The surveyor who executes the survey, signs the certificate of survey. This signature is very important as it is the surveyor's approval that the field notes are indeed a true representation of the survey. It is signed in the capacity of a Cadastral Surveyor, regardless of their official title. If a surveyor is no longer employed as a Cadastral Surveyor in the state, the surveyor's Branch Chief may sign in lieu of that individual.
- 2. Under supervision, a Surveying Technician or Student Trainee (Land Surveyor) may execute and sign the survey if assigned. If so, their title is a Cadastral Surveyor and a series 1373 Land Surveyor must also be listed on the title page and also sign the certificate.

The name of the signing 1373 Land Surveyor is preceded by the words "under the supervision of" both on the title page and on the certificate. The supervising series 1373 Land Surveyor has the title "Cadastral Surveyor" or "Chief, Branch of Field Surveys" on both the title page and in the certificate.

- 3. If two or more Cadastral Surveyors survey different portions of a survey at different times under the same Group No. or U.S. Survey No., two or more certificates of survey may be made. If more than one Certificate of Survey is made, there will still be only one Certificate of Approval.
- 4. The original copy of the field notes is signed and dated with a black ballpoint pen. The duplicate copy is dated only, with a black ballpoint pen. In the signature space on the duplicate copy, type the symbol /s/ with the surveyors typed name following. Note: The Chief Cadastral Surveyor for Alaska signs and dates both the original and duplicate copies of the Certificates of Approval.

- 5. The identification of surveys in the certificate must be identical with that on the title page.
- 6. There should be no abbreviations except for "U.S."and "No."; the only exception is "township", "range", etc. when space is limited. Numerical figures are not spelled out.
- 7. Concurrently surveyed surveys do NOT need to be signed or approved on the same date, as long as the common survey work is being approved first. i.e. approve the westerly prior to the easterly township and the northerly before the southerly. Be careful around the standard parallel!
- 8. See appendix for examples.

I. <u>CERTIFICATE OF TRANSCRIPT</u>

- 1. The identification of surveys in the transcript must be identical with that on the title page, which is identical to the Certificate of Survey and Certificate of Approval.
- 2. The Certificate of Transcript is identical on the original and duplicate sets of field notes. A line or large "X" will be drawn through the Certificate of Transcript on the original set of field notes as it is not necessary to certify the original. The Chief Cadastral Survey for Alaska signs the Certificate of Transcript on the duplicate copy only.
- 3. There should be no abbreviations except for "U.S." and "No."; the only exception is "township", "range", etc. when space is limited. Numerical figures are not spelled out.

J. ABBREVIATED TYPICAL CHECKLIST FOR FIELD NOTE WRITING

1. <u>Title Page</u>

- Description of surveys complete: Tp., R., Mer., State or U.S.S. No.
- Surveyor's name and title
- Dates of SI's and Approval
- Group No./ U.S. Survey No.
- Dates of Assignment Instructions
- Dates of commencement and completion of survey
- Geographic position (USS's only)
- Check index agrees with Pg. No.

2. Introductory Paragraphs

- History complete, check all original documents, MTP, etc.
- Description of survey matches title page
- Special paragraphs: Monumentation, magnets, nonconventional meanders, protracted corner. positions, etc.
- Reference to <u>Manual</u> and Special Instructions
- Method used to establish true meridian
- Statement of search for intervening corners (Dep. Resurvey)
- GP (and datum) of point in survey and how determined
- Double check GP
- Mean magnetic declination and how determined
- Preliminary Statement if needed

3. Body of Notes

- Page Nos.
- Headings describe first line on that page
- Line description at beginning of each survey line
- Name of previous surveyor and year when resurveyed
- Notes in proper order
- Topo calls: consistent and check against original record
- Meander topo
- Improvements
- Ties: All used control stations tied
- U.S. Survey lots tied together
- Townships have all inholdings tied
- Lines across page as needed
- All previously established corners accounted for
- Land, soil, timber at end of each orig. Rect. Survey mile

4. Corner Descriptions

- Evidence of found original cors. fully described
- New monuments fully described, size of mounds
- Cap markings
- Disposition of found original mons.
- BT's & accessories: species, diam., bearing, dist., marks
- If cors. not record, new info. shown
- Cors. reestablished using proper control and procedures

5. Other

- Index diagram
- Consistency in wording and format
- General description
- Survey location agrees with title page and certificates
- Field assistants (full name & initial) & official title
- Certificate of survey, approval, and transcript agrees with title page and introduction
- Plat and notes agree

6. Spelling

- alongside
- beginning
- clear-cut
- devil's club
- floatplane
- ill defined
- in part
- long side
- motorboat
- pootschki
- sloping
- unnamed
- well-defined

CHAPTER III. FIELD SURVEY PLAT PREPARATION

GENERAL GUIDELINES

A. <u>Responsibilities</u>

- 1. A portion of Chapter IX of the <u>Manual</u> is devoted to plats and should be studied thoroughly. Additionally the plat in the 1973 <u>Manual</u> sleeve should be studied thoroughly. Creating a survey plat is as much an art as it is a skill.
- 2. Consistency is important. All of the BLM surveys in the country, as a whole build upon and support one another and have done so for over 200 years. It is for this reason and for those that must defend our surveys in the future, a consistent format is critical for proper legal interpretation. It must also be remembered that due to the innumerable variation of conditions encountered in the execution of a field survey, no two surveys are alike, and variations are inevitable.
- 3. The field surveyor is responsible for turning in a complete and accurate record, using word processing and automated drafting software. The records submitted should be of such completeness, accuracy, and quality that it could be the final product.
- 4. Records often get reproduced from reproductions many times: congestion and small letter size (0.06 and smaller) should be avoided. A good test is to scan and then print your survey on an 8 ½ x 11 inch sheet of paper; all information should be readily legible.
- 5. Many of the platting guides and a lot of the nomenclature used in platting is patterned after the field note record, therefore a complete reading and understanding of Chapter II of these Guidelines should be undertaken prior to commencing this Chapter.

B. General

- 1. The term "plat" (singularly) refers to all sheets of a particular survey.
- 2. The type of rectangular platting that is specified in the special instructions is very important. Dashed "surveyed by protraction" lines are nearly analogous to a "surveyed line," as they define the bounds of the acreage in the surrounding sections and additionally defines how the township will be subdivided in the future and may indicate how corners are re-established in the future.

C. "Plat Only" Surveys

- 1. Whether you are performing an original survey, subdivision, retracement, or dependent resurvey, all pertinent field data should be collected and properly presented in the official record, whether it is traditional field notes accompanied with a plat or a "plat only" format where the field notes are incorporated onto the plat. Any complex survey and especially complex dependent resurveys should utilize separate field notes.
- 2. It must be remembered that a "plat only" survey is merely a plat that has the field notes accompanying it on the face of the plat. A "plat only" should depict bearings, distances, survey lines, meander enumeration, corner letter chronology, etc., in the same order as if field notes were being written.
- 3. Cartographic standards should not be compromised in order to fit all the data on the plat. The drawing should not be reduced in size merely to accommodate the "Plat Only" format. In particular:
 - No text should be less than 0.08
 - Corner description text should be 0.08
 - Corner description circles depicting the corner marks should be 1 $^1\!\!/ 4$ ins. diam.

A good test is when the survey plat is scanned and then printed on an $8 \frac{1}{2} \times 11$ inch sheet of paper; all information should be legible.

- 4. Generally, the "Plat Only" survey format may be utilized for any survey when all the survey information, including monuments, can be shown on no more than 2 sheets.
- 5. Generally, abbreviated field notes, which reference a corner on the plat to a corner description in the field notes with a letter designator, may be utilized for any survey when the survey exceeds 2 sheets.
- 6. All primary monuments must be fully described either on the plat, in abbreviated field notes, or in traditional field notes. There are exceptions for townsite surveys.
- 7. So called "monument jackets" that were used occasionally in the past, are not acceptable.

8. The surveyor certificate will be on sheet one only of a multi-sheet survey. The DSD certificate will be on each sheet.

9. Platting

- a. The monument descriptions, meanders, and improvement ties should all be tabulated separately. Monument descriptions should have a diagram of the cap markings.
- b. Monument symbols (a small filled in circle) will be depicted on both plats for any concurrently surveyed corners.
- c. Letter designators are used to cross reference the corner positions with the monument descriptions. The corner letter designators normally proceed in the same order as when writing field notes of the survey. The following sequence should be used- A, B, C, ... X, Y, Z, A1, B1, C1, ... X1, Y1, Z1, A2, B2, C2, ...

D. Rectangular Plat Types

- 1. Tracts (NOT like a Tract 37)
 - a. When the special instructions request the rectangular survey to use "tract" land identifiers, all contiguous selected lands within a township, extending beyond a section boundary will have the encompassed area surveyed as one unit and labeled on the plat as a "Tract". These types of "tracts" are simply an interim stage between a township exterior survey and the survey of all the individual sections within the township. The sections exist within this type of tract, they just have not had their boundaries delineated yet. Theoretically, in the future, the "tract" designation will eventually be eliminated when all the sections are individually surveyed.
 - b. This style of platting is used typically for State of Alaska land selections unless otherwise specified. An exception to this sometimes is mineral claim identification/ exclusion surveys.
 - c. Each "tract" will have a sequential letter identifier beginning with the letter "A", (e.g. "Tract A", "Tract B", etc.) along with the respective acreage for each tract. If there is only one "Tract" it will be labeled "Tract A".
 - d. The "tracts" will have all meanderable water and inholdings excluded, which may result in the creation of additional "Tracts." The "Tract" labeling sequence will be progressively labeled as A, B, C,Y, Z, A1, B1,Y1, Z1, A2, B2, etc.
 - e. There will be no protracted section lines shown. However, tick marks representing the calculated location of section corners may be shown.
 - f. Section labels will be shown on both sides of surveyed section lines on the interior of the township and along the interior of the township boundaries.

- g. Corner monuments located at rectangular corner positions will be marked as regular rectangular corners.
- h. When the land to be surveyed is bounded entirely by a surveyed section, fractional section, or portion of a section, it will be identified and platted as provided for in Secs. 3-99 through 3-111 of the <u>Manual</u>.
- i. All islands and islets located entirely within a section will be surveyed and platted as lots of the respective section. Islands in their entirety extending across a computed unsurveyed section line will be identified as a "Tract" of the township.
 - j. An island with a surveyed line crossing it will have each portion identified as either a "Lot" or a "Tract" depending on whether the remaining portion has a computed unsurveyed section line intersecting it or not.

If there are a combination of these types of lots and tracts for islands, it is acceptable to just label them all as "tracts". It is also acceptable to label all islands as "tracts" no matter what their size or location. Be consistent within the township and your project.

2. Protracted Sections

This style of platting is used for selections made under ANCSA unless otherwise specified.

Also see "Lotting" (in this Chapter)

E. General Cartographic Standards

1. Plat Material

The "working plat" may be produced on either lightweight paper or 4 mil mylar. Just prior to signature, an archivable mylar with archivable ink will be produced which becomes the official survey plat to which the signatures are affixed.

2. Plat Orientation and Layout

- a. The sheet size is $19 \ge 24$ inches. A border is drawn 1-1/2 inches from each edge, resulting in an enclosed rectangle of $16 \ge 21$ inches. The sheet is oriented so that the long direction extends left and right.
- b. A marginal area of five inches along the right-hand side is excluded from the working area of the plat and is reserved for the plat memorandum.

However, on rectangular surveys, the top 3 or 4 inches may be utilized for an enlarged diagram when space permits and the township title will extend into the marginal area.

- c. For rectangular surveys, the township is centered on the working area of the plat with about two inches of extra space around each side excluding the area reserved for the plat memorandum.
- d. Generally, when only a portion of a township is surveyed, (generally 4 or less sections) it is not necessary to depict the entire township. Good judgment must be used in each case. Generally, the rectangular survey

should show the work at the minimum increment of a whole section.

A vicinity diagram (about $6 \ge 6$ ins.) can be a useful aid and if the entire township is depicted when only a small portion was actually worked in, extreme care should be taken when putting any non-survey data (e.g. water lines) on a survey plat to avoid any false implications.

- e. For U.S. Surveys, the marginal area is separated by a solid line the same thickness as the borders on U.S. Survey plats. This line is parallel to and five inches to the left of the right-hand border. It extends the entire distance from the top border to the bottom border. Nothing is placed inside this area except the plat title, subtitle, sheet number (when applicable) and the plat memorandum. In special cases, it is permissible to omit this line in order to utilize a portion of the marginal area for the layout of irregularly shaped surveys. On surveys with multiple sheets this marginal line can be left off of all subsequent sheets. If omitted, leave at least a 4×5 inch space in the lower right-hand corner for the acceptance certificate.
- 3. Officially Filed Statement
 - a. The officially filed statement is placed in the top margin of the plat, just outside the border. This statement starts five inches to the left of the right-hand border, the words "Officially Filed" and "ORIGINAL" (without quotation marks) are on the first line. These are vertical 175 lettering. Upper and lower case letters are used for "Officially Filed," while the word "ORIGINAL" is in all capital letters and is placed so that the end of the word is even with the right-hand border of the plat.
 - b. On the next line the word "DATE" is aligned with the left end of the first line, using vertical, 120 size letters, all capital. A dashed underline extends from the end of the word "DATE", out to a point even with the end of the work "Filed".
- 4. General Standards
 - a. Plotted bearings must be in their proper orientation to the north arrow. Measured distances must be plotted in their proper relationship to the scale bar.
 - b. The final plat is drafted in black ink. The line work will be dense and sharp with smooth edges. Lines must meet flush at angle points without overlapping. When monument symbols are used, the lines will stop flush with the edge of the symbol. Spaces within dashed lines must look even.
 - c. The finished plat must have an aesthetic, pleasing appearance. A scale

must be selected for the layout which will allow the survey information to be placed on the plat in a clear and uncongested manner. Sound judgment must be exercised in the placement of lettering and details so that a balanced appearance is maintained. Enlarged diagrams, corner descriptions, and tabulated information must be placed at a sufficient distance from the main drawing to avoid confusion.

d. Protracted section lines and lot lines must be drawn to the intersection with surveyed boundaries or meander lines. It is unacceptable to leave the lines hanging, or ending with a space between the dashes, since the point of these intersections must be clearly shown.

It is also preferable that the intersection of protracted lines also cross at a dash rather than in the space between the dashes, although it is less critical as long as the intended intersection point is not ambiguous.

Conversely, dashed lines that are straight line extensions of a solid line, should begin with a space, in order that the termination of the solid line is clearly known.

- e. No lines should intersect (or "touch") surveyed lines, such as leader lines or tie lines, except for topography depicted calls and monument symbols.
- 5. Lettering Standards
 - a. The lettering style is pure Gothic or simple block. It is similar to Simplex font with minor variations. Lettering sizes given in these guidelines refer to K & E Leroy lettering sizes. These figures are given in thousandths of an inch. If another system is used the line weights and lettering sizes should match these sizes as nearly as possible.
 - b. Slanted lettering should be 22° to the right of vertical.
 - c. The smallest lettering normally used is the 80 lettering size. Avoid 60 lettering size as it does not reproduce well when producing copies.
 - d. Lettering should be oriented to read from the bottom and the right-hand side of the sheet. Along lines with bearings of North to N. 5° W., and South to S. 5° E., the lettering is oriented to read from the right-hand side, even though this is slightly upside down when viewed from the bottom.

Letters should not touch lines or other letters or come so close together that they cause problems when making legible copies; there must be a clear space between them. Lettering must be uniform in density. Distorted or faint letters are not acceptable.

Words and letters should be equally spaced.

e. Pen sizes (width of numbers and letters) are not included in this chapter as each pen size corresponds to a specific number or letter height. See "Line Weights" in this chapter and the Line Weight table in the Appendix.

6. Abbreviations

A.P	angle point
alum	aluminum
Am	amended
A.M	Amended Monument
A.M.C	auxiliary meander corner
A.M.S	Army Map Service
bdy., bdrs.	boundary, boundaries
B.L.M./BLM	Bureau of Land Management
CC	closing corner
ch., chs	chains
cor., cors	corner, corners
diam	diameter
E. or E	East
ft	foot, feet
in., ins	inch, inches
lat	latitude
long	longitude
links	lk., lks.
M.C	meander corner

a. The following abbreviations are commonly used:

Mi	mile
mkd	marked
M.S. or MS	mineral survey
N. or N	North
N.G.S	National Geodetic Survey
No	number
R., Rs	range, ranges
S. or S	South
sec., secs	section, sections
S.M.C	special meander corner
Sq	square (on Townsite plats only)
T., Tp, Tps	township, townships
U.S.G.S	United States Geological Survey
U.S.L.M	United States Location Monument
U.S.M.M	United States Mineral Monument
U.S.S. or USS	United States Survey (U.S. Survey)
W. or W	West
W.C	witness corner
W.C.A.M.C	witness corner auxiliary meander corner
W.C.M.C	witness corner meander corner
W.C.S.M.C	witness corner special meander corner

- b. Letters used in cap markings are not considered abbreviations and may not conform to the above list.
- c. A few words which are commonly abbreviated in the field notes, but are not normally abbreviated on plats, are: Standard Parallel and Guide Meridian
- d. A few words which are typically abbreviated in other places, but not abbreviated on the plat (or field notes) are: Radius, Long Chord, Delta (nor the symbol), Length of Curve, Mountain, Creek, River, Island, Highway, Road, Strait, Inlet, and centerline.

7. Symbols

- a. The degrees (°), minutes ('), and seconds (") symbols are used. The common punctuation for the period, comma, quotation marks and parentheses are also used.
- b. The lower case times symbol (x) is used to separate dimensions as in the example: "3 x 5 feet."

c. The symbols for feet and inches are not acceptable on survey plats.

Also see "Corner, Monuments, and Similarly Related"- Monument Symbols in this Chapter.

8. Enlarged Diagrams/ Details

- a. The term "Enlarged Diagram" can be used interchangeably with the term "Detail", however, in general, the term "Enlarged Diagram" is used for a blow-up of a large area, while the term "Detail" is used for a blow-up of a very small portion of the drawing requiring a large scale to depict clearly.
- b. Any time critical information cannot be clearly portrayed at plat scale an enlarged diagram or detail must be drawn. Although an enlarged diagram is not required to depict all line call features on plats with field notes, they can simply be left off the main drawing.
- c. A detail can be made of a portion of the enlarged diagram if necessary.
- d. The scale depends on the size needed to show the required information, however standard scales must be used. A second sheet may be used if there is insufficient space on the first sheet. Enlarged diagrams or details may be placed in any open space in the working area of the plat.

They must be clearly separated from the main drawing and other enlargements to avoid confusion.

On rectangular plats, enlarged diagrams or details may be placed in the top 4 inches of the space for the plat memorandum, in a large water body, or a surveyed or unsurveyed portion of the plat as long as it is clearly separated and not confused to be a part of the main drawing.

- e. An "enlarged diagram" and a "detail"(except not a "bubble detail") must have a scale bar; however, one scale bar may be used for several enlarged diagrams provided they are all drawn at the same scale and placed in the same vicinity on the plat.
- f. Multiple Enlarged Diagrams and Details are often identified by letters so that they can be easily referenced to the appropriate portion of the drawing. Especially when there is more than one, each enlargement must be clearly labeled either ("ENLARGED DIAGRAM", "ENLARGED DIAGRAM A", "DETAIL" or "DETAIL A", etc. If a second sheet is used entirely for enlargements one label may be sufficient for the whole sheet. These are labeled in 140 vertical lettering or 175 vertical lettering.

- g. The appropriate area on the main drawing must have a corresponding label referring to the enlarged diagram or detail, e.g., "See Detail" or "See Enlarged Diagram". If an enlargement is on a different sheet where statements must also refer to the sheet number, e.g., "See enlarged Diagram B, Sheet 2". These statements are labeled in either 80 vertical lettering, or a 100 vertical lettering. The use of capital and lower case letters is optional.
- h. It is not necessary to repeat detail on the enlargement which has already been shown on the main drawing; however, corner numbers and other labeling which helps identify the area should be depicted on both drawings. The survey numbers and lot numbers may be shown on both drawings if space is available. The acreage may be shown on either drawing but should NOT be shown in both places. It is preferable for all of the detailed information to be shown on the enlargement rather than having some detail on the main drawing and some on the enlargement. All survey lines and meander lines in the area covered by

the enlargement must be shown exactly as they are portrayed on the main drawing.

i. If a bubble detail is used, labels that identify the placement of the detail (lot number, U.S. Survey numbers, etc.) can be omitted, and no references to the drawing are needed (such as DETAIL, and See Detail). The portion of the drawing requiring a detail is circled (or an oval type shape may be used) with a thin dashed line. A magnified circle or oval, also made with a thin dashed line, is drawn in an open space within 1 to 3 inches of the smaller circle. Everything shown inside the magnified circle is an enlargement of the area within the small circle. These circles are connected by thin straight dashed lines drawn tangent to the circles. The drawing inside the magnified circle does not need to be drawn to any specific scale, and no scale bar is used.

- 9. Second Sheets
 - a. A second sheet is used whenever there is too much information or detail to fit on one sheet. The title of the second sheet must be exactly the same as the title on the first sheet. The sheet size and border dimensions are also the same; however on U.S. Surveys, it is not necessary to leave a five-inch marginal area on second sheets.
 - b. Space for a signature block must be left in the lower right-hand corner of each sheet. This space must be at least four inches high and five inches wide.
 - c. In the extreme upper right-hand corner of each sheet, just inside the border, the sheets are numbered, e.g., Sheet 1 of 2 Sheets; Sheet 2 of 2 Sheets. These statements are labeled in 100 vertical lettering.

10. Drafter's Initials

- a. The initials of the draftsperson should be placed in the lower lefthand corner of each sheet just inside the plat borders. These should be lettered so they will read from the bottom of the sheet at the 80 lettering size. They may be vertical or slant but are normally done in all capital letters.
- b. If there was more than one drafter, it is permissible to put each drafter's initials in sequential order separated with slashes.

- 11. <u>Title and Subtitle</u>
 - a. U.S. Surveys
 - (1.) The title is centered in the marginal area about 0.7 inches below the top border. The title is placed on two lines. The first line reads U.S. SURVEY; the second line reads No. 00000, ALASKA. This is done in vertical lettering, using the 175 lettering size. The lines must be separated with a space about equal to the height of the letters. This title is oriented to read from the bottom of the sheet. It is placed in this position regardless of which way north is designated on the plat.

- (2.) The U.S. Survey No. is also labeled inside the drawing of a survey that is one parcel. The U.S. Survey No. is NOT shown inside surveys that are lotted. When labeling inside the survey, the word "Alaska" is omitted. The remaining portion of the U.S. Survey No. is repeated and is spelled out in the same manner as the title in the margin. 175 vertical lettering is used. The use of one or two lines is optional. The U.S. Survey No. title must be placed so that it appears balanced and centered within the survey.
- (3.) U.S. Survey No. titles of adjacent surveys are shown in 100 vertical lettering, or 120 vertical lettering, depending on available space. These may be abbreviated if necessary.
- (4.) If a subtitle is used it is centered below the main title leaving approximately one-half inch of space between the title and subtitle. Original surveys have no subtitle except to identify multiple lots in a multi-lot survey; subtitles are used for resurveys, subdivisions, supplemental plats, and amended plats. All capital 140 vertical lettering is used. Examples: DEPENDENT RESURVEY, DEPENDENT RESURVEY AND SUBDIVISION, SUPPLEMENTAL PLAT, and NOORVIK TOWNSITE.
- b. Rectangular
 - (1.) The township title is centered on the entire paper approximately ¹/₂ inch below the top border, all capital letters, 240 vertical lettering is used. No abbreviations are allowed. Commas are placed as shown in the following example: TOWNSHIP 2 NORTH, RANGE 5 WEST, OF THE COPPER RIVER MERIDIAN, ALASKA
 - (2.) If a subtitle is used it is centered below the main title leaving approximately one-half inch of space between the title and subtitle. Original surveys normally have no subtitle; subtitles are used for resurveys, subdivisions, and supplemental plats. Only the primary purpose of the survey is shown in the subtitle. All capital 175 vertical lettering is used. Examples: DEPENDENT RESURVEY, DEPENDENT RESURVEY AND SUBDIVISION, SEGREGATION SURVEY.

If a sub-title is utilized in a multi-sheet survey, it is only shown on sheet 1 if subsequent sheets are only enlarged diagrams, details or "blow ups."

12. <u>Scale</u>

- a. The scale selected to lay out the plat must be one of the common scales of 10, 20, 30, 40, 50, 60, or 80 chains to the inch, or an even multiple of 10 (or division by 10) of any one of these. Contrived scales other than the 15 scale will not be used. It is preferred not to use the15 scale, but it may be used in limited situations. See appendix for examples.
- b. All surveys (except U.S. Survey townsites) are measured in chains. One chain equals 66 ft. and each chain is subdivided into 100 links.
- c. Township plats are normally drawn at 40 chains per inch. Larger scales are used when only a portion of the township is shown.

13. Scale Bar

a. The scale bar matching the scale of the drawing is placed somewhere near the bottom of the working area of the sheet on U.S. Surveys. It is normally centered underneath the drawing, however, it may be moved from this position when it is necessary to avoid crowding.

Township plats normally have the scale bar centered beneath the township at the bottom of the sheet about 3/4 inch above the border.

The length of the scale bar should be in balance with the size of the drawing.

- b. The scale bar for an enlarged diagram or detail is normally centered about ¹/₂ inch below the drawing. Shorter scale bars are normally used.
- c. The increments are numbered above the scale bar in vertical lettering at the 80 lettering size. Centered underneath the bar the word "Chains" (without quotation marks) is shown in vertical lettering, using capital and lower case letters. This is done at the 100 lettering size.
- d. On townsite plats, a similar scale bar is used, but the increments are in hundreds of feet, and the word "Feet" (without quotation marks) is placed under the scale.

14. North Arrow

The north arrow is placed on the left-hand side of the plat paper about 0.8 inch inside the border and is centered latitudinally on the paper. It

may be adjusted slightly from this position to allow room for other detail. The north arrow is oriented true north with lettering at the vertical 80 size.

15. Magnetic Declination

- a. The mean magnetic declination is now optional if it is not observed, but is recommended to state it.
- b. The magnetic declination is centered beneath the north arrow. Since the magnetic declination typically varies throughout a large area, the word "mean" precedes the statement to indicate that the figure is the average for the area. The declination is given in fractional form to the nearest one-quarter degree, e.g., 30 1/4°, 20 1/2°, 28 3/4°, etc., (not 30°15', etc.). The direction of the declination follows the magnitude and is abbreviated. The direction of declination is East everywhere in Alaska, e.g., "Mean Magnetic Declination 29 1/2° E."
- c. The declination words and value are lettered in four lines using, capital and lower case letters at the vertical 100 lettering size.

16. Surveyed/Unsurveyed Land

- a. Unsurveyed lands show neither an acreage or protracted lines.
- b. The unsurveyed portion of a township is labeled "UNSURVEYED" across the area in capitals and slanted lettering. The lettering size depends on space. The lettering should be spaced out to cover the majority of the unsurveyed land. Section labels are not normally shown in the unsurveyed area, although in rare cases it is permissible to label sections adjoining a surveyed line. Section lines are protracted approximately 3/4 inch into the unsurveyed area from each surveyed section corner in the interior of the township.
- c. U.S. Surveys or Mineral Surveys located in the unsurveyed area, should be plotted using the best available record tie information.
- 17. <u>Geographic Position (G.P.)</u>
 - a. For U.S. Surveys, it is preferable to place the NAD83 value on the body of the plat on a "plat-only" survey, similar as done on rectangular plats. The supporting information describing the accuracy and derivation is placed in the plat memorandum.

b. All control stations described in the field notes will be shown on the plat along with their values and datum. Although, if an OPUS solution is used (and reported) to determine the position of your survey, the control station value should NOT be shown as it is probably not compatible and may lead to confusion. If these values are published by an agency other than BLM, the published value is shown to the number of significant figures published which is normally to 0.001 second.

If the station was established by BLM or a value for some other agency's station is assigned by BLM, the value is given to 0.001 second. Although not recommended, if revising a published value, the record must show and state that it is a BLM assigned value. Immediately centered beneath the datum, the following is stated: (BLM Assigned Value).

- c. The datum is normally centered below the geographic position and is all capitals. Alternatively it can be centered to the right of the position.
- d. In addition to the geographic position of any control stations shown for rectangular surveys, the NAD 83 geographic position of the most SE and NW corner of the township or lesser area surveyed will be shown on the plat. If the southeast or northwest corner is not monumented, consider:
 - (1.) It is preferable to give the geographic position of a corner on the township boundary.
 - (2.) It is preferable to give the geographic position of a monumented position. If the corner is witnessed, state on the plat "At. W.C." above the latitude and longitude
 - (3.) If the southeast (or northwest) corner was previously monumented, but was not recovered, then give the geographic position of the most southeasterly (or northwesterly) corner of the new work.
- e. The geographic position uses vertical lettering, with upper and lower case letters for the words "Latitude" and "Longitude" in two lines. The words "North" and "West" are abbreviated. The NAD83 datum is centered beneath or centered and to the right of the geographic position. Lettering is vertical and normally 80 lettering size.
- 18. Bearings and Distances
 - a. The bearings and distances on the plat must conform (content and direction) to the field notes of the current survey and to the official record of previously surveyed lines which are not being resurveyed or

retraced.

b. Cardinal bearings, NORTH, SOUTH, EAST, and WEST, are spelled out and shown in all capital letters. When north, south, east, or west appear in other bearings they are abbreviated and must have a period after the single letter. Bearings are usually given to the nearest minute. Bearings from zero to nine degrees have the initial zero omitted in front of the degrees, however, the initial zero is never omitted from the minutes or seconds. For bearings less than 1 degree, a zero with the applicable minutes is utilized

A space is used before the degrees and after the minutes on noncardinal bearings if space permits, except on witness corner labels.

- c. Bearings and distances are in slanted lettering unless they are included as part of a statement that is done in vertical lettering. The lettering size of overall bearings and distances may vary from 80 to 100 to 120 depending upon the scale selected for the survey and the space available for lettering. Bearings and distances may be leader lined to the appropriate line segment along very short portions of line. The overall bearings and distances would normally be considered the entire distance between consecutive corner numbers of the primary survey on U.S. Surveys and between section corners on rectangular surveys. Do not stop the measurement at a witness corner unless it is an angle point on the line. There are exceptions.
- d. Distances are presumed to be in chains unless otherwise indicated, therefore the word "Chains" is omitted from the plat. Those distances which are in chains are normally shown to two decimal places. A mineral survey segregation survey normally has the distances shown in equivalent chains distance to three decimal places. Distances less than one chain must have a zero to the left of the decimal point.
- e. Bearings and distances listed in tabular form on the plat must include the unit of measurement after each distance. These are abbreviated.

f. In narrative form, the bearings must be preceded by the word "bears," while the distances must be followed by the abbreviated units of measurement as well as the abbreviation for "distance."

A bearing and distance shown along a surveyed line should be spaced so that the bearing is placed approximately one-third of the length and the distance is placed approximately two-thirds of the length. The lettering is placed so that a space of about one-half of the letter height is left between the line and lettering.

The lettering (bearing and distance) on U.S. Surveys is normally located outside the surveyed area.

- g. Breakdown distances are shown to give the distances along surveyed lines to intermediate points on the line. These include corners of adjacent surveys and witness points. Breakdown distances are not used to give the distance to topographic calls or witness corners. Breakdown distances should be one size smaller than the size used for the overall length of the line. They are placed on the opposite side of the line than the overall bearings and distances, or closer to the line when that is not practical. A distance must be shown for each segment of the line so that the total of all the breakdown distances will equal the overall distance.
- h. The placement of lettering may be offset somewhat from its proper position to avoid congested areas, however, it should not be offset significantly to make room for line call features. It is better to break the line call feature for the lettering.
- i. The bearing always proceeds the distance. If the bearing and distance are stacked on one side of the line, the distance is placed closest to the line.
- j. Bearings and distances on a retraced or resurveyed line are depicted the same as on an original survey line.
- k. On a record survey line (not retraced or resurveyed) that is incorporated into your record, the record bearings and distances, including witness bearings and distances are depicted. Line calls are not shown.
- 1. When a new bearing and distance is returned for a surveyed line that is resurveyed, the difference between it and the original record is not shown in the field notes or on the plat; only the new values will be returned.
- m. Distance totals do not cross the common point between a previously surveyed (record) line and a newly surveyed or retraced line.

- Record bearings and distances of inholding surveys on rectangular plats need not be shown if space does not permit or if it becomes congested.
- o. The "record" (record bearings and distances) should be shown when (and only when) an area is returned against the line(s).
- p. On all survey plats, except townsites, the distances are given in chains.

All of the distances on a townsite survey are measured in feet, while the distances around the exterior boundaries are also given in chains. The distances are presumed to be in feet, therefore the word "feet" is not shown. The measurement in chains is in parentheses, is carried to four decimal places and has the abbreviation "chs." following the distance. Example: N. $36^{\circ} 47'$ W., 478.33 (7.2474 chs.).

- q. On rectangular township plats, overall distances are normally shown in the 80 or 100 lettering size. Along the township boundaries the bearings are shown either with the 100 lettering size, or a 120 lettering size, depending on space available. Along subdivisional lines (interior section lines) the bearings are shown in the 80 lettering size or 1 size smaller than the township boundary size.
 - (1.) On a township boundary, bearings and distances are normally placed outside the township. Distances are shown once for each section, while there is just one bearing for each segment of straight line and is therefore placed further from the line.

In the unusual event that a township boundary is surveyed by protraction (and is used in determining the acreage of your survey), the distances between the protracted section corners are shown in parenthesis.

- (2.) When dashed lines cross a position for a section corner on the township boundary, falling in the water, sub-distances of 80.00 chs. are not normally shown to the theoretical corner position.
- (3.) On surveyed subdivisional lines (interior section lines) bearings and distances are shown once for each section and at a smaller size than those on the section boundary. Bearings and distances should normally be placed above and on one side of the line as viewed from the bottom or the right side of the sheet. Alternatively, the bearing and distance may straddle the line, where the bearing would be on the top and the distance below.

- (4.) On rectangular surveys, bearings and distances are shown inside of inholdings crossed by rectangular lines to any rectangular corners (e.g. sec. cors.) and to the intersection with the lines of the inholding.
- (5.) In a township with protracted sections, when dashed lines cross a position for a section corner on an interior section line, falling in the water, sub-distances of 80.00 chs. are not normally shown to the theoretical corner position.
- (6.) Section subdivisional lines are normally shown at the 80 lettering size. The centerlines of each section are given one bearing and distance across the entire section, however the centerlines of each 1/4 section terminate at the opposing section centerline.
- r. Also see "Lettering Standards" in this chapter.

F. Survey Lines and similarly related

1. Solid Lines

The following lines are shown solid. These lines are not broken for lettering or other detail except as noted:

- The plat border and on U.S. Surveys, the border segregating the marginal area. In special cases on U.S. Surveys, the border separating the plat memorandum may be broken or omitted altogether.
- Surveyed Lines. This includes any previously surveyed work (inholdings, land grants, etc.) which may be shown on the plat. Some exceptions to this, are a surveyed line across meandered water or a blank line across accreted land, grant, or reservation.
- Meander Lines.
- Single line streams, the shorelines of double lined streams or rivers, and paved highway symbols. Other than meander lines, these lines can be broken for lettering when necessary if they are not boundary lines.
- The outline of improvements.
- Direction of flow arrows.
- The large circles representing the cap in the monument descriptions.
- Leader lines, which may also be used to connect the descriptions to the monument symbols on "plat only" surveys. These leader lines may be broken when necessary.

2. Dashed Lines

The following lines will be shown dashed and may be broken for lettering or any other detail when necessary:

- Surveyed lines across meandered water and blank lines. The line weight is the same as the adjoining solid line. Township boundary dashed lines are generally longer dashes than subdivisional lines.

- Protracted township boundaries across unsurveyed land and non-tidal water. These dashes are about ½ inch long and should be the same weight as the surveyed township boundary. Protracted township boundaries are normally omitted over major tidal water bodies or major fresh water lakes, however they may be shown for continuity.

- Protracted subdivisional lines across land. Protracted subdivisional lines are omitted over segregated water that is excluded within the township.

- Protracted centerlines and lot lines within a section
- Tie lines, unless it is "on top of" a surveyed line. (in which case it would be a solid line)
- Symbols for topographic calls such as a dirt road, trail, etc.
- Bracket or leader lines (not dotted).

3. Line Weights

Line weights may vary somewhat to allow for scale differences and individual preference within the following guidelines:

The color is representative of an automated plat drafting pen size and its respective pen width:

- (a.) The plat border should be red.
- (b.) The township boundary should be red.
- (c.) Newly surveyed or resurveyed boundaries should be either red or cyan.
- (d.) Surveyed section lines are drawn one line weight thinner than the township boundary.
- (e.) Protracted section lines are drawn either one or two line weights thinner than the township boundary.
- (f.) Protracted (or surveyed) lot lines within a section must be one line weight thinner than the exterior boundary.
- (g.) The boundaries of adjacent U.S. Surveys should be shown one line weight thinner than the boundaries of the primary U.S. Survey.
- (h.) Meander lines should be drawn one or two line weights thinner than the boundary of the primary survey, usually blue.
- (i.) Tie lines should be drawn either blue or magenta.
- (j.) Topographic symbols and improvements are either blue or magenta.
- (k.) Monument description circles and solid leader lines are cyan.
(l.) All other bracket lines or leader lines should be either blue or magenta.

4. Protracted Lines

- (a) It is best to completely avoid using protracted section lines if at all possible.
- (b) Only surveyed portions may have protracted survey lines.
- (c) Township lines and section lines should normally be protracted across meandered water bodies to indicate the intent as to how a survey was established and thus for future re-establishment.

Generally, section lines should not be protracted greater than 80 chs. distance across water or across large tidal bodies of water such as oceans, inlets, bays, and bayous.

Large fresh water bodies (eg. Lake Clark, Iliamna Lake, etc.) should be treated similarly to tidal water.

If the township cor. falls in water, protracted township lines are NOT shown/ used for that township cor.

- (d) Protracted section lines are computed based on the existing "exterior" survey and reflect how the protracted section lines would actually be surveyed with the respective acreage. Once surveyed, the protracted section lines and acreages are <u>not</u> based on the protraction diagram.
- (e) Township interior section lines protracted distances and sometimes bearings (both in parenthesis) should be placed on enough of the protracted section lines to indicate without doubt as to how (and where!) the protracted corners were established to aid in future corner re-establishment.

5. Labeling Standard Parallels and Guide Meridians

- (a) The label is centered on the space for the entire boundary of the township, whether the entire boundary is surveyed (or shown) or not.
- (b) They are labeled with 120 lettering, all capitals, and slanted. No abbreviations are used. Words like TWENTY-FIRST are hyphenated.
- (c) The boundary of an adjoining meridian should not be labeled if it is already in the township heading. For example, the statement SOUTH BOUNDARY KATEEL RIVER MERIDIAN is placed along the north boundary of a township in the Seward Meridian which abuts the Kateel River Meridian.
- (d) Townships along the North Side of a Standard Parallel
 - (1.) If closing corners are set in the southerly township, the township to the north will show no indication of the offset townships to the south, unless the southerly townships were previously surveyed.
 - (2.) On concurrently surveyed townships, treat the township to the north as having been surveyed first, before the offset section corners to the south were established.
 - (3.) If closing corners of maximum control (that do not function as a closing corner) are established for the township to the south, they should be shown on the north township plat.
- (e) Townships along the South Side of a Standard Parallel
 - (1.) Townships on the southerly side of the standard parallel will show the offset sections along the north boundary.

- (2.) Section lines for the northerly township will be projected northerly about ½ inch from the parallel, whilst the northerly township lines should be slightly longer. These lines should be one line weight thinner than the regular section and township lines. They will be solid if surveyed and dashed if protracted.
- (3.) The offset township lines will be labeled by township and ranges. They should be labeled horizontally with the ranges on each side of the township line and the township atop the township line. The lettering is vertical 80 size.
- (4.) Sections north of the standard parallel are labeled normally.
- (5.) Distances on the north boundary are given in reference to the standard corners so that the bearings and distances match the townships to the north. All measurements in reference to the standard parallel, including breakdown distances, are shown above the standard parallel. A separate bearing is used for each township.
- (6.) Only closing corners on the surveyed lines are labeled. "Closing corners" of maximum control are depicted, but not labeled as closing corners.
- (7.) Only the following distances are placed beneath the standard parallel:
 - (i.) The offset distance from the closing corner on the east boundary of the township to the next standard corner, whether it is monumented or not, or the nearest meander corner. This is true, even if the field notes have a tie to a more distant corner. The same above scenario would apply to the west boundary also.
 - (ii.) The offset distance from the closing corner of each surveyed subdivisional line to the nearest standard corner, witness point or true meander corner, whichever is the shortest, without extending past an unmonumented standard corner. If neither standard corner bracketing the closing corner is monumented, then show the distance to the nearest standard corner.
 - (iii.) The paranthetical distance showing along the north boundary of section 6, or the most westernmost section in irregular townships.

6. Labeling Abutting Township Boundaries and Previously Surveyed Areas

- (a) Boundaries (although not meanders) can be labeled as either being "surveyed/ retraced/ dependently resurveyed concurrently" or "retraced" "dependently resurveyed" or "surveyed by xxx", to help differentiate them from the original (current) survey lines. If it is quite obvious as to which lines are resurveyed or retraced, these particular labels are not required, although the "surveyed by . . " label is still required.
- (b) The survey labels are placed further from the line than any other lettering shown for the boundary. Leader lines are used to bracket the appropriate sections of the line. The statements are in slanted lettering, using capitals and lower case. Lettering size is normally 100, but 80 can be used in tight places.
- (c) A boundary described with an adjoining township of the same group is labeled as surveyed concurrently with the township and year, with the adjoining township. This indicates where the information for that boundary may be found. An example is:

Surveyed concurrently with T. 10 N., R. 7 W., in 2002-2003

(d) A previously surveyed boundary that is not being resurveyed, is labeled with the BLM surveyor's name and the date or labeled as surveyed under contract and the date. An example is:

Surveyed by John E. Doe in 1978-1980

And if it was surveyed under contract,

Surveyed under contract in 1974-1975

And if a common boundary was previously surveyed under contract with an adjacent township,

Surveyed under contract with T. 10 N., R.7 W., in 1974-1975

And if a common boundary was previously surveyed by protraction and the boundary is now being monumented,

Surveyed by protraction in 1974

And if a common boundary was previously surveyed by protraction and the boundary is now being monumented with an adjacent township,

Surveyed by protraction in 1974, surveyed concurrently with T. 10 N., R. 47 W., in 2002-2003

The word "Retraced" or "Resurveyed" can be substituted for the word "Surveyed" depending on the situation. The statements for retraced or resurveyed lines only mention the most recent work; no mention is made about the original survey if there are multiple surveys.

- (e) Previously surveyed sections of the survey (or technically- portions that have areas already counted in a previous survey) are hatched and labeled. The hatching is shown only around the edge of the previously surveyed area and extends about 1/10 inch from the previously surveyed side of the line. The labels are lettered across the previously surveyed area rather than along the surveyed lines.
- (f) If only certain townships within a group got approved, the remaining townships are still not considered as concurrent surveys.
- (g) Common corners of a concurrent survey will NOT be re-described whether original or recovered.

7. Common Labeling Between Township Boundaries

- (a) Townships with common boundaries surveyed, retraced, or resurveyed will show the same survey information for each township, except for the following possible exceptions:
 - (1) Paranthetical distances to protracted lot lines.
 - (2) The corner designator letters on a plat-only.
 - (3) On a standard parallel, the offset distance from a closing corner to the adjacent township.
 - (4) The previously surveyed or concurrent survey labels.
- (b) Previously surveyed boundaries which are not being retraced or resurveyed, will show the latest record bearings and distances. This includes breakdown distances and witness corner bearing and distances. The lettering style and size is the same as that used on the original survey work.
- (c) Monument symbols are shown ONLY for corners that were recovered (or set) during your survey. Although concurrently surveyed lines show the monument symbol on BOTH surveys.

8. Retraced Lines, Resurveyed Lines and Concurrent Surveys

- (a) Retraced/resurveyed lines are identified in the field notes or on the sketch plat. Do not repeat the record information along these lines; show only the bearings and distances of the newer (current) resurvey. This information is shown on the plat in the same manner as on original work.
- (b) For clarity, "Retracement" or "Dependent Resurvey" may be placed along the retraced or resurveyed portion of the line. Do not use statements for previously surveyed boundaries along those portions of the lines which you resurveyed. If used, the retracement/ resurvey label should be in slanted lettering. The size of the lettering varies from 80 to 120 depending upon the space available. The use of capital and lower case letters is optional but must be consistent. Dashed leader lines are used to clearly identify the lines being retraced or resurveyed.
- (c) Occasionally a previously surveyed line that is not being resurveyed or retraced forms a portion of the boundary of a newly designated parcel. These lines are identified by a previously surveyed statement in the form "Surveyed by John E. Doe, in 1910" for example, (without quotation marks). The record bearings and distances are shown along the line, and the line is labeled using the same lettering standards as for

retraced or resurveyed lines. The bearings and distances of record lines are depicted only when the line forms a portion of the boundary of the new survey and is needed for area computations.

- (d) If a U.S. Survey is being subdivided (with no other adjoining surveys) only the resurveyed/ retraced lines are labeled. The labels may be omitted if there is no question as to which lines are being retraced/ resurveyed.
- (e) Occasionally surveys with common boundaries are surveyed in the same year and are considered concurrent surveys. In this situation the common corners and lines will be shown in both records and one plat will be identified as "Surveyed Concurrently with township range and year" (without quotation marks). This statement is depicted along the appropriate line using capital and lower case letters with the same lettering standards as resurveyed lines.

9. Meanders

- (a) Meander lines are plotted with a blue pen.
- (b) On rectangular surveys, meanders are shown only in the surveyed portion of the township and stop flush at the surveyed boundaries.
- (c) Meander lines may not match previously surveyed meanders. Show what you find. If there is erosion, this usually is relatively easy to work with. If there is accretion, you may need to show a partition line across the accreted land. Partition lines are labeled with slanted 80 lettering.

When remeandering, previously surveyed meander lines are drawn with a 0000 pen and labeled ORIGINAL MEANDER LINE if necessary to distinguish it from a new meander line. If there is more than one record meander line, the survey date is used, such as 1984 MEANDER LINE. Slanted 80 lettering with magenta is used. Upper and lower case letters are optional.

(d) New meander lines should not be shown through any patented land

within surveyed sections, U.S. Surveys, or Mineral Surveys, because not only do we not have the authority, but typically the meander line has changed and we do not need riparian problems. Only the record meanders are shown if any. An informatuional traverse

(e) Field Notes

Bearings and distances along meander courses are not shown on plats which have field notes. The courses of the meanders are carried in the field note record and are not indicated on the plat in any way (no numbering, etc.) other than plotting the meander courses in their proper position.

(f) Plat-Only

- (1.) All the information pertaining to meanders which would normally show in the field notes must be portrayed on "plat-only" surveys. This information is tabulated; it is not permissible to show the bearings and distances along the meander courses. The tabulated data must be placed within the working area of the plat, but not within the boundaries of the survey.
- (2.) Tabulated data is shown in vertical lettering. The tabulation of meanders is normally broken into three basic parts:
 - (i.) The heading is centered above the tabulated data, and capital letters are used. The word "<u>MEANDERS</u>" (without quotation marks) is sufficient heading. This is labeled in 120 vertical lettering.

If a survey has been lotted the meanders of each lot are listed separately (and numbered consecutively) and a subtitle is centered above each listing. The main title is not repeated with each subtitle if all of the meanders are centered under the heading. The subtitle is labeled one size smaller than the "MEANDERS" label.

(ii.) The description of the bank is centered below the title. This may include the height and slope of the bank and the type of ground cover along the bank. This sentence concludes with the statement: "at the line of ordinary high-water", or "at the line of mean high tide." This is labeled in vertical 80 lettering size.

The description of the bank may be re-described at any point along the meanders where a significant change in the description occurs.

It is optional to include a paragraph describing the point of beginning and the ending point as this information is depicted on the drawing of the plat.

(iii.) If the water flows, this is always noted by stating whether you are meandering on the right or left bank.

(iv.) The meander courses and distances are listed in a column below the description. Each meander course is numbered for identification.

The abbreviated word "chs." follows the distance of each course in the column.

This is labeled in vertical 80 lettering size. In order to maintain the proper appearance of the columns the following items are kept in vertical alignment: the units column of numbers; the letters in the bearings; the degree and minute signs; and the distance decimal points.

The meanders should be numbered and in the same order as if writing field notes. If there is more than one set of nonconnected meanders within one lot, the numbering for the second set should commence where the last set left off and broken with a new header. The numbering sequence is started over with each U.S. Survey lot.

The meanders should be enumerated on the "water side" of the meander line. The meander numbers can be placed inside of the survey in congested areas if necessary.

In very congested areas where the meander line is welldefined but it is difficult to fit the meander course numbers in, then as many as possible should be labeled along the meanders. The omitted meander course numbers are then labeled with the first and last ones separated with a hyphen. A Detail / Enlarged Diagram is not necessary.

- (3.) Topographic calls that intersect meander courses are listed following the appropriate meander course, e.g., "At 2.35 chs. dist. on this course, creek, 3 lks. wide, course N. 60°W."; "At end of course, right bank of slough, bears N. 50°W." These statements are placed to the right of the meander course, and the next meander course is spaced below the statement. These statements are lettered in the same size and style as the meander courses.
- (4.) On the drawing each meander course is given a number corresponding to the numbers of the tabulated meanders. These numbers are placed at midpoint along each meander course on the water side of the line so they will not be confused with corner numbers. They are labeled in slanted lettering and are normally one size smaller than the corner numbers of the survey. Periods are not used.

10. Labeling Meanderable Water Bodies

- (a.) Named meanderable water bodies are labeled in slanted all capital lettering. Sometimes, lesser water bodies are labeled with Capital and lower case lettering. Flowing water is normally labeled along (generally parallel to) the meander courses, while still water is labeled to read horizontally.
- (b.) The lettering size depends on the space available and can vary from slanted 100 to 175. Names are found on U.S.G.S. quadrangle maps or in the <u>Dictionary of Alaska Place Names.</u>

Other "local names" must have the subtitle "(Local Name)" (without quotation marks) placed after the local name. The subtitle is labeled in capital and lower case letters and is shown in parentheses. This is

normally centered beneath the name and is one size smaller.

- (c.) Flow arrows must be used to indicate the direction of flow on hydrographic features with moving water. These should be placed before or after the name of the water body along the general course of the river. It is common practice to show the flow arrows with a curved line that conforms roughly with the configuration of the meander courses along that portion of the water course. Flow arrows should be drawn about 1-1 ¹/₂ inches long with a blue pen. A narrow arrowhead is placed on the appropriate end. No tail emblem is used.
- (d.) River names and flow arrows should not hug the meanders too closely. Depending on the scale of the drawing, they would normally be placed between ¹/₂ to 1 inch from the meander line.

11. Segregation of Inholdings and Water Bodies

- (a.) All information (bearings and distances) must be available which allows users to reconstruct the acreage shown on the plat. On traditional rectangular surveys, the bearings and distances around the exterior boundaries of the segregated inholding(s) DO NOT need to be depicted since they are available in the official record.
- (b.) Water bodies are surveyed according to the conveyance document and any subsequent navigability redetermination. This may result in surveyed meanders stopping or starting at section lines (land status/ownership boundaries) with resultant discontinuities on the plat.

- (c.) When records are compatible a supplemental plat should be produced without modification to the subsisting record. See Sec. 9-88 of the <u>Manual</u>.
- (d.) If discrepancies are identified between your meanders and record meanders a resurvey of the meanders (properly termed "remeanders") is required. This may be accomplished by photogrammetric methods if the location of the inholding meanders can be supported by existing controlled photo coverage. If existing photo coverage does not support the location of the documented meander record, new controlled photo coverage must be obtained or remeanders must be performed in the field.
- (e.) The platting of a resurvey performed in order to segregate an inholding will be identified in the subtitle as a "Segregation Survey," as covered by sections 9-79 and 9-105 to 9-107 in the <u>Manual</u>. This accomplishes the same purpose as a supplemental plat, but incorporates new field (or photogrammetric) data.
- (f.) A resurvey accomplished photogrammetrically for the purpose of segregating navigable water that was not depicted on the original plat is typically labeled as a "Photogrammetric Resurvey."
- (g.) If navigable water and inholdings are segregated on the same plat, the subtitle is typically labeled "Photogrammetric Resurvey and Segregation Survey."
- (h.) The subtitle "Amended Plat" will not be used.

12. Islands

- (a) Any surveyed island, no matter how small, must have meanders and be shown on the plat. Small islands may be tied to the center and described by a radius or diameter. An enlarged diagram may be required.
- (b) An asterisk symbol is not acceptable. It is used for maps.
- (c) Should it be necessary to identify islands that have formed (arising from the bed) after Statehood (Jan. 3, 1959), they should be outlined

with a dashed line only, with no bearings or distances, acreage, tie, or parcel identifier. Additionally, the plat memorandum is noted.

13. Line Calls

- (a.) Plats with Field Notes
 - (1.) Many of the topographic calls made along surveyed lines are depicted on the plat. These features are plotted, shown with the proper symbol and labeled. The features which are depicted include highways, roads, trails, power lines, telephone lines, pipelines, bridges, tunnels, rivers, sloughs, creeks, marshes, and sometimes improvements such as fences and garden plots.
 - (2.) Features not normally shown include gullies, ridges, slopes, tree lines and meadows.
 - (3.) Line calls are normally labeled in slanted 80 lettering size. The distance to a topographic feature is presumed to be to the center of the feature unless otherwise stated.
 - (4.) The distances to these calls are not shown on the plat. Along linear features such as roads, creeks, power lines, etc., it is preferable to label the name of the feature oriented along the length of the feature, while non-linear features such as lakes, ponds, marshes, etc., are normally labeled square with the page.
 - (5.) Labels of minor topographic features (creeks, trails, fences, etc.) are normally not placed on the plat, except for significant topography such as a paved highway, major water way, etc..

(b.) Plat-only

- (1.) All topographic line calls must be depicted on "plat only" surveys. They are plotted using the appropriate symbols (see the section on symbols and the appendix).
- (2.) The distance to the call, which is measured in the direction of travel from the preceding corner number, is placed at an irregular angle radiating out from the point of intersection. The

- (3.) Topographic line call features are labeled near the point of intersection. The name of the feature is followed by the description, e.g. "Creek, 15 lks, wide, course S. 35° W."; "Trail, 4 lks. wide, bears S. 10° E. and N. 10° W."; "Marsh, edge bears N. 85° E. and S. 75° W."; "Ridge, bears N and S"; "Ravine, drains S. 30° E."
- (4.) The use of capital or lower case lettering is optional, but must be consistent on the plat. Features are labeled in slanted lettering and are labeled at the 80 lettering size. The labeling statement does not run together with the distance mentioned in the previous paragraph.

- 14. <u>Centerline Traverses</u>
- (a.) Plats with Field Notes
 - (1.) An informative traverse of the centerline of a highway should be plotted and shown on the final plat. Centerline traverses may be portrayed in either of two ways:

- (i.) They may be plotted with a centerline symbol and labeled as the centerline of the highway.
- (ii.) Preferably they may be plotted with the appropriate symbol and labeled with the name of the highway.
- (2.) The bearings and distances are not shown along the course of a centerline traverse unless the centerline forms a boundary of the survey.
- (b.) Plat-only
 - (1.) On "Plat only" surveys an informative centerline traverse is plotted and labeled in the same manner as they are on surveys with field notes, however, all of the information which would normally be in the field note record must be shown on the plat. This is typically listed in tabular form like meanders.
 - (2.) The description of the beginning and ending points must be included.
 - (3.) The intersection of the traverse with a surveyed line is labeled with a distance along the surveyed line in the same manner as used for line calls.

15. Curves

(a) Occasionally a portion of the boundary of a survey is along a curve. The data describing the curve is labeled in 80 lettering size with all capital vertical letters.

- (b) The data describing the curve may be placed near the curve or tabulated in a convenient space within the working area of the plat. The information must include the radius, the length along the curve (this is placed on the survey line on the drawing), and the long chord. The central (delta) angle is optional to be shown.
- (c) The unit of measurement must be stated after each distance and should be abbreviated. Distances which are measured in chains may be expressed to three decimal places for increased accuracy.

The radius and length of curve are normally in chains.

The long chord is a bearing and distance.

The central (delta) angle, if shown, is in degrees and minutes.

(d) If there are several curves on the survey each curve must be clearly identified, such as "Curve, line 2-3, Lot 1".

G. Corners, Monuments, and similarly related

1. Monument Legends

There are two types of monument legends:

- (a) Legends identifying the monument type or physical characteristics:
 - 1. Examples of this could be as simple as primary and secondary monuments or specific such as stainless steel post or very specific such as stainless steel post, 28 ins. long, 2 ½ ins. diam., set 25 to 28 ins. in the ground, with brass cap, mkd. with the lot and block lines and Nos., townsite initials ATS, survey No. S4000, and the date 2010, unless otherwise noted.
 - 2. To avoid both repetitious field note writing and plat corner descriptions, townsite type survey plats should utilize a legend to indicate the monument type with reference to a corner symbol.
 - 3. A legend is necessary and is placed in any open space near the bottom of the working area of the plat. Legends are normally done in the 80 lettering size. The symbols are shown on the left at the same size as is used on the drawing. About one-half inch to the right of each symbol either a "brief description" or a "full description" is given.
 - (a.) A "brief description" is given on the plat and a more detailed description is given in the field notes. All capital letters are utilized. Examples are: "BRASS CAPPED IRON POST", "ALUMINUM ROD WITH ALUMINUM CAP", "COPPERWELD ROD WITH BRASS CAP", etc.
 - (b.) A "full description" is completely described on the plat, such as: Stainless steel rod, 9/16 ins. diam., 30 ins. long, with a magnet in the top of the rod, driven 22 to 24 ins. in the ground, with brass cap, 1 ½ ins. diam., mkd. BLM, the lot and block Nos. and lines, and the date 2010, unless otherwise noted.
 - 4. Suggested symbols to use in depicting the "type of monument"

legend:	
Solid circle	Stainless steel post
Open circle	Auxiliary monument (s.s. rod, rebar, etc.)
Solid square	Brass tablet
Open square	Other

The symbols should be 0.08 in. in height but may vary from .05 to 0.10 inches in height for aesthetic reasons.

- (b) Legends identifying the type of corner or historical character:
 - 1. Examples of this are specific symbols for: corners set, original corners remonumented, accepted local corners, etc. They are often utilized when analyzing a preliminary survey.
 - 2. Whilst beneficial prior to approval of the survey by the field surveyor and the Reviewer, these symbols identifying the historical character of the monument, are normally not utilized on the final plat.
 - 3. Suggested monument symbols to use to depict the "type of corner"

Filled diamond	Original BLM cor. remonumented this survey
Open diamond	Original BLM cor., previously remonumend
Filled square	Corner previously established or reestablished;
	remonumented this survey
Open square	Local corner accepted; not remonumented
Filled circle	Corner established or reestablished this survey
Open circle	Calculated position; not monumented

The symbols should be 0.08 in. in height but may vary from .05 to 0.10 inches in height for aesthetic reasons.

2. Monument Symbols

(a) Most survey plats do NOT require a legend as one standard monument symbol is used to represent all monumented corners.

Monument symbols are used to indicate the positions of newly established, recovered, or accepted monuments. Do not show a monument symbol if your survey did not recover or re-establish the corner position, however, monument symbols are shown for monuments established concurrently with an adjoining survey.

An exception is traditional rectangular surveys which do not utilize any monument symbol, as it is already known where monumented corners are located. See sample plat in <u>Manual</u> sleeve.

(b) The typical symbol is a filled-in circle 0.08 inch in diameter (•), but may range from 0.05 to 0.10 inch in diameter. This symbol is plotted on the drawing so that the center of the circle indicates the position of a monument.

With the exception of townsite type surveys, monument symbols are generally NOT used to indicate the type of monument set, therefore one symbol is used for all monumented positions.

- (c) On traditional rectangular surveys, where monument symbols are not shown, if a corner that typically should be monumented is not monumented, the words "not monumented" are placed at the corner position. The words should radiate outward at an irregular angle.
- (d) On surveys with 2-mile monumentation, if a corner or typically numerous corners should be monumented and are not, a paragraph stating that there is lesser monumentation is placed in the field note introduction.
- (e) Control stations utilize an open equilateral triangle symbol, about 0.10 inches high.

- (f) U.S. Location Monuments (U.S.L.M.) or U.S. Mineral Monuments (U.S.M.M.) utilize a filled-in equilateral triangle symbol about 0.10 inches high.
- (g) On townsite plats typically, a different symbol is shown for each type of monument established. (The exterior boundaries of a townsite are documented in the field notes, whilst the plat is the only record of the interior lines and monumentation.) The aforementioned symbols are used to indicate different types of monuments.

3. Corner Numbers (U.S. Surveys)

- (a) The corner numbers are placed near each true corner inside of the respective lot/ survey. The word "Cor." is not shown. Corner numbers are depicted in either 80 or 100 vertical lettering depending on the scale of the drawing.
- (b) Some corner numbers of adjoining surveys are also shown. Every line or portion thereof, should have two corner numbers identifying it, except for a meander line, which should have just the corner adjoining your survey numbered.

These corners (of adjoining surveys) are labeled one size smaller than the corner numbers of the primary survey. If the position of a corner is not shown on the plan, but is on an extension of a line which was not shown to its full length, the corner number is shown in parentheses. These numbers are placed near the end of the line on the side toward the appropriate survey.

(c) If the lot corners of a U.S. Survey are numbered in addition to the exterior corners of the survey, the lot numbers will be lettered one size smaller. When a lot corner number and an exterior corner number are used for the same corner, the lot corner number is placed closer to the corner point.

4. Designating Corners

When subdividing U.S. Surveys, rectangular lots, or Tracts, and a corner becomes a corner of the new lot and it is not visited, only a notation of the new lot No. (& corner No.) on the plat is necessary. A statement on the

plat or in the field notes describing the designation is not required.

- 5. <u>Meander Corners</u>
 - (a) A meander corner is the actual point at which a surveyed line intersects a meander line. If the meander corner is witnessed, no further designation of the meander corner is given on the plat; W.C.M.C. information is sufficient to identify the meander corner. If the meander corner is not witnessed the letters "M.C." are used to identify the corner. These letters are vertical and normally at the 80 lettering size. Periods are placed after each letter.
 - (b) A special meander corner (S.M.C.) is the point where a surveyed section subdivisional line (including a partition line) intersects meandered water. Periods are placed after each letter.
 - (c) An auxilary meander corner (A.M.C.) is the beginning point for meandering a lake or island which is not intersected by a surveyed line. Periods are placed after each letter.
 - (d) An old meander corner that is no longer on the present day meander line is identified with the date that the meander corner was a meander corner, such as "1975 M.C."
- 6. <u>Closing Corners</u>
 - (a) A closing corner may be designated or established at the intersection with a standard parallel. Closing corners are abbreviated "CC" without periods and are vertical. These letters straddle the new surveyed line when practical.
 - (b) Closing corners are not labeled on protracted section lines intersecting a standard parallel from the south.

7. <u>Witness Points</u>

- (a) The position of each witness point is indicated by the appropriate monument symbol. The point is identified by the letters "W.P." (Without quotation marks). This is normally done in vertical 80 lettering size. The lettering is normally oriented at an irregular angle and is placed outside the survey when practical. Periods are placed after each letter.
- (b) Breakdown distances are used to indicate the position of each witness point.

8. <u>Witness Corners</u>

- (a) The monumented point for a witness corner is indicated by a monument symbol. The information which describes the position of the witness corner relative to the true point is placed at the true point. (Not at the witness corner!) Breakdown distances are NOT used to indicate the position of an on line witness corner.
- (b) Off line witness corners are shown connected to the true point with a thin dashed line.
- (c) The witness corner data is kept in a single line when practical. The information is placed at an irregular angle projecting out from the true corner position. It is normally shown in slanted 80 lettering size. The data is given without commas in the following order:
 - (i.) The single letter abbreviations for witness corner or witness corner to the meander, auxiliary, or special meander corners. Periods are placed after each capital letter.

- (ii.) The bearing from the true point to the monumented point. Cardinal bearings must be spelled out in all capital letters.
- (iii.) The distance from the true point to the monumented point. The distance is given in chains; although the word "chains" is omitted.

9. Angle Points

- (a) If the angle point is monumented, a monument symbol is placed at the point. If it is not monumented, a short tick mark, perpendicular to the mean bearing of the two lines, is placed at the point. The tick mark is drawn with a 0000 pen and extends 0.03 inches on each side of the line.
- (b) Angle points are labeled "A.P." in capital, vertical letters, using 80 lettering size. Periods are placed after each letter. The labeling is normally placed perpendicular to the mean bearing of the two lines.
- (c) If there is more than one angle point, they are typically numbered, such as A.P. 1, A.P. 2, A.P. 3, etc.

10. <u>Reference Monuments</u>

- (a) Reference monuments are corner accessories and are described in accessory format with the monument description.
- (b) No indication of the position of the reference monument is shown on the drawing of the survey. They are NOT depicted like a witness corner nor is a monument symbol used.
- (c) If a reference monument should become a controlling point on a line in the course of retracing that line (basically functioning as a witness point) a monument symbol should be shown, along with the marks "W.P." adjacent to it.

11. Control Stations

- (a) Control stations include triangulation stations, doppler stations, electronic control stations, etc. Show only those control stations with ties that were established during the current survey.
- (b) Control stations are shown with an open triangle symbol and are labeled using vertical 80 lettering size as follows:

(i.) The agency identification is given on the first line and is abbreviated.

- 1. B.L.M. Bureau of Land Management
- 2. N.G.S. -National Geodetic Survey (formerly known as United States Coast and Geodetic Survey. (U.S.C. & G.S.)
- 3. U.S.C.E. U.S. Army Corp of Engineers
- 4. U.S.G.S. United States Geological Survey
- 5. A.M.S. Army Map Service
- (ii.) The name of the station is given on the next line. The name must be exactly as it appears in the published record of the establishing agency. Only include the date if the date is in the actual station name. The name is enclosed by quotation marks and should not contain periods or commas. Use all capital letters.

(iii.) The geographic position is given for each control station tied to unless an OPUS solution position is used (and reported) as it is probably not compatible and may lead to confusion.. Any other types of corners tied to do not have a geographic position reported.

This position information is placed beneath the station name. -The words latitude and longitude may be abbreviated as Lat. and Long. respectively. -North and West must be abbreviated as N. and W. The values will be given in degrees, minutes, and seconds.
The datum (NAD83 and/or NAD27) is centered either beneath the longitude or centered to the right between the latitude and longitude.

- (iv.) Geographic positions of control stations determined by BLM are given to thousandths of a second, while other agencies value's are given to typically the value that is published which is also typically to the thousandth of a second.
- (v.) As all surveys must be tied to the National Spatial Reference System (NSRS), a 1983 value for the North American Datum must be used. (NAD 83).

If a control station is used in determining a NAD 83 value for your survey, a NAD 83 value needs to be shown along with the NAD 27 value of the control station.

If the BLM revises the value of a station established by another agency an explanatory statement is used: "(BLM Assigned Value)" beneath the geographic position.

(vi.) The monument must be described either in the field notes or on the plat if there are no field notes (plat-only). Accessories to control stations are not normally described unless at variance with the record.

12. U.S. Location Monuments (U.S.L.M.)

- (a) U.S. location monument symbols are depicted like a control station except the triangle symbol is filled in. The labeling is normally abbreviated, e.g., U.S.L.M. No. 5642.
- (b) A geographic position is not normally reported for U.S. location monuments unless it is a corner of the survey and it is the only corner being reported with a geographic position.

13. Monument Descriptions

All corners on the plat having a bearing and distance to/from them, must be fully described either narratively or pictorially.

Plat-only

(a.) The entire description of each monument must be described on the plat. Each monument is assigned a letter which corresponds with the same letter placed near the description.

The letters are assigned in the same order as the survey is surveyed and as if it was written up utilizing field notes.

- (b.) The letters are labeled in 120 vertical lettering. Each letter is circled for emphasis. The circles are drawn just large enough to avoid touching the letter and are drawn using cyan. A letter is placed about one-half inch from the monument symbol it represents and a straight, solid leader line is drawn from that circle toward the monument symbol at a non-cardinal (irregular) direction. It is preferable to locate the corner letter identifier on the exterior of the survey. The leader line should be the same thickness as the circle and does not touch the monument symbol.
- (c.) The basic element of each monument description is a large circle representing the cap. (Occasionally recovered monuments have no cap in which case the entire description should be written out in paragraph form.) Inside each circle the cap markings are placed just as they are shown in the field tablet. The intersection of the lines shown on the cap designates the corner point. This point should be centered (or nearly centered) within the circle. All of the circles are 1 ¼ inches in diameter and are drawn with cyan. In most cases the lettering within the circle is oriented to read from the bottom of the sheet. This lettering is labeled in vertical 80 lettering.
- (d.) A descriptive statement, similar to that which is used in field notes, accompanies each monument and is placed to the right of the circle showing the cap markings. It is oriented to read from the bottom of the sheet and is labeled in vertical 80 lettering.
- (e) The corner description is left justified and is approximately 3 ins. wide.

H. Misc.

1. Section Labels

- (a) Sections are numbered in sequence beginning at the northeast corner of the township, thence proceeding westerly across the top row of sections to the northwest corner, thence south to the next row of sections and easterly to the east boundary, and continuing in this fashion until the township is complete.
- (b) Label all surveyed sections and sometimes for clarity purposes, those unsurveyed sections adjacent to a surveyed line or that touch one corner. Sections in adjacent townships are not shown, however offset sections are labeled when a township closes on previously surveyed work.
- (c) Section labels are in vertical lettering, capital and lower case letters, and abbreviated "Sec." with a period. The label is normally 120 lettering, although a 100 lettering size may be used in congested areas. The section label and number are placed slightly above the center of the section, however, they are sometimes offset to avoid plotted features like meander lines. The label can be outside the area surveyed and may straddle a U.S. Survey, meander line, survey line, etc.

2. Tract Labels

Tract labels are normally centered in the tract and are labeled in vertical 120 lettering size. The size may vary between 100 and 240 depending upon space and aesthetics.

3. Acreages

- (a) General
 - (1.) Original acreages are only shown for areas that are newly surveyed (original survey) and subdivided non-aliquot parcels.
 - (2.) Resurveyed acreages are now required as per the Manual 9-122 and 9-146.
 - (3.) The units of area must be commensurate with the unit of measurement. The chain unit is used with acreage and the foot unit is used with square footage.
 - (4.) Acreages are always shown to the 0.01 acre except on regular original sections where they are shown as 640 or on irregular or regular portions of sections where the aliquot parts are shown to the nearest acre. i.e 160, 80, 40, 20, 10, or 5.
 - (5) Even when the measured area is much smaller than 0.01 acres, the acreage is never reported smaller than 0.01 acres.
- (b) Section Acreages
 - (1.) If an original regular section can be completely described by aliquot parts, the surveyed area is returned to the full acre without the decimal point or decimal acreages.
 - (2.) All original irregular sections (that normally require lots) are shown to the hundredth of an acre. The total of all the lots is the section acreage and is placed just below the section label, with vertical lettering and the next size smaller than the section label. The word "acres" is not used.

If the section was not originally surveyed in its entirety, the sum of the newly surveyed portions of the section is placed in the center of the section below the section label.

Resurveyed sections or portions of sections with new areas returned of previously platted areas, do not have the sum of the acreages placed in the center of the section below the section label.

- (c) Township Acreages
 - (1.) The total area surveyed is determined by adding up all of the section acreages and rectangular tracts ("tract 37's"). This total is centered beneath the scale bar in vertical 100 size lettering. The statement should read like: ""Area Surveyed: 00,000.00 Acres"

The total area resurveyed (with new acreages being reported) is placed just below the "Area Surveyed" (in the lower portion of the plat) with the words "Area Resurveyed".

- (2.) The acreage for a non-tract 37 tract (e.g. Tract A) is shown centered just below the tract label in vertical 100 lettering size or the next size smaller than the tract label.
- (3.) The acreage of an original township survey should be computed using the actual reported bearings and distances, which are typically mostly cardinal directions and 80's. (i.e. do not use ":West 480.00 nor just the acreages from the protraction diagrams.)

Although, an original "Tract A" township survey with some resurveyed boundaries should have the "protracted" acreage reported if within 5% of the actual computed acreage.

- (4.) A "paper platted" township defined by latitudes and longitudes, should report the actual computed acreages derived from your (current) survey.
- (d) U.S. Survey Acreages
 - (1) A U.S. Survey that is not lotted has the acreage shown only in the plat memorandum and not on the body of the plat.
 - (2) Lotted U.S. Surveys have the acreage on each lot. The total original area and total resurveyed area are both shown in the plat

memorandum.

4. <u>Ties</u>

- (a) If a record tie exists and was used in determining the location of a survey on your plat, the record tie will be shown.
- (b) Every tie in the field notes should be shown on the plat, except when there are numerous ties to lakes and/ or islands that would clutter the plat, it is acceptable to omit these ties from the plat and place them in the field notes only.
- (c) The tie shown on the plat should make no mention of whether the corner tied is unapproved or not.
- (d) All ties, no matter how long, are now mean bearings. Ties greater than 80.00 chains should be shown to the nearest second. No labels as to the type of bearing are required to accompany the bearing. Distances are always to the one-hundredth of a chain.
- (e) Direct ties will be used to indicate how an inholding survey was plotted on a rectangular plat. No computed ties should be used. See Section 9-95 of the <u>Manual</u>. A single tie is sufficient to locate contiguous surveys.
- (f) Great care must be exercised in using an approximate geographic position to plot an inholding on a rectangular survey plat. If data is not available to assure accurate plotting and closure, a tie should be obtained in the field.
- (g) Parenthetical bearing and distance ties to inholdings will not be utilized. Parenthetical bearings and distances are only used on

surveyed lines.

- (h) Tie lines are depicted with a dashed line and drawn in blue. Ties along surveyed lines that are considered retracements or dependent resurveys, are depicted as solid lines.
- (i) Tie bearings and distances are slanted using 80 lettering size. There is no comma between the bearing and the distance. If additional information about the tie is included along the tie line, it will be done in the same lettering size and style as the bearing and distance.
- (j) Ties are presumed to originate at the true point unless otherwise stated. If it is not clear, (especially with very short witness distances) ties from a witness corner or a witness corner to a meander corner should state "From W.C." or "From W.C.M.C." respectively to identify the origin of the tie or conversely "To W.C." or "To W.C.M.C."
- (k) The destination of the tie is shown either pictorially through the drawing or identified by name.
 - (i) The corner label may be labeled at the termination point.
 - (ii) For ties which would extend off the working area of the plat if shown to their proper scale, the information may be shown along the tie line in which case an arrowhead is placed at the end of the tie line and the corner being tied to is identified by placing the corner label along the line with the bearing and distance. In this case, the word "To" precedes the corner identification.
 - (iii) A compressed distance symbol may be plotted in the tie line to indicate that the distance is not plotted to scale. This allows the corner to be shown within the working area of the plat and identified at the termination point.

If a tie extends across a survey to a point beyond the other side (esp. on U.S. Surveys), it is preferable to NOT compress the distance so much that the terminal point of the tie falls within the boundaries of the survey.

5. Inholding Surveys

- (a) Inholding surveys are any metes and bounds survey (typically a U.S. Survey or Mineral Survey) that fall and are plotted within the surveyed portion of the township. The acreage of the inholding survey is not included in the section acreage.
- (b) Record ties are used for plotting the inholding but the tie is not shown. Inholdings can be shown if necessary in the unsurveyed portions of the township.
- (c) It is not necessary to depict the record bearings and distances on the perimeter of the inholding surveys abutting the newly surveyed area.
- (d) Each inholding survey should be labeled and hatched. The hatching helps identify the area not included in the acreage. Normally the entire space is hatched, although on larger surveys, only the edges need to be. Labels can be abbreviated, such as "U.S. SURVEY No. XXXX" or "U.S.S. XXXX" or "USSXXXX" and are labeled with vertical, normally in 80 lettering size.

Hatching is oriented at a different angle for each survey. Any detail or enlargement drawings should carry the same hatching orientation as on the main drawing.

It is not necessary to show the interior lotting or mineral survey claim

names, unless it is necessary to identify a recovered corner. If claim names are shown, they are labeled with the same lettering size and pen as used for U.S. Surveys.

(e) Protracted section lines and lot lines do not cross inholding surveys.

6. Lotting

- (a) General
 - A land hook, indicating the same lot, should be used to connect two portions of a lot when a feature (road, building, etc.) appears to possibly be a lot division line.
 - (2) Lotting information is in vertical lettering and is normally in 80 lettering size.
 - (3) The acreage for a lot is centered below the lot number. If an enlarged diagram is used, do NOT show the acreage for the same lot in both places. The acreage is shown to two decimal places. Only the figures are depicted on the plat; the word "Acres" is not shown. The acreage is shown the same size as the lot number and is in vertical lettering.

(b) U.S. Survey Lotting

- (1.) A U.S. Survey which contains only one parcel is not lotted. The acreage for an unlotted U.S. Survey will be depicted in the plat memorandum and does not show on the body of the plat.
- (2.) Surveys with two or more parcels are lotted. Lot numbers are normally centered within the parcel. These are done in 100 vertical lettering.
- (3.) On the primary survey the lot number is depicted on the plat and the word "Lot" is not shown. On adjacent surveys the word "Lot" is included for clarity. Normally the word "Lot" is lettered using upper and lower case. Lot numbers of adjacent surveys should be one size smaller than the lot numbers of the primary survey.
- (4.) Each original lot of the primary survey must have an acreage.
- (5.) Townsite plats have, block numbers and lot numbers assigned. The block numbers are placed as near the center of

the block as practical. These are done in vertical 120 lettering size. Each block number is circled (similar to the monument description letters on plat only surveys). The circle is made just large enough to avoid touching the numbers and all the block number circles must be the same size. Lot numbers are lettered in the same style as on other U.S. Survey plats except that vertical 80 lettering is normally used.

In townsites, the area of each lot is given in square feet, with vertical 80 lettering. A comma is used to separate the hundreds from the thousands in numbers 10,000 and over. Areas in square feet are indicated by showing the abbreviation "sq. ft." (without quotation marks) after each area. Examples: 57,430 sq. ft.; 7430 sq. ft.

(c) Rectangular Lotting

- Previously surveyed sections should normally not be relotted except in certain dependent resurvey or subdivision situations.
 (e.g. a new acreage) If a portion of a section was previously lotted, number these lots with their original numbers and do not return any areas for them. Always begin new lotting with the next higher lot number in the section.
- (2) Acreage Determination for Rectangular Lots
 - (i) There must be a closed traverse that closes 1:4000 and 1:2828 in latitude and departure.
 - (ii.) The traverse is adjusted using the compass rule to close flat.
 - (iii) Any protracted section corners are determined.
 - (iv) The Manual subdivision procedures are followed.
- (v) Intersection points are determined with the protracted section lines.
- (vi) Acreages are computed.
- (vii) The calculated acreages are proportionately adjusted if record acreages exist (and is within 5% of the original acreage), in order that the totals equal the original acreage.

- (3) The following are some options for lotting of sections in preference order. The appropriate type of lotting should be specified in the special instructions.
 - (i.) Traditional Lotting
 - a. Protracted subdivision-of-section lines are run between opposite corresponding quarter corners, with fractional quarters lotted to provide the maximum number of aliquot parts, as per the <u>Manual</u>.
 - b. It is preferred that the lots do not cross section centerlines. Consideration should also be given to making practical shaped lots that tend to divide shore space equally. It is better to create lots smaller than 10 acres than greater than 50 acres.
 - c. The procedure for assigning lot numbers is similar to

the sequence for numbering sections, that is they are numbered in a back and forth pattern across the section in 4 rows, starting in the northeast corner. Lots encountered simultaneously should be numbered north to south. If a parcel extends over two horizontal rows, do not assign a lot number until encountering the bulk of the parcel.

- (ii) One Large Lot
 - a. If the section is fractional or an inholding invades it or only a portion of the section is surveyed, the section area surveyed is labeled "1" for Lot 1.
 - b. If noncontiguous portions of a section are surveyed, they must be lotted, labeled, and numbered as lots. There is no maximum lot size.

7. Improvements

- (a) Plats with Field Notes
 - (1.) The word "improvements" refers to buildings and other cultural features which have been constructed, although roads and power lines and similar type features are not usually considered improvements. Improvements are plotted to scale on the final plat and labeled as shown in the field notes.
 - (2.)Only the outline of the buildings are shown along with the feature label. These outlines are normally drawn in blue. On small scale plats it is permissible to show the improvements filled in solid since many of them will appear very small. Improvements are labeled in vertical lettering at the 80 lettering size.

- (3.)Do not show the actual tie to the improvement on the plat.
- (4.) Do not plot outhouses or temporary improvements such as trailers on the plat.
- (5.) Improvements tied in as accessories are typically not shown on the plat.
- (b) Plat-only
 - (1.) The improvements are plotted and shown in the same manner as on plats with field notes. The information about the improvements which normally shows in the field notes must be tabulated within the working area of the plat, but not inside the survey.
 - (2.) The tabulated data is shown in vertical lettering. It is broken into three basic parts:
 - (i.) The heading is centered above the tabulated information. The heading reads "IMPROVEMENT" or "IMPROVEMENTS" (without quotation marks) in vertical 120 lettering size using all capital letters.

If the survey has several lots with improvements plotted in more than one lot, a subtitle identifying the lot number is necessary and is centered below the heading. The word "Lot" is placed before the lot number in vertical 100 lettering size. The use of capital and lower case letters is optional.

- (ii.)A statement identifying the corner from which the improvements are tied is centered below the heading. This statement will be placed before each group of improvements tied from a particular corner and a new statement will precede a listing of improvements tied from a different corner, e.g., "From cor. No. 4, Lot 2", "From the witness cor. to cor. No. 2, Lot 1, a meander cor." These statements are labeled in vertical 80 lettering size. The use of capital and lower case letters is optional.
- (3.) A narrative statement pertaining to each improvement is placed below the identity of the corner in vertical 80 lettering size. The use of capital and lower case letters is optional. Each statement is listed separately and contains the following information:

- (i.) The identity of the corner of the improvement which is tied. It is preferable for the corner to be identified as the "most southerly" (or easterly, etc.) corner; however, buildings with sides extending close to cardinal bearings should have the corners identified as the NW, SW, SE, or NE corner.
- (ii.) The name of the structure. This often includes a brief description of the type of material used to construct the building.
- (iii.) The dimensions of the structure in feet. Rectangularly shaped structures have length and width listed with the shortest side listed first. Irregularly shaped buildings have a metes and bounds traverse around their perimeter.
- (iv.) The bearing and distance of the tie line. This distance is in chains. The word "chains" is shown and abbreviated "chs." The tie bearing and distance precedes the dimensions when a metes and bounds description of the structure is used.
- (v.) The bearing of the long side or one of the sides of the building. This bearing is in one direction, extending from the corner described at the beginning that is tied to. This information is omitted when a metes and bounds description is used.
- (4.) When numerous improvements are plotted on small-scale survey, it is permissible to give each improvement a letter designation. The letters correspond to letters placed near the improvements on the drawing and will coincide with a letter preceding the narrative description of the feature.
- 8. "Aguilar Surveys"
 - (a) These types of surveys (Native allotments typically on State patented land) should preferably be prepared as "plat only" surveys as the State of Alaska desires to record these surveys upon BLM accepting them.
 - (b) Additional information is required in the "unusual survey situations, methods, or equipment" portion of the plat memorandum, as follows:

This survey was conducted under <u>The Stipulated Procedures for</u> Implementation of Order, Ethel Aguilar, et al v. United States of <u>America</u>, 474 F. Supp. 840 (D. Alaska 1979), and by authority of the Memorandum of Understanding between the United States Department of the Interior, Bureau of Land Management, and the State of Alaska, Department of Natural Resources, dated September 5, 2000.

I. Plat Memorandum (with Field Notes)

- 1. General
 - (a.) There should be no abbreviations except for "U.S.", "No." and "NAD 83" or other datums; the only exception is "township", "range", etc. when space is limited. Numerical figures are not spelled out.
 - (b.) The plat memorandum is center justified for U.S. Surveys and

left justified for rectangular surveys, although the acceptance certificate for both types of survey is left and right justified.

The U.S. Survey plat memorandum is double spaced if space permits.

- (c.) At the end of each line, no commas are used.
- 2. <u>Rectangular Survey Plat Memorandum (with Field Notes)</u> should include the following in the following order:
 - (a.) A history of surveys should be included in the plat memo or the following statement:

A history of surveys is contained in the field notes.

- (b.) State what the survey represents, including the Township, Range, Meridian, and State.
- (c.) If necessary, a paragraph stating that the lottings and areas have not changed, such as:

Except as indicated hereon, the lottings and areas are as shown on the plat of survey accepted May 1, 1955 and supplemental plat accepted June 1, 1960.

And if the accretions/ erosions are lotted, add the following statement to the above paragraph:

Lottings affected by accretion or erosion are shown in parts, denoting land and water areas, for informational purposes only.

If ties are omitted from a plat (e.g. on proportioned corners from a protracted sections survey plat), a paragraph is used such as:

> Ties to controlling corners used for proportionate measurement are omitted from this plat and are in the field note record only.

As there has not been consistent use on plats as to whether

forward or mean bearings are used, the fact the mean bearings are exclusively used now should be stated as follows:

All surveyed lines and ties between corners are mean bearings.

All surveyed lines are mean bearings.

- (d.) Paragraph stating who executed the survey, survey dates, Manual reference, and special instructions date (only).
- (e.) If it is unclear on the face of the plat which lands were actually surveyed, that is, whether or not islands were looked for or not, it is important to state this fact. There are numerous methods to state this:

This survey includes any and all islands in the Yukon River in this township.

No islands exist in sections 5 and 8.

This survey encompasses all of the land above the line of mean high tide in sections 16 and 17 and the southwest one-quarter of section 18.

(f.) If islands have arisen after Statehood (non-federal land) and are shown on the plat, state something similar to the following:

The islands depicted on the plat with dashed lines arose from the river bed after January 3, 1959 and are not public lands.

There were islands noted in the Yukon River that are not depicted on the plat that arose from the river bed after January 3, 1959 and are not public lands.

Unsurveyed islands depicted by dashed outlines are lands unavailable for survey and disposal as determined by the Secretary of the Interior.

- (g.) Statements defining the term "tract" with a letter designator (i.e. "Tract A's", as opposed to "Tract 37's") are no longer used on the plat to identify rectangularly surveyed land.
- (h.) Acceptance certificate

- 3. <u>U.S Survey Plat Memorandum (with Field Notes)</u> should include the following in the following order:
 - (a.) U.S. Survey label and its No.

- (b.) Subtitle, a very brief description of the survey which generally specifies if any retracement or dependent resurvey and/ or if more than one lot was surveyed.
- (c.) Additional description of the survey work. (if any)
- (d.) Where the survey is situated, including the township, range, meridian, and state.
- (e.) Geographic position and datum.

A NAD83 position can be given here and labeled as such, although it is preferable to place it only on the plat drawing.

See "Introduction" portion in the "Field Note Writing" chapter for format and content.

- (f.) Total original area and total resurveyed area surveyed under your assignment, listed and labeled separately
- (g.) One of these statements:

All surveyed lines and ties between corners are mean bearings.

All surveyed lines are mean bearings.

- (h.) Who the Cadastral Surveyor is and their title, dates of the survey, reference to the special instructions and their date and approval date.
- (i.) Acceptance certificate

J. <u>Plat Memorandum ("Plat-only")</u> - U.S. Surveys & Rect.

- 1. Title and brief subtitle, center justified.
- 2. The following portion of the plat memorandum on a "plat only" survey should be left justified, no hyphens, and normally include the following in the order as listed:
 - (a.) The statement:

This plat contains the entire survey record.

This plat (in 2 sheets) contains the entire survey record.

- (b.) History of surveys
- (c.) Unusual survey situations, methods, or equipment.

Statements related to the existence of islands.

Definition of a tract when used in a different context than used in the Manual.

Survey method, utilization of GNSS (static, RTK, etc.), meander method, etc.

(Also see "Introduction" in the Field Note chapter)

(Also see "Aquilar Surveys" in this chapter)

- (d.) Typically for rectangular surveys- a statement if the lottings and areas have not changed.
- (e.) The statement,

"This survey was executed by _____Cadastral Surveyor, _____, 20___, in accordance with the specifications set forth in the Manual of Surveying Instructions (2009), Special Instructions dated _____, approved _____, and Assignment Instructions dated _____."

Note: For rectangular surveys, a reference to the survey group No. is also included.

(f.) Field Assistants

- (g.) For U.S. Surveys only- Area, in acres (for original and resurveyed areas surveyed under your assignment
- (h.) A description of the methods used to determine the directions of lines and reference to the true meridian. Example:

The direction and length of lines were determined by Global Navigation Satellite Systems (GNSS) Real-Time Kinematic (RTK) observations and augmented by lines projected by fore and backsights with a repeating theodolite and distances measured with electronic distance measurement. The direction of each line is with reference to the true meridian. All bearings are mean bearings. All distances are horizontal distances reduced to their sea level equivalent.

- (i.) Dependent resurvey paragraph if necessary. See Manual sec. 9-21 (6).
- (j.) Statement (if not included in (h) above):

All surveyed lines and ties between corners are mean bearings.

All surveyed lines are mean bearings.

(k.) The NAD83 geographic position is preferably placed at the reported corner on the plat drawing, although the plat memorandum will describe the adjustment date, epoch, reference to the GNSS accuracy standards, OPUS, etc.

See "Introduction" in the Field Note Writing chapter for format and content.

- (l.) How the mean magnetic declination was determined. The actual value is not entered here but is entered only on the plat below the north arrow.
- (m.) The general location of the survey, plus for U.S. Surveys only, the Township, Range, Meridian, and State.
- (n.) General description: land, soil, vegetation, etc.
- (o.) Access to the survey
- 2. The same standard acceptance certificate (not referencing the field notes)

is always used, even on a multi-sheet plat, on each sheet. It is right and left justified and words may be hyphenated.

3. If the plat memo gets too crowded, break off the geographic position information first, secondly the history of surveys, and thirdly break off the general description. Alternatively, if you hare utilizing a second sheet, just continue the memorandum on second sheet.

K. Surveyor Certificate

- 1. The surveyor does not sign the final plat if there are associated field notes; they sign only the field notes. The surveyor only signs the "plat-only" plat, as it contains the field notes.
- 2. The signatures on the final "plat-only" mylar should be with either the readily available Sanford Sharpie Ultra Fine Point pen or if available the German Staedtler Lumocolor 318 Fine Point pen.
- 3. If more than one surveyor signs the plat, they can be different dates.

L. Non-GS-1373 Land Surveyor Executing the Survey

- 1. Occasionally a Surveying Technician or Student Trainee (LS) may execute a survey and is permitted to sign the certificate. This can only be accomplished under the supervision of a GS-1373 Land Surveyor.
- 2. In the plat memorandum (with plats having field notes), the signing non-GS-1373 Land Surveyor will have the title "Cadastral Surveyor." Directly below the title, insert the words "under the supervision of" followed by the GS-1373 Land Surveyor's name, and title (Cadastral Surveyor or Chief, Branch of Field Surveys).
- In the "plat only" plat memorandum, the signing non-GS-1373 Land Surveyor will have the title "Cadastral Surveyor," similar to the following "…_____, Cadastral Surveyor, under the supervision of ______, Cadastral Surveyor … (or Chief, Branch of Field Surveys)."
- 4. In the "plat only" surveyor's certificate, the following wording is utilized: "I, ______, under the supervision of ______, HEREBY CERTIFY "
- 5. Two signature lines are used in the "plat only" surveyor's certificate, with

the supervising GS-1373 Land Surveyor last. Both are labeled "Cadastral Surveyor".

M. Abbreviated Typical Checklist for Survey Plats (with Field Notes)

- 1. Plat
- Plat agrees with field notes in all respects
- Nothing on plat that is not identified/described in notes, except areas and rectangular lotting
- Title: Tp., Rg., Mer., & state or U.S. Survey No.
- Subtitle, if necessary
- Plat border: 16 x 21 ins.; Plat Memo & Accept.: 5 ins.
- North arrow with true north and magnetic declination
- Scale with unit of measurement
- Tp. & Rg. or U.S.S. No. of adjoining surveys
- Historical surveys labeled
- Latitude & Longitude, with N. and W. and appropriate NAD label for all control stations and for the SE and NW cors. of Tps. on rect. plats
- Acreage compass rule adjusted
- Orig. Rect.: total area of each sec. & at bottom of plat
- Resurveys: Area shown on each lot and a total (resurveyed) acreage at bottom of plat (rect.) or plat memorandum (U.S.S.)
- All applicable cors., lots and sections numbered
- Curve data (min.): radius, long chord bearing & dist., & arc length
- Monument symbols
- Distances between all cors. and WP's on surveyed lines except WC's
- All witness cors. shown with bearing & dist. from true point
- CC as needed
- MC, AMC, and SMC as needed
- AP and WP as needed
- Ties:
 - To U.S. Surveys/ control (when necessary)
 - Between lots of U.S. Surveys
 - Over 80 chs., reported to seconds
- Labels: rivers, reservation boundaries, ROW's, local names, etc.
- Improvements
- Dependent Resurvey labels (if necessary for clarity)
- Rect. lotting: check land status, areas, previous plats, sequence
- USS lotting: lots No.'d & acreage on lot if more than 1 lot per survey
- Check proportions
- Check parenthetical distances
- All rect. sections No.'d and in proper sequence
- Compare plats, previous and concurrent, having common lines

- Check section and lot closures
- Topography
- 2. Plat Memorandum (Rectangular survey with field notes)
- History of surveys
- Description of survey
- Lotting & acres as shown on previous plats, date of plats
- Mean bearing statement
- Surveyor's name and title
- Dates of commencement and completion of survey
- Dates of SI's; Group No., and state
- Acceptance certificate
- 3. Plat Memorandum (U.S. Survey with field notes)
- U.S. Survey No.
- Description of survey
- Geographic position of a cor. of the survey and datum
- Acreage of total area surveyed (orig. & resurveyed listed separately)
- Surveyor's name and title
- Dates of commencement and completion of survey
- Dates of SI's
- Mean bearing statement
- Acceptance certificate

CHAPTER IV. DATA TO BE SUBMITTED

A. UPON COMPLETION OF THE FIELD SURVEY

- 1. The actual field survey is the biggest and most important step in the land conveyance process. Many folks have a vested interest in seeing the completion of the field survey.
- 2. The final records preparation should be prepared based upon a priority schedule.
- 3. Personally send any pertinent information to the survey file to ensure inclusion. See chapter I., section P (Investigative Reports)

B. SUBMISSION TO REVIEW

- 1. Typical minimum checklist for supplemental data to be submitted to Review:
 - a. Move sheets/ drop sheets.
 - b. Legible corner mark "rubbings" or digital photographs.
 - c. Indexed Field Books
 - d. True line & closure, including any adjustments or proportions (text file)
 - e. Lats. & longs. for all points (digital)
 - f. Working digital drawing ("Dirty Sheet") with cross referenced point numbers/ names to lats. and longs.
 - g. All GNSS field collected points in Autocad (e.g. temp. corners, true points, accessories, topo., etc.)
 - h. Explanation, justification, and documentation for anything that is unconventional or deviates from the special instructions or the <u>Manual</u>.
 - i. Brief cover letter describing point labeling nomenclature, basis of coordinates, datum, and generally how the survey was computed.
 - j. If the Reviewer and Surveyor decide to have any of the Reviewer's suggested changes digitally outlined in a different color by the Reviewer on the plat and/or field notes, a digital copy of the notes and plat will need to be

submitted.

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- 2. The front of the field envelope/ box should be filled out, i.e. identification of project, miles, monuments, etc.
- 3. If necessary for clarity, a field sketch sheet showing random and true line, as well as WCs, WPs, identified original corners, control, etc. Cross-referenced to field books, if necessary. If closure sheets for traverses, acreage and drop sheets are used, they must be labeled. If used, indexed field books.
- 4. Hard copy automated draft plat in "final" form. It should not require any edits.
- 5. Hard copy automated draft field notes in "final" form. They should not require any edits.
- 6. A report detailing the existence of any islands arising from the bed of a navigable water body after Statehood (Jan. 3, 1959). The "islands" should be listed narratively. Ultimately the report along with the materials used in making the determination (e.g. maps, photos, quad. maps, navigability reports, etc.) should be placed in the survey file.
- 7. Other associated pertinent data, such as quad. maps, field notes and plats of prior surveys, etc. This is basically everything that was received prior, during, and subsequent to the field survey.
- 8. If the survey is to be charged to a unique charge code or if it is involved with a time deadline, this notation should be "flagged" on the front of the field envelope so that it is obvious to anyone working with the survey.
- 9. BIA Reimbursable Surveys
 - a. Investigative Reports (if required) for the BIA should be submitted concurrently with the field survey.
 - b. Submit:
 - (1) A .DWG drawing file for the administrative survey. (field diagram)
 - (2) A MS Word file for the investigative (administrative) report.
 - (3) A CD (PDF or TIF format) with the investigative report, field diagram,

and any extra pictures. When using ACAD, use black lines.

Label the CD or CD case with the U.S.S./ Tp., R., Mer., Sec., BIA Tract No., and general location.

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C. DIGITAL DATA SUBMISSION

- 1. Upon the surveyor signing the plat or notes, the digital copy of the "final" plat and notes should be posted on a common server by the surveyor, in order to assist others in updating the MTPs, GCDB, or other digital data bases.
- 2. Digital copies of any Investigative reports (except BIA Investigative Reports) should be placed on the common server.
- 3. The digital data is intended for temporary internal use only.
- 4. The digital data is located on the server at:

Field_Surveys on 'ilmakct6na1' (drive letter:)

Completed Surveys (digital)

5. All digital data will be purged from the server periodically.

E. <u>FEDERAL REGISTER</u>

Suggested criteria necessitating Federal Register publication:

- 1. A court ordered survey
- 2. A local corner is accepted or rejected.
- 3. A riparian boundary is redefined.
- 4. Aguilar stipulations apply.
- 5. A reimbursable customer requests.

ANILCA, sec. 902a should preclude the necessity for any ANCSA surveys to be published.

This Index is color coded to indicate source of information.

H-1275-1 - Manual Land Status Records (Revised Proposed 2001 Edition from Rick Dickman) Oregon/Washington Proposed Abbreviations (Robert DeViney - retired 2006) Oregon/Washington Proposed Abbreviations (Land Records Team - Post Robert DeViney)

1st Prin Mer	First Principal Meridian
2nd Prin Mer	Second Principal Meridian
3rd Prin Mer	Third Principal Meridian
4th Prin Mer	Fourth Principal Meridian
5th Prin Mer	Fifth Principal Meridian
6th Prin Mer	Sixth Principal Meridian
1/2	Half
1/4	Quarter
A	A
A	Acre(s)
A&M Col	Agriculture and Mechanical College
A/G	Anchors & guys
A/Rd	Access road
ACEC	Area of Critical Environmental Concern
Acpt	Accept/Accepted
Acq	Acquired
Act of Cong	Act of Congress
ADHE	Adjusted homestead entry
Adm S	Administrative site
Admin	Administration, administered
AEC	Atomic Energy Commission
AF	Air Force
Agri	Agriculture, Agricultural
AgriExp Sta	Agriculture Experiment Station
AHA	Alaska Housing Authority
AHE	Additional homestead entry
All Min	All minerals
Allot	Allotment
Als PS	Alaska public sale
Amdt	Amendment, Amended, Amends
Anc Fas	Ancillary facilities
ANS	Air Navigation Site
AO	Area Office
Apln	Application
ApIn Ext	Application for extension
ApInt	Applicant
Арр	Appendix
Approp	Appropriation, Appropriate, Appropriated

Cim Mer	Cimarron Meridian
Circ	Circular
CI	Classification
Cmplx	Complex
Cmplx Surf	Surface Segregation Complex
Cmplx Sub	Subsurface Segregation Complex
Co	Company
Coal (Not abbreviated)	Coal
Comm P	Community pit
Comm S	Communication site
Compt	Competitive, Completed
Con	Contain, Containing
Condemn	Condemnation
Cong	Congress
Cons Esmt	Conservation Easement
Consol	Consolidate, consolidated
Conv	Convert, Converted
Coop	Cooperative
Corp	Corporation
County (Not abbreviated)	County
Срд	Campground
CR Mer	Copper River Meridian
Cr Per	Crossing permit
CRE	Credit entry
Cult S	Cultural site
Cur	Curative
Cur Pat	Curative patent
D	D
D	Director
D/C	Ditches and/or Canals
DC	Donation claim
Ded	Dedication
Def	Deficiency
Dept	Department
Dept of Agri	Department of Agriculture
Dept of Int	Department of the Interior
Des	Designated, Designation
Desc	Description
Det	Determination
Dia	Diagram
Disp	Disposal
Dist	District
DLE	Desert Land entry
	D1 + 1 + 14

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DM O	District Manager Order
Doc	Document
Dup	Duplicate, Duplication
E	E
E	East
Eff	Effective
EHE	Enlarged homestead entry
Elim	Elimination
Enlgmt	Enlargement
EO	Executive Order
ES	Exchange survey
Esmt	Easement
Esmt	Easements
Estb	Established
Excl	Excluding, Excluded, Excludes, Exclude
Exp	Expire(d)
Expl	Explore, Exploration
Ext	Extended, Extension, Extend. Extends
F	F
F&WS	Fish and Wildlife Service
FAA	Federal Aviation Administration
Fbx Mer	Fairbanks Meridian
FC	Final certificate
Fed	Federal
FERC	Federal Energy Regulatory Commission
FERC O	Federal Energy Regulatory Commission Order
FF Lse	Fur farm lease
FFMC	Federal Farm Mortgage Corporation
FHA	Farmers Home Administration
Fis	Fissionable materials
FLS	Forest lieu selection
Flwg	Following
FmU	Farm unit
FPA	Federal Power Act
FPC	Federal Power Commission
FR	Federal Register
Frac	Fractional
Frac Int Pat	Fractional interest patent
FRC	Federal Records Center
FS	Forest Service
FUP	Free use permit
FWS	Bureau of Sports Fisheries and Wildlife
FX	Forest exchange
G	G

(00.000	
G Sta	Gauging station
Gd	Gold
Geo	Geothermal
Geol	Geological
Geol Str	Geologic structure
GLO	General Land Office
GLO O	General Land Office Order
GR Dist	Grazing District
Gr Lic	Grazing license
Gr Per	Grazing permit
Grp	Group
GR Lse	Grazing lease
GSA	General Services Administration
GSR Mer	Gila and Salt River Meridian
Н	Н
Haz	Hazard
Hda S	Headquarters site
Hdatrs	Headquarters
HDS	Homestead declaratory statement
HE	Homestead entry
HES	Homestead entry survey
HI	Historical Index
Hist S	Historical site
HR	Hardrock
Hum Mer	Humboldt Meridian
Hunts Mer	Huntsville Meridian
Hwy	Highway
IA	Indian allotment
IBLA	Interior Board of Land Appeals
IC	Interim conveyance
ID	Interior Decisions
Iden	Identify, Identification
	Indemnity List
IL Base	Indemnity List Base lands
ILD	Interior Land Decisions
Illus	Illustration
Inc	Including, Inclusive, Included
Incl	Inclusive
Incorp	Incorporated
Ind Fee	Indian fee
Ind Hd Tr Pat	Indian homestead trust patent
Ind Mer	Indian Meridian
Ind Res	Indian reservation

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Ind Tr	Indian trust
Int	Interest
Intpr	Interpretation
IS	Indemnity selection
IT	Isolated tract
J	J
Juris	Jurisdiction
К	К
KCLA	Known Coal Leasing Area
KGRA	Known Geothermal Resource Area
KGS	Known Geologic Structure
KLA	Known Leasing Area
KR Mer	Kateel River Meridian
KRCRA	Known Recoverable Coal Resource Area
L	L
L/W	Lying within
La Mer	Louisiana Meridian
Lat	Latitude
LD	Land Decision
LD, Lds	Land, Lands
LH	Lighthouse
Lic	License
Lit	Litigation
LO	Land Office
Loc	Location
Long	Longitude
LR	Leasable Resource
LS	Lieu selection
Lsbl	Leasable
Lse	Lease
Ltd	Limited
Ltr	Letter
LU	Land Utilization
LUP	Land Use Permit/Plan
M	M
M&B	Metes and Bounds
Mat S	Material site
MC	Mining claim
MCOA or MOA	Mining Claim Occupancy Act
MD Mer	Mount Diablo Meridian
Mdr	Meander
ME	Mineral entry
Mer	Meridian
Mal	Meteorological

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Mgmt	Management
Mich Mer	Michigan Meridian
Mil Pur	Military purpose
Mil Res	Military reservation
Mil RG	Military Road Grant
Mil WR	Military Wagon Road
Mil WRG	Military Wagon Road Grant
Mill S	Millsite
Min	Mineral
Min Cert or MC	Mineral certificate
Misc	Miscellaneous
ML	Mineral location
MLCI	Mineral Location and Contest Index
MM	Mineral Monument
MMS	Mineral Management Service
MOA	Mineral Occupancy Act
Mod	Modification
Mon	Monument
Mont Prin Mer	Montana Principal Meridian
MS	Mineral survey
Mt	Mount
Mtn	Mountain
MTP	Master Title Plat
Mtr	Monitor
Mtrg	Monitoring
Mult	Multiple
Mult Use	Multiple use
N	N
N	North
N Mex Prin Mer	New Mexico Principal Meridian
N Mon	National Monument
N Prs	National Preserve
NA	Native allotment
Nat	Natural
Nat G	Natural gas
Natl	National
NAV	Navigable
Nav Mer	Navajo Meridian
NCompt	Noncompetitive
NE	Northeast
NF	National Forest
NG Sel	Native Group selection
NGEO	Not Open to Geothermal Leasing
Nit	Nitrate

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No	Number
NOE	Not Open to Entry
NOL	Not Open to Lease
NOM	Not Open to Mining (Location and Entry)
NOMM	Not Open to Mineral Materials sales
NONM	Not Open to Non-Metalliferous location
NOS	Not Open to Surface entry
NOSM	Not Open to Saleable Minerals
NOSS	Not Open to Subsurface entry
NP	National Park
NPPR	Native primary place of residence
NPS	National Park Service
NRL	National resource lands
NW	Northwest
NWR	National Wildlife Refuge
0	0
0	Order
0&C	Oregon and California (revested lands)
OE	Open to Entry
OG	Oil and gas
Oper	Operation
OS	Oil shale
~~	
р	Р
P Par	P Parcel
P Par Part (Not abbreviated)	P Parcel Part
Par Part (Not abbreviated) Partially (Not abbreviated)	P Parcel Part Partially
Par Part (Not abbreviated) Partially (Not abbreviated) Pat	P Parcel Part Partially Patent
P Par Part (Not abbreviated) Partially (Not abbreviated) Pat PD	Parcel Part Partially Patent Public domain
P Par Part (Not abbreviated) Partially (Not abbreviated) Pat PD Per	P Parcel Part Partially Patent Public domain Permit
Par Par (Not abbreviated) Partially (Not abbreviated) Pat PD Per Perm	Parcel Part Partially Patent Public domain Permit Permission
Par Par (Not abbreviated) Partially (Not abbreviated) Pat PD Per Perm Perm Pet Res	Parcel Part Partially Patent Public domain Permit Permission Petroleum reserve
Par Par (Not abbreviated) Partially (Not abbreviated) Pat PD Per Perm Pet Res Pho	Parcel Part Partially Patent Public domain Permit Permission Petroleum reserve Phosphate
Par Par (Not abbreviated) Partially (Not abbreviated) Pat PD Per Perm Pet Res Pho PL	Parcel Part Partally Patent Public domain Permit Permission Petroleum reserve Phosphate Public Law
Par Par (Not abbreviated) Partially (Not abbreviated) Pat PD Per Per Perm Pet Res Pho PL PL PLC	Parcel Part Parti Partially Patent Public domain Permit Permission Petroleum reserve Phosphate Public Law Private land claim
P Par Part (Not abbreviated) Partially (Not abbreviated) Pat PD Per Perm Pet Res Pho PL PLC PLO	Parcel Part Parti Partially Patent Public domain Permit Permission Petroleum reserve Phosphate Public Law Private land claim Public Land Order
P Par Part (Not abbreviated) Partially (Not abbreviated) Pat PD Per Perm Pet Res Pho PL PLC PLO PLS	Parcel Part Partially Patent Public domain Permit Permission Petroleum reserve Phosphate Public Law Private land claim Public Land Order Public Land Sale
P Par Part (Not abbreviated) Partially (Not abbreviated) Pat PD Per Perm Pet Res Pho PL PLO PLS Plt	Parcel Part Part Partially Patent Public domain Permit Permission Petroleum reserve Phosphate Public Law Private land claim Public Land Order Public Land Sale Plant
P Par Part (Not abbreviated) Partially (Not abbreviated) Pat PD Per Perm Pet Res Pho PL PLO PLS Pit Pot	Parcel Part Part Partially Patent Public domain Permit Permission Petroleum reserve Phosphate Public Law Private land claim Public Land Order Public Land Sale Plant Potassium
P Par Part (Not abbreviated) Partially (Not abbreviated) Pat PD Per Perm Pet Res Pho PL PLC PLO PLS Plt Pot Pot Pot	Parcel Part Partially Patent Public domain Permit Permitsion Petroleum reserve Phosphate Public Law Private land claim Public Land Order Public Land Sale Plant Potassium
P Par Part (Not abbreviated) Partially (Not abbreviated) Pat PD Per Perm Pet Res Pho PL PLC PLO PLS Plt Pot Pot Pot Potash (Not abbreviated) PPB	Parcel Part Partially Patent Public domain Permit Permit Permission Petroleum reserve Phosphate Public Law Private land claim Public Land Order Public Land Sale Plant Potassium Potash Primary place of business
P Par Part (Not abbreviated) Partially (Not abbreviated) Pat PD Per Perm Pet Res Pho PL PLO PLS Pit Pot Pot Per	Parcel Part Partially Patent Public domain Permit Permission Petroleum reserve Phosphate Public Law Private land claim Public Land Order Public Land Sale Plant Potassium Potash Primary place of business Prospecting permit
P Par Part (Not abbreviated) Partially (Not abbreviated) Pat PD Per Perm Pet Res Pho PL PLC PLO PLS Plt Pot ash (Not abbreviated) PPB Pre Pre	Parcel Part Partially Patent Public domain Permit Permission Petroleum reserve Phosphate Public Law Private land claim Public Land Order Public Land Sale Plant Potassium Potash Primary place of business Prospecting permit Preemption
P Par Part (Not abbreviated) Partially (Not abbreviated) Pat PD Per Perm Pet Res Pho PL PLO PLS Pit Pot Pot Pre Pre Pot Pot Pit Pot Pre Pre Pre Prin Mer	Parcel Part Partially Patent Public domain Permit Permission Petroleum reserve Phosphate Public Law Private land claim Public Land Order Public Land Sale Plant Potassium Potash Primary place of business Prospecting permit Preemption Principal Meridian

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Index of Standard Abbreviations (Sorted by Abbreviation)

Duel	Project
Proj	Project
Prop	Propose, Proposed
Prot Wdl	Protective withdrawal
PS	Public sale
Pt	Point
PU	Public use
Pur	Purchase
Purp	Purposes
Purs	Pursuant
PW Res	Public water reserve
Pwr Proj	Power project
PwrS	Power site
PX	Private exchange
Q	Q
QCD	Quit claim deed
Qs	Quicksilver
R	R
R	Range
R&PP	Recreation and Public Purposes
R&R	Register and receiver
R/W	Right-of-Way
RA	Resource Area
RB	River basin
RCA	Recreation Conservation Area
Rcpl	Reciprocal
Rd	Road
RDS	Reservoir declaratory statement
re	Reference
Rec Lse	Recreation lease
Recd	Received
Recl	Reclamation
Re-cl	Reclassified
Reci Wdl	Reclamation withdrawal
Recon	Reconveyed
Re-Des	Redesignation
Reg	Regional
Rein	Reinstated
Rei	Rejected Rejection
Rel	Relinguished Relinguishment
Res	Reservation Reserve
Resc	Rescind Rescinded
Reso	Resource(s)
Rest	Restoration Restored
Doove	Decenvoir
L/G2MI	Neservoli

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Rev	Revocation, Revoked
Rfg	Refuge
Rgr Sta	Ranger station
RHE	Reclamation homestead entry
RI	Range improvement
Rmks	Remarks
RR	Railroad
RRG	Railroad grant
RRIS	Railroad indemnity selection
RRLS	Railroad lieu selection
RS	Revised Statutes
RSB	River sub-basin
Rstd	Restricted
Rstd Surf	Surface Segregation Restricted
Rstd Sub	Subsurface Segregation Restricted
Rvst	Revested
Ry	Railway
S	S
S	South
S&M	Soil and moisture
S&O	Swamp and overflow
SAH	Soldier's additional homestead
SB Mer	San Bernardino Meridian
Sch	School
Scn	Scenic
SCS	Subsistence camp site
SD	State Director
SD O	State Director's Order
SDS	Soldier's declaratory statement
SDW	Stock driveway
SDW WdI	Stock driveway withdrawal
SE	Southeast
Sec	Section
Sec of Agri	Secretary of Agriculture
Sec of Int	Secretary of the Interior
Segr	Segregation, Segregated
Segr Undet	Segregation Undetermined (Both Surf and Sub)
Sel	Selection, Selected
Sew Mer	Seward Meridian
SG	State grant
SHC	Small holding claim
Si	Silver
Sim	Simultaneous
Oite (Mat althousisted)	Sito

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QI Mor	Salt Lake Meridian
	Suit Lake Meridian
	Swallip land use normit
SLOF	Special land use permit
50	Secretarial Order
50 9-4	State Office
Sod	Sodium
Spec Per	Special permit
SR	Serial Register
SRHE	Stockraising nomestead entry
SRP	Serial Register Page
SS	State selection
SSE	Subsurface estate
ST	Small tract
ST CI	Small tract classification
St Hel Mer	St. Helena Meridian
ST Lse	Small tract lease
St Step Mer	St. Stephens Meridian
Sta	Station
Stat	Statute
Stats	Statutes
Sto	Storage
Str	Structure
STS	Small tract sale
Subdiv Und	Subdivisions undefined
Subj	Subject
Subm	Submerged
Sul	Sulphur
Suppl	Supplemental
Sur	Survey, Surveyed
Surf	Surface
Sus	Suspended
SV	Scenic value
SW	Southwest
SX	State exchange
T	Т
T or Tp	Township
T&M	Trade and manufacturing
T/S	Timber and stone
ТА	Tentative approval
Tall Mer	Tallahassee Meridian
TC	Timber culture
TCP	Timber cutting nermit
Tol	Telenhone
Tolog	Tolograph
Teley	relegraph

(
Temp	Temporary
Term	Terminate, Termination
Territory, Territorial (Not abbreviated)	Territory, Territorial
thru	Through
Tmb	Timber
Tns	Townsite
Tps	Townships
Tr	Tract
Trans	Transmission
Trf	Transfer
Trf Juris	Transfer of jurisdiction
Trfd	Transferred
Tri Sta	Triangulation station
Trsp	Trespass
TUP	Temporary use permit
U	U
UA	Unit Agreement
Uintah Mer	Uintah Meridian
Uintah Sec Mer (Obsolete; see Uintah Meridian)	Uintah Special Meridian
Unapprop	Unappropriated
Und	Undefined
Undet	Undetermined
UNDGD	Underground
Undiv	Undivided
Unk	Unknown
Unsur	Unsurveyed
Ur	Uranium
US	United States
USAF	United States Air Force
USC	United States Code
USGS	United States Geological Survey
USS	United States Survey
Ute Mer	Ute Meridian
V	V
V	Village
Var Int	Variable Interest
vs	Versus
W	W
W	West
W/Chg	With change(s)
W/I	Within
W/O	Without
W/S	Wild and Scenic
Wa	Water

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WAA	War Assets Administration
War Dept	War Department
Wash Mer	Washington Meridian
WD	Warranty deed
Wdl	Withdrawal
Wdn	Withdrawn
Wdns	Wildemess
Will Mer	Willamette Meridian
WP	Water power
WP Des	Water power designation
WR	Water rights
WR Mer	Wind River Meridian
WS	Watershed
Wt	Warrant
X	X
х	Exchange(d)

STATE OF ALASKA

CONTENTS

BASE LINE DESIGNATION	STATE	BOROUGH	QUAD
CAMPBELL AIRSTRIP CBL (2009 REMEASURED)	ALASKA	ANCHORAGE	N611493
F.W. WILLIAMSON CBL (2001 REMEASURED)	ALASKA	KENAI	N601512
FAIRBANKS CENTENNIAL CBL	ALASKA	NORTH STAR	N641474
JUNEAU CBL (2001 REMEASURED)	ALASKA	JUNEAU	N581343
WASILLA APT CBL (2009 REMEASURED)	ALASKA	MAT-SU	N611494

US DEPARTMENT OF COMMERCE - NOAA	CALIBRATION BASE LINE DATA	QUAD: N611493
NOS - NATIONAL GEODETIC SURVEY	BASE LINE DESIGNATION: CAMPBELL AIRSTRIP CB	ALASKA
SILVER SPRING MD 20910	PROJECT ACCESSION NUMBER: 16397	ANCHORAGE COUNTY
	NEAREST TOWN: ANCHORAGE	

LIST OF ADJUSTED DISTANCES (2/10/2009)

		ADJ. DIST.(M)		ADJ. DIST.(M)	
STD. FROM STATION ERROR (MM)	ELEV.(M) TO STATION	ELEV.(M)	HORIZONTAL	MARK - MARK	
GEO STA 60002 A 1973 GEO STA 60002 A 1973 GEO STA 60002 A 1973	73.456 150 1984 73.456 430 1984 73.456 1000 1984	74.675 77.323 82.398	150.0030 429.9938 999.9608	150.0080 430.0112 1000.0008	.1 .1 .2
150 1984 150 1984	74.675 430 1984 74.675 1000 1984	77.323 82.398	279.9907 849.9577	280.0032 849.9928	.1 .1
430 1984	77.323 1000 1984	82.398	569.9670	569.9896	.1

DESCRIPTION OF CAMPBELL AIRSTRIP BASE LINE YEAR MEASURED: 1984 YEAR REMEASURED: 2009 LATITUDE: 61 09 13 LONGITUDE: 149 47 26

AZIMUTH: 45 DEGREES TRUE NORTH CHIEF OF PARTY: OWM

THE BASE LINE IS LOCATED ON THE EAST SIDE OF ANCHORAGE AT THE BUREAU OF LAND MANAGEMENT ANCHORAGE FIELD OFFICE AND ALONG THE SOUTHEAST EDGE OF THE CAMPBELL AIRSTRIP. THE CAMPBELL AIRSTRIP IS AN ACTIVE AIRSTRIP! WATCH FOR AIRCRAFT AT ALL TIMES!

THE BASE LINE IS A NORTHEAST-SOUTHWEST LINE WITH THE 0 METER POINT ON THE SOUTHWEST END. IT IS MADE UP OF THE 0, 150, 430, AND 1000 METER POINTS. ALL OF THE MARKS ARE SET ON A LINE SOUTHEAST OF AND PARALLEL WITH THE RUNWAY AND NORTHWEST OF THE TRACK ROAD ON THE SOUTHEAST SIDE OF THE AIRSTRIP.

TO REACH THE 0-METER FROM THE JUNCTION OF SEWARD HIGHWAY AND DOWLING ROAD, GO EAST ON DOWLING ROAD FOR 0.96 KM (0.6 MI) TO TTS JUNCTION WITH LAKE OTIS PARKWAY. TURN RIGHT AND GO SOUTH ON LAKE OTIS FOR 0.88 KM (0.55 MI) TO EAST 68TH AVENUE. TURN LEFT ON 68TH AVENUE AND GO EAST FOR 1.61 KM (1.0 MI) TO JUNCTION WITH ABBOTT LOOP ROAD AND RUTH STREET, TURN RIGHT AND GO SOUTH ON ABBOTT LOOP ROAD FOR 0.08 KM (0.05 MI) TO ENTRANCE OF ANCHORAGE FIELD OFFICE OF BUREAU OF LAND MANAGEMENT. TURN LEFT AND GO EAST INTO BLM FACILITY FOR 0.08 KM (0.05 MI) AND BEAR RIGHT AT THE FORK TO GATE ON THE RIGHT (LOCKED AFTER HOURS AND ON WEEKENDS), PASS THRU GATE AND CONTINUE EASTERLY FOR 0.48 KM (0.3 MI) TO BLM PARKING LOT, STAY TO LEFT AND CONTINUE EAST PAST GARAGES FOR 0.16 KM (0.1 MI) TO WARNING SIGN AND ENTRANCE TO RAMP. (CHECK WITH PERSONNEL IN RAMP TRAILER ON RIGHT FOR CLEARANCE TO ENTER CAMPBELL AIRSTRIP.) PASS THRU RAMP ENTRANCE AND GO EASTERLY ACROSS GRAVEL RAMP FOR 0.16 KM (0.1 MI) TO WEST EDGE OF SOUTH END OF AIRSTRIP. BEAR RIGHT ON TRACK ROAD AND CROSS AIRSTRIP FOR 0.08 KM (0.05 MI) TO 0 METER POINT ON THE RIGHT AS DESCRIBED. TO REACH THE OTHER MARKS TURN LEFT ON TRACK ROAD ALONG EDGE OF WOODS AND GO NORTHEAST 0.16 KM (0.1 MI) TO 150 METER POINT ON LEFT. CONTINUE NORTHEAST FOR 0.24 KM (0.15 MI) TO 430 METER POINT ON THE LEFT. CONTINUE NORTHEAST FOR 0.56 KM (0.35 MI) TO 1000 METER POINT ON THE LEFT. THE 0 METER POINT IS A STANDARD US GLO DISK STAMPED "GEO STA 60002 A 1973" SET INTO THE TOP OF A METAL PIPE 23 CM (9 IN) IN DTAMETER PROJECTING 25 CM (10 IN) ABOVE THE GROUND. IT IS: 24.689 M (81.0 FT) SW FROM CENTER LINE OF TRACK ROAD, 2.230 M (7.3 FT) SE FROM 12.5 CM (5 IN) BIRCH TREE, AND 1.615 M (5.3 FT) NE FROM 12.5 CM (5 IN) SPRUCE TREE. THE 0 METER POINT IS A BLM GEOCEIVER STATION. EXCEPT FOR THE O METER POINT, WHICH IS DESCRIBED, ALL THE OTHER MARKS ARE STANDARD BASE LINE DISKS SET IN 18 INCH SOUARE
CONCRETE MONUMENTS WHICH PROJECT ABOUT 3 INCHES AND ARE SET IN 5 FOOT ROUND CONCRETE PADS. NOTE THAT THE PAD AT THE 150 METER POINT

IS UNSTABLE. ALL OF THESE MARKS ARE STAMPED WITH THEIR BASE LINE DESIGNATION AND THE YEAR 1984.

USER NOTES - CBL USERS SHOULD TAKE CARE IN PLUMBING OVER ALL POINTS. ELEVATIONS ARE FOR CBL USE ONLY.

THIS BASE LINE WAS ESTABLISHED IN CONJUNCTION WITH THE ANCHORAGE CHAPTER OF THE ASPLS. FOR FURTHER INFORMATION CONTACT ALASKA SOCIETY OF PROFESSIONAL LAND SURVEY, ANCHORAGE CHAPTER, P.O. BOX 10-2106, ANCHORAGE, AK 99510-2106 OR CALL MIKE WILSON, BLM,

AT 907-267-1312.

US DEPARTMENT OF COMMERCE - NOAA	CALIBRATION BASE LINE DATA	QUAD: N601512
NOS - NATIONAL GEODETIC SURVEY	BASE LINE DESIGNATION: F.W. WILLIAMSON CBL	ALASKA
SILVER SPRING MD 20910 - AUGUST 21, 2001	PROJECT ACCESSION NUMBER: 16397	KENAI BOROUGH
	NEAREST TOWN: SOLDOTNA	

LIST OF ADJUSTED DISTANCES (AUGUST 20, 2001)

		A	DJ. DIST.(M)	ADJ. DIST.(M)	
FROM STATION ERROR (MM)	ELEV.(M) TO STATION	ELEV.(M)	HORIZONTAL	MARK - MARK	
0 0 0	37.490 150 37.490 400 37.490 1246	34.960 33.901 35.624	150.0088 399.9873 1246.5189	150.0302 400.0034 1246.5203	.1 .2 .2
150 150	34.960 400 34.960 1246	33.901 35.624	249.9784 1096.5098	249.9807 1096.5100	.1
400	33.901 1246	35.624	846.5313	846.5330	.1

DESCRIPTION OF F. W. WILLIAMSON BASE LINE YEAR MEASURED: 1984 YEAR REMEASURED: 2001 LATITUDE: 60 20 25 LONGITUDE: 151 16 29 AZIMUTH: 24 DEGREES TRUE NORTH CHIEF OF PARTY: BK

THE BASE LINE IS LOCATED ABOUT 23.3 KM (14.5 MI) SOUTH OF KENAI AND 18.5 KM (11.5 M) SOUTHWEST OF SOLDOTNA ALONG THE EAST SIDE OF

KALIFORNSKY BEACH ROAD NEAR THE KASILOF AIRPORT.

THE BASE LINE IS A NORTH-SOUTH LINE WITH THE 0 METER POINT ON THE SOUTH END. IT IS MADE UP OF 0, 150, 400, AND 1246 METER POINTS.

MARKS FOR THE CALIBRATION OF 100 AND 200 FOOT TAPES ARE SET SOUTH AND NORTH OF THE 400 METER POINT RESPECTIVELY. AN 800 METER POINT WAS SET BUT NOT MEASURED TO. THE HORIZONTAL DISTANCES FROM 400M MARK TO THE CENTERS OF THE 100 FOOT AND 200 FOOT DISKS

ARE 99.99 FT (30.477 M) AND 199.96 FT (60.948 M) RESPECTIVELY, AND TO THE OFF-CENTERED PUNCHES ON THE DISKS ARE 100.00 FT (30.480 M) AND 200.00 FT (60.960 M) RESPECTIVELY. THE TAPE CALIBRATION MARKS WERE NOT REMEASURED IN 2001.

TO REACH THE BASE LINE FROM THE JUNCTION OF STERLING HIGHWAY (ALASKA ROUTE 1) AND KALIFORNSKY BEACH ROAD ABOUT 20.1 KM (12.5 MI) SOUTHWEST OF SOLDOTNA GO NORTH ON KALIFORNSKY BEACH ROAD FOR 2.3 KM (1.45 MI) TO A DRIVEWAY ON THE RIGHT WHERE THE ROAD BEGINS TO STRAIGHTEN OUT AND THE 0 METER POINT ON THE RIGHT AS DESCRIBED. TO REACH THE OTHER METER POINTS, CONTINUE NORTH ON THE BEACH ROAD FOR 0.16 KM (0.1 MI) TO THE 150 METER POINT ON THE RIGHT AS DESCRIBED. CONTINUE NORTH ON BEACH ROAD FOR 0.24 KM (0.15 MI) TO A SIDE ROAD LEFT AND THE 400 METER POINT ON THE RIGHT AS DESCRIBED. TO REACH THE 1246 METER POINT CONTINUE NORTH ON THE BEACH ROAD FOR 0.72 KM (0.45 MI) TO A SIDE ROAD RIGHT AND ENTRANCE TO THE KASILOF AIRPORT. TURN RIGHT AND GO ABOUT 16.5 M (54.0 FT) TO A GRAVEL SIDE ROAD LEFT. TURN LEFT AND GO NORTH ON GRAVEL ROAD FOR 0.16 KM (0.1 MI) TO THE MARK ON THE RIGHT AS DESCRIBED.

THE 0 METER POINT IS A STANDARD NGS DISK NOT STAMPED SET INTO THE TOP OF A ROUND CONCRETE MONUMENT 23 CM (9.0 IN) IN DIAMETER PROJECTING 5 CM (2 IN) ABOVE THE GROUND. IT IS LOCATED 27.13 M (89.0 FT) EAST FROM CENTERLINE OF BEACH ROAD, 18.1 M (59.4 FT) NORTHWEST FROM A TELEPHONE CABLE BOX, 10.82 M (35.5 FT) SOUTH FROM THE CENTERLINE OF GRAVEL DRIVEWAY, 3.0 M (9.85 FT) WEST FROM

HIGHWAY ROW POST, AND 0.2 M (0.66 FT) WEST FROM WITNESS POST.

THE 150 METER POINT IS A STANDARD NGS DISK NOT STAMPED SET INTO THE TOP OF A ROUND CONCRETE MONUMENT 23 CM (9 IN) IN DIAMETER PROJECTING 5 CM (2 IN) ABOVE THE GROUND. IT IS LOCATED 27.28 M (89.5 FT) WEST FROM THE CENTERLINE OF BEACH ROAD, 22.6 M (74.15 FT) SOUTHWEST OF A TELEPHONE CABLE BOX, 12.8 M (42.0 FT) NORTHWEST OF POWER POLE J4 24 7310, AND 0.21 M (0.7 FT) WEST FROM WITNESS POST.

THE 400 METER POINT IS A STANDARD NGS DISK NOT STAMPED SET INTO THE TOP OF A ROUND CONCRETE MONUMENT 23 CM (9 IN) IN DIAMETER

RECESSED 5 CM (2 IN) BELOW THE GROUND. IT IS LOCATED 60.9 M (200 FT) SOUTH FROM THE 200 FOOT POINT, 30.5 M (100 FT) NORTH FROM

100 FOOT POINT, AND 27.28 M (89.5 FT) EAST FROM THE CENTERLINE OF BEACH ROAD.

THE 1246 METER POINT IS A STANDARD NGS DISK NOT STAMPED SET INTO THE TOP OF A ROUND CONCRETE MONUMENT 23 CM (9 IN) IN DIAMETER

FLUSH WITH THE GROUND. IT IS LOCATED 3.565 M (11.7 FT) NORTHWEST FROM POWER POLE J5 18 1940, 3.2 M (10.5 FT) EAST FROM THE CENTERLINE OF GRAVEL ROAD, 3.05 M (10.0 FT) WEST OF A HIGHWAY ROW POST, AND 0.15 M (0.5 FT) WEST FROM WITNESS POST.

USER NOTES - CBL USERS SHOULD TAKE CARE IN PLUMBING OVER ALL POINTS. ELEVATIONS ARE FOR CBL USE ONLY.

THIS BASE LINE WAS ESTABLISHED IN CONJUNCTION WITH THE KENAI PENINSULA CHAPTER OF THE ASPLS. FOR FURTHER INFORMATION CONTACT ALASKA SOCIETY OF PROFESSIONAL LAND SURVEYORS, KENAI PENINSULA CHAPTER, BOX 468, SOLDOTNA, AK 99669.

US DEPARTMENT OF COMMERCE - NOAA	CALIBRATION BASE LINE DATA	QUAD: N641474
NOS - NATIONAL GEODETIC SURVEY	BASE LINE DESIGNATION: FAIRBANKS CENTENNIAL CBL	ALASKA
SILVER SPRING MD 20910 - AUGUST 21, 2001	PROJECT ACCESSION NUMBER: 16397	NORTH STAR BOROUGH

NEAREST TOWN: FAIRBANKS

LIST OF ADJUSTED DISTANCES (AUGUST 15, 2001)

			AD	J. DIST.(M)	ADJ. DIST.(M)	
STD.		0				
ERROR (MM)	ELEV.(M) TO	STATION	ELEV.(M)	HORIZONTAL	MARK - MARK	
0 M 2001	132.824 150	M 2001	132.861	149.9887	149.9887	.1
0 M 2001	132.824 430	M 2001	133.308	429.9934	429.9936	.1
0 M 2001	132.824 1000	M 2001	134.571	999.9741	999.9756	.2
150 M 2001	132.861 430	M 2001	133.308	280.0047	280.0051	.1
150 M 2001	132.861 1000	M 2001	134.571	849.9854	849.9871	.1
430 M 2001	133.308 1000	M 2001	134.571	569.9807	569.9821	.1

DESCRIPTION OF FAIRBANKS CENTENNIAL BASE LINE YEAR MEASURED: 2001 LATITUDE: 64 50 56 LONGITUDE: 147 48 19 AZIMUTH: 90 DEGREES TRUE NORTH CHIEF OF PARTY: MG

THE BASE LINE IS LOCATED ALONG THE PHILLIPS FIELD FRONTAGE ROAD ADJACENT TO THE JOHANSEN EXPRESSWAY IN FAIRBANKS. IT IS LOCATED

10 METERS SOUTH OF THE CENTERLINE OF PHILLIPS FIELD ROAD WITHIN A GRASSY AREA BETWEEN THE SOUTH CONCRETE CURB AND THE PAVED BIKE PATH. THE FRONTAGE ROAD IS WITHIN THE SECTION LINE COMMON TO SECTIONS 5 & 8, TOWNSHIP 1 SOUTH, RANGE 1 WEST, FAIRBANKS

MERIDIAN, ALASKA.

THE BASE LINE IS A WEST-EAST LINE WITH THE 0 METER POINT ON THE WEST END. IT IS CONSISTS OF THE 0, 150, 430, AND 1000 METER POINTS

WITH A 200-FOOT TAPE CALIBRATION MONUMENT SET EAST OF THE 150 METER POINT.

TO REACH THE 0-METER THERE ARE TWO ROUTES AVAILABLE. IF YOU ARE ON AIRPORT WAY FROM THE FAIRBANKS INTERNATIONAL AIRPORT TERMINAL,

PROCEED EAST UNTIL YOU COME TO THE INTERSECTION WITH UNIVERSITY AVE. CONTINUE EAST ALONG AIRPORT WAY FOR 1.61 KM (1.00 MI) UNTIL REACHING THE INTERSECTION WITH PEGER ROAD. TURN LEFT AND GO NORTH ON PEGER ROAD FOR 1.08 KM (0.67 MI) UNTIL REACHING THE

INTERSECTION WITH PHILLIPS FIELD ROAD. TURN LEFT AND GO WEST ON PHILLIPS FIELD ROAD FOR 1.41 KM (0.88 MI) UNTIL IT TERMINATES

IN A PAVED CUL-DE-SAC NEAR THE BRIDGE CROSSING NOYES SLOUGH FOR THE JOHANSEN EXPRESSWAY AND THE 0-METER POINT AS DESCRIBED BELOW.

IF YOU ARE ON THE JOHANSEN EXPRESSWAY EASTBOUND FROM ANCHORAGE PROCEED TO THE INTERSECTION WITH GEIST ROAD AT UNIVERSITY AVE.

CONTINUE EAST ALONG THE JOHANSEN EXPRESSWAY FOR 1.87 KM (1.16 MI) BY EXITING THE SOUTHBOUND TURN LANE ONTO THE PEGER ROAD OFF

RAMP UNTIL YOU REACH THE INTERSECTION WITH PHILLIPS FIELD ROAD. TURN RIGHT AND GO WEST THE PHILLIPS FIELD ROAD FOR 1.41 KM (0.88 MI) UNTIL TERMINATING AT THE CUL-DE-SAC AND THE 0-METER POINT AS DESCRIBED BELOW.

THE 0-METER POINT IS A STANDARD NGS DISK STAMPED "0 M 2001" SET INTO THE TOP OF A ROUND RED CONCRETE MONUMENT 30 CM (12.0 IN) IN

DIAMETER FLUSH WITH THE SURFACE OF THE GROUND. IT IS 5 M (16.4 FT) WEST OF THE CONCRETE CURB AT THE END OF THE PAVED TURNAROUND

AT THE INTERSECTION OF PHILLIPS FIELD ROAD AND MARIAN DRIVE, 5.45 M (17.88 FT) SOUTH OF A METAL ROAD SIGN MARKING THE END OF

III-248

PHILLIPS FIELD ROAD, 1.8 M (5.91 FT) SOUTHEAST OF A TWO METER HIGH STEEL POST WITH AN ATTACHED METAL SIGN LETTERED "000" AND 0.3 M (0.98 FT) EAST OF AN ORANGE CARSONITE POST LABELED "SURVEY MONUMENT".

THE 150-METER POINT IS A STANDARD NGS DISK STAMPED "150 M 2001" SET INTO THE TOP OF A ROUND RED CONCRETE MONUMENT 30 CM (12.0 IN) IN DIAMETER FLUSH WITH THE SURFACE OF THE GROUND. IT IS LOCATED EAST OF THE 0-METER POINT WITHIN THE GRASSY MEDIAN BETWEEN THE SOUTH CURB LINE OF PHILLIPS FIELD ROAD AND THE PAVED BIKE PATH. IT IS 7.85 M (25.75 FT) SOUTH OF THE CENTERLINE OF PHILLIPS FIELD ROAD, 8.0 M (26.25 FT) NORTH OF A METAL SIGN LETTERED "150" ATTACHED TO A 21 CM (8.0 IN) DIAMETER SPRUCE TREE, 16.2 M (53.15 FT) EAST AND 1.3 M (4.27 FT) NORTH OF A METAL STORM DRAIN LOCATED IN THE CONCRETE CURB ADJACENT TO PHILLIPS FIELD ROAD, AND 21.0 M (68.9 FT) EAST OF A METAL SIGN POSTING THE "SPEED LIMIT 30". NOTE: THE REFLECTIVE METAL SPEED LIMIT SIGN CAN BE UNBOLTED FROM TTS BASE AND TAKEN DOWN BECAUSE IT IS PARTIALLY OBSTRUCTING THE 150-METER MARK. THE 430-METER POINT IS A STANDARD NGS DISK STAMPED "430 M 2001" SET INTO THE TOP OF A ROUND RED CONCRETE MONUMENT 30 CM (12.0 IN) IN DIAMETER FLUSH WITH THE SURFACE OF THE GROUND. IT IS LOCATED EAST OF THE O-METER POINT WITHIN THE GRASSY MEDIAN BETWEEN THE SOUTH CURB LINE OF PHILLIPS FIELD ROAD AND THE PAVED BIKE PATH. IT IS 8.5 M (27.9 FT) SOUTH OF THE CENTERLINE OF PHILLIPS FIELD ROAD, 6.5 M (21.3 FT) NORTH OF A METAL SIGN LETTERED "430" ATTACHED TO A CHAIN LINK FENCE, AND 5.7 M (18.7 FT) EAST AND 2 M (6.6 FT) NORTH OF A METAL STORM DRAIN LOCATED IN THE CONCRETE CURB ADJACENT TO PHILLIPS FIELD ROAD. THE 1000-METER POINT IS A STANDARD NGS DISK STAMPED "1000 M 2001" SET INTO THE TOP OF A ROUND RED CONCRETE MONUMENT 30 CM (12.0 IN) IN DIAMETER FLUSH WITH THE SURFACE OF THE GROUND. IT IS LOCATED WITHIN A 2.5 M (8.2 FT) WIDE BY 2.0 M (6.6 FT) HIGH GRAVEL PAD ADJACENT TO THE SOUTHERN SHOULDER OF A 2.5 M (8.2 FT) WIDE PAVED BIKE PATH LYING 38.0 M (124.7 FT) EAST OF ITS CROSSING WITH PHILLIPS FIELD ROAD. IT IS 3.9 M (12.8 FT) NORTH OF A METAL SIGN LETTERED "1000" ATTACHED TO A CHAIN LINK FENCE ADJACENT TO A BIKE PATH WHICH PARALLELS THE JOHNSON EXPRESSWAY OVERPASS ABOVE PEGER ROAD. USER NOTES - CBL USERS SHOULD TAKE CARE IN PLUMBING OVER ALL POINTS. ELEVATIONS ARE FOR CBL USE ONLY. THIS BASE LINE WAS ESTABLISHED IN CONJUNCTION WITH THE FAIRBANKS CHAPTER OF THE ALASKA SOCIETY OF PROFESSIONAL LAND SURVEYORS. FOR FURTHER INFORMATION CONTACT THE FAIRBANKS ASPLS AT: PO BOX 81568, FAIRBANKS AK, 99708, MARTIN GUTOSKI, TELEPHONE 907-488-0927.

26.084 590.0126

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590.0364

ALSO, INFORMATION IS AVAILABLE VIA THE INTERNET AT THE STATE WIDE ASPLS HOMEPAGE AT HTTP://WWW.POLARNET.COM/~ASPLS/.

US DEPARTMENT OF COMMERCE - NOAA NOS - NATIONAL GEODETIC SURVEY SILVER SPRING MD 20910 - AUGUST 21,	2001	CALIBRATION BASE LINE DA BASE LINE DESIGNATION: PROJECT ACCESSION NUMBER NEAREST TOWN: JUNEAU	ATA JUNEAU CBL R: 16397		QUAD: N581343 ALASKA JUNEAU BOROUGH
		LIST OF ADJUSTED DISTANCES	(AUGUST 15,	2001)	
				ADJ. DIST.(M)	ADJ. DIST.(M)
FROM STATION FROM STATION FROM STATION	ELEV.(M)	TO STATION	ELEV.(M)	HORIZONTAL	MARK - MARK
0 1981 0 1981 0 1981	19.812 19.812 19.812	2 150 1981 2 410 1981 2 1000 1981	20.143 20.784 26.084	150.0050 410.0015 1000.0142	150.0053 410.0027 1000.0339
150 1981 150 1981	20.143 20.143	3 410 1981 3 1000 1981	20.784 26.084	259.9966 850.0092	259.9974 850.0300

DESCRIPTION OF JUNEAU BASE LINE YEAR MEASURED: 1982 YEAR REMEASURED: 2001 LATITUDE: 58 24 01 LONGITUDE: 134 33 24 AZIMUTH: 0 DEGREES TRUE NORTH CHIEF OF PARTY: RK

410 1981

THE BASE LINE IS LOCATED 3.25 KM (2.0 MI) NORTH OF THE JUNEAU INTERNATIONAL AIRPORT, ABOUT 0.1 KM (0.05 MI) SOUTH OF THE BORDER OF THE NORTH TONGASS NATIONAL FOREST, IN THE PAVED BIKE LANE ON THE EAST SIDE OF GLACIER SPUR ROAD, ON STATE PROPERTY.

THE BASE LINE IS A NORTH-SOUTH BASE LINE WITH THE 0 METER POINT ON THE SOUTH END. IT CONSISTS OF 0, 150, 410, AND 1000 METER POINTS. THERE IS NO 100-FOOT TAPE CALIBRATION STATION LOCATED AT THIS BASE LINE.

POINTS. THERE IS NO TOU-FOOT TAFE CALIBRATION STATION LOCATED AT THIS BASE LINE.

20.784 1000 1981

TO REACH THE BASE LINE FROM THE JUNCTION OF STATE HIGHWAY 7 (EGAN DRIVE) AND MENDENHALL LOOP ROAD (0.85 KM (0.5 MI) NORTHWEST OF

THE AIRPORT) GO NORTH ON MENDENHALL LOOP ROAD (CHANGES TO GLACIER SPUR ROAD) FOR 4.0 KM (2.35 MI) TO GARNET STREET ON THE RIGHT. CONTINUE NORTH FOR 0.1 KM (0.05 MI) TO STATION 0 METER POINT ON THE RIGHT.

THE 0 METER POINT IS A STANDARD NGS DISK STAMPED "0 1981" SET INTO THE TOP OF A ROUND CONCRETE MONUMENT 30 CM (12 IN) IN DIAMETER RECESSED 5 CM (2 IN) BELOW THE GROUND. IT IS LOCATED 82.9 M (272 FT) SOUTH FROM EXTENDED CENTER LINE OF GLADSTONE STREET, 74.83 M (245.5 FT) NORTH FROM EXTENDED CENTER LINE OF GARNET STREET, 5.24 M (17.2 FT) EAST FROM ROAD CENTER, 3.01 M (9.9 FT) SOUTHWEST FROM METAL LIGHT POLE 124, AND 0.61 M (2.0 FT) WEST FROM ROAD EDGE.

THE 150 METER POINT IS A STANDARD NGS DISK STAMPED "150 1981" SET INTO THE TOP OF A ROUND CONCRETE MONUMENT 30 CM (12 IN) IN DIAMETER RECESSED 5 CM (2 IN) BELOW THE GROUND. IT IS LOCATED 65.38 M (214.5 FT) NORTH FROM EXTENDED CENTER LINE OF GLADSTONE STREET, 21.70 M (71.2 FT) SOUTHWEST FROM CENTER OF TONGASS NATIONAL FOREST SIGN, 5.2 M (17 FT) EAST FROM ROAD CENTER, AND 0.61

M (2.0 FT) WEST FROM ROAD EDGE.

THE 410 METER POINT IS A STANDARD NGS DISK STAMPED "410 1981" SET INTO THE TOP OF A ROUND CONCRETE MONUMENT 30 CM (12 IN) IN DIAMETER RECESSED 5 CM (2 IN) BELOW THE GROUND. IT IS LOCATED 5.2 M (17 FT) EAST FROM ROAD CENTER AND 0.61 M (2.0 FT) WEST FROM ROAD EDGE.

THE 1000 METER POINT IS A STANDARD NGS DISK STAMPED "1000 1981" SET INTO THE TOP OF A ROUND CONCRETE MONUMENT 30 CM (12 IN) IN DIAMETER RECESSED 5 CM (2 IN) BELOW THE GROUND. IT IS LOCATED 4.82 M (15.8 FT) EAST FROM ROAD CENTER AND 0.61 M (2.0 FT) WEST

FROM ROAD EDGE.

ALL DISKS ARE SET IN CONCRETE POSTS IN AN IRON SLEEVE ABOUT 5 CM BELOW GROUND. THE TOP OF THE SLEEVE IS FLUSH WITH THE ROAD

SURFACE, IN THE MIDDLE OF A 0.7 M (2.3 FT) SQUARE CONCRETE PAD. A WATER METER COVER IS LOCKED ONTO THE SLEEVE. ALL OF THE MARKS

ARE SET IN LINE IN THE BIKE LANE ALONG THE EAST SIDE OF THE ROAD.

USER NOTES - CBL USERS SHOULD TAKE CARE IN PLUMBING OVER ALL POINTS. ELEVATIONS ARE FOR CBL USE ONLY.

THIS BASE LINE WAS ESTABLISHED IN CONJUNCTION WITH THE ALASKA DEPARTMENT OF TRANSPORTATION. FOR FURTHER INFORMATION, CONTACT ALASKA DEPARTMENT OF TRANSPORTATION, 6860 GLACIER HIGHWAY, JUNEAU AK 99801 OR PHONE MR. TIM REED AT 907-465-4491 OR MR. GARRITH MCLEAN AT 907-465-4492. ALSO, INFORMATION IS AVAILABLE VIA THE INTERNET AT THE STATE WIDE ASPLS HOMEPAGE AT HTTP://WWW.POLARNET.COM/~ASPLS/.

US DEPARTMENT OF COMMERCE - NOAF NOS - NATIONAL GEODETIC SURVEY SILVER SPRING MD 20910	7	CALIBRATION BASE LIN BASE LINE DESIGNATIO PROJECT ACCESSION NU NEAREST TOWN: WASII	E DATA N: WASILLA CBL MBER: 16397 LA		QUAD: N611494 ALASKA MAT-SU COUNTY	
		LIST OF ADJUSTED DISTANC	ES (2/10/2009)		
			A	DJ. DIST.(M)	ADJ. DIST.(M)	
STD.						
FROM STATION	ELEV.(M)	TO STATION	ELEV.(M)	HORIZONTAL	MARK – MARK	
ERROR (MM)						
0 2007	102.017	200 2007	103.388	199.9969	200.0016	.1
0 2007	102.017	430 2007	104.928	430.0003	430.0102	.2
0 2007	102.017	1100 2007	107.229	1099.9702	1099.9825	.3
200 2007	103.388	430 2007	104.928	230.0035	230.0086	.1
200 2007	103.388	1100 2007	107.229	899.9733	899.9815	.2
430 2007	104.928	1100 2007	107.229	669.9699	669.9739	.1

WASILLA CALIBRATED BASE LINE MONUMENT LOCATIONS

BY GEORGE STROTHER, PLS, AND ROBERT FARMER, PLS 3-9-2009 WEATHER: HIGH CLOUDS, +20 F, 15 MPH WIND, SNOW AND ICE PACK. GPS - GARMIN 496 WITH WAAS DIFFERENTIAL CORRECTION, SN 1970794 WGS 84 DATUM

WASILLA CALIBRATED BASE LINE MONUMENTS ARE ALL 3" BRASS CAPS SET BELOW THE SURFACE IN CAST IRON MONUMENT CASES, WITH THE ANNULUS

BETWEEN THE CASE AND THE MONUMENT OF OIL SOAKED WOOD SHAVINGS. THE CASE LIDS ARE FASTENED TO THE BASES WITH STAINLESS STEEL BOLTS.

ALL THE MONUMENTS ARE IN THE NORTH WEST SIDE THE THE PAVED MAIN TAXI WAY, OPPOSITE THE RUNWAY SIDE. THE MONUMENT CASES ARE SET

ABOUT 0.05 FEET BELOW THE ASPHALT SURFACE, INSIDE A RING OF CONCRETE.

0 METER MONUMENT IS LOCATED AT THE SOUTHWESTERN END OF THE TAXI WAY, 3.5 FEET NORTHEASTERLY THE ROW OF TAXIWAY BLUE LIGHTS

THE RUNWAY SIDE OF THE TAXI WAY ASPHALT, 45.3 FEET FROM THE BLUE LIGHT AT THE CORNER OF THE TAXIWAY, 16.2 FEET FROM THE SECOND AND 14.4 FEET FROM THE THIRD BLUE LIGHTS INDICATING THE END OF THE TAXIWAY. N61D 34' 09.2" LAT. , W 149D 33' 04.4" LONG 200 METER MONUMENT, IS NEAR THE SOUTHERLY CORNER OF A LARGE AREA OF A ASPHALT NEAR THE FUEL PUMPS, 160.8 FEET SOUTHERLY OF THE SOUTHERN CORNER OF THE AVIATION GASOLINE PUMP, AND 3.5 FEET SOUTHEASTERLY FROM THE PAINTED EDGE OF THE TAXI WAY, AND , 35.0 FEET NORTHWESTERLY OF THE SOUTHEAST EDGE OF THE TAXI WAY ASPHALT, AND 46.5 FEET NORTHWESTERLY OF A TAXI BLUE WAY LIGHT ACROSS THE TAXI WAY, AND 43.7 FEET EASTERLY OF THE CENTER OF A ROUND STORM DRAIN FIELD INLET GRATE. N61D 34' 12.8" LAT. , W 149D 32' 53.2" LONG 430 METER MONUMENT IS NEAR THE EASTERLY CORNER OF THE TRANSIENT AIRCRAFT PARKING, AND 119.5 FEET SOUTHWESTERLY OF THE PAINTED CENTERLINE OF TAXI WAY "B", AND 3.7 FEET SOUTH EASTERLY OF THE WESTERN TAXIWAY PAINTED MARKINGS, AND 35.0 FEET NORTHWESTERLY OF THE SOUTHEASTERN EDGE OF THE TAXI WAY ASPHALT, AND 69.8 FEET NORTHERLY OF A TAXI WAY BLUE LIGHT AND 65.2 FEET WESTERLY OF A TAXI WAY BLUE LIGHT BOTH OF WHICH ARE ALONG THE SOUTH EASTERLY SIDE OF THE TAXIWAY., AND 177.7 FEET EASTERLY OF THE CORNER OF THE CHAIN LINK AIRPORT SECURITY FENCE. N61D 34' 16.9" LAT. , W 149D 32' 40.3" LONG 1100 METER MONUMENT IS LOCATED NEAR THE NORTHERLY END OF THE TAXI WAY, 48.4 FEET SOUTHWESTERLY FROM THE SECOND TO LAST TAXI WAY BLUE LIGHT AND 135.7 FEET NORTHEASTERLY FROM THE THIRD TO LAST TAXIWAY BLUE LIGHT BOTH LIGHTS ARE ALONG THE STRAIGHT LINE ON THE NORTHWESTERLY SIDE OF THE TAXIWAY, AND 1.7 FEET SOUTHEASTERLY FROM THE PAINTED TAXI WAY LINE, AND 3.5 FEET SOUTHEASTERLY FROM NORTHWESTERN EDGE OF THE TAXIWAY ASPHALT PAVING, AND 169.1 FEET EASTERLY FROM THE CORNER OF THE CHAIN LINK AIRPORT SECURITY FENCE. N61D 34' 29.1" LAT. , W 149D 32' 02.6" LONG

INDICATING THE END OF THE TAXI WAY, AND 20.2 FEET NORTHEASTERLY OF THE END OF ASPHALT. THIS MONUMENT IS 35 FEET

NORTHWESTERLY OF

	U.S.	Survey	No.	8689,	Alaska
Chaine					
Charns					

U.S. Survey No. 8689, Alaska Chains Homestead Entry Survey No. 921 was surveyed by Geo. W. Root, U.S. Forest Service Surveyor, in 1901, and assigned U.S. Survey No. 461 upon acceptance by the U.S. General Land Office in 1905. U.S. Survey No. 458 was surveyed by Fred A. Garside, U.S. Transitman, in 1903. U.S. Survey No. 1100 was surveyed by Irving McK. Reed, Cadastral Surveyor, in 1967. U.S. Survey No. 7544 was surveyed under contract by John B. Doe, Alaska registered Land Surveyor, in 1967. U.S. Survey No. 7784 was surveyed concurrently by Arthur G. Blake, Cadastral Surveyor, in 2001. Townships 13 North, Ranges 17 and 18 West, Fairbanks Meridian, Alaska, were surveyed by John H. Smith, Cadastral Surveyor, in 1993. The plat has not been accepted as of this date. A field investigation revealed that land had accreted to U.S. Survey No. 458. A partition line was surveyed across the accreted land adjoining U.S. Survey No. 458, commencing at the true point for corner No. 6, Lot 2, identical with the true point for cor. No. 6, U.S. Survey No. 458, a meander corner in 1903. An informational traverse of the centerline of the Steese Highway was performed in order to compute and monument the location of the northwesterly side of the Steese Highway rightof-way. The following field notes are those of the survey of U.S. Survey No. 8689, comprising 3 lots, and the dependent resurvey of portions of U.S. Survey Nos. 458, 461, and 1100, and the survey of a partition line for accreted lands adjoining U.S. Survey No. 458 and the recovery and remonumentation of certain corners. This survey was executed in accordance with the specifications set forth in the Manual of Surveying Instructions (2009) and Special Instructions dated May 20, 2010. The direction and length of lines were determined by Global Navigation Satellite Systems (GNSS) Real-Time Kinematic (RTK) observations and augmented by lines projected by fore and backsights with a repeating theodolite and distances measured with electronic distance measurement. The direction of each line is with reference to the true meridian. All bearings are true mean bearings. All distances are horizontal distances reduced to their sea level equivalent.

	U.S. Survey No. 8689, Alaska
Chains	
Chains	
	Preliminary to the resurvey the lines of the original survey were retraced and search was made for all corners and other calls of the record. Identified corners were remonumented in their original positions; lost corners were restored and monumented at proportionate positions based on the original record. The retracement data were thoroughly verified and only the true line field notes are given herein.
	The geographic position of the witness corner to corner No. 6, Lot 2, identical with the witness corner to corner No. 6, U.S. Survey No. 458, a meander corner in 1903, in NAD83 (2011), epoch 2010.00, as determined by GNSS observations, to a <i>Network</i> <i>Accuracy</i> of less than or equal to 0.050 meters, semi-major axis 95 percent error ellipse, as defined in the Bureau of Land Management's <u>Standards for the Positional Accuracy of Cadastral</u> <u>Surveys When Using Global Navigation Satellite Systems (GNSS)</u> , dated February 23, 2009, is:
	Latitude 65° 50' 11.341" North, Longitude 144° 05' 15.971" West (NAD83)
	The observed mean magnetic declination was 30 1/4° E.
	Dependent Resurvey of a Portion of U.S. Survey Nos. 461 and 1100, Alaska
	(Restoring the 1901 and 1967 surveys by Geo. W. Root and Irving McK. Reed, respectively)
	Beginning at cor. No. 3, U.S. Survey No. 461, identical with cor. No. 2, U.S. Survey No. 1100, monumented with an iron post, 2 ½ ins. diam., firmly set, projecting 6 ins. above the ground, with brass cap mkd. C3 S461 C2 S1100 1967, from which the remains of the 1901 bearing tree
	A spruce snag, 10 ins. diam., 6 ft. high, bears S. 55° E., 57 lks. dist., with no marks visible.
	and the 1967 bearing tree
	A spruce, 8 ins. diam., bears N. 55° E., 101 lks. dist., with no marks visible on a healed blaze. (Record, N. 65° E.)

Dependent Resurvey of a Portion of U.S. Survey Nos. 461 and 1100, Alaska

Chains	
	and a new bearing tree
	A spruce, 4 ins. diam., bears N. 40 1/2° W., 135 lks. dist., mkd. X BT.
	Add the marks 2010 to the brass cap.
	N. 80° 00' E., on line 3-2, U.S. Survey No. 461, identical in part with line 2-3, U.S. Survey No. 1100.
	Across a SW slope, through spruce and birch.
4.50	Enter recently disturbed ground, edge indeterminate.
6.50	True point for cor. No. 2, U.S. Survey No. 461, established at three-point control; there is no remaining evidence of the original cor.; falls in a drainage way, bears N. 65° E. and S. 65° W. This cor. also now becomes the true point for cor. No. 4, Lot 1, U.S. Survey No. 8689.
	From this point, the point selected for the witness cor. to cor. No. 2, U.S. Survey No. 461, identical with the point selected for the witness cor. to cor. No. 4, Lot 1, U.S. Survey No. 8689, bears N. 35°45' W., 2.00 chs. dist.
	At the witness cor.
	Set a stainless steel post, 28 ins. long, 2 1/2 ins. diam., 26 ins. in the ground, and in a collar of stone, 2 ft. diam., with brass cap, mkd.
	WC
	S8689 S461 L1 C2 C4
	2010
	from which
	A spruce, 14 ins. diam., bears N. 15° E., 34 lks. dist., mkd. X BT. A spruce, 11 ins. diam., bears N. 84° W., 96 lks. dist., mkd. X BT.
	Drive a steel fence post, 5 ft. long, 2 $3/4$ ft. in the ground, 2 lks. N of the witness cor.

Dependent Resurvey of a Portion of U.S. Survey Nos. 461 and 1100, Alaska

Chains Deposit a magnet in a white plastic case at the base of the stainless steel post. Gravel road, 25 lks. wide, bears N. 65° E. and S. 65° W. 7.10 9.50 Leave disturbed ground, edge bears N and S; asc. moderate W slope through birch and cottonwood. 16.00 Cor. No. 3, U.S. Survey No. 1100, identical with cor. No. 3, U.S. Survey No. 7544, determined at record bearing and distance from the remains of the original bearing tree A spruce stump, 15 ins. diam., bears N. 32° E., 22 lks. dist., with fragmentary scribe marks visible on an open blaze. This cor. also now becomes the point for cor. No. 3, Lot 1, U.S. Survey No. 8689. At the corner point Set a stainless steel post, 28 ins. long, 2 1/2 ins. diam., 20 ins. in the ground to solid rock, encircled by a mound of stone, 3 ft. base to top of brass cap, mkd. S8689 L1C3 C3 C3 S1100 S7544 2010 from which A spruce, 9 ins. diam., bears S. 35 1/2° E., 64 lks. dist., mkd. C3 S7544 BT. Snow blazed. A spruce, 7 ins. diam., bears S. 7 1/4° E., 42 lks. dist., mkd. S7544 C3 BT. Snow blazed. Dig pits 18 x 18 x 12 ins., SE, S, and SW of stainless steel post, 3 ft. dist. Drive a steel fence post, 5 ft. long, 3 ft. in the ground, 1 lk. SE of cor. Deposit a magnet in a white plastic case at the base of the stainless steel post.

Dependent Resurvey of a Portion of U.S. Survey Nos. 461 and 1100, Alaska

Chains	
	Dependent Resurvey of Another Portion of U.S. Survey No. 461, Alaska
	(Restoring the 1901 survey by Geo. W. Root)
	From the true point for cor. No. 2, identical with the true point for cor. No. 4, Lot 1, U.S. Survey No. 8689, on line 2-3, U.S. Survey No. 1100, hereinbefore described.
	From this point, the witness cor. to cor. No. 2, identical with the witness cor. to cor. No. 4, Lot 1, U.S. Survey No. 8689, bears N. 35°45' W., 2.00 chs. dist., hereinbefore described.
	North, on line 2-1. This line also now becomes identical in part with line 4-5, Lot 1, U.S. Survey No. 8689.
	Over level ground through scattered scrub spruce and tamarack, with scattered willow patches.
4.60	Approximate location of underground oil pipeline, bears S. 85° E. and N. 85° W.
8.05	Top of cliff, 20 ft. high, bears E and N. 80° W.; desc. precipitous N slope.
8.10	Base of cliff, bears E and N. 80° W.; desc. gradual N slope.
11.10	Trail, 6 lks. wide, bears N. 75° E. and S. 75° W.
12.60	Windy Creek, 25 lks. wide, 1 ft. deep, course N. 70° E. from S. 85° W.
14.20	Creek, 4 lks. wide, course N. 60° E.
16.00	The witness cor. to cor. No. 1, a meander cor. in 1901, monumented with a granite stone, $4 \ge 7 \ge 8$ ins., firmly set, 6 ins. below the ground, with top broken off and not found, mkd. HES 17 C1 WCMC on W side. This cor. also now becomes the point selected for the witness cor. to cor. No. 5, Lot 1, U.S. Survey No. 8689, a meander cor.
	At the corner point
	Set a stainless steel post, 28 ins. long, 2 1/2 ins. diam., 24 ins. in the ground, and in a mound of stone, 3 ft. base, 1 ft. high, with brass cap, mkd.



Dependent Resurvey of Another Portion of U.S. Survey No. 461, Alaska Dependent Resurvey of a Portion of U.S. Survey No. 458, Alaska

Chains centerline, determined from the remains of the original bearing tree A spruce stump, 14 ins. diam., with decayed trunk lying alongside, with scribe marks BT visible on the stump and fragmentary scribe marks S 58 visible on the trunk. This cor. also now becomes the point for cor. No. 5, Lot 2, U.S. Survey No. 8689. At the corner point Set a stainless steel post, 28 ins. long, 2 1/2 ins. diam., 18 ins. in the ground to solid rock, encircled by a mound of stone, 3 ft. base to top of brass cap, mkd. S8689 S458 L2 C5 CF 2010 from which A boulder, 10 x 12 x 6 ft. above the ground, bears N. 65° W., 211 lks. dist., mkd. X BO in letters, 4 ins. high, on the E face, 3 ft. above the ground. Deposit a magnet in a white plastic case at the base of the stainless steel post. North, on line 5-6. This line also now becomes identical with line 5-6, Lot 2, U.S. Survey No. 8689. Descend gradual N slope through scrub willow and low birch with scattered spruce. 1.70 Telephone line, 4-wire, bears N. 60° E. and S. 60° W. 2.75 Power transmission line, 3-wire, bears N. 70° E. and S. 70° W. Right bank of slough, bears N. 75° E. and S. 75° W. 4.80 5.50 Left bank of slough, bears N. 60° E. and S. 65° W. 6.40 Stream, 10 lks. wide, course N. 40° E. 7.50 The witness cor. to cor. No. 6, a meander cor. in 1903, monumented with an iron post, 2 ins. diam., firmly set, projecting 8 ins. above the ground, with brass cap mkd. WC MC C6 S458 1903; the original pits and mound of stone accessories were not found. This cor. also now becomes the witness cor. to cor.

Dependent Resurvey of a Portion of U.S. Survey No. 458, Alaska

Chains	
	No. 6, Lot 2, U.S. Survey No. 8689.
	Add marks to brass cap to read
	WC 1903 MC C6 L2 S8689 S458
	1903 2010
	Drive an alum. rod, 9 ft. long, 3/4 ins. diam., 8 1/2 ft. in the ground, 10 lks. S of cor., with an orange triangular marker bolted on the top.
	From the witness cor., National Geodetic Survey triangulation control station "MIKE" bears N. $23^{\circ}19'36"$ E., 85.25 chs. dist., monumented with a brass tablet, $3 1/2$ ins. diam., cemented in the highest point of bedrock, $6 \ge 8 \ge 2$ ft. exposed above the ground, mkd. MIKE 1950 and with a triangle. Referenced as shown in the published record.
12.50	True point for cor. No. 6, a meander cor. in 1903, on the former right bank of the Yukon River; not monumented. This cor. now also becomes the true point for cor. No. 6, Lot 2, U.S. Survey No. 8689.
	Survey of a Partition Line for Accreted Lands Adjoining U.S. Survey No. 458, Alaska
	From the true point for cor. No. 6, a meander cor. in 1903, identical with the true point for cor. No. 6, Lot 2, U.S. Survey No. 8689, on the former right bank of the Yukon River; not monumented.
	N. 15°25' W., on a partition line for accreted lands adjoining U.S. Survey No. 458, normal to the median line of the Yukon River. This line also now becomes identical with line 6-7, U.S. Survey No. 8689.
	Over level ground through scattered willow brush.
2.57	Point selected for the witness cor. to a cor. for the accreted lands adjoining U.S. Survey No. 458, a meander cor. This cor. now also becomes the point selected for the witness cor. to cor.

Survey of a Partition Line for Accreted Lands Adjoining U.S. Survey No. 458, Alaska

Chains	
	No. 7, Lot 2, U.S. Survey No. 8689, a meander cor.
	Set a stainless steel post, 28 ins. long, 2 1/2 ins. diam., flush with the ground, with brass cap mkd.
	WC
	MC
	C7
	L2 S8689
	2010
	from which
	A magnet, in a blue plastic case, bears S. 60° W., 12 lks. dist., buried 1 ft. below the ground.
	Drive a steel fence post, 5 ft. long, 3 1/2 ft. in the ground, 1 lk. SE of witness cor. on line.
	Deposit a magnet in a white plastic case at the base of the stainless steel post.
3.57	True point for a cor. for the accreted lands adjoining U.S. Survey No. 458, a meander cor., not monumented due to the liability of destruction by ice and water action This cor. now also becomes the true point for cor. No. 7, Lot 2, U.S. Survey No. 8689, a meander cor., on the present right bank of the Yukon River.
	Lot 1, U.S. Survey No. 8689, Alaska
	Beginning at the true point for cor. No. 1, Lot 1, identical with the true point for cor. No. 1, Lot 2, both meander cors., on the right bank of the Yukon River, at the line of ordinary high water, not monumented due to the liability of destruction by ice and high water.
	South, on line 1-2, Lot 1, identical with line 1-2, Lot 2. Ascend across a rolling W slope through scrub willow and alder with scattered spruce, birch, and aspen.
2.00	Point selected for the witness cor. to cor. No. 1, Lot 1, identical with the point selected for the witness cor. to cor. No. 1, Lot 2, both meander cors.

Chains Set a stainless steel post, 28 ins. long, 2 1/2 ins. diam., flush with the ground, with brass cap mkd. WC MC C1 C1 L1 L2 S8689 2010 from which An aspen, 6 ins. diam., bears S. 52° E., 41 lks. dist., mkd. X BT. A birch, 8 ins. diam., bears S. 48° W., 90 lks. dist., mkd. X BT. Drive a steel fence post, 5 ft. long, 2 3/4 ft. in the ground, 2 lks. S of the witness cor. Deposit a magnet in a white plastic case at the base of the stainless steel post. From the witness cor., the witness cor. to the most southerly meander cor. of secs. 7 and 12, Tps. 13 N., Rs. 17 and 18 E., Fairbanks Mer., Alaska, bears S. 88°12' E., 5.23 chs. dist., monumented with a stainless steel post, 2 1/2 ins. diam., firmly set, projecting 4 ins. above the ground, with brass cap mkd., WC MC T13N S7 S12 R17E R18E 1993. The magnetic accessories were not searched for. 3.30 Enter marsh, edge bears N. 60° E. and S. 60° W. 4.60 Leave marsh; northerly edge of lake, bears N. 70° E. and N. 75° W. Southwesterly edge of lake, bears N. 70° E. and S. 70° W. 7.85 9.30 Seasonal stream, 10 lks. wide, course N. 55° E. Stream, 10 lks. wide, course N. 40° W., from S. 55° E. 11.70 14.55 Same stream, 8 lks. wide, course N. 65° E. 16.40 Pipeline, 12 ins. diam., bears E and W. 19.50 Cor. No. 2, Lot 1, identical with cor. No. 2, Lot 2, cor. No. 4, U.S. Survey No. 7544, and cor. No. 2, U.S. Survey No. 7784,

Lot 1, U.S. Survey No. 8689, Alaska

Lot 1, U.S. Survey No. 8689, Alaska

Chains monumented with an alum. rod, 3/4 in. diam., firmly set, projecting 6 ins. out of the ground, with alum. cap mkd. C4 S7544 C2 S7784 1967, from which the original accessories A dead cottonwood, 24 ins. diam., bears S. 40 $1/2^{\circ}$ W., 18 lks. dist., with fractional marks 544 visible on a partially healed blaze. (Record, poplar). A tamarack, 12 ins. diam., bears N. 18° W., 57 lks. dist., mkd. X BT on partially healed blazes. (Record, spruce, N. 18° E., 75 lks.). A granite outcrop, 6 x 8 x 2 ft. high, bears East, 290 lks. dist., mkd. B X O. The original orange fiberglass cone, 25 ins. diam. base, 4 ins. diam. top., 24 ins. high, was found over and wired to the alum rod. Add marks to the alum. cap to read S8689 L1 | L2 C2 C2 C4 C2 S7544 S7784 2010 1967 from which a new bearing tree A spruce, 8 ins. diam., bears N. 50° E., 27 lks. dist., mkd. C2 L2 S8689 BT. Snow blazed. From the true point for cor. No. 5, Lot 1, a meander cor., on line 1-2, U.S. Survey No. 461, on the right bank of the Yukon River, at the line of ordinary high water, hereinbefore described. Thence downstream with the meanders of the right bank of the Yukon River, along a well-defined, eroding bank, 4 to 6 ft. high, at the line of ordinary high water. N. 81°08' E., 4.04 chs.

Lot 1, U.S. Survey No. 8689, Alaska

Chains East, 5.50 chs. At 4.20 chs., Windy Creek, 25 lks. wide, 2 ft. deep, course N. 15° E. S. 80°00' E., 3.50 chs. N. 75°00' E., 7.00 chs. At end of course, true point for cor. No. 1, Lot 1, identical with the true point for cor. No. 1, Lot 2, both meander cors., hereinbefore described. Lot 2, U.S. Survey No. 8689, Alaska From cor. No. 2, Lot 2, identical with cor. No. 2, Lot 1, cor. No. 4, U.S. Survey No. 7544, and cor. No. 2, U.S. Survey No. 7784, hereinbefore described. N. 89°55' E., on line 2-3, Lot 2, identical with line 2-3, U.S. Survey No. 7784. Descend moderate NE slope through willow and birch. 3.00 Ravine, drains N; asc. moderate SW slope. 5.10 End ascent; over level ground through scattered spruce with alder undergrowth. 6.30 Power transmission line, 3-wire, bears N. 30° E. and S. 30° W. 7.30 Telephone line, 1-wire, bears N. 35° E. and S. 35° W. 9.02 Point for cor. No. 3, Lot 2, identical with cor. No. 3, U.S. Survey No. 7784, on the northwesterly side of the Steese Highway right-of-way, on a curve, 2.27 chs. perpendicular from the apparent centerline. Set a stainless steel post, 28 ins. long, 2 1/2 ins. diam., 26 ins. in the ground, with brass cap mkd. S8689 L2 C3 C3 S7784 2010 from which

Chains A utility pole, 8 ins. diam., bears S. 45° E., 10 lks. dist., mkd. PL 62.

Chains	The intersection of fences, extending NE and SW, bears S. 41° E., 12 lks. dist.
	Deposit a magnet in a white plastic case at the base of the stainless steel post.
	Thence on line 3-4, Lot 2, on the northwesterly side of the Steese Highway right-of-way, on the arc of a circular curve to the right, having a radius of 16.50 chs., long chord bears N. 44°45' E., 9.832 chs. dist.
	Over level ground through spruce and birch with alder undergrowth.
4.00	Pipeline, 12 ins. diam., bears E and W.
9.80	Southwesterly edge of paved driveway, bears S. 35° E. and N. 35° W.
9.98	Point for cor. No. 4, Lot 2, on the northwesterly side of the Steese Highway right-of-way, 2.27 chs. perpendicular from the apparent centerline; falls in paved driveway.
	Drive a P-K nail, 2 ins. long, flush with the pavement
	from which
	A stainless steel post, 28 ins. long, 2 1/2 ins. diam., set 27 ins. in the ground, for a reference monument, bears North, 35 lks. dist., with brass cap mkd. C2 S8689 RM-1 2001 35 LKS and an arrow pointing to the cor.
	A stainless steel post, 28 ins. long, 2 1/2 ins. diam., set 27 ins. in the ground, for a reference monument, bears West, 35 lks. dist., with brass cap mkd. C2 S8689 RM-2 2001 35 LKS and an arrow pointing to the cor.
	N. 62°05' E., on line 4-5, Lot 2, on the northwesterly side of the Steese Highway right-of-way.
	Over pavement.
0.25	Northeasterly edge of paved driveway, bears S. 35° E. and N. 35° W.; over level ground through spruce and birch with alder undergrowth.
2.50	Cor. No. 5, Lot 2, identical with cor. No. 5, U.S. Survey No. 458, on the northwesterly side of the Steese Highway right- of-way, 2.27 chs. perpendicular from the apparent centerline, hereinbefore described.

Lot 2, U.S. Survey No. 8689, Alaska

Chains From the true point for cor. No. 7, Lot 2, a meander cor., on the present right bank of the Yukon River, at the line of ordinary high water, hereinbefore described. Thence upstream with a meander of the right bank of the Yukon River, on a well-defined bank, 1 to 2 ft. high, at the line of ordinary high water. S. 75°00' W., 17.81 chs. At end of course, true point for cor. No. 1, Lot 2, identical with the true point for cor. No. 1, Lot 1, both meander cors.; hereinbefore described. Lot 3, U.S. Survey No. 8689, Alaska Beginning at the true point for the auxiliary meander cor. of Lot 3, on the northerly bank of an unnamed island in the Yukon River, at the line of ordinary high water; not monumented due to the liability of destruction by ice and water action. From this point, the witness cor. to the auxiliary meander cor., Lot 3, bears South, 1.00 ch. dist. At the witness corner Set a stainless steel post, 28 ins. long, 2 1/2 ins. diam., 26 ins. in the ground, with brass cap mkd. WC AMC LЗ S8689 2010 from which A granite outcrop, 14 x 22 x 10 ft. high, bears S. 24 1/2° E., 15 lks. dist., mkd. X BO on the NW face,

Lot 3, U.S. Survey No. 8689, Alaska

ins	
	3 ft. above the ground.
	A granite boulder, 4 x 5 x 3 ft. high, bears S. 48 1/4° W 81 lks. dist., mkd. X BO on N face, 2 ft. above the ground.
	Drive a steel fence post, 5 ft. long, 3 ft. in the ground, 2 lks. S of witness cor.
	Deposit a magnet in a white plastic case at the base of the stainless steel post.
	From the witness cor., the witness cor. to cor. No. 1, Lot 1, identical with the witness cor. to cor. No. 1, Lot 2, both meander cors., bears S. 21°21' E., 9.89 chs. dist., hereinbefore described.
	Thence counterclockwise with the meanders of the unnamed island in the Yukon River, along a well-defined, low bank, 1 to 2 ft. high, at the line of ordinary high water.
	N. 80°05' W., 5.30 chs.
	S. 32°18' W., 4.22 chs.
	S. 75°20' E., 4.85 chs.
	N. 85°45' E., 10.50 chs.
	N. 68°01' W., 8.29 chs. At end of course, true point for the auxiliary meander cor., Lot 3, hereinbefore described.
	Recovery and Monumentation of Certain Corners U.S. Survey No. 8689, Alaska
	Corner No. 4, U.S. Survey No. 461, monumented with a schist stone, 4 x 8 x 22 ins., firmly set, 4 ins. below the ground, mkd. C4 S851 with an X on top; no accessories of record. At the corner point Set a stainless steel post, 28 ins. long, 2 1/2 ins. diam., 26 ins. in the ground, with brass cap mkd.

Recovery and Monumentation of Certain Corners U.S. Survey No. 8689, Alaska

Chains	
	S461 C4
	2010
	Drive a steel fence post, 5 ft. long, 3 ft. in the ground, 2 lks. SE of cor.
	Deposit the original mkd. schist stone alongside the stainless steel post.
	Deposit broken green glass and a magnet at the base of the stainless steel post.
	Corner No. 5, U.S. Survey No. 461, monumented with a granite stone, 2 x 6 x 14 ins., firmly set, extending 2 ins. above the ground, mkd. C5 S851 with an X on top; no accessories of record.
	At the corner point
	Set a stainless steel post, 28 ins. long, 2 $1/2$ ins. diam., 27 ins. in the ground, with brass cap mkd.
	2010
	Drive a steel fence post, 5 ft. long, 3 ft. in the ground, 2 lks. S of cor.
	Deposit the original mkd. granite stone alongside the stainless steel post.
	Deposit broken green glass and a magnet at the base of the stainless steel post.
	General Description
	This survey, comprising 3 lots, is situated on the right bank of the Yukon River, on the northwesterly side of the Steese Highway right-of-way, and approximately 2 1/2 miles northwesterly from Circle, in Townships 13 North, Ranges 17 and 18 East, Fairbanks Meridian, Alaska.

U.S. Survey No. 8689, Alaska

Chains	
	The land is rolling in the southern portions and covered with spruce, birch, and cottonwood, with willow and alder undergrowth. The northern portion along the Yukon River is mostly level and covered with willows.
	The soil is silty loam over bedrock, and frozen to a depth of about 24 inches at the time of survey.
	The Steese Highway is a well traveled and maintained, asphalt surfaced, highway. There were no other improvements observed except those noted in this record.
	There were no islands in the immediate vicinity except Lot 3.
	Access to the survey was by automobile and motorboat.



UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT

FIELD ASSISTANTS

NAMES	CAPACITY
John D. Thayer	Lead Land Surveyor
John A. Johnson, jr.	Land Surveyor
Mark L. Smith III	Student Trainee, (Land Surveyor)
Robert M. Jones	Surveying Technician
Karen E. Anderson	Surveying Aid
Fred (NMI) Roberts	Volunteer
Michael G. Green	Contract Laborer

CERTIFICATE OF SURVEY

I, Robert L. Smith, Cadastral Surveyor, HEREBY CERTIFY upon honor that, in pursuance of special instructions bearing date of the 20th day of May, 2010, I have surveyed U.S. Survey No. 8689, comprising 3 lots, and dependently resurveyed portions of U.S. Survey Nos. 458, 461, and 1100, surveyed a partition line for accreted lands adjoining U.S. Survey No. 458 and recovered and remonumented certain corners, situated on the right bank of the Yukon River, adjoining the Steese Highway, and approximately 2 1/2 miles northwesterly from Circle, within Townships 13 North, Ranges 17 and 18 East, Fairbanks Meridian, in the State of Alaska, which is represented in the foregoing field notes as having been executed by me and under my direction; and that said survey has been made in strict conformity with said special instructions, the Manual of Surveying Instructions for the Survey of the Public Lands of the United States, and in the specific manner described in the foregoing field notes.

(Date)

(Cadastral Surveyor)

CERTIFICATE OF APPROVAL

BUREAU OF LAND MANAGEMENT Anchorage, Alaska

The foregoing field notes of the survey of U.S. Survey No. 8689, comprising 3 lots, and the dependent resurvey of portions of U.S. Survey Nos. 458, 461, and 1100, and the survey of a partition line for accreted lands adjoining U.S. Survey No. 458 and the recovery and remonumentation of certain corners, in Townships 13 North, Ranges 17 and 18 East, Fairbanks Meridian, in the State of Alaska, executed by Robert L. Smith, Cadastral Surveyor, having been critically examined and found correct, are hereby approved.

(Date)

(Chief Cadastral Surveyor for Alaska)

CERTIFICATE OF TRANSCRIPT

I CERTIFY That the foregoing transcript of the field notes of the abovedescribed surveys of U.S. Survey No. 8689, in Townships 13 North, Ranges 17 and 18 East, Fairbanks Meridian, Alaska, is a true copy of the original field notes.

(Chief Cadastral Surveyor for Alaska)

	T. 9 N., R. 4 W., Copper River Meridian, Alaska
Chaine	
Charns	
	ΛΟΤΛΤΝΙΛΤ
	ORIGINAL
	UNITED STATES
	DEPARTMENT OF THE INTERIOR
	BOKERO OF LAND MANAGEMENI
	FIFID NOVES
	OF OF
	THE SUBVEY OF
	IL C CUDVEY No. 2620
	COMPRESENC 2 LONG
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	IL C CUDVEY NOC 450 461 and 1100
	U.S. SUKVEI NUS. 438, 401, AND
	AND
	THE SURVEY OF A PARTITION LINE FOR
	ACCRETED LANDS ADJOINING U.S. SURVEY NO. 458, AND
	THE RECOVERY AND REMONUMENTATION OF CERTAIN CORNERS
	SITUATED ON
	THE RIGHT BANK OF THE IUKON RIVER
	ADJOINING TO THE STEESE HIGHWAY, AND
	APPROXIMATELY Z 1/Z MILES NORTHWESTERLY FROM
	WITHIN
	TOWNSHIPS 13 NORTH, RANGES 17 AND 18 EAST
	OF THE FAIRBANKS MERIDIAN, ALASKA
	THE GEOGRAPHIC POSITION
	OF THE WITNESS CORNER TO
	CORNER NO. 6, LOT 2, IDENTICAL WITH
	THE WITNESS CORNER TO
CC	DRNER NO. 6, U.S. SURVEY NO. 458, A MEANDER CORNER IN 1903
	IS:
LA	TITUDE 65°50'11.341" NORTH, LONGITUDE 144°05'15.971" WEST
	(NAD83)
	IN THE STATE OF ALASKA
	EXECUTED BY
	Debent I Omith Orderturi Orderturi
	Robert L. Smith, Cadastral Surveyor

T. 9 N., R. 4 W., Copper River Meridian, Alaska Chains Under special instructions dated May 20, 2010, approved May 21, 2010, which provided for the surveys included under U.S. Survey No. 8689, and assignment instructions dated June 1, 2010. Survey commenced: June 10, 2010 Survey completed: June 27, 2010 U.S. Survey No. 5229, was surveyed by Hobart B. Hyatt, Supervisory Cadastral Surveyor, in 1974. The survey of the Second Standard Parallel North along the south boundary of Township 9 North, Range 3 West, was surveyed by Richard R. Bidasolo, Robert A. Brown and William H. Twenhoffel, Cadastral Surveyors, in 1977 through 1985. U.S. Survey Nos. 11525 and 11527, were surveyed by John B. Able, Alaska registered Land Surveyor, in 1996. A portion of the south boundary of Township 10 North, Range 4 West, Copper River Meridian, Alaska, was surveyed concurrently by John A. Pex, Cadastral Surveyor, in 2010. The following field notes describe the dependent resurvey of a portion of U.S. Survey No. 5229, and the survey of the Second Standard Parallel North along the south boundary of Township 9 North, through Range 4 West, the First Guide Meridian West, through Township 9 North, between Ranges 4 and 5 West, a portion of the east boundary, a portion of the subdivisional lines, a portion of the subdivision of section lines of section 12 and a portion of the meanders of Township 9 North, Range 4 West, of the Copper River Meridian, Alaska. This survey was executed in accordance with the specifications set forth in the Manual of Surveying Instructions, 2009, and Special Instructions for Group No. 781, Alaska, dated May 30, 2010, and Supplemental Special Instructions, dated June 22, 2010. The direction and length of lines were determined by Global Navigation Satellite Systems (GNSS) Real-Time Kinematic (RTK) observations and augmented by lines projected by fore and backsights with a repeating theodolite and distances measured with electronic distance measurement. The direction of each line is with reference to the true meridian. All bearings are true mean bearings. All distances are horizontal distances reduced to their sea level equivalent. Preliminary to the resurvey the lines of the original survey were retraced and search was made for all corners and other calls of the record. Identified corners were remonumented in their original positions; lost corners were restored and monumented at proportionate positions based on the original record. The retracement data were thoroughly verified and only

	T. 9 N., R. 4 W., Copper River Meridian, Alaska
Chains	
	the true line field notes are given herein.

T. 9 N., R. 4 W., Copper River Meridian, Alaska

Chains	
	The geographic positions in NAD83 (2011), epoch 2010.00, for the two corners below were determined by GNSS observations utilizing the National Geodetic Survey Online Positioning Users Service (OPUS), to a <i>Network Accuracy</i> with a maximum peak-to-peak separation for each component of the computed position, of less than or equal to 0.050 meters, as defined in the Bureau of Land Management's <u>Standards for the Positional Accuracy of Cadastral</u> <u>Surveys When Using Global Navigation Satellite Systems (GNSS)</u> , dated February 23, 2009.
	The southeast corner of the township is:
	Latitude: 62° 30′ 39.172″ North, Longitude: 145° 52′ 20.608″ West (NAD83)
	The northwest corner of the township is:
	Latitude: 62° 31′ 56.921″ North, Longitude: 145° 55′ 33.982″ West (NAD83)
	The mean magnetic declination was obtained from U.S. Geological Survey quadrangle map "GULKANA (C-4)," Alaska, 1950 edition, with minor revisions in 1977, and indicates a value of 28 1/2° East.
	Dependent Resurvey of a Portion of U.S. Survey No. 5229, Alaska
	(Restoring the 1974 survey by Hobart B. Hyatt)
	Beginning at cor. No. 3, U.S. Survey No. 5229, monumented with an iron post, 2 1/2 ins. diam., firmly set, projecting 8 ins. above the ground, with brass cap mkd. S5529 C3 1974.
	There is no remaining evidence of the original bearing trees.
	N. 81° 00' W., on line 3-4.
2.24	Intersect the E. bdy. of the Tp., point for the closing cor. of secs. 13 and 18, Tps. 9 N., Rs. 3 and 4 W., hereinafter described.
10.00	Corner No. 4, U.S. Survey No. 5229, monumented with an iron post, 2 1/2 ins. diam., firmly set, projecting 7 ins. above the ground, with brass cap mkd. S5229 C4 1974, from which the original bearing trees

Dependent Resurvey of a Portion of U.S. Survey No. 5229, Alaska

Chains A spruce, 5 ins. diam., bears N. 4° E., 62 1/2 lks. dist., with scribe marks X BT visible on partially healed blazes. A spruce, 4 ins. diam., bears N. 67° E., 42 1/2 lks. dist., with scribe marks X BT visible on partially healed blazes. T. 9 N., R. 4 W., Copper River Meridian, Alaska Preliminary Statement The bearings and distances between corners are omitted from the following field notes and are shown only on the plat. Corner descriptions are referenced from the plat to the body of these notes using a letter designator. Α The stan. cor. of Tps. 9 N., Rs. 3 and 4 W., monumented with an alum. rod, 5/8 in. diam., firmly set, projecting 12 ins. above the ground, with alum. cap mkd. SC T9N R4W R3W S36 S31 1978, from which the original bearing trees A spruce stump, 12 ins. high, 4 ins. diam., bears N. 79° E., 109 1/2 lks. dist., with scribe marks X BT visible. A spruce, 4 ins. diam., bears N. 6 $1/4^{\circ}$ W., 113 lks. dist., with scribe marks X BT visible on partially healed blazes. and a new bearing tree A spruce, 4 ins. diam., bears N. 73 1/4° E., 112 lks. dist., mkd. X BT. Add the marks 2010 to cap. From this point, National Geodetic Survey control station "JULIE 1963" bears N. 34°17'31' E., 200.28 chs. dist., monumented with an iron post, 2 1/2 ins. diam., firmly set, projecting 2 ins above the ground, with brass cap mkd. NGS JULIE 1963. Referenced as shown in the published record.
Chains Located on flat terrain, among dense scrub spruce and scattered alder brush. В Point selected for the witness cor. to the meander cor. of sec. 36, on the S. bdy. of the Tp. Set a stainless steel post, 28 ins. long, 2 1/2 ins. diam., 27 ins. in the ground, with brass cap mkd. WC T 9 N R 4 W S 36 2010 from which A spruce, 4 ins. diam., bears N. 65 $1/4^\circ$ E., 27 1/2 lks. dist., mkd. X BT. A spruce, 4 ins. diam., bears S. 22° E., 79 1/2 lks. dist., mkd. X BT. Deposit a magnet in a white plastic case at the base of the stainless steel post. Located E of a 3 ft. high bank, in dense spruce with undergrowth of alder and willow. С Point selected for the witness cor. to the meander cor. of sec. 35, on the S. bdy. of the Tp. Set a stainless steel post, 28 ins. long, 2 1/2 ins. diam., 26 ins. in the ground, with brass cap mkd. WC T 9 N R 4 W S 35 → MC 2010 from which

Chains A spruce, 5 ins. diam., bears S. 34° W., 45 1/2 lks. dist., mkd. X BT. A spruce, 4 ins. diam., bears N. 66 3/4° W., 21 lks. dist., mkd. X BT. Deposit a magnet in a white plastic case at the base of the stainless steel post. D Point for the stan. cor. of secs. 34 and 35, on the S. bdy. of the Tp. Set a stainless steel post, 28 ins. long, 2 1/2 ins. diam., 28 ins. in the ground, with brass cap mkd. SC T 9 N R 4 W S 34 S 35 2010 from which A spruce, 3 ins. diam., bears N. 80 $3/4^{\circ}$ E., 20 1/2 lks. dist., mkd. X BT. A spruce, 5 ins. diam., bears N. 14° W., 287 1/2 lks. dist., mkd. X BT. Deposit a magnet in a white plastic case at the base of the stainless steel post. Located on a small strip of land in marshy bog, with small ponds of standing water broken by small strips of land. Ε Point selected for the witness cor. to the meander cor. of sec. 33, on the S. bdy. of the Tp. Set a stainless steel post, 28 ins. long, 2 1/2 ins. diam., 28 ins. in the ground, in a collar of stone, 2 ft. base, with brass cap mkd.

Chains WC T 9 N R 4 W S 33 MC 2010 from which A spruce, 4 ins. diam., bears N. 61 3/4° E., 36 1/2 lks. dist., mkd. X BT. A spruce, 4 ins. diam., bears S. 12° E., 48 lks. dist., mkd. X BT. Deposit a magnet in a white plastic case at the base of the stainless steel post. Located in spruce, with undergrowth of scrub willow and dwarf birch. F Point selected for the witness cor. to the meander cor. of sec. 32, on the S. bdy. of the Tp. Set a stainless steel post, 28 ins. long, 2 1/2 ins. diam., 26 ins. in the ground, with brass cap mkd. WC T 9 N R 4 W S 32 MC 2010 from which A spruce, 4 ins. diam., bears S. 47° W., 58 lks. dist., mkd. X BT. A spruce, 5 ins. diam., bears N. 21° W., 49 1/2 lks. dist., mkd. X BT. Deposit a magnet in a white plastic case at the base of the stainless steel post. Located in spruce and willow brush. G

Chains Point for the stan. cor. of Tps. 9 N., Rs. 4 and 5 W. Set a stainless steel post, 28 ins. long, 2 1/2 ins. diam., 25 ins. in the ground, with brass cap mkd. SC T 9 N R 5 W | R 4 W S 36 S 31 2010 from which A spruce, 6 ins. diam., bears N. 50 3/4° E., 61 lks. dist., mkd. T9N R4W S31 SC BT. A spruce, 5 ins. diam., bears N. 48 1/2° W., 11 lks. dist., mkd. T9N R5W S36 SC BT. Deposit a magnet in a white plastic case at the base of the stainless steel post. Located 62 lks. S of small lake, shore bears N. 42° E. and S. 65° W. Η Point for the cor. of secs. 19, 24, 25 and 30, on the W. bdy. of the Tp. Set a stainless steel post, 28 ins. long, 2 1/2 ins. diam., 28 ins. in the ground, with brass cap mkd. T 9 N R 5 W R 4 W S 24 S 19 S 25 S 30 2010 from which A spruce, 4 ins. diam., bears N. 11 $3/4^{\circ}$ E., 76 lks. dist., mkd. X BT. A spruce, 4 ins. diam., bears S. 82 1/4° E., 11 lks. dist., mkd. X BT. A spruce, 7 ins. diam., bears S. 89 3/4° W., 143 1/2 lks. dist., mkd. T9N R5W S25 BT.

Chains A spruce, 8 ins. diam., bears N. 21 3/4° W., 94 lks. dist., mkd. T9N R5W S24 BT. Deposit a magnet in a white plastic case at the base of the stainless steel post. Located on slight NW slope, among spruce trees with undergrowth of willow and dwarf birch. Ι Point for the cor. of secs. 7, 12, 13 and 18, on the W. bdy. of the Tp. Set a stainless steel post, 28 ins. long, 2 1/2 ins. diam., 26 ins. in the ground, with brass cap mkd. т 9 м R 5 W R 4 W S 12 S 7 S 13 S 18 2010 from which A spruce, 9 ins. diam., bears N. 55 3/4° E., 172 lks. dist., mkd. T9N R4W S7 BT. A spruce, 7 ins. diam., bears S. 82° E., 74 lks. dist., mkd. T9N R4W S18 BT. A spruce, 7 ins. diam., bears S. 61° W., 31 1/2 lks. dist., mkd. T9N R5W S13 BT. A spruce, 10 ins. diam., bears N. 55° W., 33 lks. dist., mkd. T9N R5W S12 BT. Deposit a magnet in a white plastic case at the base of the stainless steel post. Located on rolling ground, among dense black spruce and pucker brush. J Point for the cor. of secs. 19, 24, 25 and 30, on the E. bdy. of the Tp. Set a stainless steel post, 28 ins. long, 2 1/2 ins. diam., 26 ins. in the ground, with brass cap mkd. T 9 N

Chains	
	R 4 W R 3 W S 24 S 19
	S 25 S 30
	2010
	from which
	A spruce, 4 ins. diam., bears N. 35 1/2° E., 40 1/2 lks. dist., mkd. T9N R3W S19 BT.
	A spruce, 4 ins. diam., bears S. 40 1/4° E., 143 1/2 lks. dist., mkd. T9N R3W S30 BT.
	A spruce, 3 ins. diam., bears S. 72° W., 61 1/2 lks. dist., mkd. X BT.
	A spruce, 3 ins. diam., bears N. 40° W., 57 lks. dist., mkd. X BT.
	Deposit a magnet in a white plastic case at the base of the stainless steel post.
	<u>K</u>
	Point for the closing cor. of secs. 13 and 18, on the E. bdy. of the Tp., on line 3-4, U.S. Survey No. 5229.
	Set a stainless steel post, 28 ins. long, 2 1/2 ins. diam., 28 ins. in the ground, with brass cap mkd.

Chains S 5229 S 13 S 18 R4W R3W СС T 9 N 2010 from which A spruce, 4 ins. diam., bears S. 47° E., 8 1/2 lks. dist., mkd. T9N R3W S18 CC BT. A spruce, 4 ins. diam., bears S. 56 3/4° W., 80 1/2 lks. dist., mkd. T9N R4W S13 CC BT. Deposit a magnet in a white plastic case at the base of the stainless steel post. L Point selected for the witness cor. to the meander cor. of secs. 7 and 12, on the E. bdy. of the Tp. Set a stainless steel post, 28 ins. long, 2 1/2 ins. diam., 27 ins. in the ground, with brass cap mkd. WC T 9 N R4W R3W S 12 S 7 MC 2010 Drive a steel fence post, 6 ft. long, 3 ft. in the ground, 10 lks. N of witness cor. Deposit a magnet in a white plastic case at the base of the stainless steel post. Located in tall grass with scattered willow, and 90 lks. S of a trail, 15 lks. wide, bears N. 80° E. and S. 80° W. М Point for the N 1/16 sec. cor. of secs. 7 and 12, on the E. bdy. of the Tp. Set a stainless steel post, 28 ins. long, 2 1/2 ins. diam., 25 ins. in the ground, with brass cap mkd. N 1/16

Chains S 12 S 7 2010 from which A spruce, 4 ins. diam., bears N. 71 1/4° E., 46 1/2 lks. dist., mkd. X BT. A spruce, 7 ins. diam., bears S. 15 1/2° W., 83 lks. dist., mkd. N 1/16 S12 BT. Deposit a magnet in a white plastic case at the base of the stainless steel post. From this point, cor. No. 5, U.S. Survey No. 11527, bears N. 13°57' W., 79.39 chs. dist., hereinafter described. Ν Corner No. 5, U.S. Survey No. 11527, monumented with a stainless steel post, 2 1/2 ins. diam., firmly set, projecting 6 ins. above the ground, with brass cap mkd. C5 S11527 1996, from which the original bearing trees A dead spruce, 5 ins. diam., bears N. 45° E., 87 lks. dist., with scribe marks X BT visible. A spruce, 5 ins. diam., bears N. 11 3/4° W., 78 lks. dist., mkd. with partially healed blaze. (Record bearing N. 9 1/2° W.) and a new bearing tree A spruce, 6 ins. diam., bears N. 41 3/4° E., 107 1/2 lks. dist., mkd. C5 S11527 BT. Snowblazed. Add the marks 2010 to brass cap. 0 Point for the N 1/16 sec. cor. of secs. 11 and 12. Set a stainless steel post, 28 ins. long, 2 1/2 ins. diam., 25 ins. in the ground, with brass cap mkd. N 1/16 S 11 S 12 2010

Chains from which A spruce, 3 ins. diam., bears S. 80 3/4° E., 14 lks. dist., mkd. X BT. A spruce, 3 ins. diam., bears S. 70° W., 11 lks. dist., mkd. X BT. Deposit a magnet in a white plastic case at the base of the stainless steel post. Located in wet tundra, and small tussocks, among scattered black spruce, scrub willow and alder. Ρ Witness cor. to cor. No. 1, U.S. Survey No. 5229, a meander cor., monumented with an iron post, 2 1/2 ins. diam., firmly set, projecting 5 ins. above the ground, with brass cap mkd. WC MC S5229 C1 1974, from which the original bearing trees A spruce, 9 ins. diam., bears N. 4° E., 62 1/2 lks. dist., with scribe marks X BT visible on partially healed blazes. A spruce, 4 ins. diam., bears N. 67° E., 42 1/2 lks. dist., with scribe marks X BT visible on partially healed blazes. Q Witness cor. to cor. No. 1, U.S. Survey No. 11525, a meander cor., monumented with an iron post, 2 1/2 ins. diam., firmly set, projecting 4 ins. above the ground, with brass cap mkd. WC MC S5229 C1 1974, from which the original bearing trees A spruce, 9 ins. diam., bears S. 0°05' E., 82 lks. dist., mkd. X BT. A spruce, 14 ins. diam., bears S. 59°36' W., 46 lks. dist., mkd. X BT.

Chains	
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	Witness cor. to cor. No. 4, U.S. Survey No. 11525, a meander cor., is determined at record bearing and distance from the remains of the original bearing trees; original monument was found lying loose on the ground.
	A spruce, 7 ins. diam., bears S. 7 1/2° W., 17 lks. dist., mkd. X BT.
	A spruce, 7 ins. diam., bears N. 32 1/4° W., 16 1/2 lks. dist., mkd. X BT.
	At the corner point
	While digging hole for stainless steel post, found original clear magnet, 28 ins. below the ground. Leave in place.
	Reset the original stainless steel post, 28 ins. long, 2 1/2 ins. diam., 27 ins. in the ground, with brass cap mkd. WC MC C4 S11525 1996.
	Reset original magnet at the base of the stainless steel post.
	Drive a steel fence post, 5 ft. long, 2 1/2 ft. in the ground, 10 lks. W of witness cor. on line.
	Add the marks 2010 to cap.
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	From the true point for the meander cor. of sec. 36, on the S. bdy. of the Tp., on the easterly bank of an unnamed lake, at the line of ordinary high water; not monumented due to the liability of destruction by ice and water action.
	Thence counterclockwise with the meanders of the bank of the unnamed lake, at the line of ordinary high water.
	<pre>N. 16°43' E., 4.47 chs. N. 10°31' E., 8.01 chs. N. 13°44' W., 2.83 chs. N. 12°15' W., 2.66 chs. N. 3°00' E., 1.02 chs. N. 31°33' W., 2.76 chs. S. 88°32' W., 6.59 chs. S. 52°16' W., 2.85 chs. S. 15°00' W., 2.17 chs. S. 23°15' W., 2.32 chs.</pre>

Chains S. 38°45' W., 5.85 chs. S. 30°01' W., 1.32 chs. S. 31°02' W., 8.49 chs. s. 20°32' W., 1.87 chs. At end of course, the true point for the meander cor. of sec. 35, on the S. bdv. of the Tp., at the line of ordinary high water; not monumented due to the liability of destruction by ice and water action. From the meander cor. of sec. 34, on the S. bdy. of the Tp., on the easterly bank of an unnamed lake, at the line of ordinary high water; not monumented due to the liability of destruction by ice and water action. Thence counterclockwise with the meanders of the bank of the unnamed lake, at the line of ordinary high water. N. 6°26' W., 1.72 chs. N. 25°00' W., 4.94 chs. N. 6°42' W., 1.47 chs. N. 18°24' E., 1.75 chs. N. 35°59' E., 3.18 chs. N. 48°42' E., 1.22 chs. S. 71°44' E., 0.32 chs. S. 22°27' E., 0.33 chs. S. 84°39' E., 0.85 chs. N. 75°58' E., 1.23 chs. N. 34°32' E., 0.71 chs. N. 3°29' E., 1.50 chs. N. 19°06' W., 1.22 chs. N. 40°46' W., 0.54 chs. N. 76°54' W., 1.10 chs. S. 61°47' W., 0.72 chs. N. 72°30' W., 1.34 chs. N. 62°58' W., 3.95 chs. N. 48°07' W., 1.63 chs. N. 35°31' W., 3.41 chs. N. 29°24' W., 2.15 chs. N. 51°29' W., 2.98 chs. N. 74°28' W., 1.44 chs. s. 79°13' W., 2.72 chs. S. 60°08' W., 2.69 chs. S. 46°28' W., 3.55 chs.

ins I			
s. 47°5	9' W., 1.60	chs.	
s. 56°3	7'W., 2.43	chs.	
s. 33°5	0'W., 0.53	chs.	
S. 6°4	4'W., 0.62	chs.	
s. 19°0	1'E., 0.50	chs.	
S. 67°1.	5'E., 0.65	chs.	
S. 21°3	3'E., 0.99	chs.	
s. 13°4	7'E., 2.64	chs.	
S. 21°0	8'E., 1.04	chs.	
S. 34°2	8'E., 3.94	chs.	
s. 34°5	5'E., 2.97	chs.	
S. 39°1	0'E., 1.90	chs.	
S. 20°0	4'E., 4.47	chs.	
S. 16°3	1'E., 2.03	chs. At en	d of course, the most
	of		easterly meander cor.
	01		sec. 33, on the S.
	bdy. of		
	of		the Tp., at the line
	not		ordinary high water;
			monumented due to the liability of
	destruct	lon by	ice and water action.
From th 33, on unnamed due to Thence	the S. bdy. o l lake, at the the liability counterclockw	for the most westerly f the Tp., on the eas line of ordinary hig of destruction by ic rise with the meanders	meander cor. of sec. terly bank of an h water; not monumented e and water action. of the bank of the h water
	i iuke, ut the	Time of orainary mig	ii water.
N. 6°2	6'W., 4.10	chs.	
N. 29°5	∠'W., U.92	cns.	
N. 50-3	/ W., 4.6/	chs.	
N 30°2	4 W., 1.77 2 W 1.58	chs	
N 3000	∠ w., ⊥.Jo 3'W २७∩	chs	
N 26°/	S W., S.70 8' W - 2 /7	chs	
N 32°5	0'W, 2.4/	chs	
N. 44°0	0'W 540	chs.	
N. 32°4	5'W., 351	chs.	
N. 26°1	4'W 3.61	chs.	
N. 44°1	6'W., 5.41	chs.	
N. 49°4	7'W., 4.40	chs.	
N. 43°3	1'W., 5.19	chs.	
N. 32°2	5'W., 3.15	chs.	
N. 14°0	5'W., 2.20	chs.	
-	,		

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Chains						
	Ν.	4°31'	Ε.,	5.03	chs.	
	Ν.	20°17'	W.,	0.38	chs.	
	Ν.	54°30'	W.,	0.96	chs.	
	Ν.	75°10'	W.,	1.96	chs.	
	s.	84°08'	W.,	3.07	chs.	
	s.	77°23'	W.,	0.80	chs.	
	s.	61°30'	W.,	0.89	chs.	
	s.	47°49'	W.,	3.06	chs.	
	s.	58°26'	W.,	8.29	chs.	
	s.	61°53'	W.,	5.81	chs.	
	s.	12°39'	Ε.,	1.31	chs.	
	s.	12°28'	W.,	0.48	chs.	
	s.	40°33'	W.,	2.61	chs.	
	s.	47°39'	W.,	1.98	chs.	
	s.	60°38'	W.,	5.37	chs.	
	s.	51°33'	W.,	1.67	chs.	
	s.	38°22'	W.,	0.79	chs.	
	s.	18°10'	W.,	1.73	chs.	
	s.	4°36'	W.,	0.71	chs.	
	s.	21°49'	E.,	1.43	chs.	
	s.	46°50'	E.,	2.66	chs.	
	s.	1°38'	E.,	1.50	chs.	
	s.	26°29'	E.,	2.11	chs.	
	s.	12°31'	E.,	2.16	chs.	
	s.	1°24'	W.,	2.29	chs.	
	s.	11°30'	W.,	2.34	chs.	
	s.	20°45'	W.,	3.43	chs.	
	S.	16°56'	W.,	2.18	cns.	
	S.	48-56	W.,	1 (7	cns.	
	IN.	9 52 .	W.,	1.0/	cns.	
	N.	66 09 °	W.,	1 10	chs.	
	э. с	0J 14 26º101	VV • ,	1.10	cha.	
	э. с	30 I0 13°лл !	VV • ,	0.00	chs.	
	з. с	10 44 5°10!	w., r	2 65	chs.	
	у. с	30°22'	ш ., Е	1 74	chs.	
	s.	44°47'	ш ., Е.,	0.85	chs.	
	s.	14°51'	ш• , Е	0.85	chs	
	s.	6°53'	W.,	1 14	chs.	
	s.	19°37'	W.,	1.41	chs.	At end of course, the true
	~.	10 01	cor		0110 •	point for the meander
			bdv	•		of sec. 32, on the S.
			lin	• • of		of the Tp., at the
			111	C UI		ordinary high water;
			not			
						monumented due to the liability of

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Chains			
	destruc	tion by	
			ice and water action.
	From the true point meander cor., on the ordinary high water destruction by ice	for cor. No. 1, U.S. e westerly bank of Fis ; not monumented due t and water action.	Survey No. 5229, a h Lake, at the line of o the liability of
	From this point, the	e witness cor. to cor.	No. 1, U.S. Survey No.
	5229, a meander cor hereinbefore descri	., bears S. 8°54' W., bed.	0.10 chs. dist.,
	Thence clockwise wi the line of ordinar	th the meanders of the y high water.	bank of Fish Lake, at
	N. 61°16' W., 4.30) chs.	
	N $51^{\circ}57'$ W - 2 22	chs.	
	N $35^{\circ}55'$ W 5.70		
	N 37°16' W 5.16		
	$N = 20^{\circ}20^{\circ}$ M = 5.10		
	$N_{1} = 29 \times 20 \text{ W}_{1}$ 3.42		
	N. 21 40° W., 0.22		
	N. 34 ⁻ 20 ⁻ W., 2.54	i cns.	
	N. 29°20' W., 2.68	chs.	
	N. 18°31' W., 1.3	chs.	
	N. 13°45' W., 2.89) chs.	
	N. 1°17' W., 1.26	5 chs.	
	N. 7°08' E., 2.16	chs.	
	N. 4°20' W., 1.69) chs.	
	N. 11°04' E., 3.65	chs.	
	N. 26°13' E., 1.79) chs.	
	N. 46°36' E., 1.03	Chs.	
	N. 70°14' E., 1.47	/ chs.	
	N. 51°13' E., 0.68	chs. At en	d of course, the true
			point for cor. No. 1,
	U.S.		Currey No. 11525
	meander		Survey No. 11525, a
	medificer		cor.,; not monumented
	due to		
			the liability of
	destruc	tion	by ice and water
	action.		
	From this point, the 11525, a meander condescribed.	e witness cor. to cor. r., bears West, 2.80 c	No. 1, U.S. Survey No. hs. dist., hereinbefore
	From the true point meander cor., at t monumented due to t action.	for cor. No. 4, U.S. he line of ordinary hi he liability of destru	Survey No. 11525, a gh water; not ction by ice and water
	From this point, the	e witness cor. to cor.	No. 4, a meander cor.,

Chains															
	bea	ars Wes	t, 1.7	5 chs	. dist	t., h	nereir	nbef	ore	desc:	ribe	ed.			
	Тh	ence cl	ockwis	e wit	h the	mean	ders	of	the	hank	of	Fish	Lake	at	÷
	the	e line	of ord	inary	high	wate	er.	01	CIIC	bank	01	1 101		c, u	
	N.	15°55'	W.,	7.36	chs.										
	Ν.	24°19'	W.,	1.40	chs.										
	Ν.	44°47'	W.,	1.18	chs.										
	Ν.	62°13'	W.,	2.90	chs.										
	Ν.	70°41'	W.,	3.70	chs.										
	Ν.	78°00'	W.,	2.25	chs.			At	end	d of d	cour	se,	inte	rsect	t
			Cro	ok.						right	t ba	ink c	of Fi	sh	
			the	er,						then	ce u	ıpstr	ceam t	with	
			,	-						mean	ders	of	the :	right	t
			ban	ĸ						of F:	ish	Cree	ek, at	t the	Э
			lin	е						ofo	rdir		high		
			wat	er.						01 0.		lary	nrdu		
	s.	45°30'	W.,	2.30	chs.										
	s.	26°00'	W.,	2.35	chs.										
	s.	15°00'	W.,	1.40	chs.										
	s.	24°00'	W.,	1.30	chs.										
	s.	24°39'	W.,	0.98	chs.										
	s.	57°36'	W.,	0.71	chs.										
	s.	76°04'	W.,	0.77	chs.										
	Ν.	84°31'	W.,	3.08	chs.										
	Ν.	59°53'	W.,	0.84	chs.										
	Ν.	84°00'	W.,	0.38	chs.										
	Ν.	45°04'	W.,	2.24	chs.										
	Ν.	26°49'	W.,	4.40	chs.										
	Ν.	18°43'	W.,	5.59	chs.										
	Ν.	54°39'	E.,	0.28	chs.										
	Ν.	13°51'	W.,	2.66	chs.										
	Ν.	2°45'	W.,	1.86	chs.										
	Ν.	25°26'	E.,	2.68	chs.										
	Ν.	51°21'	E.,	3.46	chs.										
	Ν.	2°18'	W.,	2.73	chs.										
	Ν.	87°51'	E.,	0.73	chs.										
	Ν.	26°57'	E.,	0.43	chs.										
	Ν.	62°11'	W.,	0.76	chs.										
	Ν.	31°20'	W.,	0.57	chs.										
	Ν.	0°42'	E.,	5.25	chs.										
	Ν.	31°44'	E.,	0.59	chs.										
	Ν.	18~45'	E.,	2.03	chs.										
	N.	3°23'	E.,	2.27	chs.										
	N.	28~48	W.,	5.97	chs.										
	Ν.	20°44	W.,	5.18	chs.										
	Ν.	1~14'	W.,	1.02	chs.										

Chains N. 15°33' E., 1.03 chs. N. 0°56' W., 2.79 chs. N. 6°35' W., 2.94 chs. 0.61 chs. N. 28°51' E., N. 53°45' E., 1.78 chs. 1.05 chs. N. 72°51' E., N. 37°15' E., 1.93 chs. N. 4°35' W., 2.48 chs. At end of course, the most westerly special meander cor. on the E and W centerline of the NW 1/4 of sec. 12; not monumented due to the liability of destruction by ice and water action. From the most easterly special meander cor. on the ${\tt E}$ and ${\tt W}$ centerline of the NW 1/4 of sec. 12, on the left bank of Fish Creek, at the line of ordinary high water; not monumented due to the liability of destruction by ice and water action. Thence downstream with the meanders of the left bank of Fish Creek, at the line of ordinary high water. S. 15°34' E., 0.87 chs. S. 73°06' E., 0.28 chs. N. 81°19' E., 1.83 chs. S. 49°45' E., 0.29 chs. S. 5°26' E., 0.51 chs. 0.67 chs. S. 25°16' W., S. 44°23' W., 1.48 chs. 1.58 chs. S. 26°12' W., S. 46°54' W., 0.63 chs. S. 84°51' W., 2.64 chs. 0.63 chs. S. 69°01' W., S. 32°19' W., 0.47 chs. s. 4°23' W., 0.58 chs. S. 12°25' E., 1.26 chs. 0.56 chs. S. 63°03' E., 0.60 chs. S. 85°58' E., 0.47 chs. S. 56°48' E., S. 29°18' E., 0.60 chs. S. 7°45' E., 0.64 chs. 0.79 chs. s. 11°39' W., 2.63 chs. S. 29°40' W., S. 7°07' W., 0.84 chs. S. 13°01' E., 1.11 chs.

Chaine				
Charns	s 22º13	'E.	4 89 chs	
	S 28º04	□., 'E	4 35 chs	
	S. 20 04	⊔., ' ⊑	1.95 chs.	
	s 6°54	⊥., ' ™	3 31 chs	
	g 26°26	"., " E	1 43 chs	
	5.2020	₽•, ! E	1.45 CHS.	
	5. 41 40 c 0001	· E.,	2.15 CHS.	
	5. 901	· W.,	0.47 Chs.	
	S. $66^{-}29$	' W.,	1.59 cns.	
	S. 81-21	' W.,	2.30 Chs.	
	S. 13-56	' Е.,	3.41 Chs.	
	S. 14°52	' W.,	2.95 chs.	
	S. 34°13	' W.,	3.04 chs.	
	S. 24°02	'W.,	2.22 chs.	
	S. 0°14	' E.,	2.14 chs.	
	S. 14°08	' E.,	2.87 chs.	
	s. 19°07	' E.,	2.50 chs.	
	s. 24°44	' E.,	5.45 chs.	
	N. 78°12	' E.,	3.55 chs.	
	N. 86°26	' E.,	1.34 chs.	
	N. 24°59	' E.,	5.87 chs.	At end of course, intersect
		a] /		Fish Lake; thence
		CIC	JCKWISE	with the meanders of
		Fis	sh	
				Lake, at the line of
				ordinary high water.
	N. 52°48	' E.,	5.81 chs.	
	N. 85°59	' E.,	1.98 chs.	
	N. 51°51	' E.,	6.92 chs.	
	N. 5°10	'W.,	5.55 chs.	
	N. 79°44	'W.,	1.03 chs.	
	N. 35°32	'W.,	1.58 chs.	
	N. 11°08	' W.,	1.93 chs.	
	N. 71°43	' E.,	12.64 chs.	
	N. 75°34	' E.,	1.47 chs.	
	N. 81°52	' E.,	3.12 chs.	
	N. 70°35	' E.,	1.82 chs.	
	N. 61°49	' E.,	5.84 chs.	
	N. 69°21	' E.,	3.80 chs.	
	N. 54°43	' E.,	3.54 chs.	
	N. 72°38	' E.,	1.56 chs.	
	N. 89°06	' E.,	1.94 chs.	
	s. 75°59	'E.,	0.61 chs.	At end of course, the
				meander cor. of secs.
		7 a	and	
		+ h /	2	12, on the E. bdy. of
		CILE	-	Tp., at the line of
		ord	dinary	1., 20 000 01
			_	high water; not
		mor	numented	

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Chains			
	if		due to the liability
		~	destruction by ice and
	wate.	Ţ	action.
	From auxiliary me an unnamed lake, monumented due te action.	eander cor. No. 1, at the at the line of ordinary o the liability of destru	e northernmost point of high water; not action by ice and water
	From this point, bdy. of the Tp., hereinbefore desc	the cor. of secs. 7, 12, bears S. 62°30' W., 55.0 cribed.	13 and 18, on the W. 9 chs. dist.,
	hereinbefore desa Thence clockwise lake, at the lind S. 48°53' E., 1 S. 29°19' E., 3 S. 56°27' E., 1 S. 70°13' W., 0 N. 77°10' E., 4 S. 79°30' E., 1 S. 68°21' E., 2 S. 51°24' E., 2 S. 51°24' E., 2 S. 56°55' E., 1 N. 28°40' E., 0 N. 55°35' E., 1 N. 80°39' E., 3 N. 68°57' W., 0 N. 4°41' E., 0 S. 73°48' E., 0 S. 12°58' E., 0 S. 22°13' W., 1 S. 45°02' W., 1 S. 45°02' W., 1 S. 45°02' W., 1 S. 45°12' W., 2 S. 57°10' W., 2 S. 37°11' W., 2 S. 32°52' W., 1 S. 24°55' W., 2 S. 13°06' W., 1 S. 12°53' E., 0	cribed. with the meanders of the e of ordinary high water. 1.42 chs. 3.11 chs. 1.49 chs. 1.49 chs. 1.49 chs. 1.40 chs. 1.90 chs. 2.45 chs. 2.45 chs. 2.45 chs. 2.45 chs. 2.45 chs. 1.57 chs. 1.57 chs. 1.64 chs. 1.85 chs. 1.85 chs. 1.89 chs. 1.89 chs. 1.89 chs. 2.26 chs. 2.34 chs. 1.90 chs. 0.53 chs.	e bank of the unnamed
	S. 5°37'E., 1	1.67 chs.	
	S. 58°56' W., (0.56 chs.	

Chains						
	s.	81°38'	W.,	0.87	chs.	
	Ν.	46°24'	W.,	2.44	chs.	
	Ν.	46°18'	W.,	2.57	chs.	
	Ν.	66°12'	W.,	1.34	chs.	
	Ν.	87°52'	W.,	0.84	chs.	
	s.	64°29'	W.,	0.70	chs.	
	s.	41°47'	W.,	0.71	chs.	
	s.	7°27'	W.,	3.54	chs.	
	s.	21°17'	E.,	1.81	chs.	
	s.	1°19'	W.,	0.37	chs.	
	s.	45°03'	W.,	0.30	chs.	
	s.	79°59'	W.,	1.12	chs.	
	Ν.	77°13'	W.,	2.15	chs.	
	Ν.	36°37'	W.,	0.78	chs.	
	Ν.	16°53'	W.,	2.70	chs.	
	Ν.	22°42'	W.,	1.51	chs.	
	Ν.	40°59'	W.,	2.19	chs.	
	Ν.	37°02'	W.,	2.23	chs.	
	Ν.	16°54'	W.,	3.06	chs.	
	Ν.	28°58'	W.,	4.09	chs.	
	Ν.	2°57'	Ε.,	1.41	chs.	
	Ν.	15°11'	Ε.,	1.58	chs.	
	Ν.	9°51'	Ε.,	1.51	chs.	
	Ν.	9°41'	E.,	2.33	chs.	
	Ν.	27°51'	W.,	1.71	chs.	
	Ν.	2°12'	W.,	1.47	chs.	
	Ν.	15°55'	Ε.,	2.21	chs.	
	Ν.	36°25'	Ε.,	1.79	chs.	
	Ν.	14°57'	Ε.,	0.33	chs.	
	Ν.	59°52'	Ε.,	1.32	chs.	
	Ν.	74°58'	Ε.,	2.35	chs.	
	Ν.	66°28'	E.,	2.59	chs.	
	s.	77°26'	E.,	0.47	chs.	
	Ν.	72°47'	E.,	0.33	chs.	
	Ν.	80°36'	E.,	2.30	chs.	
	s.	86°17'	Ε.,	2.16	chs.	
	Ν.	76°57'	Ε.,	0.76	chs.	At end of course, auxiliary
			200	1 +bo		meander cor. No. 1,
			and	i the		point of beginning.
						<u> </u>
	Fro an mon ac ⁻	om auxi unname numente tion.	liary d lake d due	meand , at to th	er con the l: e liab	r. No. 2, at the northernmost point of ine of ordinary high water; not pility of destruction by ice and water
	Fro bdj he:	om this y. of t reinbef	point he Tp. ore de	bear bear	cor. s S. S ed.	of secs. 19, 24, 25 and 30, on the E. 57°19'39" E., 133.21 chs. dist.,

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Chains										
	Ther	nce cl	ockwis	e wit	h the meanders	of the	bank	of	the	unnamed
	lake	e, at	the li	ne of	ordinary high	water.				
	S. 8	38°11'	Б.,	2.66	chs.					
		720161	, r	1 60	che					
		72 IU	ш ., Б	1.00	cho.					
	5.3	1000	L.,	0.90	chs.					
	s.	T.08.	E.,	1./4	chs.					
	s.	1°19'	Ε.,	5.81	chs.					
	S. 2	20°06'	Ε.,	2.31	chs.					
	s.	4°28'	Ε.,	2.34	chs.					
	s. 1	10°48'	Ε.,	3.42	chs.					
	s.	8°23'	Е.,	2.29	chs.					
	G 1	140081	– • , ह	2 4 8	chs					
		00161	ш ., г	2,10	cho.					
	5.	0 40 c020.	L.,	1 00	clis.					
	s.	638	E.,	1.82	cns.					
	s.	3°35'	Ε.,	1.61	chs.					
	S. 1	17°42'	W.,	1.20	chs.					
	S. 2	28°21'	W.,	4.11	chs.					
	S. 5	52°36'	W.,	2.32	chs.					
	S. 7	74°10'	W.,	2.34	chs.					
	s. 7	70°58'	W.,	5.71	chs.					
	S. 5	50°11'	W.,	1.68	chs.					
	S. 3	3.3°58'	W.,	3.88	chs.					
	N 8	38°26'	Е.	0 37	chs					
		320161	, r	0.27	chc.					
) 2 I U	ш ., М	0.27	cho.					
		21 10	vv.,	0.52	clis.					
	S. 3	3/~53'	W.,	1.21	cns.					
	S. 1	/8°29'	W.,	0.91	chs.					
	N. 6	58°18'	W.,	0.72	chs.					
	N. 7	78°21'	W.,	2.13	chs.					
	S. 7	79°53'	W.,	4.69	chs.					
	S. 7	71°31'	W.,	3.25	chs.					
	S. 8	34°44'	W.,	4.30	chs.					
	N. 6	69°41'	W.,	4.33	chs.					
	N. 7	73°27'	W.,	2.63	chs.					
	N. 5	54°22'	W.,	2.02	chs.					
	N 4	47°01 '	W .	2 20	chs					
	N 1	19°44 '	W.,	1 19	chs.					
		25°47!	τ _ν τ	3 10	chs.					
			VV • /	2 01	chis.					
	IN. 2	20 00.	w.,	2.91	cns.					
	N. 4	41°34'	W.,	1.2/	cns.					
	N. 5	5°33'	W.,	2.07	chs.					
	N. 3	38°28'	W.,	2.96	chs.					
	N.	9°10'	W.,	0.76	chs.					
	N. 1	10°53'	Ε.,	0.79	chs.					
	N. 3	35°10'	Ε.,	1.65	chs.					
	N. 3	31°11'	Ε.,	5.02	chs.					
	N. 4	49°12'	E.,	5.86	chs.					
	N. 1	17°33'	E.,	2.10	chs.					

Chains	
	N. 34°02' E., 1.32 chs.
	N. 56°09' E., 2.73 chs.
	N. 45°38' E., 3.30 chs.
	N. 66°46' E., 5.23 chs.
	N. 53°04' E., 4.19 chs.
	N. 32°11' E., 3.50 chs.
	N. 44°11' E., 1.93 chs.
	N. 79°32' E., 3.12 chs.
	N. 86°42' E., 3.26 chs.
	S. 87°05' E., 3.52 chs.
	N. 85°04' E., 3.18 chs.
	N. 75°28' E., 2.12 chs.At end of course, auxiliary meander cor. No. 2, and the point of beginning.
	From auxiliary meander cor. No. 3, at the northernmost point of an unnamed lake, at the line of ordinary high water; not monumented due to the liability of destruction by ice and water action.
	From this point, the stan. cor. of secs. 34 and 35, on the S. bdy. of the Tp. bears S. 14°18'28" W., 84.33 chs. dist., hereinbefore described.
	Thence clockwise with the meanders of the bank of the unnamed lake, at the line of ordinary high water.
	S. 65°48' E., 0.38 chs.
	S. 53°13' E., 3.75 chs.
	S. 58°56' E., 3.85 chs.
	S. 73°02' E., 4.99 chs.
	S. 88°42' E., 2.56 chs.
	N. 75°16' E., 1.44 chs.
	N. 48°47' E., 1.40 chs.
	N. 61°00' E., 0.88 chs.
	N. 75°12' E., 2.00 chs.
	S. 86°25' E., 1.59 chs.
	S. 60°01' E., 0.67 chs.
	S. 36°10' E., 0.71 chs.
	S. 20°00' E., 0.72 chs.
	S. 25°47' E., 2.31 chs.
	S. 18°13' E., 2.65 chs.
	S. 1°20' W., 2.59 chs.
	S. 21°55' E., 4.81 chs.
	S. 2°57' E., 3.04 chs.
	S. 6°53' E., 1.27 chs.
	S. 21°17' E., 1.48 chs.
	S. 2°33' E., 0.63 chs.
	S. 18°00' W., 0.64 chs.
	S. 29°05' W., 5.63 chs.
	S. 4°28' E., 0.35 chs.

						Mear	nders		
т.	9	Ν.,	R.	4	W.,	Copper	River	Meridian,	Alaska

Chains	
	S. 58°46' E., 0.22 chs.
	N. 66°34' E., 1.03 chs.
	N. 30°44' E., 2.40 chs.
	N. 81°59' E., 0.53 chs.
	S. 48°24' E., 0.61 chs.
	S. 9°46' E., 0.63 chs.
	S. 19°24' W., 0.67 chs.
	S. 38°06' W., 2.24 chs.
	S. 34°47' W., 1.63 chs.
	S. 20°17' W., 1.67 chs.
	S. 36°24' W., 0.72 chs.
	S. 54°32' W., 1.43 chs.
	S. 20°43' W., 1.01 chs.
	S. 59°21' W., 0.89 chs.
	N. 67°40' W., 0.39 chs.
	N. 38°45' W., 2.44 chs.
	N. 65°12' W., 0.67 chs.
	N. 85°37' W., 0.74 chs.
	S. 75°29' W., 0.75 chs.
	S. 48°03' W., 0.71 chs.
	S. 30°17' W., 0.75 chs.
	S. 20°44' W., 2.26 chs.
	S. 27°03' W., 2.89 chs.
	S. 44°00' W., 1.90 chs.
	S. 17°56' W., 1.19 chs.
	S. 1°06' W., 3.03 chs.
	S. 15°58' E., 2.52 chs.
	S. 0°43' W., 1.51 chs.
	S. 25°31' W., 1.81 chs.
	S. 35°49' W., 4.22 chs.
	S. 47°44' W., 2.36 chs.
	S. 33°47' W., 1.26 chs.
	S. 63°32' W., 2.55 chs.
	S. 47°14' W., 1.39 chs.
	S. 80°53' W., 1.67 chs.
	N. 87°59' W., 1.71 chs.
	S. 66°05' W., 4.45 chs.
	S. 78°15' W., 2.96 chs.
	S. 62°33' W., 0.97 chs.
	S. 77°50' W., 1.92 chs.
	N. 83°49' W., 1.24 chs.
	N. 66°52' W., 1.96 chs.
	N. 44°24' W., 2.14 chs.
	N. 24°46' W., 1.94 chs.
	N. 16°21' W., 4.26 chs.
	N. 14°01' W., 6.53 chs.
	N. 7°42' W., 3.02 chs.
	N. 3°25' E., 8.38 chs.

Chaina	
Chains	N. 21°28' E., 1.48 chs.
	N. 35°36' E., 2.39 chs.
	N. 53°07' E., 2.22 chs.
	N. 48°04' E., 2.92 chs.
	N. 73°17' E., 0.69 chs.
	S. 79°27' E., 0.62 chs.
	S. 61°00' E., 0.68 chs.
	S. 42°30' E., 0.70 chs.
	S. 26°25' E., 2.39 chs.
	S. 38°21' E., 2.05 chs.
	S. 27°01' E., 4.20 chs.
	S. 52°03' E., 0.69 chs.
	S. 81°36' E., 0.80 chs.
	N. 71°36' E., 0.79 chs.
	N. 44°20' E., 3.21 chs.
	N. 31°19' E., 1.60 chs.
	N. 2°57' E., 4.25 chs.
	N. 8°25' E., 3.50 chs.
	N. 2°26' W., 5.57 chs.
	N. 11°52' E., 1.54 chs.
	N. 10°17' E., 2.96 chs.
	N. 3°41' E., 3.07 chs.
	N. 9°00' W., 6.05 chs.
	N. 2°28' W., 3.73 chs.
	N. 19°38' W., 0.89 chs.
	N. 33°10' W., 2.57 chs.
	N. $0^{\circ}07'$ W., 0.54 chs.
	N. 36 ³ 39' E., 0.48 cns.
	N. /1-30' E., 0.39 Chs. At end of course, auxiliary meander cor No 3
	and the
	point of beginning.
	From auxiliary meander cor. No. 4, at the southernmost point of an unnamed lake, at the line of ordinary high water; not monumented due to the liability of destruction by ice and water action.
	From this point, the witness cor. to the meander cor. of sec. 33, on the S. bdy. of the Tp. bears S. 29°00' W., 25.84 chs. dist., hereinbefore described.
	Thence clockwise with the meanders of the bank of the unnamed lake, at the line of ordinary high water.
	N. 84°27' E., 2.01 chs.
	N. 72°23' E., 0.97 chs.
	N. 55°20' E., 2.16 chs.
	N. 65°38' E., 3.62 chs.
	N. 51°03' E., 6.79 chs.

Meanders T. 9 N., R. 4 W., Copper River Meridian, Alaska

Meanders											
	т.	9	Ν.,	R.	4	W.,	Copper	River	Meridian,	Alaska	

Chains	
	N. 59°06' E., 1.69 chs.
	N. 42°09' E., 0.87 chs.
	N. 22°14' E., 1.49 chs.
	N. 10°17' E., 1.54 chs.
	N. 25°54' E., 3.13 chs.
	N. 11°49' E., 0.67 chs.
	N. 12°56' W., 2.07 chs.
	N. 27°32' W., 4.40 chs.
	N. 18°31' W., 1.74 chs.
	N. 8°16' W., 2.70 chs.
	N. 7°08' E., 1.31 chs.
	N. 29°31' E., 2.56 chs.
	N. 38°56' E., 3.67 chs.
	N. 27°32' E., 5.70 chs.
	N. 35°33' E., 1.03 chs.
	N. 49°40' E., 1.87 chs.
	N. 66°36' E., 0.56 chs.
	S. 46°45' E., 0.53 chs.
	S. 10°44' W., 0.71 chs.
	S. 50°12' W., 2.03 chs.
	S. 37°11' W., 1.06 chs.
	S. 14°50' W., 2.19 chs.
	S. 24°49' W., 3.06 chs.
	S. 50°17' W., 1.72 chs.
	S. 69°33' W., 0.97 chs.
	S. 46°03' W., 2.17 chs.
	S. 33°27' W., 1.11 chs.
	S. 16°45' W., 1.07 chs.
	S. 2°07' E., 1.06 chs.
	S. 21°15' E., 1.90 chs.
	S. 36°57' E., 2.17 chs.
	N. 87°15' E., 0.38 chs.
	N. 31°43' E., 0.37 chs.
	N. 3°10' W., 4.18 chs.
	N. 25°28' E., 2.44 chs.
	N. 38°05' E., 2.10 chs.
	N. 59°16' E., 1.82 chs.
	N. 38°15' E., 0.93 chs.
	N. 24°55' E., 1.06 chs.
	N. 16°35' E., 2.19 chs.
	N. 58°10' E., 4.06 chs.
	N. 67°55' E., 0.89 chs.
	N. 37°34' E., 0.87 chs.
	N. 14°20' E., 1.81 chs.
	N. 1°03' W., 1.35 chs.
	N. 34°30' E., 0.94 chs.
	N. 60°08' E., 0.55 chs.
	N. 37°16' E., 0.68 chs.

Chains		
	N. 5°04' W.,	2.11 chs.
	N. 29°48' W.,	1.37 chs.
	N. 53°32' W.,	1.47 chs.
	N. 70°00' W.,	2.84 chs.
	N. 55°52' W.,	1.53 chs.
	N. 41°41' W.,	3.13 chs.
	N. 29°09' W.,	2.29 chs.
	N. 18°18' W.,	5.66 chs.
	N. 74°11' W.,	3.24 chs.
	N. 53°53' W.,	2.59 chs.
	N. 75°15' W.,	1.87 chs.
	N. 83°00' W.,	3.09 chs.
	N. 73°40' W.,	2.05 chs.
	N. 87°18' W.,	0.77 chs.
	S. 65°24' W.,	0.56 chs.
	S. 41°41' W.,	3.80 chs.
	s. 62°21' W.,	3.45 chs.
	s. 62°15' W.,	2.77 chs.
	s. 41°00' W.,	2.72 chs.
	s. 21°15' W.,	1.21 chs.
	S. 8°26' E.,	0.54 chs.
	S. 36°04' E.,	0.43 chs.
	S. 89°00' E.,	0.36 chs.
	N. 62°14' E.,	1.31 chs.
	S. 51°03' E.,	0.22 chs.
	S. 36°20' W.,	0.70 cns.
	S. 58 ⁻ 1/' W.,	2.24 CDS.
	S. 44 14' W.,	1.26 ChS.
	5. 24 33' W.,	1.55 ChS.
	S. 1024 W.,	4.42 CHS.
	S. 3020 W.,	$\begin{array}{c} 1.10 \text{ chs} \\ 2.24 \text{ chs} \end{array}$
	S. 4037 W.,	1.01 chs
	S. 2000 W.,	1.07 chs
	S 7°48' E	0.95 chs
	S. 29°34' E.	1.57 chs.
	s. 20°32' W.,	1.81 chs.
	S. 10°24' E.,	0.96 chs.
	S. 23°52' E.,	1.91 chs.
	s. 2°20' W.,	0.61 chs.
	s. 44°34' W.,	0.18 chs.
	s. 86°23' W.,	2.32 chs.
	s. 78°54' W.,	1.30 chs.
	S. 53°02' W.,	1.48 chs.
	S. 36°15' W.,	0.64 chs.
	S. 14°25' W.,	0.74 chs.
	S. 7°22' E.,	1.64 chs.
	S. 10°36' E.,	1.65 chs.

Meanders T. 9 N., R. 4 W., Copper River Meridian, Alaska

Chains								
	s.	3°27'	W.,	5.52	chs.			
	s.	7°18'	E.,	1.01	chs.			
	s.	21°13'	E.,	5.69	chs.			
	s.	28°27'	Ε.,	2.06	chs.			
	s.	67°27'	Ε.,	0.53	chs.			
	Ν.	48°43'	Ε.,	0.49	chs.			
	Ν.	7°33'	Ε.,	0.57	chs.			
	Ν.	18°23'	W.,	1.32	chs.			
	Ν.	29°57'	W.,	0.52	chs.			
	Ν.	8°12'	Ε.,	0.31	chs.			
	s.	78°29'	Ε.,	0.36	chs.			
	s.	42°13'	Ε.,	0.81	chs.			
	Ν.	72°50'	Ε.,	0.18	chs.			
	Ν.	9°36'	W.,	1.73	chs.			
	Ν.	13°43'	W.,	4.11	chs.			
	Ν.	66°39'	Ε.,	0.27	chs.			
	s.	35°13'	Ε.,	0.38	chs.			
	s.	12°51'	Ε.,	7.38	chs.			
	s.	5°23'	Ε.,	0.56	chs.			
	s.	62°40'	W.,	1.47	chs.			
	s.	3°30'	Ε.,	2.27	chs.			
	s.	12°37'	E.,	0.70	chs.			
	s.	39°48'	E.,	0.68	chs.			
	s.	59°18'	Ε.,	1.85	chs.			
	s.	74°23'	E.,	1.84	chs.			
	s.	57°13'	E.,	1.71	chs.			
	s.	53°39'	E.,	4.15	chs.			
	s.	25°56'	E.,	0.31	chs.			
	s.	28°24'	W.,	0.90	chs.			
	s.	86°57'	W.,	1.03	chs.			
	s.	61°38'	W.,	0.32	chs.			
	s.	8°48'	E.,	0.59	chs.			
	s.	39°32'	E.,	1.97	chs.			
	s.	56°06'	E.,	1.05	chs.			
	s.	80°57'	E.,	1.97	chs.		At	end of course, auxiliary meander cor. No. 4,
			ana	ciie				point of beginning.
								Tract C
	₽ ~	om the		- * **	oonder		ract	C at the coutherrandst
	point of an unnamed island, in an unnamed lake, at the line of ordinary high water; not monumented due to the liability of destruction by ice and water action.							
	From this point, the witness cor. to the meander cor. of sec. 32, on the S. bdy. of the Tp. bears S. 57°33' W., 24.41 chs. dist., hereinbefore described.							

Meanders T. 9 N., R. 4 W., Copper River Meridian, Alaska

Chains Thence clockwise with the meanders of the bank of an unnamed island, at the line of ordinary high water. 2.15 chs. N. 66°13' E., 0.61 chs. N. 27°08' E., N. 32°27' E., 1.38 chs. 0.63 chs. S. 80°00' W., S. 28°09' W., 0.94 chs. 1.45 chs. S. 45°58' W., 0.81 chs. S. 85°22' W., S. 88°20' W., 0.71 chs. 0.47 chs. S. 6°00' W., S. 83°05' E., 0.68 chs. At end of course, the auxiliary meander cor., Tract C, and the point of beginning. Tract D From the auxiliary meander cor., Tract D, at the southernmost point of an unnamed island, in an unnamed lake, at the line of ordinary high water; not monumented due to the liability of destruction by ice and water action. From this point, the witness cor. to the meander cor. of sec. 33, on the S. bdy. of the Tp. bears S. 68°16' E., 22.01 chs. dist., hereinbefore described. Thence clockwise with the meanders of the bank of an unnamed island, at the line of ordinary high water. N. 15°31' W., 1.44 chs. N. 77°32' W., 1.63 chs. 0.69 chs. N. 81°30' W., S. 42°50' E., 0.99 chs. S. 76°13' E., 1.05 chs. S. 2°58' E., 0.32 chs. S. 69°24' W., 0.52 chs. 0.30 chs. S. 18°45' E., S. 86°31' E., 1.34 chs. At end of course, the auxiliary meander cor., Tract D, and the point of beginning.

Chains	
	General Description
	This survey is situated approximately 86 miles southwesterly from Paxson, Alaska.
	The land is gentle rolling mountains, supporting spruce, birch with undergrowth of willow and alder. The elevation varies from approximately 2000 to 2500 ft. above sea level.
	The soil varies from loam and gravel to rocky.
	Access to the survey was by helicopter.

UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT

FIELD ASSISTANTS

NAMES	CAPACITY
Michael W. Beale	Land Surveyor
Joseph P. Burns	Land Surveyor
Craig S. Dukart	Land Surveyor
Kurt D. Huhta	Land Surveyor
Matthew J. Kurchinski	Land Surveyor
Erik K. Lee	Land Surveyor
Gary L. McIntyre	Land Surveyor
Paul L. Moss	Land Surveyor
Peter R. Nanok	Land Surveyor
Mark D. Wahfield	Land Surveyor
Christopher D. Wiita	Land Surveyor
Amanda J. Allred	Student Trainee (LS)
Samuel R. Morris	Student Trainee (LS)
Emily J. Davenport	Surveying Technician
Christopher M. Jones	Surveying Technician
Samuel W. Naramore	Surveying Technician
Evan G. Bobby	Surveying Aid
Nathan J. Rathbun	Materials Handler
Barry S. Guim	Cartographer
Amy S. Moss	Volunteer
Michael W. Beale	Land Surveyor
Joseph P. Burns	Land Surveyor
Craig S. Dukart	Land Surveyor
Kurt D. Huhta	Land Surveyor

CERTIFICATE OF SURVEY

I, John A. Pex, Cadastral Surveyor, HEREBY CERTIFY upon honor that, in pursuance of Special Instructions bearing date of the 30th day of May, 2010, I have dependently resurveyed a portion of U.S. Survey No. 5229, and surveyed the Second Standard Parallel North along the south boundary of Township 9 North, through Range 4 West, the First Guide Meridian West, through Township 9 North, between Ranges 4 and 5 West, a portion of the east boundary, a portion of the subdivisional lines, a portion of the subdivision of section lines of section 12 and a portion of the meanders of Township 9 North, Range 4 West, of the Copper River Meridian, in the State of Alaska, which is represented in the foregoing field notes as having been executed by me and under my direction; and that said survey has been made in strict conformity with said special instructions, the Manual of Instructions for the Survey of the Public Lands of the United States, and in the specific manner described in the foregoing field notes.

(Date)

(Cadastral Surveyor)

CERTIFICATE OF APPROVAL

BUREAU OF LAND MANAGEMENT Anchorage, Alaska

The foregoing field notes of the dependent resurvey of a portion of U.S. Survey No. 5229, and the survey of the Second Standard Parallel North along the south boundary of Township 9 North, through Range 4 West, the First Guide Meridian West, through Township 9 North, between Ranges 4 and 5 West, a portion of the east boundary, a portion of the subdivisional lines, a portion of the subdivision of section lines of section 12 and a portion of the meanders of Township 9 North, Range 4 West, Copper River Meridian, Alaska, executed by John A. Pex, Cadastral Surveyor, having been critically examined and found correct, are hereby approved.

(Date)

(Chief Cadastral Surveyor for Alaska)

CERTIFICATE OF TRANSCRIPT

BUREAU OF LAND MANAGEMENT Anchorage, Alaska

I CERTIFY That the foregoing transcript of the field notes of the above described surveys in Township 9 North, Range 4 West, Copper River Meridian, Alaska, is a true copy of the original field notes.

(Date)

(Chief Cadastral Surveyor for Alaska)



ORIGINAL

UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT

FIELD NOTES OF THE DEPENDENT RESURVEY OF A PORTION OF U.S. SURVEY NO. 5229 AND THE SURVEY OF THE SECOND STANDARD PARALLEL NORTH ALONG THE SOUTH BOUNDARY OF TOWNSHIP 9 NORTH, THROUGH RANGE 4 WEST THE FIRST GUIDE MERIDIAN WEST, THROUGH TOWNSHIP 9 NORTH, BETWEEN RANGES 4 AND 5 WEST, A PORTION OF THE EAST BOUNDARY, A PORTION OF THE SUBDIVISIONAL LINES, A PORTION OF THE SUBDIVISION OF SECTION LINES OF SECTION 12 AND A PORTION OF THE MEANDERS OF TOWNSHIP 9 NORTH, RANGE 4 WEST OF THE COPPER RIVER MERIDIAN IN THE STATE OF ALASKA

> EXECUTED BY John A. Pex, Cadastral Surveyor

Under Special Instructions dated May 30, 2010, approved June 4, 2010, and Supplemental Special Instructions dated June 22, 2010, approved June 27, 2010, which provided for the surveys included under Group No. 781, Alaska, and assignment instructions dated June 4, 2010.

> Survey commenced: June 4, 2010 Survey completed: August 15, 2010