

Evaluation of Corner Evidence

Monte L. King
Supervisory Land Surveyor
Idaho Cadastral Survey
1387 S. Vinnell Way
Boise, Idaho 83709
(208) 373-3984

mking@blm.gov

Alabama & Idaho PLS

&

Bradley Dillon

Cadastral Surveyor



Credit for much of the content to Kenneth D. Roy,
BLM Indian Lands Surveyor, Eastern States Cadastral Survey/BIA Midwest Region



Objectives

- ▶ Reinforce some principles that will assist you in evaluating evidence for its ability to serve as proof of a corner point, and to help you determine:
 - What is the best evidence of a corner point?
 - How much evidence is enough?
- ▶ After evaluating the available evidence at a corner point, according to the principles of evidence for your geographic area, you should be able to determine whether a corner point should be classified as **existent**, **obliterated**, or **lost**, and understand how and why these terms are used.

Objectives (cont.)

- ▶ When the original monument and its accessories are gone, you should consider all means for ascertaining the location of the corner point by knowing and applying all elements of collateral evidence that should be evaluated for their ability to serve as proof of the corner point, before determining that the corner point is “lost.”
- ▶ You should be able to prepare corner descriptions and/or field notes that more thoroughly describe and document all the elements of evidence you found and utilized to determine the corner point, and which demonstrate your reason(s) for weighting and/or rejecting conflicting evidence.

Idaho Corner Perpetuation & Filing – Declaration of Policy ID Code § 55-1602 (2021)

It is the purpose of this chapter to protect and perpetuate public land survey corners and information concerning the location of such corners by requiring the systematic establishment of monuments and filing of information concerning the marking of the location of such public land survey corners and to allow the systematic location of other property corners, thereby providing for property security and a coherent system of property location and identification; and thereby eliminating the repeated necessity for reestablishment and relocations of such corners once they are established and located.

Idaho Recording of Surveys – Contents ID Code § 55-1906 (2021)

The records of survey shall, at a minimum, show:

.....

(6) Surveyor's narrative. The narrative must explain:

(a) The purpose of the survey and how the boundary lines and other lines were established or reestablished and the reasoning behind the decisions;

(b) Which deed records, deed elements, survey records, found survey monuments, plat records, road records, or other pertinent data were controlling when establishing or reestablishing the lines; and

(c) For surveys that contain a vertical component, the narrative shall show the benchmarks used, the vertical datum referenced, and the methodology used to achieve the elevations.

SURVEYS MUST CONFORM TO UNITED STATES MANUAL ID Code § 31-2709 (2021)

No surveys or resurveys hereafter made shall be considered legal evidence in any court within the state, except such surveys as are made in accordance with the United States manual of surveying instructions, the circular on restoration of lost or obliterated corners and subdivisions of sections, issued by the general land office, or by the authority of the United States, the state of Idaho, or by mutual consent of the parties.

Manual of Surveying Instructions 1-29

General Rules

1. That the boundaries and subdivisions of the public lands as surveyed under approved instructions by the duly appointed surveyors, the physical evidence of which consists of monuments established on the ground, and the record evidence of which consists of field notes and plats duly approved by the authorities constituted by law, are unchangeable after the passing of title by the United States.
2. That the original township, section, quarter-section, and other monuments as physically evidenced must stand as the true corners of the subdivisions which they were intended to represent and will be given controlling preference over the recorded directions and lengths of lines.
3. That sixteenth-section corners not marked in the process of the original survey shall be placed as nearly as possible on the line connecting the section and quarter-section corners, and midway between them, except on the last half mile of section lines closing on the north and west boundaries of the township, or on other lines between fractional or irregular sections.

Manual of Surveying Instructions 1-29

General Rules

4. That the center lines of a regular section are to be ascertained by running straight lines from the quarter-section corner on one boundary of the section to the corresponding corner on the opposite section line.
5. That in a fractional section where no opposite corresponding quarter-section corner has been or can be fixed, the center line of such section must be run from the proper quarter-section corner as nearly in a cardinal direction to the meander line, reservation, or other boundary of such fractional section, as due parallelism with section lines will permit.
6. That lost or obliterated corners of the approved surveys must be restored to their original locations whenever this is possible.

Manual of Surveying Instructions 5-10

Principles of Resurveys

- ▶ A dependent resurvey is a retracement and reestablishment of the lines of the original survey or prior resurvey in their true original positions according to the best available evidence of the positions of the original corners.
 - By Definition protects Bona Fide Rights. (*126 IBLA 361 Yeargan*)
- ▶ In legal contemplation and in fact, 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.

Manual of Surveying Instructions

Principle of Resurveys

- ▶ 5-25 Bona fide rights are those acquired in good faith under the law.
 - Bona Fide belief concerning a boundary does not always constitute a bona fide right. (*174 IBLA 239 Rylee; 180 IBLA 082 Vestch; 180 IBLA 389 Hillstrom*)

- ▶ 5-26 The question for the surveyor in such cases is whether the claimant made a good faith effort to locate the claimed land on the ground, based on the best available evidence of the survey under which a claim was allowed. Arbitrary location (*with no reliance on one Federal monument*) cannot qualify as a having a bona fide right as to location.

Manual of Surveying Instructions

Exceptions to Rules of Resurveys

► 6-35 & 6-36 Good Faith Locations

- It may be held generally that the claimant, entryman, or owner of lands has located his or her lands by the good faith location rule if such care was used in determining the boundaries as might be expected by the exercise of ordinary intelligence under existing conditions.
- A good faith location is a satisfactory location of a claim or of a local point. It is one in which it is evident that the claimant's interpretation of the record of the original survey as related to the nearest corners existing at the time the lands were located is indicative of such a degree of care and diligence upon their part, or that of their surveyor, in the ascertainment of their boundaries as might be expected for that time and place. This is referred to as the good faith location rule.

Manual of Surveying Instructions

Exceptions to Rules of Resurveys

▶ 3-137 Good Faith Location and Subdivision of Section

- Where the evidence of an extant subdivision-of-section survey indicates
 - ▶ (1) a good faith attempt to relate it to the original controlling survey,
 - ▶ (2) conformance as nearly as possible to legal subdivision principles,
 - ▶ (3) reasonable accuracy standards for that time and place,
 - ▶ (4) sufficiency for identification of the legal subdivisions, and
 - ▶ (5) without fraud or gross error, the statutory intent of stability of boundaries and title to lands will have been met.

Manual of Surveying Instructions

Exceptions to Rules of Resurveys

► 6-41 through 6-44 Satisfactory Local Conditions

- It is not intended to disturb satisfactory local conditions with respect to roads, fences, and other evidence of use or occupancy. The surveyor has no authority to change a property right that has been acquired legally, nor accept the location of roads, fences, and other use or occupancy as prima facie evidence of the original survey. Something is needed in support of these locations. This will come from whatever intervening record there may be, the testimony of individuals who may be acquainted with the facts, and the coupling of these things to the original survey.
- In many cases due care has been exercised to place the property fences and other evidence of use or occupancy on the lines of legal subdivision and locate the public roads on the section or subdivision of section lines. These are matters of particular interest to the adjoining owners, and it is a reasonable presumption that care and good faith would be exercised with regard to the evidence of the original survey in existence at the time. Obviously, the burden of proof to the contrary must be borne by the party claiming differently.
- A property corner or a use or occupancy position should exercise a regular control upon the retracement only when it was placed with due regard to the location of the original survey, or agreement is so close as to constitute the best available evidence.

Manual of Surveying Instructions

Exceptions to Rules of Resurveys

▶ 6-45 through 6-49 Local Points of Control

- Once a local point of control is accepted in an official survey it has all the authority and significance of an original corner. The influence of such points is combined with that of the previously identified original corners in making final adjustments of the temporary points.
- When a local reestablishment of a lost corner has been made by proper methods without gross error, it will ordinarily be acceptable. Monuments of unknown origin must be judged on their own merits, but they should never be rejected out of hand without careful study.
- The age and the degree to which a local corner has been relied on by all affected landowners may lead to its adoption as the best remaining evidence of the position of the original corner. The surveyor must consider all these factors. However, he cannot abandon the record of the original survey in favor of an indiscriminate adoption of points not reconcilable with it.

Resurveyor's Guide

▶ What was the original surveyor suppose to do?

- How can I search for and evaluate corners, reestablish corners unless I know what the original surveyor was suppose to do?
- Where do I find out what the original surveyor was supposed to do?
 - ▶ Special Instructions
 - ▶ Survey orders
 - ▶ Contract or Group files
 - ▶ Federal statute laws
 - ▶ Federal regulations
 - ▶ Survey manuals
 - ▶ Subject matter texts, classroom education, self-study
 - ▶ On-the-ground training
- What Manual was the original surveyor surveying under?
- https://glorerecords.blm.gov/reference/default.aspx?id=05_Appendices|07_Surveying_Manuals
 - ▶ That's the book I want to study and read so I can understand what the original surveyor was supposed to do.

Resurveyor's Guide

▶ What did the original surveyor say he did?

- I know this may be hard to believe, but, believe it or not, it may be different than what he was supposed to do.
- How do I find out what the original surveyor said he did?
 - ▶ Plats and field notes
 - ▶ Contract or Group files
 - ▶ Correspondence associated with the survey project
- There are three parts to an official federal authority survey:
 - ▶ Plats
 - ▶ Field Notes
 - ▶ Contract or Group file
- For every contract let by the GLO and every survey group let by the GLO and later, the BLM, there is a file. They are numbered sequentially, by state. You may need to be able to examine all three parts of the official survey to get the whole picture of what the surveyor said he did; if you don't, you are only getting a part of the story.

Resurveyor's Guide

▶ What did the original surveyor actually do?

- It is the exception to the rule, but, believe it or not, it may be different than what he was supposed to do or what he said he did.
- How do I find out what the original surveyor actually did?
 - ▶ Thorough Retracement
 - ▶ Analyze all records and recovered evidence
 - ▶ Reasonably reconcile all discrepancies
- In some situations, it will be discovered that there is a conflict between what the surveyor said he did and what he actually did. Examples:
 - ▶ Monument dimensions and type of material (*record states wood post but a marked stone is recovered*)
 - ▶ Bearing tree species, distance, bearing, and size

Categories of Corners

- ▶ **Existent:** An existent corner is one whose original position can be identified by substantial evidence of the monument or its accessories, by reference to the description in the field notes, or located by an acceptable supplemental survey record, some physical evidence, or testimony. Manual, Sec. 6-11
- ▶ **Obliterated:** An obliterated corner is an existent corner where, at the corner's original position, there are no remaining traces of the monument or its accessories, but whose position has been perpetuated, or the point for which may be recovered, by substantial evidence from the acts or reliable testimony of the interested landowners, competent surveyors, or other qualified local authorities, or witnesses, or by some acceptable record evidence. Manual, Sec. 6-17
- ▶ **Lost:** A lost corner is one whose original position cannot be determined by substantial evidence, either from traces of the original marks or from acceptable evidence or reliable testimony that bears upon the original position, and whose location can be restored only by reference to one or more interdependent corners. Manual, Sec. 7-2

Evidentiary Standards

- ▶ Beyond a Reasonable Doubt – Highest Legal Standard
- ▶ Clear and Convincing – More likely & highly probable to be true than untrue
- ▶ Preponderance of the Evidence – Just enough evidence to make it more likely than not (*50%*)
- ▶ Substantial Evidence – Reasonable mind might accept as adequate to support a conclusion
- ▶ Scintilla of Evidence – Latin for Spark; Smallest Trace of evidence to support a claim

Interior Board of Land Appeals (IBLA) Cadastral Survey Evidentiary Standards / Burden of Proof

Jacobson & Downer 103 IBLA 83 1988

The proper standard for the Bureau of Land Management to apply in the course of a resurvey is to consider a corner existent (or found) if such a conclusion is supported by substantial evidence. "*Substantial evidence*" is such relevant evidence as a reasonable mind might accept as adequate to support a conclusion.

Peter Paul Groth 99 IBLA 104 1987

A person challenging a resurvey after the official filing of the plat of resurvey has the burden of establishing by a preponderance of evidence that the resurvey was fraudulent or grossly erroneous in regards to the Manual of Surveying Instructions.

Notice of Filing of Official Plat

Federal Register Notice constitutes Notice

Categories of Evidence

Direct original evidence:

- ▶ Field notes of the original survey
- ▶ Monuments and accessories (bearing trees)
- ▶ Original blazed lines
- ▶ Line trees
- ▶ Natural monuments and other features of record

Categories of Evidence

▶ Collateral Evidence

- Any other form of evidence that is in addition to the direct evidence, and which supports or reinforces the location of the original corner. When the primary evidence is missing or destroyed, the other remaining forms of evidence, considered "*collaterally*", may be the best indication of the original corner position.
- Measurements, by revealing relationships to other elements of evidence and the original record, generally play an important role in the decision to utilize collateral evidence to prove a corner point.
- Collateral evidence in surveying might be similar to circumstantial evidence in law – by itself, it may seem insignificant; but an abundance of it could be convincing

Elements of Collateral Evidence

- ▶ Testimony
- ▶ Records
- ▶ Topographic Calls
- ▶ Occupation
- ▶ Measurements

Elements of Collateral Evidence

Testimony of Individuals 6-20

- The testimony of individuals may relate to the original monument or the accessories, prior to their destruction, or to any marks fixing the locus of the original survey. Weight will be given to testimony according to its completeness, its agreement with the original survey, and the steps taken to preserve the original location. Such evidence must be tested and confirmed by relating it to known original corners and other calls of the original field notes...

Testimony of Individuals Should include 6-21

- Name, age, address.
- How long at that address
- When knowledge of the corner position first acquired.
- A photograph including the corner point and the witness, with the date, photographer's signature and the witness signature.
- An actual statement by the witness, which in complete and signed.

Elements of Collateral Evidence

Testimony of Individuals 6-22

- Witness must be duly qualified – information should be first hand, complete, and not *personal opinion*.
 - Testimony should be able to stand appropriate test of its bona fide character, i.e. it is honest, in good faith, genuine, and without fraud.
 - Must be sufficiently accurate for what is required in normal surveying practice.
-
- ▶ Testimony cannot overcome the original monument or its accessories as to the location of the original corner.
 - ▶ Testimony must generally be related to other calls and corners of the original record.
 - ▶ Caution: the witness may mistakenly confuse evidence of a property boundary or unwritten right with evidence of the original survey. The surveyor has to be able to distinguish between the two.

Elements of Collateral Evidence

► Records

- Records created subsequent to the original survey, which purport to document the location of an original corner in some way – such as a perpetuation or ties to other original corners or features. *The record must be authentic in relation to the original notes and plat.*
- Records create a chain of recovery history by documenting the existence and location of a corner at the time the record was created.
- Records document new evidence that is in addition to the original evidence, i.e. a new, more durable monument, or new ties to additional features or accessories, which can then be used to find an original corner point that has been perpetuated.

Elements of Collateral Evidence

▶ Records (cont.)

■ Sources of Records:

- ▶ Private (local) surveyors
- ▶ Appropriate state agencies
- ▶ County Surveyor or County/City Engineer
- ▶ County Clerk and Recorder
- ▶ State and County highway departments
- ▶ Railroads
- ▶ Abstract and Title companies
- ▶ Logging and mining companies
- ▶ Historical societies and libraries
- ▶ Archives (National & Regional Archives – Washington, D.C., Seattle, San Francisco, Denver, Kansas City, Boston)
- ▶ Federal agencies (U.S. Forest Service, Bureau of Land Management, Bureau of Indian Affairs, U.S. Geological Survey, National Park Service, Bureau of Reclamation, National Geodetic Survey, U.S. Fish & Wildlife Service, Army Corps of Engineers)

Elements of Collateral Evidence

▶ Topographic Calls 6-23

- The proper use of topographic calls of the original field notes may assist in recovering the locus of the original survey. Such evidence may merely disprove other questionable features or be a valuable guide in arriving at the immediate vicinity of a line or corner. At best a topographic call or calls can verify or disprove questionable evidence of the original monument or its accessories. In rare cases, they may serve as substantial evidence to fix the position of a point, line or corner.

▶ Topographic Calls 6-24

- 6-24 It should be remembered that the position of items of topography in the interior of sections, as shown upon the plats of the public land surveys, has been almost invariably based upon estimates by the surveyor, rather than upon actual measurements thereto, and at best represents only an approximation of the actual position of the topography. It is ordinarily only the distances at which sections lines intersect various items of topography that are actually measured on the ground.

Elements of Collateral Evidence

- ▶ Topographic Calls 6-25
- ▶ These facts have sometimes caused distrust and virtual avoidance of the use of topography in corner point verification or restoration where proper application might be extremely helpful. Misapplication usually may be avoided by applying the following tests:
 - ▶ The determination should result in a definite locus within a small area;
 - ▶ The evidence should not be susceptible of more than one reasonable interpretation
 - ▶ The corner locus should not be contradicted by evidence of a higher class or by other topographic notes

Elements of Collateral Evidence

► Topographic Calls – Cautions:

- Topographic calls may have been made on the random line rather than the true line between corners.
- Generally, if the restoration of a corner is dependent upon items of topography alone, and appears to be questionable – don't use it!!
- Checks should be made to determine whether the results of restoring a corner from topographic calls are harmoniously related to the original and subsequent surveys.
- Note the precision with which the calls were originally recorded – nearest whole chain or half chain?
- Distinct vs. indistinct features, i.e. "Enter swamp/marsh" – location could fluctuate and be subject to more than one interpretation; while "A rock ledge" location is generally stationary.
- Must be in the same location as at the time of the original survey – rivers move, earthquakes change shoreline locations, i.e. Alaska.

Elements of Collateral Evidence

► Occupation

- Occupation, especially when long continued, MAY afford satisfactory evidence of the original boundary, when no other evidence is attainable. The presumption could be that the occupation evidence was constructed upon some information or assumed knowledge of the actual line. The surveyor should inquire when the evidence of occupation (*fence, tree line, hedgerow, field, etc.*) originated.
- Unless it can be proven otherwise, and lacking evidence of a higher order, occupation evidence which could have originated when the original corners still existed should be considered as *possible* evidence of the location of the original corners that have become obliterated or lost. *This evidence should be accepted only when it can be reasonably reconciled with the original record and other evidence of the original survey.*

Elements of Collateral Evidence

► Occupation (cont.)

- Caution: It is often the case that occupation evidence was placed for convenience and does not conform to the original survey lines (*i.e. fences may have only been approximated*).
- A challenge to the surveyor is to distinguish when occupation is merely evidence of a potential unwritten right (*i.e. adverse possession*) versus evidence of the original survey (*title*) line.
- Curtis M. Brown (*Fence Lines and Written Title Lines, 1972*) states:
 - “Land lawfully gained by unwritten means extinguishes the old written title, but does not alter the position of the original survey lines. Therefore, title lines and survey lines do not always coincide.”

Elements of Collateral Evidence

► Measurements

- Specialty of the surveyor, and knowledge of their use as evidence is as important as making and analyzing them. In ranking conflicting evidence for boundary determination, the courts have generally relegated measurements below more tangible elements such as monuments.
- However, surveyors commonly use measurements to assist in proving the validity of collateral evidence at a corner point by its relationship to other original corners. Measurements are evidence that can be used to determine a corner is obliterated rather than lost. They are the method of “linking” (*tying*) the “footsteps” (*collateral evidence*) of the original surveyor.

Elements of Collateral Evidence

► Measurements (cont.)

- Help to identify the relationship of all record calls and corners of the original record, as well as elements of any subsequent record. They demonstrate good vs poor relationships when evaluating conflicting evidence.
- Show characteristics and “trends” of the original survey and facilitate the development of patterns and “indexes”.
- Enable the development of trial proportions, i.e. one, two, three, and four point control solutions.

A position based on collateral evidence should be duly supported, generally through proper relationship (*harmoniously related*) to known corners, and in agreement with the field notes regarding distances to natural objects, stream crossings, line trees and off-line tree blazes, or unquestionable testimony, etc.

Elements of Collateral Evidence

► Measurements (cont.)

- Caution: Although technology makes it simpler to “create” a mathematical position for a corner point, than to search and evaluate physical evidence, evidence of measurement is incompetent to prove an original monument in error. When called for in a deed, evidence must prove where the monument was as of the date of the deed, not where the measurement says it ought to have been set.
- GPS/GNSS is great technology; however, it is but another measurement tool, and coordinates are measurement derivatives. GPS/GNSS does *not* find monuments, evaluate evidence, or make any survey decision. It does not enlarge or change legal boundary principle.

Retracing Original Surveys

- ▶ The first step in retracing original surveys is to find authentic original corners.
- ▶ Trial calculation is made for missing corners and a search is made for evidence of the original survey.
- ▶ If additional evidence is found, a new trial calculation is made followed by a more exhaustive search for more obscure evidence.

Retracing Original Surveys

- ▶ Physical evidence of original corners is disappearing; and in many regions of the country, it is gone. In these areas the recovery of original corner positions depends mostly upon corner perpetuation records.
- ▶ For this reason, it is imperative that a search is made for all pertinent records that conceivably may contain some corner information.

Original Survey Without Error

- ▶ A surveyor who locates the township and section lines or block and lot lines in a subdivision, is an original surveyor.
- ▶ Once an original survey is approved and titles have passed on the basis of it, it is deemed to be without error.
- ▶ This is the rule announced in the Act of February 11, 1805. The boundaries as run and marked will control.

Original Surveying Instructions Important When Retracing

- ▶ Surveying Instructions are crucial to understanding the original survey. A retracing surveyor should be familiar with the instructions that were applicable when that survey was made.
- ▶ The presumption is that the surveys were conducted according to the instructions unless it can be proven otherwise.
- ▶ There are differences in methods of subdividing townships especially in instructions issued before 1850. Knowledge of the method employed may aid in corner discovery.

Running Random And True Lines When Dividing Townships into Sections

- ▶ A random line is a survey line that is run from a fixed corner in the direction of another fixed corner which it may or may not intersect.
- ▶ A true line is a direct line between established corners of the rectangular survey.
- ▶ Since neither the distance nor the direction to the objective corner is known until it is reached, a random line is not blazed, but stakes are set at five or ten chain intervals and a temporary quarter section corner is set at the end of 40 chains.

Random Line Intersections (*Fallings*)

- ▶ If the random line happens to intersect the objective corner at 80 chains, the random line is blazed as a true line and the temporary quarter corner is made permanent.
- ▶ If the random line does not strike the objective corner intersecting North, South, East or West of it, the distance "**falling**" to the objective corner is measured.

Offsets From Random To True Line

- ▶ Proportional offsets are made from the stakes on the random line to the true line which is then blazed and marked. This means that if the falling was 100 links, the offset at mid-point would be 50 links.
- ▶ If the distance to the intersection exceeds or falls short of 80 chains the temporary quarter section is moved to a mid point position on the true line between the established corners.

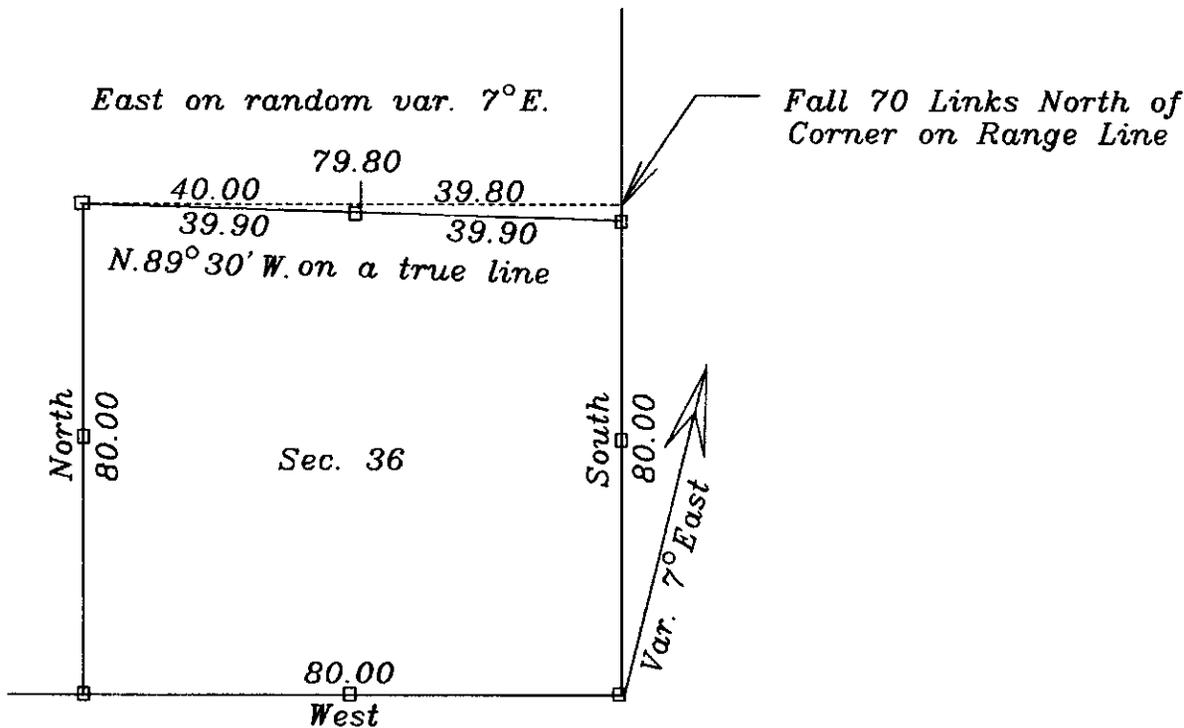
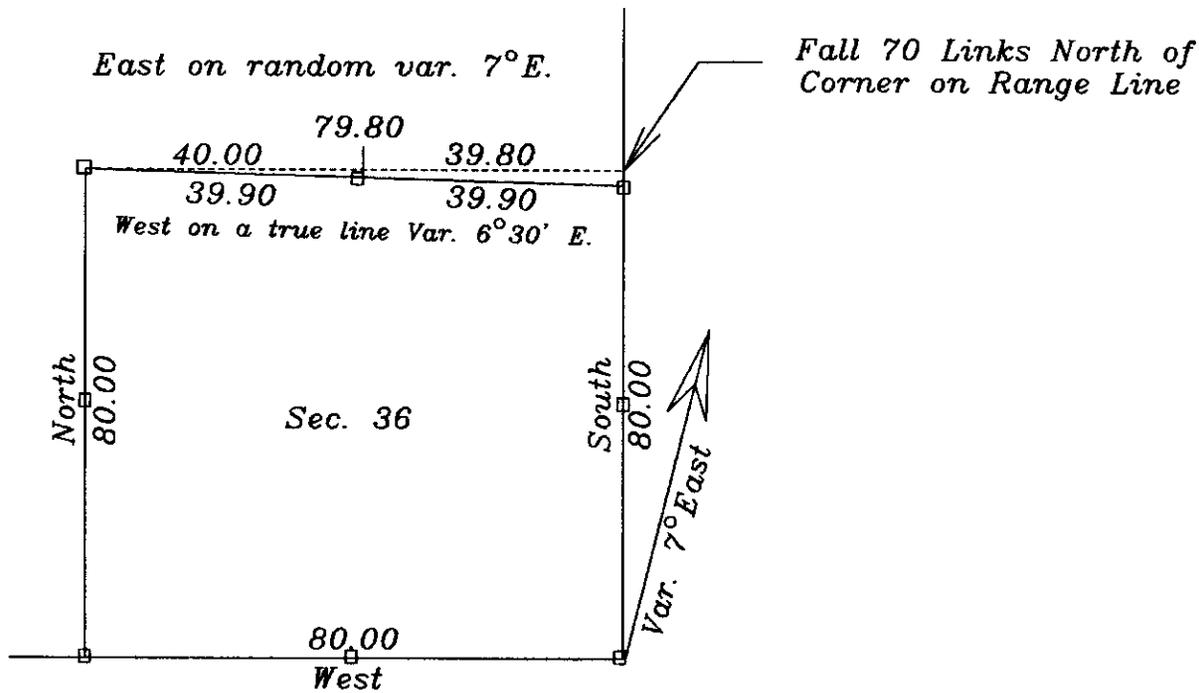
Random & True Line

Know the tricks of the trade:

3/7ths of the falling in links is the required change in bearing in minutes.

$$\frac{70}{1} \cdot \frac{3}{7} = \frac{210}{7} = 30'$$

This type of knowledge can help explain discrepancies found in the record.



Prior To 1864 Variation Adjusted Instead Of The Bearing Of East-West Lines

- ▶ With reference to figure 32 it will be seen that in one case, the true line direction is called West and the variation of the compass was altered to compensate for the falling.
- ▶ In the other case, it shows that the true bearing of the line is reported and the variation of the compass is not changed.
- ▶ The former practice was directed to be discontinued in the **1864** Instructions of the General Land Office.

Setting Corners and Marking Bearing Trees

- ▶ Corner monumentation and marking bearing trees to preserve the corner point were the most important tasks of the surveyors.
- ▶ Corners were monumented with wooden posts, rocks, pits and mounds of certain minimum dimensions.
- ▶ Post and bearing trees were marked as directed by law with a timber scribe, and rocks were notched or scribed with a chisel.
- ▶ One bearing tree was to be taken in each section; four at section corners; two at quarter-section corners, closing corners and meander corners.
- ▶ In the southern public land states these directions were not strictly adhered to.

Accessories

- ▶ Bearing trees are accessories to the corner and are considered a part of the monument of the corner point.
- ▶ If one bearing tree or its remains are found and positively identified, the corner point is located at the record bearing and distance from it. The record is presumed correct unless proven otherwise.
- ▶ This rule must not be departed from unless there is overwhelming evidence to the contrary.

Evidence of Bearing Trees

- ▶ If the evidence consists only of a depression identified by a landowner as the stump hole of a bearing tree, a surveyor must determine the corner point from it at record bearing and distance.
- ▶ The surveyor must locate the center of the depression considering the size of the tree when it was marked.
- ▶ If retracements show that the original deputy measured from the face of the tree, the surveyor should consider this when making a record distance measurement from a stump hole.
- ▶ Otherwise, the distance should be taken to the estimated center of the stump hole.

Remains Of Bearing and Line Trees

- ▶ In most of the Public Land States, except in some of the forested regions of the West and in the Lake States, the original bearing trees, line trees, blazed trees, wooden posts and pits and mounds of the original survey have almost totally vanished.
- ▶ The only direct evidence of the bearing trees that may still exist is the stump of the tree or the depression or stump hole where it once stood.
- ▶ The stump hole may contain charcoal or burned-out roots or a resinous tap root as is the case with some southern pines.

Forested Areas of the Western United States

- ▶ In the forested areas of the western United States and occasionally in the Lake States, blazed lines, living bearing trees, and line trees of the original surveys are still evident today.
- ▶ In the Southern, Midwestern and Plain States original bearing trees are a rare find.
- ▶ In swamps, the part of a corner post below the water line may still be found occasionally.
- ▶ In the South, some of the resinous (rich or fat) pine posts or pine knots (the resinous base of pine tree limbs) that were used for original corner monuments still exist, as well as stone monuments wherever they were used in original surveys.

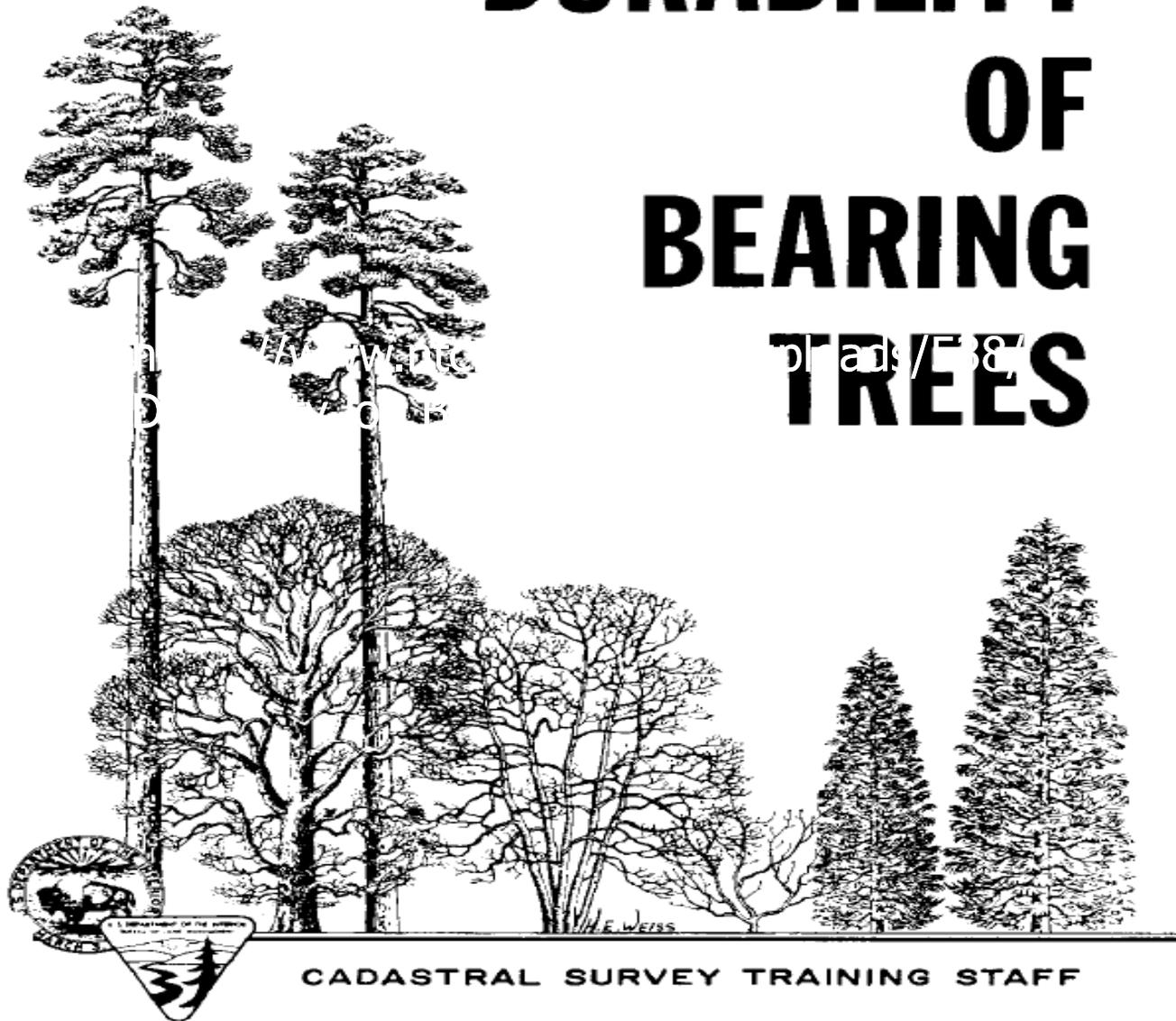
Characteristics of Tree Species

- ▶ The longevity of bearing trees and the presence of a tap root depends upon the tree species.
- ▶ Among the hardwood trees, Hickory forms somewhat of a taproot and the white oak group lives longest.
- ▶ Several of the southern pines, under certain physical conditions, form a huge tap root.
- ▶ Unlike other trees the diameter of a palm tree decreases with age.

Durability of Bearing Trees

https://www.ntc.blm.gov/krc/uploads/538/Durability_of_Bearing_Tree.pdf

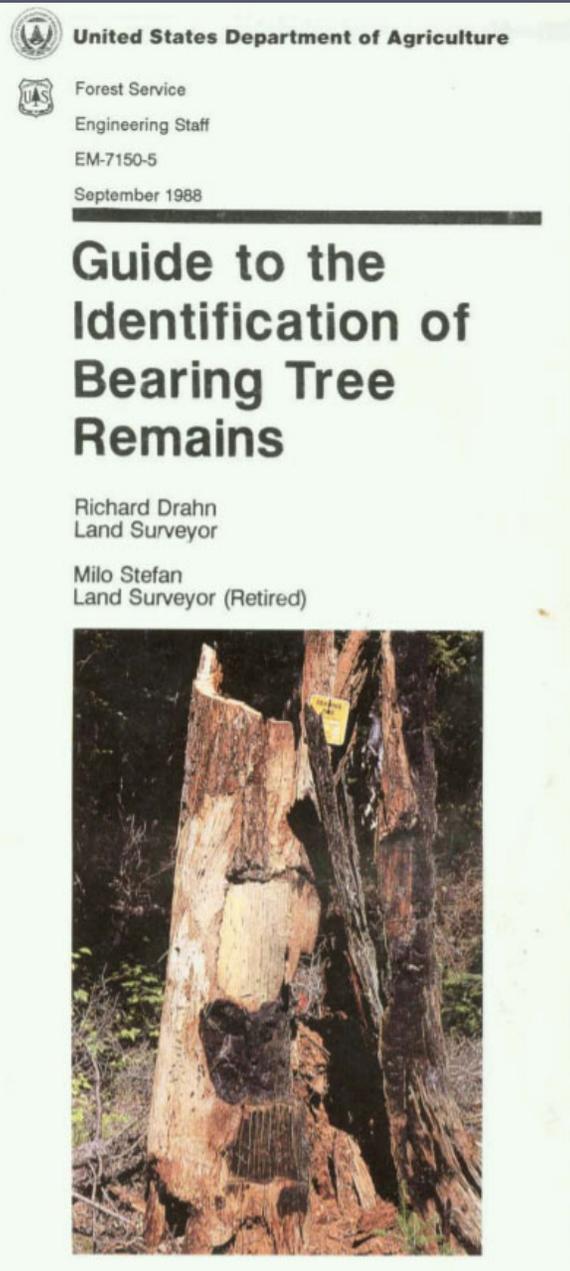
DURABILITY OF BEARING TREES



CADASTRAL SURVEY TRAINING STAFF

Guide to Identification of Bearing Tree Remains

https://www.ntc.blm.gov/krc/uploads/538/Identification_Bearing_Tree.pdf



Superior Bearing Trees

- ▶ Generally speaking, resinous, decay resistant and thick barked fire resistant trees such as some of the pines, redwoods and Douglas Fir are likely to last longest.
- ▶ The resinous stumps and tap roots of softwood trees can last a very long time. For example, a resinous pine corner post set in 1820 was found to be in fair condition in 1987.
- ▶ In the South, the resinous remains of pines are harvested for the production of explosives. Some of the tap roots are so massive that they break off when pulled or dynamited, leaving a portion of the root remaining deep in the ground.

Recovery Analysis of Township No. 3 North, Range No. 7 East,
of the Choctaw Meridian, Mississippi.

Original Survey: October 23, 1832
Dependent Resurvey: February 6, 1948 116 Years

No. of Original Corners: 133
No. of Recovered Original Corners: 39
Recovery Percentage 29%

No. of Original Accessories: 270
No. of Recovered Original Accessories 83
Recovery Percentage: 31 %

| No. of Orig. | Tree Species | No. Fd | Recovery % |
|--------------|--------------|--------|------------|
| 2 | Ash | 0 | 0% |
| 8 | Beech | 3 | 37% |
| 1 | Black Gum | 0 | 0% |
| 19 | Black Jack | 4 | 21% |
| 11 | Black Oak | 1 | 9% |
| 4 | Chesnut | 1 | 25% |
| 1 | Elm | 0 | 0% |
| 21 | Hickory | 2 | 10% |
| 3 | Holly | 1 | 33% |
| 4 | Maple | 0 | 0% |
| 2 | Oak | 1 | 50% |
| 113 | Pine | 56 | 50% |
| 2 | Poplar | 0 | 0% |
| 18 | Post Oak | 4 | 22% |
| 39 | Red Oak | 7 | 18% |
| 3 | Sasafras | 1 | 33% |
| 2 | Sourwood | 1 | 50% |
| 7 | Sweet Gum | 0 | 0% |
| 8 | White Oak | 1 | 13% |
| 2 | Willow Oak | 0 | 0% |

Longevity Of Bearing Trees

White Oaks and Needle Leafed Trees

- ▶ Among the hardwood trees the white oak group is longest lasting.
- ▶ With few exceptions, such as the Sand Pine in Florida and Black Spruce in the Lake States, most all soft wood species (needle bearing) have a good survival record if not disturbed by man.

There Are Always Exceptions

- ▶ Among the living original bearing trees of the original rectangular surveys are:
 - A Black Gum in Alabama, marked in 1820
 - A Tulip Tree in Alabama, marked in 1832
 - A living Black Gum and Red Oak at a 1/4 section corner in Arkansas, scribed in 1843
 - A living Burr Oak at a section corner just West of Chicago, marked in 1834
- ▶ Unless you are surrounded by miles of concrete and blacktop, there is always a chance that a bearing tree or evidence of it withstood the ravages of time and activities of man.

Elements of Bearing Tree Evidence

- ▶ If four bearing trees are marked and recorded at a section corner the following elements must be considered for each tree.
 - The species
 - The diameter
 - The bearing from the corner to the tree
 - The distance from the corner to the tree

Record Elements Compared with Findings

- ▶ For four bearing trees this means that 16 record elements must be compared with the findings on the ground.
- ▶ It is a rare event when all these elements are found to agree precisely with the record.
- ▶ The best a surveyor can hope to do is to intelligently explain any difference between his findings and the record.
- ▶ A surveyors professional judgment is based on experience and understanding of the use of the tools, instructions and methods used by the original surveyors.

Use The Same Tools That Were Used By The Original Surveyor

- ▶ In the search for original bearing trees, it is best to use a quadrant compass rather than an azimuth compass and a measuring tape graduated in chains and links.
- ▶ By doing so, errors in converting record bearings to azimuths and record distances to feet are avoided. Also, mistakes made by original surveyors, such as transpositions mentioned earlier, can be more readily detected.

Transpositions

- ▶ For example, suppose you are checking for evidence of a pine tree 60 inches in diameter at the record distance of 42 links.
- ▶ At the record bearing from a temporary corner point and at 24 links you fall into the center of a massive stump hole and there is nothing at 42 links.
- ▶ The difference between 24 and 42 is 18, which is evenly divisible by nine identifying a transposition.
- ▶ If these distances are converted to feet, 15.84 and 27.72 respectively, the difference is 11.88 which is meaningless and a possible transposition goes undetected.

Mistakes Made Using a Quadrant Compass

- ▶ For instance, a bearing of N. 23° W. may have been read to the right of the 20° mark instead of to the left, and recorded as N. 17° W.
- ▶ Azimuths from North always increase when turned in a clockwise direction.
- ▶ Quadrant bearings, in clockwise rotation increase in the northeast and southwest quadrant and decrease in the southeast and northwest quadrants.
- ▶ Transpositions of bearings by the original surveyor such as a N. 17° W. that was recorded as N. 71° W. are no longer easily spotted when bearings are converted to azimuths and mistakes can be made making conversions.

Tap Roots, Size of Trees and Wind Fall

- ▶ When a bearing tree is gone, it is important to know if it was a species that typically grew a tap root; if so, there is an excellent chance that evidence of it still exists below the surface of the ground.
- ▶ If a bearing tree had a large diameter, a large depression and a mound can sometimes be found at record bearing and distance from a corner position, indicating that the tree probably had been blown over.
- ▶ The roots of the blown-down tree pulled up earth as it fell creating a depression. When the root system decayed, the dirt that clung to the roots was deposited creating a mound of earth on one side of the depression.

Charcoal Remains As Evidence

- ▶ If a tree or stump has been burned out, traces of charcoal can usually be found below the surface of the ground in the place where it once stood. Pine charcoal feels like talc when rubbed between fingers, oak charcoal feels gritty.
- ▶ Charcoal and decayed wood can be identified as to its species by the Forest Products Laboratory of the U.S. Forest Service in Madison, Wisconsin.
<http://www.fpl.fs.fed.us/>

Distance Measurements To Bearing Trees

- ▶ In general surveys made before 1890 could have been measured to the face or to the center of the bearing trees.
- ▶ After that date, typical instructions called for measurements to the middle or center of the tree at the root crown.
- ▶ Therefore, in surveys made prior to 1890, analyzation should occur with the physical measurements to the remains of bearing trees to consider and determine the measurement used in the original survey.

"Record Calls" to Topographic Features

- ▶ The early chaining instructions state that the prescribed chaining process using 11 chaining pins or arrows facilitates the recollection of the distances to objects on the line.
- ▶ The fact that reliance was based on recollection, rather than on the spot recordation of distances, weakens the weight that may be placed on calls of record.
- ▶ There are instances when calls vary five chains or ten chains from the record position. (*Tally error; call associated with the incorrect tally*)

Reliability of Calls of Record

- ▶ The accuracy and reliance on calls must be based on retracements of township surveys made by a given deputy surveyor and his chain carriers.
- ▶ If retracements show close correlation between the record and new measurements to objects on line, more weight can be placed on such calls.
- ▶ In some cases, calls of record to topographical features can be used to restore a corner in its original position when all direct evidence of the monument and its accessories are gone.
- ▶ In other cases, calls may support vague direct evidence such as dim stump holes or bearing trees.

Disturb The Evidence Only When Necessary

- ▶ It is well to remember that the surveyor who is the first to recover an original corner, sees the best evidence that exists at that time.
- ▶ When he disturbs this evidence in any way, by digging or rearrangement of objects that mark the corner point, the evidence will not be so convincing to another surveyor who visits the site afterwards.

Record What You Find

- ▶ Due to the disturbance of evidence, it is very important that all observations and findings be written down and made a part of the official survey record.
- ▶ It is not good enough to show a found original corner as a symbol on a plat of survey and to show it in the legend as a found original corner without any other detail as to its authenticity.

Corner Evidence Interpretation

- ▶ If another surveyor has located a corner from a stump-hole and it appears to have been done according to the rules of survey, it should be accepted. Considering the nature of original surveys, someone can always come up with a slightly different location for a corner point.
- ▶ However, if it appears from the record that such a location was made using questionable methods, which resulted in survey lines in conflict with existing boundary fences, it should be questioned.

Considerations – Corner Evidence Evaluation

- ▶ Was the corner established by a surveyor who was qualified to perform land surveys, according to State regulations?
- ▶ Is the record complete or are there ambiguities which cannot be satisfactorily resolved?
- ▶ How long has the corner been in place and has it been relied upon by local landowners to mark their boundaries?
- ▶ Has the corner been used by other surveyors?
- ▶ Has the corner been used in deeds to convey land?
- ▶ Was the corner established using proper control and proper procedures?
- ▶ Are errors in positioning minor technical errors or gross error?
- ▶ Is the Federal land public domain, re-acquired, re-conveyed?
- ▶ Can you defend your decision if challenged? On what basis?

Analyzing Corner Evidence

- ▶ The field notes give bearings and distances from corners to bearing trees, line trees, topographic and other features. The closer to the corner these items are, the stronger their influence on the original corner position.
- ▶ If an original corner monument or a perpetuation of it is found in place, it marks the corner point.
- ▶ If a monument is absent or uncertainty exists about the corner location, the bearing trees are the next best evidence of the corner position.

Report the Facts

- ▶ Complete descriptions of found and set monuments
(includes witness testimony, if any)
- ▶ Narrative statements about rejected evidence, deviations from the Manual, and why you did what you did!
- ▶ Identification of the areas involved in a possible unwritten right
- ▶ The source of your record data used in boundary determination
- ▶ Leave your opinions out of the facts
- ▶ Demonstrate that you considered other options and why you did not choose them

Extant Subdivision Example



T34NR3E Boise PM Idaho

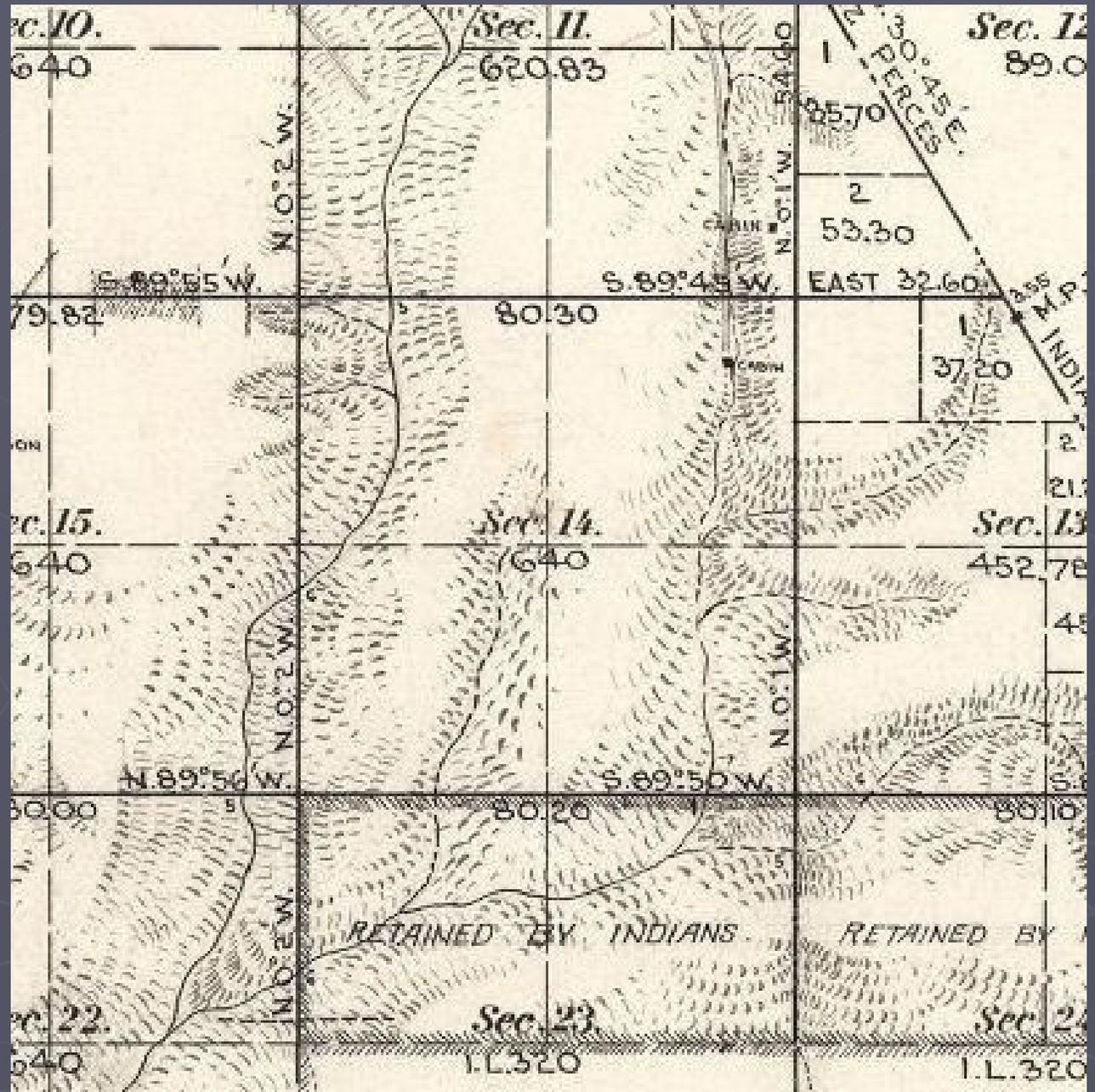
Section 14 – Extant Subdivision

▶ Pertinent records:

- 1898 Original Survey
- County Surveyor – E.C. Spedden PLS No. 73
 - ▶ Sept. 22, 1905, Survey No. 17 - established and monumented the Center 1/4 and the Center West 1/16
 - ▶ Sept. 26, 1905, Survey No. 21 - Survey for a road beginning at Center 1/4 running North to 1/4 section corner then east along section line...
 - ▶ June 14, 1909, Survey No. 102 - established and monumented the East and West 1/16's between sections 14 & 23, the West 1/16 between sections 11 & 14, the North 1/16 between sections 13 & 14, the Center North 1/16, the Center East 1/16, the NE 1/16, and the NW 1/16.
- 2017 Official Dependent Resurvey

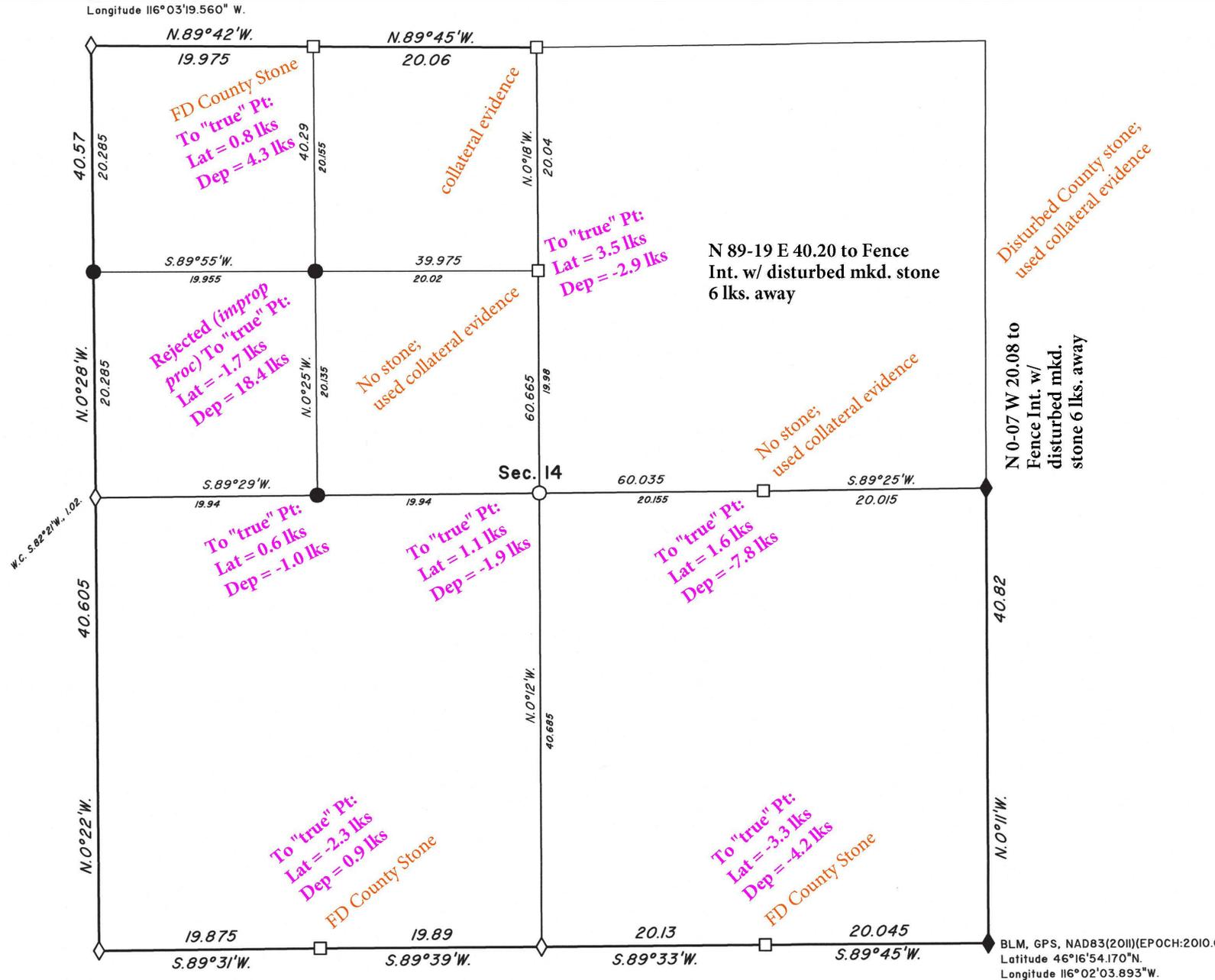
T34NR3E Section 14 cont.

1898 Original
Survey Plat



T34NR3E Section 14 cont.

2017
Resurvey
Plat



T34NR3E Section 14 cont.

- ▶ The 1805 Act established the subdivision corners and is clear as to the method to be used for properly retracing the establishment.
- ▶ The County Surveyor executed his survey accordingly except at the NW & NE 1/16 corners where he utilized improper procedure (*gross error*).
 - There are minor technical differences, however most of the survey does meet the requirements of Manual sections “3-137 Good Faith Location and Subdivision of Section” & “5-25 Bona fide rights are those acquired in good faith under the law.”

T34NR3E Section 14 cont.

E 1/16 Secs. 14 & 23

- ▶ 1898 Original Survey
 - Established by the 1805 Act
- ▶ 1909 County Surveyor
 - Proper procedure for establishment and monumenting at “midpoint” and on the line
 - Recorded what was done
- ▶ 2017 Resurvey
 - Recovered County Surveyor monument (*stone*)
 - Located 14 lks. North of an old E/W barbed wire fence
 - Perpetuated with a modern monument

T34NR3E Section 14 cont.
W 1/16 Secs. 14 & 23



- ▶ 1898 Original Survey
 - Established by the 1805 Act
- ▶ 1909 County Surveyor
 - Proper procedure for establishment and monumenting at “midpoint” and on the line
 - Recorded what was done
- ▶ 2017 Resurvey
 - Recovered County Surveyor monument (*stone*)
 - Perpetuated with a modern monument



T34NR3E Section 14 cont.

Center 1/4 Section 14

- ▶ 1898 Original Survey
 - Established by the 1805 Act
- ▶ 1909 County Surveyor
 - Proper procedure for establishment and monumenting at the intersection of the center lines of the section
 - Recorded what was done
- ▶ 2017 Resurvey
 - No monument recovered
 - Reestablished at the intersection of the accepted County Surveyor center lines of the section
 - Located in the N/S road center line
 - Not monumented due to it not being Fed Interest

T34NR3E Section 14 cont.

Center East 1/16 Sec. 14

- ▶ 1898 Original Survey
 - Established by the 1805 Act
- ▶ 1909 County Surveyor
 - Proper procedure for establishment and monumenting at “midpoint” and on the line
 - Recorded what was done
- ▶ 2017 Resurvey
 - No monument recovered
 - Reestablished at an old fence corner with fences extending East and South – agrees with County Surveyor
 - Not monumented due to it not being Fed Interest

T34NR3E Section 14 cont.

Center North 1/16 Sec. 14

- ▶ 1898 Original Survey
 - Established by the 1805 Act
- ▶ 1909 County Surveyor
 - Proper procedure for establishment and monumenting at “midpoint” and on the line
 - Recorded what was done
- ▶ 2017 Resurvey
 - No monument recovered
 - For reestablishment, utilized the N/S road for longitude and an old fence extending West for latitude – agrees with County Surveyor
 - Not monumented due to it not being Fed Interest

T34NR3E Section 14 cont.

NW 1/16 Sec. 14

▶ 1898 Original Survey

- Established by the 1805 Act

▶ 1909 County Surveyor

- Improper procedure for establishment and monumenting. Utilized "shortcut" method setting at midpoint of N/S center line
- Recorded what was done

▶ 2017 Resurvey

- Recovered County Surveyor stone
- Rejected due to improper procedure (*gross error*) & zero reliance
- Established at intersection per 1805 Act and monumented

Questions??

Monte L. King
Supervisory Land Surveyor
Idaho Cadastral Survey
1387 S. Vinnell Way
Boise, Idaho 83709
(208) 373-3984
mking@blm.gov

