Monumentation and the Corner Record

STUDY GUIDE 2012

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Reading Assignment

Chapter 4 of the 2009 Manual of Surveying Instructions

Exercise #1 Definitions

The purpose of this exercise is to familiarize the learner with terminology used in monumentation and the corner record. The definitions are taken from the 2009 Manual or the Glossary of BLM Surveying and Mapping Terms. The digital copy of the Glossary can be found on the CFedS hard drive under "Resources" on the course map for the initial training.

Directions: Match each term with its definition.

Terms

A. Aliquot parts
B. Angle Point
C. Auxiliary Meander Corner
D. Bark Scribe
E. Bearing tree
F. Blaze
G. Closing corner
H. Collateral evidence
I. Copperweld
J. Corner
K. Corner accessories
L. Corner of maximum control
M. Corner of minimum control
N. Crossing closing corner
O. Elongated section
P. Existent corner
Q. Grooves
R. Hack
S. Indicated corner
T. Junior corner
U. Line tree
V. Location corner
W. Lost corner
X. Meander corner
Y. Mineral monument
Z. Monument
AA. Notches
BB. Obliterated corner
CC. Off-line closing corner
DD. Reference monument
EE. Regular corner
FF. Snow blaze
GG. Standard corner
HH. Witness corner
II. Witness point

ANSWER	DEFINITION
	A monumented station on a line of the survey that is used to perpetuate an important location more or less remote from and without special relation to any regular corner. (Manual of Surveying Instructions, 2009, sec. 4-18)
	Type of meander corner established at a suitable point on the meander line of a lake lying entirely within a quarter-section or on the meander line of an island falling entirely within a section and which is found to be too small to subdivide. (Glossary of BLM Surveying and Mapping Terms, page 5 hard copy, page 6 digital copy)
	A tree marked with prescribed marks cut into the trunk and used as a corner accessory. (Glossary of BLM Surveying and Mapping Terms, page 7 hard copy, page 8 digital copy)
	A monument established at a prominent point and tied to one or more special surveys where there is no public land survey corner or previously established location monument within two miles of the survey. (Manual of Surveying Instructions, 2009,sec. 4-20)
	A mark made upon a tree trunk, usually at about breast height. The bark and a small amount of live wood are removed with an axe or other cutting tool, leaving a flat, smoothed surface which forever bands the tree. (Glossary of BLM Surveying and Mapping Terms, page 7 hard copy, page 8 digital copy)
	A corner established where a survey line terminates at the intersection with a previously fixed boundary, at a point between corners. (Glossary of BLM Surveying and Mapping Terms, page 10 hard copy, page 12 digital copy)
	A corner which fixes the position for sections on all sides. (Glossary of BLM Surveying and Mapping Terms, page 13 hard copy, page 15,)
	Such things as acts and testimony of interested landowners, competent surveyors, other qualified local authorities or some acceptable record evidence that may be used along with other evidence in identifying the true original position of a corner. (Glossary of BLM Surveying and Mapping Terms, page 11 hard copy, page 13 digital copy)
	A section with excess distance in one or more directions requiring one or more additional tier(s) or range(s) of lots in any “half” of the section. (Manual of Surveying Instructions, 2009, sec. 3-110)
	A monumented point, established to witness the true point for a corner where the corner point falls in an inaccessible place where it cannot be marked. (Manual of

ANSWER	DEFINITION
	Surveying Instructions, 2009, sec. 4-16)
	A horizontal notch cut well into a tree at about breast height. (Glossary of BLM Surveying and Mapping Terms, page 23 hard copy, page 27 digital copy)
	Nearby physical object to which corners are referenced for their future identification or restoration. (Glossary of BLM Surveying and Mapping Terms, page 13 hard copy, page 15 digital copy)
	Scribe marks lightly cut into the bark of a tree without blazing. (Glossary of BLM Surveying and Mapping Terms, page 6 hard copy, page 7 digital copy)
	A point on the surface of the earth, determined by the surveying process which defines an extremity on a boundary of the public lands. (Glossary of BLM Surveying and Mapping Terms, page 13 hard copy, page 15 digital copy)
	A brand-name for a copper coated steel rod with a brass cap which may be authorized for use in monumentation of corner in certain areas where the use of a regulation monument is not practical. (Glossary of BLM Surveying and Mapping Terms, page 13 hard copy, page 15 digital copy)
	A term adopted by the USGS to designate a corner of the public land surveys whose location cannot be verified by the criteria necessary to class it as a found or existent corner, but which is accepted locally as the correct corner and has been recovered by field investigation. (Glossary of BLM Surveying and Mapping Terms, page 26 hard copy, page 30 digital copy)
	A monument set as an accessory for a corner where a permanent monument with cap cannot be established or where other acceptable accessories are not available. (Manual of Surveying Instructions, 2009, sec. 4-17)
	A corner which is part of a survey occurring at a date subsequent to a prior (senior) survey. (Glossary of BLM Surveying and Mapping Terms, page 28 hard copy, page 33 digital copy)
	Elongated depressions scored into the face of a stone monument where the faces of the stone are turned to the cardinal. (Glossary of BLM Surveying and Mapping Terms, page 23 hard copy, page 27 digital copy)
	A corner established at the intersection of standard, township or section lines with the meander line near banks of meanderable bodies of water. (Glossary of BLM

ANSWER	DEFINITION
	Surveying and Mapping Terms, page 32 hard copy, page 38 digital copy)
	A tree intersected by a surveyed line, marked with hacks or notches and reported in the field notes of the survey. (Glossary of BLM Surveying and Mapping Terms, page 30 hard copy, page 34 digital copy)
	A corner whose original position can be identified by substantial evidence of the monument or its accessories, by reference to the description in the filed notes, or located by an acceptable supplemental survey record, some physical evidence or reliable testimony. (Manual of Surveying Instruction, 2009, sec. 6-11)
	A small additional blaze at a height of 6 to 8 feet above the ground on tree monuments or bearing trees. (Glossary of BLM Surveying and Mapping Terms, page 52 hard copy, page 62 digital copy)
	A corner which does not fix the position for the sections on all sides. (Glossary of BLM Surveying and Mapping Terms, page 13 hard copy, page 15 digital copy)
	A monument established at a prominent point and tied to a mineral survey where there is no public land survey corner or previously established mineral/location monument within two miles of a mineral survey. (Manual of Surveying Instruction, 2009, sec. 10-152)
	V-shaped indentations cut upon the exposed vertical edges of a stone monument where the vertical edges of the stone have been turned to the cardinal. (Glossary of BLM Surveying and Mapping Terms, page 37 hard copy, page 44 digital copy)
	A point on a line of a survey of a boundary, usually where the alignment or boundary deflects from a straight line. (Manual of Surveying Instructions, 2009, sec. 4-19)
	A corner set where a township or section line intersects (crosses) the line of a previously surveyed line of a non-rectangular survey. (Glossary of BLM Surveying and Mapping Terms, page 13) Under the 2009 Manual, when a new corner of this type is established it will be identified as a corner of minimum control. (Manual of Surveying Instructions, 2009, sec. 377)
	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, other qualified local authorities, or witnesses, or by some acceptable record evidence. (Manual of Surveying Instructions, 2009, sec. 6-17)

ANSWER	DEFINITION
	Legal subdivisions, except fractional lots, or further subdivision of any smaller legal subdivision, except fraction lots, by division into halves or fourths ad infinitum. (Glossary of BLM Surveying and Mapping Terms, page 3 hard copy, page 4 digital copy)
	Corners which are established or indicated by the survey according to the normal plan of the rectangular system. (Glossary of BLM Surveying and Mapping Terms, page 46 hard copy, page 55 digital copy)
	A closing corner monument that was not actually located on the line that was closed upon. (Glossary of BLM Surveying and Mapping Terms, page 38 hard copy, page 45 digital copy)
	A corner 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 of Surveying Instructions, 2009, sec. 7-2)
	A senior corner on a standard parallel or base line. (Glossary of BLM Surveying and Mapping Terms, page 52 hard copy, page 62 digital copy)
	The object or physical structure that marks the corner. (Manual of Surveying Instructions, 2009, sec. 6-8)

Exercise #1 Answer Key

ANSWER	DEFINITION
II	A monumented station on a line of the survey that is used to perpetuate an important location more or less remote from and without special relation to any regular corner. (Manual of Surveying Instructions, 2009, sec. 4-18)
C	Type of meander corner established at a suitable point on the meander line of a lake lying entirely within a quarter-section or on the meander line of an island falling entirely within a section and which is found to be too small to subdivide. (Glossary of BLM Surveying and Mapping Terms, page 5 hard copy, page 6 digital copy)
E	A tree marked with prescribed marks cut into the trunk and used as a corner accessory. (Glossary of BLM Surveying and Mapping Terms, page 7 hard copy, page 8 digital copy)
V	A monument established at a prominent point and tied to one or more special surveys where there is no public land survey corner or previously established location monument within two miles of the survey. (Manual of Surveying Instructions, 2009,sec. 4-20)
F	A mark made upon a tree trunk, usually at about breast height. The bark and a small amount of live wood are removed with an axe or other cutting tool, leaving a flat, smoothed surface which forever bands the tree. (Glossary of BLM Surveying and Mapping Terms, page 7 hard copy, page 8 digital copy)
G	A corner established where a survey line terminates at the intersection with a previously fixed boundary, at a point between corners. (Glossary of BLM Surveying and Mapping Terms, page 10 hard copy, page 12 digital copy)
L	A corner which fixes the position for sections on all sides. (Glossary of BLM Surveying and Mapping Terms, page 13 hard copy, page 15,)
H	Such things as acts and testimony of interested landowners, competent surveyors, other qualified local authorities or some acceptable record evidence that may be used along with other evidence in identifying the true original position of a corner. (Glossary of BLM Surveying and Mapping Terms, page 11 hard copy, page 13 digital copy)
O	A section with excess distance in one or more directions requiring one or more additional tier(s) or range(s) of lots in any "half" of the section. (Manual of Surveying Instructions, 2009, sec. 3-110)
HH	A monumented point, established to witness the true point for a corner where the corner point falls in an inaccessible place where it cannot be marked. (Manual of

ANSWER	DEFINITION
	Surveying Instructions, 2009, sec. 4-16)
R	A horizontal notch cut well into a tree at about breast height. (Glossary of BLM Surveying and Mapping Terms, page 23 hard copy, page 27 digital copy)
K	Nearby physical object to which corners are referenced for their future identification or restoration. (Glossary of BLM Surveying and Mapping Terms, page 13 hard copy, page 15 digital copy)
D	Scribe marks lightly cut into the bark of a tree without blazing. (Glossary of BLM Surveying and Mapping Terms, page 6 hard copy, page 7 digital copy)
J	A point on the surface of the earth, determined by the surveying process which defines an extremity on a boundary of the public lands. (Glossary of BLM Surveying and Mapping Terms, page 13 hard copy, page 15 digital copy)
I	A brand-name for a copper coated steel rod with a brass cap which may be authorized for use in monumentation of corner in certain areas where the use of a regulation monument is not practical. (Glossary of BLM Surveying and Mapping Terms, page 13 hard copy, page 15 digital copy)
S	A term adopted by the USGS to designate a corner of the public land surveys whose location cannot be verified by the criteria necessary to class it as a found or existent corner, but which is accepted locally as the correct corner and has been recovered by field investigation. (Glossary of BLM Surveying and Mapping Terms, page 26 hard copy, page 30 digital copy)
DD	A monument set as an accessory for a corner where a permanent monument with cap cannot be established or where other acceptable accessories are not available. (Manual of Surveying Instructions, 2009, sec. 4-17)
T	A corner which is part of a survey occurring at a date subsequent to a prior (senior) survey. (Glossary of BLM Surveying and Mapping Terms, page 28 hard copy, page 33 digital copy)
Q	Elongated depressions scored into the face of a stone monument where the faces of the stone are turned to the cardinal. (Glossary of BLM Surveying and Mapping Terms, page 23 hard copy, page 27 digital copy)
X	A corner established at the intersection of standard, township or section lines with the meander line near banks of meanderable bodies of water. (Glossary of BLM Surveying and Mapping Terms, page 32 hard copy, page 38 digital copy)
U	A tree intersected by a surveyed line, marked with hacks or notches and reported in the field notes of the survey. (Glossary of BLM Surveying and Mapping Terms, page 30 hard copy, page 34 digital copy)
P	A corner whose original position can be identified by substantial evidence of the monument or its accessories, by reference to the description in the filed notes, or located by an acceptable supplemental survey record, some physical evidence or reliable testimony. (Manual of Surveying Instruction, 2009, sec. 6-11)
FF	A small additional blaze at a height of 6 to 8 feet above the ground on tree monuments or bearing trees. (Glossary of BLM Surveying and Mapping Terms, page 52 hard

ANSWER	DEFINITION
	copy, page 62 digital copy)
M	A corner which does not fix the position for the sections on all sides. (Glossary of BLM Surveying and Mapping Terms, page 13 hard copy, page 15 digital copy)
Y	A monument established at a prominent point and tied to a mineral survey where there is no public land survey corner or previously established mineral/location monument within two miles of a mineral survey. (Manual of Surveying Instruction, 2009, sec. 10-152)
AA	V-shaped indentations cut upon the exposed vertical edges of a stone monument where the vertical edges of the stone have been turned to the cardinal. (Glossary of BLM Surveying and Mapping Terms, page 37 hard copy, page 44 digital copy)
B	A point on a line of a survey of a boundary, usually where the alignment or boundary deflects from a straight line. (Manual of Surveying Instructions, 2009, sec. 4-19)
N	A corner set where a township or section line intersects (crosses) the line of a previously surveyed line of a non-rectangular survey. (Glossary of BLM Surveying and Mapping Terms, page 13) Under the 2009 Manual, when a new corner of this type is established it will be identified as a corner of minimum control. (Manual of Surveying Instructions, 2009, sec. 377)
BB	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, other qualified local authorities, or witnesses, or by some acceptable record evidence. (Manual of Surveying Instructions, 2009, sec. 6-17)
A	Legal subdivisions, except fractional lots, or further subdivision of any smaller legal subdivision, except fraction lots, by division into halves or fourths ad infinitum. (Glossary of BLM Surveying and Mapping Terms, page 3 hard copy, page 4 digital copy)
EE	Corners which are established or indicated by the survey according to the normal plan of the rectangular system. (Glossary of BLM Surveying and Mapping Terms, page 46 hard copy, page 55 digital copy)
CC	A closing corner monument that was not actually located on the line that was closed upon. (Glossary of BLM Surveying and Mapping Terms, page 38 hard copy, page 45 digital copy)
W	A corner whose original position cannot be determined by substantial evidence, either from traces of the original marks or from acceptable evidence or reliable testimony

ANSWER	DEFINITION
	that bears upon the original position and whose location can be restored only by reference to one or more interdependent corners. (Manual of Surveying Instructions, 2009, sec. 7-2)
GG	A senior corner on a standard parallel or base line. (Glossary of BLM Surveying and Mapping Terms, page 52 hard copy, page 62 digital copy)
Z	The object or physical structure that marks the corner. (Manual of Surveying Instructions, 2009, sec. 6-8)

Common Abbreviations (Optional Exercise)

The purpose of this exercise is to familiarize the learner with abbreviations used in monumentation and the corner record. The abbreviations are taken from the Common Abbreviations Bureau of Land Management Public Records document.

Directions: Match each term with its abbreviation.

Terms

A. all minerals
B. cash entry
C. desert land entry
D. ditches and/or canals
E. executive order
F. exchange(d)
G. forest lieu selection
H. forest exchange
I. grazing permit
J. headquarters site
K. homestead entry
L. indemnity list
M. Indian homestead trust patent
N. Indian trust
O. Jurisdiction
P. lieu selection
Q. lighthouse
R. military reservation
S. mineral survey
T. native allotment
U. oil and gas
V. patent
W. public law
X. public sale
Y. quit claim deed
Z. recreation and public purposes
AA. railroad grant
BB. state grant
CC. small holding claim
DD. townsite
EE. warranty deed
FF. withdrawal

The abbreviation "_____" on the Master Title Plat or Historical Index stands for:	Term
1. Ind Hd Tr Pat	
2. NA	
3. X	
4. D/C	
5. EO	
6. HE	
7. Mil Res	
8. PS	
9. Wdl	
10. Gr Per	

The abbreviation "_____" on the Master Title Plat or Historical Index stands for:	Term
11. MS	
12. QCD	
13. RRG	
14. WD	
15. CE	
16. IL	
17. OG	
18. R&PP	
19. Tns	
20. DLE	
21. Hdq S	
22. LH	
23. Pat	
24. SG	
25. All Min	
26. FX	
27. SHC	
28. FLS	
29. Ind Tr	
30. LS	
31. Juris	
32. PL	

Common Abbreviations Answer Key

Abbreviation	Term	Definition
1. Ind Hd Tr Pat	**M**	Under the various Indian Homestead Acts, any Native American who applied would be given an allotment of private land, which would be held in trust for 25 years before the deed would be turned over to the owner. Depending on how the land would be used, the allotment might be 160, 80, or 40 acres, and people were allowed to choose their own allotments. Under the "Dawes Act" of 1887 the Indian would also be entitled to full United States citizenship.
2. NA	**T**	Under the terms and provisions of the Act of May 17, 1906, as amended, the Secretary of the Interior is authorized to allot not to exceed 160 acres of vacant, unappropriated and unreserved non-mineral land in Alaska; or, subject to the provisions of the Act of March 8, 1922, of vacant, unappropreated and unreserved public land in Alaska that may be valuable for coal, oil and gas deposits; or, under certain conditions, of National Forest Lands in Alaska, to an Indian, Aleut or Eskimo of full or mixed blood who resides in and is a native of Alaska and who is the head of a family, or is twenty-one years of age. An allotment will not be made until the lands are surveyed by BLM and until satisfactory proof of 5 years continuous use and occupancy by the applicant has been approved by the Director of BLM.
3. X	**F**	The Bureau of Land Management and the U.S. Forest Service are authorized to dispose of public land using exchanges, where public land is traded to willing private entities, individuals, or state or local governments in exchange for lands desired by the federal government.
4. D/C	**D**	All patents for lands taken up after August 30, 1890, under any of the land laws of the United States or on entries or claims validated by the Act of August 30, 1890, west of the one hundredth meridian, contained reservation for ditches and/or canals from the lands in the patent.
5. EO	**E**	Executive Orders were often used to establish or modify Indian reservation boundaries. The president's power to issue executive orders comes from Congress and the U.S. Constitution. Executive orders differ from presidential proclamations, which are used largely for ceremonial and honorary purposes. Executive orders do not require congressional approval.
6. HE	**K**	The Homestead Act of 1862 provided for the transfer of 160 of unoccupied public land to each homesteader on payment of a nominal fee after five years of residence; land could also be acquired after six months of residence at $1.25 an acre. In 1976 the act

Abbreviation		Term	Definition
			expired in all the states but Alaska, where it ended in 1986.
7.	**Mil Res**	**R**	A military reservation is property that the United States government has set aside for military purposes and over which it has exclusive jurisdiction.
8.	**PS**	**X**	Under the authority of the Federal Land Policy and Management Act of 1976, BLM can sell public lands. Any lands that are offered must be sold at fair market value, that is, at a price comparable to similar private lands.
9.	**Wdl**	**FF**	A withdrawal restricts the disposition of public land and holds them for specific public purposes. There are four major categories of formal withdrawals: 1. Administrative (Secretary of the Interior) 2. Presidential Proclamations 3. Congressional 4. Federal Power Act (FPA) or Federal Energy Regulatory Commission (FERC) Withdrawals Withdrawals must accomplish one or more of the following: • Transfer total or partial jurisdiction of Federal land between Federal agencies. • Close (segregate) Federal land to operation of all or some of the public land laws and/or mineral laws. • Dedicate Federal land to a specific public purpose With the exception of the Federal Power Act and the Antiquities Act, all of the previous authorities were repealed and replaced by Section 204(a) of Federal Land Policy and Management Act (1976) which authorizes the Secretary of the Interior to make, modify, and revoke withdrawals. In addition, Congress retains the authority to modify and/or revoke any administrative withdrawal through legislation.
10.	**Gr Per**	**I**	Grazing permits issued under the Taylor Grazing Act of 1934 allow the permit holder to use publicly owned forage on federal lands; they do not convey a property right. The permits are revocable, amendable and non-assignable.
11.	**MS**	**S**	A mineral survey is a cadastral survey of a lode claim, placer claim or mill site with all its notes and plats. This type of survey is executed by a U.S. Mineral Surveyor for the purpose of marking the legal boundaries of mining claims on the public domain. Mineral surveys are identified by number.
12.	**QCD**	**Y**	A quit claim deed is an instrument of conveyance of real property that passes any title, claim, or interest that the grantor has in the premises but does not make any representations as to the validity of such title.

Abbreviation	Term	Definition
13. RRG	**AA**	Congress passed a series of acts authorizing land grants to promote the construction railroad. The railroads were generally granted a certain number of sections per mile of track. The land was taken as odd numbered section within a specific distance from the track. Where there was an existing valid entry on land to be taken, other lands could be selected in lieu of the original parcel.
14. WD	**EE**	A warranty deed conveys fee title to the land described and in addition guarantees the grantor will make good the tile if it is found wanting.
15. CE	**B**	The Act of April 24, 1820 (3 tat.566) allowed an individual to purchase land from the United Sates government at the price of $1.25 per acre.
16. IL	**L**	A listing of alternate lands granted to States, Railroads and wagon roads under the public land laws when granted lands were unavailable.
17. OG	**U**	The Bureau of Land Management (BLM) leases minerals and manages oil and gas development activities on over 570 million acres of BLM and other federal lands, as well as private lands where mineral rights have been retained by the federal government. The other Agencies identify areas under their jurisdiction where leases can be sold and will determine the appropriate lease stipulations necessary to protect surface resources. The BLM issues the lease and manages the sub-surface operations, but the Agency manages the surface operations throughout the drilling process on lands under their jurisdiction. Most BLM regulations that govern the BLM's oil and gas leasing program may be found in Title 43 of the Code of Federal Regulations, Part 3100. Under these laws, the BLM has the authority to approve or deny oil and gas leases or to impose environmental restrictions on leases when appropriate.
18. R&PP	**Z**	Public Purposes Act (68 Statute 173; 43 United States Code 869 et. seq.) was a complete revision of the Recreation Act of 1926 (44 Stat. 741). This law is administered by the Bureau of Land Management (BLM).The act authorizes the sale or lease of public lands for recreational or public purposes to State and local governments and to qualified nonprofit organizations. Examples of typical uses under the act are historic monument sites, campgrounds, schools, fire houses, law enforcement facilities, municipal facilities, landfills, hospitals, parks, and fairgrounds.
19. Tns	**DD**	A townsite is an area of public lands which has been segregated for disposal as an urban development, often subdivided into blocks, which are further subdivided into town lots.

Abbreviation	Term	Definition
20. DLE	**C**	The act of March 3, 1877 (19 Stat. 315) authorized desert claims of 320 acres at $1.25 per acre. The act authorized the appropriation of water and provided three years to show that the land had been reclaimed.
21. Hdq S	**J**	A headquarters site is a parcel of 5 acres or less of public lands in Alaska which are used as and are subject to entry as, headquarters for a productive industry.
22. LH	**Q**	Lands set aside for Lighthouse purposes were withdrawn by Executive Order, Secretarial Order, or Acts of Congress.
23. Pat	**V**	By definition a Land Patent is the only form of proof of absolute title to Land in the United States of America. "A patent is the highest evidence of title and is conclusive as against the government and all claiming under junior patents or titles" *U.S. v. Stone 2 US 525*. The patented "grant of land is a public law standing on the statute books of the State, and is notice to every subsequent purchaser under any conflicting sale made afterward." *Wineman v. Gastrell 2 U.S. App. 581*.
24. SG	**BB**	States carved from the public lands were granted a section(s) in each township. States did not always receive the same number of sections. The lands were conveyed on the date the plat was signed; confirmatory patents were sometimes issues at a later date.
25. All Min	**A**	This tells you that all the mineral interest within the patent has been reserved to the United States or if the parcel has been acquired by the U.S., this tells us that all the mineral interest was acquired.
26. FX	**H**	This act of March 20, 1922 (16 USC 485) authorizes the Secretary of Agriculture to accept on behalf of the United States title to any lands within the exterior boundaries of the national forests which, in his opinion, are chiefly valuable for national-forest purposes in exchange for land of equal value or the remove an equal value of timber within the national forests.
27. SHC	**CC**	The survey and conveyance of Small Holding Claims was authorized pursuant to the Act of March 3, 1891 (26 Stat. 854), the Act of June 15, 1922 (42 Stat. 650) and the Act of June 8, 1926 (44 Stat. 709). The entryman or predecessors-in-interest was required to maintain continuous, adverse, actual, bona fide possession of public lands for at least 20 years prior to the cadastral survey of the lands involved. Small holding claims are found in several southwestern states.
28. FLS	**G**	The Forest Lieu Act of 1897, permitted the exchange of privately

Abbreviation	Term	Definition
		owned land in forest reserves for “in lieu'' selections elsewhere. Of course, there are many instances of abuse where cutover lands were exchanged for much more valuable lands.
29. Ind Tr	**N**	The federal Indian trust responsibility is a legally enforceable fiduciary obligation, on the part of the United States, to protect tribal lands, assets, resources, and treaty rights, as well as a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes.
30. LS	**P**	An application to acquire title to public lands in exchange for which the applicant relinquished their rights or title to other lands which they ,for some reason, cannot or do not wish to acquire or hold.
31. Juris	**O**	Jurisdiction is the power or right to exercise authority.
32. PL	**W**	Acts of Congress are designated as either "Public Laws", relating to the general public, or "Private Laws", relating to specific individuals. Since 1957 all Acts of Congress have been designated as "Public Law X-Y" or "Private Law X-Y", where X is the number of the Congress and Y is a number sequentially assigned to each act.

Part #1: Research and Organize the Existing Record

My name is John McCauley. I am a land surveyor with the Bureau of Land Management. I have over 25 years of field experience working with the Bureau of Land Management. I am also a licensed surveyor in the states of Colorado, Oregon and Washington State. I have worked on cadastral projects for nearly every federal agency that has land boundary issues, including the Department of Energy, Department of Defense, National Park Service, Bureau of Reclamation and the United States Forest Service. The majority of my career has been spent dealing with Indian land issues.

I have done cadastral survey projects for the Ute /Mountain Ute and Southern Ute reservations in Colorado, the Kootenai Reservation near Bonners Ferry, Idaho and most of the Indian reservations in Washington State. For the last 18 years, I worked out of a detached duty station with my office at the main agency building of Yakama Nation where I was part of a cadre that developed then nationally promoted cadastral GIS which is listed in the fiduciary trust model as the Yakama Model.

I was just recently coaxed out of the field and I now serve as a technical leader for cadastral surveys in the Oregon State Office. So, my roots are in the field. Although I do have a bachelor's degree in forestry, I learned this profession through the mentoring system. I look at this CFedS program as another continuation of that mentoring system. I hope to pass onto you some of my field experience so that you can become more effective in your field survey work.

What I hope you will gain out of this presentation is the idea that you are not alone out there and you cannot work in a vacuum. There are certain local, regional, and national contacts that you are going to have to make and we all work together in this growing field. One thing that my experience has taught me is that you always need to document well everything that you do. Today we are going to talk about monumentation and the corner record.

We are going to talk about researching the record, sources of survey and title records and I will show you some of the different places and some more obscure places where I have found survey records. The need to have local, regional and national contacts. These local contacts can be with the county, other surveyors, especially other surveyors because of the records that they hold in their own offices. Regional contacts that you need to make including the BILS Surveyors, the BLM Indian Land Surveyors, located in the BIA Regional Offices. National contacts, which would be the local cadastral offices located in the states in which you are working.

Another aspect of this presentation deals with Monumentation, specifically, Chapter IV of the 2009 Manual. We will cover some of the different aspects of monumentation in the Act and the accessories to be taken and the requirements for the accessories are different types of corners. We will also deal with how to mark different kinds of corners.

To start, I would really like to point to Chapter IV and especially Section 4-2 wherein it reads, "The law provides that the corners marked during the process of an original survey shall forever remain fixed in position, even disregarding technical errors that may have passed undetected before acceptance of the survey." Another important aspect is that the "Courts attach major importance to evidence relating to the original position of the corner….and that evidence is not only the monument in the field but deals with the records we can find and different sources that describe what people have utilized over the years to represent that specific corner.

Always remember that the corner monument is direct evidence of the position and again it is not just the position in the field, it is the records that we can locate, scattered around the country sometimes that pertain to that specific corner position. I would like you to remember is that when you are dealing with Indian Lands, you are dealing with the people who have been there a very long time. For centuries people have had issues with their neighbors about the position and location of their property boundaries. In some cases, they may not have exactly known where there property boundaries are and we will look at some of the ways that we can resolve these issues through record research.

The objectives for this course are given a corner point with evidence, you will be able to research the record, evaluate the recovered evidence, determine whether the corner position requires rehabilitation or actually needs to be remonumented, establish the proper accessories for that specific corner type and then the documentation. The documentation is very important to perpetuating the corner evidence that you recovered for generations to come. Another objective of this course is that given a corner point requiring monumentation that you will be able to research the record, evaluate that record evidence and monument that record according to the 2009 Manual for that specific corner type.

Establishing the proper accessories and again documentation. You will hear me continue to talk about documentation, because one of the things that I have learned through my experience that you will always have to eventually cover your butt. Every survey that I do for the federal government is subject to protest and appeals. I am always preparing for litigation because should somebody protest and appeal work that I have done, I have to prepare the evidence for the United States Attorney's Office and Department of Justice to defend the survey performed in the field. I would like to start here with what I like to call preparing to find the corner.

Now, a good majority of the original surveys those surveys done under the contract system prior to 1910. It has been my experience that the majority of these surveys where faithfully executed. However, due to local conditions and just general difficulty with the equipment, these guys got a little wild at times. Their notes are good and you can relate them to the ground. It is just a matter of putting together the pieces of the information to put yourself in a position to be successful in finding that corner. So researching the corner history is very important. Researching the local history of the area can be very important.

There are surveys in Oregon State and the southern Willamette Valley, that when you look on the original plats, they show that the area is cleared, that there is no vegetation, barely any vegetation and no timber. When we go out there today, nearly 150 years after these original surveys, some of these townships are completely timbered. The local history has it that the local Indian people who lived in that area routinely burned the vegetation keeping it clear for their crops. So today, the vegetation has grown back and it looks nothing like the area did described in the original survey. If you did not know the local history, you would think that the original survey was fraudulent. That is not the case. So, knowing the local history of the area can help you analyze the survey information that you find.

Another thing that I have to throw in is site analysis and the use of cadastral GIS. It has become a very important tool. Something we could not do ten years ago. The computer technology was simply not there. Today, most counties have some kind of a GIS that can help you find the information you need. In fact, they are good source of all land status information in the county.

Something else I like to point out is what I call getting lucky. Another aspect of my experience has taught me that my logic and math only gets me so far. Sometimes you just have to get lucky. The best definition of luck I have ever seen is when preparation meets opportunity and that is where this record research will enable you to put yourself in a position to find the corner. Being aware of the corner history, the local history, background research with a GIS puts yourself in a position to be successful in

recovering these original corners. Something I will always tell the people who work with me especially the college kids we have hired many college students over the years, and my main point is don't ignore the obvious.

These corners were set to be found and utilized. I mean the obvious not only in the field such as a fence corner a roadway intersection; I am talking about what the survey records say. Sometimes by putting different records together, you can narrow down and pinpoint locations just by being attentive and curious about what they are really talking about. Something else that I have learned over the years is that record research really takes perseverance, determination and creativity.

The creativity part deals with looking in different spots. These survey records over the course of time have gotten scattered around. I have spent many hours in the basements of county courthouses and in old jail cells where they store records looking for information and what I call planting seeds. Talking with people at the counties, talking with people in the national archives -- planting the seeds in their minds that -- have you seen this and if you do give me a call.

I have been called back to different places to search again and found the evidence because somebody was looking through something and they saw something that I had mentioned to them and called me back. So perseverance, determination and creativity are important aspects of the record research. Perhaps something you should consider budgeting for when you are bidding on these jobs. Cause these corners again were meant to be found. This particular picture is an original mound of earth just waiting to be found.

It does not look like much. It was out there for one hundred and twenty years. I walked past it and I sent someone else to go in and look again and they found the corner nearly fifteen chains out of position. Why was I even there? How did I know to find it? That is because we found this corner. This is in the same survey and it is the original mound of stone and the original wood post. This corner should not have survived because it had been out there one hundred twenty years before we found it in an area that had been burnt over by many wild fires.

Because of the topography calls, I was able to locate this position, refine my search area, and found this particular corner six chains out of position, which led me to the other corner which we just looked at. I was able to find it and perpetuate these corners. Again, they do not look like much.

Here is another corner circled here in the red. It is a wood post. Of all things, it has a stone underneath it. Something very particular or peculiar, but it was noted in the original notes verifying this corner position. Your record research and interpreting this data is very important groundwork to be laid before you even step out of your vehicle.

So let us talk about these sources of the survey records. Of course, you realize that the Bureau of Land Management has not only the old General Land Office records, but also has the BLM survey records. BIA, they have the allotment records. Those are in the form of the title status reports (TSRs) and the Bureau of Indian Affairs has some of the United States Indian Service (USIS) Records. There are other sources for that will talk about. Some other places that you can look for and find these United States Indian Survey records.

The county courthouses have the fee land records, but within the county, there are many departments. One interesting fact is that the Bureau of Land Management does not record their survey plats in the counties. They are provided a copy, but where that copy ends up it could be in the county surveyor's office or it could be in the roads department. Sometimes they are in the public works department. Of course we know that normally the auditor has all of the deeds and the assessors since they are tracking where all of the monies are coming from they have become a very good source for not only the deeds but also links to find these deeds through title history.

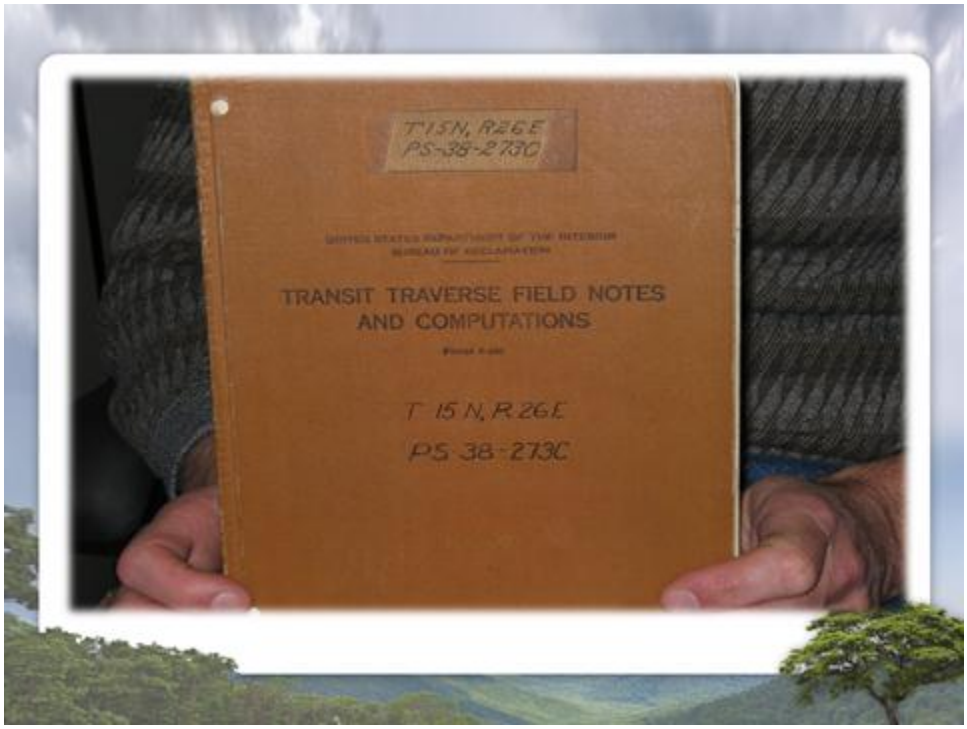
If you really are looking for deeds the best place is the local title companies. Many of these organizations will do some of your research at no cost. Sometimes you have to pay. Sometimes the money is well worth spent when trying to create a title history of the property you are trying to survey. Other federal agencies over the course of time have also done surveying. The Bureau of Reclamation did many surveys in the 1930s, which was known as the reclamation period. You may remember Bob Dahl talking about the fact that there are only about 250 cadastral surveyors working for the federal government. I have made career out of working at another motel in another town, traveling around the country doing surveys.

In the 1930s, we did not have enough surveyors to go around either and with these large Bureau of Reclamation projects going on, they simply were not going to wait for the General Land Office to come and do there survey work. Unfortunately, much of the work done by the Bureau of Reclamation and

we are talking about boundary surveys, regular cadastral surveys were not accepted by the General Land Office.

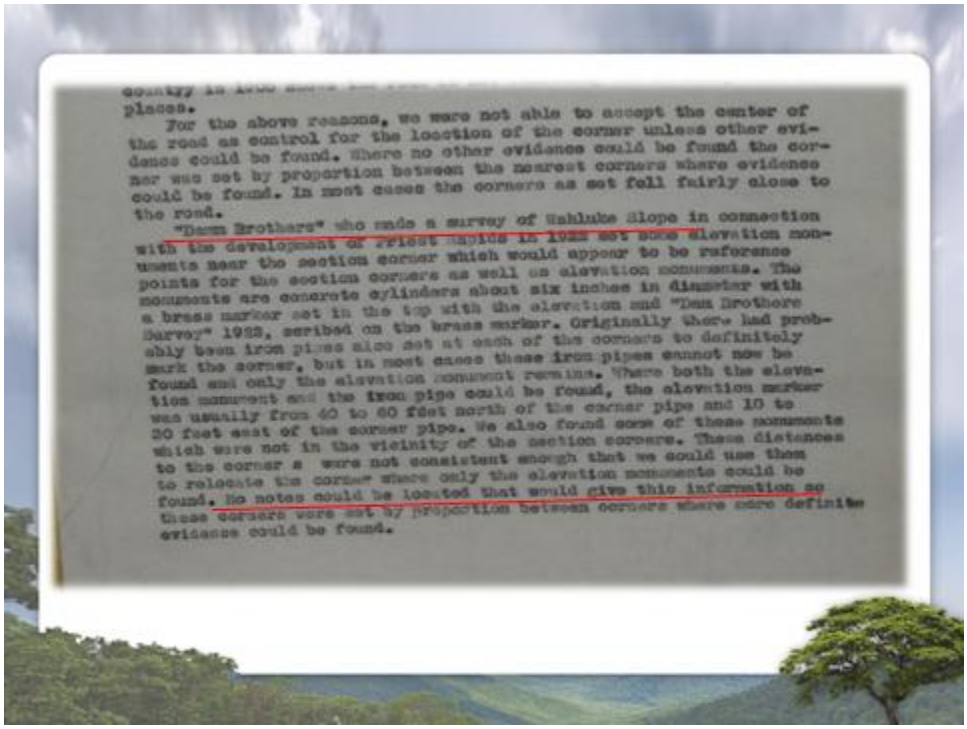
They were done essentially to specifications however, if you remember in Bob Dahl's presentation, that unless the survey has all of the required documents such as the special instructions and assignment instructions they are not considered official cadastral surveys. The Bureau of Reclamation surveys from the 30's are sort of in that grey area of authorized federal government surveys.

I did a large project for the Department of Energy, did the entire exterior boundary of the Hanford Reach National Monument located in Eastern Washington State and I knew that there were Bureau of Reclamation surveys there form the 1930s and had been sitting on the ground for over 75 years by the time I had done my work. At a closer time to the original surveys which in that areas were done in the 1880s. I wanted to work with the monuments that had been on the ground used and accepted by the locals. Here I was able to find up in the vault records office of the Bureau of Reclamation in Euphata, Washington they actually had all of the information relating to the survey work done by the Bureau of Reclamation in the 1930s up to about 1939. In there they had these transit traverse computation books and what a gold mine of information.



When you looked in here you had all of their field notes describing specifically what they had done. In addition to that, they actually had reports describing why they had made certain determinations describing some of the more obscure corners that they had found on the ground.

For example in this report, they talk about the Damn brothers. I found some of these monuments out there in the field. Very nicely set monuments, well-marked with elevations. They were not marked for section corners, but they were always in the general vicinity of where a normal public lands survey corner would be. Were they the corner or not. These people researching in the 1930s found the information relating to these corners and I was able to determine that they were not part of the public land survey system simple accessories normally used for elevations and in relation to other reclamation projects done in the area. Great source of information.

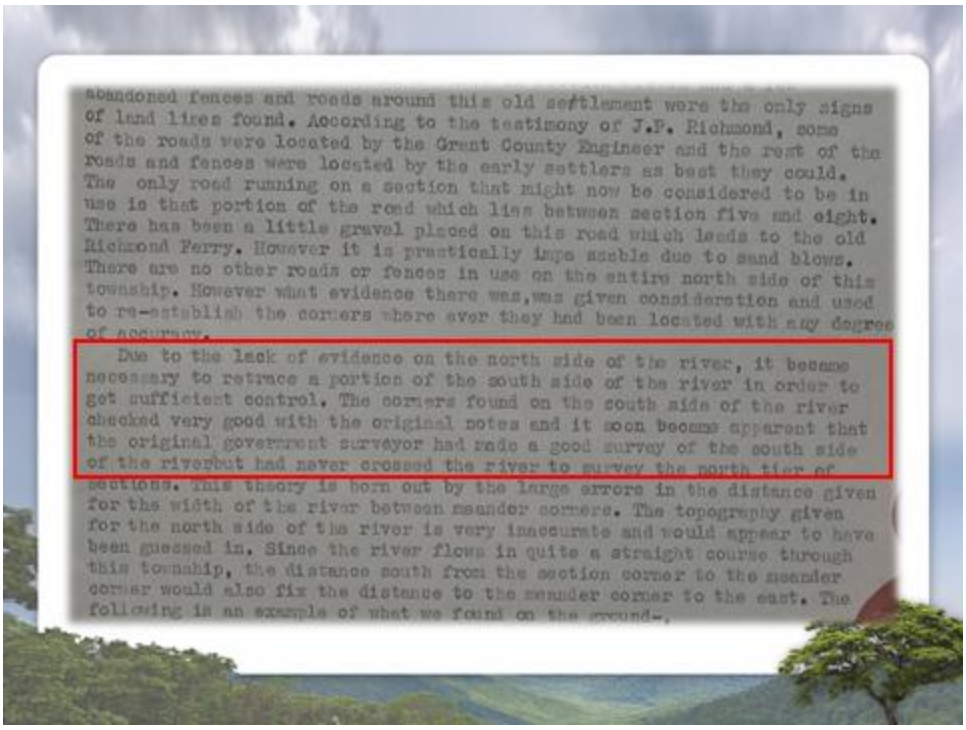


places.

For the above reasons, we were not able to accept the center of the road as control for the location of the corner unless other evidence could be found. Where no other evidence could be found the corner was set by proportion between the nearest corners where evidence could be found. In most cases the corners as set fell fairly close to the road.

"Damn Brothers" who made a survey of Wahluke Slope in connection with the development of Priest Rapids in 1933 set some elevation monuments near the section corner which would appear to be reference points for the section corners as well as elevation monuments. The monuments are concrete cylinders about six inches in diameter with a brass marker set in the top with the elevation and "Dam Brothers Survey" 1933, scribed on the brass marker. Originally there had probably been iron pipes also set at each of the corners to definitely mark the corner, but in most cases these iron pipes cannot now be found and only the elevation monument remains. Where both the elevation monument and the iron pipe could be found, the elevation marker was usually from 40 to 60 feet north of the corner pipe and 10 to 20 feet east of the corner pipe. We also found some of these monuments which were not in the vicinity of the section corners. These distances to the corner s were not consistent enough that we could use them to relocate the corner where only the elevation monuments could be found. No notes could be located that would give this information as these corners were set by proportion between corners where more definite evidence could be found.

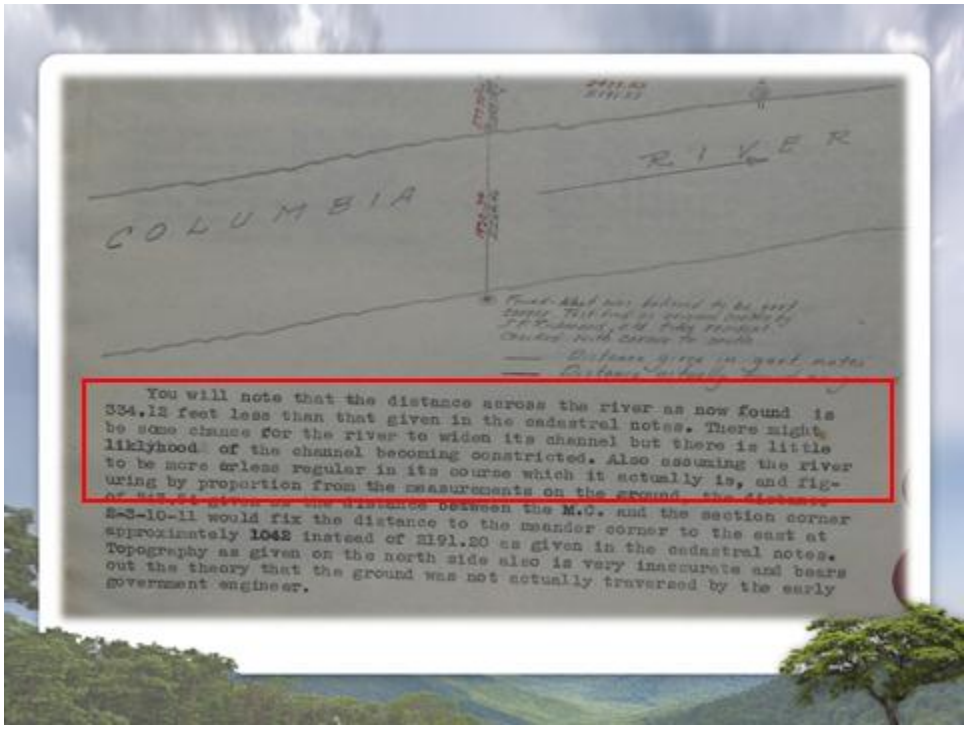
The Bureau of Reclamation found that due to the lack of evidence on the north side of the river, it became necessary to trace a portion of the south side of the river in order to get sufficient controls. The corners found on the south side of the river checked very well with the notes and soon became apparent that the original government surveyor had made a good survey on the south side of the river but had never crossed the river to survey the northern tier of the township.



abandoned fences and roads around this old settlement were the only signs of land lines found. According to the testimony of J.P. Richmond, some of the roads were located by the Grant County Engineer and the rest of the roads and fences were located by the early settlers as best they could. The only road running on a section that might now be considered to be in use is that portion of the road which lies between section five and eight. There has been a little gravel placed on this road which leads to the old Richmond Ferry. However it is practically impassable due to sand blows. There are no other roads or fences in use on the entire north side of this township. However what evidence there was,was given consideration and used to re-establish the corners where ever they had been located with any degree of accuracy.

Due to the lack of evidence on the north side of the river, it became necessary to retrace a portion of the south side of the river in order to get sufficient control. The corners found on the south side of the river checked very good with the original notes and it soon becomes apparent that the original government surveyor had made a good survey of the south side of the riverbut had never crossed the river to survey the north tier of sections. This theory is born out by the large errors in the distance given for the width of the river between meander corners. The topography given for the north side of the river is very inaccurate and would appear to have been guessed in. Since the river flows in quite a straight course through this township, the distance south from the section corner to the meander corner would also fix the distance to the meander corner to the east. The following is an example of what we found on the ground.

The next page of the report, they even included diagrams. They show that there measurement across the river was three hundred thirty four feet less than that cited by the original government surveyor. So here they were able to document what they had done and why they did it. This made it very easy for me to evaluate their survey and come to a conclusion on how I was going to use their corners.

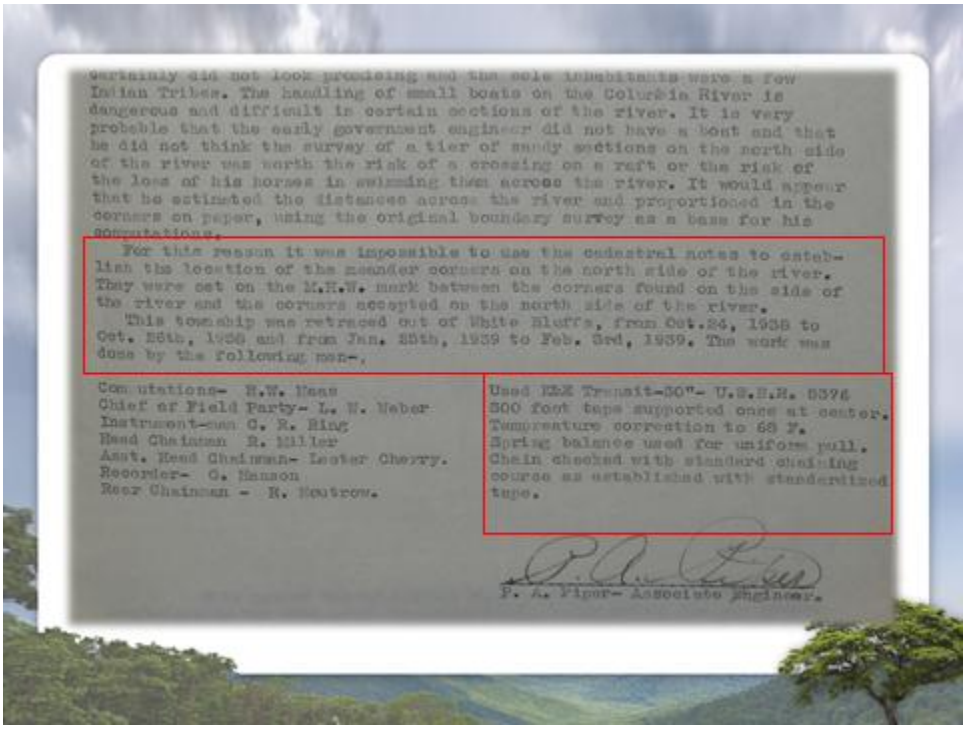


COLUMBIA

RIVER

You will note that the distance across the river as now found is 334.12 feet less than that given in the cadastral notes. There might be some chance for the river to widen its channel but there is little liklyhood of the channel becoming constricted. Also assuming the river to be more or less regular in its course which it actually is, and figuring by proportion from the measurements on the ground the distance between the M.C. and the section corner S-3-10-11 would fix the distance to the meander corner to the east at approximately 1042 instead of 2191.20 as given in the cadastral notes. Topography as given on the north side also is very inaccurate and bears out the theory that the ground was not actually traversed by the early government engineer.

On the next slide, it even shows what they used for equipment. You can see that they had K&E, transit, and they were taping of course, Using a three hundred foot long tape all calibrated . Very good work. It is interesting how specific this gentleman was, P.A. Piper. They give the reasons why they did what they did. This is some very interesting important information that is only located at one source.



certainly did not look promising and the sole inhabitants were a few Indian Tribes. The handling of small boats on the Columbia River is dangerous and difficult in certain sections of the river. It is very probable that the early government engineer did not have a boat and that he did not think the survey of a tier of sandy sections on the north side of the river was worth the risk of a crossing on a raft or the risk of the loss of his horses in swimming them across the river. It would appear that he estimated the distances across the river and proportioned in the corners on paper, using the original boundary survey as a base for his computations.

For this reason it was impossible to use the cadastral notes to establish the location of the meander corners on the north side of the river. They were set on the M.H.W. mark between the corners found on the side of the river and the corners accepted on the north side of the river.

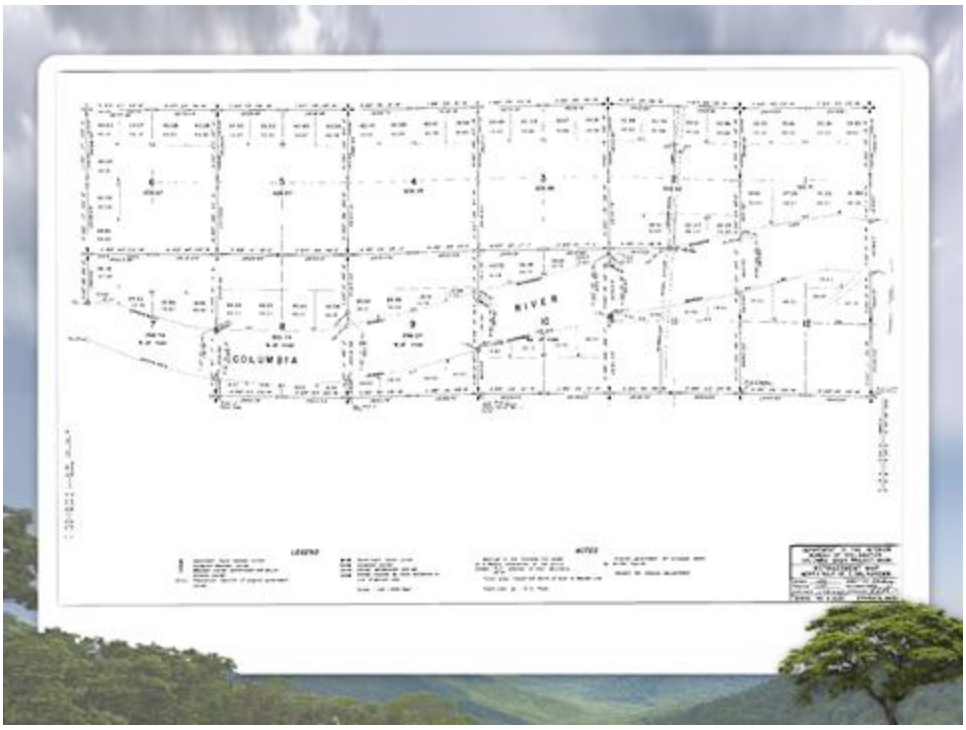
This township was retraced out of White Bluffs, from Oct.24, 1938 to Oct. 26th, 1938 and from Jan. 25th, 1939 to Feb. 3rd, 1939. The work was done by the following men-.

Computations- H.W. Haas
Chief of Field Party- L. W. Weber
Instrument-man C. R. Ring
Head Chainman R. Miller
Asst. Head Chainman- Lester Cherry.
Recorder- G. Hanson
Rear Chainman - R. Neutrow.

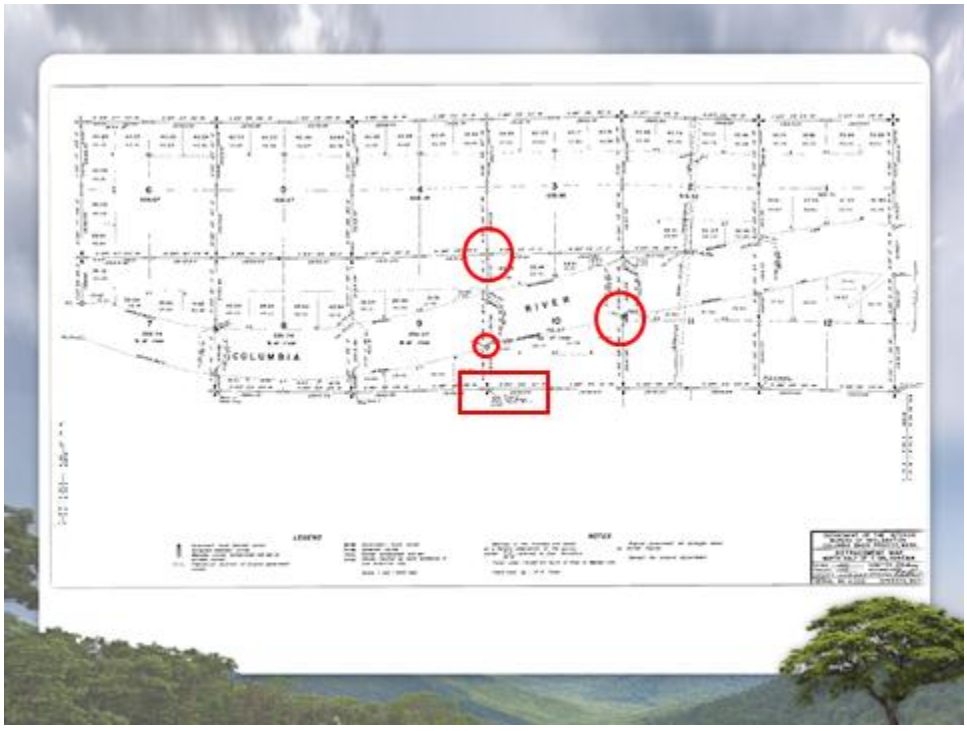
Used K&E Transit-30"- U.S.H.M. 8376
300 foot tape supported once at center.
Temperature correction to 68 F.
Spring balance used for uniform pull.
Chain checked with standard chaining course as established with standardized tape.

P. A. Piper- Associate Engineer.

We have since taken these books from the Bureau of Reclamation, we have scanned them and now we have them stored in the Oregon state office and in addition to other copies that are located in their vault. The next slide we can see some of their plats.



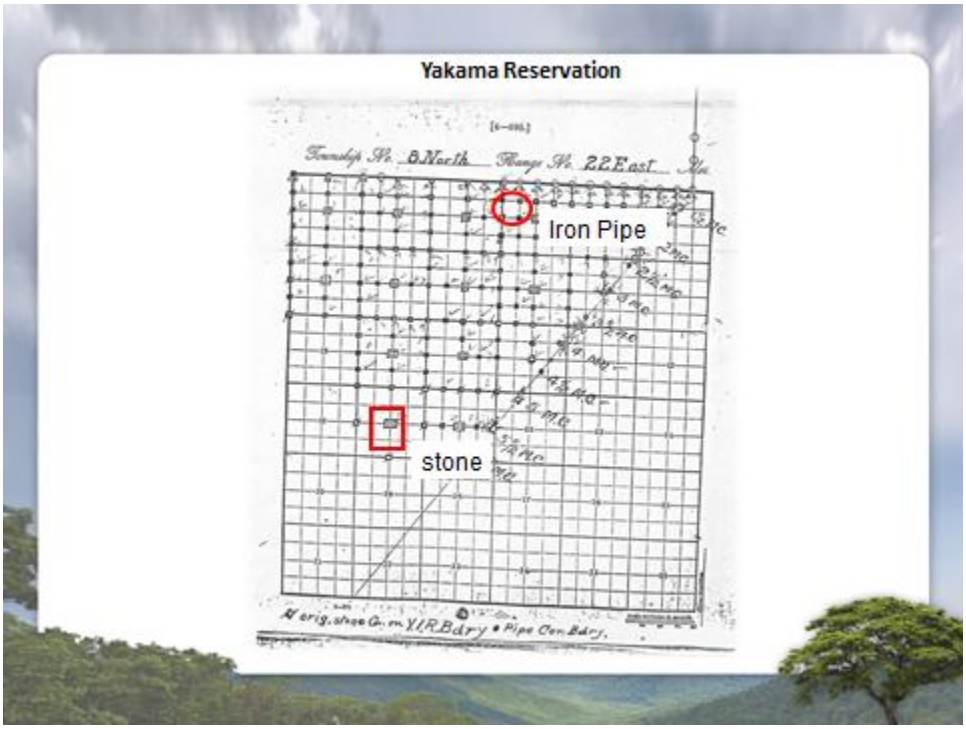
This is just great. I want to look at Section 10 here. We will zoom in here on Section 10, and here even on the plat they show us what they have. You can see that the southwest corner of section 10, they had a large mound of rocks with identifiable section corner posts. And they even had the mound of stone from the original meander corner then from their legend, you can see that this corner was not found. One of things they did with this record. They tried to get them accepted and used by the General Land Office and they simply said it is not to our standards and we are not going to use them.



Well we get seventy – eighty years down the road; these are something I want to work with. People have used and accepted these corners for a number of years; I do not want to change things. I want to work with what people think is the right thing. From my investigation and evaluation of the Bureau of Reclamation records, I was able to work with these. We actually sat down and recalculated all of these positions. If I saw a double proportion of a section corner, I checked their work. Everything checked out great and I was able to work with the monuments on the ground and not try to recreate or redo what they had done back in the 1930s.

I am going to the next part, and we will talk some more about the survey records. Now the Bureau of Indian Affairs has the allotments and United States Indian Service records mostly. On some reservations, the tribes have 638 realty functions and they would be within the tribal realty. Many reservations have microfiche documents relating to allotments and sometimes there are not actual hard copies of United States Indian Service records but you may find actual surveys and even off a reservation that deals with an allotment surveyor having been there. Say before 1920 and surveyed theses off reservation allotments.

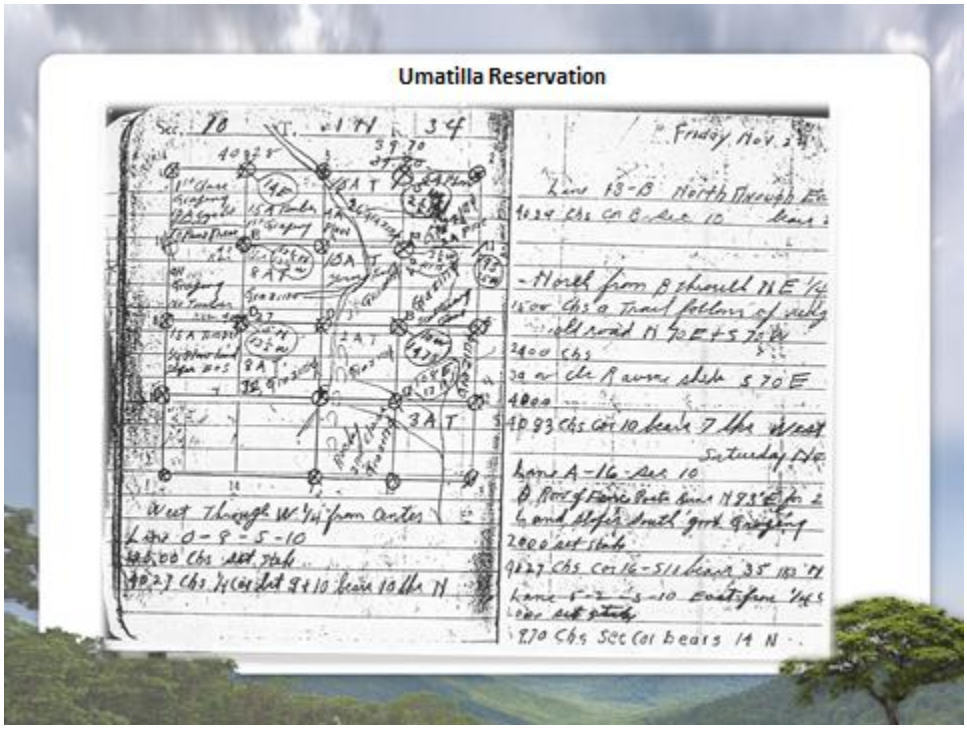
However, in many cases the records are incomplete or simply non-existent. Without good records, it is very difficult to reestablish these surveys because you simply do not know that they have done. You do not know if they had an original stone that they re-monumented, or how they arrived at that corner position. A good example of this is the records that they have for the Yakama Indian Reservation in central Washington State.



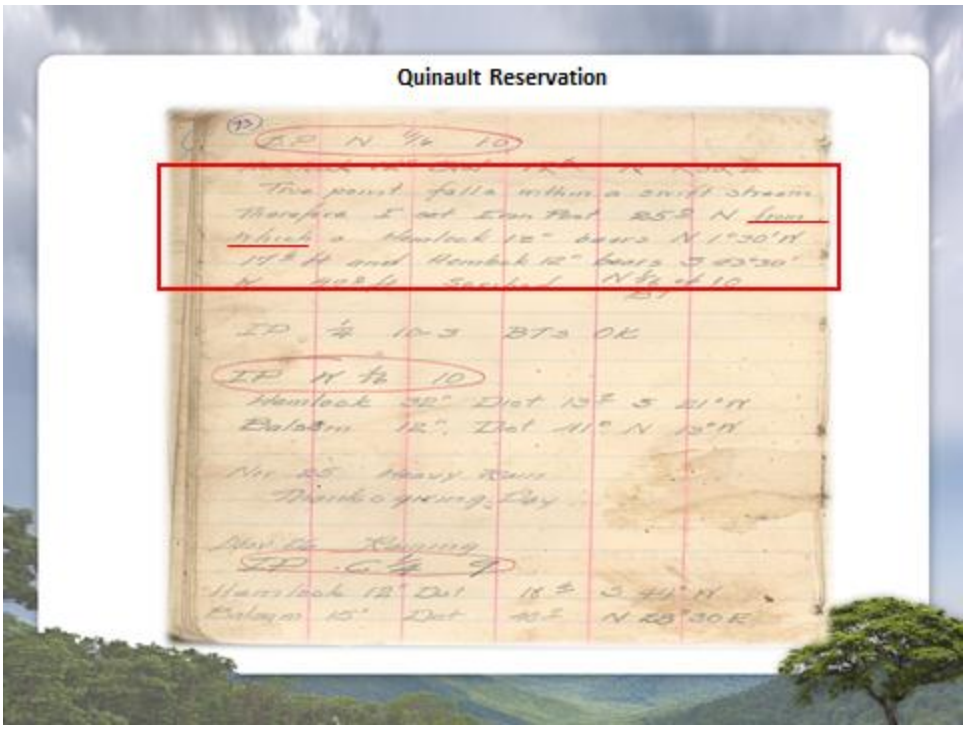
All we can see here is we have a bunch of dots and some boxes. So we can see that if there is a dot on here. They set an iron pipe. If there is a square that means that they set a stone. It does not tell me how they arrived at the position. If it is perpetuation of an original corner. All it says is a monument was set there. This diagram also has interesting documentation in here on the right side of this straight line, you can see the actual mile markers listed for the reservation boundary. It was very common that along reservation boundaries, monuments were not established at actual public land survey corner positions but

they established mile markers and half-mile markers along the boundary to determine the location of that boundary.

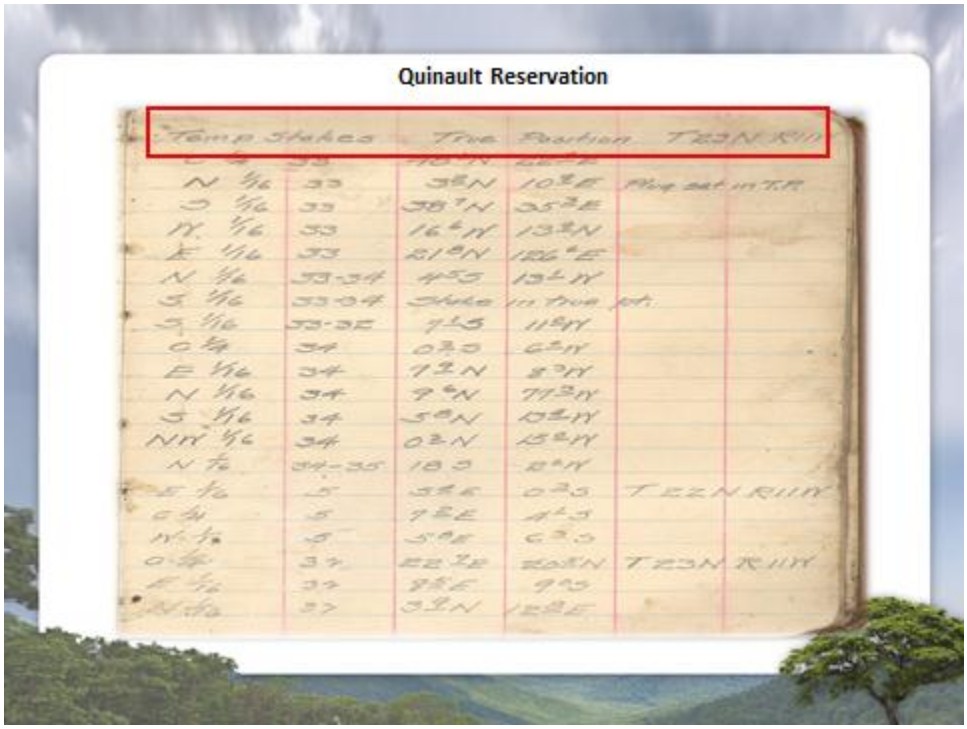
On the next slide we have a copy of the field book from the Umatilla Reservation in Northeastern Oregon. Now these survey records, there is information that is to be gleaned from these. You can see how they talk about the different calls as they are going along. It is at least something to help key you in to what the allotment surveyors were doing at that time.



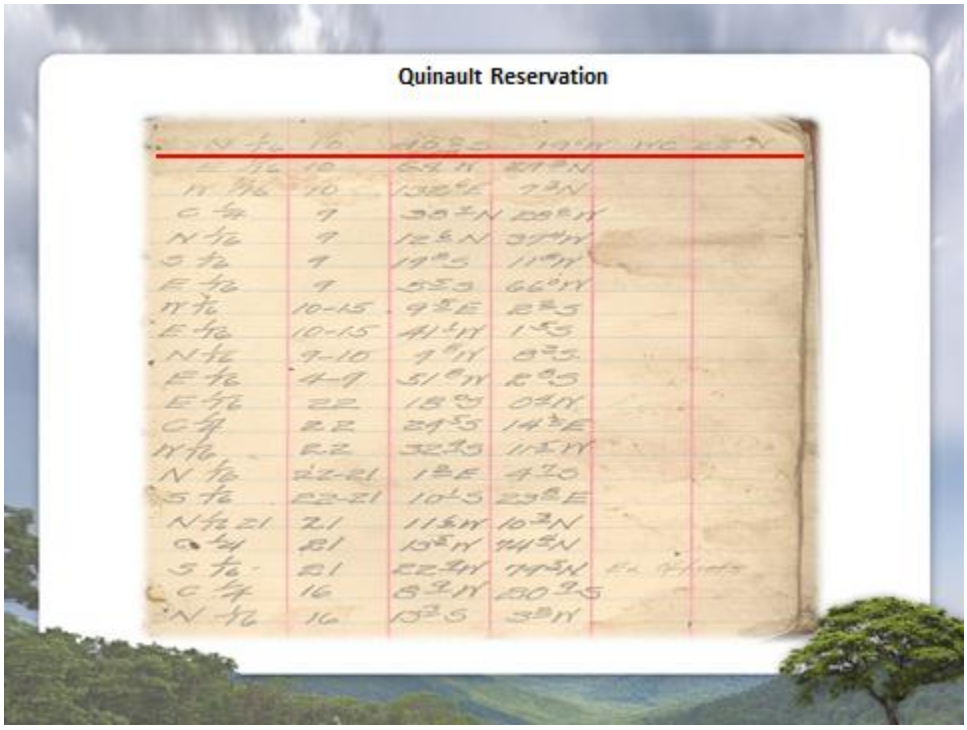
Some records are better than most. These are a copy of the field books, actual field books from the Indian Allotting Agents on the Quinault Reservation. Here it's talking about the North 1/16 of Section 10 where it says the true point falls within a swift stream, so he sets an iron post twenty–five feet North and then from which, he gives ties to the bearing trees.



Now, this is interesting situation. We know that they set the corner twenty–five feet North but what is it? As we look further into the records, we can see it on the next page of these notes where he talks about what are these positions. Here he has his corner positions that are the temporary stakes, then the true position. What these are in the boxes here—these are corner moves. So he has a temp then these are the moves he is going to make to establish the true position.

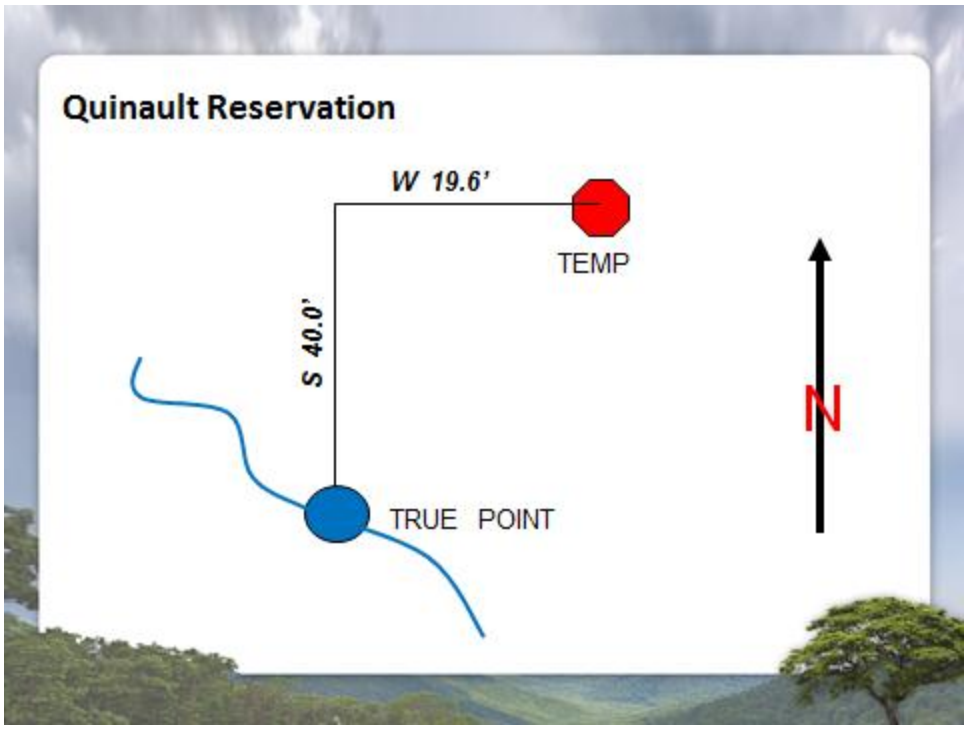


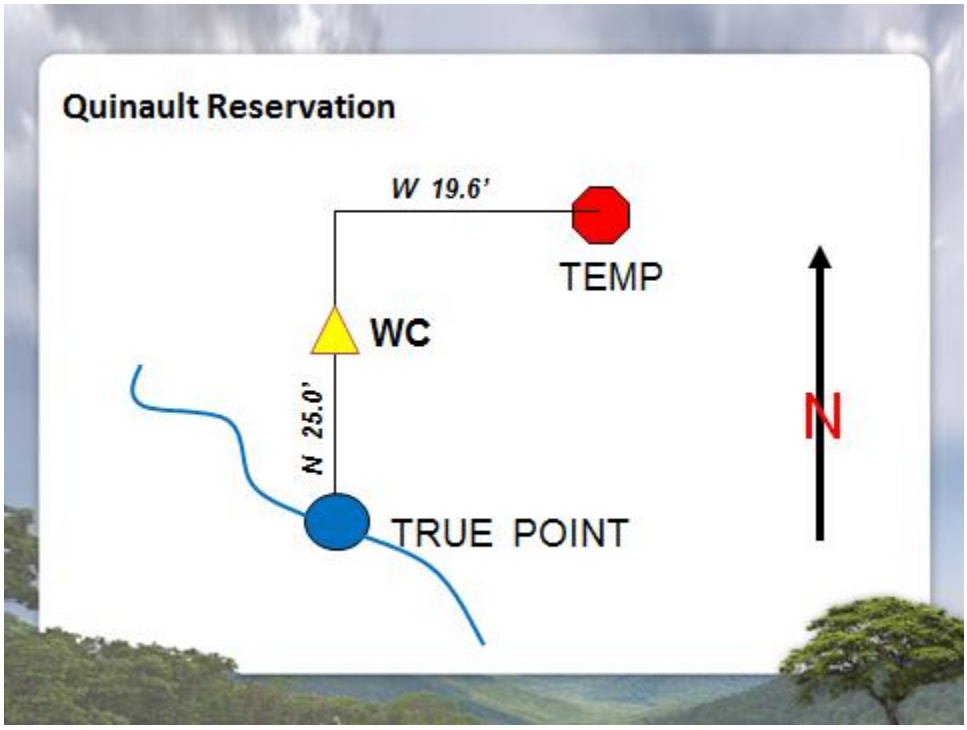
Then we go to the next page in the notes. We see here that the N1/16th of Section 10 and we can see it is a witness corner. He went twenty–five feet north and set a witness corner. Now the question is, this witness corner on the line? Or is it an off line witness corner? We reconstruct this survey because we have the information and we can create a diagram that tries to interpret what they could have done.



Now the Quinault Reservation is very interesting place. I would say, in a sense dangerous. Anytime you step off the road, it is an accident waiting to happen because the terrain can be very steep, uneven and it is forested. It is tremendous forest out there, but because it is on the coast of Washington State, nothing seems to decay very much. You are walking along the ground, well now that is the point, where is the ground, Sometimes you cannot tell where the ground is. You may be walking on deadfall that is 10 feet above the actual ground surface. We know that they had difficulty even maneuvering around and especially chaining out there. So we think about how this person would make this corner move.

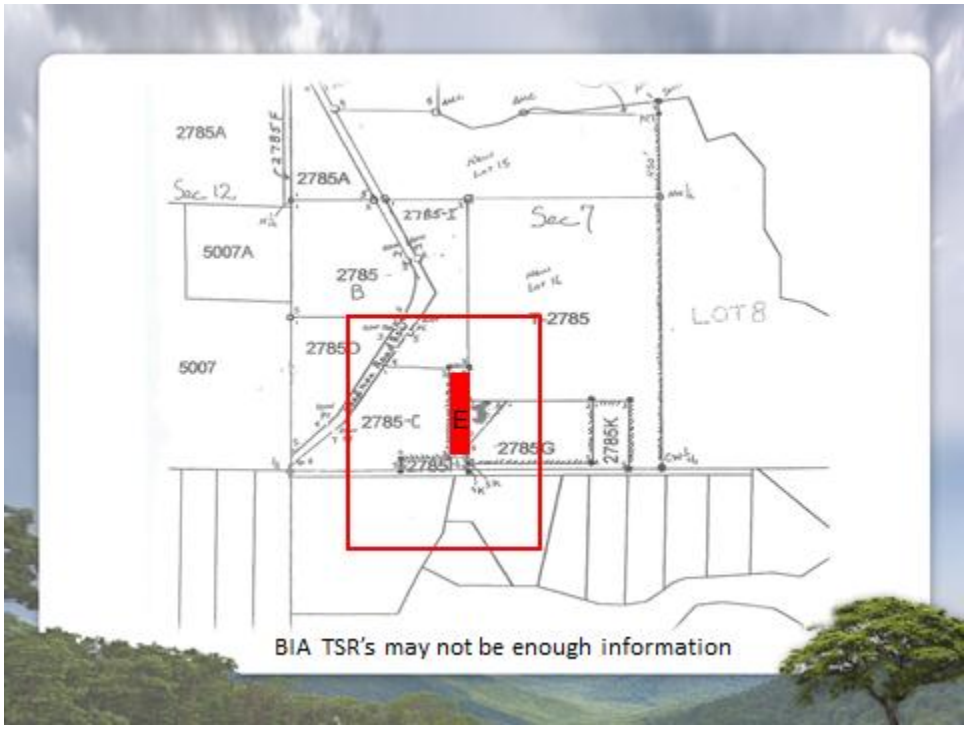
We look at the next slide and we reenact their corner move. Where they went west 19.6 feet then south 40 feet. We are going to assume that they went in cardinal directions because it is what there move said. They cut a line west they cut a line south, and then he says he went north 25 feet to establish his witness corner. So our assumption becomes that this witness corner was on his cut line making that corner move and this an off line witness corner and would be perpetuated as such.





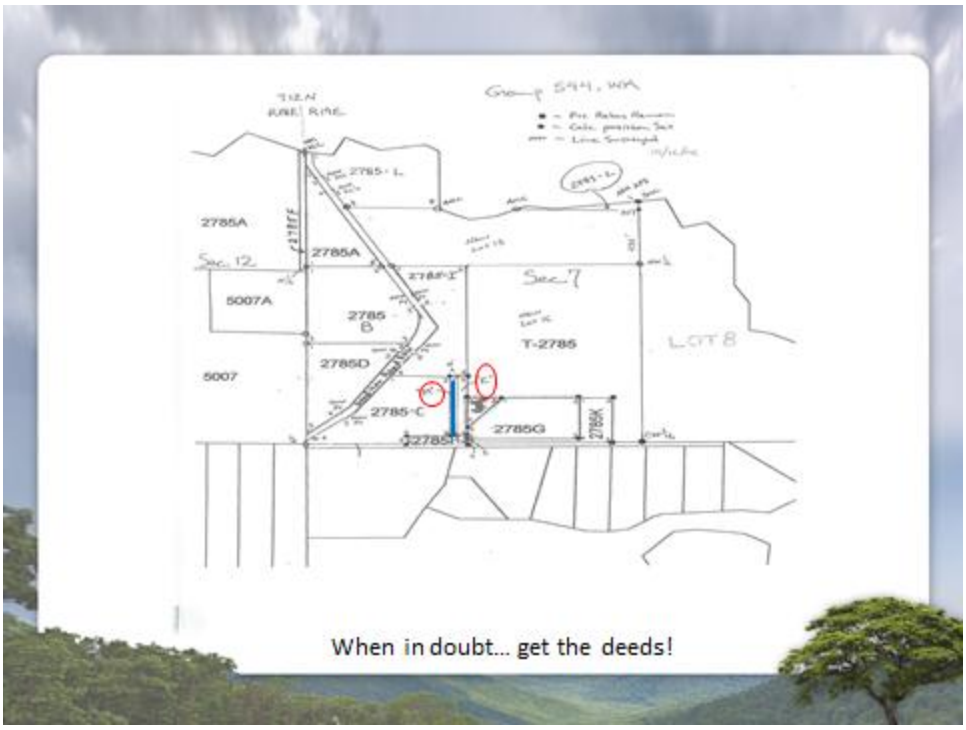
Here is another example of how using the record all the records may be needed to actually figure out what is going on out in the field. I want point out that the Bureau of Indian affairs title status reports or TSRs sometimes that information may not be enough.

Here we see a parcel that I have labeled E. I gathered all of the TSRs and I saw references on the TSRs that show that there were documents associated with it and low and behold these documents were deeds. Actual conveyances of these individual tribal tracts, that became individual ownership and I needed those deeds, because all of the information that I previously had that had been supplied to me to start this project said well that is going to be Parcel E.



Well one day in the field, one the land owners stopped me and I realized now that he was upset about something else, but basically chewed me out and said my survey was all wrong and I tried to talk with him and show him my diagrams and he didn't want to look at that so I backed away. He got me thinking, something is not right here. This person is very familiar with the area and I am missing something. I got all of the deeds and low and behold, what I found as shown on the next slide, that there was another parcel in this area.

The Bureau of Indian Affairs was not aware of but this landowner sure knew about it. He knew that the line I had initially shown for the boundary of E. Well it was the boundary of E, but through the course of conveyances, the legal description had changed and that parcel C actually contained an extra 10 feet cut out of E, and now that will become Parcel M.

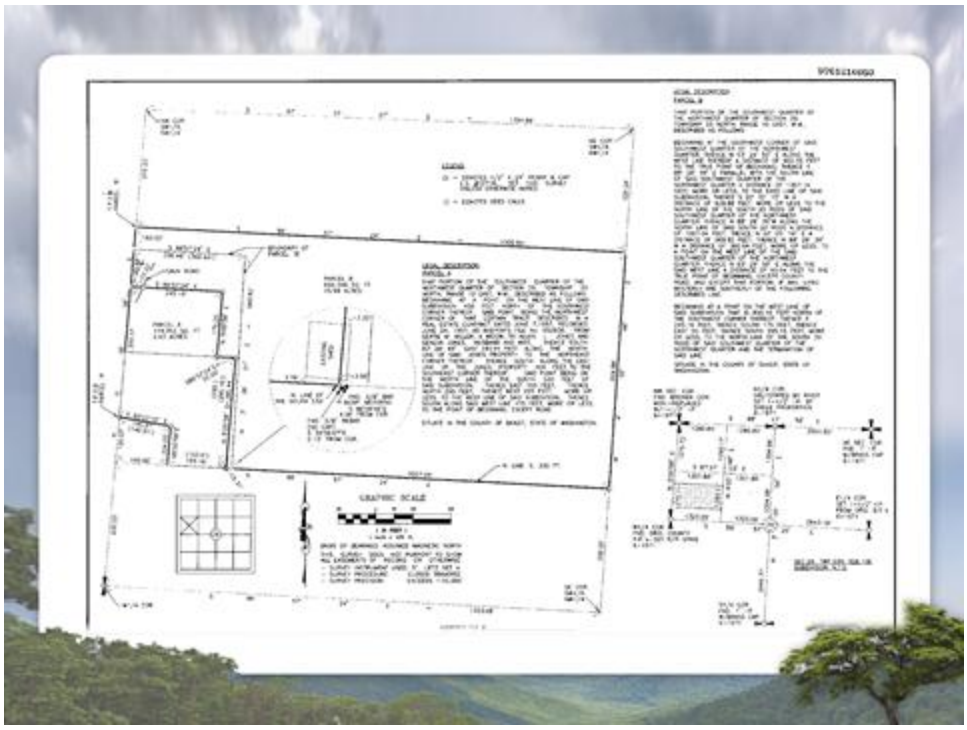


The point is – when in doubt you will need to get all of the deeds, all of the information, TSRs are usually not enough. If there are deeds associated with the TSR – you can contact the locals BILS who can help you get these documents. So let us talk some more, again the BIA has the title status reports (TSRs) for all allotted parcels. Always check the TSR descriptions especially if there are deeds available. There will be a document number listed on that TSR associated with that particular allotment. That many cases are usually just an easement, but sometimes it is an actual deed of conveyance associated with that specific parcel. BIA has the document numbers on these TSRs.

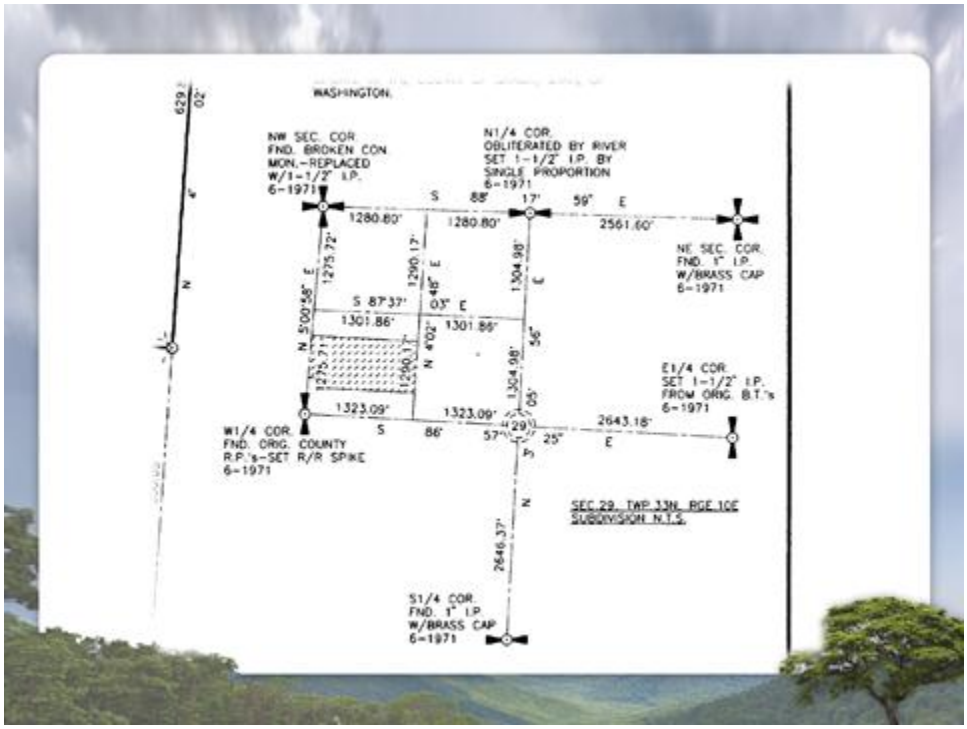
Here I want to show an example of the usefulness of cadastral GIS where placing land lines on top of aerial photography helps gives you an overall perspective of an area. In this particular job, one of the things that I was assigned to do that the tribe was very interested in is this parcel here.

They had purchased this parcel based on a legal description that showed that the eastern boundary of the parcel was somewhere out in this location. However, you can see that this river, this is the Sauk River in Washington State and it has eaten away part of this parcel. This land is simply gone, it no longer exists. This is an important piece of information that gives me some concept of what was going on out on the ground. The Sauk Seattle tribe has purchased this land in fee and was in the process of trying to convert some of the parcels into trusts.

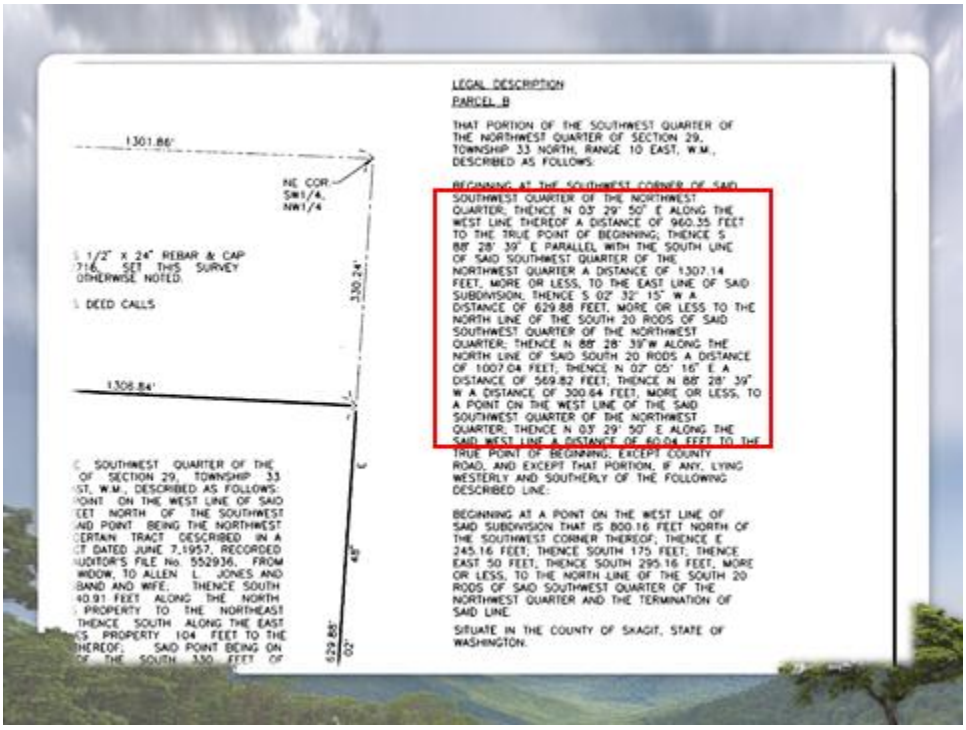
So here we see a copy of the survey that the tribe had for one of their parcels. I like this survey because it provides all of the information that we need to reconstruct what was actually done by the private surveyor.



You can see on this next slide, he provides the section breakdown information. We can determine what he found and how he subdivided the section. Even better, he even includes the legal description.



I would say the only thing missing from this plat is the fact that the deed for this property was recorded prior to this survey. It would have been nice to have the actual auditors file number referencing that deed. Here you see he has the legal description of the property. Beginning at the southwest corner of the property and follows around the tract.



LEGAL DESCRIPTION

PARCEL B

THAT PORTION OF THE SOUTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 29, TOWNSHIP 33 NORTH, RANGE 10 EAST, W.M., DESCRIBED AS FOLLOWS:

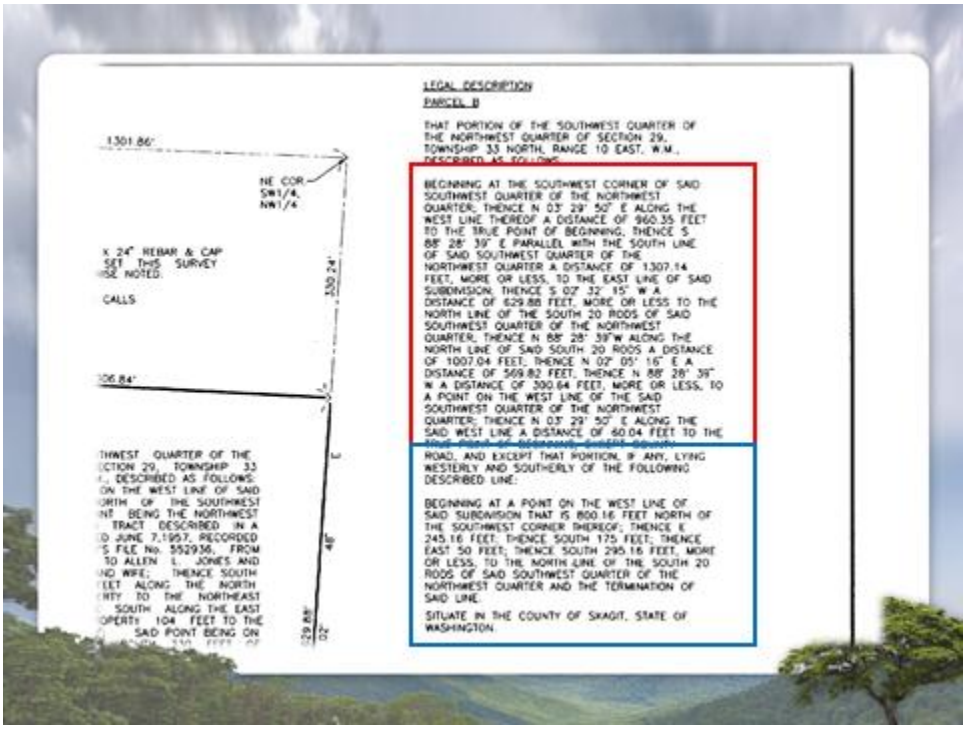
BEGINNING AT THE SOUTHWEST CORNER OF SAID SOUTHWEST QUARTER OF THE NORTHWEST QUARTER; THENCE N 03° 29' 50" E ALONG THE WEST LINE THEREOF A DISTANCE OF 960.35 FEET TO THE TRUE POINT OF BEGINNING; THENCE S 88° 28' 39" E PARALLEL WITH THE SOUTH LINE OF SAID SOUTHWEST QUARTER OF THE NORTHWEST QUARTER A DISTANCE OF 1307.14 FEET, MORE OR LESS, TO THE EAST LINE OF SAID SUBDIVISION; THENCE S 02° 32' 15" W A DISTANCE OF 629.88 FEET, MORE OR LESS TO THE NORTH LINE OF THE SOUTH 20 RODS OF SAID SOUTHWEST QUARTER OF THE NORTHWEST QUARTER; THENCE N 88° 28' 39" W ALONG THE NORTH LINE OF SAID SOUTH 20 RODS A DISTANCE OF 1007.04 FEET; THENCE N 02° 05' 16" E A DISTANCE OF 569.82 FEET; THENCE N 88° 28' 39" W A DISTANCE OF 300.64 FEET, MORE OR LESS, TO A POINT ON THE WEST LINE OF THE SAID SOUTHWEST QUARTER OF THE NORTHWEST QUARTER; THENCE N 03° 29' 50" E ALONG THE SAID WEST LINE A DISTANCE OF 60.04 FEET TO THE TRUE POINT OF BEGINNING; EXCEPT COUNTY ROAD, AND EXCEPT THAT PORTION, IF ANY, LYING WESTERLY AND SOUTHERLY OF THE FOLLOWING DESCRIBED LINE:

BEGINNING AT A POINT ON THE WEST LINE OF SAID SUBDIVISION THAT IS 800.16 FEET NORTH OF THE SOUTHWEST CORNER THEREOF; THENCE E 245.16 FEET; THENCE SOUTH 175 FEET; THENCE EAST 50 FEET; THENCE SOUTH 295.16 FEET, MORE OR LESS, TO THE NORTH LINE OF THE SOUTH 20 RODS OF SAID SOUTHWEST QUARTER OF THE NORTHWEST QUARTER AND THE TERMINATION OF SAID LINE.

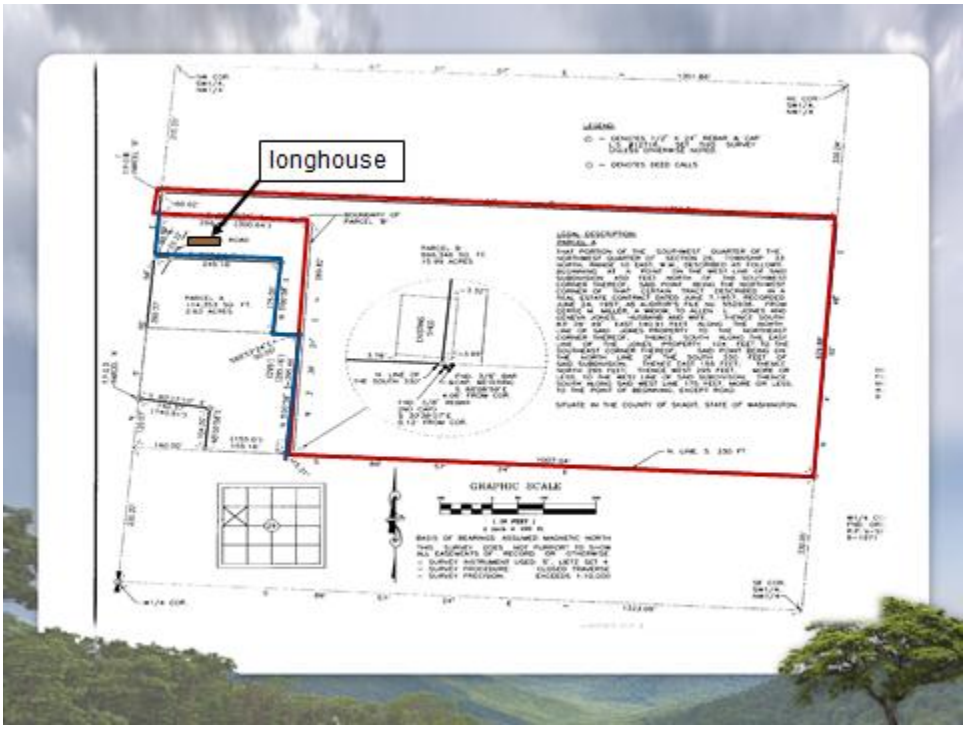
SITUATE IN THE COUNTY OF SKAGIT, STATE OF WASHINGTON.

On the next slide you can see that this is the tract that he is describing, it is actually the housing area of the tribe. What is interesting about the legal description is at the end where here, he gives an exception that is proving to be somewhat difficult in determining property ownership. But this is the way the deed was written, where it says, except that portion if any, lying westerly and southerly of the following described line.

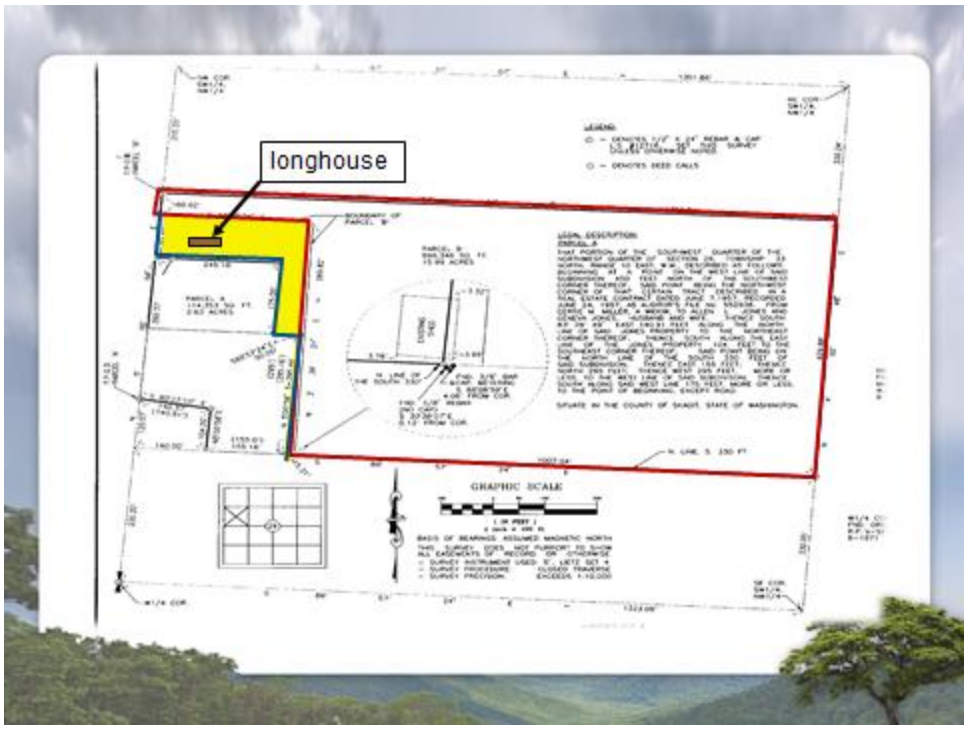
So on this slide; we can see that the blue line, the blue line represents that legal description where everything south and west of it is not included. Just as a point of reference, here is the north arrow. Great everything south and west of that line is excluded.



Well that leads to a little bit of a problem. As you can see they built the long house on property that they believe is theirs. In here, there is an exclusion or a gap in their legal description. We actually sent this to the regional solicitors and asked for their opinion. Our determination is by his legal description which is the deed that they purchased (the entire area in yellow) may not be tribal land and if we have some unknown facts in the deed, we need to clear these up before this property can be brought into trust.



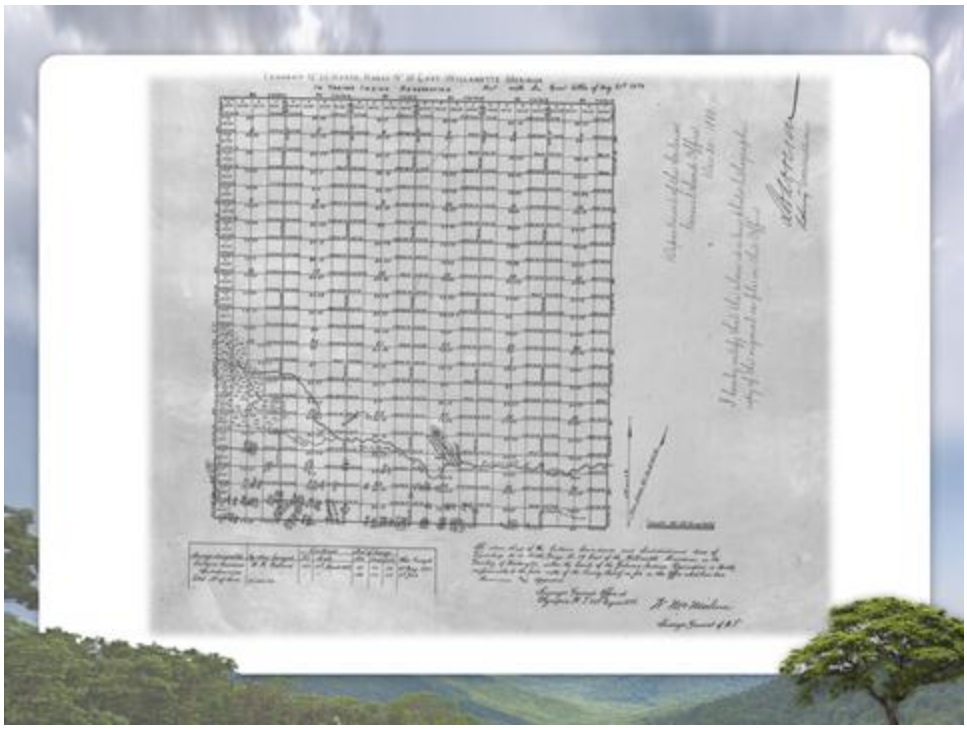
This looks not really a surveying situation but more of a realty concern but the solution just may be that the tribe may have to go back to the person or heirs or people they bought it from and get a quick claim deed. Because obviously they think they own it and the person they bought from did own all of the property and could have conveyed this to them probably meant to. By the legal description we were not able to prove that they actually own this piece of property. That is another important aspect of your task in dealing with the Indian Nations or anybody in general that people think they own something.



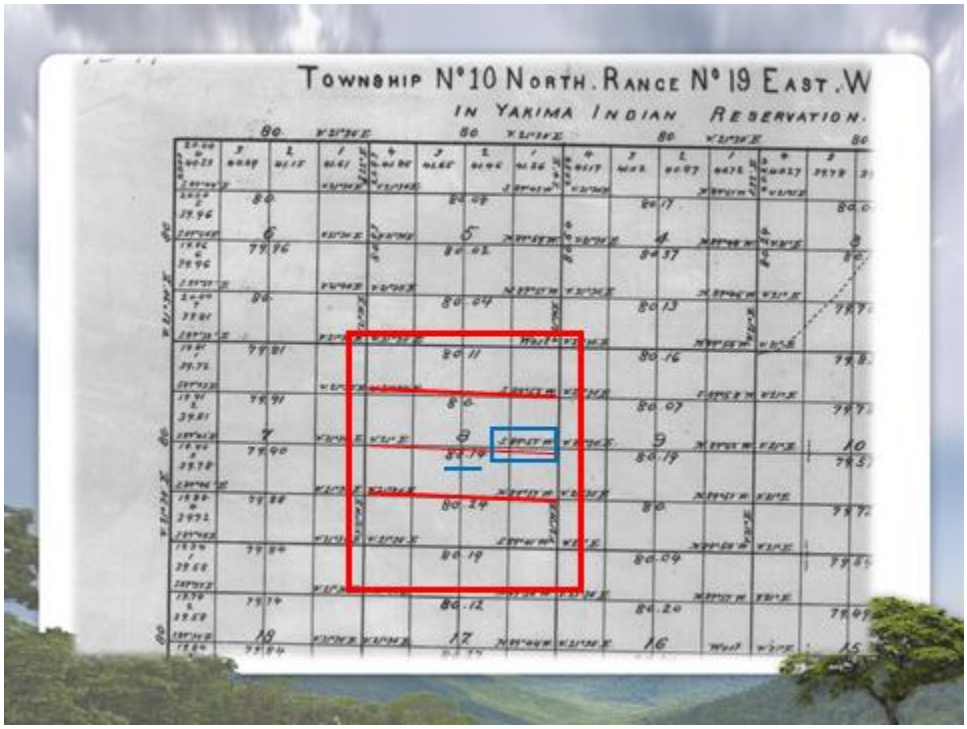
Another basic fact or one my little rules, people do not put money or effort in building improvements unless they believe that they own the property. In this particular situation, the legal description did not provide enough information to prove that they own that piece of property where they built their longhouse.

Let us talk about some of the misconceptions some people have about General Land Office records. What I was taught in college is that the first survey is the controlling survey. That is what you start with, that is what everything was built on. Well the reality of the situation is that the first GLO survey may not be the controlling survey. It is not always shown in the record. They do not go back and stamp these plats with rescinded or overwritten or not in use anymore, they are still there as part of the record.

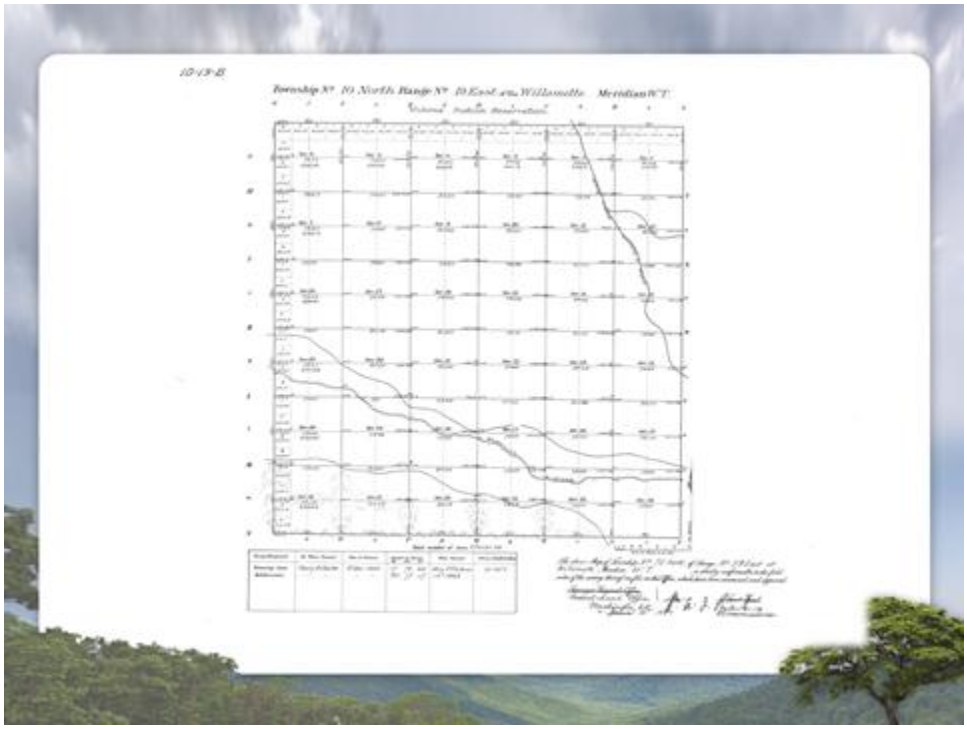
What we do use, is the date of entry, the first interest in the land or the patent date wherein that piece of property was conveyed from federal interest into private holdings in fee or even into trust. A common occurrence on the Yakama Reservation is a series of surveys. In here we have one of the original surveys done on the Yakama Reservation and you can tell by all of these lines in here that this is a three mile township.



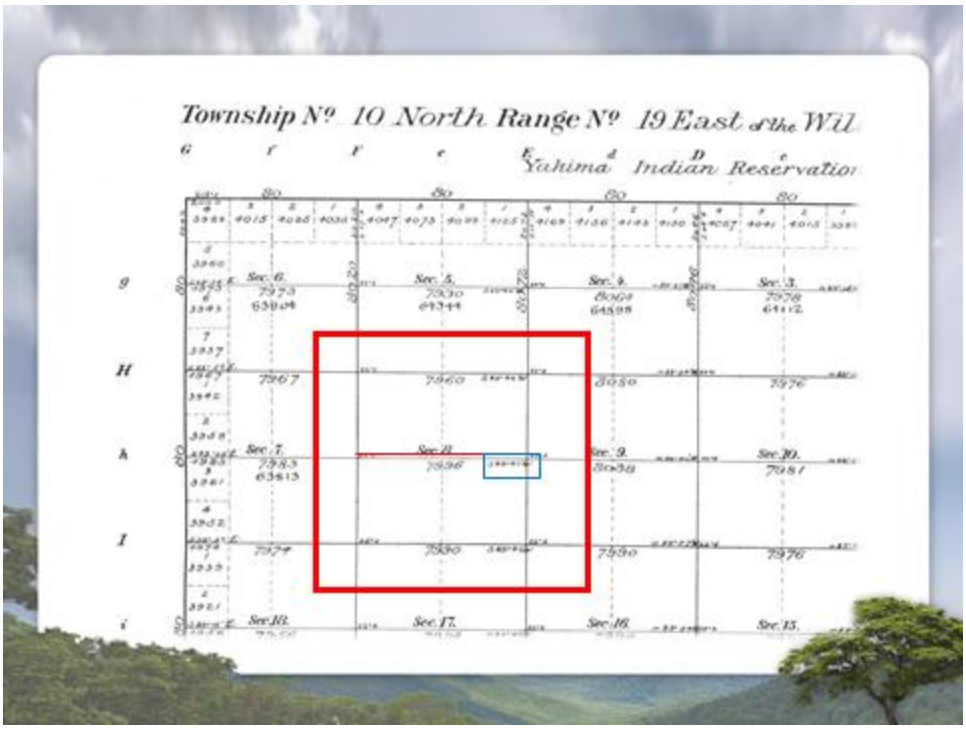
Let us focus in here on Section 8. Here we see in Section eight, while we have three lines typical of a three mile survey done east to west, where the center of the section was set at midpoint, the center south 1/16th set at midpoint east west and the center north 1/16th set at midpoint east west. None of the north south lines were surveyed.



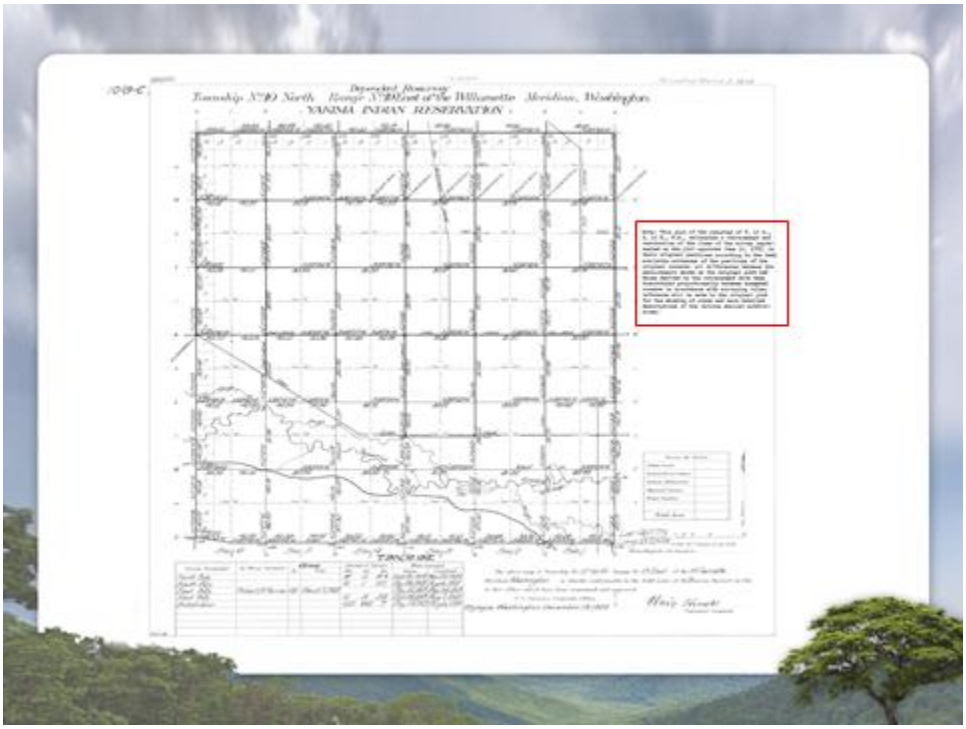
Well what is interesting about this is this survey was done about 1865, was redone in 1879. Here let us focus in again on Section 8. Here we see the next survey; well he did not do a three mile subdivision.



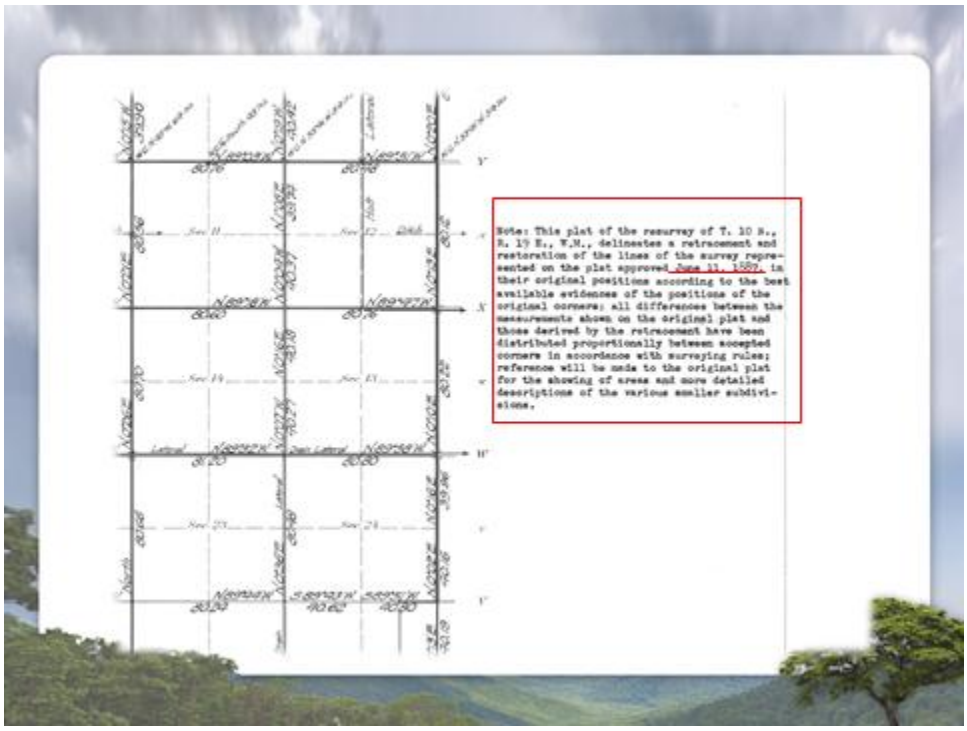
All this man did was survey the east west center line and he established his center of the section at midpoint east west. You can also see there in the blue box that there is the bearing of that section line. Not only did he not run any of the north south lines but also he did not subdivide this section by the three mile method.



But when you go through the calculations you find that yes the center is set midpoint east west, but on this slide here, the remainder of this section was actually subdivided by normal rectangular methods so that the center south 1/16th is at midpoint north south, the center north 1/16th at midpoint north south again and all of the interior, north east, south east, south west, and north west 1/16th corners of this section were determined by intersection not the typical three mile.



Now there is nothing shown on that original survey plat that states that it has been superseded by this second survey. But the records, the parcel records going into fee, the allotment records going into trust, their dates all are after this survey, after 1887 and the only other reference that we get is in the next federal government survey which is shown on this slide which was done about 1918. Up in the red box we will focus in on that. It actually refers you back to the correct survey, that second survey, not the original three mile survey. So the only place you will see that reference as to which is the proper original survey is on this later plat.



In researching the record, you would think, and that normally it is the case, the original or the first survey is the controlling survey, but it is not always true. That is why it is so important to gather all the records dealing with that township, so you can abstract and compare and contrast them against each other to determine which is the controlling survey.

Now here I state that local surveyors have records prior to the Recording Act. In fact, some states do not have Recording Acts. Prior to the Recording Act in the western states, well that was what the value of the survey office was. When you bought a surveying business, what you were really buying was not only the clientele but there survey records. There has been no mandate to have the older surveys recorded and filed and put in public record. So they are still only contained in the offices of these private survey companies. That is why it is very important to be an active member of your local surveying association to make these contacts with your peers and exchange information and talk about do you have this have you seen this.

I am currently looking for records of the Simpson Timber company up in Washington State, so I have made contacts with private surveying firms trying to locate these records. Well as a matter fact today there is no Simpson Timber company office in Washington State. I am looking for these records and hoping that my contacts with the local surveying association can help me to determine how the monuments I found in the field how they were established. What they are related to are they perpetuations of an original record or are they reestablishments of lost corners?

Another interesting fact is that not all surveys on Indian lands were recorded. It is my understanding that in the state of Arizona, the counties do not allow survey records on Indian reservations to be recorded. I dealt with this same type of situation on the Yakama Reservation in Washington State where the local surveyors felt that it was not necessary to record them or in some cases when they were hired by the tribe, they were instructed by the tribe not to record these surveys. It was in the same idea as attorney client privilege. They were their personal privileged information and they did not want them out in the public.

It took me about 10 years and a lot of talking and convincing to finally get the tribe to agree and the private surveyors to agree that they would record these surveys so that information was out and available to anyone doing surveying work on the Reservation. There may be records in an office on the Reservation that were never recorded. Surveys in the county and that could be well in the tribe's road office, or where I worked on the Yakama Reservation, they were in the Bureau of Indian Affairs Soil, Moisture and Conservation office. They were the people who dealt directly with those peoples leasing Indian lands and developing farm plans. Their agriculture engineer kept a separate file of these survey plats done on the reservation. There are number of records not recorded.

Other sources of information that we have used from time to time are the federal regional archives. Of course the Bureau of Indian Affairs has started to archive all of their records in Lenexa Kansas. Access to that is getting better. I have been trying to do research there and they have contractors that you need to contact who actually go in and do this type of research. You cannot go there and do research at this time.

There is the National Archives in Washington DC, and most tribes have some type of an Archive. I can almost guarantee that you can never get inside a tribal archives vault, but if you are persistent and determined you can get information from these different sources by simply asking again and again. Being persistent that these are records that you really need to enable you to help them determine their land status and do surveys on their property.

I would like to kind of surmise and bring out some examples of why you need to have all of the records. Again I do this work prior to going to the field. Gathering all of this information so I am very well informed about what I am looking at in the field. Now you need to compare and contrast these different pieces of information to determine what is really going on, where am I going to look and how can they narrow down my search area to put me in situation where I can succeed. Where I am going to be successful in recovering these corners.

Sometimes it is a matter of developing a chain of title. This is something that you should sincerely consider budgeting time for the research. It takes time and may instances I have had to go back to a county three times. It is like my home projects. Every project I start takes three trips to the hardware store. Well, the same with record research. It seems to be, at time, at matter of saying the right thing to the right person. Maybe because the person you talked to the day before was not there that will lead you around the corner to another room and there are the records that you need. It always seems to be someone in the county who knows where this stuff is.

It is a matter of being persistent and that planting of seeds and plants the idea in people's mind of what you are looking for and they deal with records repeatedly. Again I have been called back because they think that they have found something. I think I found something you were interested in. Let us go back down in the basement in the old jail and I bet we will find it this time and it is worked.

Also want to talk about the need to organize all of the documents. I talked before about working for the federal government all surveys that I do are subject to protest and appeal. I address and prepare all surveys as if they are going to be litigated. Gathering all of the information in an organized fashion, indexing all of my field observations and I create a packet of all information pertinent to the project. Nothing I do goes onto a final form without a very thorough review. I have to create a packet that someone else can pick this job up cold and be able to follow exactly what I have done and hopefully come to the same conclusions.

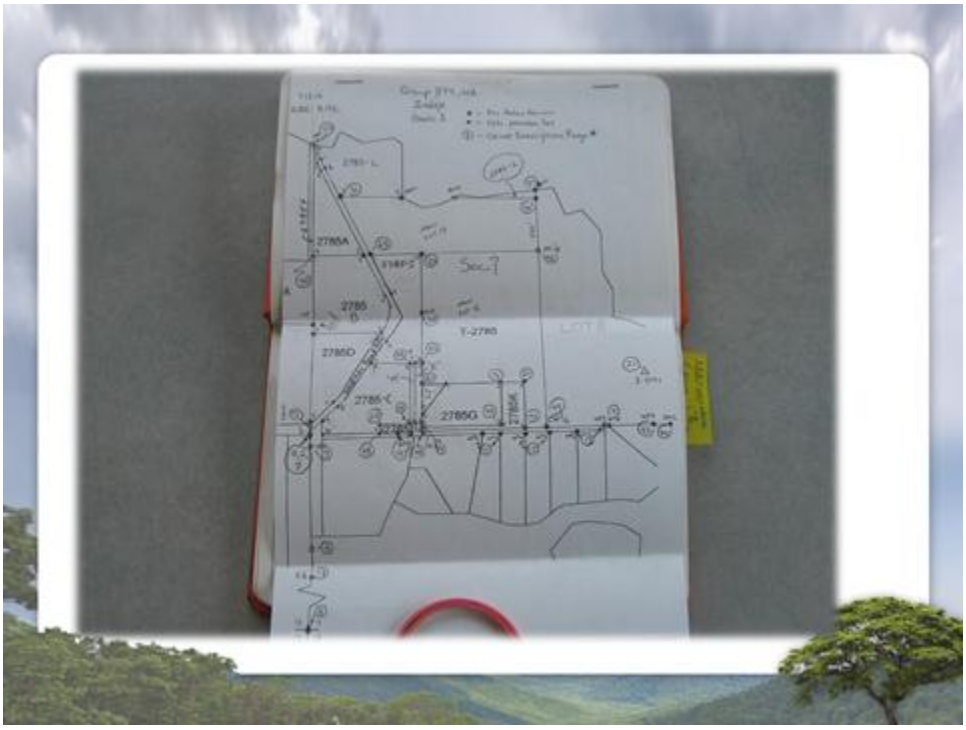
That is one of my other little rules is I do not like the lawyers and judges to read me the law. Yes, that is there expertise, but I find it important to try to lead them to the proper conclusion by surmising and gathering all of the pertinent information, so that they can come to the proper conclusion based on the facts that I have collected.

Something Bob Dahl once said, in gathering information for very complicated situations, it is not a matter of everyone agreeing on the outcome, but at least agrees that we have the right facts. That these are the facts that are pertinent to the situation but let us see what shakes out. Let us at least agree on the facts. Again the preparation for litigation being well organized, having very logical and readable arguments that someone else can follow to your final conclusions.

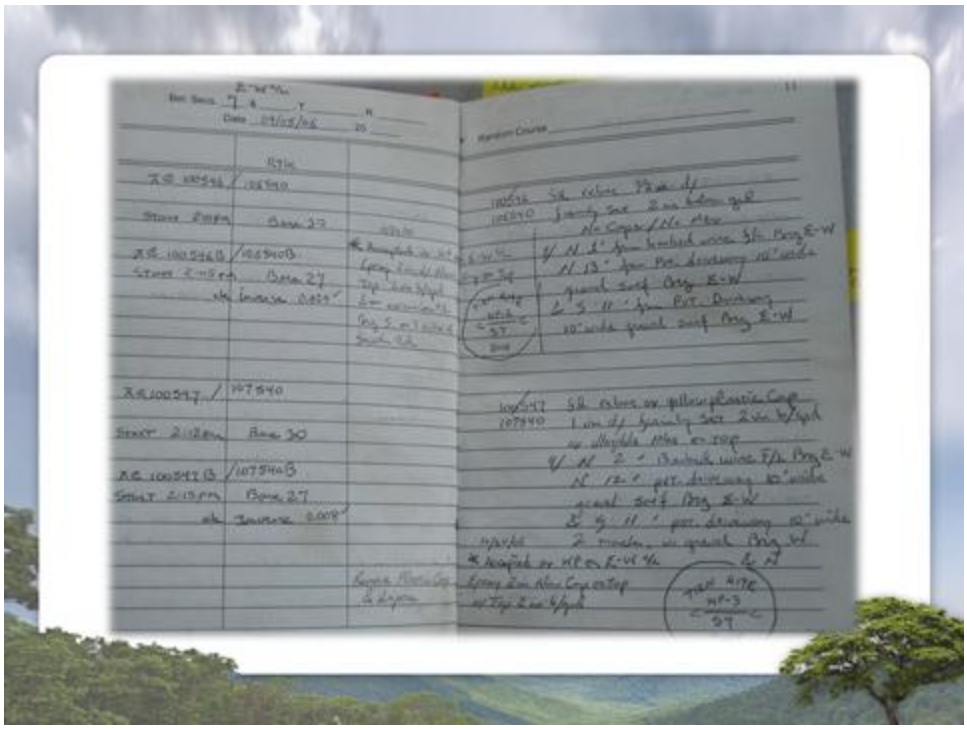
So on the next slide is an example of one of the packets that I put together. Everything is organized into folders. There are different folders in here for all of the surveys, all of the TSRs or legal documents, background information. Everything is organized into a separate folder into one packet.

All of my filed books are organized and well indexed. Here is that same situation with my Parcel E and M. This index in the front of the field book will lead anyone opening up this book to the proper page of that specific corner description.

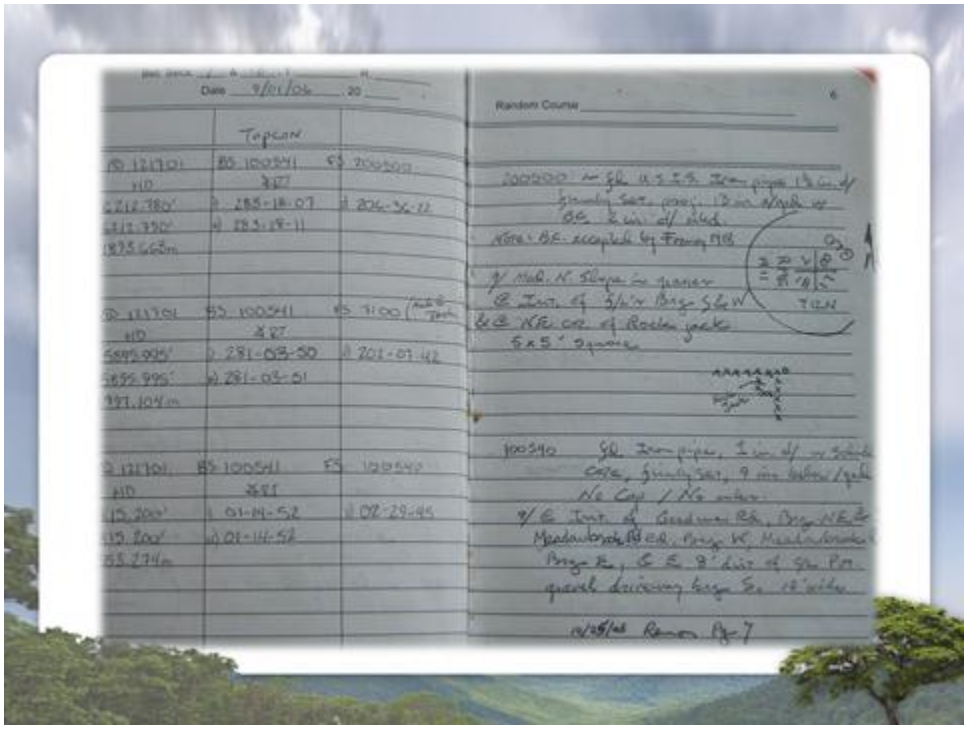
Here is an example of some of the records that I keep in the field. Where you see here I am using my GCDB identifier number, GCBD is the geographic coordinate database that can be used for a specific coordinate identifier in any township. Always documenting exactly what I found, just write down the facts.



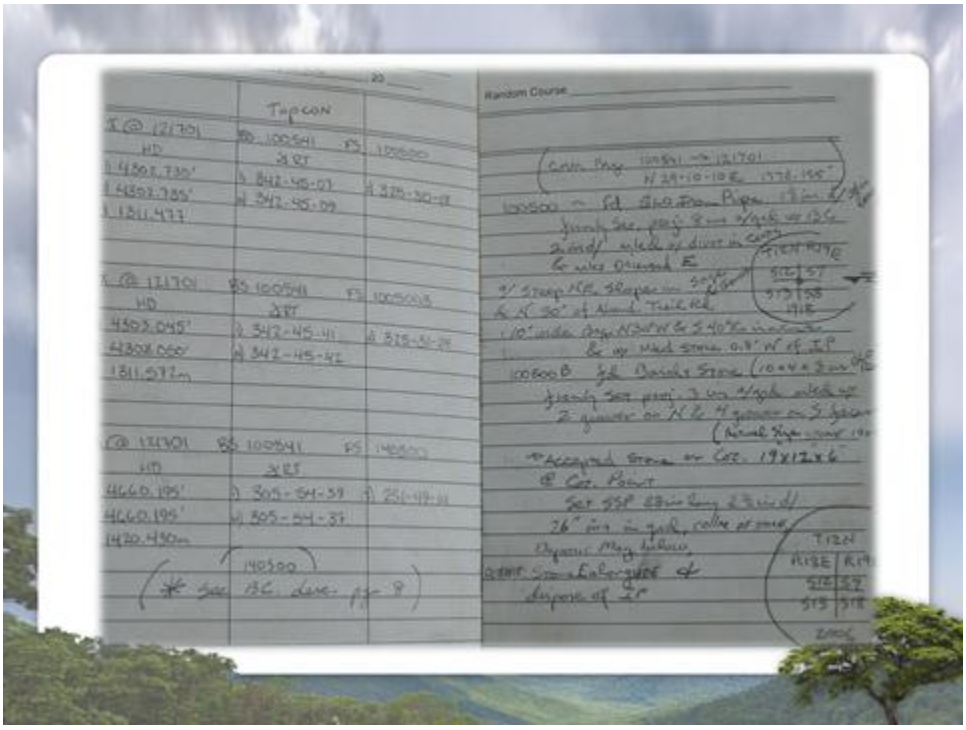
I found a rebar half inch in diameter. That rebar was firmly set and projecting two inches above the ground. Then also a description of what I had done there. In this case, you can see that I accepted this corner and remonumented this position and since it was on the line, it was not an angle point but was utilized as a witness point.



Here is another corner description; in here this is a recovered United States Indian Service iron pipe. You can see here that this iron pipe was originally established in 1911. I also included a little description here that shows its relationship to a rock jack that it was not exactly at the fence corner but immediately adjacent to this fence corner intersection.



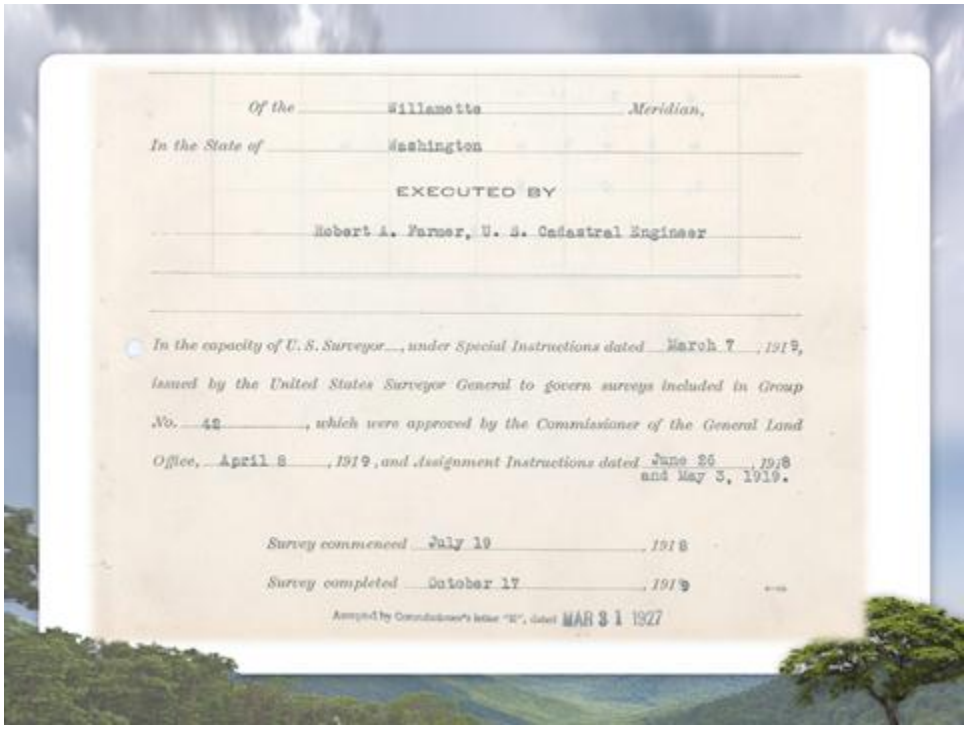
Something else that is of interest here. I make notations as to what type of instrumentation I was using. In this case it was done by terrestrial methods and I was using a Topcon. You can see my distance measurements and course you can see two angular measures to confirm or provide redundant information that the corner was tied in correctly then to a closed figure.



Here is another corner description again, my GCDB point identifier 100500, for the corner of sections 7, 18, 12 and 13 of the west boundary of township twelve north range nineteen east. In this case, here we found two monuments. There was a GLO iron pipe that was established in 1918, but immediately alongside we also found a basalt stone so here I have two monuments.

If you remember previously from one of Dennis' presentations he talked about the GLO, early in the years setting iron pipes immediately alongside or adjacent to marked stones. In this case, we determined that the marked stone was the corner and not the iron pipe. We got that information by looking at the field notes.

On the next slide we see that this survey was done by Robert Farmer U.S. Cadastral Engineer between 1918-1919. In his corner description of that same corner, he says that he set his iron pipe alongside north of the stone. Our determination for this particular corner was that the original set stone is the actual corner monument and that the iron pipe set by Farmer in 1918 is simply an accessory to that corner.



Of the Willamette Meridian,

In the State of Washington

EXECUTED BY

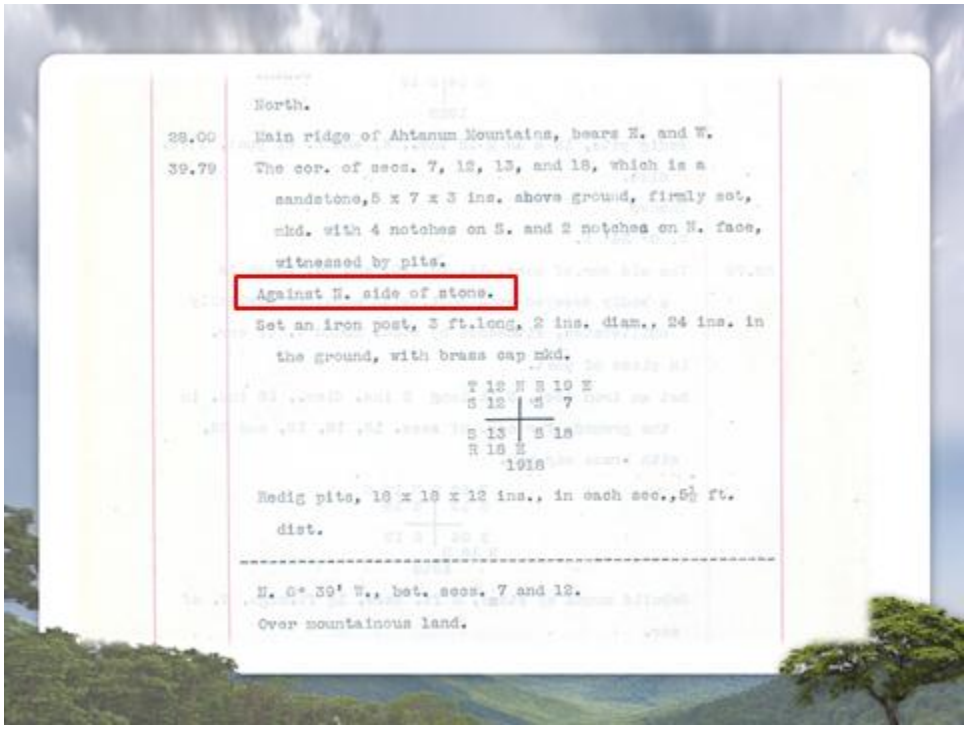
Robert A. Farmer, U. S. Cadastral Engineer

In the capacity of U. S. Surveyor, under Special Instructions dated March 7, 1919, issued by the United States Surveyor General to govern surveys included in Group No. 42, which were approved by the Commissioner of the General Land Office, April 8, 1919, and Assignment Instructions dated June 26, 1918 and May 3, 1919.

Survey commenced July 19, 1918

Survey completed October 17, 1919

Accepted by Commissioner's letter "E", dated MAR 31 1927



North.

28.00 Main ridge of Ahtanum Mountains, bears E. and W.

39.79 The cor. of secs. 7, 12, 13, and 18, which is a sandstone, 5 x 7 x 3 ins. above ground, firmly set, mkd. with 4 notches on S. and 2 notches on E. face, witnessed by pits.

Against N. side of stone.

Set an iron post, 3 ft. long, 2 ins. diam., 24 ins. in the ground, with brass cap mkd.

T 12 N R 19 E
S 12 | S 7
S 13 | S 18
R 18 E
1918

Redig pits, 18 x 18 x 12 ins., in each sec., 50 ft. dist.

N. 0° 39' W., bet. secs. 7 and 12.

Over mountainous land.

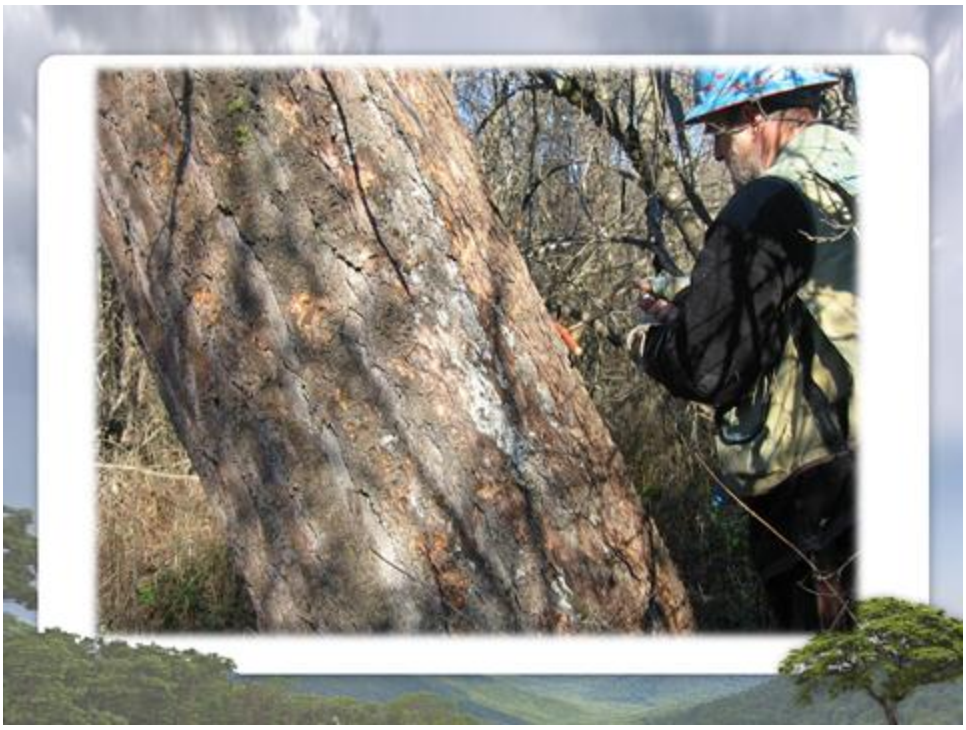
So we remonumented the stone, with a stainless steel pipe and buried the original stone alongside. I also removed the iron pipe and buried that alongside but only preserved one corner position for that section corner. This was a specific case and we had evidence that clearly said that the iron pipe was not meant to be the original corner it was an accessory and at this particular location, it is surrounded by federal land. We were not encumbering any private surveys or private land by distinguishing between the pipe and the stone. The stone was the original and accepted corner.

Part #2 Preserving the Evidence

Let's move on to Preserving the Evidence. I want to talk about bearing trees with healed blazes. Talk about how you would open the blaze and a little trick that perhaps would enable you to not open the blaze and disturb the tree. The use of an increment bore to age a tree and to age the date of the blaze.

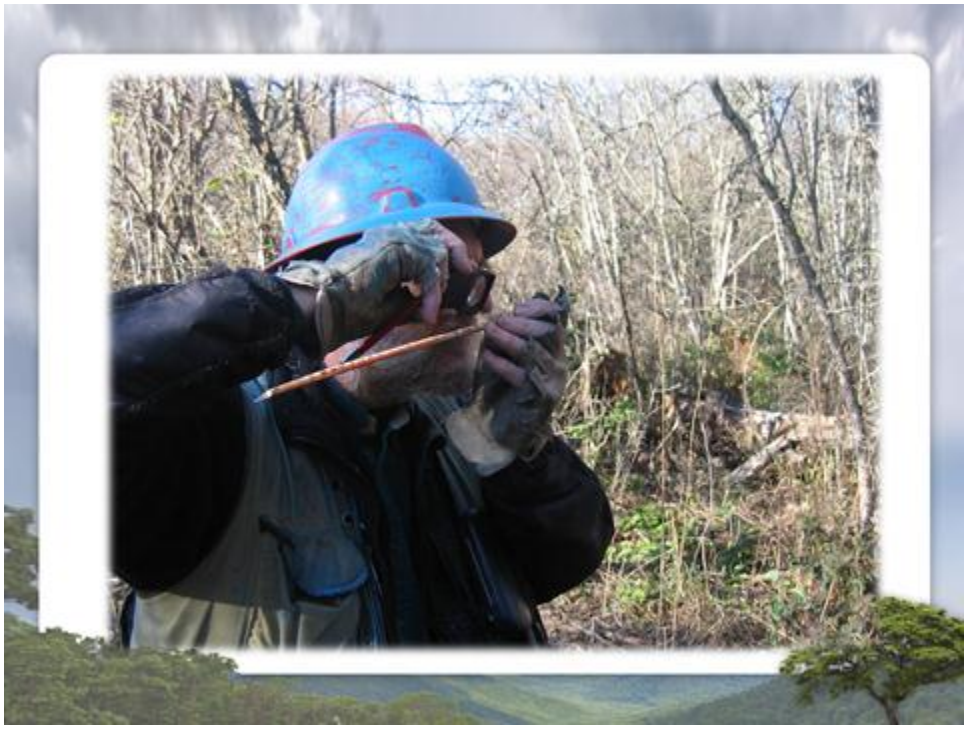
Something you might consider when you need to increment bore and an age a tree is to ask for professional help. I am working on a project on the Spokane Indian Reservation where the age of the trees that we found out there is going to be very critical in the final determination of property boundaries. I asked a BIA Forester shown on this next slide and this is Ted Hensel.

He is a professional forester with the Bureau of Indian Affairs and he is very familiar with the trees in this area. As a routine part of his job, he cores several hundred trees a year. Here we see Ted and he has the increment bore and this way it works.

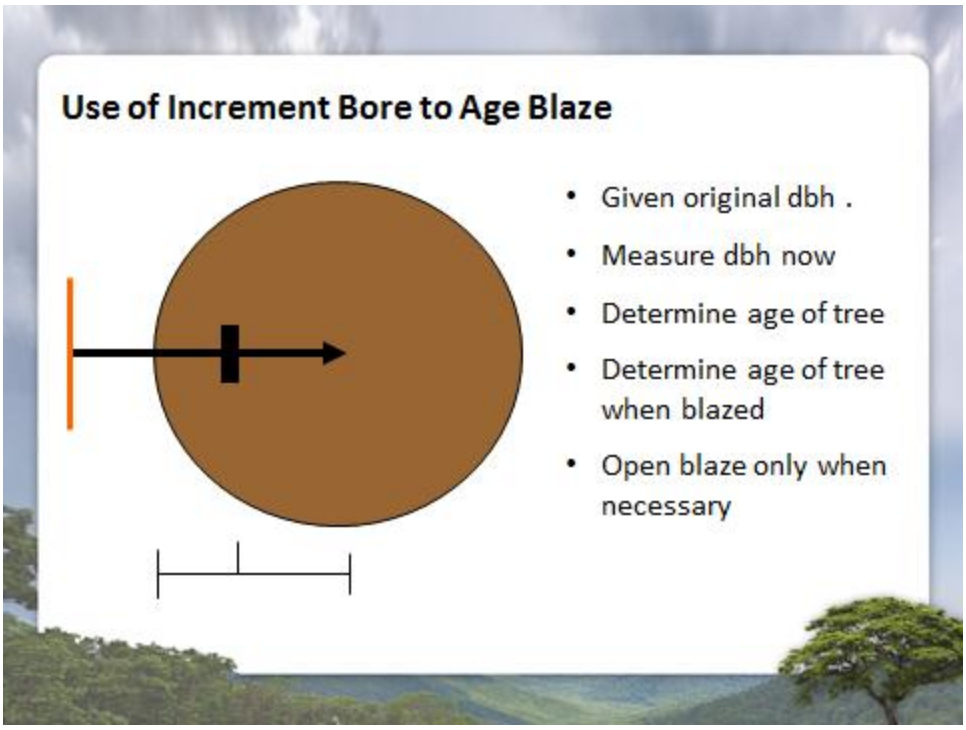


Here is the handle that you actually turn, it screws into the tree, and here is the actual boring part that will go into the tree. The alignment here is that Ted is actually trying to aim that bore right into the center of the tree to try to encompass all the rings to get an accurate core date. Here we see that the handle is screwed all the way into the tree. It was almost at the limit of his tree bore. Then what he is doing is sliding out the core sample here.

Then you count the rings. It is very typical that when a tree is very young the rings are widely spaced. Then as the tree gets older, they get more and more tightly packed. Here you can see Ted using a magnifying glass to count the outer rings of the tree. This particular tree aged out at one hundred and fifty years and it became a critical part of my research and investigation of this project. There is nothing wrong with asking for professional help on something that is not normally along your line of expertise.



Here is a little trick to use an increment bore to date the age of a blaze. Sometimes it will even help you to determine if it is a blaze because trees get scared out in the woods by logging activity or even just naturally by other trees falling over. In the original notes you are looking for this bearing tree you will be given the original diameter at breast height. Of course, all foresters breast are four and a half feet off the ground. Then by measuring the diameter of breast height, now you get some idea of the amount of growth that has occurred.



Using the increment bore and going directly through the face from the healed blaze through the blaze to the center of the tree. You can determine the age of the tree and there will be a discoloration in the core sample that you will be able to decipher that. This is where the blaze is it will be a darkened portion in the ring count.

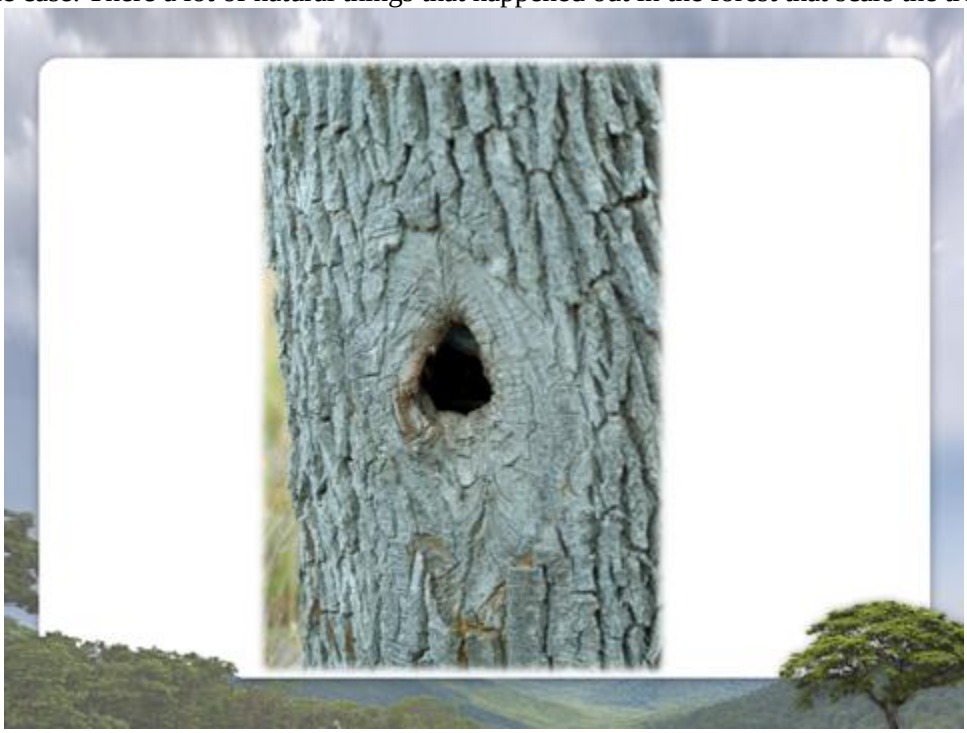
You will be to determine the age of the tree when it was marked and then determine how many years it has been since that the tree was marked. Opening a blaze or healed blaze is very difficult and rather dangerous with a chainsaw. Because you need to use the point end of the chainsaw, you are subject to kickback plus it scars the tree again. It can be very useful when you absolutely have to determine that a tree is a marked bearing tree. You will get those nice reversed markings on the core sample that is removed.

Only open blazed trees when absolutely necessary. This little increment bore technique can help you determine whether you are really looking at a tree that could have been marked at the time of the original survey.

Now let us look at both sides of the original scribed tree where we have not only had the original scribed portion but the cut out portion with the reverse blazing. On this example, you can see this is the scribed portion of the tree. Here it is clearly marked with the "W". Inundated into the wood and the number seven. The reverse marks are exactly that. They are actually extending out and pitch filled so they are topped the ridges are extending out to the mark on the tree and here is the reverse seven and the of course the reverse W.

Now I would like to show you some examples of bearing trees that have been found in the field. These trees are over one hundred years old and I believe the survey was done in the late 1800s. The first example that you can see on this slide is an oak tree. An oak tree is very good, durable but they have a problem in that once they get older, they tend to heart rot. You can see here that there is definitely a hole in the tree.

I will take a closer look at this. It is now a bird nest or a squirrel hole. I want to go back to the previous slide where the actual blaze mark that is a healed blaze does not really look like too much. That is usually the case. There a lot of natural things that happened out in the forest that scars the trees.



On this next slide, here is a ponderosa pine again marked over one hundred years ago. What is nice about the tree that makes it easily recognizable is the fact that it has a bearing tree tag. That bearing

tree tag was set on this tree in 1987. It was chipped away and the tree has actually grown out and around the bearing tree tag.

Of course towards the bottom of the tree, we have the scar from the blaze marks. This next slide, you can see that without the bearing tree tag if you are just looking at the blazed portion of the tree, it really does not look like much. That is one of the difficulties in looking for original bearing trees. They get scared and these scars heal over.

What is more typical of a one hundred year old blaze tree is on this next slide. Not only does it have the tags making it easily identifiable as a bearing tree, but the way the scar has healed, the bark did not necessarily fill in and plate out as it did around of the rest of the tree. It is very typical with older ponderosa pine tree is that they form from these large plate areas. As you can see, within the scar and in and around that it has not filled in and it makes it an easily identifiable blaze marking.

At this point, let us go to a video clip with Gary Briant and a real world situation where opening an original bearing tree provided the necessary positive evidence to prove a corner position.

Gary Briant Testimonial

Hi, I am Gary Briant and I am the Survey Manager for Welch-Comer and Associates in Coeur d'*Alene* Idaho. We do a lot of work for different boundary surveys and different things. I would like to tell you a little story about a bearing tree that I found several years back. We were working in the Potlatch Idaho area and this was a survey for Idaho Forest Industries. They were a timber company that wanted to do some logging in the area.

Every day we walked by this particular tree and, as we were walking by it I noticed a little scar. It was probably a three inch scar, a four inch scar maybe right there towards at the base of the tree and there was a brass cap right at the corner of a field, this plowed field and this brass cap just didn't fit this tree. There had been four, five or six surveyors in there ahead of us and somewhere along the line; someone had set the brass cap monument. Iron pipe with brass cap on it and found no evidence of the original corner.

There was a fence line running west out of the corner there was a fairly new fence and every day we walked in there for about a week because we were surveying the lines back in to pick up the section corners and different things. As I recall, this position did not really match the GLO position in terms of distance from some of the other corners and that is what struck my curiosity about this bearing tree because it would have fit a little closer to that relationship. This was a forty inch tree at this time and I think it was a twelve inch tree when they scribed the tree originally and so one day as I walking by there and I decided we were going to buy a tree or this was going to be a bearing tree. I started to hack into the tree and this is a plug out of that tree.

I started to hack into the tree with an ax to try and get down to see if there was any scribing or whatnot down on the tree and it was just such a heavy big tree so I decided to get a chainsaw. I got a chainsaw and cut in and around a portion of this where we thought the scribing would be then hit it with a sledgehammer and out pops a perfect-mirrored image of what was scribed on that tree.

Probably cannot read it because it is backwards but it says S 23 ¼ and the BT was down below which is somewhat abnormal from what it would normally be. Usually it would be ¼ S23 BT or something like that. At any rate, you can feel the raised letters on as the pitch and the sap worked its way. The tree kind of overgrows. You can see where the scar of the tree and like I say this is the back where the bark was out here and in here is where the face of the tree was and when this pops out the pitch fills in the crevices and gives you a perfect mirrored image. I might add that this corner was about 30 feet from the iron pipe that we had found.

There was a fence line running north and east out of this. They were downed fences old and ancient fences. We went through and found pieces of the fence. You had to pull it up out of the duff. Then we also took testimony from one of the landowners in the area that recalled the tree, recalled the actual fence being up and the stone at the fence corner at the time that he lived on the land and so we ended up setting a new corner about thirty feet from the other.

I am sure there were a few land surveyors that did not like that position, but nonetheless that is my story.

Exercise #2 Bearing Trees

The purpose of this exercise is to acquaint the learner with the Durability of Bearing Trees pamphlet by requiring the student to look up certain information. This pamphlet includes a rating for each tree's durability as a bearing tree.

Directions: Enter the number corresponding to the rating assigned to each tree. **Note**: It is not necessary to complete all the regions just those where you may work. You should also look up trees, found in your areas that are not listed below.

The pamphlet is available online at: http://www.nevadasurveyor.com/bearing_trees/

Rating Scale

1 – Excellent, 2 – Very Good, 3 – Good, 4 – Fair, 5 – Poor, 6 – Very Poor

RATING	NORTHEAST TREE REGION
	Red Pine; other names: hard pine, pitch pine and yellow pine (Durability of Bearing Trees, Page 4)
	Jack Pine; other names: scrub pine and black pine (Durability of Bearing Trees, Page 5)
	Eastern Hemlock; other names: hemlock spruce and spruce pine (Durability of Bearing Trees, Page 14)
	Eastern Larch; other names: tamarack, hackmatack and juniper (Durability of Bearing Trees, Page 15)
	Black Ash; other names: red ash, swamp ash and water ash (Durability of Bearing Trees, Page 47)
	White Spruce; other names: swamp spruce, bog spruce, skunk spruce and Canadian spruce (Durability of Bearing Trees, Page 18)
	Birch; other names: canoe birch, white birch, silver birch, gray birch and swamp birch (Durability of Bearing Trees, Page 70)
	Eastern White Pine; other names: northern pine, soft pine, black pine and conk pine (Durability of Bearing Trees, Page 3)
	Basswood; other names: linden (Durability of Bearing Trees, Page 73)
	Black Spruce; other names: swamp spruce, bog spruce, skunk spruce and Canadian spruce (Durability of Bearing Trees, Page 18)

Rating Scale

1 – Excellent, 2 – Very Good, 3 – Good, 4 – Fair, 5 – Poor, 6 – Very Poor

RATING	EASTERN TREE REGION
	Black Walnut; other names: American walnut and oilnut (Durability of Bearing Trees, Page 75)
	Sycamore; other names: buttonwood and buttonball (Durability of Bearing Trees, Page 76)
	Hickory; other names: shagbark, bitternut, pignut, pecan and swamp hickory (Durability of Bearing Trees, Page 72)
	American Elm; other names: white elm, soft elm, water elm, gray elm, red elm and cork elm (Durability of Bearing Trees, Page 71)
	White Oak; other names: stave oak, blue oak, and scrub oak (Durability of Bearing Trees, Page 30)
	Red Oak; other names: gray oak and yellow oak (Durability of Bearing Trees, Page 31)
	Red Mulberry (Durability of Bearing Trees, Page 78)
	White/Green Ash; other names: red ash, swamp ash and water ash (Durability of Bearing Trees, Page 47)
	Beech; other names: beechnut, which beech and red beech (Durability of Bearing Trees, Page 77

Rating Scale

1 – Excellent, 2 – Very Good, 3 – Good, 4 – Fair, 5 – Poor, 6 – Very Poor

RATING	MIDWEST TREE REGION
	Honey Locust; other names: false acacia and thorn tree (Durability of Bearing Trees, Page 79)
	Prairie Crab Apple; other names: wild crab and crab (Durability of Bearing Trees, Page 64)
	Willow (Durability of Bearing Trees, Page 61)
	Hackberry; other names: hard hack, sugarberry, nettletree, false elm and palo blanco (Durability of Bearing Trees, Page 63)
	Cottonwood; other names: eastern poplar, plains poplar, tacamahac, balm-of-gilead, balm and bam (Durability of Bearing Trees, Page 51-53)

Rating Scale

1 – Excellent, 2 – Very Good, 3 – Good, 4 – Fair, 5 – Poor, 6 – Very Poor

RATING	ROCKY MOUNTAIN TREE REGION
	Rocky Mountain Juniper; other names: cedar, western cedar and red cedar (Durability of Bearing Trees, Page 22)
	Pinyon; other names: pinyon pine and nut pine (Durability of Bearing Trees, Page 12)
	Limber Pine; other names: pitch pine and scrub pine (Durability of Bearing Trees, Page 7)
	Blue Spruce; other names: silver spruce, white spruce and hemlock (Durability of Bearing Trees, Page 17)
	Bigtooth Maple (Durability of Bearing Trees, Page 41)
	Velvet Ash (Durability of Bearing Trees, Page 48)
	Engelmann Spruce; other names: silver spruce, white spruce and hemlock (Durability of Bearing Trees, Page 17)
	Ponderosa Pine; other names: yellow pine, bull pine, blackjack pine and pitch pine (Durability of Bearing Trees, Page 2)
	Mountain Mahogany (Durability of Bearing Trees, Page 74)
	Lodgepole Pine; other names: black pine, scrub pine, shore pine, coast pine, tamarack and jack pine (Durability of Bearing Trees, Page 8)
	Narrowleaf Cottonwood (Durability of Bearing Trees, Page 52)
	Quaking Aspen; other names: popple, poplar and quaker (Durability of Bearing Trees, Page 54)
	Gambel Oak; other names: Rocky Mountain white oak (Durability of Bearing Trees, Page 36)

Rating Scale

1 – Excellent, 2 – Very Good, 3 – Good, 4 – Fair, 5 – Poor, 6 – Very Poor

RATING	CENTRAL WESTERN TREE REGION
	Bristlecone Pine; other names: hickory pine (Durability of Bearing Trees, Page 10)
	White Fir; other names: white balsam, balsam fir, red fir, yellow fir and silver fir (Durability of Bearing Trees, Page 25)

Rating Scale

1 – Excellent, 2 – Very Good, 3 – Good, 4 – Fair, 5 – Poor, 6 – Very Poor

RATING	SOUTHWEST DESERT TREE REGION
	Mexican Ironwood (Durability of Bearing Trees, Page 84)
	Mesquite; other names: desert mesquite (Durability of Bearing Trees, Page 81)
	Joshua Tree; other names: yucca, yucca cactus and palmetto (Durability of Bearing Trees, Page 86)
	Saguaro Cactus; other names: tree cactus and giant cactus (Durability of Bearing Trees, Page 87)
	Manzanita (Durability of Bearing Trees, Page 89)
	Desert willow (Durability of Bearing Trees, Page 62)
	Palo Verde; other names: green-bark acacia and acacia (Durability of Bearing Trees, Page 80)

Rating Scale

1 – Excellent, 2 – Very Good, 3 – Good, 4 – Fair, 5 – Poor, 6 – Very Poor

RATING	NORTHWEST TREE REGION
	Douglas fir; other names: red fir and Douglas spruce (Durability of Bearing Trees, Page 1)
	Cedar; other names: redwood, arborvitae, shinglewood, Lawson cypress and Oregon cedar (Durability of Bearing Trees, Page 19)
	White Bark Pine; other names: pitch pine and scrub pine (Durability of Bearing Trees, Page 7)
	Western Larch; other names: larch, hackmatack and juniper (Durability of Bearing Trees, Page 15)
	Noble Fir; other names: red fir, white balsam, balsam fir, silver fir, yellow fir and larch (Durability of Bearing Trees, Page 25)
	White Fir; other names: red fir, white balsam, balsam fir, silver fir, yellow fir and larch (Durability of Bearing Trees, Page 25)
	Western White Pine; other names: silver pine, white pine Idaho pine and larch (Durability of Bearing Trees, Page 6)
	Pacific Madrone; other names: mathrone, madrona and laurel (Durability of Bearing Trees,

RATING	NORTHWEST TREE REGION
	Page 55)
	Cascara Buckthorn; other names: chittum, shittum, shittumwood, bearberry and bearwood (Durability of Bearing Trees, Page 60)
	Yew; other names: hemlock (Durability of Bearing Trees, Page 24)
	Sitka Spruce; other names: yellow spruce, silver spruce and coast spruce (Durability of Bearing Trees, Page 16)
	Western Hemlock; other names: gray fir, silver fir, Alaska pine and alpine spruce (Durability of Bearing Trees, Page 13)
	Chinquapin; other names: chink, chinkapin and chestnut (Durability of Bearing Trees, Page 58)
	Grand Fir; other names: red fir, white balsam, balsam fir, silver fir, yellow fir and larch (Durability of Bearing Trees, Page 25)
	Pacific Silver Fir; other names: red fir, white balsam, balsam fir, silver fir, yellow fir and larch (Durability of Bearing Trees, Page 25)
	Alder; other names: Oregon alder, western alder and mulberry (Durability of Bearing Trees, Page 45)
	Vine Maple; other names: Douglas maple (Durability of Bearing Trees, Page 43)
	Mountain Hemlock; other names: gray fir, silver fir, Alaska pine and alpine spruce (Durability of Bearing Trees, Page 13)

Rating Scale

1 – Excellent, 2 – Very Good, 3 – Good, 4 – Fair, 5 – Poor, 6 – Very Poor

RATING	ALASKA TREE REGION
	Black Spruce; other names: swamp spruce, bog spruce and skunk spruce (Durability of Bearing Trees, Page 18)
	White Spruce; other names: swamp spruce, bog spruce and skunk spruce (Durability of Bearing Trees, Page 18)
	Sitka Spruce; other names: Yellow spruce, silver spruce and coast spruce (Durability of Bearing Trees, Page 16)
	Western Hemlock; other names: gray fir, silver fir, Alaska pine and alpine spruce (Durability

RATING	ALASKA TREE REGION
	of Bearing Trees, Page 13)
	Mountain Hemlock; other names: gray fir, silver fir, Alaska pine and alpine spruce (Durability of Bearing Trees, Page 13)
	Sitka Alder; other names: scrub alder (Durability of Bearing Trees, Page 46)
	Mountain Alder; other names: scrub alder (Durability of Bearing Trees, Page 46)
	Paper Birch; other names: canoe birch, white birch, silver birch and swamp birch (Durability of Bearing Trees, Page 70)
	Quaking Aspen; other names: popple, poplar and quaker (Durability of Bearing Trees, Page 54)
	Black Cottonwood; other names: tacamahac, poplar, balm-of-gilead, balm and bam (Durability of Bearing Trees, Page 53)
	Balsam Poplar; other names: tacamahac, poplar, balm-of-gilead, balm and bam (Durability of Bearing Trees, Page 53)
	Alaska Cedar; other names: yellow cedar, yellow cypress, Alaska cypress and Sitka cypress (Durability of Bearing Trees, Page 53)

Exercise #2 Answer Key

Rating Scale

1 – Excellent, 2 – Very Good, 3 – Good, 4 – Fair, 5 – Poor, 6 – Very Poor

RATING	NORTHEAST TREE REGION
1	Red Pine; other names: hard pine, pitch pine and yellow pine (Durability of Bearing Trees, Page 4)
2	Jack Pine; other names: scrub pine and black pine (Durability of Bearing Trees, Page 5)
1	Eastern Hemlock; other names: hemlock spruce and spruce pine (Durability of Bearing Trees, Page 14)
3	Eastern Larch; other names: tamarack, hackmatack and juniper (Durability of Bearing Trees, Page 15)
4	Black Ash; other names: red ash, swamp ash and water ash (Durability of Bearing Trees, Page 47)
3-5	White Spruce; other names: swamp spruce, bog spruce, skunk spruce and Canadian spruce (Durability of Bearing Trees, Page 18)
4	Birch; other names: canoe birch, white birch, silver birch, gray birch and swamp birch (Durability of Bearing Trees, Page 70)
1	Eastern White Pine; other names: northern pine, soft pine, black pine and conk pine (Durability of Bearing Trees, Page 3)
2	Basswood; other names: linden (Durability of Bearing Trees, Page 73)
3-5	Black Spruce; other names: swamp spruce, bog spruce, skunk spruce and Canadian spruce (Durability of Bearing Trees, Page 18)

Rating Scale

1 – Excellent, 2 – Very Good, 3 – Good, 4 – Fair, 5 – Poor, 6 – Very Poor

RATING	EASTERN TREE REGION
1	Black Walnut; other names: American walnut and oilnut (Durability of Bearing Trees, Page 75)
2	Sycamore; other names: buttonwood and buttonball (Durability of Bearing Trees, Page 76)
2	Hickory; other names: shagbark, bitternut, pignut, pecan and swamp hickory (Durability

RATING	EASTERN TREE REGION
	of Bearing Trees, Page 72)
2-3	American Elm; other names: white elm, soft elm, water elm, gray elm, red elm and cork elm (Durability of Bearing Trees, Page 71)
2	White Oak; other names: stave oak, blue oak, and scrub oak (Durability of Bearing Trees, Page 30)
3	Red Oak; other names: gray oak and yellow oak (Durability of Bearing Trees, Page 31)
3	Red Mulberry (Durability of Bearing Trees, Page 78)
3-4	White/Green Ash; other names: red ash, swamp ash and water ash (Durability of Bearing Trees, Page 47)
4	Beech; other names: beechnut, which beech and red beech (Durability of Bearing Trees, Page 77

Rating Scale

1 – Excellent, 2 – Very Good, 3 – Good, 4 – Fair, 5 – Poor, 6 – Very Poor

RATING	MIDWEST TREE REGION
3	Honey Locust; other names: false acacia and thorn tree (Durability of Bearing Trees, Page 79)
5	Prairie Crab Apple; other names: wild crab and crab (Durability of Bearing Trees, Page 64)
5	Willow (Durability of Bearing Trees, Page 61)
4	Hackberry; other names: hard hack, sugarberry, nettletree, false elm and palo blanco (Durability of Bearing Trees, Page 63)
4-5	Cottonwood; other names: eastern poplar, plains poplar, tacamahac, balm-of-gilead, balm and bam (Durability of Bearing Trees, Page 51-53)

Rating Scale

1 – Excellent, 2 – Very Good, 3 – Good, 4 – Fair, 5 – Poor, 6 – Very Poor

RATING	ROCKY MOUNTAIN TREE REGION
1-2	Rocky Mountain Juniper; other names: cedar, western cedar and red cedar (Durability of Bearing Trees, Page 22)
2-3	Pinyon; other names: pinyon pine and nut pine (Durability of Bearing Trees, Page 12)
3	Limber Pine; other names: pitch pine and scrub pine (Durability of Bearing Trees, Page 7)
3-4	Blue Spruce; other names: silver spruce, white spruce and hemlock (Durability of Bearing Trees, Page 17)
5	Bigtooth Maple (Durability of Bearing Trees, Page 41)
5	Velvet Ash (Durability of Bearing Trees, Page 48)
3-4	Engelmann Spruce; other names: silver spruce, white spruce and hemlock (Durability of Bearing Trees, Page 17)
2	Ponderosa Pine; other names: yellow pine, bull pine, blackjack pine and pitch pine (Durability of Bearing Trees, Page 2)
3	Mountain Mahogany (Durability of Bearing Trees, Page 74)
4	Lodgepole Pine; other names: black pine, scrub pine, shore pine, coast pine, tamarack and jack pine (Durability of Bearing Trees, Page 8)
4-5	Narrowleaf Cottonwood (Durability of Bearing Trees, Page 52)
5	Quaking Aspen; other names: popple, poplar and quaker (Durability of Bearing Trees, Page 54)
5	Gambel Oak; other names: Rocky Mountain white oak (Durability of Bearing Trees, Page 36)

Rating Scale

1 – Excellent, 2 – Very Good, 3 – Good, 4 – Fair, 5 – Poor, 6 – Very Poor

RATING	CENTRAL WESTERN TREE REGION
3	Bristlecone Pine; other names: hickory pine (Durability of Bearing Trees, Page 10)
3-5	White Fir; other names: white balsam, balsam fir, red fir, yellow fir and silver fir (Durability of Bearing Trees, Page 25)

Rating Scale

1 – Excellent, 2 – Very Good, 3 – Good, 4 – Fair, 5 – Poor, 6 – Very Poor

RATING	SOUTHWEST DESERT TREE REGION
1	Mexican Ironwood (Durability of Bearing Trees, Page 84)
2-4	Mesquite; other names: desert mesquite (Durability of Bearing Trees, Page 81)
3	Joshua Tree; other names: yucca, yucca cactus and palmetto (Durability of Bearing Trees, Page 86)
3	Saguaro Cactus; other names: tree cactus and giant cactus (Durability of Bearing Trees, Page 87)
5	Manzanita (Durability of Bearing Trees, Page 89)
4-5	Desert willow (Durability of Bearing Trees, Page 62)
4	Palo Verde; other names: green-bark acacia and acacia (Durability of Bearing Trees, Page 80)

Rating Scale

1 – Excellent, 2 – Very Good, 3 – Good, 4 – Fair, 5 – Poor, 6 – Very Poor

RATING	NORTHWEST TREE REGION
1	Douglas fir; other names: red fir and Douglas spruce (Durability of Bearing Trees, Page 1)
2	Cedar; other names: redwood, arborvitae, shinglewood, Lawson cypress and Oregon cedar (Durability of Bearing Trees, Page 19)
3	White Bark Pine; other names: pitch pine and scrub pine (Durability of Bearing Trees, Page 7)
2-4	Western Larch; other names: larch, hackmatack and juniper (Durability of Bearing Trees, Page 15)
3-5	Noble Fir; other names: red fir, white balsam, balsam fir, silver fir, yellow fir and larch (Durability of Bearing Trees, Page 25)
3-5	White Fir; other names: red fir, white balsam, balsam fir, silver fir, yellow fir and larch (Durability of Bearing Trees, Page 25)
4	Western White Pine; other names: silver pine, white pine Idaho pine and larch (Durability of Bearing Trees, Page 6)
5	Pacific Madrone; other names: mathrone, madrona and laurel (Durability of Bearing Trees,

RATING	NORTHWEST TREE REGION
	Page 55)
6	Cascara Buckthorn; other names: chittum, shittum, shittumwood, bearberry and bearwood (Durability of Bearing Trees, Page 60)
1	Yew; other names: hemlock (Durability of Bearing Trees, Page 24)
3	Sitka Spruce; other names: yellow spruce, silver spruce and coast spruce (Durability of Bearing Trees, Page 16)
2-4	Western Hemlock; other names: gray fir, silver fir, Alaska pine and alpine spruce (Durability of Bearing Trees, Page 13)
4	Chinquapin; other names: chink, chinkapin and chestnut (Durability of Bearing Trees, Page 58)
3-5	Grand Fir; other names: red fir, white balsam, balsam fir, silver fir, yellow fir and larch (Durability of Bearing Trees, Page 25)
3-5	Pacific Silver Fir; other names: red fir, white balsam, balsam fir, silver fir, yellow fir and larch (Durability of Bearing Trees, Page 25)
4-5	Alder; other names: Oregon alder, western alder and mulberry (Durability of Bearing Trees, Page 45)
5	Vine Maple; other names: Douglas maple (Durability of Bearing Trees, Page 43)
2-4	Mountain Hemlock; other names: gray fir, silver fir, Alaska pine and alpine spruce (Durability of Bearing Trees, Page 13)

Rating Scale

1 – Excellent, 2 – Very Good, 3 – Good, 4 – Fair, 5 – Poor, 6 – Very Poor

RATING	ALASKA TREE REGION
2-5	Black Spruce; other names: swamp spruce, bog spruce and skunk spruce (Durability of Bearing Trees, Page 18)
2-5	White Spruce; other names: swamp spruce, bog spruce and skunk spruce (Durability of Bearing Trees, Page 18)
3	Sitka Spruce; other names: Yellow spruce, silver spruce and coast spruce (Durability of Bearing Trees, Page 16)
2-4	Western Hemlock; other names: gray fir, silver fir, Alaska pine and alpine spruce

RATING	ALASKA TREE REGION
	(Durability of Bearing Trees, Page 13)
2-4	Mountain Hemlock; other names: gray fir, silver fir, Alaska pine and alpine spruce (Durability of Bearing Trees, Page 13)
6	Sitka Alder; other names: scrub alder (Durability of Bearing Trees, Page 46)
6	Mountain Alder; other names: scrub alder (Durability of Bearing Trees, Page 46)
4	Paper Birch; other names: canoe birch, white birch, silver birch and swamp birch (Durability of Bearing Trees, Page 70)
5	Quaking Aspen; other names: popple, poplar and quaker (Durability of Bearing Trees, Page 54)
5	Black Cottonwood; other names: tacamahac, poplar, balm-of-gilead, balm and bam (Durability of Bearing Trees, Page 53)
5	Balsam Poplar; other names: tacamahac, poplar, balm-of-gilead, balm and bam (Durability of Bearing Trees, Page 53)
2	Alaska Cedar; other names: yellow cedar, yellow cypress, Alaska cypress and Sitka cypress (Durability of Bearing Trees, Page 53)

Part #3 Perpetuating the Corner

That was interesting. Thanks a lot Gary. Now let us talk about the arrangement and marking of corner accessories. You can find this in Chapter 4, Sections 4-93 through 4-113 of the 2009 Manual. I want to talk about first are township corners, section corners, closing corners and meander corners. I have grouped these four different types of corners together because they all have a couple of things in common. One, they are all related to at least two different sections and each one of these on their BTs is marked with the township and range. In addition, they are marked for the section in which they are located. This is a very important fact.

A standard corner, these corners are located on a standard parallel. Usually common to two sections and they are always marked in addition to the township and range with the letters S and C. Closing corners to be to township to the south of the standard parallel those sections corners and even the township corners as they close into the standard corner are marked with their respective township and range and the letters CC. Meander corners are also marked with the township and range and the letters MC and they are normally associated with two different sections.

All BTs include the marks BT and the BT is always located at the bottom of the blaze. The reason for this is that you are marking a tree and normally if you are out there doing work in the field it is usually related to forestry and these trees usually do get harvested. So by placing the BT markings at the bottom of the tree, we would hope that once the tree is harvested that those marks would remain for us to easily identify that as an original bearing tree.

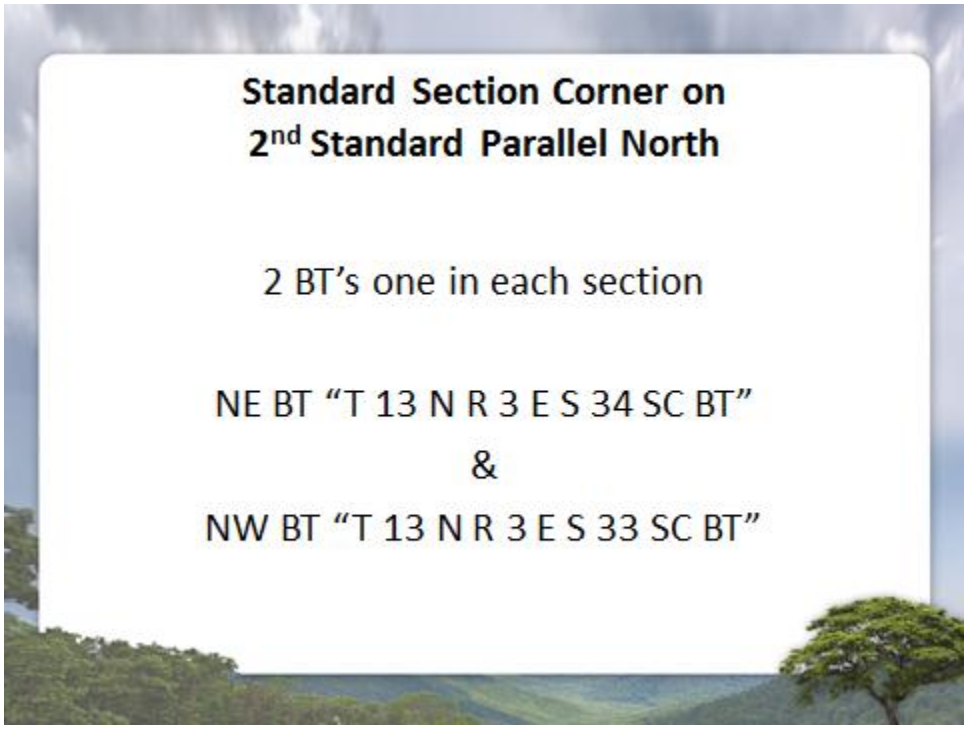
Going to the next slide, let us talk about the order of BT marks. These BT marks are always read sideways from the top to the bottom of the tree. Here I have an example that was sawed off a tree that when109 I am talking about marks being read sideways. The top of the tree would be up here, the bottom

of course the BT mark is down here. You can see how it can be read from the side. This one is Township 27 North, Range 3 East Section 12 BT (12NR3ES12BT).

Taking a closer look we can see how this surveyor had his own style for scribing trees. If we look at the T here, we can see that he did not draw a horizontal line, rather he used a circular tool of the tree scribe to make the top of the T. We can also see little extensions here, one on the 2 and especially here over on the E where each end of the E has a little extension on it. This information can be very critical when you run into decayed remains and you are looking for very small minute pieces of scribe markings.

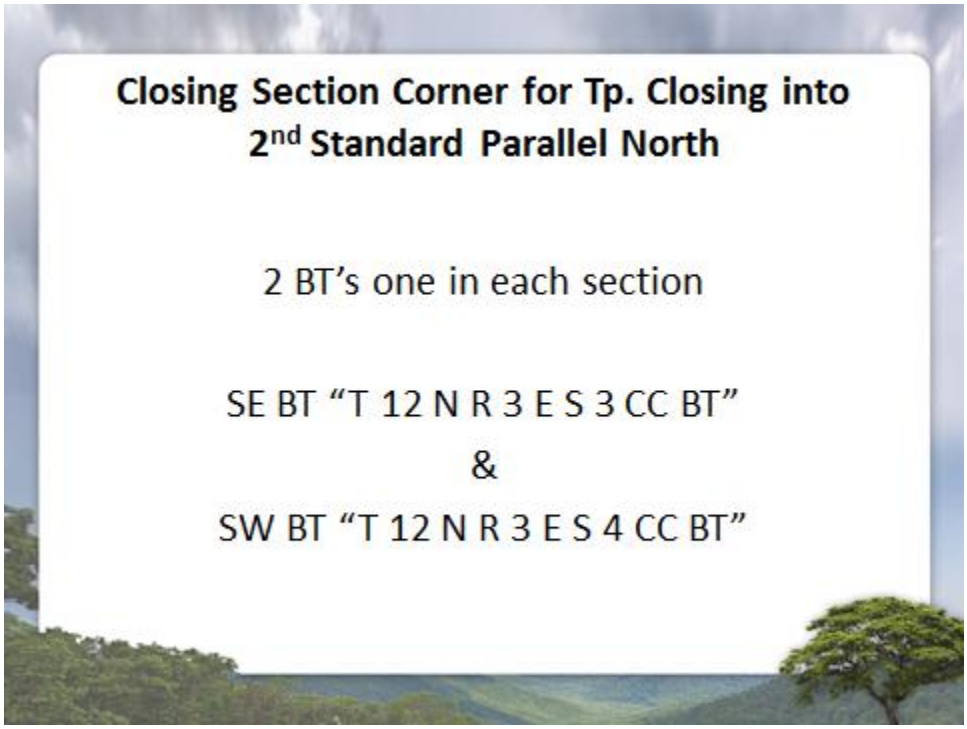
Going back to the arrangement and marking of the corners. All of these BTs for corners will have township and range, section, corner type and by corner type again we are referring to standard corners, closing corners, and meander corners, then of course is BT. One point I would like to make is that when you are scribing a live tree it is a good practice to start the scribe marks from the bottom up. Because as you will see in the next examples there are a lot of marks that you are going to need to put on this tree and it can be difficult to create one even blaze on the first try if you start and try to scribe from the top down.

So let us look at an example of a corner position and what the tree markings would look like. On the next slide, let us consider a position that is a standard section corner on the second standard parallel north.



This will be a corner that is common to two sections, so we want two BTs, one in each section. Now the second standard parallel north would be the south boundary of township thirteen north. So this bearing tree to the northeast in section thirty-four would read T 13 N R 3 E S 34 SC (since it is a standard corner) BT. And the other bearing tree to the north west in section 33 of course would have the Township 13 North Range 3 East Section 33 SC for standard corner and BT.

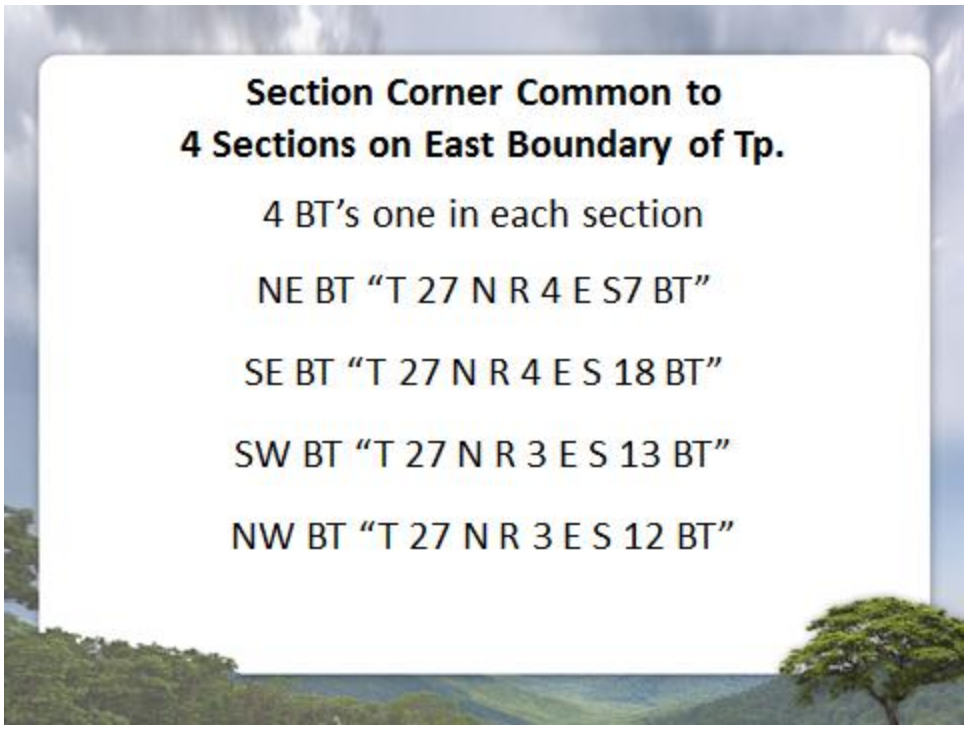
Let us consider another example of a closing corner in the township that is closing into the second standard parallel north.



That of course would be Township 12 north. The north boundary of township 12 closes into the standard parallel. You still have the situation of a corner common to two sections. You want two bearing trees. Except this time we are going to mark them to the south in the closing township. So in this case, the bearing tree will be marked for section 3, township 12 N R 3 E S 3 CC (for closing corner) BT. The SW bearing tree marked for section 4 of course including CC for closing corner and BT located at the bottom of the blaze.

You can see by just from these two examples that they are a lot of marks that you need to put on the tree so again I would urge you that when you are scribing a live tree to start at the bottom and work your way up. Start with the T put in the B and CC and then work your way on up. That way if you do not have enough room in your initial blaze, it is a lot easier to lengthen the blaze up the tree because you will run out of ground or into the ground if you try to lengthen the blaze down to the bottom of the tree.

Let us look at another example. The section corner that is common to four sections on the eastern boundary of the township.

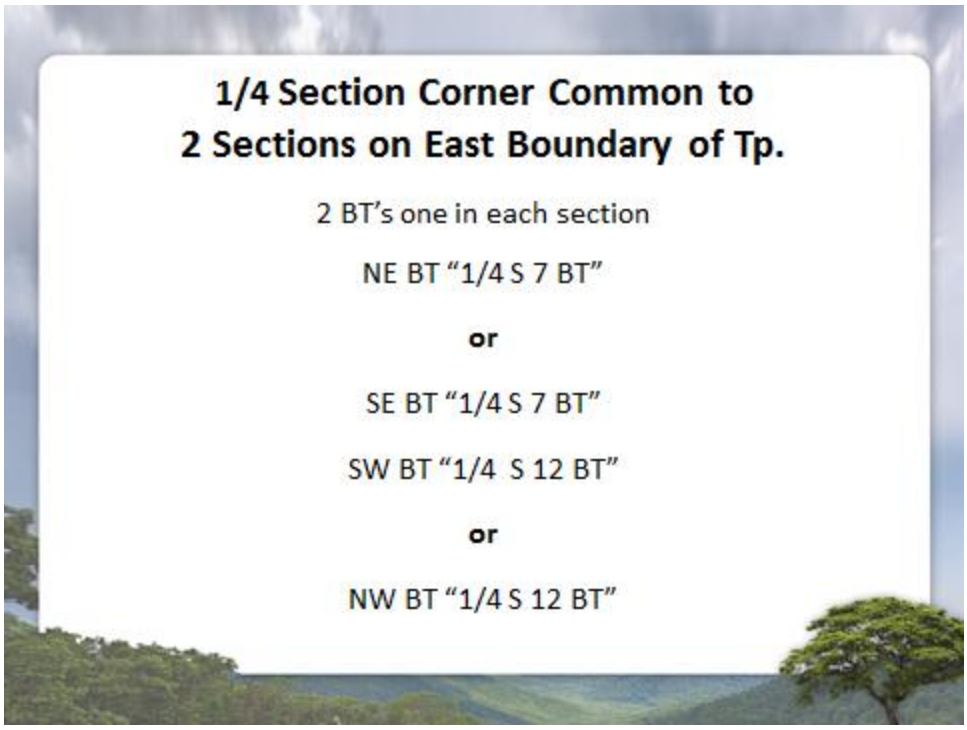


Since it is common to four sections it requires four bearing trees. One in each section. As you can see here that I have chosen the corners of sections 7, 12, 13 and 18. Since we are on the boundary the east boundary of the township, we have two different ranges that are involved. So the north east and south east trees are going to reflect the fact that they are in range 4 E, and Westerly bearing trees in the south west and north west are going to reflect the fact that they are in range 3 East.

Our northeast tree in section 7 is a section corner so it gets township and range reference to the section 7 and of course BT. The bearing tree in the North West referencing section 12 is marked township 27 north Range 3 East (because it is in a different range) referenced to the section 12 and BT.

Let's move on and consider the arrangement and marking of corner accessories for ¼ corner and $1/16^{th}$ corners on the exterior of a section. Again these corners are marked for the type of corner that they are whether it is a quarter corner. Of course on the exterior of a section we have four different types of $1/16^{th}$ corner. It can be a north $1/16^{th}$ between sections, a south $1/16^{th}$, an east or west $1/16^{th}$ between sections. In this case it is not required to mark the township and range on the bearing tree. What we will do is mark them for the section and the type of corner that they represent. So let us look at an example.

Here I have chosen a quarter corner section that is common to two sections on the east boundary of the township. Although we are going to represent a corner that is in two different ranges, you do not need to add township and range to this. You do need two bearing trees. You have an option for the bearing trees in section seven; you can mark either one in the northeast quadrant or one in the southeast quadrant. You also need to mark and reference section twelve. You have an option there. You can mark a bearing tree in the southwest quadrant or the northwest quadrant.



In this case, the scribe marks on the tree to represent this quarter corner are one slash four, S 7 BT. It does not matter if it is in the northeast or southeast quadrant. All it has to do is be in section seven. The trees are always marked to represent the section in which they are located. Then the bearing tree for section twelve is simply marked one quarter S 12 BT. You have that same option of where you can mark that tree either in the southwest or in the northwest quadrants.

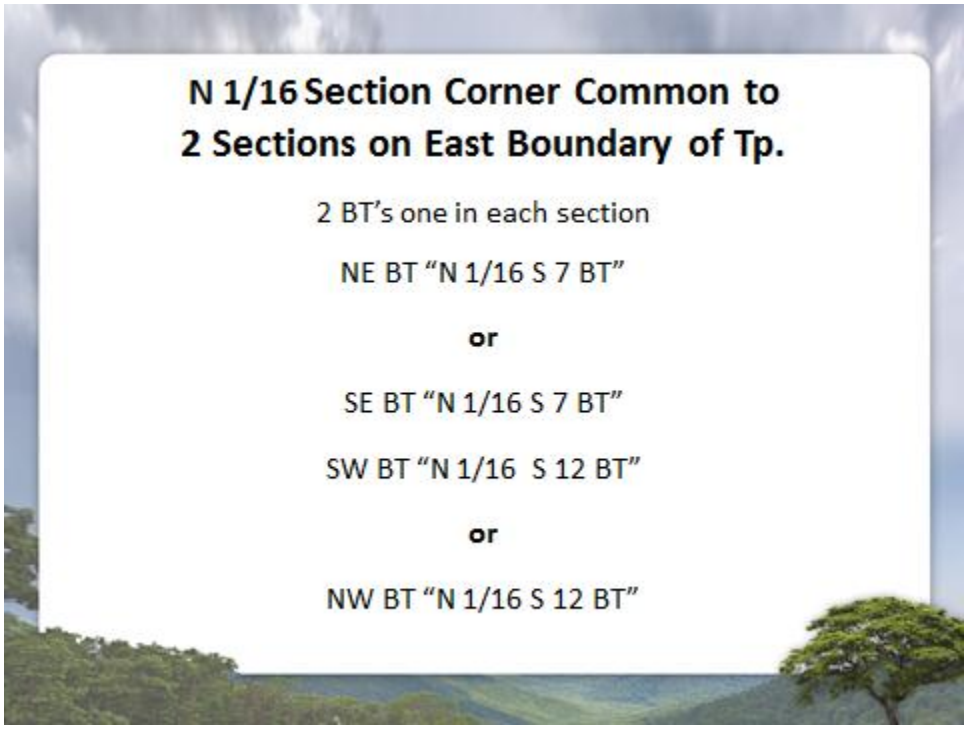
Now one sixteenth corners essentially the same idea, but you need to reference what type of one sixteenth corner it is. In this case I have chosen the north one sixteenth corner between sections seven and twelve on the east boundary of the township.

Here again you have an option of northeast or southeast quadrants to mark in section seven or the tree would be marked N 1/16 S 7 BT, either in the northeast or south east quadrants. The west in section twelve you have the same option either northwest or southwest quadrants. The tree is simply marked N 1/16 S 12 BT.

Let us consider another type of corner. These are the quarter corner and 1/16 corners on the interior of a section. On the inside of a section, you only have one type of quarter corner that would be the center C 1/4. You still have four different types of 1/16 corners on the east and west centerlines. In addition, to the centers of each quarter of the sections you have your northeast, southeast, southwest and northwest 1/16ths and those are distinguished on the bearing trees. Again marked for the section in which they are located.

The bearing tree marks for trees on the interior of a section are only slightly different and those types of corners on the interior of a section would be ¼ and in this case, there is center one quarter of a section and the different types of $1/16^{th}$ that are located inside of the section. We have to consider that we are going to try to mark a center quarter, a center north $1/16^{th}$ or is it a center west $1/16^{th}$. The example of these corner marks would be for the center quarter would be C ¼ S 7 BT. It is a quarter corner, so it still requires 2 bearing trees.

Another example would be the center north 1/16th Section 7. You are still required to have two bearing trees and the marks on the trees would read CN 1/16 S 7 BT. So we still need two bearing trees and we would like to locate those in different quadrants. Let us move to the next slide and we will talk about the selection of bearing trees.



When selecting bearing trees it is important to try to pick different species. In today's modern forest it is very common to see an even a class of trees where they are all the same size, as far as diameter and age class. All the same type of tree. If it is possible, it is good to pick two different types of trees. Whether it is a Douglas fir, or a ponderosa pine, or a pine and an oak, or an oak and a grand fir. Have two different kinds of trees and it is especially important on the interior of a section. For example, for the center quarter for section 7, which requires two trees you need two trees to mark, put the same marks on both of the trees. It is important to try to distinguish between the two different trees that you are going to pick by either species or different size.

Another consideration, a useful tool is the use of XBT. If you run into a situation such as at center quarter of a section and the only trees available are in the northeast quadrant. You do not want to mark both trees in the same quadrant with the same scribe marks. It would be perfectly acceptable to mark one tree with the normal C ¼ S7 BT, and the other with XBT. When you mark a tree and scribe it XBT, you are actually making two different blazes. The X is in its own separate blaze, about breast height. As I mentioned before that is about four and a half feet off the ground.

The BT always goes down at the base of the tree so should it be harvested, that BT will remain on the stump as a reference to your corner position. Another option you may have is in an area of active logging. The project you may be working on may be a boundary survey for a timber sale and you know that the trees are going to be harvested out of that area. You could actually set another full size monument, a reference monument, much like a bearing tree to reference that true point to the corner.

I just talked about on a steep southeast slope; it is a good idea to blaze on the downhill side of trees. The uphill sides can be subject to rocks or other fallen trees that might scar the tree making it resemble an actual blaze on the face of the tree. Try to mark the trees on the downhill side. You will also find that it is much easier to tape horizontally to the true corner position. If you are taping down the hill to your corner point rather than trying to tape horizontally up the hill to a bearing tree.

Now let us talk about tying in these corner accessories. With bearing trees the bearings are always taken to the center of the blaze. The distance measurement is taken to the side center of the tree. Now in the Oregon state offices, the past 15 years, we have been using magnetic "PK" nails that we drive in the side center of the tree. That gives us a common reference point for anyone trying to determine the location, the exact location on the tree that was tied in. Another nice thing about these magnetic PK nails is that over the course of time should that stump decay and fall apart, you will be able to find this magnetic nail and determine that this was the stump. It is just a nice means to give you a common point of reference to a good growing tree.

When you tie in an XBT or an XBO. An XBO would be used as a point of reference that his actually chiseled in say a bridge abutment or in a rock face or say a larger boulder located near your corner position. When you tie to those positions of an XBT or XBO, for the bearing tree the bearing is taken to the center of the X. Of course the measurement to the tree is the side center at the base down by the BT for your distance. On an XBO, typically you measure both. The bearing and distance to the center of the X.

What you will see in BLM and GLO notes is that these references to the corner accessories are always referenced from the corner to the accessory. That is why they us the terminology "from which". So always reference the tie from the corner to the accessory. Another important factor is to clear the line to the accessory. You have a clear point, a clear view from the accessory to the corner point. This extra cut line somewhere down the line could actually be an indication that someone was there. I have stumbled along corners in the field before because I noticed cutting. The opened line of sight from the corner point to the accessory will help you easily tie in that corner accessory.

You should also consider making calls and ties to monuments that were not utilized in your survey. It is very common to find other corner monuments other monuments of some type located near your corner. Do not be afraid to call for them. Make note of what you find out there. If it was something from a previous survey that you did not use call for it, describe it say you did not use it. You can also make ties to other man made features. More and more we find ourselves working along in and around homes.

A tie to a corner of a home is a good reference to a corner position especially in a growing and developing area. I want to discourage the use of tying to power poles and manhole covers. Especially wooden power poles because these do not last forever and they are routinely replaced. If you are going to use a reference to a power pole you should make note of the numbers on the power pole. That way someone years later can confirm whether or not it was the actual power pole that you tied to previously. Believe it or not, manhole covers do wear out. Over the course of time they are replaced. It is not a good idea to use a tie to those manhole covers.

Moving on to the next slide, you will see in the Manual where it talks about the number of pits required at each corner. Normally, these are not done anymore. We try to be OSHA safe, not create a hazard in and near the corner, but it is something that you can do in the absence of other accessories that are taken. The Manual is very clear, on how to construct a pit. It should be 12 inches deep, 18 inches square and this is in Section 4-95 of the 1973 Manual. In todays' surveying it is normally not something that is a requirement normally not done.

Mounds of stone are still an important accessory to your corner positions. The Manual shows the location of mounds of stone in Figure 4-11, that is on page 125. You will see that on north-south lines. The mounds of stone are usually built to the west. On east-west lines, the mounds of stone are normally built to the north.

Say you are on a steep east facing slope on the east side of a section setting a quarter corner where the mound of stone should be built on the west of the pipe. You do not want to build a mound of stone uphill from your corner monument, it is perfectly reasonable to build the mound of stone on the downhill side to try to help support that monument on that steep east facing slope. So again common sense is do the best thing you can to perpetuate that corner position and just make not of where you put the mound of stone.

Moving to next slide, let us talk about some of the basic requirements for corner perpetuation or re-monumentation. That would be having a metal post and metal cap from the course marked for the corner. Something that I like to do is to rehabilitate a corner that is somewhat disturbed prior to tying it in. Say you come across a corner and it is leaning slightly in the mound of the stone that is surrounding it and it is falling apart. I would rehabilitate, rebuild and straighten that corner position before I tied it in. Another important thing is to verify the marks on existing corners. Make sure that you are at the right place. I have noticed this is especially in controlled survey work where the crew was told to go and setup on the triangulation stations and instead they setup on the azimuth mark referencing the triangulation stations. It is always important to verify the marks on the existing corner that it is the position that you really want to tie in, the one that is going to be the controlling monument for your survey.

Another recommendation is to carry a digital camera. This has always been a great reference for me. Typically I will go out and do field work for six to eight months of the year and then during the winter time I will finally sit down to write my field notes. I realize that in most states that the private surveyors are required to file and record any remonumentations, changes in corner locations within 90 days but it gives you a future reference for what you found out in the field and provides a good reference for anyone down the line reviewing your work.

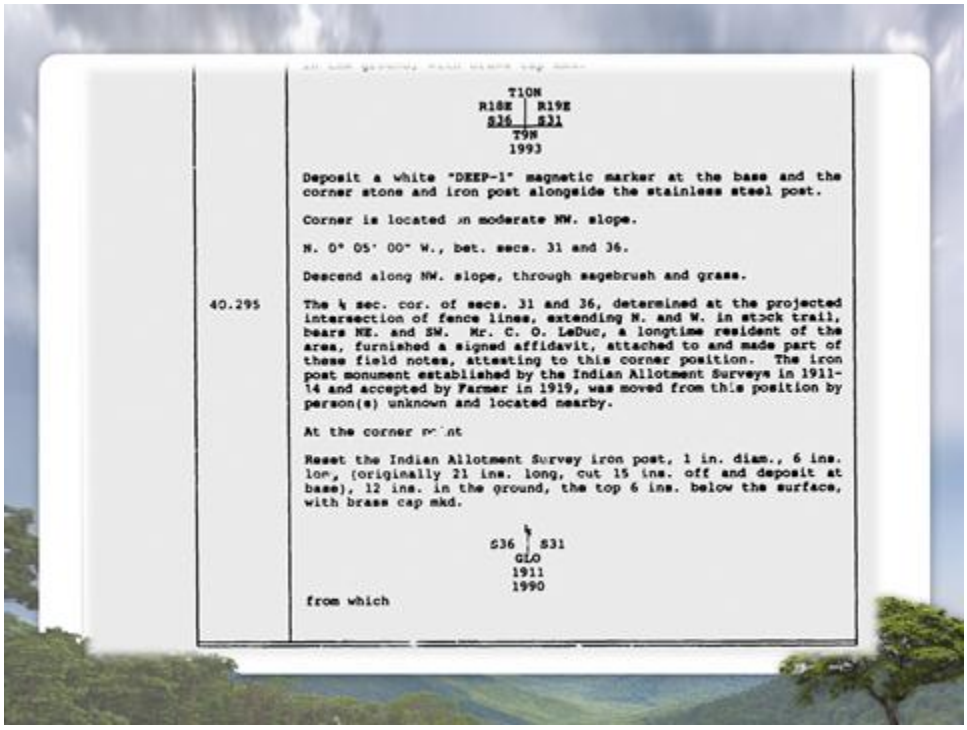
Going to the next slide let us talk about Corner Descriptions. I want to talk about the BLMs standard format for corner descriptions. For recovered corners, where you find evidence in the field, what you are going to do first is give the legal description of the corners. Such as the ¼ section corner of Sections 7 and 12 on the west boundary of the township. Fully describe the legal description of the corner. Then go on to who established the corner and give a location of where the record of that persons reestablishment of the corner is located. Such as, a survey by John Doe, recorded on October 12, 1977, in the Klickitat County's auditor's office. So that anyone wanting to confirm this corner position has that direct reference of who set the corner, whose corner it is and where it came from.

Then you can describe what you found. Describe the monument as far as size and type. That would be outside diameter, perhaps the length of it projecting out of the ground, was it set firmly in the ground, is it an iron pipe or is it an aluminum pipe. Does it have a brass cap or does it have an aluminum cap.

Going to the next slide, you need to describe what you did. Did you actually remonument or did you just rehabilitate the corner. Just to make this differentiation. Rehabilitation would mean that perhaps you rebuilt the mound of stone, straightened the monument or tied in or made new bearing tress reference to the monument.

Remonumentation deals with actually changing the corner monument itself. So say you found an original set stone, you would carefully reference the position of that stone, remove that stone, and then dig a hole for your monument then place that original stone alongside and finish setting your monument that would be remonumentation. Then in your corner description, you would call for the accessories, whether it is bearing trees or reference monuments. I like to give a good general location of the corner. Such as the corner is located South 75 feet of US Highway 220. Something that would enable someone else to immediately key in on the location of the monument. Give them a quick reference in the field where that monument is located.

So let us look at a corner description and some BLM notes. Here we have the ¼ section corner of Sections 31 and 36. We have given the legal description of the corner. Here we see that it was determined at the projected intersection of fence lines extending northwest and a stock trail bearing northeast and southwest. Here is something new.



T10N
R18E | R19E
S36 | S31
T9N
1993

Deposit a white "DEEP-1" magnetic marker at the base and the corner stone and iron post alongside the stainless steel post.

Corner is located on moderate NW. slope.

N. 0° 05' 00" W., bet. secs. 31 and 36.

Descend along NW. slope, through sagebrush and grass.

40.295 The ¼ sec. cor. of secs. 31 and 36, determined at the projected intersection of fence lines, extending N. and W. in stock trail, bears NE. and SW. Mr. C. O. LeDuc, a longtime resident of the area, furnished a signed affidavit, attached to and made part of these field notes, attesting to this corner position. The iron post monument established by the Indian Allotment Surveys in 1911-14 and accepted by Farmer in 1919, was moved from this position by person(s) unknown and located nearby.

At the corner point

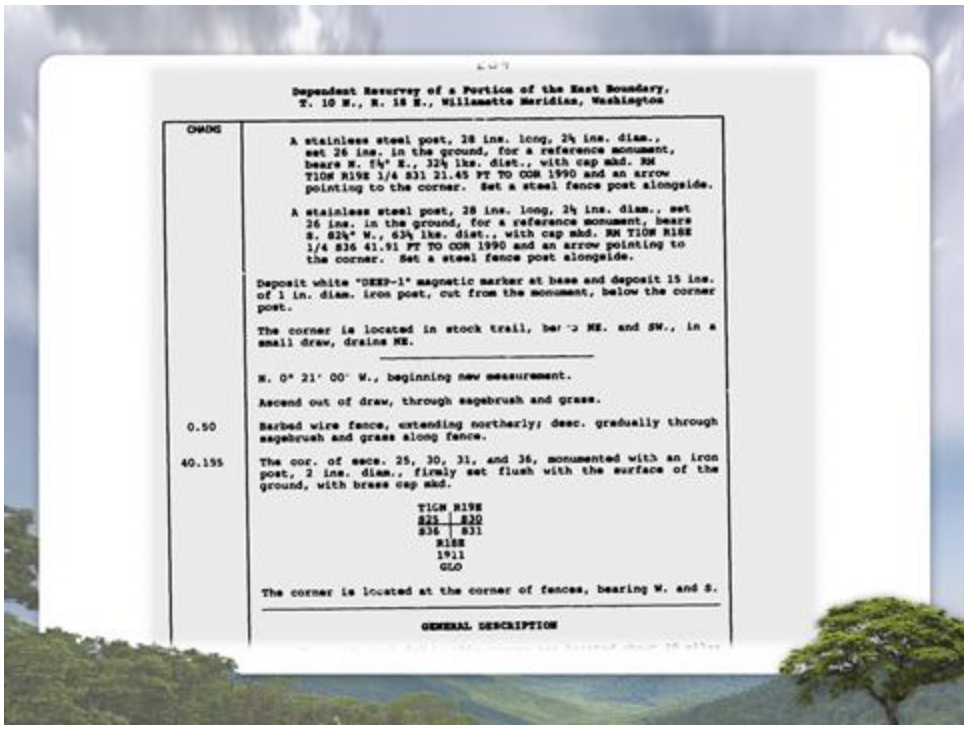
Reset the Indian Allotment Survey iron post, 1 in. diam., 6 ins. long, (originally 21 ins. long, cut 15 ins. off and deposit at base), 12 ins. in the ground, the top 6 ins. below the surface, with brass cap mkd.

S36 | S31
GLO
1911
1990

from which

In this particular case, we use testimony of Mr. C.O. LeDuc a longtime resident of the area. So here we are describing essentially who established the corner. What is our evidence for this corner position? In this case, we are dealing with testimony by the local landowner. Looking further into this, then we will describe what we found. In this case, the iron post monument was moved from its position by persons unknown. I want to make another point here that this corner description also says that the signed affidavit is contained in these field notes, so it is actually, somebody looking for that reference that affidavit is made a part of these field notes and they are usually done at the very back of the field notes.

We have given our legal description of the corner; we have described it who found it or what was there. Now we want to describe the corner monument and what we did at this location. So again going back to the slide, you see the terms “At the corner point” and “Reset”. In this case there was an Indian Allotment Survey there nearby and we reset that same monument.



Dependent Resurvey of a Portion of the East Boundary,
T. 10 N., R. 18 E., Willamette Meridian, Washington

CHAINS	
	A stainless steel post, 28 ins. long, 2½ ins. diam., set 26 ins. in the ground, for a reference monument, bears N. 5½° E., 32¼ lks. dist., with cap mkd. RM T10N R19E 1/4 831 21.45 FT TO COR 1990 and an arrow pointing to the corner. Set a steel fence post alongside.
	A stainless steel post, 28 ins. long, 2½ ins. diam., set 26 ins. in the ground, for a reference monument, bears S. 82¾° W., 63¾ lks. dist., with cap mkd. RM T10N R18E 1/4 836 41.91 FT TO COR 1990 and an arrow pointing to the corner. Set a steel fence post alongside.
	Deposit white "DEEP-1" magnetic marker at base and deposit 15 ins. of 1 in. diam. iron post, cut from the monument, below the corner post.
	The corner is located in stock trail, bears NE. and SW., in a small draw, drains NE.
	N. 0° 21' 00" W., beginning new measurement.
	Ascend out of draw, through sagebrush and grass.
0.50	Barbed wire fence, extending northerly; desc. gradually through sagebrush and grass along fence.
40.195	The cor. of secs. 25, 30, 31, and 36, monumented with an iron post, 2 ins. diam., firmly set flush with the surface of the ground, with brass cap mkd.

T1GN R19E
825 | 830
836 | 831
R18E
1911
GLO

The corner is located at the corner of fences, bearing W. and S.

GENERAL DESCRIPTION

That monument here the brass cap marks you can see here that there 1911 and this BLM resurvey reestablishing this corner by the affidavit was done in 1990. We consider the US Indian Survey monuments federal government monuments and that is why we add another date. So we verify it sort of sprinkle the holy water on this monument by adding the new date of when reestablished the position in this case, based on testimony.

You will also see in this and now we are going to describe our accessories. We begin with the term "from which". The accessories are always described from the corner to the accessory. Turning to the next page of these field notes, here instead of bearing trees, we made two reference monuments. Then we described that corner, so we have a stainless steel post fully described the monument that was set and it is 28 inches long, 2 ½ inches diameter and that we set it 26 inches in the ground then give the bearing and distance to the brass cap. Also provides information as to what is marked on the brass cap, that this is clearly not a true point for the corner, it is a RM. That RM is stamped at the very top of the brass cap to identify it as a reference monument.

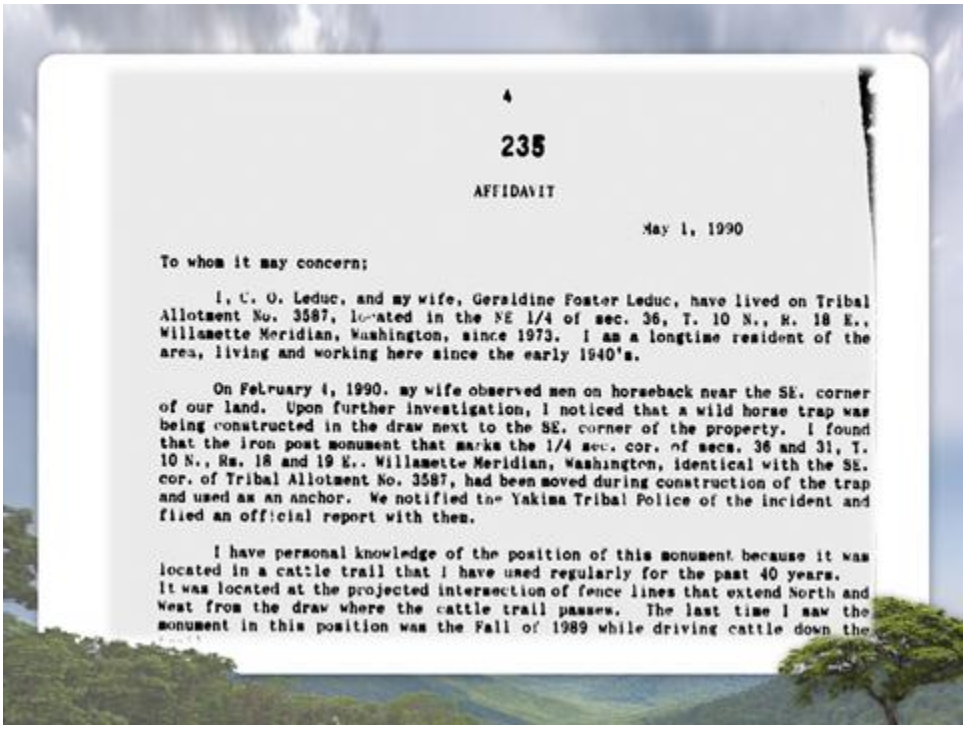
In addition, it describes the legal corner that it is referencing by provide the township and range, the legal description of ¼ of section 31, and then on the cap we will actually imprint it with the distance 21.45 feet to the corner and of course that the monument was set. Another interesting aspect about the reference monument is the fact that it contains an arrow much like a witness corner this one points to the true point for the corner. Then we describe here that we set the fence post alongside this reference monument.

Something I have not mentioned yet is the use of a memorial. Here you can see when we talk about setting a magnet. In the past 15 years the Bureau of Land Management Oregon State Office has been using well there it is a brand name a Deep 1. Essentially a high powered magnet is electronically detectable to a depth of about 8 feet. We place this monument underneath the brass cap. It is very common up in forested areas as there is a lot of activity going on with logging and building of roads. Should that monument be destroyed, the magnet since it is underneath the survey monument, the idea is

that it would remain. So the brass cap iron post monument is ripped out, the magnet will still be in place enabling us to easily reestablish that corner position.

Here is a description and a use of a memorial in the form of a magnet placed under the survey iron post. Something I mentioned before that I like to do is I give it a quick reference to where is this corner located. Here we see that it is in the stock trail. That is why we use the reference monuments. Because the actual true point for the corner it was not in a location where we could not set a monument. It was in a position where we did not want to set an above ground monument. Another situation would be in a road where you do not want a monument is sitting up above the pavement. You would bury the monument underneath the road whether it is asphalt or gravel and then set two reference monuments above ground to reference that true point position enabling someone to easily identify that corner position and not put the actual true point to the corner in a precarious place where I can be disturbed.

Let us go to this next slide; here I mentioned that the affidavit was made a part of the notes. This is a signed and sworn affidavit remembering that the man's name was Mr. C.O. LeDuc describes who he is. Another important thing is that he lives in the location where the survey work was done. That he is a longtime resident of the area and it even makes that point. Now, I worked on this survey. I actually prepared this affidavit for Mr. LeDuc to sign and I explained it to him so that he could go to a notary. If you look at the next slide you can see the bottom of the affidavit, that is was actually notarized. So signed, notarized and a sworn statement saying that he saw the corner before it was disturbed and I used his testimony to reestablish this corner position.



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235

AFFIDAVIT

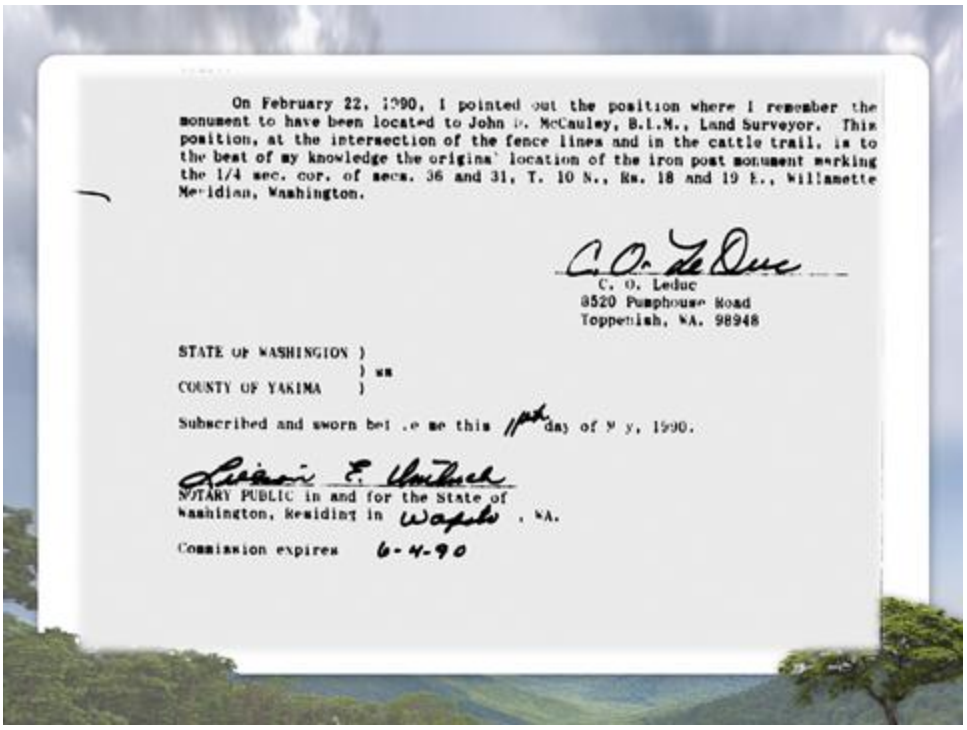
May 1, 1990

To whom it may concern:

I, C. O. Leduc, and my wife, Geraldine Foster Leduc, have lived on Tribal Allotment No. 3587, located in the SE 1/4 of sec. 36, T. 10 N., R. 18 E., Willamette Meridian, Washington, since 1973. I am a longtime resident of the area, living and working here since the early 1940's.

On February 1, 1990, my wife observed men on horseback near the SE. corner of our land. Upon further investigation, I noticed that a wild horse trap was being constructed in the draw next to the SE. corner of the property. I found that the iron post monument that marks the 1/4 sec. cor. of secs. 36 and 31, T. 10 N., Rs. 18 and 19 E., Willamette Meridian, Washington, identical with the SE. cor. of Tribal Allotment No. 3587, had been moved during construction of the trap and used as an anchor. We notified the Yakima Tribal Police of the incident and filed an official report with them.

I have personal knowledge of the position of this monument because it was located in a cattle trail that I have used regularly for the past 40 years. It was located at the projected intersection of fence lines that extend North and West from the draw where the cattle trail passes. The last time I saw the monument in this position was the Fall of 1989 while driving cattle down the



On February 22, 1990, I pointed out the position where I remember the monument to have been located to John P. McCauley, R.L.S., Land Surveyor. This position, at the intersection of the fence lines and in the cattle trail, is to the best of my knowledge the origina' location of the iron post monument marking the 1/4 sec. cor. of secs. 36 and 31, T. 10 N., Rs. 18 and 19 E., Willamette Meridian, Washington.

C. O. Leduc

C. O. Leduc
8520 Pumphouse Road
Toppenish, WA. 98948

STATE OF WASHINGTON)
) ss
COUNTY OF YAKIMA)

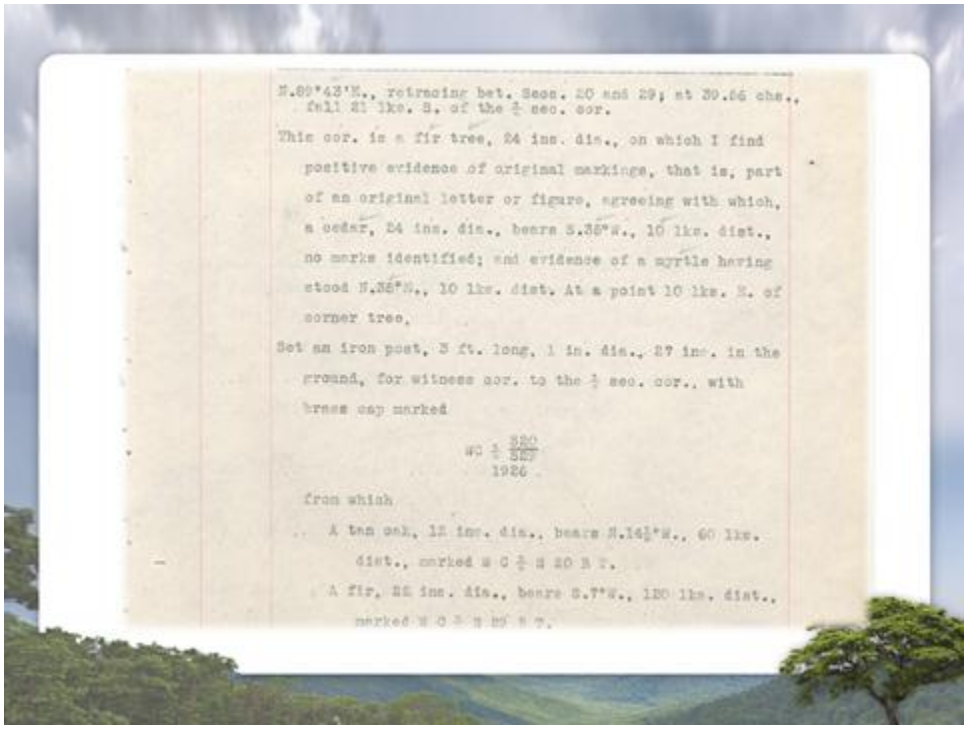
Subscribed and sworn bef .e me this 11th day of M y, 1990.

Lillian E. Umbach

NOTARY PUBLIC in and for the State of Washington, Residing in Wapato, WA.

Commission expires 6-4-90

Going to the next slide, here I want to talk about another corner description and it is important to note that this particular corner description is from 1926. The point I want to make here is that the format for corner descriptions at this time by the General Land Office and the Bureau of Land Management has remained essentially the same.



N.89°43'E., retracing bet. Secs. 20 and 29; at 39.86 chs., fell 21 lks. S. of the ¼ sec. cor.

This cor. is a fir tree, 24 ins. dia., on which I find positive evidence of original markings, that is, part of an original letter or figure, agreeing with which, a cedar, 24 ins. dia., bears S.36°W., 10 lks. dist., no marks identified; and evidence of a myrtle having stood N.36°W., 10 lks. dist. At a point 10 lks. N. of corner tree,

Set an iron post, 3 ft. long, 1 in. dia., 27 ins. in the ground, for witness cor. to the ¼ sec. cor., with brass cap marked

40 | 320
1926

from which

A tan oak, 12 ins. dia., bears N.14½°W., 60 lks. dist., marked B C ¼ S 20 B T.

A fir, 22 ins. dia., bears S.7°W., 120 lks. dist., marked B C ¼ S 20 B T.

We give a legal description of what the corner is and what we found, what references were made such as bearing trees. So looking at this next slide, we can say that this corner, what is the monument. Well this happens to be the actual true point for the corner is a fir tree. So here we have a corner tree. The surveyor in 1926 found positive evidence of the original marks on the tree.

Now to reference this position, he backed away and at a point, you see here 10 links to the east of the corner tree he sets a witness corner. What is important here is that if we look at the top of this survey line, we see up here that there is the bearing of the line that he is following as he is retracing between sections 20 and 29. He is following a bearing of North 89 degrees 43 minutes east. Now, when he sets this reference to the witness corner, the actual tree corner, which is the true point for that quarter corner position. He did not set an online witness corner. It is very clear in his field notes here that the bearing of the line was north 89, 43 east and he moved 10 links east of the corner so this clearly identifies this as an offline witness corner.

The general format has always remained the same where we describe what we found, then what we did and then we cite our references and as you can see here, again we use the term "from which". So the accessories are always referenced from the corner to the accessory. In this case he used a tan oak and fir trees. He gives the bearings to the blaze and the center of the blaze and then that 60 links distance to that tan oak is measured to the side center of the tree.

Notice that the scribe marks on the tree include WC. These trees are referencing the witness corner and not the true point. Now, recently we found that the original corner tree not only been logged so it was a stump but the stump had decayed to a point where we could actually set a monument. We took one of our aluminum drive rod monuments that are 36 inches long and used 2 lengths of that drive rod 72 inches, drove that down into the tree based on this tie, not the center of the tree. We used the reference from this witness corner 10 links to the east, to position the corner. Drove it down through the center of the tree to its refusal then set an aluminum cap on top then re-tied the bearing trees in back to the original true point.

Now we also amended this witness corner monument. We erased the marks WC and changed it to RM. This now functions as a reference monument. In all actuality in the very beginning, it functioned more as a reference monument rather than as a witness corner. Because remember the function of a witness corner is a monument to reference a position that could not actually be monumented where as a reference monument is used to reference a corner position that could not be occupied. There is actually a true point to the corner and some type of monument at that location but you cannot occupy it and that is when you use a reference monument. If you cannot establish a corner monument at the true point, that is when you use a witness corner. This was always a reference monument. We have now monumented the true point and changed it to function as a reference monument.

Reading Assignments

Section 9-5 through 9-35 of the 2009 Manual of Surveying Instructions

Field Notes (pages 426-431) of the 2009 Manual of Surveying Instructions

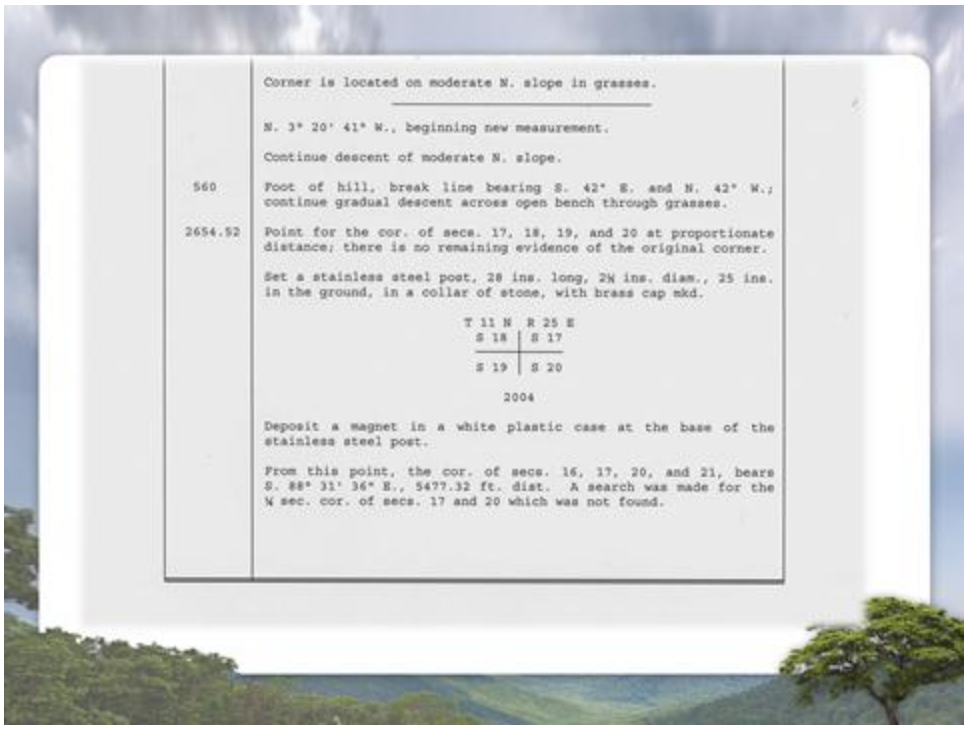
Part #4 Corner Monumentation and Creating the Record

Now I am going to talk about the standard format in BLM notes for reestablished or new corners. You will see that they always start with the term "point for". That is an indication that this is a new monument or a reestablished corner. Then you will see that the format contains the legal description for the corner such as the one quarter section corner of sections 30 and 31 or the east 1/16 corner of sections 30 and 31. Then it goes on to describe what you set. A description of the monument as far as the size and type and how you found the monument.

The typical BLM corner description will read that you found an iron pipe 1 ½ inches diameter firmly set projecting 12 inches out of the ground. We will go to the next slide. The standard format would then proceed with the call for accessories. Describe what the accessories were whether they are BTs or RMs. Again the description is always written in the terms of "from which". The accessories are always from the corner position from the corner to the accessory.

Then I always like to add the general location of the corner that gives anyone searching for the corner a quick reference of the corner position such as south 270 feet from Highway 228. Just to give a quick reference that the corner is south of the highway and not north of the highway. Then since this is reestablished corners, it is important to provide documentation of the controlling corners. So if you reestablished a quarter corner by proportionate measurement, if it's not covered on your plat, it should be covered in the field notes giving that tie to the controlling corners east or west or north or south and some type of description of those controlling corners.

Let us look at the next slide and here is a corner description from a set of BLM field notes. First you notice that these are modern field notes. That the distances are in feet and not chains. As I said before since this is a reestablished corner position, it always begins with the phrase "point for" the corner. So here we have point for the corner of sections 17, 18 19 and 20 at proportionate distance. Then we always make the comment that there is no remaining evidence of the original corner. It is our verification that we did search but did not find that original corner position. So following that same general format we have described the legal description of the corner and now we move on to what we set.



Corner is located on moderate N. slope in grasses.

N. 3° 20' 41" W., beginning new measurement.

Continue descent of moderate N. slope.

560 Foot of hill, break line bearing S. 42° E. and N. 42° W.; continue gradual descent across open bench through grasses.

2654.52 Point for the cor. of secs. 17, 18, 19, and 20 at proportionate distance; there is no remaining evidence of the original corner.

Set a stainless steel post, 28 ins. long, 2½ ins. diam., 25 ins. in the ground, in a collar of stone, with brass cap mkd.

T 11 N R 25 E
S 18 | S 17
S 19 | S 20

2004

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

From this point, the cor. of secs. 16, 17, 20, and 21, bears S. 88° 31' 36" E., 5477.32 ft. dist. A search was made for the ¼ sec. cor. of secs. 17 and 20 which was not found.

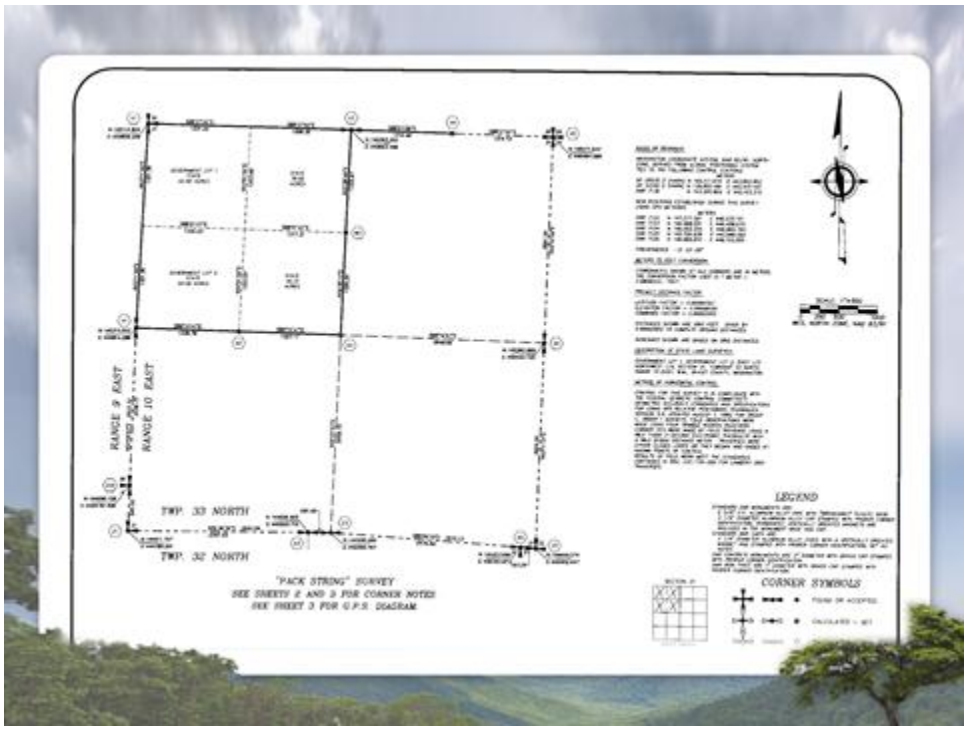
So here we set a steel post 28 inches long 2 ½ inches in diameter and 25 inches in the ground. In this case, in a collar of stone. There you see the standard section corner marks. We have township and range on the top, the proper orientation for each of sections. The lines drawn properly orientated for the section lines and of course the date of when the monument was set. Then we follow that with the call for the memorial. Again in the Oregon state office for the past 15 years we have been placing these magnets underneath these brass caps that are detectable to about a depth of 8 feet. That should the monument be destroyed or knocked out we can go back and look for that magnet that would easily and quickly identify where that corner was located before it was destroyed.

Then I also mentioned how we should call for and provide documentation of the controlling corners. That is the last paragraph in this corner description where we are running the field notes along certain section lines, but we did not run this line so we are going to provide a tie describing the other controlling corner that was used to reestablish this section corner position. In this case we are going to call for the section corner to the east. For sections 16, 17, 20 and 21 provide the bearing and the distance. Notice that we also make note that we searched for the intervening corner but did not find it. So we are covering ourselves that we did all of the work, this is the only corner that we could find. This is the controlling corner for the reestablishment of this section corner.

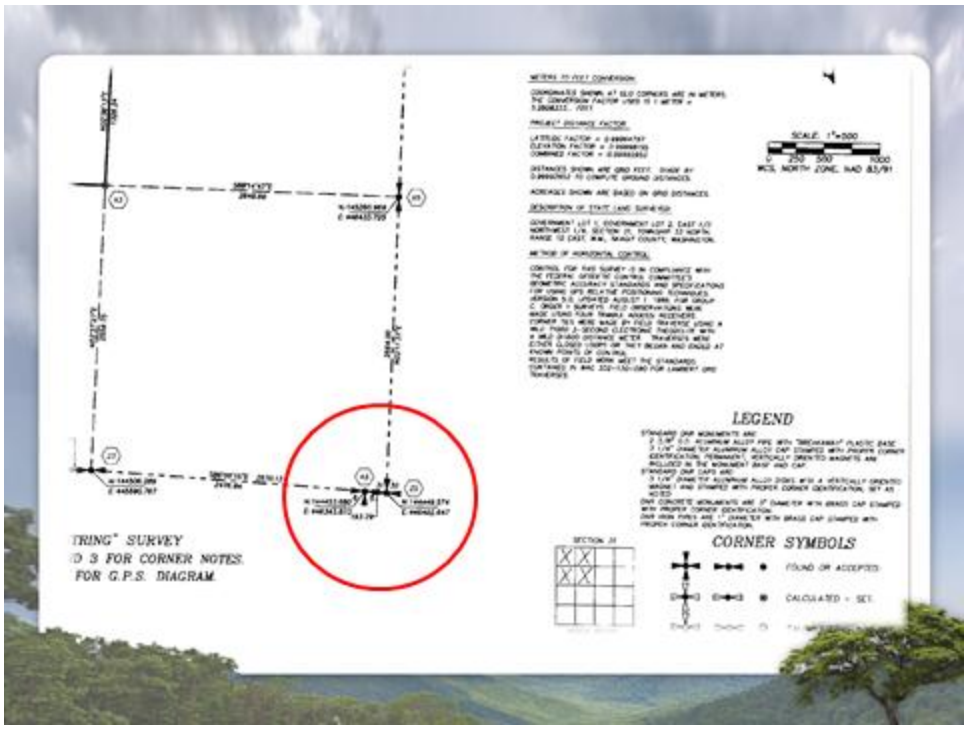
Now of course in the private sector, you are not going to write field notes, but what I would suggest is that in the information that you file with the county, you could perhaps budget for a second plat sheet wherein you could describe all of your corner evidence. Give a complete description of the corner and perhaps even history of the corner, who else had found it what other information is of record that describes this corner position. I also suggest that you cite all of the references utilizing the corner and where they are located. We have seen examples where not all corner records are located in the county. It could be in some private surveyor's office, they could be in the basement of the jail, in the county commissioner's office, and they could be in the public works department.

It is good to cite the specific department in the county where they are located or even another federal agency. Such as the example I used from the Bureau of Reclamation Records that they are only located at that particular office in their vault. It is also a good idea to cite conflicting evidence. Call for the corners that you did not use and perhaps provide an explanation as to why you did not utilize that corner position. Do not be afraid to say that you did not find someone else's corner in the correct position. Document what you have done. Just be thorough in saying this is what I did and this is why I did it. Another, which is usually in the states requirements, is to cite all of the encroachments. In cadastral surveying that is your job. You are trying to identify the boundaries and make notice give notice of encroachments. That is usually the reason why you are there. If there is a disagreement as to where the boundary is located and not everyone may agree that you have even done the survey correctly. By citing the encroachments, citing all of your conflicting evidence, you bring out all of the facts.

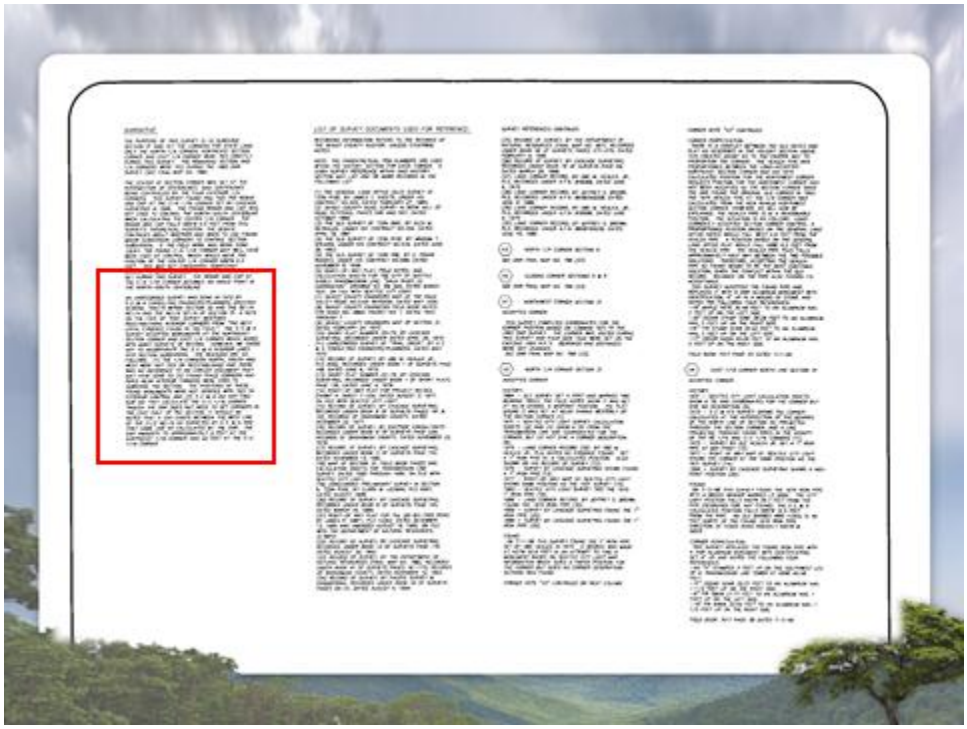
I mentioned earlier that it may be difficult to get everyone to agree on the final conclusions, but if you can get everyone to agree that you have gathered the correct facts, it gives you a starting point to develop the final solution to your surveying situation. On the next slide I want to show you an example of a private survey that has been done very well.



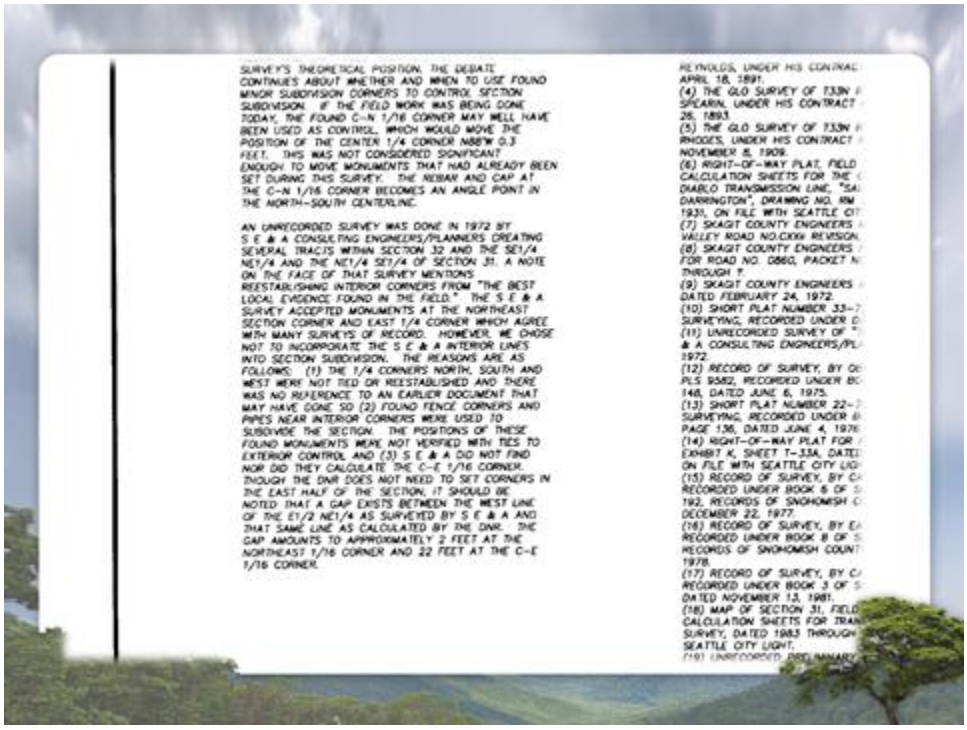
It has a lot of information and this one in particular took three sheets to document all of the surveying work that was done. So we are going to zoom in down in this lower part of the plat and then we will go to the next page and here we see that he uses the common references the identifier marks A5, tells you it is on the north boundary of one township and it's the corner of sections 5 and 6 and you can see the number Z5 which tells you it is on the south boundary of the township to the north, the corner of sections 31 and 32. This plat also has a very nice legend. It gives you a quick reference describing the corners. You know quickly by looking at the plat if it is a found corner, a calculated corner that was set or a calculated corner that was not set.



Now we go to sheet two of this plat, and here contains a narrative and we will look a little closer at that describing his entire survey, but these are all his corner descriptions. This very impressive plat provides a lot of information. Let us look a little closer at the information provided on this plat. On the next slide we will zoom into the red box and look at the narrative.



Here we see in his narrative he talks about an unrecorded survey done in 1972. Describes the information that was found there and then goes on to specifically state, that he did not incorporate some of the information from that survey into his survey. It goes on to cite the reasons are as such. This is great, provides all of the information and you do not have to guess at what information this person was using.

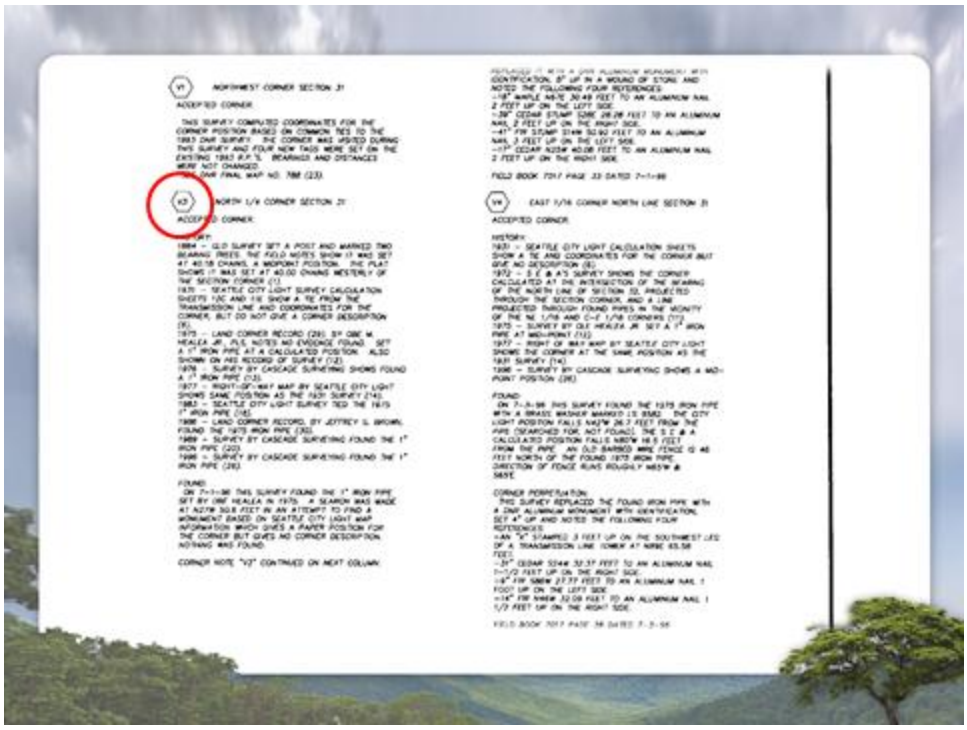


SURVEY'S THEORETICAL POSITION. THE DEBATE CONTINUES ABOUT WHETHER AND WHEN TO USE FOUND MINOR SUBDIVISION CORNERS TO CONTROL SECTION SUBDIVISION. IF THE FIELD WORK WAS BEING DONE TODAY, THE FOUND C-N 1/16 CORNER MAY WELL HAVE BEEN USED AS CONTROL, WHICH WOULD MOVE THE POSITION OF THE CENTER 1/4 CORNER N88°W 0.3 FEET. THIS WAS NOT CONSIDERED SIGNIFICANT ENOUGH TO MOVE MONUMENTS THAT HAD ALREADY BEEN SET DURING THIS SURVEY. THE REBAR AND CAP AT THE C-N 1/16 CORNER BECOMES AN ANGLE POINT IN THE NORTH-SOUTH CENTERLINE.

AN UNRECORDED SURVEY WAS DONE IN 1972 BY S E & A CONSULTING ENGINEERS/PLANNERS CREATING SEVERAL TRACTS WITHIN SECTION 32 AND THE SE1/4 NE1/4 AND THE NE1/4 SE1/4 OF SECTION 31. A NOTE ON THE FACE OF THAT SURVEY MENTIONS REESTABLISHING INTERIOR CORNERS FROM "THE BEST LOCAL EVIDENCE FOUND IN THE FIELD." THE S E & A SURVEY ACCEPTED MONUMENTS AT THE NORTHEAST SECTION CORNER AND EAST 1/4 CORNER WHICH AGREE WITH MANY SURVEYS OF RECORD. HOWEVER, WE CHOSE NOT TO INCORPORATE THE S E & A INTERIOR LINES INTO SECTION SUBDIVISION. THE REASONS ARE AS FOLLOWS: (1) THE 1/4 CORNERS NORTH, SOUTH AND WEST WERE NOT TIED OR REESTABLISHED AND THERE WAS NO REFERENCE TO AN EARLIER DOCUMENT THAT MAY HAVE DONE SO (2) FOUND FENCE CORNERS AND PIPES NEAR INTERIOR CORNERS WERE USED TO SUBDIVIDE THE SECTION. THE POSITIONS OF THESE FOUND MONUMENTS WERE NOT VERIFIED WITH TIES TO EXTERIOR CONTROL AND (3) S E & A DID NOT FIND NOR DID THEY CALCULATE THE C-E 1/16 CORNER. THOUGH THE DNR DOES NOT NEED TO SET CORNERS IN THE EAST HALF OF THE SECTION, IT SHOULD BE NOTED THAT A GAP EXISTS BETWEEN THE WEST LINE OF THE E1/2 NE1/4 AS SURVEYED BY S E & A AND THAT SAME LINE AS CALCULATED BY THE DNR. THE GAP AMOUNTS TO APPROXIMATELY 2 FEET AT THE NORTHEAST 1/16 CORNER AND 22 FEET AT THE C-E 1/16 CORNER.

REYNOLDS, UNDER HIS CONTRAC
APRIL 18, 1891.
(4) THE GLO SURVEY OF T33N
SPEARIN, UNDER HIS CONTRACT
26, 1893.
(5) THE GLO SURVEY OF T33N
RHODES, UNDER HIS CONTRACT
NOVEMBER 15, 1909.
(6) RIGHT-OF-WAY PLAT, FIELD
CALCULATION SHEETS FOR THE
DIABLO TRANSMISSION LINE, "SA
DARRINGTON", DRAWING NO. RM
1931, ON FILE WITH SEATTLE CI
(7) SKAGIT COUNTY ENGINEERS
VALLEY ROAD NO.CXXX REVISION
(8) SKAGIT COUNTY ENGINEERS
FOR ROAD NO. 0860, PACKET N
THROUGH 7.
(9) SKAGIT COUNTY ENGINEERS
DATED FEBRUARY 24, 1972.
(10) SHORT PLAT NUMBER 33-
SURVEYING, RECORDED UNDER
(11) UNRECORDED SURVEY OF
& A CONSULTING ENGINEERS/PL
1972.
(12) RECORD OF SURVEY, BY
PLS 9582, RECORDED UNDER
148, DATED JUNE 6, 1975.
(13) SHORT PLAT NUMBER 22-
SURVEYING, RECORDED UNDER
PAGE 136, DATED JUNE 4, 197
(14) RIGHT-OF-WAY PLAT FOR
EXHIBIT K, SHEET T-33A, DATE
ON FILE WITH SEATTLE CITY LI
(15) RECORD OF SURVEY, BY
RECORDED UNDER BOOK 6 OF
192, RECORDS OF SNOHOMISH
DECEMBER 22, 1977.
(16) RECORD OF SURVEY, BY
RECORDED UNDER BOOK 8 OF
RECORDS OF SNOHOMISH COUN
1978.
(17) RECORD OF SURVEY, BY
RECORDED UNDER BOOK 3 OF
DATED NOVEMBER 13, 1981.
(18) MAP OF SECTION 31, FIEL
CALCULATION SHEETS FOR TRA
SURVEY, DATED 1983 THROUGH
SEATTLE CITY LIGHT.
(19) UNRECORDED PRELIMINARY

He was very explicit about this is what I found and this is what I did. Going to the next slide, here are his corner descriptions. You can see he uses the standard indexing number V3 and provides a complete corner history from the original GLO corner to other reestablishments on down to what he specifically found at that corner position.



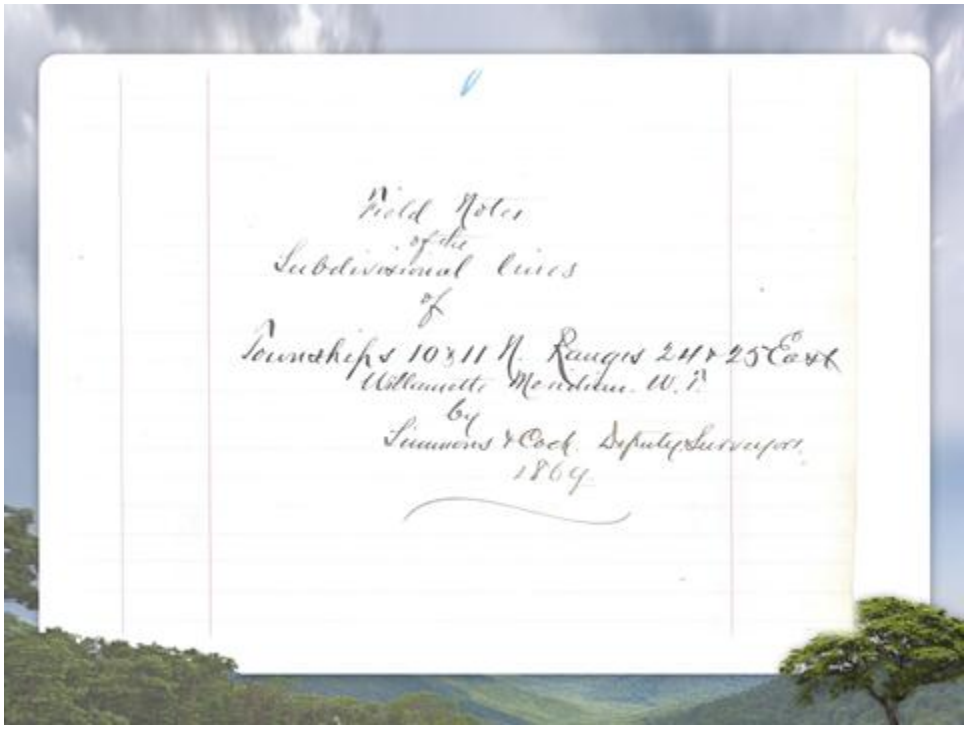
This is a wonderful example of how you can document your work and get it on record that will stand for generations to come and people can go to your survey and know exactly what you have done. If I have one little problem with this plat is that I do not like the legal description. In this V3 he calls for this as the north quarter corner of section 31. That is not the proper legal description of that corner. Because in reality that position is the ¼ corner of sections 30 and 31. We see this all the time with surveyors if they are only working in one section and they refer to that section as the north quarter corner or the east quarter corner. However the actual legal description of the corner is the corner between sections.

If you look at over here V4 does the same. It is the east 1/16 corner north line section 31. Well I have worked in this field for many years and I know what he is talking about. Always preparing to present my information to someone else such as a judge, I find it important to reference it with the correct legal description. In this case looking at the slide what he calls the east 1/16 corner north line section 31. The true legal description of this corner is that it is the east 1/16 corner of sections 30 and 31.

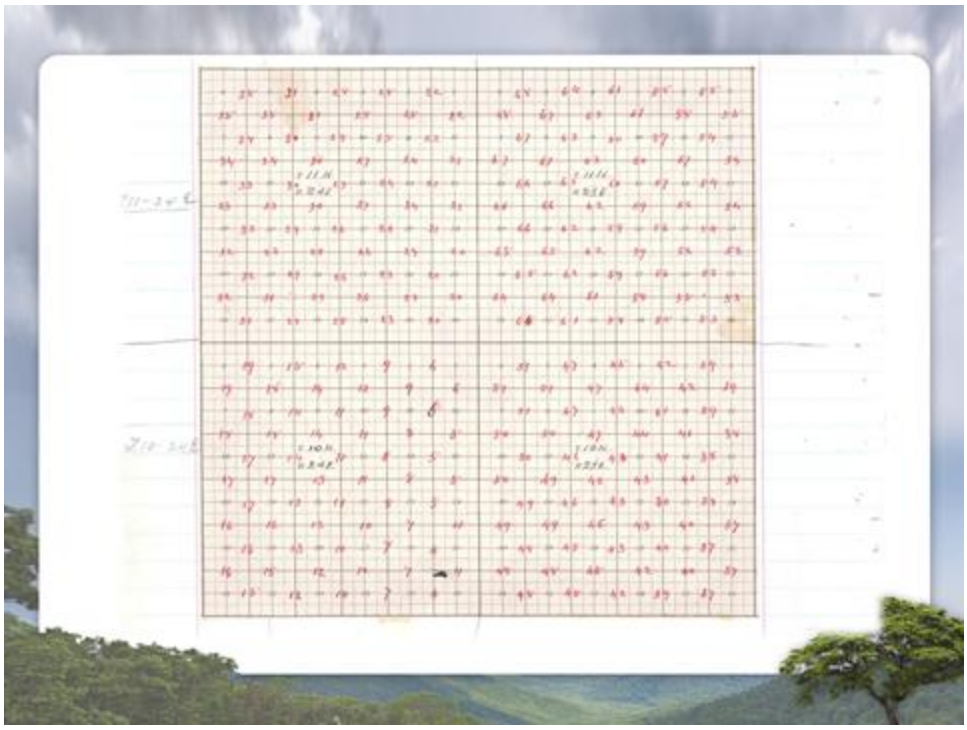
The important aspect of calling for the actual legal description is the fact that in many situations it may be the quarter corner of section 31 only. We do not always have corners that are common to both sections. So by making that distinguishing remark that it is the corner of both sections, you will distinguish that it is not just the quarter corner of section 31 or the east 1/16 of section 31. That it is in fact the 1/16 quarter corner common to both sections.

So moving on, let us talk about field applications where your preparation will meet opportunity. How you can essentially put yourself in a situation to be successful in the field to recover original corners by having that corner history in your hands. By having all of the information relevant to a corner that you are looking for in the field, it will enable you to apply your field observations to what you are actually seeing on the ground to what the record says you are looking for. It will enable you to, we like to say improvise, adapt and overcome the difficulties in trying to recover a corner that may be 100, 120, or 150

years old that no one perhaps has found since that original survey. Adapt those field notes to the actual observations in the field.

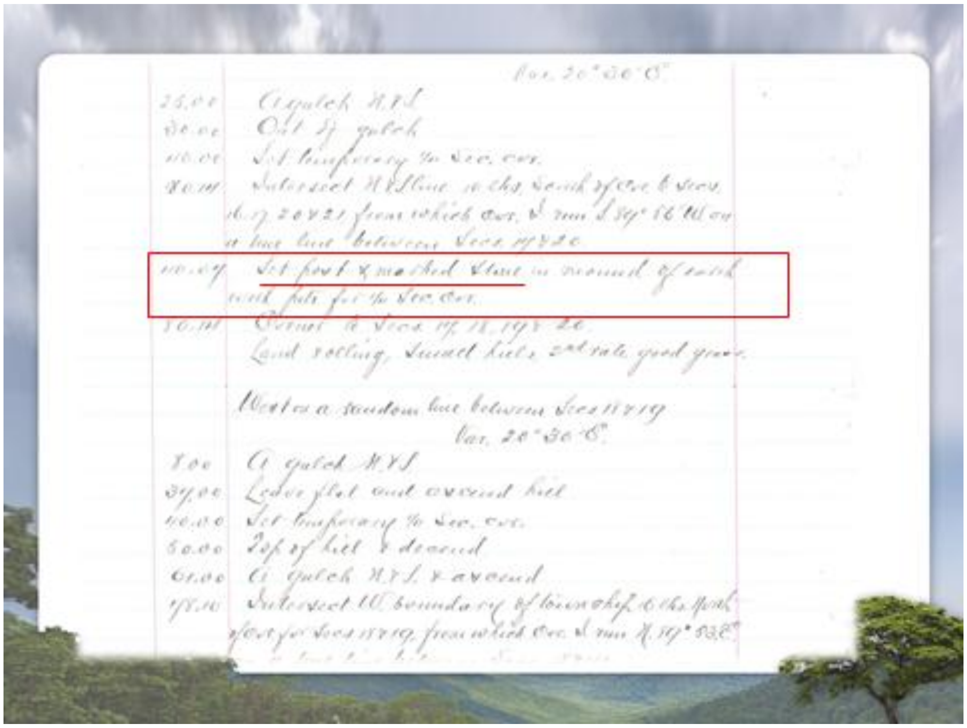


Here is an example of applying your original GLO records to evidence recovered in the field. We have a survey by Simmons & Coch Deputy Surveyors that was performed in 1869. The field work for the survey was done by our office in 2004. We are out there looking for this original corner 135 years after the original survey.



Record research in the local depositories found that no one had recovered this corner in the last 135 years. So we took the field not records, went to the field and in evaluating it, we can see that Simmons and Cock had a contract where they only did the interior sub-divisional lines of these four townships. It is important to remember that the exterior of these townships were surveyed first. The person who got the contract to survey the sub-divisional lines within the township may or may not have been the same surveyor who surveyed the exteriors of the township. They did have their notes. So the corner that we are going to be looking for in this example is the ¼ section corner of Sections 19 and 20 in township 11 north range 24 east.

Here is a copy of those field notes describing what they had set at this ¼ section corner. Most of the corners in this survey were wood posts. However, Simmons and Cock always made this remark that not only did they set a wood post but they set a marked stone with the wood post. In this case in a mound of earth with widths pits for this one quarter section corner.



Var. 20°30' E.

25.00 A gulch N.&S.
30.00 Out of gulch
40.00 Set temporary ¼ sec. cor.
80.00 Intersect N&S line 10 chs. south of cor. to secs. 16, 17, 20 & 21 from which cor. I run S 89° 56' W on a true line between secs. 17 & 20.
40.07 Set post & marked stone in mound of earth with pits for ¼ sec. cor.
80.14 Corner to secs. 17, 18, 19 & 20.
Land rolling, small hills 2nd rate good grass.

West on a random line between secs 18 & 19
Var. 20°30' E.

7.00 A gulch N&S
34.00 Leave flat and ascend hill
40.00 Set temporary ¼ sec. cor.
50.00 Top of hill & descend
61.00 A gulch N&S & ascend
79.10 Intersect W boundary of township 6 chs north of post for secs 18 & 19, from which cor. I run N 89° 53' E

So going to the actual field site on the next slide, this is wide open country. This is out in the high desert of eastern Washington State and it would have been subject to a series of wild fires over many years. You can see that there is some sage brush, but none of the sage brush and none of the plants in this area are very big. In fact in year 2000 this entire area burnt over and was reseeded, aerial reseeded by the US Fish and Wildlife Service to bring back the native bunch grass.

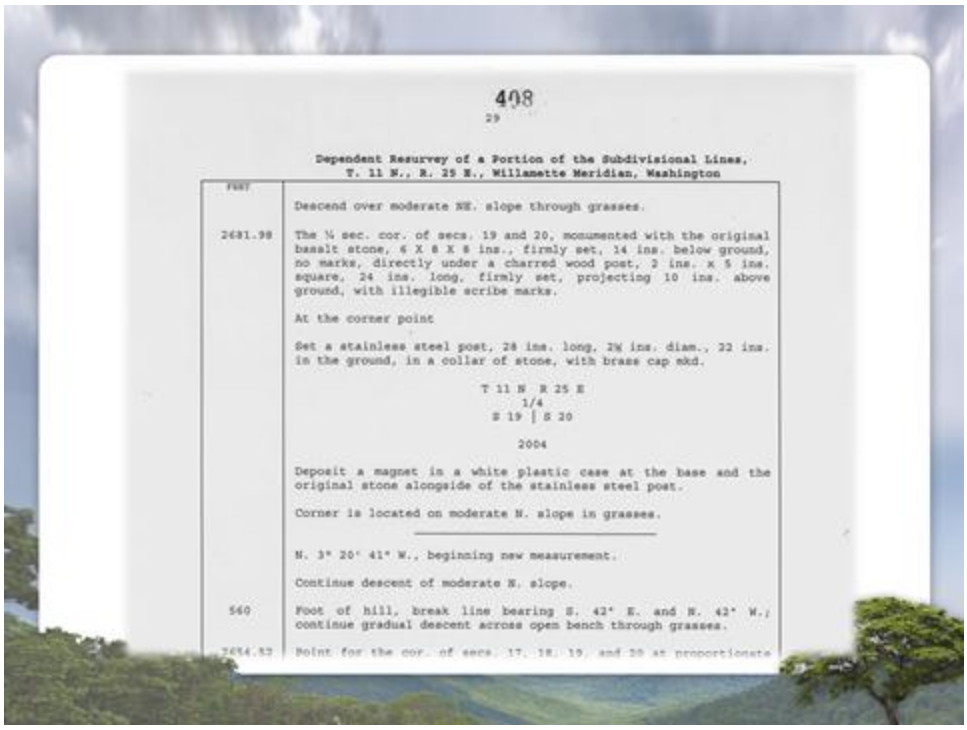
What you see in the circle there is a wood post, the burnt remains of a wood post. Zooming in on that monument there, you can see we have just a stub of a wood post and we have a stone lying around it. There were no marks on this stone and of course people lived in this area and repeatedly and you know it could have been a wood post that was associated with a fence line. In searching around we did not find any other wood in this immediate area.

In fact the fires that burnt through there essentially cleared out most of the wood and that was our common call. If you found wood out there, you let everybody know because that was a way to pinpoint an area to start searching harder. So going to the next slide.

If we take a closer look you can see down here on the right of the post and over here on the left side of the post, there appears to be perhaps some scribing. Fire and bugs have a funny way of decaying posts. Over the course of time with the weathering out in this area, it is hard to tell if that is actual scribing or what not. That could be bugs or scribing. Up in this other area it almost looks like there is an "S" that is engraved or scribed on to the post. It is inconclusive to me that this is actually a scribed set monument from the original survey. We go to the next slide when we excavated the post something curious popped up.

This stone here circled in the red, that stone although unmarked, was directly underneath this set wood post. If you remember back from the original GLO notes, Simmons said that they set a wood post and a marked stone. It was only at this corner position did I realize, that perhaps what he was talking about was that he set a marked stone underneath the wood post. The stone was actually a memorial for the scribed wood post. I do not know. To me this was conclusive evidence that this was actually the original corner set by Simmons and Cock in 1869. Again over 135 years prior to our survey.

Going to the next slide here is our remonumentation description of that corner point. You can see that these are modern notes that the distances here are shown in feet.



408

29

Dependent Resurvey of a Portion of the Subdivisional Lines,
T. 11 N., R. 25 E., Willamette Meridian, Washington

FEET	
	Descend over moderate NE. slope through grasses.
2681.98	The ¼ sec. cor. of secs. 19 and 20, monumented with the original basalt stone, 6 X 8 X 8 ins., firmly set, 14 ins. below ground, no marks, directly under a charred wood post, 2 ins. x 5 ins. square, 24 ins. long, firmly set, projecting 10 ins. above ground, with illegible scribe marks.
	At the corner point
	Set a stainless steel post, 28 ins. long, 2½ ins. diam., 22 ins. in the ground, in a collar of stone, with brass cap mkd.
	T 11 N R 25 E 1/4 S 19 | S 20
	2004
	Deposit a magnet in a white plastic case at the base and the original stone alongside of the stainless steel post.
	Corner is located on moderate N. slope in grasses.
	N. 3° 20' 41" W., beginning new measurement.
	Continue descent of moderate N. slope.
560	Foot of hill, break line bearing S. 42° E. and N. 42° W.; continue gradual descent across open bench through grasses.
2654.52	Point for the cor. of secs. 17, 18, 19, and 20 at proportionate

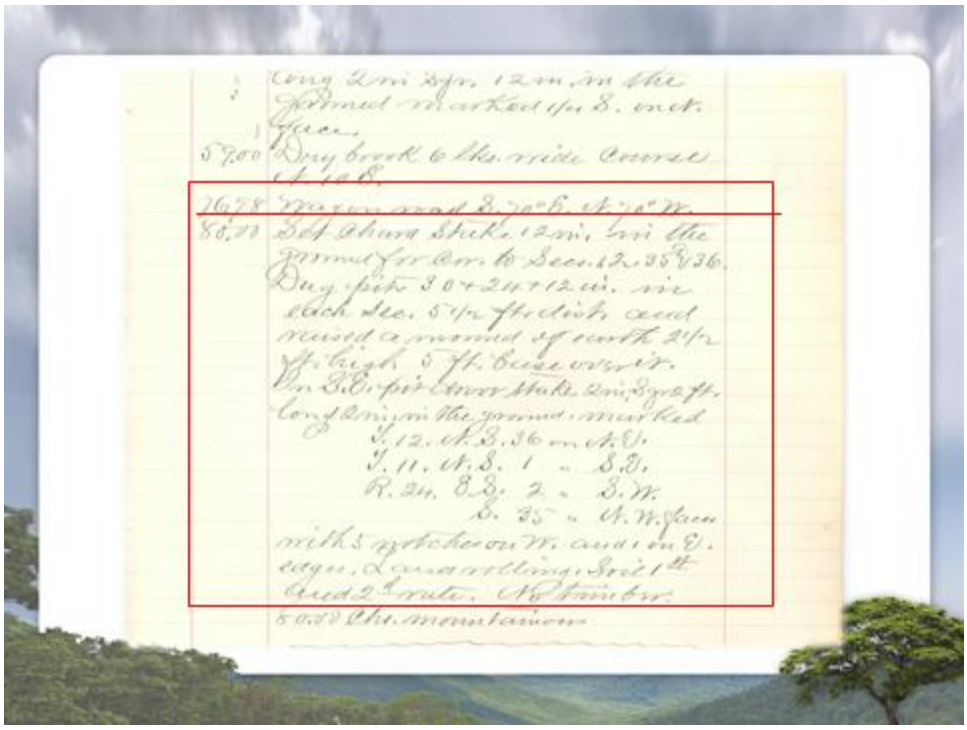
Again with our corner description we start with the legal description of the corner. The one quarter section corner of sections 19 and 20, describe what we found, monumented with the original basalt stone, provide the dimensions of that stone and how we found it firmly set 14 inches below the ground, no marks. Then describe the other monument, which was the wood post 2 inches by 5 inches square, 24 inches long, firmly set projecting 10 inches above the ground with illegible scribe marks. Then we go on to describe what we did at that position, and since this is a remonumentation of the original corner we say "at the corner point".

Then describe the monument that we set and you can see here that these are the marks that were put on the brass cap for that monument with township and range on the north since it is a north south quarter corner there is one quarter located on the north side of the line and then the proper orientations of the sections with the section 19 to the west and section 20 to the east and of course the date when we established this monument.

Then I will go on to describe what we did with the memorials that we had a magnet that we placed at the base of the stainless steel post and then the original stone was placed alongside these original stone monuments are not your trophies they are corner evidence and they are to be left at that corner position to help perpetuate that this was the original corner, and the original corner stays there. Again they are not your trophies to take home and put in your garden, they are evidence of that corner position that should remain at that corner position. Then the last little notation on here is that the corner is located on a moderate north slope in grasses. Just something to give help to someone else coming into this area to key him or her in on where is the general location that we are going to be looking for this corner monument.

So let's talk about another situation this is in the same general area in Eastern Washington and another corner that I think we were pretty fortunate to find and this is a picture that I showed earlier in this presentation of Ken Saveland and he is holding an original wood post in a mound of stone.

That original survey was done in 1881 and our field work was done in 2004. This wood post would have been in the field for 121 years before anyone made a record that they had found it. So let us look at the field notes from the Richardson survey from 1881. Here that we can see that as he is running from east to west at 76.98 chains, he calls for a wagon road. Now this site is located in Eastern Washington and it is part of the Hanford Reach National Monument. It has been federal land that was taken back from private parties back in the early 1940s for the Hanford works project. This has been a closed area to the public ever since the early 1940s. Out on the ground you can still see this actual wagon road with the two ruts going on and across the open desert.



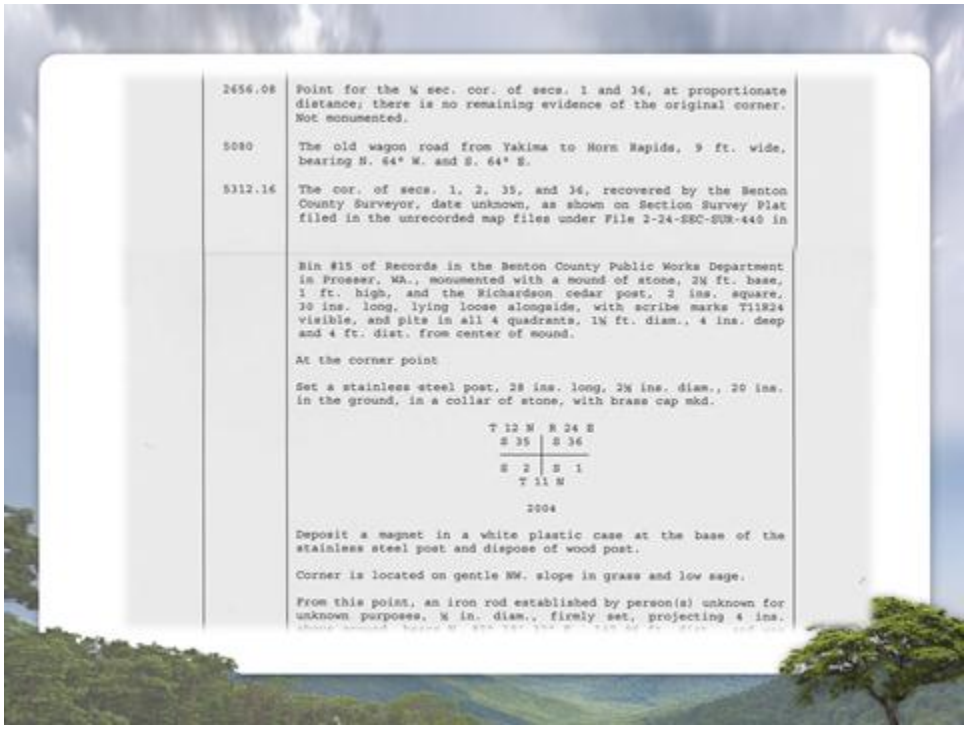
At this particular location, we are along the south boundary of township 12 north ranges 24 east moving towards the corner of sections 35, 36 and 1, 2 on that south boundary of the township. Now when we initially searched for this position, we looked essentially 200 feet to the east of that wagon road, covered this entire area and found nothing. I had a feeling that this corner was there with the tie to the wagon road out in this area. It was the only road and even today people or I should say I would take maybe a little extra time if I were setting a corner that was immediately adjacent to a road where people could commonly see it. I had a feeling that this corner just had to be there.

Low and behold it was there. We not only found a mound of stone but we found the original scribed wood post set by Mr. Richardson in 1881. What he had done was reverse that topo call, so instead of this being located to the east of the wagon road 3 chains, we found it west of the wagon road, 3 chains. So all together, this corner position was nearly 400 feet out of position based on Richardson's tie to that wagon road. But an important piece of information is something that I was able to pull out of my experience of having had followed Mr. Richardson around in several different areas and knew that he had this nuance this little bad habit of sometimes reversing his topography calls.

Let us look closer on the next slide at the corner evidence. Here we see an overgrown and truly embedded mound of stone. The stones are being overgrown by the grasses and got new growth coming in over here.

Only parts of some of the stones are sticking up out of the ground. Go to the next slide, here is the wood post. You can actually see and I mentioned earlier that we are in township 12 north range 24 east. Right here this is the "R" here is the "2" and the number "4" still clearly visible on this wood post and you can see the other fire damage done to this.

It is quite a miracle that this has lasted out in the ground for over 120 years. On this next slide, here is our description and the field notes of that corner position. So first we cite the legal description of the corner.



2656.08 Point for the ¼ sec. cor. of secs. 1 and 36, at proportionate distance; there is no remaining evidence of the original corner. Not monumented.

5080 The old wagon road from Yakima to Horn Rapids, 9 ft. wide, bearing N. 64° W. and S. 64° E.

5312.16 The cor. of secs. 1, 2, 35, and 36, recovered by the Benton County Surveyor, date unknown, as shown on Section Survey Plat filed in the unrecorded map files under File 2-24-SEC-SUR-440 in

Bin #15 of Records in the Benton County Public Works Department in Prosser, WA., monumented with a mound of stone, 2½ ft. base, 1 ft. high, and the Richardson cedar post, 2 ins. square, 30 ins. long, lying loose alongside, with scribe marks T11N24 visible, and pits in all 4 quadrants, 1½ ft. diam., 4 ins. deep and 4 ft. dist. from center of mound.

At the corner point

Set a stainless steel post, 28 ins. long, 2½ ins. diam., 20 ins. in the ground, in a collar of stone, with brass cap mkd.

T 12 N R 24 E
S 35 | S 36
S 2 | S 1
T 11 N

2004

Deposit a magnet in a white plastic case at the base of the stainless steel post and dispose of wood post.

Corner is located on gentle NW. slope in grass and low sage.

From this point, an iron rod established by person(s) unknown for unknown purposes, ¾ in. diam., firmly set, projecting 4 ins.

The corner of sections 1, 2, 35 and 36. Then we cite anyone else who had recovered this corner. It was actually noted on a plat by the Benton County surveyor in an old records bin. This was one of those documents that took me three trips to the county courthouse by saying the right thing to the right person who led me around the corner to another room of records and bins and we started going through there and found on that plat there was a reference that somebody found the wood post and the mound of stones, but that plat was dated and I don't see a date in the field notes here and I don't believe we had a reference of when that was just that somebody at some time found something out there.

So looking back at the corner description, we cite who else had found the corner. Then we go on to find what we found there. Monumented with a mound of stone 2 1/2 foot base, 1 foot high and called for the Richardson cedar post which was 2 inches square 30 inches long lying loose alongside. So for this corner position we monumented the true point. We took the center of the mound of stone as the true point for this corner. We also found pits in all four quadrants that were 1 ½ foot diameter and 4 inches deep and four feet distance from the center of the mound.

So going on in our corner description, then we describe what we did at the corner where we set our stainless steel post and give our dimensions of that post and the fact that we set it 20 inches in the ground. Here is an example of the brass cap markings on a section corner on a south boundary of a township. We see that we have the township and range going across the top with the township to the north. Lines drawn on the cap to represent the section lines and proper orientation and of course the sections listed in their proper placement at this section corner. Since we have two separate townships here, the township to the south is listed on the bottom side of the cap and then of course the date when we established this corner position the year 2004.

We describe the memorial that we set which in this case was a magnet in white plastic case and I would point out that notice we do not have a description of what we did with that original wood post. I just mentioned in the previous corner description that the stones are not your trophies to be taken back to the office and that they should stay at the corner position. This wood post was of a different character if we planted that post alongside our stainless steel post the wood would decay in the ground and create a void immediately adjacent to our new monument. We do not want to do that. So this scribed wood post has been given to the United States Fish and Wildlife Service and it is going to be a part of their new visitor center for the Hanford Reach National Monument and a tribute to the surveys that were done out in this area.

Going to the next slide, here is a picture of Tom Caster who is currently the Bureau of Land Management Indian Land Surveyor for the northwest region.

At this time in 2004 he was my technical lead and we worked together on projects working with different situations and I gave him a call one day and told him, Tom you have to come out, you have got to see this because nobody finds an original mound of earth over 120 years after a survey has been done by the General Land Office. Very few and far between but Tom is standing on an original mound of earth and this original position is the township corner that is located one mile to the east of the marked post and mound of stone that we previously looked at.

In fact by finding that marked wood post which was 400 feet out of position, here we were able to pinpoint a new search area for this township corner that was not only the mound of stone where this hatchet is actually on top of the mound of earth and to the right over here is one of the original pits. You can just see the other pit right over here. We had a mound of earth with pits. That is pretty good evidence because it does not actually look like much. Here you can just see the hatchet on top of this mound of earth.

I tried to explain to Tom why I felt this was the corner. That it agreed with the topography calls to the draw up to the north; draw over to the east to the top of the ridge of the west. Tom said no this was great, I believe you. We can see the pits, so we lay out and determined where we were going to establish the center of the mound by intersecting and crisscrossing the lines between the pits.

Where that line crisscrossed we put our wood hub. And Tom who was sitting in the office raring to go, you saw previously that he had the post hole digger so he started to dig the corner. Digging a hole so we could put in our stainless steel post, we got down a couple of pulls on the post hole digger and nothing was coming out. Couldn't figure it out, you put the post hole digger down and pull it up and no dirt would come up. So he reached down and pulled out on this next slide

The remains of the bottom part of the original wood post of this township corner. Standing with Tom is Rich Dykeman. At this time he was one of our student trainees. I really like the expression on his face kind of as if that son of a gun did not expect to find that.

This is the conclusive evidence that we had actually had the original township corner. Going to the next slide, by finding that township corner, it enabled us to key in and locates the next township corner six miles to the north. I want to point out here that these corners oh 120 years after they have been established really do not look like much. You can see that the stones are almost completely embedded into the ground, just sticking up a little bit.

The legal description for this corner, the description given in the GLO notes for this corner was that it was a wood post within a mound of stone. What's interesting is that the center of this ring of stones, you can see the rings and how the stones are embedded around forming a circular ring that the actual center of this although we did not find any remains of the wood post, the center was very soft. As if the post had been pulled out and filled in with sand over the years.

Going to this next slide, this corner is the next section corner north on the range line on the original mound of earth township corner. So by finding the very first corner, the wood post with the mound of stone 400 feet out of position we were able to key us in to the adjacent corners around it such as that township corner or the mound of earth which was actually 15 chains out of position to the nearest found corner in the township to the east. By finding one corner keys you in, allows you to recalculate your search areas and leads you into other set corners that are just waiting to be found out there.

Looking at the slide there is a close up of this same section corner, again they do not look like very much, but they all have a general characteristic of a circular pattern with a soft center in this particular case. As you can see in the background there are many stones just lying about. Another key thing is once you follow a particular surveyor around for a while, you get more used to or are more easily able to recognize how they set there corners.

Look at the next slide, here is an example of some of what it takes in certain sites to monument a corner. We have our GPS equipment set up, and this was a reestablished corner position, but because of terrain here, we had to build a supporting mound of stone to help hold up our stainless steel post.

Let us talk some more about corner descriptions, it is important to remember that corners are marked for only one corner position.

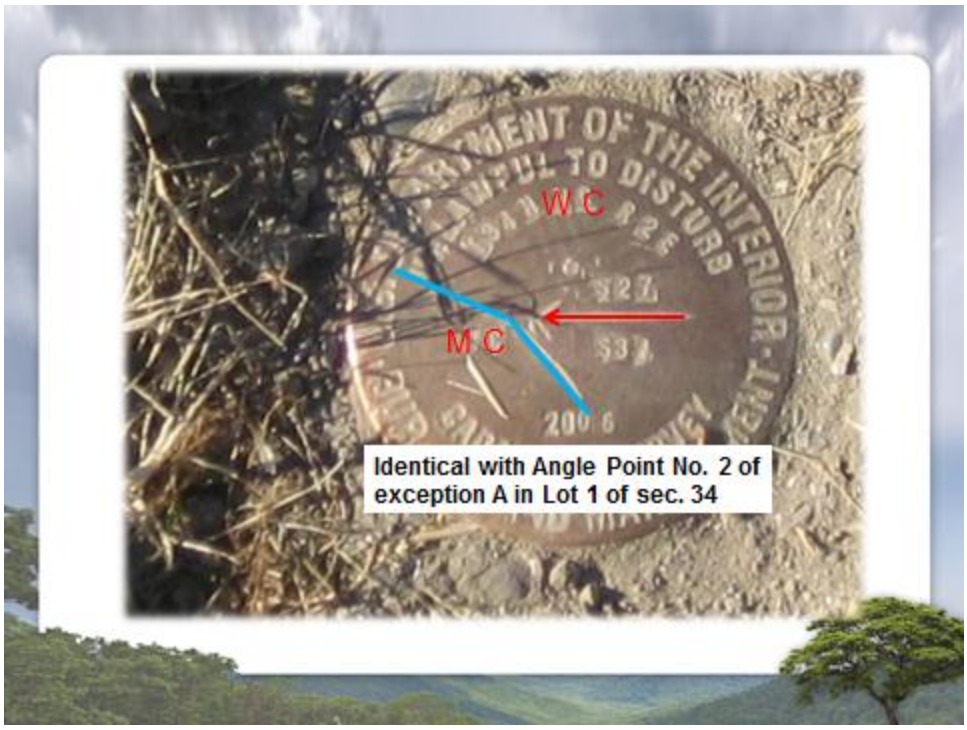
However monuments can represent more than one corner position. The point is the marks on the cap only represent one position. Your description can refer to it as identical with other points. Let us look at the next slide and here we are on the Swinomish Indian Reservation in Washington State.

You can see that we are in a residential area and right down here I have my plumb bob set over a survey monument that is in someone's yard.

Another important point to make here is that before I established this monument I talked to the landowner and asked them for permission described how I could set the monument just below, just almost even with the ground so that he could still mow his lawn and not hit the monument. Going to the next slide here is another shot of it. We are not very far away from his house right in his front yard.

Now as we look out to the west of this position, you can see that I have a road then we have it is actually Puget Sound, so I am limited as to how far I was going to go to establish a good permanent location for this particular monument.

Now what this monument represents is shown on this slide where it is a witness corner for the meander corner of sections 27 and 34 in township 34 north range 2 east.



So at this point let us recap some of the things that we talked about. We talked about researching the record, evaluation of recovered corner evidence, differences between rehabilitation and remonumentation, how to establish the proper corner accessory and how to mark those accessories and what documentation you should include in your final products so that for generations to come, other surveyors will be able to follow and know exactly what you saw, exactly what you did out in the field to help perpetuate and verify your surveying work.

Now let us go to the field and watch myself and Todd Rosenbalm reestablish an original GLO corner from the remains of an original bearing tree.

Part #5 Remonumenting a Corner From One Original Bearing Tree

Here we are going to remonument an original corner. We initially found this position using the GCDB Coordinates for a search area. In searching around, we located this by seeing the tags on the tree. What we found is an original bearing tree, which is now a stump. Looking into the blaze, we can still see the scribe marks clearly showing this to be a quarter corner of section 29 and BT. The marked scars are still visible inside this blaze.

We found stones just down the hill here but it is lying loose. There was another bearing tree mark for this position but that one is completely gone. This is the only original evidence of the quarter corner position we have. When the surveyor George Mills marked this in 1893, it was already a 40-inch tree and as you can see, it is still a very large tree.

What we are looking for - our intent is to come record, bearing and distance off the center of the tree. We know from our experience in retracing George Mills, that he tied his distances to the side center of the tree. Of course, the bearing is going to come off the blaze and its relationship to the center of the tree. There is a bit of duff here. The tree has grown out and over, enlarged in other areas, so it is not a complete circle. It is somewhat oblique. What we are going to do is look at the top of the tree and determine the center based on the rings. Taking the wire brush, I clear away the duff. Now I can clearly see the center of the tree, the rings converge right at this location here.

I am going to take one of our magnetic PK nails and I am going to drive it down into the center. I am going to go ahead and leave this here that is why I drove it flush. Once this tree completely rots away, this PK nail will still be in this location somewhere to help identify that this tree was here. Before coming out here today, I came up with GPS equipment and we are on a kind of moderate northwest slope. The possibility of getting a solar for a good basis of bearing would be very difficult in this location. I set two positions down the hill. One where I could see the tree and where I believe the corner is going to go and the other further down the hill that we are going to use as a back sight. I occupied both of those positions; put GPS on them, and then two sessions changing the height of the satellite antenna. Between the two sessions and then processed that through OPUS.

Now I have a basis of bearing based on GPS. We are going to tie in the center of this tree and then I am going to calculate a corner move to where the true point of the corner is going to go down the hill. Here the original stone is lying loose down the hill. This is the only remaining evidence of the original corner position, so we need to be very precise on how we are going to tie it in. I have GPS for a basis of bearing down the hill. Todd has set up right over there, so he is going to turn two angles to prism. This prism has a bull's eye bubble, so I will be able to hold it steady and level. He is turning two angles and the precision of this work; those two angles need to agree within 20 seconds. He'll turn the two angles, and then shoot the distances to this location. I will figure out the corner move at record bearing and distance based on Mills original 1893 survey notes.

I figured the corner move from the remains of that stump up there, and Todd is putting the angle right into the instrument. I am going to pull a tape initially just to get close. We are kind of on a side slope here, so I want to get an idea of where it is going to go, and I can clear out an area before I set a nail and try to tie in the true point.

Well it did not move far, we wanted 47.16 and that is somewhere in here. Todd. It is rough but that is where it is. So apparently, it was knocked out of the ground from right in here. Actually as I look around there is kind of a depression here but I am not going to take that. I am going to hold to the remains of that bearing tree. Let me move some stuff out of the way. Actually as I clear this out, I can see there are sort of a ring of stone here still. This is the original stone with the marks clearly on it. Now this position is the quarter corner between sections 29 to the east and section 30 to the west. The original surveyor should have marked this stone and should have probably been oriented like so and probably still marked on the north face.

I am going to dig around in here, you cannot really see the hole, but there are definitely stones around the positioning here. It is rocky though. There is embedded stones right in the area here where this should have been set. Let me go ahead, clear this out, and create a place for us to work.

Sometimes with original wood corners, where they have mineral claims and they used 4 x 4 posts and wood or cedar posts where very common in the pacific northwest. You can actually still find the hole. When you clear away the duff like this, you will see a depression and be able to reach down in there and pull out the wood fragments and tell exactly where that wood post was set. Here it is mostly rock and I do not see a natural depression, so I am going to hold with my original idea here laid out record, bearing and distance that is off the tree. We almost got her down to the right depth; we are going to check it here in a moment. What Todd is doing is widening out the hole on the downhill side, so we can place its original stone underground. We are going to set it on the downhill side to help support the pipe.

Notice that we didn't bring a shovel with us, or post hole diggers. You get mountainous terrain, so Todd and I are the crew. It is how much we can carry; we get by with just our mountain bar and a bowl. So let us just check this that is looking good. We have some nice set rock right here and we do not really want to disturb. I think that is going to be just fine, it looks like we have enough room for original stone to go on the ground. We are still going to build a mound of stone or at least a collar of stone around this pipe. Let me go ahead and bend out these flanges. We will get here in there, check our references, and get it on and see what we got.

So go ahead and get the pipe in there, magnet first. The black end is going to be down towards the ground so many times you just drop it in there that way. Check that and we are in. Now you can see why I used my plumb bob for the initial reference, because now we are level with the pipe. That looks good from my north orientation, so once more the other way. That is just a hair high. Bring it up there. That looks good. I got my north, shaking it around. I am sitting on the dirt.

First off, always get little rocks, so when someone holding the monument, take these smaller hand size rocks, and place them right down on those flanges. This is before I put any dirt on the pipe, at all. Get a good layer of rock in there. Let me get that lathe over there for tamper. Then as we are filling it up, start tamping on it. It is a mixture of rock and the original stone. I put a little too much in there, because I know I saw that spot right on this side. We are going build a collar of stone around this.

The original stone clearly marked one quarter with a closed face four. Here is our 1 slash and the closed face 4. Again, these marks are not huge. We look at it on here; roughly it is only four inches long but clearly marked, so they did not make extravagant marks on it. I mean stones; basalt stones like this are difficult to mark with the chisel, and especially the closed face 4. When you are trying to close this off, that middle piece tends to chip out. By taking our time, we make a very distinct mark by closing our four.

That is another trait of Mr. Mills he did very good work. I am taking this stone with the marks. I am going to take it and put the stone upside down and then in this case we have got a little bit of a slope so I am going to set it on the downhill side. It helps support the stainless steel pipe we just put in. It does

not matter that this is sticking up a little bit; we are going to add more stones around it to make it taller. Now using this little bowl, what I am doing is clearing out a ring around it that sloping into the corner so when we lay our collar stone in here they are slanting into the corner. If they decide to fall out like in this area, it is probably going to have four, five, or six feet of snow on top of it, and then the runoff and the melting. You do not want it to fall apart unless, or if it does you want it to fall apart towards the corner so it can only implode instead of falling down the hill.

Another key issue is you do not want to build your mound or collar stone that is higher than the cap. It can be flush with it by the time we are done we will have enough dirt on everything we will be flush. You do not put any rocks that are up over the top of the corner. One of the last things I am doing is as we go around this, trying to fill in any holes, support the rocks that are in this collar. A few nice flat rocks on top help settle it in.

I always walk around them, if it falls apart now it is not going last a hundred years. Now, since I want to move the instrument up to this location, to tie in the new bearing trees, because we cannot see the bearing trees from that position, I want to check it again. Todd, if you want to go back and put that move back in the book, the move in the book back in the gun. Let us just see where we are. Where are we at, does that look good for line? OK.

Here we are going to mark this tree for our new corner monument. I cleared out some of the duff, made myself a nice little work area. Since we are in an area, that is commercially logged repeatedly, I am going to try to put our blaze as low as we can. The idea is that when they come and log this tree, ideally, they are going to cut her off somewhere up in here, and at the very least, the BT of the blaze will still be on the stump. This is the quarter corner between Sections 29 and 30, so we are East of the corner so I need to put the marks on here as 1/4, S, 29, BT. So I just kind of plan out what I'm going to do.

I typically make the first cut at the bottom, so then I can peel it down to that position and pop it off. I am going to put my safety glasses on, because I always seem to get some bark flying. Sometimes the bigger axe helps, or at least a good hand axe is key. I am looking at the corner because I want these blaze marks to be facing right towards the corner position. Just like the original tree, this is right behind us, so I will start with my bottom cuts. Then I have to think backwards, so it is TB, 92, S, ¼, so my blaze is going to have to be at least this long. Get all those scribe marks on there.

Right now, I just got the bark off that is not deep enough. This material here is the cadmium layer; it is an actual living part of the tree. I need to get this cadmium layer off and actually scribe into the solid wood of the tree. Some people like to mark them from the bottom up, that is to ensure that you do not run out of room and then have to cut down lower than your initial cut. This definitely helps make a distinctive mark, years and years after it ages. The axe marks down here on the bottom. Cause as this heals; all that may be left is just a single strip in the middle. Start at the beginning, ¼. Make those with the straight-line tool. Now the point it for syncing so you can make circular symbols such as the S.

You see I have made the S and the beginning of the two with the circular part. Straight line, still have a little cadmium layer here, it just peels right away. S, 29, now all I need is the BT, and I still have a little bit of cadmium here. That is my mark, how I make my T's. A little bit of dirt, and there you go. ¼, S, 29, BT, facing right at the corner monument. One more thing to prep this before we tie her in.

The Oregon State Office has a requirement that we place one of these magnetic PK nails side center right. You can set it on the left side and sometimes conditions dictate that. The beginning of the field notes will state that the PK nail is set side right unless otherwise noted in the field notes. In this case, not a problem, I am going to set it at side center right. Notice I left some branches here, I did not think it is necessary to take off everything around the tree, to stress this tree. This is going to be stressed enough

and we want this tree to last for quite some time. I am going to knock off a couple more. Size up the tree again and look at the monument. Where is side right? About right back in here. I am just going to create a little place for it then I will double check. That PK nail is about 3 inches long and I only drove it in about half way. I am going to allow some room for the tree to grow over time. This nail will still be visible on the outside, so you are going to leave it out just a hair, maybe about half way inch, inch and a half. Todd do you think you would be able to see that from there. Especially when I put a prism on it, cause the prism is going to be out over on this side.

We are on the other side of the corner now. The quarter corner of Section 29 to the East and Section 30 to the West. I am on the West side. This particular area, I already marked a fir tree for Section 29 and here I want to take a different species. Two reasons, one in particular, in this area there has been a problem with the spruce bug worm and it has been just devastating to the Douglas fir. Pines have done very good, so this tree is a little small. My estimation, I do not think I want to put the full blaze on it. When you look at it the diameter that is a 5-inch tree, usually 6 inches or above you can get a full blaze on and it will not hurt the tree. It will survive and heal over. A 5-inch tree or less, if you have to take one, you have another option rather than putting the full set of marks such as what I put on the other tree in Section 29, ¼, S, 29, BT.

Here I am going to mark this one X BT. Here you get two separate blazes, the X goes up about breast height, and then the BT is going to go at the bottom. So I will start with the X first and that is my T. Here we have it, the second accessory, X BT. We have our circular dye set and this is a quarter corner between Sections 29 and 30. The first thing we need to do is make our North/South line. The cap, the date is at the bottom orientated to the North, so the date is always on the South side. Make my North/South line. Requirements for a quarter corner are that it has to have township and range. We will be adding that we are in Township 9 North, Range 16 East, and Willamette Meridian in the state of Washington. I just look at my dyes and mark them as they come up.

One quarter then Township 9 North, 16 East, ¼, Section 30 to the West, Section 29 to the East, and the date, 2007. Now I need to finish my corner description and everything is set. I already made note of the original evidence so now I can talk about what we did here and what we did with the original stone. We set a stainless steel post and measurement. Then we set this monument being 28 inches long, so we set it 20 inches in the ground. I was talking about this being a collar, it looks at this point, and the finished product looks like a mound of stone. With a mound of stone, we are going talk about the base, the base width. It looks like its 2 to 2 ½-foot. So, 20 inches in the ground and the mound of stone, 2 ½-foot base, and you can see its right up to the top of the brass cap.

Deposit the original stone alongside and place the deep magnet under the stainless steel post. Make a quick diagram, looking at the pipe, check it make sure I marked it right with Township 9 North, Range 16 East. Then the references to the tree would come next, so it would be from which, we have a Fir 13 inches diameter, bearing, south. Bearing actually calculates out to south 40 degrees, 43 minutes and 24 seconds. All that is required is the nearest degree, so its South 40 degrees and 43 minutes, would be referenced as South 40 and ¾ degrees east. I will go ahead and mark the tags for this. The tag says corner is, so you need to reverse the bearing. When marking the tag for the tree, it is where the corner is from the tree, so the bearing will be North 40 and ¾ degrees west. We shot our distance. Distances are reported to the nearest tenth of a foot, so 17.3 feet.

Now all we need to do is tag these on the trees, using our aluminum nails. The only other trick is to make sure you have the right tag for the right tree. So here Todd, you want to put this one in Section 29 on the fir, and I will go put this on, the other one on the pine in Section 30.

Part #6 U.S. Indian Service Allotment Corner

My name is John McCauley, I am a cadastral surveyor, with the Oregon State Office of the Bureau Land Management. Here today, we are in Township 28 North Range 39 East, in the state of Washington, on the Spokane Indian Reservation.

The stone I am holding here is an original Indian Allotment corner. We can tell that, number one by the marks on it, where it is marked IA, and the fact that we are on an Indian Reservation, and it is a corner separating Indian allotments. I located this particular corner, based on my contacts with the Bureau of Indian Affairs-Spokane Agency, and people I know with the Spokane Tribe. They informed me that they had a plat book that noted corner monuments that had been found over the course of time. In that plat book, at this location, it showed that at some time, somebody had found a rock, and that is essentially all I knew.

In this position, here represents the center West 1/16 of Section 26. What is interesting about this position is that Section 26 is a fractional section. The Eastern boundary of the Spokane Reservation follows Chamokane Creek and Section 26 is therefore fractional up to the creek. We had one GLO survey on the East side of the creek, and a separate independent GLO survey on the reservation west of the creek. So, this is an interior section corner.

Now in proving this corner position, what I had to do is resurvey the exterior of the section. Then I figured what would be the weighted mean bearing for the East/West/Center line of this section and a weighted mean bearing for the North/South/Center line of the section. I figured out where the center quarter would be located, and then the position for the Center-West 16th. The actual true location at this time based on our resurvey evidence would have been 6 feet away from where this stone was located set in the ground.

As you can see around me, this area was burned by wildfire. In fact, it burned so hot it actually fractured the stone. The stone was still well set, and as you can see, well-marked. Now that 6 foot of difference, that is pretty darn good. Especially when you consider the Western quarter corner was missing and had to be reestablished and of course that it is fractional.

The Indian Allotment Surveys up in this area probably started somewhere, after 1892, and continued until, into the 1920's. What is very typical is that any corner set by the Indian Allotment Surveyors or the General Land Office prior to 1910 was stone monuments. So, although the only information we have about this corner, is the fact that it existed in a plat book, where somebody noted that they had found this stone. That is it. There is no other information about the Indian Allotment Surveys that were done on the Spokane Reservation.

A good point to remember is that this is separating Indian allotments. So any time, you're inside of a section and you have a corner position, whether it be a 1/16 in this case, a 1/64, a 1/256, or 1/1024 section corner, if it separates Indian allotments there's the possibility that the Indian Allotment Surveyors came in and surveyed the property and set stones. We just do not know where they all are, or very much information else about these corner monuments. Todd and I are getting ready to remonument this position and I like to point out that the method that we are using is from the western quarter corner to this position; we are going to hold that bearing, whatever it is. However, from here to the East, we are still going to use that weighted mean bearing to locate and position the center quarter of the section.

Now different state offices may choose to do something different. I want to point out that you are not alone out here. You really need to talk to your technical lead, whomever you are working with, with the Bureau of Land Management, to determine how, if, and when you are going to use and accept these corners. Now this one in particular, it was well set, there is a discoloration, or a change in color on the stone. We can see the bottom is still white, whitish, and it was set, it has been here a long time.

Again, prior to 1910, they were probably setting stones, so this corner monument has been here probably since prior to 1910. Another interesting point about the Indian Allotment Surveyors is that in their special instructions, they were required to take that new Indian landowner out and show them the corner position. We believe in the Oregon State Office, that when we can find these corner stones, we usually, we check them based on their own individual merit, like I said this one's 6 feet from my calculated position, that's good, we're going to accept it and remonument this corner.