A history and procedural description of subdividing sections
by the Three-Mile Method©

Oklahoma Society of Land Surveyors
Summer Seminar Series
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Oklahoma State University
Oklahoma City Campus

Presented by

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Introduction

The three-mile method of subdividing the sections of the Public Land Survey System is one of great importance to the Oklahoma land surveyor. In fact these sections are located in other states, as well. Being able to recognize, understand and retrace these previous surveys is as essential as understanding the standard protraction method of subdivision. These sections may be found in all areas which were previously Indian lands. Performing a proper retracement will, as in other survey, ensure the protection of the rights of the current and future title holders of such lands.

Seminar objectives

- Understand the history of the three-mile method of subdivision
- Recognize sections as having been surveyed using the three-mile method
- Identify sections which have been independently resurveyed by protraction (Statutory Method)
- Determine when parcels lying in re-surveyed sections are subject to original three-mile surveys
- Perform calculations to aid in the reconnaissance, location and reestablishment of three-mile corners
- Properly perpetuating the record to aid in the future identification of three-mile sections

Your presenter

Michael Ray received his first surveying license in Oklahoma and subsequent licenses in Arkansas and Kansas, respectively. He was in the second group of surveyors to be certified as Certified Federal Surveyors by the Bureau of Land Management. He is the Chair of the OSLS Education Committee, an Adjunct Instructor of Surveying Technology at Tulsa Community College, a past speaker for the OSLS annual conference and the organizer of the OSLS Exam Review Course.

Michael began his surveying career at the US Army Engineer Center & School at Ft. Leonard Wood, MO. He served as a Technical Engineer (51T and later 21T) with the Missouri, Arkansas and Colorado Army National Guard. He earned an Associate of Applied Science in Surveying Technology from Tulsa Community College and has worked in every position from survey draftsman to department manager.
The methods of surveying Indian lands throughout America were many in the mid-nineteenth century. Up to this point surveys were being conducted under a variety of instructions issued by numerous authorities. Everyone from Congress, the Indian Office, the President, the Secretary of the Interior and even the Surveyor General held sway over how surveys were conducted. James M. Edmunds, Commissioner of the General Land Office, recommended one law to place all surveys on Indian lands, specifically, under the authority of the office of the Commissioner and that law was passed in 1864. (White)

**The Act of April 8, 1864**

Titled “An Act to provide for the better Organization of Indian Affairs in California” this Act had slightly more up its sleeve and was the first legislation to have a direct impact on our topic. Section 6 of the Act states that “…hereafter, when it shall become necessary to survey an Indian or other reservations, or any lands, the same shall be surveyed under the direction and control of the general land-office, and as nearly as may be in conformity to the rules and regulations under which other public lands are surveyed.” Section 6 of the Act is now codified in 25 USC 176.

Following passage of the Act surveys were, in nearly every instance, conducted under contract with the Surveyor General except for surveys performed in what is now Oklahoma (formerly the Indian Territory). Elsewhere in the country Deputy Surveyors were now surveying reservations into townships and sections under the authority of the GLO Commissioner. This provided for some semblance of parity between sets of instructions at least in principle.

**A simple deviation**

43 USC 770 states that “The Secretary of the Interior may, by regulation, provide that departures may be made from the system of rectangular surveys whenever it is not feasible or economical to extend the rectangular surveys in the regular manner or whenever such departure would promote the beneficial use of lands. “

While allowance is made for departure from the statutory method surveys it is necessary for one to first have a reason for that departure. The government’s intention to patent allotment parcels to individual Indians provided that reason. Allotments were generally made in either 20 or 40 acres, with 40 being the most common. In order to facilitate the demarcation of 40-acre parcel boundaries on the ground the three-mile method was born. It first appears in 1868 instructions to Deputy Surveyors in North Dakota and continued to appear in instructions to surveyors until approximately 1887. The method was employed until approximately the 1920s when the practice was abolished. (Claflin)
Surveys in the Indian Territory

Despite the practice of the three-mile method in other areas (such as North Dakota) it would take a few more years for it to catch on in the Indian Territory. In 1870 Ehund Darling & Theo. Barrett were contracted to survey the Chickasaw lands by the intersection method. The difference here is that rather than allowing the sections to be quartered by protraction he actually ran the east-west and north-south lines on the ground. (A note of caution: In 1896 the Commissioners of the Five Civilized Tribes requested that the Chickasaw Nation be resurveyed as nearly all of the original evidence of the Darling & Barrett surveys had been obliterated. In 1897 the request was granted and the USGS performed independent resurveys of the Nation and those surveys are to be considered the original surveys)

In 1872 the Commissioner of the GLO hired O.T. Morrill to survey the Pottawatomie Indian Reservation and issued instructions to Mr. Morrill. The instructions called for the subdivision of sections into 40-acre tracts. An illustrative diagram was included in the instructions and appears below. The instructions stated that the subdivision method to be used was for the surveyor to “…erect additional corners on the parallel intermediate between quarter section and section corners at equidistant places…”

The instructions further stated: “For your further information I enclose a diagram of a section of land, illustrating the method to be adopted by you for the subdivision into sixteen forty acre tracts involving three additional random and true lines to be surveyed and marked, the same to be East and West lines as shown in yellow color on the diagram herein. In establishing the lines within the Pottawatomie reservation you will plant thereon additional corners to those required in the survey of the public lands, on the East and West lines, such as are required in the Manual of Surveying Instructions for quartersection corners viz: at every twenty chains marking them 1/16; at forty chains or at equidistant points between section corners 1/4; at sixty chains 1/16; and at eighty chains with the usual marks applicable to standard, township and section corners. It having been demonstrated by experience in the field that East and West section lines frequently fall short or exceed eighty chains in length, the corners should be in such cases planted at equidistant points as indicated on the foregoing diagram. On the North and South lines the additional corners will be set at every twenty chains and with 1/16 the same as is required for the quarter section corners in the Manual.”

It is important for us to understand how these surveys were conducted because, as in statutory sections, our primary goal it to Protect The Plat. We must conduct our resurvey in accordance with the plat and, when they differ, in accordance with the field notes as returned and approved. Understanding the methods used in the field to run the lines on the ground must be the foundation of substantive and accurate restoration of lost and obliterated three-mile corners.
Additional allotment surveys were performed subsequent to an 1874 contract by Henry Hackbush on the following:

The Quapaw Indian Reservation (the Quapaw were later moved to the Osage Reservation)
The Peoria Indian Reservation
The Seneca Indian Reservation
The Eastern Shawnee Indian Reservation
The Wyandotte Indian Reservation
&
The Sac and Fox Indian Reservation

Each of these surveys was ordered to be subdivided into 40-acre tracts.
Describing the Method

The exterior lines of the three-mile section were run in the same fashion as those run using the statutory method. The West and North lines were run subsequent to the East and South lines (West and North lines of the previous sections, respectively) with the primary difference being that each of these lines was run with an additional set of monuments to mark the exterior 1/16 corners. In some townships, the sections were surveyed by the statutory method first and then the surveyor came back and monumented the exterior and interior 1/16 corners. Corners monumented in the three-mile fashion on 40 acre allotment parcels were sometimes referred to as “1/8 corner”. Allotting agents of the BIA devised a numbering & lettering scheme to identify the corners of an allotted section.

Running the East-West lines through the section was done in a manner identical to that of running the North line of the section except that temporary corners were set every 20 chains. After the exterior 1/16 corners were marked, the surveyor proceeded to either the North or South 1/16 corner of the section and its adjoiner to the West and began running a random line to the 1/16 corner opposite of it on the East line of the section. As the surveyor went along the random line, he placed temporary monuments at each 20-chain interval. Upon intersecting the East line, the surveyor measured the falling (distance North or South) to the corner. This information was used to calculate the true bearing and distance back to the West line of the section. Proceeding back West along the true line, the surveyor would recover the temporary monuments and set permanent monuments at the 1/16 corners. The line was divided so that the monuments were placed equidistant along the line. The exception to this was on closing sections in the west tier of the Township.

In closing sections, the interior 1/16 corners were monumented at equal intervals of 20 chains beginning at the East line and thence running West. This provided for a fractional increment at the end of the line which resulted in a typical closing lot as are found in statutory sections. In elongated sections closing on the Range Line (as well as on the North Township Line) numerous methods were employed in creating lots.

If the remaining distance to close against the Range Line was 20.12 chains the surveyor would have most certainly left that excess in the lot. If the distance was much longer (33.75 chains, for instance) an additional corner may have been set at the nominal 20 chains resulting in a fractional closing distance (in this instance the distance would be 13.75 chains) and an additional tier of lots. This unusual lotting scenario, which is rarely encountered, occurs primarily against treaty or reservation boundaries.

I believe that it bears repeating: on all but the western tier of sections, 1/16 corners were set at equal divisions of the East-West 1/16 line. On closing sections (those in the Western tier) the 1/16 corners were set at 20, 40 and 60 (and in rare instances 80) chains rather that at equidistant intervals along the line.

- Please refer to the diagram on the facing page -
THE THREE-MILE METHOD OF SURVEYING WAS USED PRIMARILY ON INDIAN RESERVATIONS. THIS METHOD CONSISTED OF RUNNING THREE ADDITIONAL LINES EAST & WEST THROUGH THE SECTION, AND ESTABLISHING CORNERS AT EQUIDISTANT POSITION ON SAID LINES. THE BUREAU OF INDIAN AFFAIRS DEVISED A NUMBER AND LETTER DESIGNATION FOR IDENTIFYING THE EXTERIOR AND INTERIOR CORNERS OF THE SECTION.

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EAST ON A RANDOM LINE
WEST ON A TRUE LINE, ESTABLISHING CORNER AT EACH 1/4 OF THE TOTAL DISTANCE

EAST ON A RANDOM LINE
WEST ON A TRUE LINE, ESTABLISHING CORNER AT EACH 1/4 OF THE TOTAL DISTANCE

EAST ON A RANDOM LINE
WEST ON A TRUE LINE, ESTABLISHING CORNER AT EACH 1/4 OF THE TOTAL DISTANCE

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= SURVEYED LINES
= SECTION AND 1/4 SECTION CORNERS
= CORNERS AT EQUIDISTANT POSITION
1,2,3,a,b,c = IDENTIFYING DESIGNATION

NOTE: CORNERS NUMBER 9, 10, 11, 12, 13, 14, 15 & 16 ESTABLISHED AT EQUIDISTANT POSITIONS BETWEEN THE SECTION AND QUARTER SECTION CORNERS.
After return and approval

Once the surveys were complete they were returned to the Commissioner of the General Land Office for approval. Upon approval of the surveys patents could be issued (though they were often issued prior to survey despite the law requiring the contrary). Once the patents were issued or, as in our case, allotments were assigned the land was no longer owned by the government. The problem, however, is that not all of the intended land was allotted.

For a host of reasons many parcels never left federal ownership. An example of this is the Quapaw Tribe that was relocated from its reservation to the Osage Reservation. Technically, once this occurred, the land reverted to federal ownership (some might contend that it never actually left federal ownership despite it being granted by treaty).

In some areas allotments were made but not all parcels in a township were distributed. Many of these indisposed parcels later returned to federal ownership. The disposed parcels present a unique problem. How do you resurvey a three-mile allotment parcel lying within a section that was later independently resurveyed? Technically if an allotment was conveyed that parcel exists on the ground despite the resurvey. It may or may not have been included in the resurvey. Again, this is where a thorough search of the record pays off. It is important to determine early on whether the parcel being surveyed was one that was allotted under the three-mile plat.

In the case of entire Townships reverting to federal ownership the solution was simple: independent resurvey. Many townships within Oklahoma have been independently resurveyed from their original three-mile condition. Generally, when the 1/16 corner monuments on exterior lines of the sections were encountered, all evidence of the corners was destroyed. Unfortunately the interior monuments often were not. This is yet another reason why thorough research of the available record is required.

Once the plats of resurvey are returned and approved they control. Remember to protect the plat. If the plat and notes differ, the plat yields to the notes. This is due to the fact that the plat is created from the notes. The notes you see in the record are actually a scrivened copy of the original field tablets created by the field surveyor. The scrivener duplicated the notes and then drafted the plat from them.
Special Circumstances

From time to time unusual occurrences become apparent when searching the record. There are a number of circumstances around the country (though I have no personal knowledge of it occurring in Oklahoma) in which the 1/16 lines run through the section were run from North to South rather than from West to East. The allotments were also sometimes made in divisions of 10 and 20 acres, of the two, the 20-acre parcel being the most common.

20-acre allotment corners were generally referred to as “1/32 corner” and were established in the same manner as those of the 40-acre allotments. The diagram below illustrates the numbering scheme for the 20-acre parcels. Note that the boustrophedonic numbering system used for numbering sections within a township was also adopted for the purpose of numbering allotment parcels within a section.

METHOD OF NUMBERING 20-ACRE ALLOTMENTS

[Diagram showing the numbering scheme for 20-acre allotments]

- □ = ORIGINAL CORNER
- ○ = CORNERS AT EQUIDISTANT POSITIONS
- ● = ALLOTMENT CORNERS AT EQUIDISTANT POSITIONS
Index page of field notes for retracement of the original 1875 statutory method survey to establish “the quarter quarter section corners”.

Index page of field notes for subsequent 1875 subdivision of sections into ‘40 acre tracts’ using the three-mile method. This survey commenced April 19, 1875 and was completed on April 30, 1875 (12 days to run ±99 miles of line on the ground with compass & chain!)

Original 1875 Plat of Survey showing three-mile results.
T15N-R6E-IM, Lincoln County
Present-day Stroud, OK (Tanger Mall)
By Hackbusch, contract dated
September 8, 1874
1896 independent resurvey plat performed due to the lack of disposal of the lands previously surveyed. Note the discrepancies in the lengths of the exterior lines of the section compared to the first survey.

2008 aerial of Section 22 showing the development of the section quarters.

Example of a section surveyed by the three-mile method in Ottawa County which exists in that same condition today.
**Corners of primary control & proper method of restoration**

It is important to understand which corners are to be used for control in reestablishing lost corner positions in three-mile sections. Section & quarter-section corners controlled the exterior 1/16s. But what if your retracement recovers the North and South 1/16s on the West line with a lost 1/4 in-between? If the original monuments marking the NW and SW section corners remain as well, what controls?

Scenario #1: In retracing a three-mile section your field search yields the following results: Found original monument marking the NW section corner; Found recorded 1-inch pipe reported as having been placed “above buried sandstone marked ‘1/16’” marking the North 1/16th corner; West 1/4 corner – nothing found; South 1/16th corner – nothing found; Found original monument marking the SW section corner.

What are the controlling corners for the restoration of the West 1/4 section corner?

What are the controlling corners for the restoration of the South 1/16 corner?

Scenario #2: After restoring the West line of the section your reconnaissance of the line between the North 1/16 on the West line and the North 1/16 on the East line yields the following results: Found unrecorded 1/2-inch rebar monument at the apparent location of the NW 1/16 corner (subsequent interview of land owner yields a copy of a previous survey which shows the ½-inch rebar being set equidistant between the North 1/16 and Center North 1/16); CN 1/16 – nothing found; NE 1/16 – nothing found; Found original monument marking N 1/16 on East line.

What are the controlling corners for the restoration of the CN 1/16 and NE 1/16 corners?

The next step after deciding upon the controlling corners for your survey is to properly determine the corner location on the ground. While proportioning is our method of last resort it is that method with which we will deal here. We simply lack sufficient time to discuss standards of evidence and all of the resources we must exhaust prior to deciding upon a proportionate method of corner restoration. If there is any doubt in your mind however as to the lengths you must go to first exhaust all other possibilities I refer you to US v Doyle, 468 F2d 633 (1972) for a bit of light reading.

Whether they are interior or exterior corners, all three-mile 1/16 corners are to be reestablished using one of the four types of single proportion measurement (yes, four). Typically the two methods of single proportion used are the midpoint and closing section methods with midpoint being the most common. Interestingly enough these are the same methods by which the corners are established *originally*. So, single proportion measurement is actually the only proportionate method used to establish corners for the first time vs double proportioning which is *only* used to reestablish lost corner positions.
The following problems were taken from the CFedS training program course materials.

Use the handouts (also included in this course booklet) as a reference when making your calculations.

(For all scenarios: recovered original corners are marked by diamonds; lost corners are marked by circles)

Identify the controlling corners for the restoration of the corners shown in the exhibit below and circle your answers. (S 1/16 corner of Sections 29 & 30)

Select the proper method for restoring these corners from the options below.

- Single proportion
- Original control
- Double proportion
- Three point

Using the proper method, determine the coordinates of the lost S 1/16 corner of Sections 29 & 30 from the choices below.(corner #1 on the retracement diagram)

- N: 8678.77, E: 9989.66
- N: 8677.65, E: 9989.66
- N: 8677.65, E: 9989.34
- N: 8679.23, E: 9990.02

... identification of the corners shown in the exhibit below.

(NE 1/16 corner and CN 1/16 corner of Section 29)
Select the proper method for restoring these corners from the options below.

- Single proportion
- Original control
- Double proportion
- Three point

Calculate the positions for the corners in question and select the most correct answer from the list below using the proper method and controlling corner positions.

NE 1/16 sec. cor. of sec. 29 (corner #2 on the retracement diagram):
- N: 11,318.42, E: 13,963.45
- N: 11,325.77, E: 13,962.95
- N: 11,318.42, E: 13,962.95
- N: 11,325.77, E: 13,963.45

Center N 1/16 sec. cor. of sec. 29 (corner #3 on the retracement diagram):
- N: 11,323.24, E: 12,643.87
- N: 11,308.55, E: 12,643.87
- N: 11,323.24, E: 12,644.88
- N: 11,308.54, E: 12,644.87
Identify the controlling corners for the restoration of the corners shown in the exhibit below.

(SW 1/16 corner and CS 1/16 corner of Section 30)

Select the proper method for restoring these corners from the options below.

- Single proportion
- Original control
- Double proportion
- Three point

Calculate the positions for the corners in question and select the most correct answer from the list below using the proper method and controlling corner positions.

Center S 1/16 sec. cor. of sec. 30 (corner #4 on the retracement diagram):

- N: 8,673.25, E: 7,353.02
- N: 8,673.25, E: 7,352.45
- N: 8,679.56, E: 7,352.45
- N: 8,679.58, E: 7,353.02

SW 1/16 sec. cor. of sec. 30 (corner #5 on the retracement diagram):

- N: 8,671.06, E: 6,034.62
- N: 8,673.71, E: 6,034.63
- N: 8,671.06, E: 6,034.86
- N: 8,673.72, E: 6,034.86
Searching the record

BLM’s GLO records webpage

Navigate to http://www.glorecords.blm.gov/ in your web browser

Click on the ‘Search Surveys’ link

Next, select the proper county information

then enter the Township & Range

Your results will display on the next page
Another source of information that is relatively unknown to surveyors is the LTRO or Land Title Records Office. This is a repository of Indian title records maintained by the BIA at the local agency. You must receive permission from the Tribe or Nation on whose land the parcel is or was located to access this information. Your local BILS (Bureau Indian Land Surveyor) can help you coordinate with the appropriate authority for access to the records and with help in interpreting them. Whether in Oklahoma or another state you can find the local BILS here:


Many times, a quick look at HubTack, if you are a subscriber, can tell you whether the section in which you are working is a three-mile section. Heavily resurveyed Townships are a dead giveaway:
References


“Indian Allotment Surveys and Three Mile Section Subdivisions”; Conference handout; ACSM-MARLS-UCLS-WFPS Conference 2009 Las Vegas, NV; Claflin, James D., PLS

CFedS Training Program material – Course 6: Subdivision of Sections; 2007; Bureau of Land Management

“History of Surveying in Oklahoma”; Turner, Danny, PLS; Oklahoma Society of Land Surveyors
IDENTIFICATION OF CORNERS ON SUBDIVISION OF SECTION LINES

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Sec. 10

if 1/1024 corners are established they will be marked 1/1024 only

See Lgs. 65 & 66 MANUAL OF SURVEYING INSTRUCTIONS, 1973, for marks on the monuments
A history of survey is contained in the field notes (Not included).

This plot represents a dependent resurvey of a portion of the subdivisions lines and the subdivision of sections 20 and 30, T. 3 N., R. 34 E., Willamette Meridian, Oregon, designed to restore the corners in their true original locations according to the best available evidence.

In this example, it will be necessary to reestablish missing corners in accordance with the Manual of Surveying Instructions, 1973, and the three-mile method of section subdivision. All information needed to do so is contained in the original survey plot and this retracement diagram. The retracement data is represented herein by local plane coordinates in feet.

The directions of the lines are based on the true meridian, as determined by direct solar observation and carried forward by means of sustained orjigation.

The survey was executed by Arthur Dent, Cadstral Surveyor, beginning February 3, 2004 and completed February 26, 2004, pursuant to Special instructions dated January 11, 2004, under Group Number 42, Oregon.

**LEGEND**
- Original corner previously reestablished
- Corner established or reestablished this survey

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Portland, Oregon

This plat is strictly conformable to the approved field notes, and the survey, having been correctly executed in accordance with the requirements of law and the regulations of this Bureau, is hereby accepted.

For the Director

Chief Cadstral Surveyor of Oregon