

FUNDAMENTALS OF COMPLETIONS AND INDEPENDENT RESURVEY

Introduction

The following examples of original surveys, subdivision-of-section surveys, completion surveys and independent resurveys, are grouped together for discussion because the same basic fundamentals of law, regulations, procedures and so forth will apply in some aspect of their execution.

In nearly every case there is an out boundary to be determined by the dependent resurvey method, with unsurveyed areas being determined by the original method. The extent and form of the original survey is to be controlled by the location of any prior survey and any applicable plat.

There are only two basic types of surveys, original and dependent; original surveys create boundaries and dependent resurveys reestablish boundaries. All other designations are employed to identify the primary purpose of the survey.

Definition

An original survey creates boundaries and is usually executed in accordance with a plan. The contents of the plan will vary in detail. The plan of survey in the rectangular system is a very formal plan, wherein every detail of execution is set forth. The plan of survey for a placer claim, tract and so forth, will have fewer detailed specifications.

The dependent resurvey restores prior established boundaries, and is dependent on the condition and position of the prior survey for the correct procedure of execution.

The terms completion, independent resurvey, subdivision-of-section and so forth are in effect either an original survey, dependent resurvey, or a combination of both, executed for a primary purpose.

A completion survey is an original survey executed to complete: (a) a part of a township

boundary, (b) the boundaries of a township, (c) the subdivisional lines of a township, (d) the boundaries of a section or (e) the subdivision of a section.

The Manual of Surveying Instructions, 1973, discusses this in chapter 3, sections 100-112, entitled "Extension and Completion Surveys". In order to clarify the surveys under discussion here, the following comparison is made: An extension survey continues survey lines over accreted lands or omitted lands where the original plat returned the land as being surveyed. An extension survey may also continue lines through unsurveyed areas. Completion surveys, on the other hand, are surveys made to finish lines or enclose areas which permit the computation of the areas of adjacent public lands.

The independent resurvey is a survey designed to supersede the prior official survey on large areas of remaining Public Lands. Where the on-the-ground evidence of the original survey has become completely lost or where the evidence and the record are at such variance that the differences are irreconcilable, or the ground survey never existed in fact, the independent resurvey may be authorized.

Statutory Laws and Regulations

In making a completion survey or an independent resurvey, it is possible and even likely that it will be necessary to apply every law or regulation pertaining to surveys of the Public Lands. In keeping with the intent of these laws and regulations, there are three paramount considerations:

1. Limit of Authority of Surveyor

The authority of a surveyor is limited to identifying and marking the boundaries of the public lands on the ground and to determine whether or not lands embraced

within a claim, as occupied, have been correctly related in position to the survey on which the claim is based. He is authorized to interpret the evidence with respect to its effect upon the manner in which the resurvey will be executed.

Whether or not claims for lands have complied with all the requirements of law under certain entry is a question beyond the function of the surveyor, and should be resolved before the resurvey is initiated.

2. Protection of Rights

Bona fide Rights are those rights acquired in good faith under the law, and cannot be affected except by due process of law. The surveyor will be concerned only with the question of whether the lands have actually been located in good faith. It has been held, generally, that the entryman has located his lands in good faith, if such care was used in determining his boundaries as might be expected by the claimant exercising ordinary intelligence under existing conditions.

A claim cannot generally be regarded as having been located in good faith if no attempts have been made to relate it in some manner to the original survey.

Where lands have been occupied in good faith, but where the boundaries, as occupied, disagree with the position of the description, it should be regarded as an erroneous location. In cases of this nature the solution is not to be found in surveying, but in the process of adjudication by an amended entry. The claim boundaries may be considered in positioning the resurvey lines to which they in fact relate, but not those lines as stated in the erroneous location.

3. Ascertain the Limiting Boundaries

The limiting boundaries of the lands to be independently resurveyed or completed must agree with the previously established and identified surveyed lines of the approved surveys. In order to qualify as a limiting boundary, a line of the accepted established surveys must be conclusively identified in one position to the exclusion of all others. The lands on one side of the line are to be resubdivided under a new plan. On the other side, the original subdivisions are to be strictly maintained and none of the original conditions are to be disturbed.

The lands previously entered or patented under a prior survey are to be in no way affected as to location by a resurvey. All such lands must be identified and protected in one or two ways:

1. Wherever possible, the sections in which the claims are located are reconstructed from evidence of the original survey.
2. Where unrelated control prevents the reconstruction of the sections that would adequately protect the claims, the alienated lands are segregated as tracts.

Necessity for Survey

A prerequisite for any comprehensive and effective management of lands is to be able to physically identify and locate the boundaries of those lands.

The necessity and justification for the surveys are generally determined by the requesting agency. Surveys are required to mark patented outlying areas, to resolve trespass cases or to adequately administer the Public Lands.

If the boundaries of the lands cannot be

identified on the ground, a need for a survey exists.

Reason for Occurrence

Generally, incomplete surveys are the consequence of expediency. In the earlier surveys only those lands classified as agriculture lands were to be surveyed. In the early 1950's, the "skeleton" or "school section" survey provided for the survey of certain sections in a township, leaving most of the subdivisional lines as well as parts of the township boundaries unsurveyed. Homesteads on unsurveyed lands and mineral surveys are all sources of incomplete surveys.

The independent resurvey is most generally found necessary because of a fraudulent survey or a survey so grossly erroneous as to constitute fraud. When a survey has been faithfully executed, there is generally sufficient evidence remaining so that an independent resurvey would not be necessary.

Procedure

The procedures to follow in the execution of the independent resurvey or a completion survey are of two types, administrative and technical. They are necessarily performed in appropriate order to comply with existing laws and regulations and to produce an acceptable survey with a minimum of cost and effort.

The administrative procedure is concerned with the delegation of authority, determination and justification for the survey, and the research of record data pertaining to the surveys in the area under consideration.

The technical procedure concerns the legal and proper execution of the survey and preparation of the final returns.

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Administrative Procedure

The administrative procedure generally consists of seven major items. The sequence and content can be modified to some extent. A correct procedure, however, will assure that complications are kept to a minimum and that the requirements of law and regulations are fulfilled.

The procedure as outlined below lists the items in the appropriate position of execution:

1. The Request

Surveys are generally initiated by a request, which should:

- (A) Define which lines are to be surveyed.
- (B) Use the township as the base in developing requests.
- (C) Provide current land status.
- (D) Indicate identified corners, with information as to the remaining evidence.
- (E) Identify the need for the survey.
- (F) Set priority.
- (G) Identify the benefiting activity, for cost coding.
- (H) Provide any other information that would aid in the execution of the survey.

When the requests are received in the appropriate cadastral survey office, they should be reviewed, to ascertain if the survey is really needed. The request should be viewed in its effect on long range needs

as well as the present needs. It is a good idea to contact other using agencies to determine if they have survey needs in the area.

2. Research

Research is the gathering and compiling of known survey information pertaining to the area under consideration.

Data in the form of both plats and notes should be compared and any differences reconciled. Also, any reproduction should be checked for legibility.

The ideal person to conduct the research would be the surveyor who is going to make the survey. In this way he will be aware of any problems that may exist, and he will have time to analyze the problem and plan a course of action.

3. Special Instructions

With all the known data available, a more comprehensive set of Special Instructions can be written. In the event that there is insufficient information as to the condition of the surveys on the ground, the Special Instructions can be written for Investigative and Conditional surveys, thus eliminating the need for Supplemental Instructions at a later date.

In the event that an independent resurvey is likely, the prior survey should be suspended. This will prevent any land actions from being initiated or completed.

The Special Instructions for a completion survey should provide that unentered, outlying protracted subdivisions need not be protected and are annulled, thus simplifying the execution and plat-

ting of the new surveys.

4. Assignment Instructions

Congress has authorized the Secretary of the Interior to make surveys and resurveys as he may deem necessary to mark the boundaries of the Public Lands.

The assignment instructions are legal documents authorizing and assigning a cadastral surveyor to execute a survey of the Public Lands. The surveyor is then acting, through the Bureau of Land Management, under the authority of the Secretary of the Interior. The authority given by the assignment instructions is limited to the work as outlined in the Special Instructions. In the event that the Special Instructions are inadequate, they will need to be supplemented.

5. Approval of Plan of Survey

The independent resurvey or completion survey can be executed in different ways and still be technically correct. However, there may be a difference of opinion as to which way is better. Therefore, it is suggested that the plan of survey, as submitted by the field man, have the approval of the authorized administrative officers.

6. Prepare the Returns of the Survey

The field notes and plat are the primary records of any survey. The chief of the field party is responsible for the accuracy and sufficiency of this record.

Due regard should be given to the Manual requirements and form though it is intended that set forms of expression be used flexibly and modified when necessary

to conform to the survey. The work of the reviewing officers will be directed to the fundamental requirements of the Manual and the written Special Instructions, and the comments, if any, as to the form of the transcribed field notes, will be based upon broad grounds.

7. Survey Accepted and Filed

The Public Lands are not considered surveyed or identified until the survey is accepted and filing of the plat in the administering land office by direction of the Bureau of Land Management.

Any necessary suspension or cancellation of a survey must be made by the approving authority. If a survey was suspended and a independent resurvey executed, the prior survey is to be cancelled at the time of accepting the new survey.

Technical Procedure

The procedure to be followed in the technical execution of the completion survey or the independent resurvey consists of six distinct steps:

1. An investigation with an on-the-ground identification of the existing approved official surveys. The possible limiting boundaries of the area are determined along with any valid claims.
2. The type and extent of the survey needs are determined using the evidence from the investigation.
3. Determine the limiting boundaries of the area and develop a plan of survey, that will:
 - A. Protect any valid claims.
 - B. Create as many aliquot parts as possible.

possible.

C. Establish a minimum number of corners. (closing corners, corners of minimum control)

D. Place excess or deficiency against the north or west boundaries or adjacent to previous surveys.

4. Have the plan of survey approved.

5. Reestablish the out-boundaries by the dependent resurvey method or in the case of a completion survey by the applicable method. Segregate or determine the boundaries of any lands embraced in a valid claim based on the former approved survey.

6. Complete the survey on the approved plan.

COMPLETIONS NEAR SAN CARLOS RESERVATION

T 3 S., R. 24 E., G. & S. R. M.

TOWNSHIP 3 SOUTH, RANGE 24 EAST, OF THE GILA AND SALT RIVER MERIDIAN, ARIZONA.

- 1920 W H Thorn and B.J. Kinsey established the southeast corner of T. 3 S., R. 24 E.
- 1954 D E Harding surveyed the west boundary of T. 3 S., R. 24 E., G & S.R.M.
- 1955 D.E. Harding and F.R. Chappell surveyed the south and east boundaries of T. 3 S., R. 24 E., and section 32. See figure 1.

Reasons for Request of this Survey

The Safford, Arizona, District Manager requested this survey for BLM administrative purposes.

Special Instructions

On September 15, 1961, Special Instructions were written and approved providing for the completion survey of townships 3 south, ranges 23, 24 and 25 east, G.&S.R.M., under Group No. 363, Arizona. This case is concerned with T. 3 S., R. 24 E. only.

Conditions Found on the Ground

The surveyors assigned to conduct this completion survey found errors in the 1954-55 surveys of the boundaries and could not close against them within the limits set by the Manual of Surveying Instructions, 1947. They retraced the west, south, and east boundaries. The east boundary was 0.55 chains longer than record. The south boundary was defective in alinement but not defective in measurement when taken overall, or on the average. The west boundary was within limits for alinement but defective in measurement when the errors were taken accumulatively from the southwest corner of the township. The surveyed section 32 was within limits.

Four portions of the San Carlos Reservation boundary were found defective. See figure 2.

The following are abstracted from Baldwin's field notes:

From the 31 mile corner:

Thence along the summit of the Gila range of Mountains and 32nd mile of the S. bdy. of the White Mountain (or San Carlos) Indian Reservation.

Ascending

S. 68° 45' E., 11.90 chs.
 S. 51° 45' E., 2.10 "
 S. 51° E., 5.00 " Descending to low point
 Ascend
 S. 16½° E., 4.60 "
 S. 31° E., 3.40 " To top of high pinnacle on ridge,
 brs. SE. and NW.
 S. 51½° E., 7.70 "
 N. 81° 45' E., 2.00 " Set an iron post for 31½
 mile corner
 Cor. falls bet. two large
 boulders, or rather a crack
 in rock, on 1st pinnacle West
 of peak at south end of ridge
 leading north, about 3.00 chs.
 W. of the saddle bet. this peak
 and pinnacle Thence
 descending

Riecker ran a line due north through the flagstaff at Camp Goodwin, to the summit of the Gila Mountains. The south boundary of the reservation was to then follow the summit of the Gila Mountains southeasterly to 109° 30' west longitude

Riecker's work was later held to be unsatisfactory and resurvey was ordered

H L Baldwin resurveyed the south boundary of the San Carlos Reservation from one mile south of Camp Goodwin to the summit of the Gila Mountains and southeasterly along the summit to the southeast corner of the reservation Baldwin's resurvey mentions the Riecker monuments, where found, but the resurvey along the summit was independent of them Baldwin ran a traverse line along the summit, setting mile and half mile corners monumented with iron posts Along the portion of the boundary through range 24 east, Baldwin did not monument any of his angle points, except as they were also a mile or half mile corner

N. 74½° E., 3.20 chs. Thence ascending
 East 4.70 "
 S. 71° E., 2.70 "
 S. 38½° W., .80 " At 16 lks. - Probable old Monu-
 ment No. 3, but no marks can be
 discerned on surrounding rocks.
 Thence steep descent.
 S. 36° W., 10.70 chs.
 S. 39° 45' W, 4.70 "

S. 35½° E., 7.20 "
 S. 54° 45' E., 2.50 "
 S. 43° E., 3.50 " Set an iron post for 32
 mile corner and angle point on
 bdy.,
 Cor. falls on SE. slope 1/8 mile
 N. of brushy peak.

Note Some of the mile and half mile corners heretofore have fallen at angle points of the boundary and some on straight portions thereof. Therefore, I will hereafter distinguish between such by markings on posts and bearing trees, adding the letters AP at angle points, and omitting same when cor. falls on straight portion of the boundary.

From the 33 mile corner.

Thence along summit of the Gila range of mountains
 Ascending
 S. 55° 15' E., 4.10 chs.
 N. 85° E., 5.00 "
 S. 51° E., 6.50 "
 N. 83° 45' E., 2.30 "
 S. 27° 45' E., 2.30 "
 S. 51 3/4° E., 7.00 chs. to highest point of hill. De-
 scend along narrow broken ridge.
 S. 17° 30' E., 12.80 chs. Set an iron post for 33½
 mile corner
 Cor. falls about 3 ft. W. of
 rock ledge - the 1st one east of
 saddle before ascent to high
 peak. A very large amphitheater
 falls off abruptly to the west.

From the 37 mile corner

Thence I run along the summit of the Gila range of mountains ...
 N. 50° E, 3.90 chs. to top of rocks.
 From this point
 N. 87½° E., 2.10 " To top of rock ledge
 N. 82° E., 2.90 " " " "
 N. 75° E., 3.90 "
 N. 81° 45' E., 3.70 "
 N. 78½° E., 8.50 chs.
 S. 88½° E., 10.70 " Thence descend.
 N. 78½° E., 1.40 "

N. 82½° E, 2.90 " Set an iron post for 37½
 mile cor., also angle point.....
 Cor. falls about 2.00 chs. E. of
 top of knoll.
 N. 13½° E., 2.60 chs. Descending.
 N. 7½° W., 7.90 " Point in saddle bet. drains E.
 and W. Wire fence brs. E. and
 W. Ascend.
 N. 1° 10' E., 13.50 chs.
 N. 23½° E, 3.80 " To top of hill. Thence descend.
 N. 41½° E, 2.50 "
 N. 53° 45' E., 3.50 "
 S. 50½° E., 2.50 "
 S. 55½° E, 3.70 " Set an iron post for 38
 mile cor., also angle point.....
 Cor. falls on flat ridge gradually descending to E.

Thence along summit of the Gila range of mountains
 Continuing descent.

S. 68° E, 8.80 chs.
 S. 88½° E., 12.80 "
 N. 77° E., 18.40 " At 13.00 chs. - foot descent.
 Thence ascend.
 Set an iron post for 38½
 mile cor.
 Cor. falls in saddle 4.00 chs.
 W. of foot of rock ledge on
 volcanic knoll

From the 40 mile corner

Thence I run along the summit of the Gila range of mountains,
 which at this place is flat prairie land
 N. 79° 30' E., 25.00 chs. At 7.00 chs. on this course,
 trail brs. N. and S Ascend.
 S. 67° 30' E, 3.50 "
 S. 33½° E., 2.30 " Thence descend.
 S. 14½° W., 3.30 "
 S. 15 3/8° W., 5.90 " Set an iron post for 40½
 mile cor. and angle point

At the beginning of each mile Baldwin states that his line was along the summit of

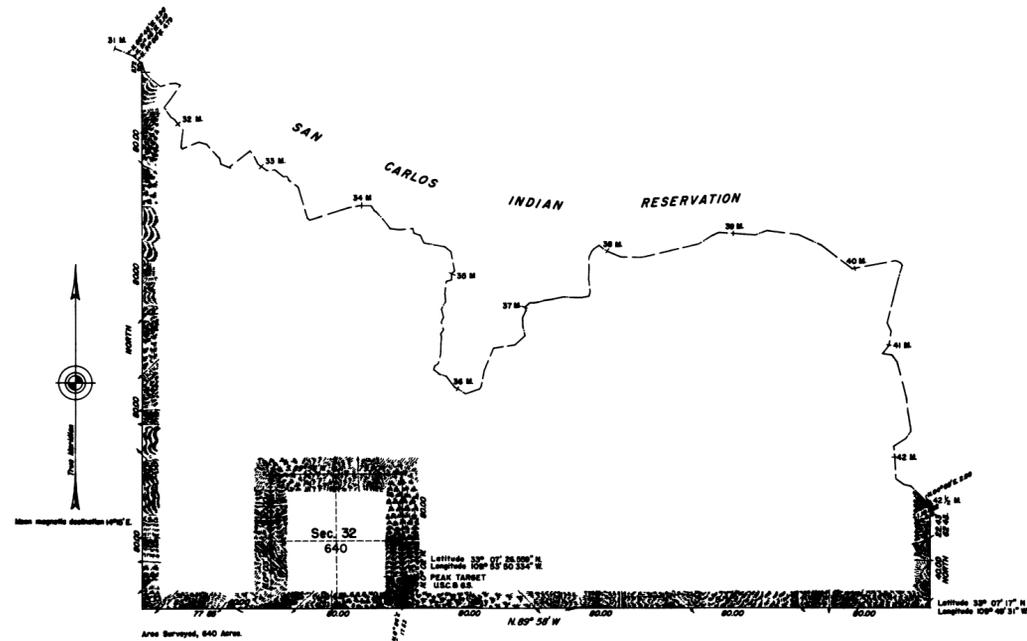


Figure 1 - Original Plat

the Gila range of mountains. It seems reasonable to assume that he made an effort to determine, as nearly as possible, the position of the summit and then run his traverse line in a manner similar to meandering a stream or lake. The U.S.G.S. map (Fort Thomas, 1960) shows this ridge to be sharply defined between the 31 and 39 mile corners but somewhat flat and undefined between the 39 and 42 mile corners.

Preliminary Statement of the Problem

The defective surveys on the boundaries needed to be considered before a plan of completion was possible.

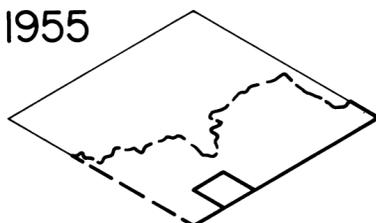
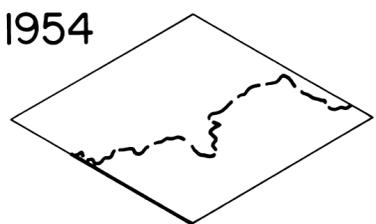
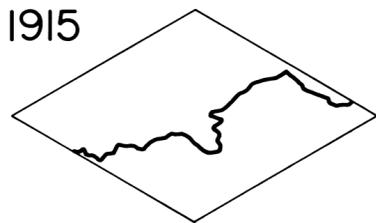
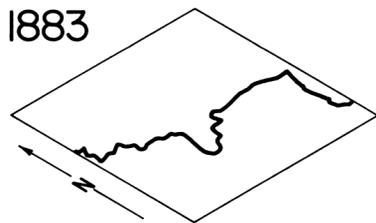
The retracements and resurveys of the boundaries and section 32 were computed using coordinate positions of the corners to prepare a plan. Figure 2 is a sketch of the township showing defective conditions.

A plan of completion was required to give the township the greatest possible number of "regular" sections and aliquot parts, and the least number of fractional lots and "double" corners. This is the desirable objective and follows the intent of the first sentence of section 3-66 of the Manual of Surveying Instructions, 1973.

Regulations

This survey illustrates the application of the following sections of the Manual of Surveying Instructions, 1973:

- 3-33 to 3-45 Limits and defective exteriors
 3-97 to 3-102 Fractional townships, Extension and completion surveys



History of Surveys

1875 T F White established the southwest corner of T 3 S, R 24 E

1883 Paul Riecker surveyed the south boundary of the White Mountain Indian Reservation, also known as the San Carlos Indian Reservation

Riecker ran a line due north through the flagstaff at Camp Goodwin, to the summit of the Gila Mountains. The south boundary of the reservation was to then follow the summit of the Gila Mountains southeasterly to 109° 30' west longitude

Riecker's field notes state that he could not survey along the impassable summit of the mountains so he erected monuments on prominent peaks and points along the ridge top, measured base lines in the flats to the north and, by triangulation, computed the courses and distances along a major portion of the boundary

Riecker's work was later held to be unsatisfactory and resurvey was ordered

H L Baldwin resurveyed the south boundary of the San Carlos Reservation from one mile south of Camp Goodwin to the summit of the Gila Mountains and southeasterly along the summit to the southeast corner of the reservation Baldwin's resurvey mentions the Riecker monuments, where found, but the resurvey along the summit was independent of them Baldwin ran a traverse line along the summit, setting mile and half mile corners monumented with iron posts Along the portion of the boundary through range 24 east, Baldwin did not monument any of his angle points, except as they were also a mile or half mile corner

COMPLETIONS NEAR SAN CARLOS RESERVATION

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- 5-20 to 5-24 Restoration of lost corners
- 5-43 Broken boundaries

Auxiliary Topic No. 1

Section 5-44 of the Manual of Surveying Instructions, 1973, specifically states that the "Grant Boundary" method of adjustment should be used to adjust errors in reservation boundaries which were surveyed prior to the township and section lines which close against it. The method is to be used after the natural calls are satisfied. In this case the natural calls were satisfied in three segments of the reservation boundary and no further adjustment was required. Three more segments were adjusted by the "Broken Boundary" method, section 5-43 of the Manual of Surveying Instructions, 1973. This method is ordinarily used on nonriparian meander lines and some other metes and bounds surveys. The "Summit of the Gila Mountains" is a natural feature of the terrain, just as is the shoreline of a lake or stream. This is possibly the reason for using the broken boundary method to adjust the reservation boundary. It is also possible that the broken boundary adjustment kept the adjusted line more closely along the summit than a grant boundary adjustment would.

The Manual of Surveying Instructions, 1973, section 7-16, states in part:

Boundaries of this sort are normally winding, and it should be understood that they are technically defined by the natural feature and not by the straight lines between angle points monumented in a survey. *Northern Pacific Railway Co. v. United States*, 227 U.S. 355 (1913).

Final Statement of the Problem

The surveyor will complete the survey with a minimum of fractional sections and lottings.

Solution

The west boundary was resurveyed holding the 1955 survey corners for alinement but changing them to angle points, with new corners set at 40 and 80 chain intervals in latitudinal measurement. The adjacent T. 3 S., R. 23 E., was being completed under the same group and the new corners were marked for maximum control.

A sectional correction line was surveyed East from the original corner of sections 28, 29, 32 and 33, with corners established at 40 and 80 chain intervals, to a closing corner of sections 25 and 36 on the San Carlos Reservation boundary.

The lines between sections 33 and 34, 34 and 35 and 35 and 36, were surveyed random and true with the excess or deficiency placed in the south half mile. Closing corners against the defective south boundary were not required because the bearings of these lines fell within the limits of 21' of arc.

The meridional lines were surveyed northerly from the sectional correction line, parallel to a theoretical east boundary. Corners were established at normal intervals with closing corners on the San Carlos Reservation boundary. The line between sections 24 and

25 was surveyed East to a closing corner, as were the lines between sections 7 and 18 and between sections 17 and 20. The line between sections 21 and 28 was surveyed random and true with two closing corners established on the San Carlos Reservation boundary. The portion of this line inside the reservation was surveyed as a blank line. The lines between sections 18 and 19, sections 19 and 30 and between sections 30 and 31 were surveyed random and true, with the deficiency in the west half mile.

A south ¼ section corner of section 36 was established 40 chains east of the corner of sections 1, 2, 35 and 36. The original ¼ section corner was corrected to refer to section 1, only.

Upon closing against the south boundary of the San Carlos Indian Reservation, ties were made to the nearest mile or half mile corner and closures were computed based on the record of Baldwin's 1915 resurvey. If the fractional sections closed within limits, the reservation boundary was retraced on record courses and distances to the closing section line. The closing corners were set at the true points of intersection.

Sections 17, 18, 22 and 24 did not close within limits because of error in the reservation boundary. The reservation boundary was retraced and resurveyed between the mile corners 31 and 32, 33 and 33½, 37 and 38½ and between the 40 and 40½ mile corners. The following field notes are abstracted from the field notes of T. 3 S., R. 24 E., approved February 26, 1964, and cover the portions of the boundary that were resurveyed.

Retracement of a Portion of the Survey Executed by H. L. Baldwin in 1915

From the 31 mile cor. on the S. bdy. of the San Carlos Indian Reservation, monumented by an iron post as described in the official record.

- S 68° 45' E, 11.90 chs. dist.
- S. 51° 45' E., 2.10 chs. dist.
- S 51° E., 5.00 chs. dist.
- S. 16° 15' E., 4.60 chs. dist.
- S. 31° E, 3.30 chs. dist.
- S 43° 30' E., 3.40 chs. dist.
- S. 51° 15' E., 9.90 chs. dist.

This dist. as originally recorded, 7.70 chs. from top of high pinnacle is in error as the original distance leaves the watershed.

- N 81° 45' E., 2.00 chs. dist.

The 3½ mile cor., monumented by an iron post as described in the official record.

Thence, from the 3½ mile cor.

- N. 74° 15' E., 3.20 chs. dist.
- East, 4.70 chs. dist.
- S 71° 00' E., 2.70 chs. dist.
- S 38° 30' W., 0.80 chs. dist.
- S. 36° 00' W., 10.70 chs. dist.
- S. 39° 45' W, 4.70 chs. dist.
- S. 35° 30' E., 8.20 chs. dist.

This distance is officially recorded as 7.20 chs., which is in error as it lacks a chain of reaching to top of the ridge.

- S. 54° 45' E, 2.50 chs. dist.

- S. 43.00' E., 3.50 chs. dist.

The 32 mile cor., monumented by an iron post as described in the official record.

From the 33 mile cor. on the S. bdy. of the San Carlos Indian Reservation, monumented by an iron post as described in the official record.

With adjusted traverse to the 33½ mile cor.

- S. 55° 43' E., 4.10 chs. dist.
- N. 84° 35' E., 5.02 chs. dist.
- S. 51° 27' E., 6.49 chs. dist.
- N. 83° 22' E., 2.31 chs. dist.
- S. 28° 09' E., 2.29 chs. dist.
- S. 52° 13' E., 6.99 chs. dist.
- S. 17° 50' E., 12.72 chs. dist.

The 33½ mile cor., monumented by an iron post as described in the official record.

From the 37 mile cor. on the S. bdy. of the San Carlos Indian Reservation, monumented by an iron post as described in the official record.

- N. 50° E., 3.90 chs. dist.
- N. 87° 30' E., 2.10 chs. dist.
- N. 82° E., 2.90 chs. dist.
- N. 75° E., 3.90 chs. dist.
- N. 81° 45' E., 3.70 chs. dist.
- S. 78° 30' E, 8.50 chs. dist.

This course as originally recorded was N. 78° 30' E., which leaves the summit of the mountains.

- S. 88° 15' E., 10.70 chs. dist.
- N. 78° 30' E., 1.40 chs. dist.

- N 82° 30' E., 2.90 chs. dist.

The 37½ mile cor., monumented by an iron post as described in the official record.

With adjusted traverse from the 37½ mile cor.

- N. 12° 24' E., 2.60 chs. dist.
- N. 8° 30' W., 7.96 chs. dist.
- N. 0° 07' E., 13.56 chs. dist.
- N. 22° 10' E., 3.79 chs. dist.
- N. 40° 30' E., 2.48 chs. dist.
- N. 54° 56' E., 3.46 chs. dist.
- S. 50° 02' E., 2.46 chs. dist.
- S. 55° 03' E., 3.62 chs. dist.

The 38 mile cor., monumented by an iron post as described in the official record.

- S 67° 57' E., 8.83 chs. dist.
- S. 88° 23' E., 12.84 chs. dist.
- N. 77° 10' E., 18.45 chs. dist.

The 38½ mile cor., monumented by an iron post as described in the official record

From the 40 mile cor. on the S. bdy. of the San Carlos Indian Reservation, monumented by an iron post as described in the official record.

With adjusted traverse to the 40½ mile cor.

- N. 79° 30' E., 25.24 chs. dist.
- S. 67° 48' E., 3.53 chs. dist.
- S. 33° 45' E., 2.31 chs. dist.
- S. 13° 59' W., 3.29 chs. dist.
- S. 14° 53' W., 5.88 chs. dist.

The 40½ mile cor.,

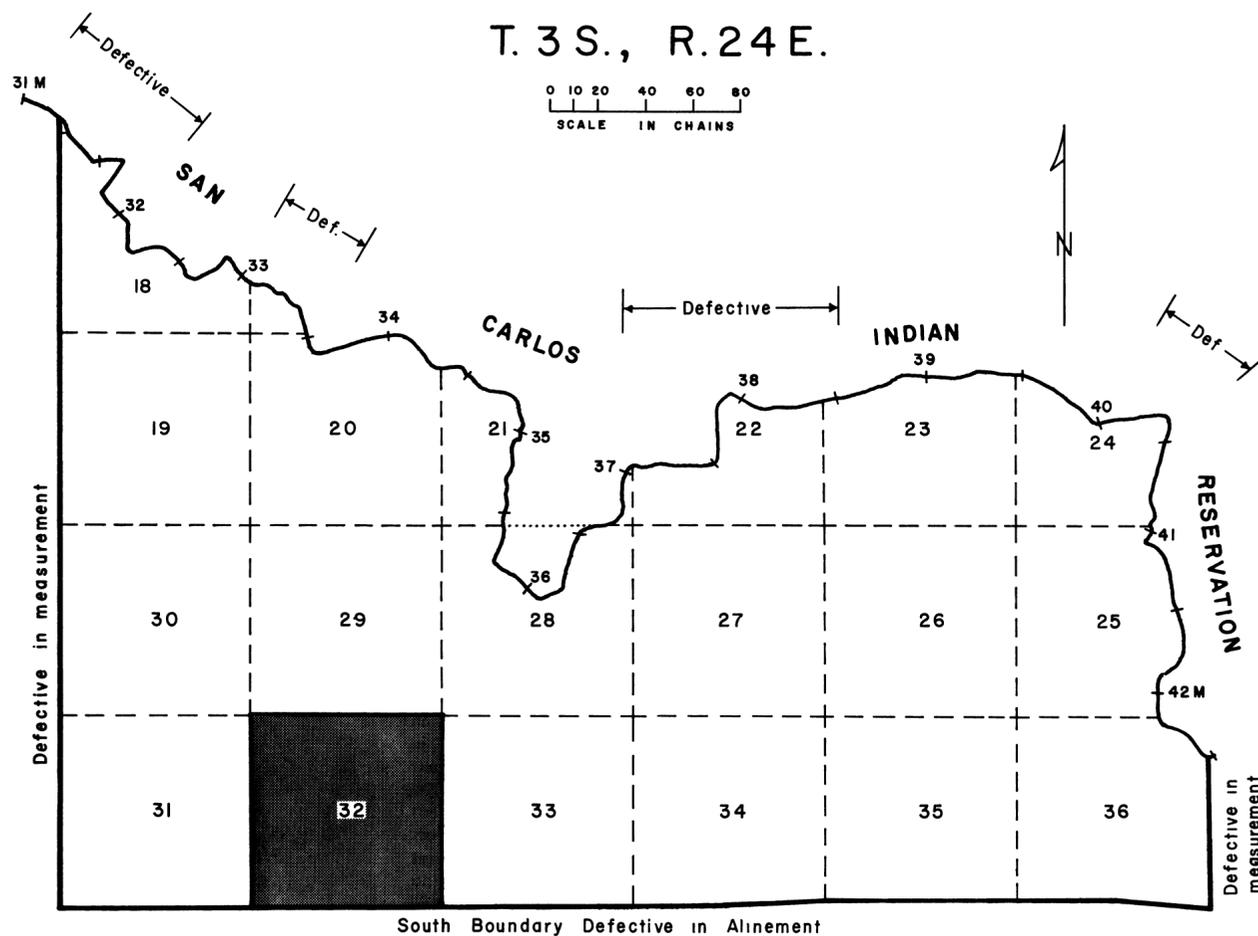


Figure 2 - Defects

The seventh course from the 31 mile corner was found to be 2.00 chains in error. In conformity with section 5-23 of the Manual of Surveying Instructions, 1973, this two chain mistake was placed where it occurred. The ridge top is sharply defined at this point and if the course were held at the record 7.70 chains, the last course would not reach the 31½ mile corner and would be off the ridge. It was manifest where the mistake occurred.

The seventh course from the 31½ mile corner was in error by 1.00 chain, evidenced also by the summit of the Gila Mountains.

The sixth course from the 37 mile corner was mistaken in bearing. Instead of N. 78° 30' E., it was clear that the bearing had to be S. 78° 30' E., for the line to remain on the ridge top and fit the monuments on the ground.

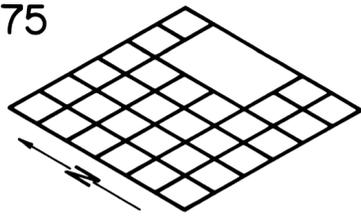
After the obvious blunders were placed where they occurred, no further adjustments had to be made in those three portions of the reservation boundary. No surplus or deficiency remained to be proportioned.

COMPLETIONS WITH DEFECTIVE BOUNDARIES

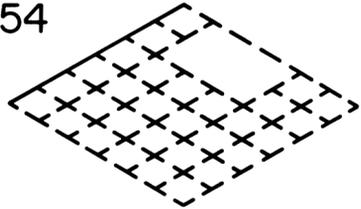
T. 4 S., R. 23 E., G. & S. R. M.

TOWNSHIP N. 4 SOUTH RANGE N. 23 EAST GILA AND SALT RIVER MERIDIAN

1875



1954



History of Surveys

- 1875 T.F. White surveyed all four boundaries and most of the subdivisional lines. The original plat is shown in figure 1.
- 1954 D.E. Harding resurveyed the north boundary and established new corners referring to the township to the north, T. 4 S., R. 23 E., Gila and Salt River Meridian.

Reasons for Request of this Survey

This survey was routinely requested for administration of the public lands.

Special Instructions

On February 24, 1958 Special Instructions were written and approved, providing for the dependent resurvey of a portion of the subdivisional lines and completion of the subdivisional lines of the township. The completion was to be executed in the normal manner unless errors of closure indicated other procedures were required.

Conditions Found on the Ground

All of sections 11 through 14, 23 and 24 were vacant public lands. Four quarter sections were protracted on the 1876 plat, see figure 1.

The surveyor retraced the exterior lines of sections 11-14, 23 and 24, including 3 miles of the east boundary. Most of the corners on the subdivisional lines were missing and the retracements were extended to the lines of sections 2, 3, 10, 15 and 22, in search for control points to govern reestablishment of the missing corners. Figure 2 indicates those corners which were recovered and those which were lost.

Preliminary Statement

It is required to complete the survey of the township subdivisional lines with as many normal sections and aliquot parts as possible.

The lost corners of the 1875 survey had to be restored before the completion plan could be determined.

Regulations

This survey illustrates the application of the following sections of the Manual of Instructions for Survey of the Public Lands, 1973:

- 5-25 to 5-28 Double Proportionate measurement
- 5-29 "Three point" control (combined single proportionate and record measure in opposite direction)
- 3-100 to 3-102 Extension and Completion Surveys
- 3-103 to 3-111 Completion of partially surveyed sections

Auxiliary Topic No. 1, Three Point Control

This survey illustrates the "three point control" method of restoring a lost corner. The double proportion method can be applied only when the lines surveyed have been extended in all four directions from the lost corner. When surveyed lines have been extended in only three directions from a lost corner there is no basis for a double proportion. This is the situation at the lost corners of sections 1, 2, 11 and 12; 10, 11, 14 and 15; and 14, 15, 22 and 23, as established in 1875. To reestablish the lost corner, the record distance of the line is used in one direction to control either the latitudinal or longitudinal position and single proportion is used to establish the opposite latitudinal or longitudinal position.

The corner of sections 1, 2, 11 and 12 was restored at record distance southerly in latitude from the corner of sections 1 and 2 on the north boundary and in departure by single proportionment between the corners of sections 1, 6, 7 and 12 and 3, 4, 9 and 10.

The corners of sections 10, 11, 14 and 15, and 14, 15, 22 and 23 were also restored by three point control at single proportion in latitude between the 1/4 corner of sections 10 and 11, and the corner of sections 22, 23, 26 and 27; and at record distance in departure, easterly from the corners of sections 9, 10, 15 and 16, and 15, 16, 21 and 22.

Auxiliary Topic No. 2, Protracted Areas

The original survey plat showed protractions of the areas of NW 1/4 section 11, NE 1/4, section 12, SW 1/4 section 23, and SE 1/4 section 24.

The accepted plat of this survey shows the protracted SE 1/4 of section 24 and SW 1/4 of section 23 but not the protracted NE 1/4 of section 12 and NW 1/4 of section 11.

The protraction of the SW 1/4 of section 23 is technically incorrect, and should not have been shown in this manner. The original protraction was from the original (1875) 1/4 corner of sections 22 and 23. If any portion of section 23 had been patented the survey of the section would be based on the original corner and not the newly established 1/4 corner of section 23 only. Since the section is all public land no actual problem exists and the section could be subdivided as the plat is drawn.

The areas of lots 1 thru 4 of section 24 on the accepted plat are in error and could be misleading because of the protracted SE 1/4 of section 24. As drawn, the plat implies that the protracted 1/4 section is based on lines parallel to the south half of the east boundary and east half of the south boundary of section 24, creating a "broken" centerline situation. There would be no good reason for this because the centerlines of the section, if surveyed normally would properly protect the protracted SE 1/4 of section 24 if it had been patented. The line between sections 13 and 24 is well within limits for "midpointing" that 1/4 section corner. The 1/4 corner of sections 23 and 24 is 40 chains north, protecting the protraction in latitude also.

Figure 4 is a diagram of section 24, with the error of closure adjusted by the broken boundary method. The diagram shows the

section boundaries and center lines, based on an adjusted, flat, closure. The 1/16 section corners are placed at midpoint between 1/4 corners and the center lines of the SW 1/4 are normal. The areas of Lots 1 thru 4 are recomputed, based on the described method of subdivision. A comparison of the areas tends to prove that this is the method of subdivision intended on the new plat.

The protractions on the 1876 plat, of the NE 1/4 of sections 12 and NW 1/4 of section 11, were cancelled and the sections lotted as shown with as many aliquot parts as possible. When an entire section is vacant this is proper and is required. If either of these 1/4 sections had been patented the procedure of completion would be quite different, in order to protect the patented lands.

Auxiliary Topic No. 3, Distortion

Sections 5-29 and 5-45 of the Manual of Surveying Instructions, 1973, outline an exception of using the record distance when control in one direction is lacking. Any "average difference" must be conclusive and though there is a shortage in the original survey measurements in this case it is not conclusive. Using an average of all the retracement distances between recovered corners would distort some of the lines being restored.

An average of all the shortages is 20 links per half mile, with a range of from 2 links up to 40 links. This range could not be construed as a definite deficiency under the circumstances.

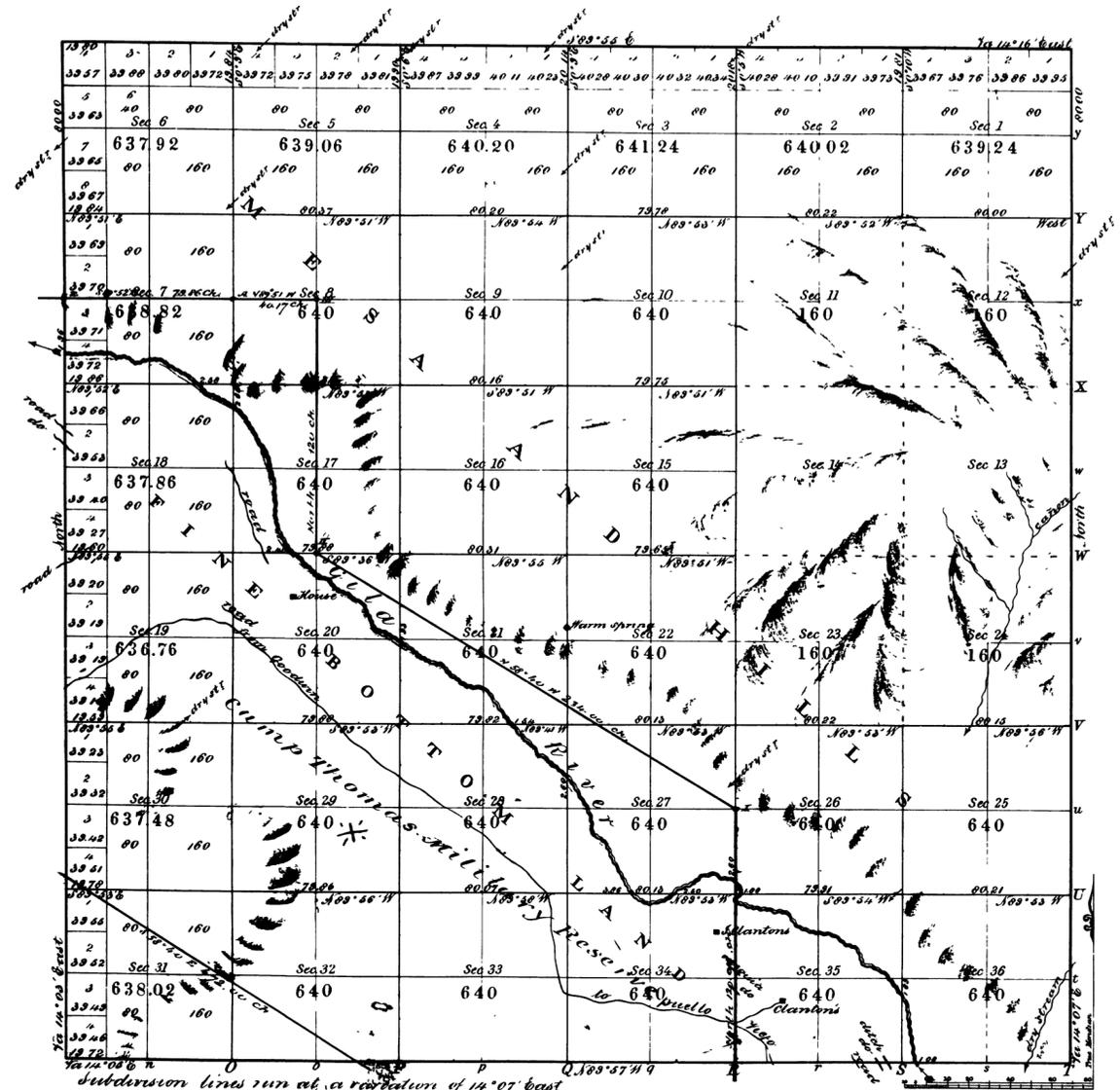


Figure 1 - Original Plat

COMPLETIONS OF KOEHN DRY LAKE BED

T. 30 S., R. 38 E., M. D. M.

43 CFR 9185.2 establishes a notification procedure whereby applicants for survey of omitted lands must notify adjacent landowners. In April of 1961 letters of notification were sent to all interested land owners near Koehn Dry Lake as contemplated by regulations outlined in 43 CFR 9185.2-2, even though the lake bed was unsurveyed land and not omitted from survey.

The field work was consequently resumed payable from Management of Land and Resources funds as a BLM project.

Conditions Found on the Ground

The resurveys and restorations by the private surveyors and county surveyors were recorded with the Kern County Surveyor and the patented lands involved were found to be occupied based upon these surveys.

The east boundary, the east four miles of the south boundary, the interior section lines and necessary meanders of the dry lake were retraced to the extent possible. The original surveys had all been monumented with mesquite wood stakes or similar material with pits and mounds. Obliteration of the original monuments was extensive and very little direct evidence of the original 1855 work was recovered.

Nine corner points were restored by single point control.

Lost section and 1/4 section corners were restored by single and double proportionate measurement.

The original meanders were restored by the broken boundary method, except in section 8 where the 1949 Myers resurvey monuments were accepted. All angle points of the non-riparian meander line were monumented and marked for a fixed boundary.

For the remaining restorations, the field surveyor had to resort to the collateral evidence provided by the many private surveyors cited in the history of surveys as well as proportionate measurement methods and the original record.

Figure 7 is a sketch of the completed dependent resurvey, showing corner recovery and the final courses and distances. The west boundaries of sections 8 and 17 and the line between sections 8 and 17 west of the dry lake were not retraced because of the prohibition against entering.

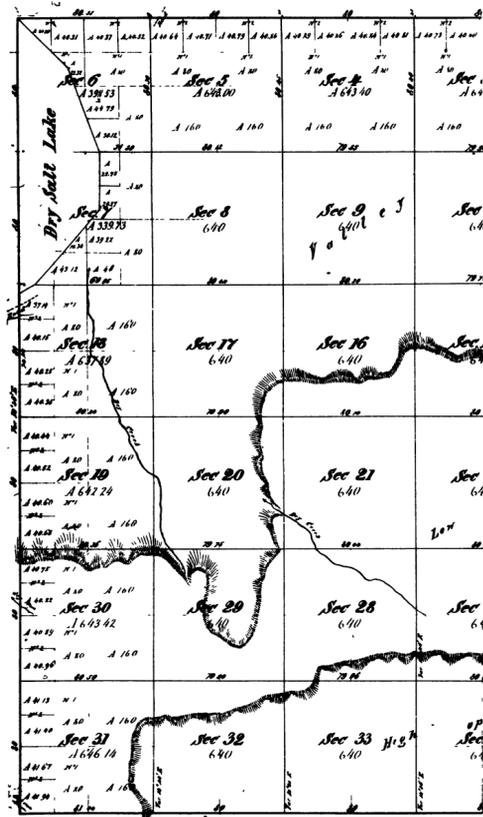


Figure 3 - Original Plat

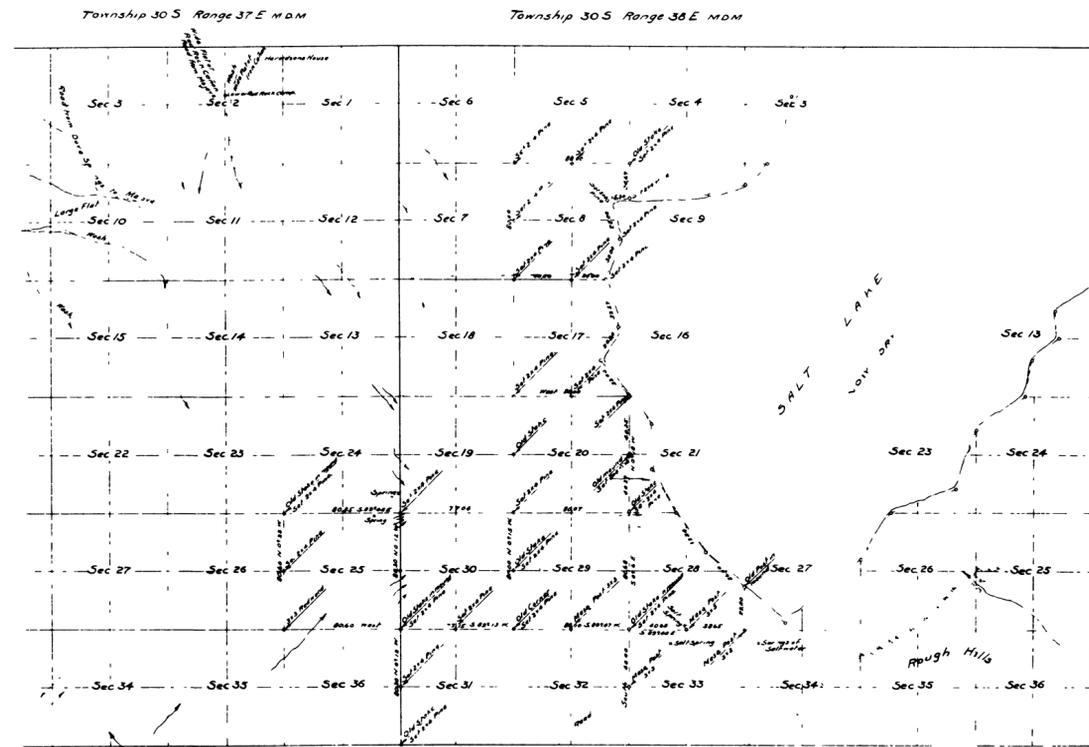
SURVEY FOR MESSRS. DAVIS, MUNSEY AND OTHERS.

Made by M. W. Buffington
Scale 40 chs to one inch



County Surveyor
Oct 10th 18 11th 1904

Filed by M. W. Buffington
Checked by Recorder
Dec 10th 1904



Note: Distances and Corners of this survey in Black
Old distances shown in Red

Figure 4 - Buffington Map

Preliminary Statement of the Problem

Following completion of restoration of all the surrounding surveys, the next step was to determine which method of completing the survey of the lands within the dry lake would protect the protracted areas returned on the 1855 plat. The completion must be accomplished so as to stay within the limits of rectangularity and achieve as many normal aliquot parts as possible from the unsurveyed lands.

The Special Instructions contain an extensive treatment of the method for completion of the surveys in this dry lake bed. All of these instructions were prepared before the corner restorations began so that the methods shown were based on the record positions of the adjacent surveys.

The surveyor is instructed to perform the completions according to that method if possible.

Regulations

This survey illustrates the application of the following sections of the Manual of Surveying Instructions, 1973:

- 3-112 to 3-114 Completion of township subdivision
- 5-25 to 5-28 Single and double proportionate measurement
- 5-43 Broken boundaries
- 5-45 Single point control
- 6-25 to 6-32 Dependent resurvey
- 7-77 to 7-93 Examples of survey of erroneously omitted areas

Amended Information

The anticipated method of completion shown in the Special Instructions could not be followed. After the resurvey data was obtained and analyzed, another method was required.

COMPLETIONS OF KOEHN DRY LAKE BED

T. 30 S., R. 38 E., M. D. M.

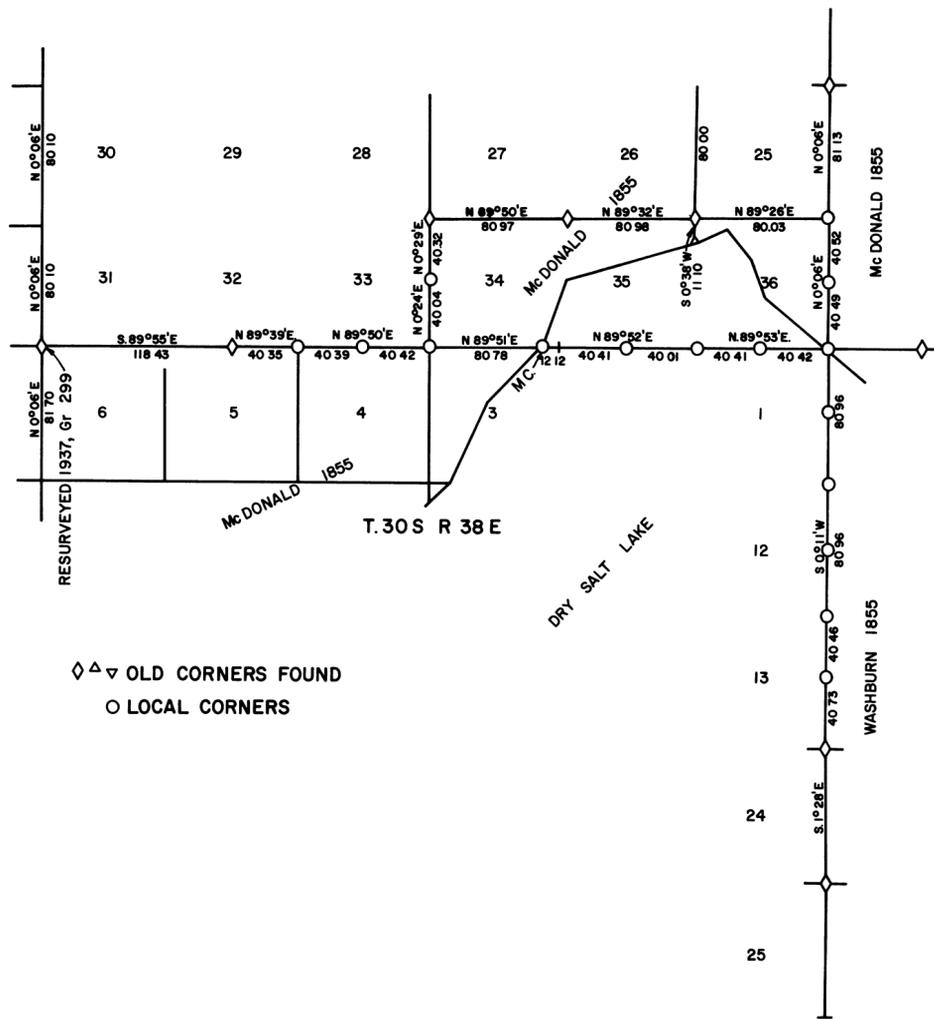


Figure 5 - 1940 Investigation by F. Wayne Forrest

T 30 S., R 38 E., M D M., CALIFORNIA
 STATUS DIAGRAM

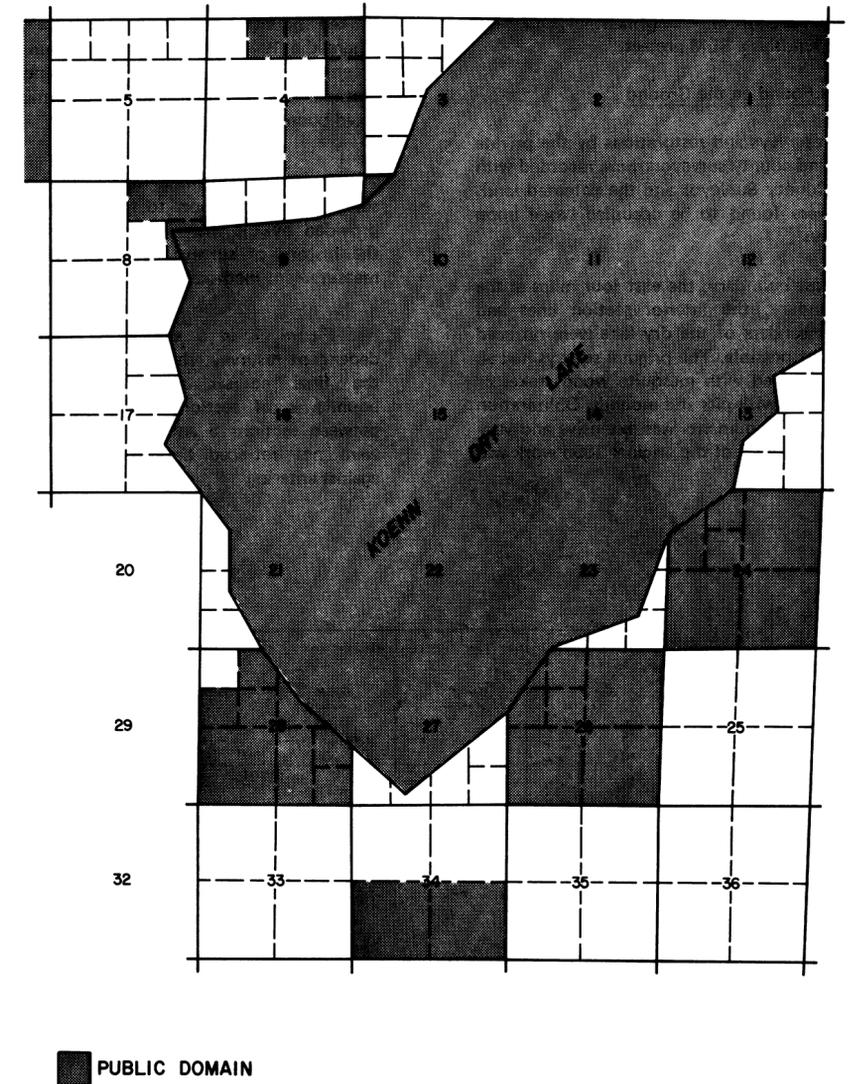


Figure 6 - Ownership Status

COMPLETIONS OF KOEHN DRY LAKE BED

T. 30 S., R. 38 E., M. D. M.

T. 30 S., R. 38 E., M. D. M., CALIFORNIA
RESULTS OF DEPENDENT RESURVEY

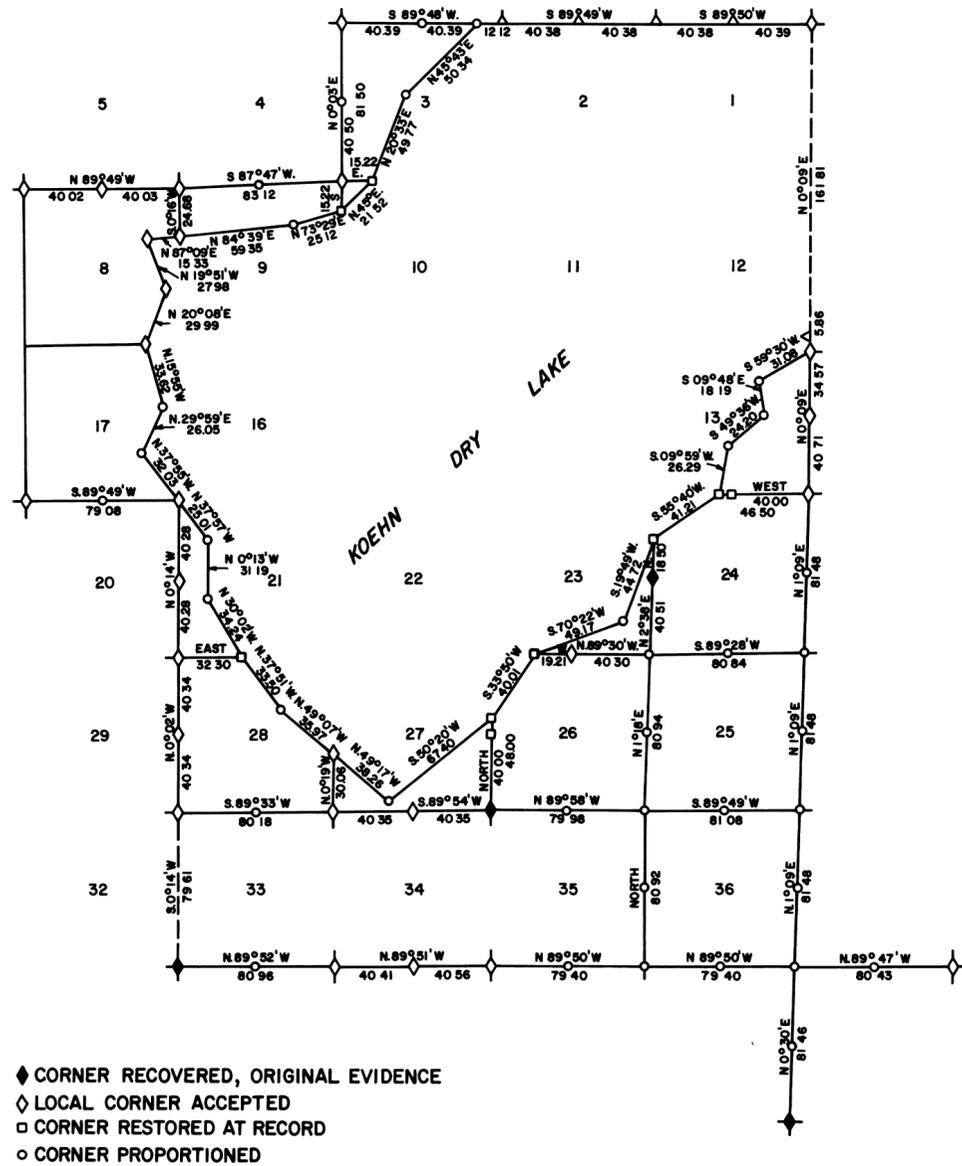


Figure 7 - Dependent Resurvey

Final Statement of the Problem

Although a theoretical plan can be protracted for any completion survey, the final result must be based upon the data obtained in the field concerning the condition of the controlling resurveys. In this situation the survey of the fractional sections had to be executed in a manner that would protect the fractional lotting on the original plat and at the same time stay within rectangular limits within the new areas. Changes in the plan may be required during the progress of the work as closures on other surveys are made.

COMPLETIONS OF KOEHN DRY LAKE BED

T. 30 S., R. 38 E., M. D. M.

Solution

The final solution adopted, employing the procedure which follows, is illustrated by the plat accepted July 30, 1971, figure 8.

The east boundary was held to the dependently resurveyed alinement of N. 0° 09' E., from the corner of sections 12 and 13 to the township corner, with corners for sections 1 and 12 established at 40 and 80 chain intervals with the excess in the last half mile. The first meridional section line was extended N. 0° 08' E., from the meander corner of sections 23 and 24, parallel to the east boundary. The corner of sections 14 and 23 only was established at the intersection of the first meridional line with a line run due East from the corner of sections 16, 17, 20 and 21. The corner of sections 13 and 24 was established at the intersection of a line run due west from the MC of sections 13 and 24. The corners of sections 2 and 11 as well as sections 11 and 14 were established at 40 and 80 chain intervals in latitude from the southeast corner of section 14. The corner of sections 12 and 13 was established at the point of intersection with a line run due west from the corner of sections 12 and 13 on the east boundary. The ¼ section corner of section 13 was established at midpoint on the west boundary of section 13. The corners on the west lines of section 1 and section 12 were established at 40 and 80 chain intervals from the southwest corner of section 12. The first meridional line was terminated at a closing corner on the north boundary of the township. The ¼ section corner on the north boundary of section 1 was established at midpoint.

The line between sections 14 and 23 was run due West, 80 chains, and the corner of sections 14, 15, 22 and 23 was thus established. The ¼ section corner was placed at midpoint.

The line between sections 26 and 27 was extended due North from the meander corner to an intersection with a line extended due East from the MC of sections 21 and 28. The NE corner of section 27 was established at the intersection.

The southeast corner of section 22 was established at the intersection of the line extended due East from the MC of sections 21 and 28 with a line run due South from the corner of sections 14, 15, 22 and 23. The southwest corner of section 23 was established at the intersection with a line extended due West from the MC between sections 23 and 26. The ¼ section corner of section 23 was established 40 chains north of the southwest corner of the section. The ¼ section corner of section 22 was established 40 chains south of the corner of sections 14, 15, 22 and 23.

From the corner of sections 14, 15, 22 and 23 the second meridional line was surveyed N. 0° 08' E., parallel to the east boundary, to a closing corner on the north boundary. The corner of sections 10, 11, 14 and 15 was established at 80 chains, the ¼ section corner of 10 and 11 at 120 chains, the corner of sections 2 and 11 at 160 chains and the ¼ section corner of section 2 at 200 chains. The corner of sections 3 and 10 was established at the intersection of a line extended due East from the MC of sections 3 and 10. The ¼ section corner for section 3 was established 40 chains north of the southeast corner of the section. The lines between sections 2 and 11 and sections 11 and 14, were surveyed "random and true" with the ¼ section corners at midpoint. The ¼ section corner on the north boundary of section 2 was established at midpoint between closing corners.

The line between section 27 and 28 was extended due North from the MC to an intersection with the line extended due East from the MC of sections 21 and 28, fixing the corner of sections 21, 22, 27 and 28.

The ¼ section corner of sections 27 and 28 was established at midpoint.

The south ¼ section corner of section 22 was established 40 chains west of the southeast corner of the section. The north ¼ section corner for section 27 was placed at midpoint on the north boundary of that section. The ¼ section corner for sections 21 and 28 was also established at midpoint.

The line between sections 21 and 22 was run N. 0° 13' W., parallel to the west boundary of section 21, with the corner of sections 15, 16, 21 and 22 established at the intersection of the line run due West from the corner of sections 16, 17, 20 and 21. The East ¼ section corner for section 21 was set at midpoint. The West ¼ section corner for section 22 was established 40 chains south of the northwest corner of section 22 placing the excess in lots along the south side of section 22.

The ¼ section corner for sections 15 and 22 was set 40 chains west of the corner of sections 14, 15, 22 and 23, with the excess in lots along the west side of those sections. The line between sections 16 and 21 was well within limits for measurement and a common ¼ section corner was established at midpoint.

The line between sections 15 and 16 was surveyed due North, parallel to the west boundary of section 16, with the ¼ section corner set at 40 chains and the corner of sections 15 and 16 only at 80 chains.

The north boundary of section 15 was surveyed "random and true", with the ¼ section corner of sections 10 and 15 established 40 chains west of the corner of sections 10, 11, 14 and 15, and the corner of sections 9 and 10 only established at the intersection of a line extended due south from the MC of sections 9 and 10. The ¼ section corner of sections 9 and 10 was established at

40 chains north of the corner of those sections, with the excess in section 10 placed in lots along the north and west sides of the section.

The line between sections 3 and 10 was completed by establishing the ¼ corner for section 10 at 40 chains west of the northeast corner of the section. The ¼ section corner for section 3 was established 40 chains east of the corner of sections 3, 4, 9 and 10, protecting the protracted north and south centerline on the 1855 plat.

Since the line between sections 17 and 18 could not be retraced, recourse had to be made to the 1855 record for the bearing of that line. Therefore the line between sections 16 and 17 was surveyed due North, with the ¼ section corner of section 16 at 40 chains and the corner of sections 9 and 16 established at 80 chains.

The line between sections 9 and 16 was surveyed "random and true," with the ¼ section corner for section 16 set at midpoint on the north boundary of that section and the ¼ section corner for section 9 established at midpoint on the south boundary of section 9.

The west boundary of section 9 was surveyed "random and true," from the corner of sections 9 and 16 to the meander corner. It happened that the bearing of the line was an extension of the resurveyed portion lying north of the dry lake. The ¼ section corner for section 9 was set at 40 chains north of the southwest corner of the section.

The line between sections 8 and 17 was extended due east from the MC to an intersection with the west boundary of section 9, where the corner of sections 8 and 17 was established. The east ¼ section corner for section 17 was set at midpoint on the east

boundary of that section. The east ¼ section corner for section 8 was placed at midpoint on the east boundary of section 8, completing the survey of the subdivisional lines in the township.

Supplementary Topic No. 1 - Rectangular Limits

Three technical errors appear on the accepted plat (in addition to the error indicated by the marginal note).

The line between sections 21 and 22 (80.56 chains) and the north boundary of section 27 (80.84 chains) are in excess of the rectangular limits (50 links) prescribed in section 3-34 of the 1973 Manual. The east ¼ corner of section 21 and north ¼ corner of section 27 were properly established at midpoint positions, but the half miles exceed the 25 link limit per half mile. The east half of section 21 and all of the north half of section 27 should have been lotted.

Supplementary Topic No. 2 - Protecting Prior Rights

The fractional areas in section 3, as returned on the 1855 plat, are based on a length of 80.32 chains for the unsurveyed east boundary of section 3. In this resurvey the south and east boundaries of section 3 were properly completed. To properly protect the patented fractional areas in section 3, however, the corners on the east boundary of section 3 should have been proportioned on the basis of an 80.32 chain record mile, i.e., 20.36, 40.72, 61.08 and 81.77 chains. All of the (new) areas in section 3 would then be lotted with areas shown.

SURVEY CONFORMING TO ERRONEOUS PATENT

Reasons for Request of this Survey

On May 15, 1967, Patent No. 02-67-0049 was issued by the Land Office in the Arizona State Office for the NE $\frac{1}{4}$ SW $\frac{1}{4}$, S $\frac{1}{2}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$, S $\frac{1}{2}$ SW $\frac{1}{4}$, W $\frac{1}{2}$ SE $\frac{1}{4}$ of section 34, T. 11 N., R. 10 E. The patent was issued in exchange for privately owned lands elsewhere within the Tonto National Forest. Because the subdivisional lines of T. 11 N., R. 10 E. had never been surveyed, the described "section 34" did not actually exist.

A request was made to survey the land described in the erroneous patent which would require cancellation of the previous exchange survey which included the same area. This prior survey (Exchange Survey No. 680) had been accepted but no exchange of land had occurred and no patents had been issued.

This case is primarily concerned with the resurvey of the south boundary and survey of a portion of the subdivisional lines of T. 11 N., R. 10 E., and in particular with the survey of the lands in section 34, which are located within the Tonto National Forest.

Special Instructions

Exchange Survey No. 680 had to be cancelled by the Washington Office before work on this survey could begin. This cancellation was accomplished June 15, 1967.

On June 29, 1967, Special Instructions were approved for Group 456, Arizona. They provided for the resurvey of the south boundary and the south 2 miles of the east boundary, as well as the original survey of the subdivisional lines of sections 25 thru 36, and subdivision of section 34, T. 11 N., R. 10 E.

Conditions Found on the Ground

The south 2 miles of the east boundary and the entire south boundary of T. 11 N., R. 10 E., were retraced and resurveyed. The east boundary was well within limits for measurement but near the 14' "danger zone" for alignment. The south boundary was out of limits for both alignment and measurement, except the south boundary of section 36.

Corners for T. 11 N., R. 10 E., were established at 40 and 80 chain intervals in longitudinal position along the north boundary of T. 10 N., R. 10 E., counting from the corner of sections 1, 2, 35 and 36.

A sectional guide meridian was run north from the corner of sections 1, 2, 35 and 36. A sectional correction line was run west from the corner of sections 25, 30, 31 and 36 on the east boundary. At the point of intersection of these lines the corner of sections 25, 26, 35 and 36 was established. The line between sections 34 and 35 was run N. 0° 01' W., parallel to the sectional guide meridian. The sectional correction line was continued west between sections 26 and 35. At the point of intersection the corner of sections 26, 27, 34 and 35 was established. This pattern was continued until sections 31 through 36 were completed. The sectional correction line was terminated at a closing corner on the west boundary of the township. The excess or deficiency was placed in the lots against the

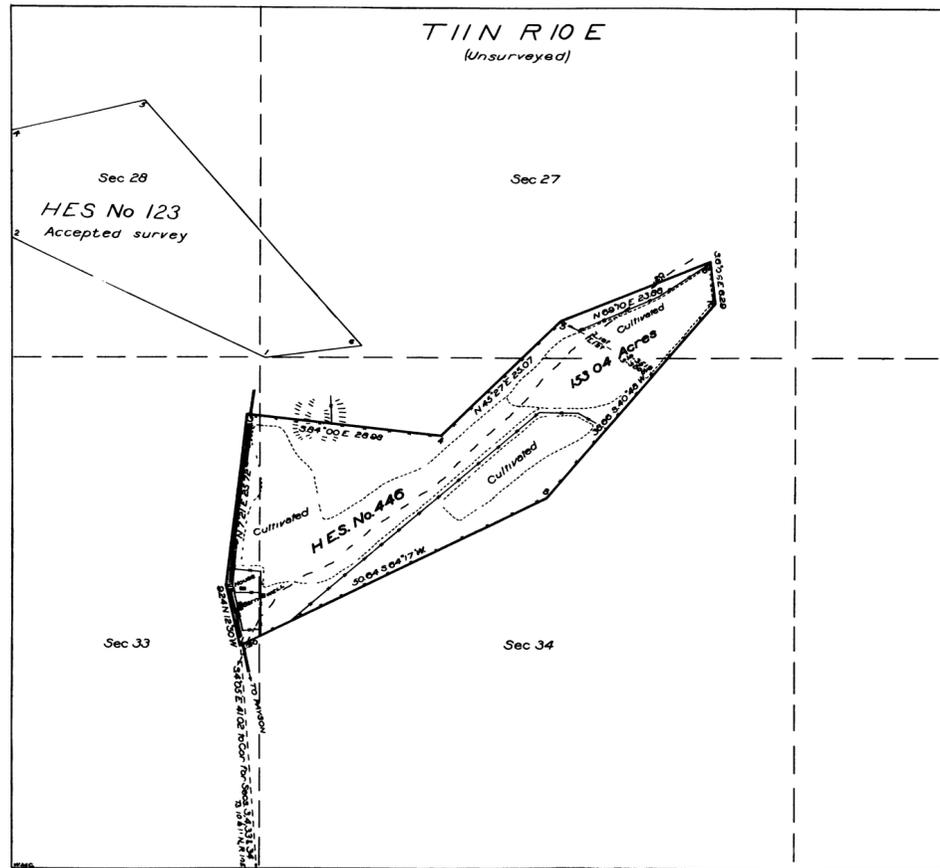


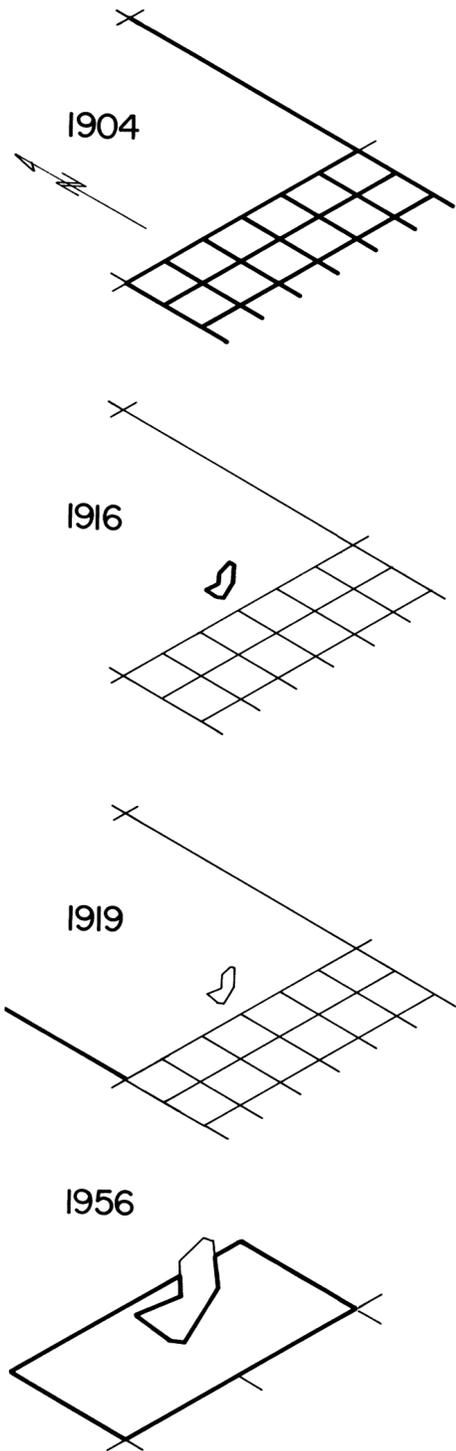
Figure 1 - H. E. S. No. 446

area described in Patent No. 02-67-0049 because the S $\frac{1}{2}$ SW $\frac{1}{4}$ of section 34 is nonexistent. Lots 6 and 7 would only approximate the same area as the S $\frac{1}{2}$ SW $\frac{1}{4}$ of section 34, as shown in figure 4.

Regulations

The case applies the following sections of the Manual of Surveying Instructions, 1973:

- 3-31 and 3-32 Retracements and resurveys
- 3-33 to 3-35 Rectangular limits
- 3-36 to 3-45 Defective exteriors
- 3-47 to 3-92 Subdivision of townships and sections
- 6-39 to 6-49 Metes and bounds surveys of private claims



History of Surveys

- 1904 Charles L. Campbell and Ivan E. Oakes surveyed the south boundary of T. 11 N., R. 10 E., and north boundary of T. 10 N., R. 10 E., as well as subdivisions of T. 10 N., R. 10 E.
- 1904 Charles L. Campbell surveyed the east boundary of T. 11 N., R. 10 E.
- 1916 R.P.A. Johnson, Forest Service surveyor, surveyed Homestead Entry Survey No. 446.
- 1919 S.E. Blout surveyed the west boundary of T. 11 N., R. 10 E.
- 1956 Charles C. Doak, Forest Service surveyor, performed Exchange Survey No. 680.

township boundaries.

Sections 25 thru 30 were surveyed in the normal manner of the rectangular system, using the sectional correction line as an "auxiliary" south boundary. The excess in section 25 was placed in the lots against the east boundary of the township. Closing corners were established at the intersection of the section lines and the boundaries of all the Homestead Entry Surveys, and ties were made to the nearest angle point of each H.E.S. Figure 3 is the final accepted plat and illustrates the pattern of survey and lotting of the sections.

Section 34 was then subdivided in the normal manner as directed by the Special Instructions, as illustrated in figure 4, where the solid section subdivisional lines represent those run on the ground. A closing corner was established on the N-S centerline of the section at the intersection with line 1-8 of H.E.S. No. 446.

The survey of section 34 established lots against the south boundary of the township. The above described procedure would not protect the

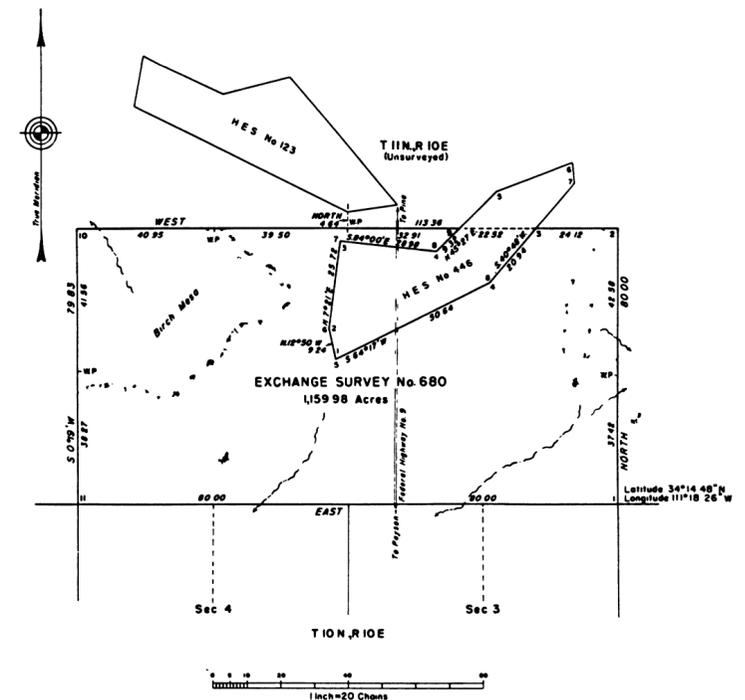


Figure 2 - Exchange Survey

SURVEY CONFORMING TO ERRONEOUS PATENT

TOWNSHIP 11 NORTH, RANGE 10 EAST, OF THE GILA AND SALT RIVER MERIDIAN, ARIZONA

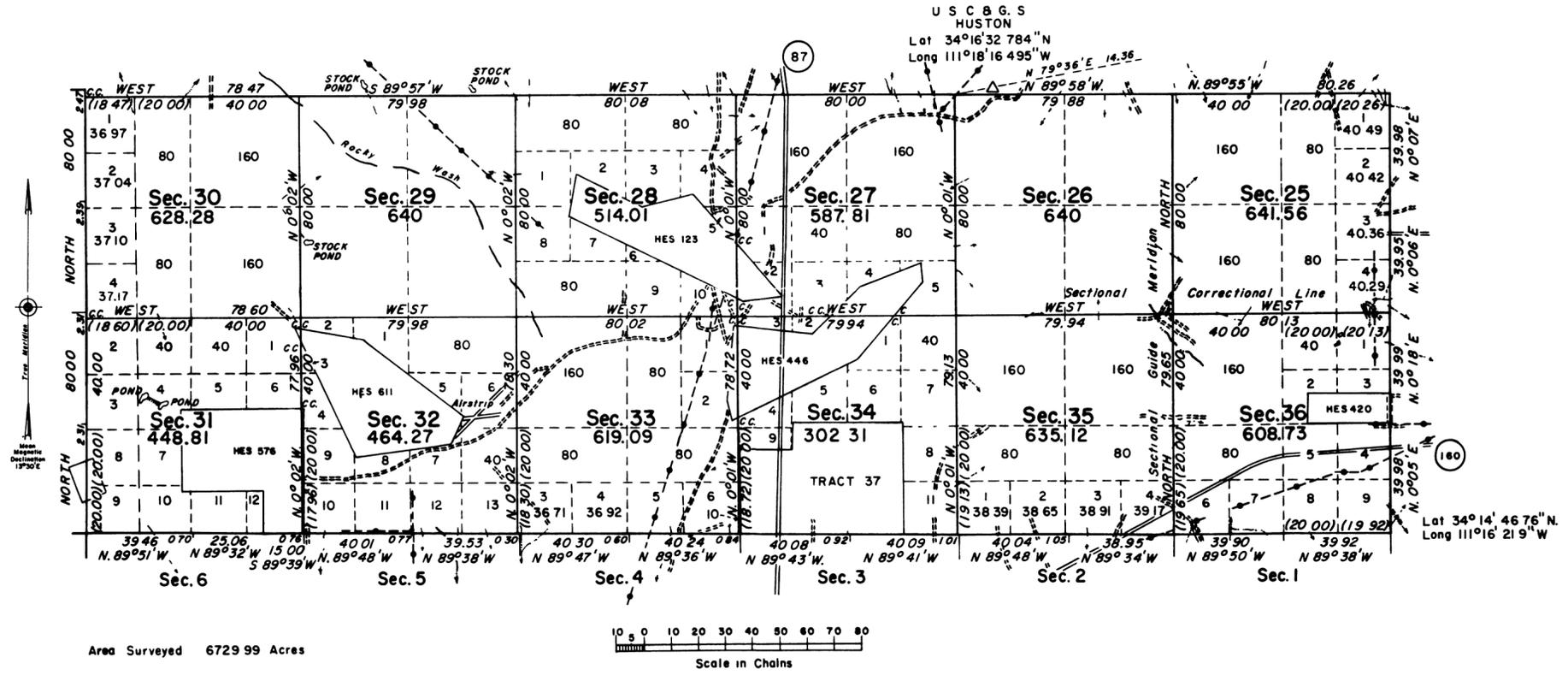


Figure 3 - Sheet 1 of Accepted Plat

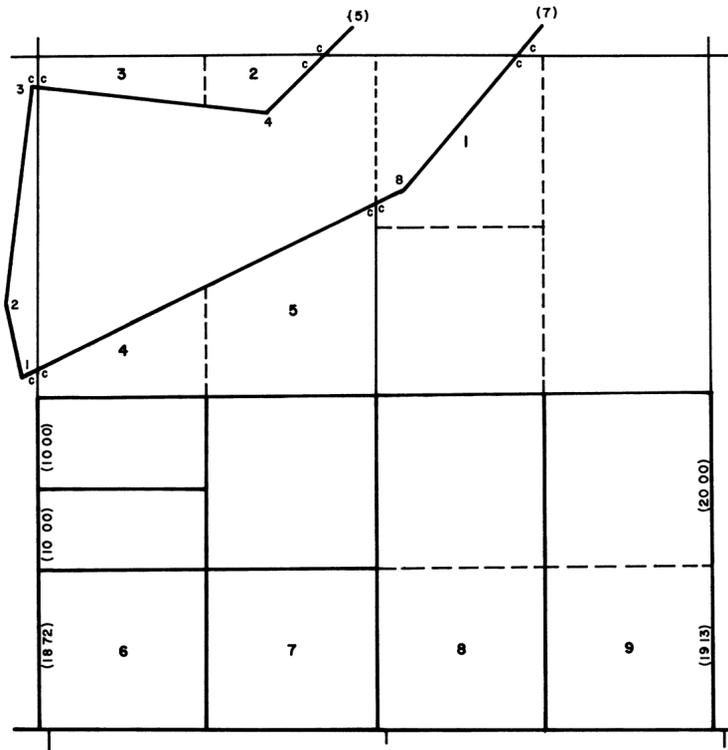


Figure 4 - Initial Subdivision

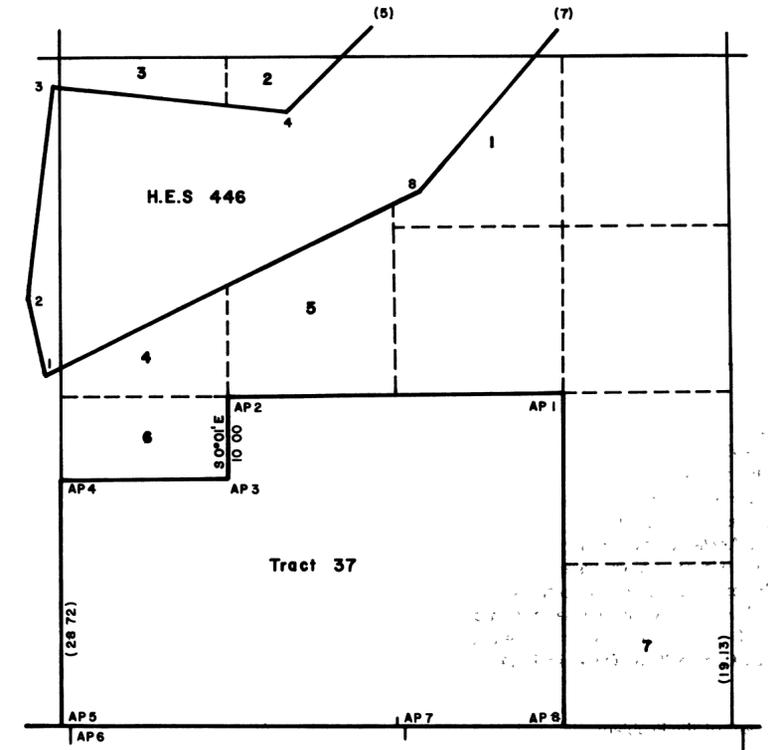


Figure 5 - Second Trial

SURVEY CONFORMING TO ERRONEOUS PATENT

Auxiliary Topic 1

Homestead Entry Surveys

Several Homestead Entry Surveys had been executed within the unsurveyed T. 11 N., R. 10 E., under the Act of June 11, 1906 (34 Stat. 233, 16 U.S.C. 506). The act provided for the survey of homesteads within a national forest where land had been classified by the Secretary of Agriculture as suitable for cultivation. These surveys were usually executed by Forest Service personnel under instructions from the BLM, and were examined and approved by the BLM. (The Enabling Acts were repealed by the Act of Oct. 23, 1962 (72 Stat. 1157) and these surveys are no longer made.)

H.E.S. No. 446 was executed in 1916 and accepted August 22, 1918. Corner No. 1 of H.E.S. No. 446 was tied to the existing corner of sections 3, 4, 33 and 34 on the north boundary of T. 10 N., R. 10 E. See figure 1.

Because patent had been issued on H.E.S. No. 446, that survey was not subject to cancellation and its boundaries were fixed.

Auxiliary Topic 2

Exchange Surveys

The Act of March 20, 1922 (42 Stat. 465) and amendments thereto, provides for the exchange of lands within National Forests, wherein the Forest Service exchanges public land for privately owned lands. The purpose is to aid in the administration of the forest lands. Patent may issue on the basis of the Exchange Survey. The Enabling Act apparently anticipated that the exchanges would be of parcels of surveyed lands described by aliquot parts of sections.

The Act of March 3, 1853 (10 Stat. 245) provided for the departure from the rectangular system of surveys of the public lands in specific areas. This was amended by the Act of April 29, 1950 (64 Stat. 93, U.S.C. 770) allowing departure from the rectangular system if used with discretion.

In 1956 the Forest Service attempted to effect an exchange of unsurveyed sections 33 and 34, T. 11 N., R. 10 E., for private lands elsewhere in the Tonto National Forest. They requested an Exchange Survey of the lands included within these theoretical sections. Special Instructions were written and approved on August 31, 1956, providing for Exchange Survey No. 680. The survey was executed by Charles C. Doak of the Forest Service in September, 1956. The survey was accepted on February 27, 1957. See figure 2. Angle points numbered 2, 9 and 10, and the four witness points were monumented. AP1 was the existing corner of sections 2, 3, 34 and 35. AP11 was the existing corner of sections 4, 5, 32 and 33. These latter corners were those established by Campbell and Oakes in 1904.

Final Statement of the Problem

Although Patent No. 02-67-0049 was issued for a described portion of section 34, no such section exists until it is surveyed, and the plat is

accepted and filed in the Land Office. The land was identified by the patent but did not actually exist in fact.

From the very beginning of the rectangular system Congress did not permit the sale or disposal of the Public Domain until after it was surveyed. Most court cases dealing with patents or claims to unsurveyed lands treat the sale of unsurveyed lands as void.

In *Buxton v. Traver*, 130 U.S. 232 (1889) the Supreme Court said:

No portion of the public domain, unless it be in special cases not affecting the general rule, is open to sale until it has been surveyed and an approved plat of the township embracing the land has been returned to the local land office.

Because the proposed exchange was still needed, a survey is required which would describe the land intended to be conveyed by the original (but void) description.

Solution

On August 28, 1967, Supplemental Special Instructions were written and approved. They provided for the survey of Tract 37 which was to include the approximate area described in the premature patent. The description of the tract was surveyed as outlined by the illustration in figure 5. AP1 is the C-E 1/16, AP2 is the C-W 1/16, AP5 is the corner of sections 34 and 35, AP7 is the 1/4 corner of section 3, AP8 is the E 1/16 of section 34. The line of AP3 to AP4 is parallel to the E-W centerline of section 34.

The Washington Office did not accept this solution to the problem of protecting the premature patent because this Tract 37 was still controlled by the subdivision of section 34 as actually surveyed. Another solution was suggested.

On April 30, 1968, amended Supplemental Special Instructions were approved. They provided for the survey of Tract 37, section 34, based on the survey and subdivision of section 34 but using the corners established along the south boundary in 1904. Thus the survey of Tract 37 would be based on the method of surveying a partial section as outlined in sections 3-93 to 3-95 of the Manual of Surveying Instructions, 1973, using the 1904 corners as the basis of the survey. The original south boundary of section 34 is within limits for both alignment and measurement and could, in theory, be surveyed as an individual section.

The survey of Tract 37, as finally accepted, does define and create the boundaries of the land intended to be conveyed by the patent. The approved field notes contain the following memorandum preceding the survey of Tract 37:

Survey of Tract 37, Section 34
Township 11 North, Range 10 East

Comprising the following described lands:

1 NE 1/4 SW 1/4, S 1/2 NW 1/4, S 1/2 SW 1/4, W 1/2 SE 1/4, Sec. 34, T. 11 N., R. 10 E., under Patent No. 02-67-0049, Arizona.

The location of this tract is based upon the subdivision of section 34, had the boundaries and section subdivision been run regular commencing at corners established on the south boundary of the township by Campbell and Oakes in 1905.

The N-S and E-W center lines of section 34 were run and temporary points set to control the survey of the tract.

The above explanatory comments regarding Tract 37 set forth the intent of the survey and protect the previously issued patent which calls for an area described by aliquot parts of a section. Those parts do not exist in fact and never will exist.

The retracement data already acquired served as the basis for protracting the theoretical survey and subdivision of section 34. The computed courses and distances around the exterior boundaries and subdivisional lines are illustrated by figure 6. Tract 37 was finally surveyed on the protracted, theoretical courses and distances of the boundaries of the subdivisions of section 34, described in the premature patent. The previously set corners of the tract were removed. The previously monumented angle and witness points of the cancelled Exchange Survey No. 680 were tied in and then removed and the accessories destroyed. The plat was accepted on February 5, 1969, in 6 sheets. Figure 7 is sheet number 5 and shows the final survey of section 34.

There may have been another way to protect the patent. Section 34 might have been surveyed individually, field notes and plat prepared and accepted. The township could then have been completed at a later date in a manner protecting the previously surveyed section 34. This method would, however, have created more lots and "double corners" than the plan which was used.

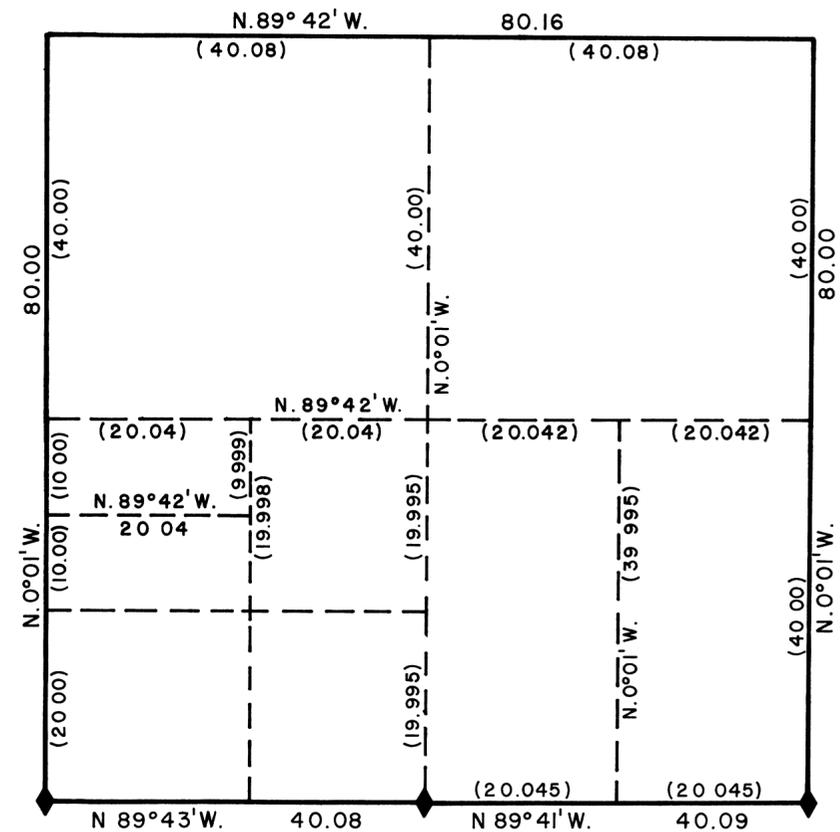
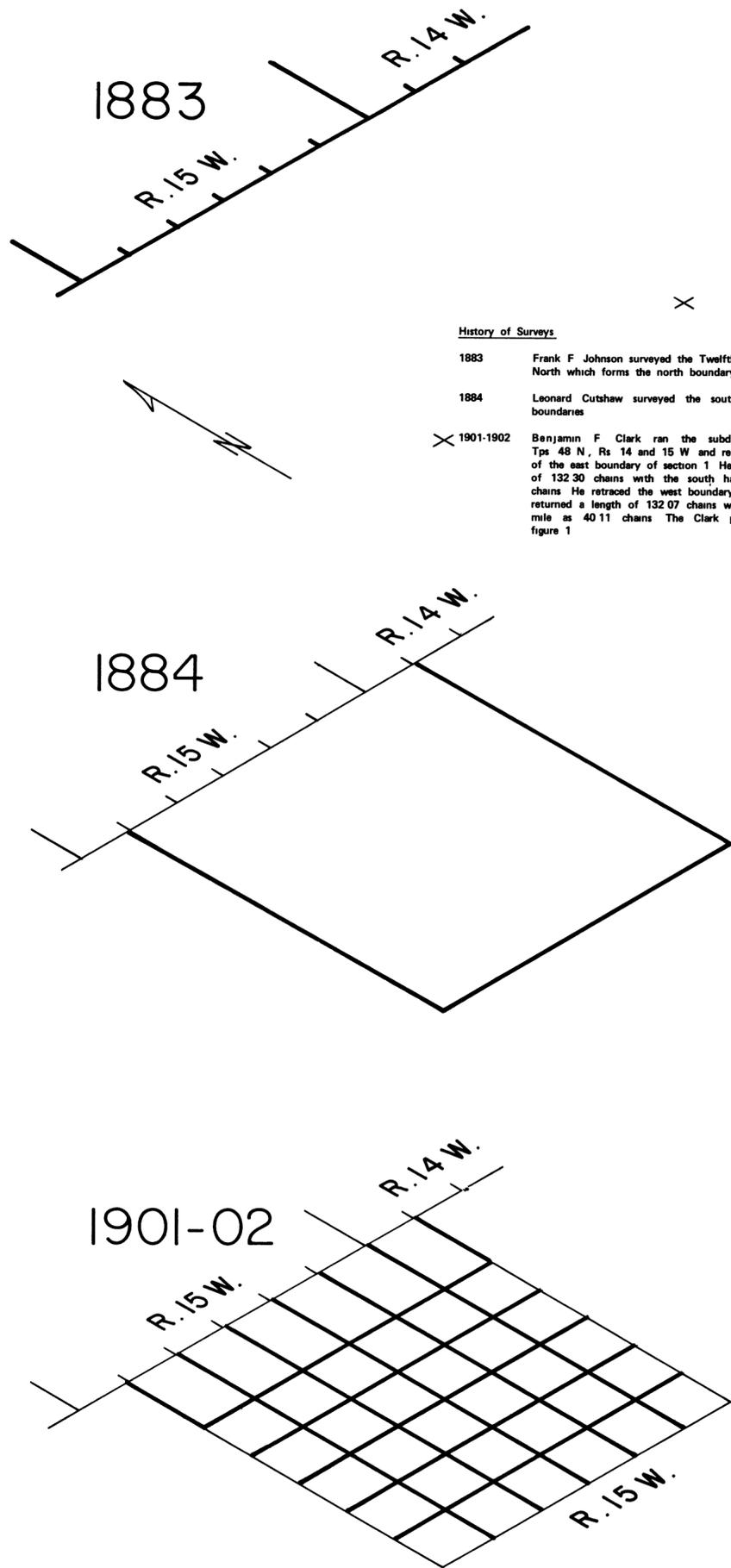


Figure 6 - Protraction of Section 34

INDEPENDENT RESURVEY IN UNCOMPAHGRE FOREST

T. 48 N., R. 15 W., N. M. P. M.



History of Surveys

- 1883 Frank F Johnson surveyed the Twelfth Standard Parallel North which forms the north boundary of the township
- 1884 Leonard Cutshaw surveyed the south, east and west boundaries
- 1901-1902 Benjamin F Clark ran the subdivisional lines of Tps 48 N, Rs 14 and 15 W and reported retracement of the east boundary of section 1. He returned a length of 132.30 chains with the south half mile as 40.08 chains. He retraced the west boundary of section 6 and returned a length of 132.07 chains with the south half mile as 40.11 chains. The Clark plat is shown in figure 1.

Reasons for Request of this Survey

Between 1906 and 1964, patents based on the Clark plat were issued for portions of sections 10, 19, 20, 21, 28, 29 and 30.

All the unpatented areas in the township except sections 19, 20 and 21 as well as 28 thru 33 were withdrawn from entry by Presidential Proclamation dated March 1, 1907. The withdrawn area became part of the Uncompahgre National Forest.

In 1921 E.H. Kimmell remonumented the closing corner of sections 5 and 6, which Clark had established on the standard parallel, 1.98 chains east of the standard corner of sections 32 and 33. Clark described the standard corner he found as being a spruce stump with scribe marks. In the original notes Johnson described the standard corner of sections 32 and 33 as a sandstone 20 x 15 x 6 inches without bearing trees.

In 1934 the U.S. Coast and Geodetic Survey extended the horizontal control net over the area. The remonumented closing corner of sections 5 and 6 was used as a station of the net and designated "G.L.O. No. 9." It was tied to station SPRUCE located on Spruce Mountain.

In 1944 local surveyors and the U.S. Geological Survey reported a tie from the properly marked corner of sections 3, 4, 9 and 10 to station SPRUCE. The relationship of the two original corners to original corners on the exterior boundaries of the township revealed a displacement of approximately one mile. The interior corners were nearly one mile too far east in relation to the boundaries.

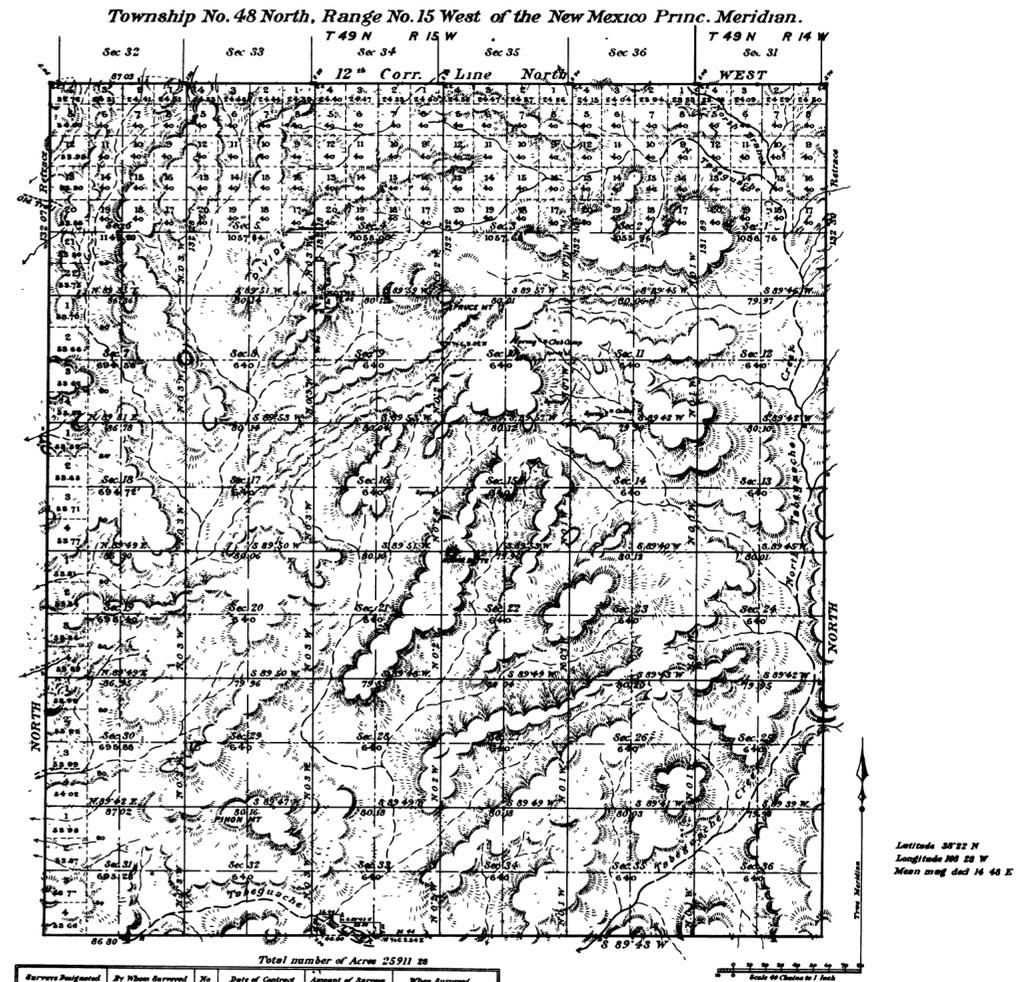
Cadastral Engineer John S. Knowles investigated the reported tie from station SPRUCE to the corner of sections 3, 4, 9 and 10 and found it correct.

In 1951 the U.S. Forest Service made a new base map of the Uncompahgre National Forest. This base map was controlled by the triangulation net and showed recovered original corners along the exterior boundaries and interior subdivision corners. This map also revealed the nearly one mile displacement of the interior corners.

In cooperation with the Forest Service a preliminary field investigation was made which verified the one mile displacement, that is: the corner marked as the corner of sections 3, 4, 9 and 10 occupies the theoretical position of the corner of sections 2, 3, 10 and 11.

The third meridional line and third latitudinal lines in the township define the south and west boundaries of a portion of the Uncompahgre National Forest.

Because the true position of the forest boundary is required to properly administer the forest lands, the resurvey of the township was requested by the Regional Forester, U.S. Forest Service in 1965.



Surveyors	By Whom Surveyed	No.	Date of Contract	Amount of Survey	When Surveyed
Subdivision	Ben F. Clark	214	Mar 7 - 4 - 1891	62 - 56 - 79	Mar 20 th 1891 - Aug 6 th 1892
East W. Boundary	Leonard Cutshaw	651	Aug 27 th 1886	0 - 12 - 36	Oct 10 th - 22 nd 1886
12 th Corr. Line North	Robt. W. Whiddell	624	Oct 21 st 1882		Sep. 10 th 1883

The above Map of Township No. 48 North, of Range No. 15 West of the New Mexico Principal Meridian in Colorado is strictly conformable to the field notes of the survey thereon on file in this Office, which have been examined and approved.

Surveyors General's Office
City and County of Denver, Colo. June 4th 1963

[Signature]
Sur. Gen.

SUSPENDED MARCH 13, 1972 File Group 524, Colorado, 9182 (420)

Figure 1 - Original Plat

Special Instructions

Special Instructions prepared for Group 524, Colorado, on April 27, 1965, provided for the resurvey of the exterior boundaries and subdivisional lines of T. 48 N., R. 15 W.

It was known from the preliminary investigation that adequate control was available for a dependent resurvey of the exterior boundaries and that these boundaries were deficient for alignment and measurement as a basis for an independent resurvey.

The surveyor was instructed to dependently resurvey the exterior boundaries, restoring lost corners by proper proportionate methods but marking the corners on the south, east and west boundaries as corners of minimum control for the townships to the south, east and west. The northeast and northwest corners of T. 48 N., R. 15 W., (both closing corners) were to be restored based on the Clark record, but no other

closing corners along the north boundary between those points were to be restored.

The patented lands within the township were to be surveyed as tracts, based on the position these tracts actually occupied. It was anticipated that the patented lands in sections 19, 20, 21, 28, 29 and 30 had been located in relation to the west boundary of the township. If this were the case those lands would be located about one mile west of the position indicated by the Clark interior corners. The tract segregations would honor the actual location rather than the patent description, yet retain the areas and shapes as described.

After segregating the patented lands the township was to be independently resurveyed by establishing new corners along the east boundary at 40 and 80 chain intervals latitudinally along that boundary. 1/16 80, 1/16 100 and 1/16 120 section corners were to be established for section 1.

INDEPENDENT RESURVEY IN UNCOMPAGRE FOREST

T. 48 N., R. 15 W., N. M. P. M.

New corners for T. 48 N., were to be established at 40 and 80 chain intervals in longitude along the south boundary, counting from the southeast corner of the township, with the excess in the south boundary of section 31.

From the new corner of sections 25 and 36 a sectional correction line would be run west across the township to a closing corner on the west boundary.

From the new corner of sections 35 and 36 on the south boundary a sectional guide meridian would be run N. 0° 01' W. to a closing corner on the north boundary. At the intersection of the sectional guide meridian and the sectional correction line the corner of sections 25, 26, 35 and 36 would be established with all corners further north at 40 and 80 chain intervals. This "pattern" would be followed throughout the remainder of the township with fractional lots placed against the north, east, south and west boundaries, creating as many new regular aliquot parts as possible.

It was anticipated that the patented lands were one mile out of position in relation to the old corners, as marked, and that those patent lines would conform to the new lines of the independent resurvey. If this were true the claim lines would be in conformity, by description, with the new section lines. If this was not the case the true conditions were to be reported when all information was fully developed.

Assignment Instructions

The field work was assigned on June 30, 1965. Work began on July 6, 1965.

Conditions Found on the Ground

Figure 2 illustrates the actual conditions found and the original corners recovered. Most of the Clark corners were recovered around section 10. The corner of sections 15, 16, 21, and 22, on Round Mountain, was a sandstone properly marked as described by Clark. From the corner of sections 15, 16, 21 and 22 the Cutshaw corner of sections 13, 18, 19 and 24, on the west boundary, was N. 89° 58' W., 307.07 chains distant, or 60 chains more than the record. From the corner of sections 15, 16, 21 and 22 a fence extended N. 89° 58' W. a distance of 2½ miles, along the posted national forest boundary. The occupied patented lands were located south of the fence. No other corners were recovered within the southwest quarter of the township. The old buildings of "Club Camp" are located in the patented S½ NE¼ section 10, as shown on Clark's plat. These conditions were reported, as directed by the Special Instructions.

Preliminary Statement of the Problem

The problem to be resolved is how to resurvey the township and protect the bona fide rights of the holders of the patented lands. The land owners in sections 19, 20, 21, 28, 29 and 30 are present and available for consultation. The owner of the patented land in section 10 is absent and unavailable.

Regulations

This survey illustrates the application of the following sections of the Manual of Surveying Instructions, 1973:

- 6-5 Independent resurvey
- 6-12 to 6-18 Bona Fide Rights of Claimants
- 6-33 to 6-56 Resurveys - independent resurvey
- 9-84 to 9-111 Resurvey plats

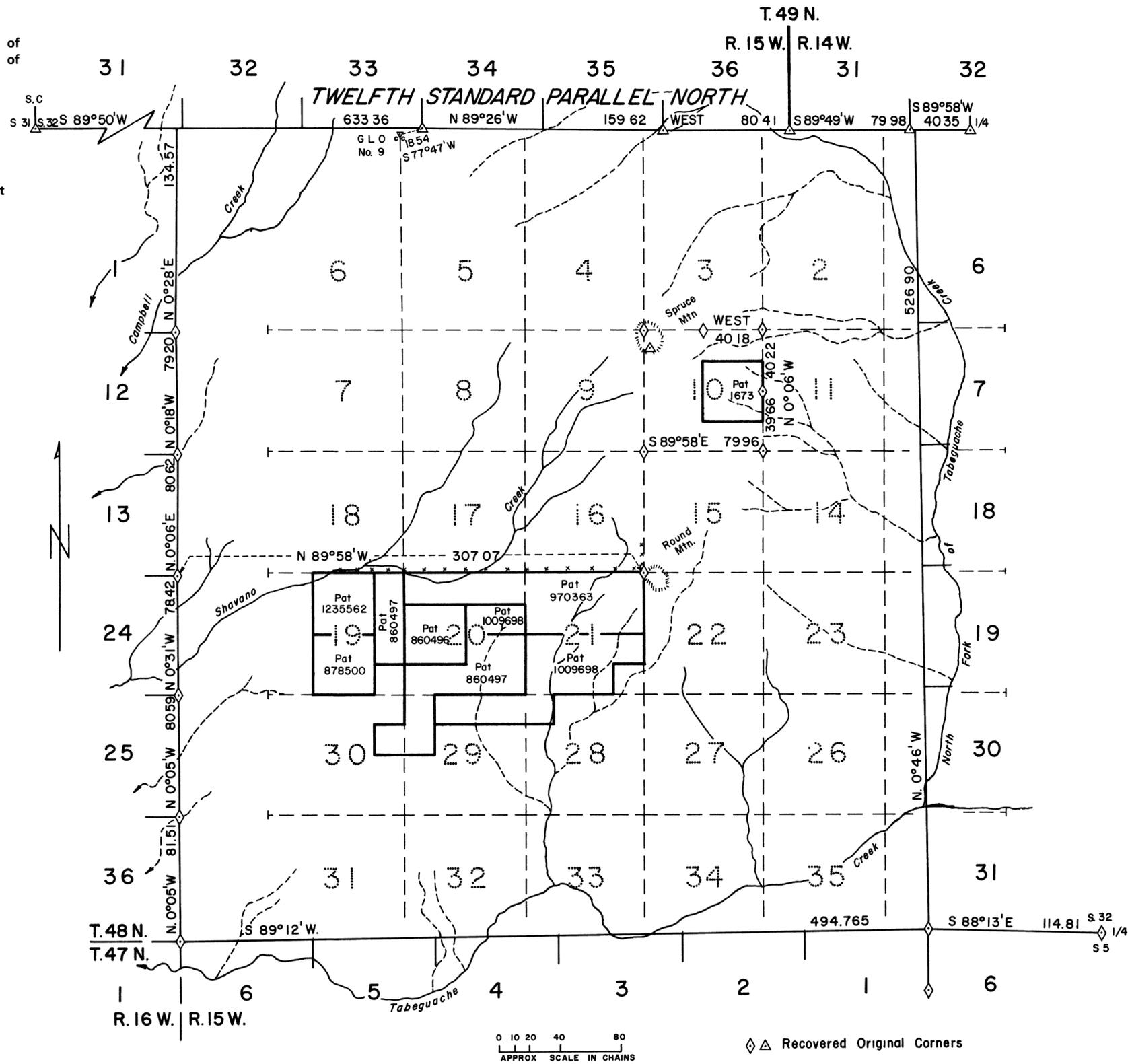


Figure 2 - Conditions Found

INDEPENDENT RESURVEY IN UNCOMPAHGRE FOREST

T. 48 N., R. 15 W., N. M. P. M.

Changes in Instructions

Amended Special Instructions, dated August 15, 1966, directed that the patented lands be segregated by metes and bounds (tract) surveys and excluded the resurvey of sections 1 through 18, 21 through 27 and 34 through 36.

Final Statement of the Problem

Perform the necessary surveys in compliance with the Manual of Surveying Instructions.

Solution

Figure 3 is the plat of the Independent Resurvey as accepted May 22, 1972.

Tract 37 is the identical parcel of land called for in the corresponding patent as defined by the dependent resurvey and subdivision of section 10 based on the recovered original corners. The N 1/16 section corner of sections 10 and 11 was monumented, designated and marked for Angle Point No. 1 of Tract 37. The center N 1/16 section corner of section 10 became Angle Point No. 2, the center S 1/16 section corner became Angle Point No. 3 and the S 1/16 section corner of sections 10 and 11 became Angle Point No. 4. The original corner monuments of the section were buried in place.

Metes and bounds surveys of Tracts 38 through 45 were made after consultation with and agreement between the owners of those tracts. All lines were based on the corner of sections 15, 16, 21 and 22 and the fence extending N. 89°58' W. therefrom. The easterly and westerly tract boundaries were made north-south lines. The northerly and southerly lines were made parallel to the fence. Distances were fixed in units of 20 chains and multiples of 20 chains. Each tract contained the exact area of land called for in the corresponding individual patents. All angle points were numbered counterclockwise beginning with Angle Point No. 1 at the most northeasterly corner of the tract. All were monumented and appropriately marked for the corner or corners of adjoining tracts, if any. Section numbers were not added to the markings. The tracts were numbered in sequence from east to west and west to east in the manner normally used for lot numbering of fractional sections.

The exterior boundaries were dependently resurveyed as directed in the Special Instructions. New corners were established at 40 and 80 chain intervals on the east and south boundaries as anticipated. The sectional correction line was run, without monumentation, west from the corner of sections 25 and 36 to an intersection with the line run N. 0° 02' W., between sections 33 and 34 where the corner of sections 27, 28, 33 and 34 was established and monumented. This pattern was continued in the survey of sections 32 and 33. The sectional correction line was terminated at a closing corner on the west boundary.

The line between sections 27 and 28 was terminated with a closing corner on the south boundary of Tract 45. A closing corner was set on each section line where the line entered or left patented lands. The excess length of section 19 and sections 30-33 was placed against the south and west boundaries as appropriate. See figure 3, the accepted plat.

The marginal data on the plat includes an "Index to Segregated Tracts." This index includes the tract number, type of patent, patent number, date of patent, serial register designation or number, township, range and section number and the subdivision of section description as given in the patent.

Prior to July 1, 1908, when the serial register numbering system came into use, the patents were designated by number and name of the issuing office. Tract 37 was Cash Entry patent number 1673, issued in the Ute Land District.

Prior to the acceptance of the independent resurvey the Washington Office was requested to suspend the 1901-02 Clark surveys and plat. The plat was suspended by memorandum dated March 13, 1972. The request for suspension of the plat should have been made prior to execution of the independent resurvey. This action is necessary to prevent any further entries, exchanges or other actions based on the old plat.

The Clark plat approved June 6, 1903, was cancelled upon acceptance of the independent resurvey plat on May 22, 1972.

Supplemental Topic No. 1

The tie given in the field notes and on the accepted plat, (figure 3) from Angle Point No. 2, Tract 37 to station SPRUCE is in error. This tie should be approximately N. 70° 56' W., about 40.16 chains distant. The geographic position of station SPRUCE is:

Latitude 38° 26' 03.386" N.

Longitude 108° 30' 09.193" W.

The geographic position of the now cancelled closing corner of sections 5 and 6, which was re-marked and is now station GLO No. 9, only, is:

Latitude 38° 27' 34.18" N.

Longitude 108° 32' 24.22" W.

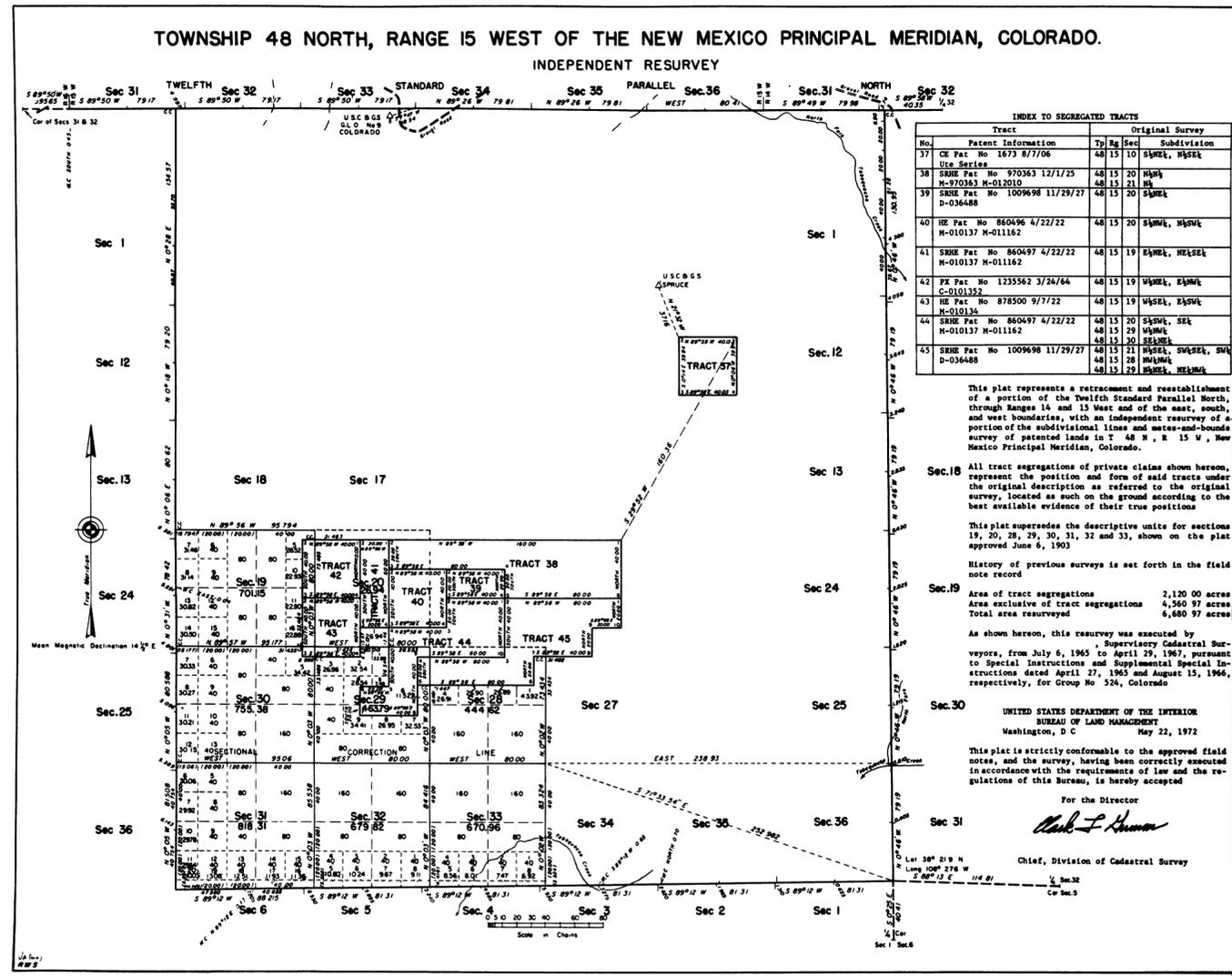


Figure 3 - Plat of Independent Resurvey

SUBDIVISION OF ELONGATED SECTION 4

Township N° 22 North Range N° 4 East Mount Diablo Meridian

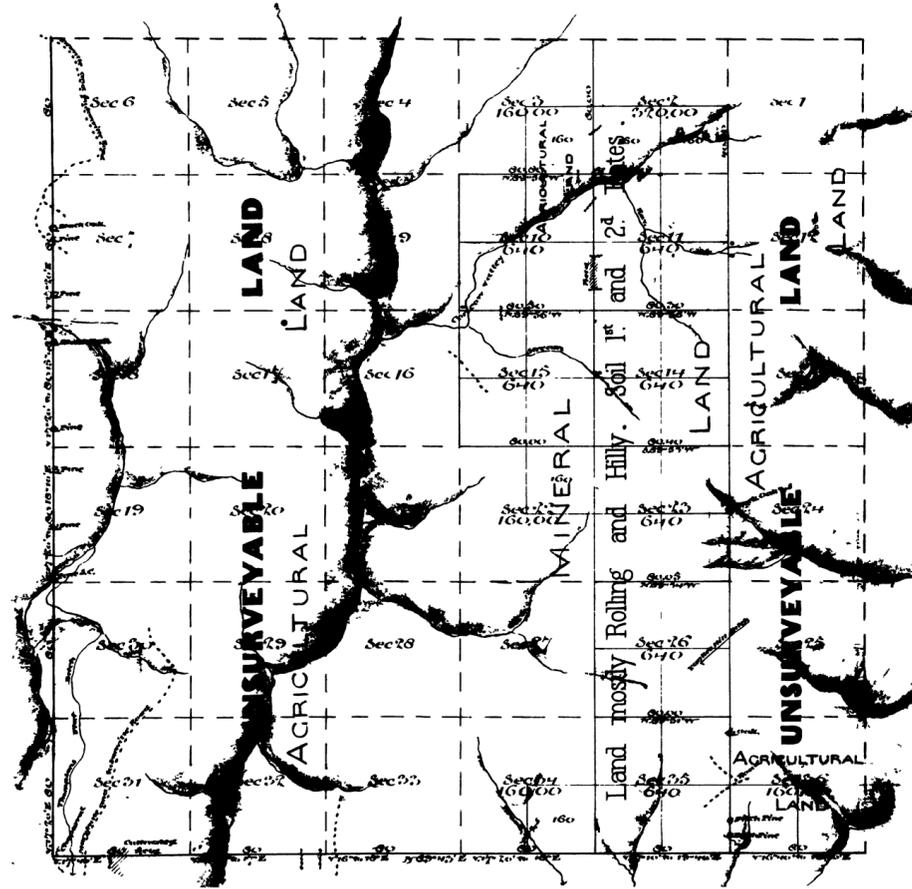
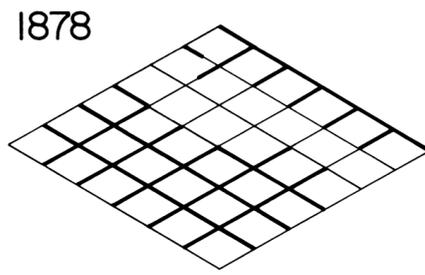
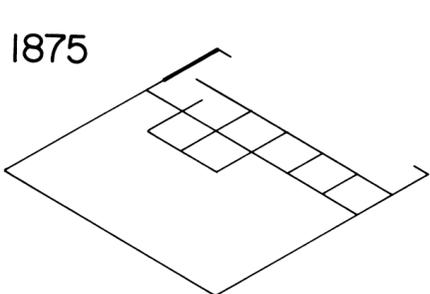
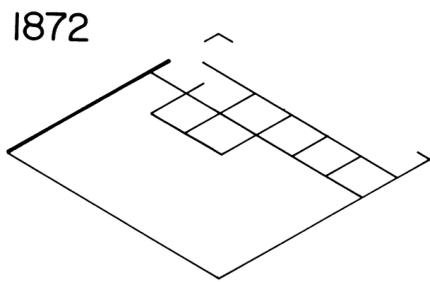
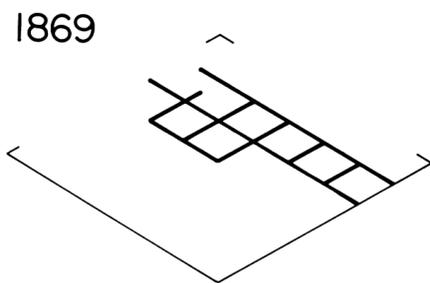
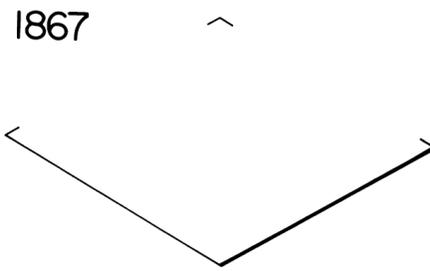
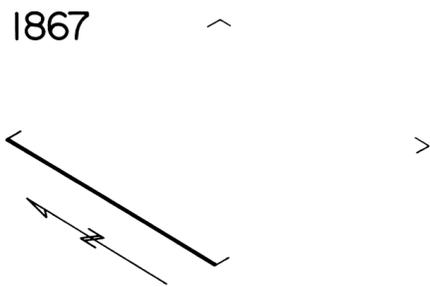


Figure 1a - Batelle Plat

T. 22 N., R. 4 E., M. D. M.



History of Surveys

- 1867 W.F. Ingalls surveyed the west boundary.
- 1867 E.H. Dyer surveyed the south boundary.
- 1869 Thornton F. Battele surveyed a portion of the subdivisional lines. See figures 1a and 1b.
- 1872 William Minto surveyed the west 4 1/2 miles of the north boundary of the township. Minto's field notes made no reference to the Battele corner of sections 2, 3, 34 and 35.
- 1875 Edward A. Von Schmidt surveyed the east 1 1/2 miles of the north boundary beginning his completion at the Minto 1/4 section corner of sections 2 and 35.
- 1878 John A. Benson surveyed the east boundary of the township, running "random and true" between the Dyer southeast corner and the Von Schmidt northeast corner of the township. Benson then completed the subdivisional lines of the township, as partially illustrated in figures 2a and 2b. Benson found a gross error in the south half of Battele's line between sections 34 and 35, displacing the corner of sections 26, 27, 34 and 35 southerly. Benson accepted Battele's corners as common to his survey which forced a strong bearing into his lines.
- 1914 Benjamin L. McCoy, Butte County Surveyor, resurveyed in the SE 1/4 of section 3, he found and perpetuated the 1/4 section corner of sections 3 and 10.
- 1957 Jesse A. Bumgarner, Registered Engineer No. 2435, resurveyed a portion of section 3, as shown by a map recorded in Book 22, page 26, Butte County records. Bumgarner's map indicates that he found the 1/4 corner of sections 3 and 4. He also re-monumented the corner of sections 9, 10, 15 and 16.
- 1963 & 1966 John W. Hamby, Land Surveyor No 2843, surveyed portions of sections 3 and 10. Hamby's maps indicate that he did not use the McCoy perpetuation of the 1/4 corner of sections 3 and 10 nor the Bumgarner 1/4 corner of sections 3 and 4. Hamby did not use any proportionate method of restoring the lost corner of sections 3, 4, 9 and 10.

Reasons for Request of this Survey

Lots 2, 3 and 4 as well as the west half of lot 5 and the west half of lot 8 were the only Federal lands remaining unpatented within section 4, T. 22 N., R. 4 E. This survey was requested to identify those public lands.

Special Instructions

Special Instructions were issued for this survey in 1965 with Supplemental Special Instructions for Group 521, California, issued on May 9, 1966. The Supplemental Instructions provided for the dependent resurvey of the boundaries of section 4, T. 22 N., R. 4 E., and survey of the subdivisional lines to the extent necessary to mark the boundaries of Federal lands within the section.

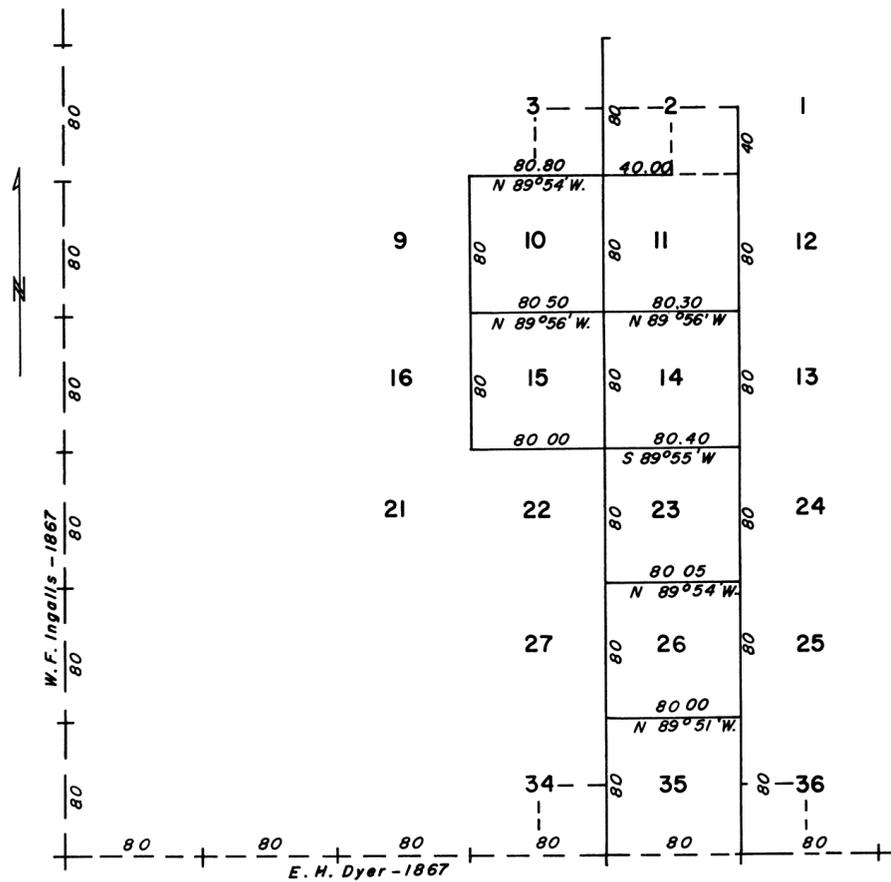


Figure 1b - Batelle's Subdivisional Lines

SUBDIVISION OF ELONGATED SECTION 4

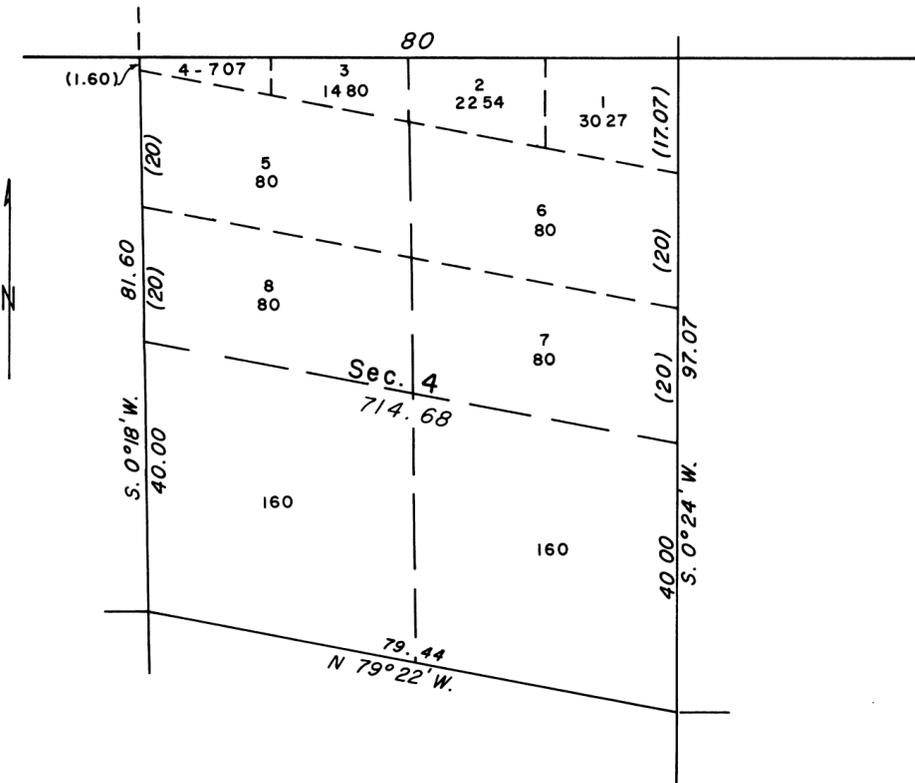
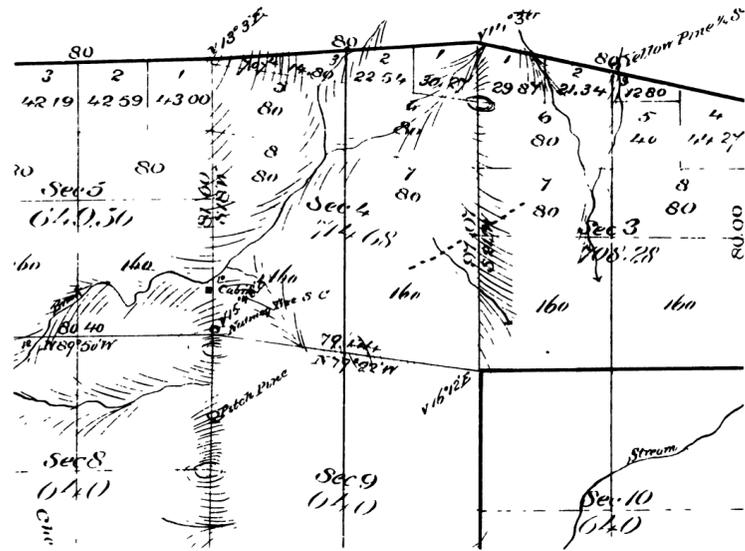


Figure 3 - Record of Section 4

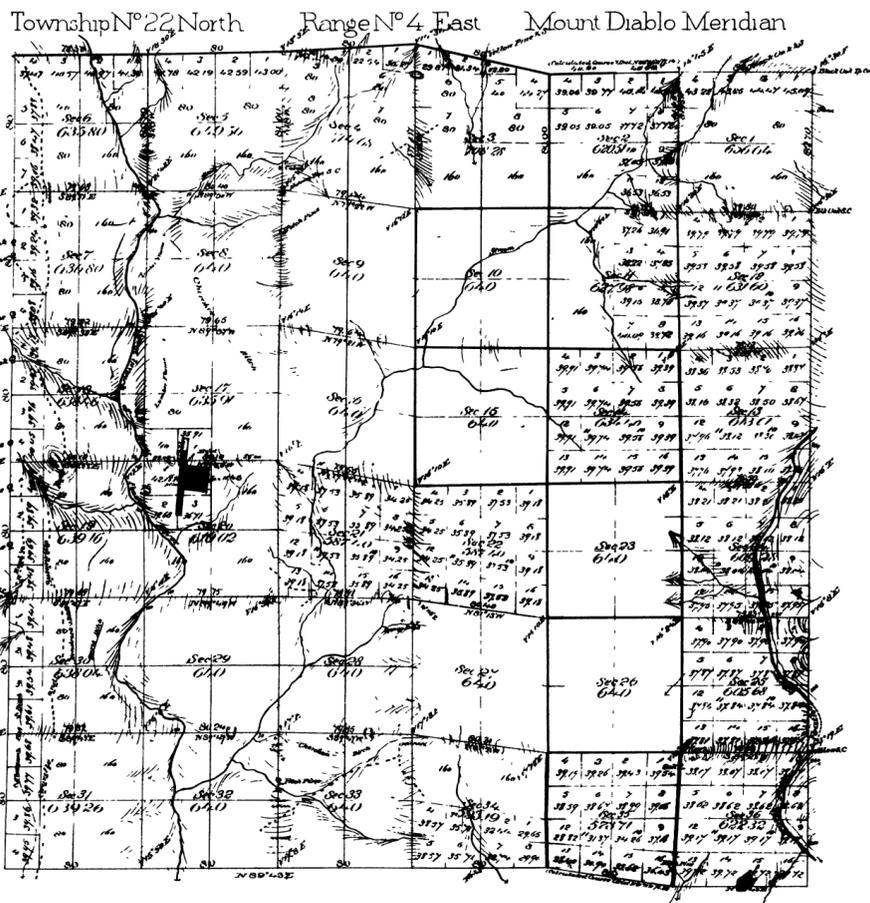


Figure 2a - Portion of Benson Plat

T. 22 N., R. 4 E., M.D.M.

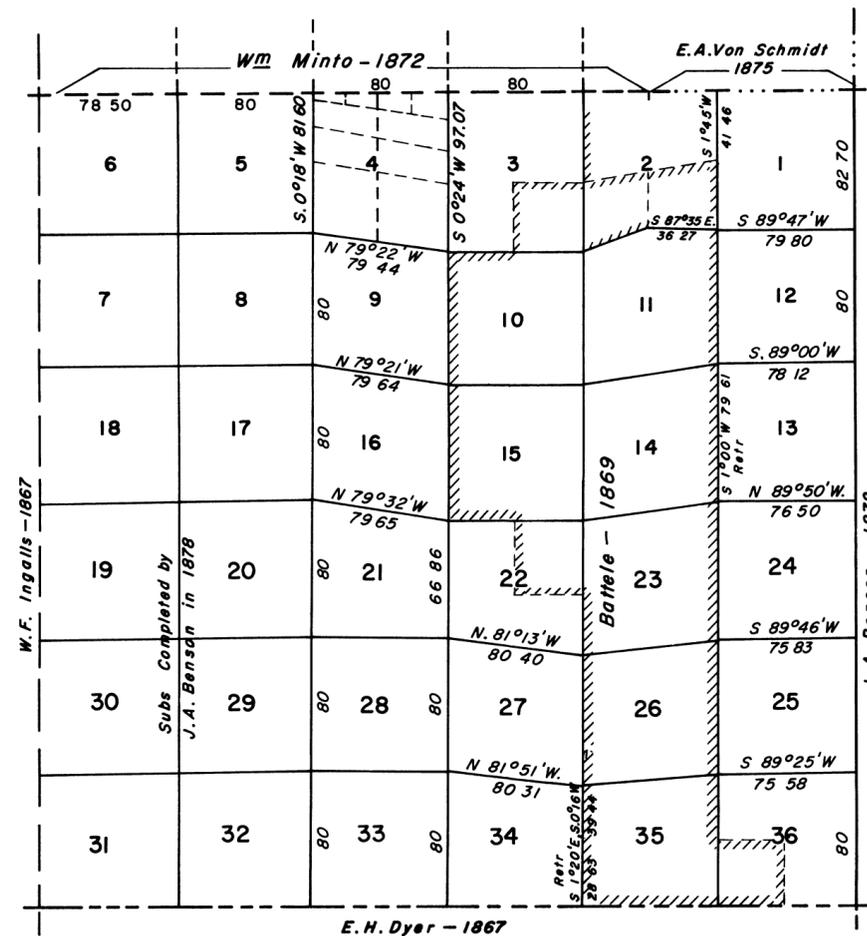


Figure 2b - Benson's Completions, 1878

SUBDIVISION OF ELONGATED SECTION 4

Conditions Found on the Ground

Figure 3 illustrates the record dimensions of section 4. The distances shown in parentheses have been added.

Upon retracement of the lines of section 4 and the control lines between sections 3 and 10 and between sections 9 and 10, considerable information was developed.

The corner of sections 3, 4, 33 and 34 was monumented with an iron pipe, wood post and mound of stone. There were two apparent bearing trees, not original, with opened blazes. The point was well correlated to the original nearby calls of topography - Concaw Creek to the east and a ravine to the north. This corner was readily acceptable.

The ¼ section corner of sections 4 and 33 was monumented with the stump of the original corner tree determined from one remaining original bearing tree.

The corner of sections 4, 5, 32 and 33 was monumented with an iron pipe and two remaining original bearing trees.

The corner of sections 9, 10, 15 and 16, determined from two original bearing trees, had been perpetuated with an iron pipe set by Bumgarner.

The point for the ¼ section corner between sections 3 and 10 was marked by two different monuments. One point was monumented with an iron pipe at the position described by County Surveyor McCoy in 1914. This point was witnessed by two rootholes, each near the 1869 Battele record values and conforming to the 1914 McCoy record. The point was also witnessed by the remains of two sawed pine stumps, one of which contained marks scribed by McCoy and in agreement with his record. The other monument was at a point 0.295 chains south and 0.055 chains west of the iron pipe set by McCoy. It was a concrete monument set by surveyor Hamby in 1963. Hamby's map does not indicate how he determined this point.

A concrete post set by Hamby in 1963 was found in the vicinity of the corner of sections 3, 4, 9 and 10. No evidence of the original corner was found. Neither the Battele notes nor the Benson notes described this corner. Presumably Battele set a monument but did not describe it at all. Hamby's map indicates that he placed his concrete monument on a line extended from the corner of sections 2, 3, 10 and 11 thru his ¼ corner of sections 3 and 10 an equal distance. His ¼ corner of sections 3 and 10 thus being at midpoint on the line.

Near the point for the ¼ section corner of sections 3 and 4, evidence of two possible corner positions was recovered. One piece of evidence was an iron pipe set by Bumgarner in 1957. As stated in the history, Bumgarner's map indicated a found corner but he did not show a description. A fence intersection is 1.551 chains south and 0.675 chains west of the iron pipe. The old, wire fences extended northerly, easterly and N. 79° W. From the fence corner a sawed pine stump, 21 inches in diameter, bears N. 79½° W., 20½ links distant. A blaze on this stump under 45 years of overgrowth had the scribe marks ¼ SBB facing the fence

corner. The Benson record for this corner calls for an 8-inch nut pine, N. 65° E., 5 links, and an 8-inch black oak, S. 62° W., 21 links. The scribe marks are not similar to any found at other corners. There is no remaining evidence of the original (Benson) bearing trees, and there are no nearby calls of topography.

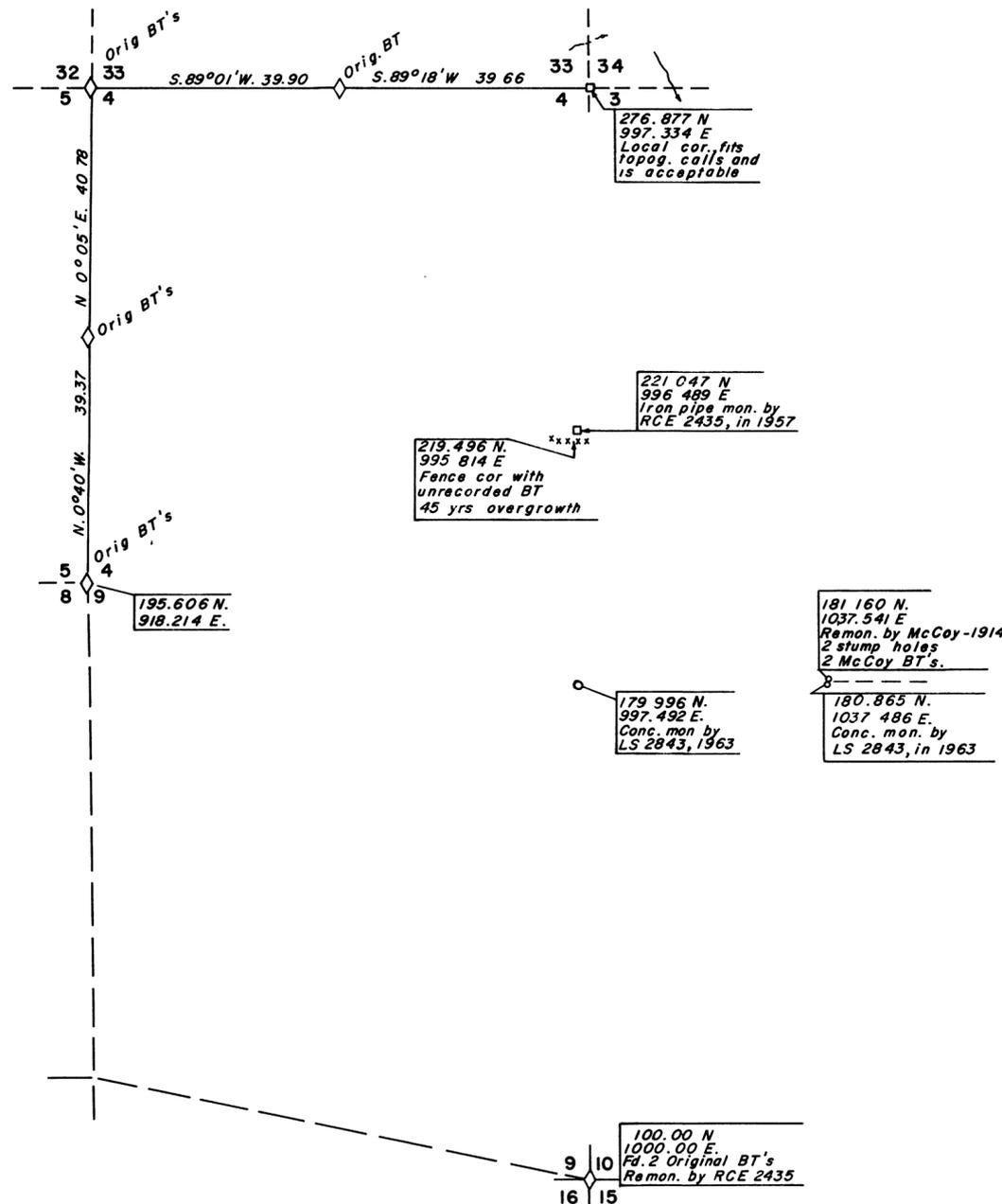


Figure 4 - Corner Evidence with Coordinates

The ¼ corner of sections 4 and 9 was a lost corner. Thorough search revealed no evidence at all of the two pine bearing trees described in the Benson notes.

The corner of sections 4, 5, 8 and 9 was monumented with an iron pipe and witnessed by

two original tanoak bearing trees, called "nutmeg" by Benson.

The ¼ section corner of sections 4 and 5 was monumented with an iron bar, witnessed by the remains of two original bearing trees.

Figure 4, illustrates the conditions found, as described above, with relative coordinates of the pertinent points based on the original corner of sections 9, 10, 15 and 16.

Preliminary Statement of the Problem

Before any decisions on restoration could begin, the surveyor had to resolve all corner identification problems using the best available evidence.

After the original corner identification is complete, the surveyor must decide whether or not the monuments set by local surveyors are within acceptable distances from properly restored positions.

Regulations

This survey illustrates the following sections of the Manual of Surveying Instructions, 1973:

6-25 to 6-28	Dependent resurvey
4-41	Elongated sections
7-8, 7-9, and 7-12	Subdivision of sections

Legal Constraints

While not a direct parallel to this problem, the land decision in 50 LD 402 had a distinct relation to this situation. 50 LD 402 is briefed as follows:

Algoma Lumber Company v. Kruger

The Algoma Lumber Company had a private survey made to establish the line between their section 13 and section 24 which was protracted on the original plat as running due west to a lake. The private survey line actually ran S. 89° 39' W., instead of West.

A later survey by the General Land Office placed the line S. 89° 57' W., and parallel to subdivisional lines to the south. The Government line intersected some buildings.

It was held in the Department hearing that the survey line ran by the local surveyor was executed within the allowable limit of error. It was further held that "No reason is apparent why the work of a local surveyor performing a service omitted by the Government should be held to closer scrutiny than that required in respect to official public-land surveys." The local survey mark was confirmed.

SUBDIVISION OF ELONGATED SECTION 4

Final Statement of the Problem

The surveyor must identify original corners and then determine the positions of the recovered corners as well as the private survey monuments involved. Once all the positions are known, a computation will determine whether or not the private survey corners are in agreement with positions determined by standard BLM practice.

If a private corner does not agree in position, the surveyor must make a judgmental determination as to acceptance or rejection of that particular corner. This requires serious consideration because one private surveyor's erroneous monument may have been the basis of proportionment for a later private survey.

Subdivision of an elongated section will require special consideration for marking the 1/16 section corners.

Solution

The cadastral surveyor visited Mr. Bumgarner. Mr. Bumgarner was 83 years of age but easily recalled his work in section 3. An affidavit was prepared and signed by Mr. Bumgarner, in which

he swore that in April of 1957 he found the remains of the black oak bearing tree, with scribing visible, and a rotted pine log in the proper position of the Benson record at the 1/4 section corner of sections 3 and 4. Therefore the iron pipe at this corner was accepted as marking the original corner point. A thorough search of the Butte County records and local inquiry revealed no evidence of who marked the pine stump near the old fence corner.

The 1914 McCoy location was accepted for the 1/4 corner of sections 3 and 10. Even though only faint root holes now remain where the original Battele bearing trees once stood, the McCoy marked trees still remain. The area has been logged for many years and there was much mining activity at the time of the original surveys. The McCoy record constituted a valid perpetuation of the original. The concrete monument set by Hamby in 1963 was tied in but no further consideration was given to it.

The Hamby concrete monument near the corner of sections 3, 4, 9 and 10 was rejected as invalid. This point was apparently determined 80 chains north of the corner of sections 9, 10, 15 and 16 and about 80 chains west of the corner of

sections 2, 3, 10 and 11. There is no indication on Hamby's maps that it was based on the official records by any acceptable method.

The corner of sections 3, 4, 9 and 10 was restored by double proportionate measurement using the original corner of sections 4, 5, 8 and 9, the original corner of sections 9, 10, 15 and 16, and the described McCoy and Bumgarner perpetuations of the 1/4 section corner to the east and north. The latitudes and departures were based on the original field notes. Benson's notes for the line between sections 4 and 9, read in part:

S. 79 1/2° E. on random line bet. secs. 4 & 9
40.00 set temp 1/2 sec. cor.
79.44 Intersect N. & S. line 19 lks. North of cor. to secs. 3, 4, 9 & 10 from which cor. I run N. 79° 22' W. on a true line bet. secs. 4 & 9.
39.72 set post for 1/2 sec. cor. ... (marked two yellow pine bearing trees)
79.44 The cor. of secs. 4, 5, 8, & 9.

In his original survey, Benson made no correction in his true line distance for the 19 links of falling. By the field notes, the random line departure between sections 4 and 9 is 78.11 chains. The true line distance should have been 79.47 chains. The plat shows an actual error of 3 links in the length of the true line and if used as the basis of proportioning, this would introduce an error of 2 links in departure in the position of the corner of sections 3, 4, 9 and 10.

A further example of this type of omission is in Benson's record of the east 1/2 mile between sections 2 and 11. In 1869 Battele had set the 1/4 corner of sections 2 and 11 and the corner of sections 1, 2, 11 and 12. The east 1/2 mile was unsurveyed. Benson surveyed that half mile in 1878. His notes read in part:

From the cor. to secs. 1, 2, 11 & 12 I run West, on a random line bet. secs. 2 & 11.
36.27 To a point 152 lks. South of 1/2 sec. cor. bet. secs. 2 & 11 from which cor. I run S. 87° 35' E. on a true line bet. secs. 2 & 11.
36.27 The cor. to secs. 1, 2, 11 & 12.

The record departure for the half mile is 36.27 chains. The stated true line length shown on the plat computed at a bearing of S. 87° 35' E., would dictate a departure of 36.24 chains. The true line should have been S. 87° 36' E., 36.30 chains.

Benson's work would have been executed under instructions from the Manual of Surveying Instructions, 1855. In reference to random lines that manual reads, "...and stakes set at the trial, or random line at every ten chains, to enable the surveyor on his return to follow and correct the trial line, and establish therefrom the true line." The surveyor therefore was not expected to actually rechain the line on return although he could have done so.

The plat and field notes are a unit to be used together and never separately. In so doing the obvious errors, or conflicts, can usually be resolved and the correct data used to restore lost corners.

The 1/16 80 section corners on the east and west boundaries of section 4 were established at proportionate positions based on the Benson plat. The north 1/16 section corners were not established because they did not control the position of Federal lands.

The east 1/16 and west 1/16 section corners on the north boundary of section 4 were established at midpoint positions between the 1/4 section corner and the section corners.

Section 4 was subdivided in the normal manner, the center 1/4 section corner being established at the intersection of the centerlines, but was not monumented. The center 1/16 80 corner was established on the north-south centerline at proportionate position, the record distance being a mean of the north "half miles" along the east and west boundaries, i.e., 49.335 chains, with the line between lots 2 and 3 being a record length of 9.335 chains. At the intersection of the north-south centerline of the NE 1/4 with the east-west 1/16 80 line, the east 1/16 80 corner was

established. The west 1/16 80 corner was established in a like manner. The northeast 1/16 and northwest 1/16 section corners were not needed and therefore not established. The west half of lots 5 and 8 were unpatented and were given new lot numbers (9 and 10) and new acreage on the plat.

Figure 5 is a copy of the plat which was accepted August 20, 1969.

TOWNSHIP 22 NORTH, RANGE 4 EAST, OF THE MOUNT DIABLO MERIDIAN, CALIFORNIA. DEPENDENT RESURVEY AND SUBDIVISION OF SECTION 4

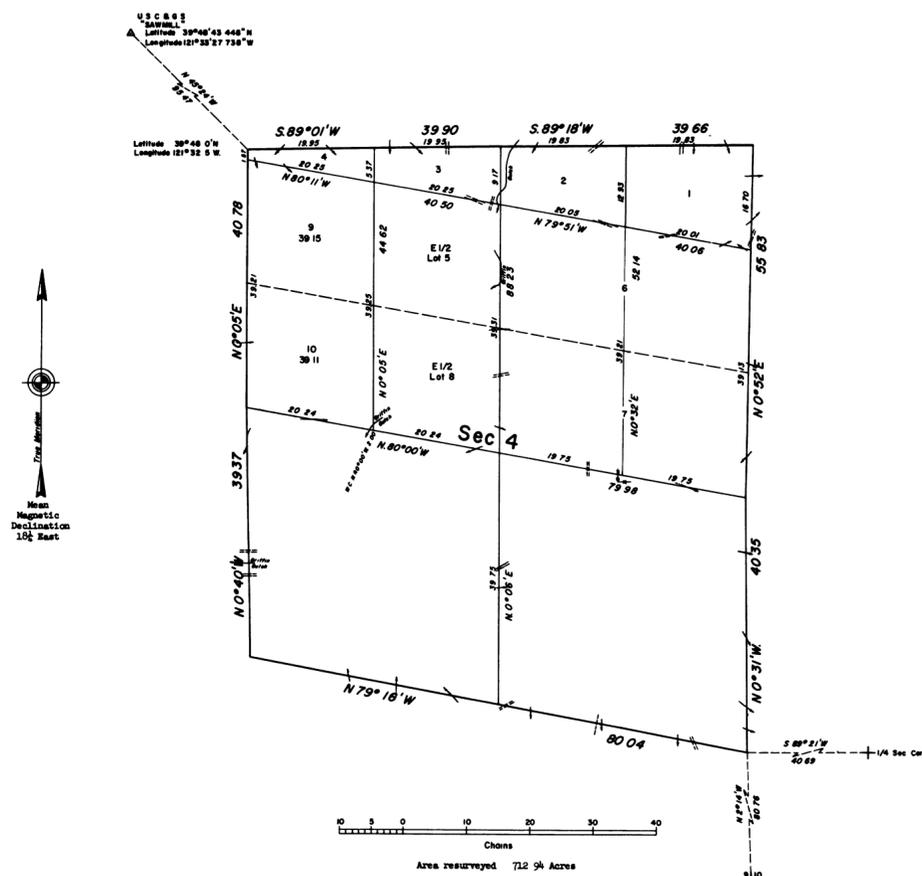
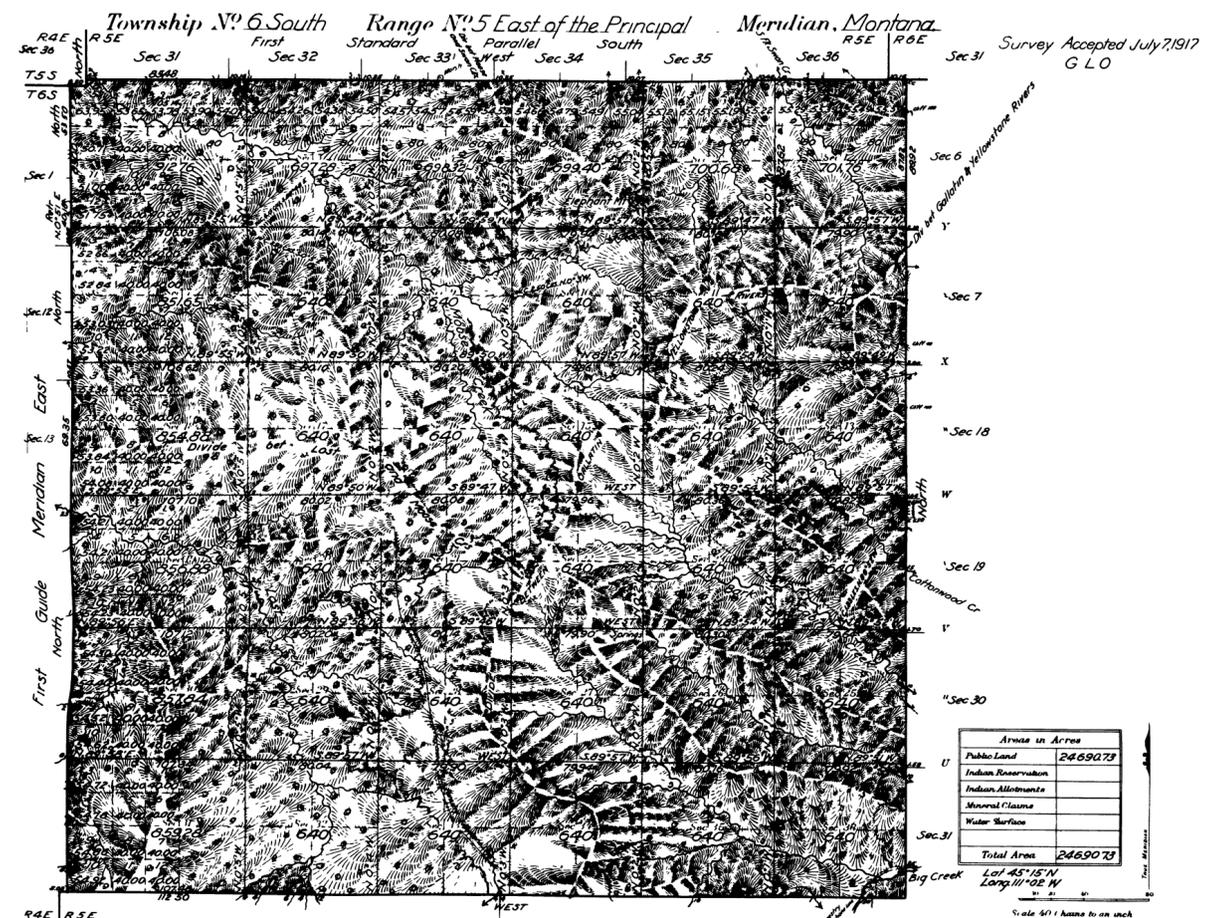
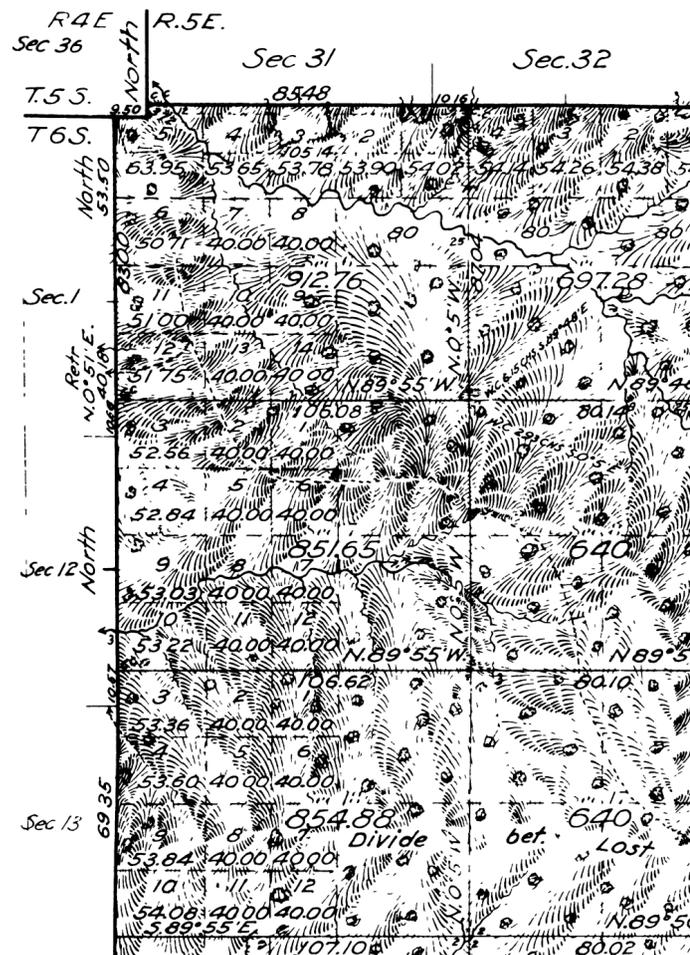
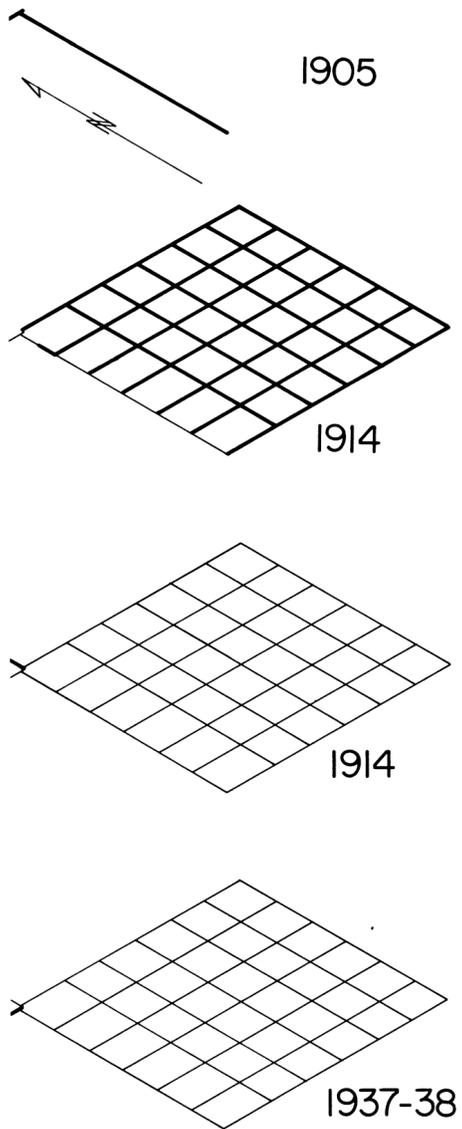


Figure 5 - Accepted Plat

SUBDIVISION OF ELONGATED SECTION 6



History of Surveys

- 1905 Ralph H and Howard C Bushnell surveyed the west boundary, (the First Guide Meridian East) and set the closing corner of Tps. 6 S., Rs 4 and 5 E., at a calculated distance. They then ran east, 9.50 chains, established the standard southeast corner of T. 5 S., R 4 E., and then ran West, establishing the First Standard Parallel South.
- 1914 F.L. Cumming and C.C. Pidgeon surveyed the south and east boundaries of the township. They surveyed the First Standard Parallel South, running West to a "closing corner" which they established at a point 3.72 chains north of the standard southeast corner of T. 5 S., R 4 E. Cumming and Pidgeon then subdivided T. 6 S., R 5 E., and retraced the south half mile of the east boundary of section 1, T. 6 S., R 4 E. The Cumming and Pidgeon plat was approved December 14, 1916, figure 1.
- 1914 Cumming and Sweeny surveyed the east boundary of T. 5 S., R. 4 E., north from the standard southeast corner of that township.
- 1937-38 W.R. Bandy rehabilitated the standard southeast corner of T. 5 S., R. 4 E., and resurveyed a portion of the standard parallel along the south boundary of that township, returning a distance of 10.13 chains to the closing corner of Tps. 6 S., Rs. 4 and 5 E.

Survey Designated	By Whom Surveyed	Group	Amount of Survey	When Surveyed
Subdivisions	F.L. Cumming & C.C. Pidgeon	17	62 12 01	June 29, 1914, Aug 17, 1914
Connections	F.L. Cumming		72 56	July 30, "
Standard Parcel	F.L. Cumming		6 15 64	July 24, "
Guide Meridian	F.L. Cumming		3 63 32	Aug 19, " Aug 10, "
East Body	Cumming & Pidgeon		6 07 62	July 18, " July 12, "
South	F.L. Cumming		6 27 49	Aug 5, " "
Guide Mer. Ref.	F.L. Cumming		40 18	Aug 17, " " 17, "
Guide Mer.	R.H. & H.C. Bushnell	183	53 30	July 24, 1905, July 29, 1905
Standard Parcel				

The above map of Township No. 6 South, Range No. 5 East of the Principal Meridian, Montana, is strictly conformable to the field notes of the survey thereof on file in this office which have been examined and approved.

U.S. Surveyor General's Office
Helena, Montana, Dec. 14, 1916.

Henry Gerhart
Surveyor General

Figure 1 - Original Plat

SUBDIVISION OF ELONGATED SECTION 6

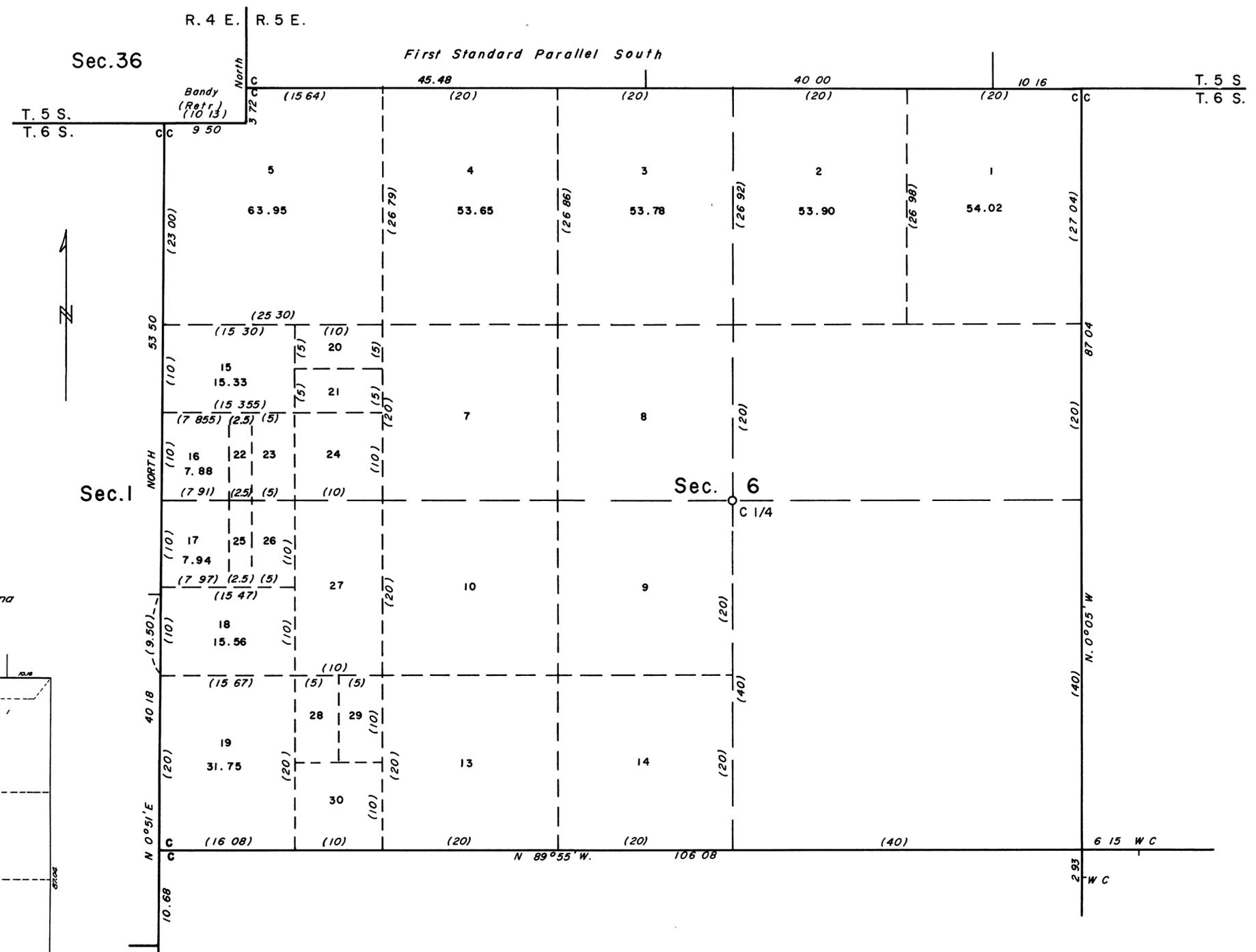


Figure 3 - Parentetical Distances

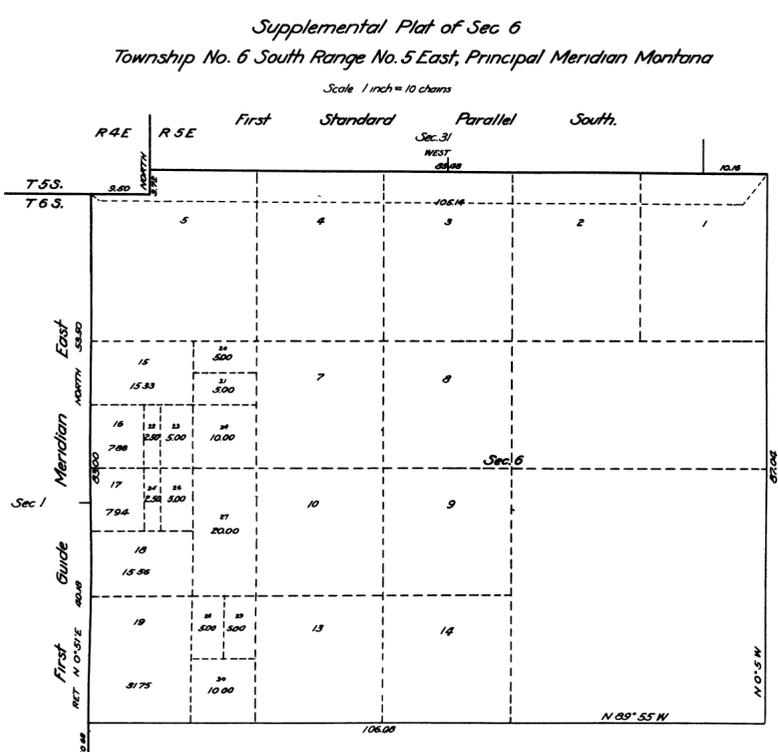


Figure 2 - Supplemental Plat

This supplemental plat correctly shows the subdivision of lots 6, 11 and 12, Sec 6 T. 6 S. R. 5 E., Prin Mer Mont, plat approved Dec 14, 1916, for the purpose of accommodating Bogeman 015303 of Edwin J. Durman, which embraces portions of said lots.
 Prepared in accordance with Commissioners letter "E" NUL, dated June 17, 1924.
 U.S. Surveyor General's Office
 Helena, Mont July 3, 1924
John W. Bullard
 U.S. Sur. Genl

SUBDIVISION OF ELONGATED SECTION 6

Reasons for Request of this Survey

On July 6, 1920, Edwin J. Durnam made application for entry on lands located in lots 6, 7, 10, 11, 12 and 13 of section 6. Section 6 is an elongated section and the lands applied for were not susceptible to an aliquot part description even though they were basically aliquot parts. On July 3, 1924, a supplemental plat of section 6 was approved, relotting lots 6, 11 and 12, as shown in figure 2. On January 8, 1926, patent was issued to Durnam for lots 21, 22, 23, 24, 25, 26, 27, and 29, plus the west half of lots 7, 10 and 13, section 6. No ground survey was made. These are the only patented lands in section 6, the remainder of the section is public lands within the Gallatin National Forest. The Forest Service requested a resurvey and subdivision-of-section survey to mark the boundaries of the patented lands, and therefore the forest boundary.

Special Instructions

Special Instructions for Group 513, Montana, were prepared on October 1, 1958. They provided for dependent resurveys and subdivision of sections in several townships, including T. 6 S., Rs. 4 and 5 E. The field work was assigned in two "stages" and began on May 25, 1959. This discussion is limited to the boundaries and subdivisions of section 6.

Conditions Found on the Ground

All of the original corners were recovered. The four closing corners of section 6 were all recovered on the controlling boundaries. The west boundary was resurveyed in 1959. The remaining boundaries and subdivisional lines were resurveyed in 1964. Controlling lines were resurveyed to assure that the closing corners were, in fact, on the line being closed upon. The resurvey was in close conformity with the record, i.e., no distortion existed.

Preliminary Statement of the Problem

The surveyor must establish the necessary corners on the north, south and west boundaries of the section, subdivide section 6 to the extent necessary to define the Forest boundary and monument and mark the corners, based on the approved plats shown in figures 1 and 2.

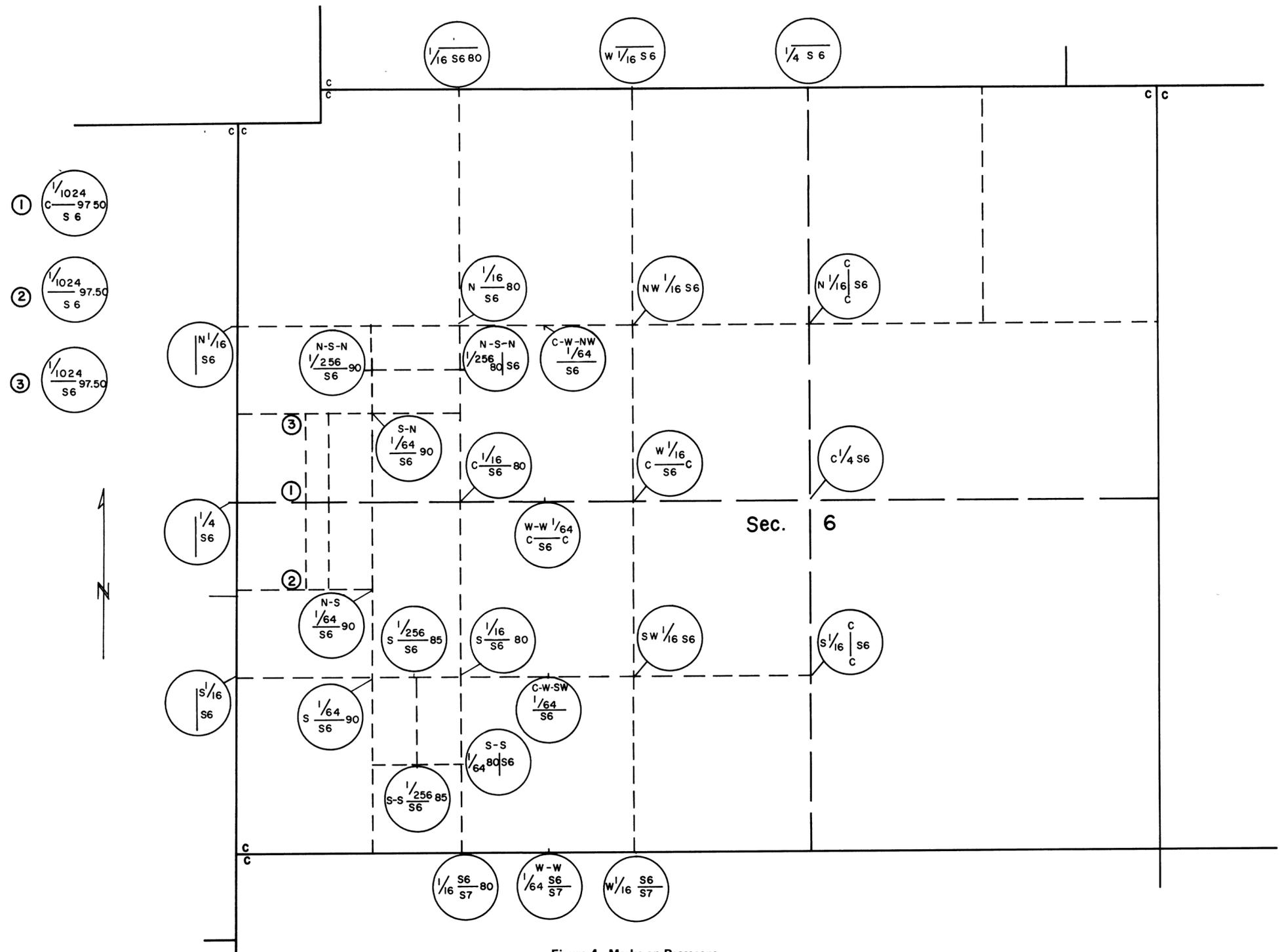
Regulations

This survey illustrates the application of the following sections of the Manual of Surveying Instructions, 1973:

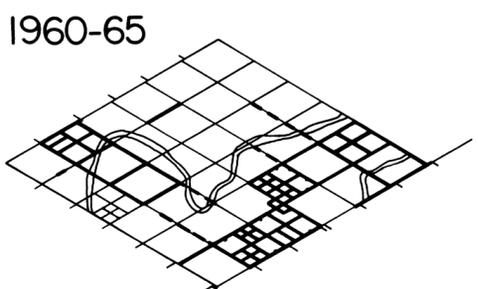
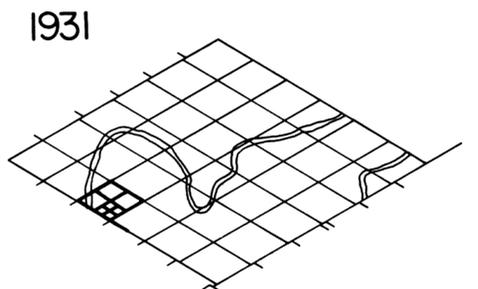
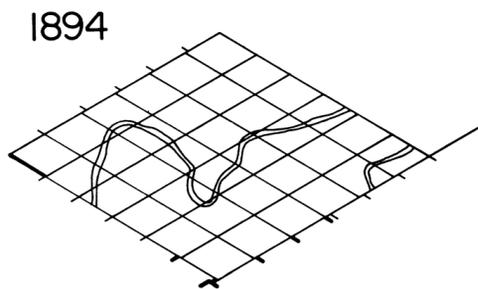
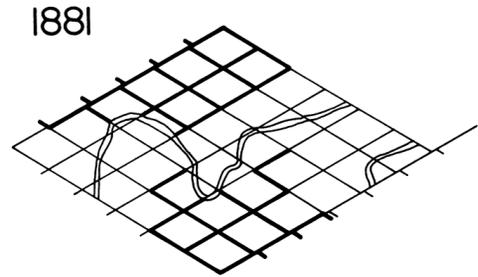
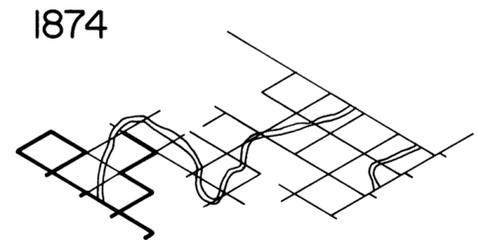
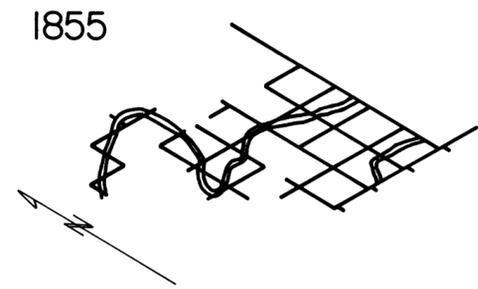
- 3-83 Elongated sections
- 3-85 to 3-87, 3-89, 3-90 to 3-92 Subdivision of sections
- 4-38 to 4-41 Marks on subdivision-of-section and elongated section corners

Final Statement of the Problem

The surveyor must determine the parenthetical distances applicable to the lots and lot areas in section 6 on which to base the proportioning of the necessary corners. He must subdivide the section to the extent necessary to mark the Forest boundary and properly mark the corner monuments.



SUBDIVISION OF SECTION WITH BROKEN CENTERLINE



History of Surveys

- 1855 Harvey Gordon and Charles T Gardner surveyed the east three miles of the south boundary (the Fifth Standard Parallel South), the east boundary, a portion of the subdivisional lines and meandered the Umpqua River through the township. The north half mile of the west boundary of section 18 was also surveyed, and outlying areas in section 18 protracted on the Gordon and Gardner plat, approved February 20, 1856, see figure 1
- 1856 Dennis Hathorn surveyed the boundaries of approximately twenty Donation Land Claims within the township. These claims are not directly pertinent to this discussion
- 1874 William H Byars surveyed the north four miles of the west boundary (resurveying the half mile of Gordon and Gardner's work), the boundaries of section 6, and the lines between sections 8 and 9, 8 and 17, 17 and 18, and 18 and 19. The northwest quarter of section 19 was protracted and listed as containing 161.64 acres. The Byars work was added to the Gordon and Gardner plat in blue ink and approved on August 20, 1875. This "composite" plat is shown in part in figure 2.
- 1881 William H. Byars completed the boundaries and subdivisional lines of the township, and resurveyed some of the previous Gordon and Gardner lines. The plat was approved on August 11, 1881, shown in figure 3.
- 1894 Elmer O. Worrick resurveyed the west boundary of section 6 and surveyed the line between sections 25 and 36, T. 22 S., R. 9 W., establishing a closing corner for those sections on the west boundary of section 30. This same year, Williams Whipple completed the surveys in T. 23 S., R. 8 W., and established closing corners along the west three miles of the south boundary
- 1931 George F Rigby dependently resurveyed the north half mile of the west boundary of section 19, boundaries of section 18, and subdivided section 18.
- 1960-65 Portions of the boundaries of sections 5, 25, 27, and 29 thru 33 were dependently resurveyed; sections 5, 25, 27, 32 and 33 were subdivided; portions of Donation Land Claim boundaries were resurveyed, and several corners remonumented under Groups 350, 436 and 514, Oregon. During this same period, many original corners in the township were remonumented by the Douglas County surveyor.

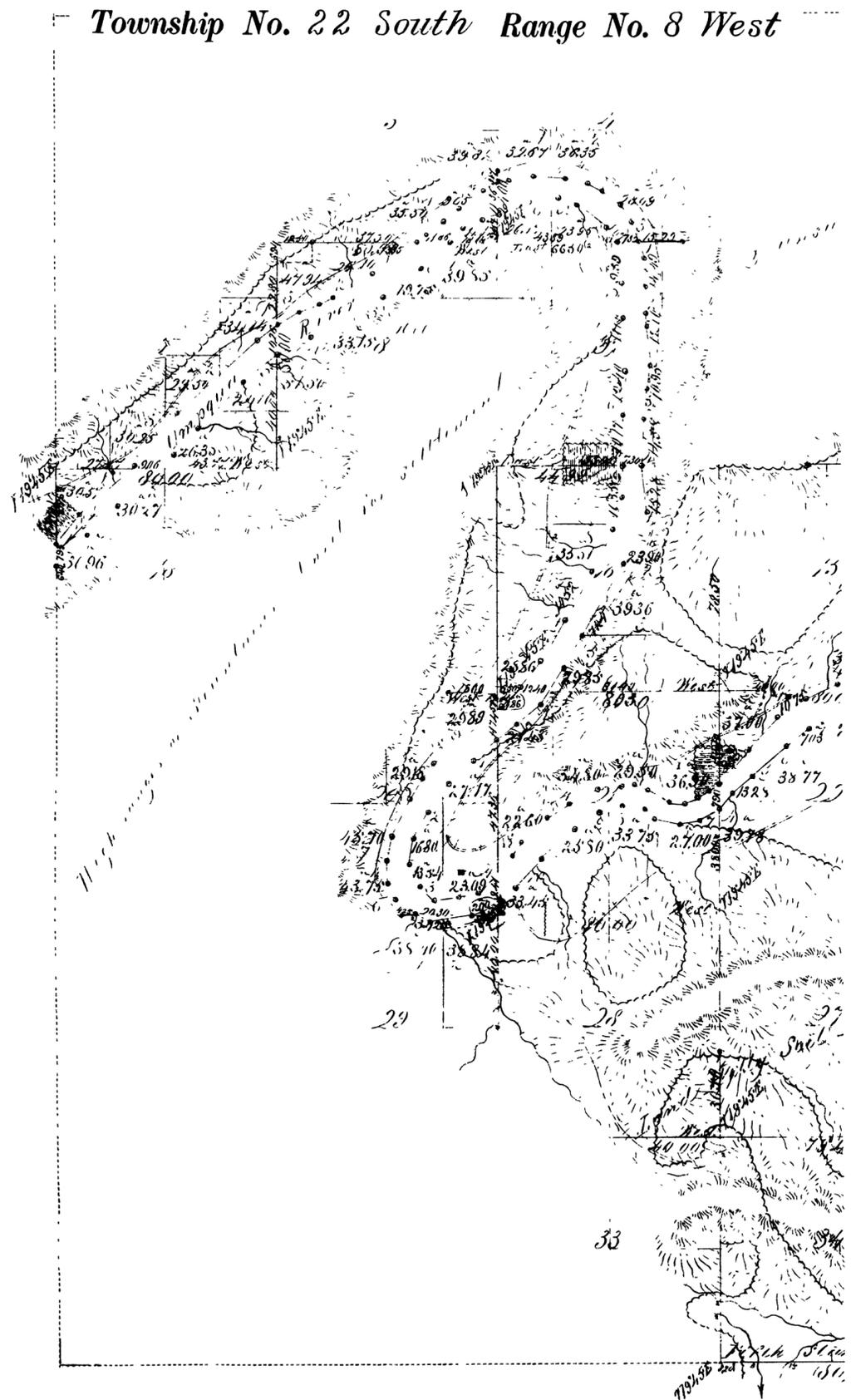
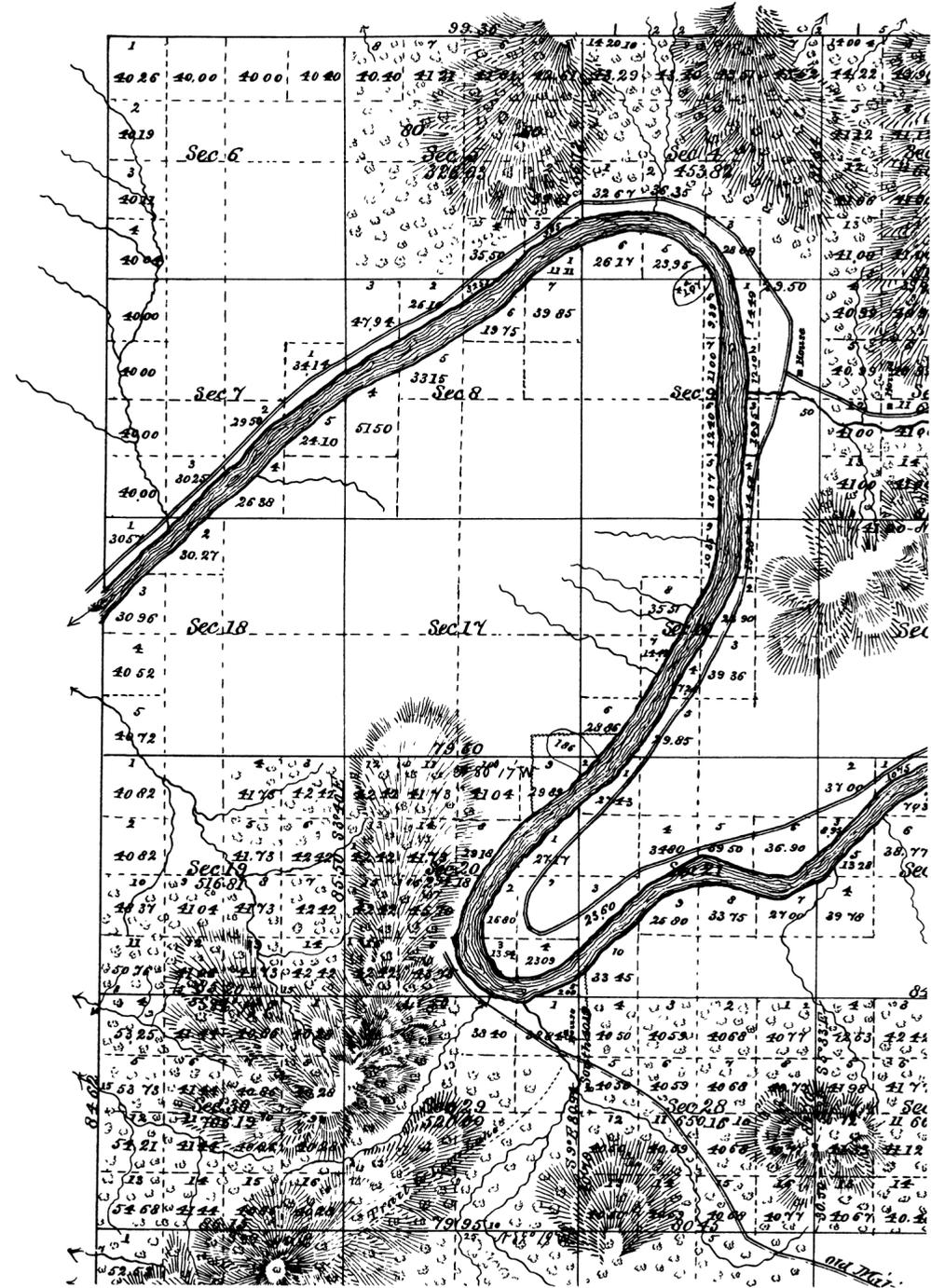
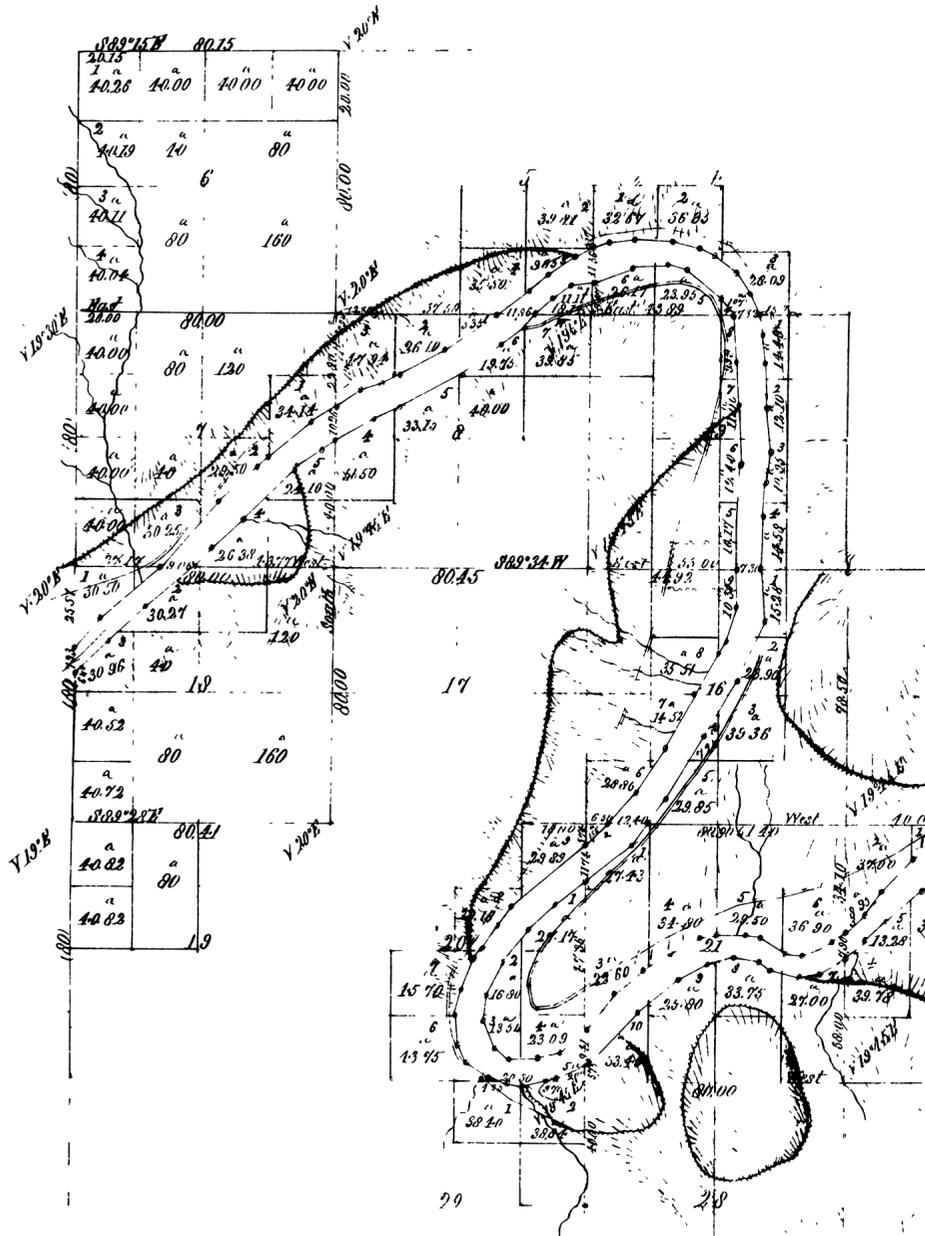


Figure 1 - Portion of 1856 Plat

SUBDIVISION OF SECTION WITH BROKEN CENTERLINE

Township 22 South, Range 8 West

Township No. 22 South Range No. 8 West



Lines	Contractor	No.	Contract Date	Amount Surveyed Miles (Chains, Links)	Commenced	Completed
Subdivisions Blue lines indicate old surveys	W.H. Byars	202	March 14th 1894	6 00 86	Oct. 29th 1894	November 1st 1894

Figure 2 - Composite Plat

Figure 3 - Byars Completions

SUBDIVISION OF SECTION WITH BROKEN CENTERLINE

Reasons for Request of this Survey

This resurvey and subdivision of sections was requested by the Coos Bay District Manager to facilitate the settlement of a timber trespass and to lay out timber sales. The subdivision of section 19 is necessary because lot 14 (the SE $\frac{1}{4}$ SE $\frac{1}{4}$) was patented on January 27, 1929, "according to the official plat of the survey of said land, returned to the General Land Office by the Surveyor General." The remainder of section 19 and part of the westerly half of section 29 are O. & C. lands. (These are Federal lands revested to the United States under the Act of June 9, 1916, from the Oregon and California Railroad.) Sections 20 and 30 are all patented.

Special Instructions

Special Instructions for Group 595, Oregon, were prepared on August 3, 1965. They provided for the dependent resurvey of the boundaries of sections 19 and 29 and subdivision of both sections to the extent necessary to delineate the Federal lands within those sections. Special Instructions for Group 657, Oregon, were prepared on September 26, 1967. They provided for the resurvey of section 11. Both groups were eventually written in one set of field notes and drawn on one plat. Field work on Group 595 began on August 16, 1965.

Conditions Found on the Ground

Due to the piecemeal progress of the original surveys and later dependent resurveys, a careful examination of the field notes was made, revealing the following facts relating to the resurvey and subdivision of sections 19 and 29:

- Gordon and Gardner surveyed the line between sections 20 and 29, running west. They set a meander corner at 9.70 chains, another meander corner at 30.00 chains (both on the left bank of the Umpqua River), and terminated the line at 34.25 chains at the foot of a bluff.
- In 1881, Byars ran east between sections 20 and 29, intersecting the river at 41.50 chains. He could not find the Gordon and Gardner meander post or witness point, so he set a meander corner of his own. Byars returned west on a true line but did not establish a $\frac{1}{4}$ section corner. Thus the line(s) between sections 20 and 29 were never tied together, no $\frac{1}{4}$ section corner was ever set, but the Byars plat (figure 3) protracts the centerline of section 29 to a midpoint position and the areas are based on an 80 chain mile.

- In 1881, Byars ran north between sections 32 and 33. He established the corner of sections 28, 29, 32 and 33 at 80 chains, then ran north on a random line between sections 28 and 29. At 80.94 chains, he fell 6.25 chains east of the Gordon and Gardner corner of sections 20, 21, 28 and 29. He then ran south (on true line) and at 40.15 chains intersected the Gordon and Gardner $\frac{1}{4}$ section corner. His notes then say he ran S. 5 $^{\circ}$ 09' E., and at 80.94 chains was back at the corner of sections 28, 29, 32 and 33. His plat shows S. 9 $^{\circ}$ E., at 40.79 chains.

This would be impossible. The south half mile should have measured along the hypotenuse, S. 8 $^{\circ}$ 43' E., 41.27 chains. If the $\frac{1}{4}$ section corner is lost, it must be restored by an irregular boundary adjustment, based on the field notes as the cardinal equivalent and not on the plat.

- Byars surveyed the west boundary of section 19 and the line between sections 18 and 19 in 1874; the northwest $\frac{1}{4}$ of section 19 was protracted on the plat. In 1881 he surveyed the west boundary of sections 30 and 31 by extending the line south to an intersection with the Fifth Standard Parallel South, which he had extended west. He then ran north on his line, set the corner of sections 25, 30, 31 and 36 at 80 chains and placed the excess (4.62 chains) in the north half mile of the west boundary of section 30.

- In 1881 Byars ran north between sections 31 and 32, 29 and 30, setting his corners at 40 and 80 chain intervals, and established the corner of sections 19, 20, 29 and 30.
- After surveying the westerly portion of the line between sections 20 and 29 (item 2 above), Byars ran west on a random line between sections 19 and 30. At 85.20 chains he intersected his west boundary 5.10 chains south of the corner of sections 19, 24, 25 and 30. His notes then say that he ran S. 86 $^{\circ}$ 13' E., on true line, set the $\frac{1}{4}$ section corner at 45.20 chains and at 85.20 chains was back at the corner of sections 19, 20, 29 and 30; with that bearing and distance shown on the plat. The true line along the hypotenuse should have been S. 86 $^{\circ}$ 34' E., 85.35 chains. If the corner of sections 19, 20,

- 29 and 30 is lost, it must be restored on the basis of the field notes as representing the cardinal equivalent, not the plat.
- Next Byars ran north on a random line between sections 19 and 20. At 85.50 chains he fell 5.50 chains east of the corner of sections 17, 18, 19 and 20. He then says he ran S. 3 $^{\circ}$ 40' E., on true line between sections 19 and 20, set the $\frac{1}{4}$ corner at 42.75 chains and was back at the corner of sections 19, 20, 29 and 30 at 85.50 chains. The true line should have been S. 3 $^{\circ}$ 41' E., 85.68 chains. Lost corners along the fifth meridional line would likewise be restored on the basis of the random line, not the erroneous true line distance shown on the plat.
- The areas of lots in section 19 are unreconcilable with the distances returned by Byars in 1874 and 1881, shown on the plat, (figure 3). Figure 4 is

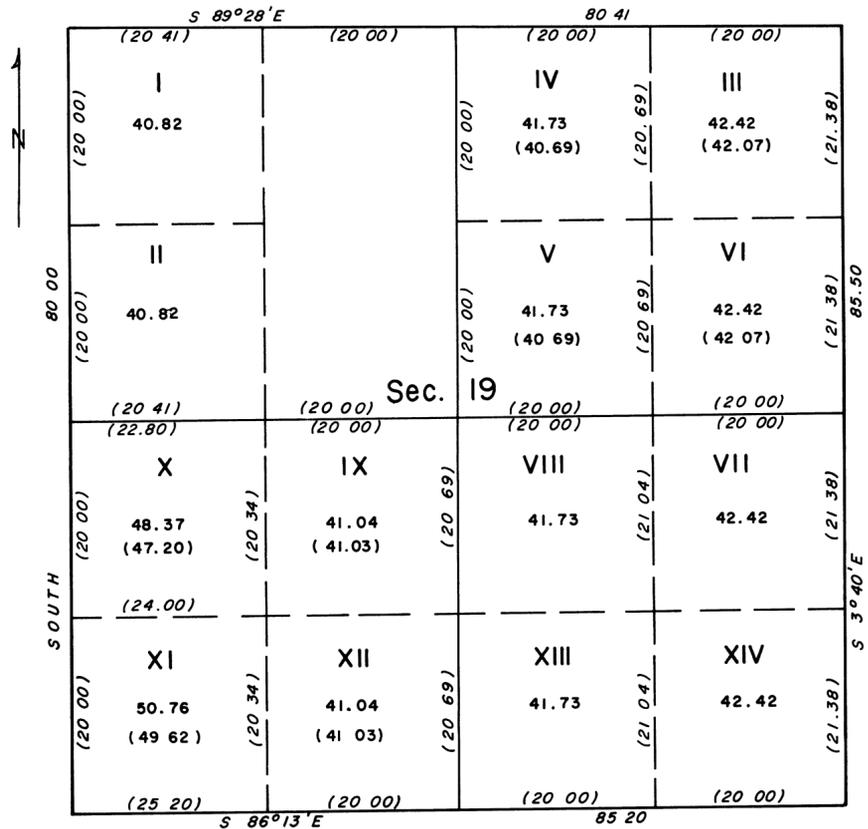


Figure 4 - Areas and Parenthetical Distances, Section 19

- an enlarged sketch of section 19 showing the original areas and distances. The parenthetical distances have been added and the correct area of the lot shown in parenthesis where the record plat is in error, i.e., lots 4 thru 6 and lots 9 thru 12.
- The exterior lines of sections 19 and 29 were retraced with thorough search for all original corners. Where necessary, additional section lines were retraced to obtain control for lost corners. The corners recovered during this and other assignments (relevant to this discussion) during the period 1960-65 are shown in figure 5.

Preliminary Statement of the Problem

The surveyor must restore the lost corners of sections 19 and 29, establish the necessary 1/16 section corners at proportionate positions and subdivide both sections to the extent necessary to mark the boundaries of O. & C. lands.

Regulations

This survey illustrates the application of the following sections of the Manual of Surveying Instructions, 1973:

- | | |
|--------------|--|
| 3-92 | Protection of areas and subdivisions as shown on the original plat |
| 5-25 to 5-28 | Double proportionate measurement |
| 5-29 | Three point control |
| 5-34 | Single proportionment along a range line |
| 5-36 | Irregular boundary adjustment |
| 5-45 | One point control |

SUBDIVISION OF SECTION WITH BROKEN CENTERLINE

Final Statement of the Problem

The surveyor must restore the lost corners, establish 1/16 section corners and subdivide sections 19 and 29. The subdivision of sections must be based upon the areas returned on the original plat (figure 3) to protect the bona fide rights of the patented lands, figure 5.

Solution

The corner of sections 19, 24, 25 and 30 on the west boundary was restored by single proportionate measurement between the recovered 1/4 corner of sections 19 and 24 and the corner of sections 30 and 31, based on the Byars record of the west boundary.

The closing corner of sections 25 and 36, T. 22 S., R. 9 W., had been remonumented by the County Surveyor and was recovered on true line, 6.20 chains north of the corner of sections 30 and 31. The 1/4 section corner of section 25, only, was established at midpoint between the closing corner and the corner of sections 19, 24, 25 and 30. The west 1/4 section corner of section 30 was not reestablished because section 30 is all patented lands.

The corner of sections 29, 30, 31 and 32 was restored by double proportionate measurement using the Byars field notes for the cardinal record length of the south half mile between sections 19 and 20.

Since the line between sections 20 and 29 had never been connected through by Byars, there was no basis for a double proportionate measurement of the corner of sections 19, 20, 29 and 30. That corner was restored by three point control, at proportionate position for latitude and at record distance in departure east of the restored corner of sections 19, 24, 25 and 30, based on the Byars field note (random) record. This resulted in a very close relationship between the record bearing and resurvey bearing of the east and south boundaries of section 19.

The line between sections 20 and 29 was resurveyed by one point control from both directions. The line was extended due west, the Gordon and Gardner record distance of 34.25 chains from the recovered corner of sections 20, 21, 28 and 29. The westerly portion was resurveyed by extending the line due east, the Byars record distance of 41.50 chains. The terminus of each segment was tied together by bearing and distance. The 1/4 corner of sections 20 and 29 was established on the Byars line at midpoint in departure between the corner of sections 20, 21, 28 and 29, and the restored corner of sections 19, 20, 29 and 30.

The 1/4 corner of sections 19 and 30 was restored by single proportionate measurement, based on the Byars random length of the line. The east 1/16 section corner was then established at midpoint between the 1/4 section corner and section corner.

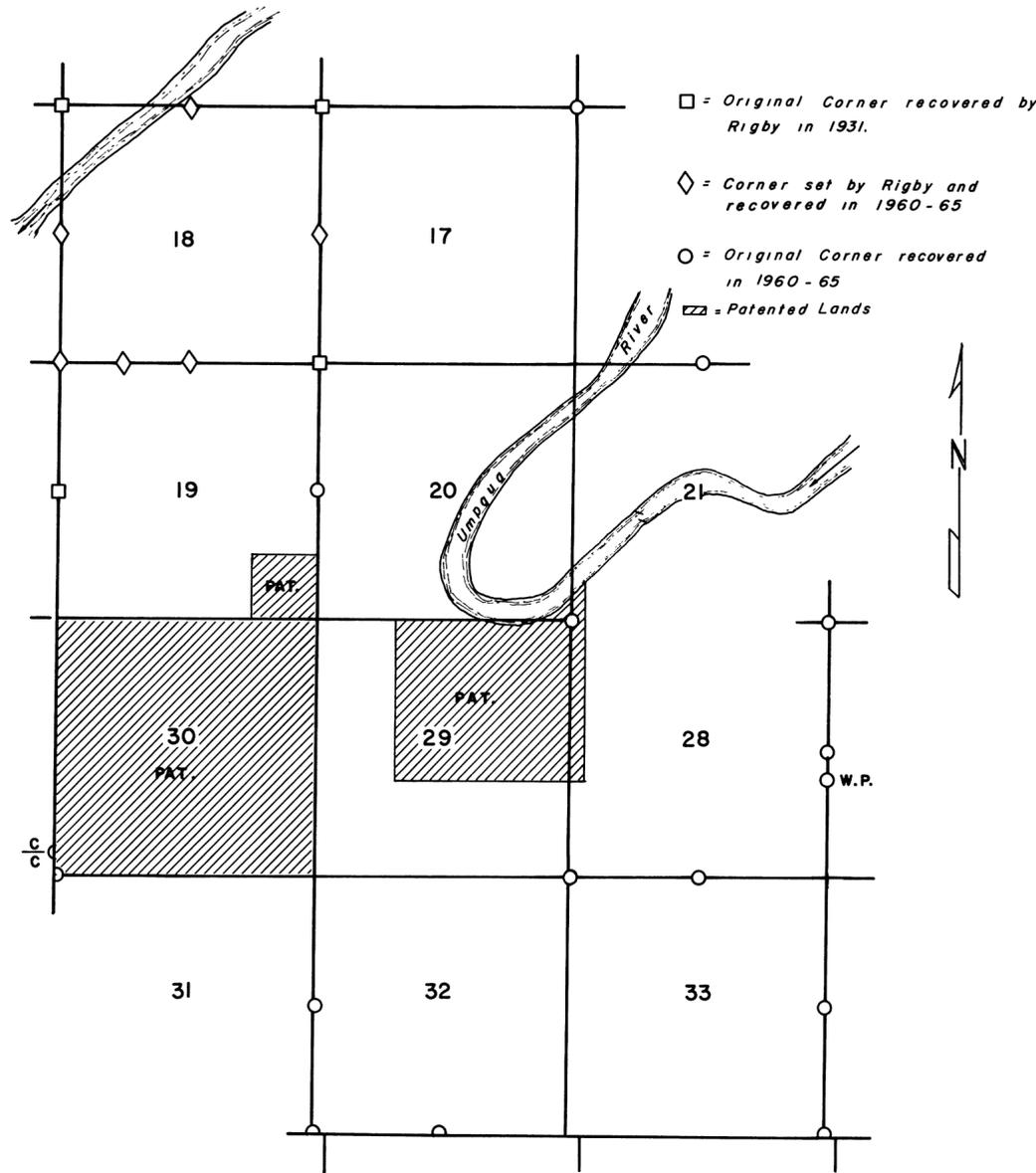


Figure 5 - Corner Recovery & Status

Section 29 was subdivided normally with straight centerlines.

Since lot 14, section 19 is patented, that section had to be subdivided in a manner which would "protect the areas" represented on the original plat, shown in figure 4. The NW 1/4 of section 19 had been protracted in 1874 with the centerlines of the section parallel to the north and west boundaries. When Byars completed the

section in 1881 with distorted south and east boundaries, the remaining three fourths of the section was lotted, creating an abnormal situation.

If section 19 was subdivided with straight centerlines connecting 1/4 section corners, the result would be approximately as shown in figure 6.

Section 19 was subdivided by surveying the north half of the N-S centerline southerly, parallel

to the north half of the west boundary and the E-W centerline easterly, parallel to the mean bearing of the west half of the north boundary. The center 1/4 section corner was established where these two lines intersected. The east half of the E-W centerline and the south half of the N-S centerline were then surveyed on connecting courses. The southeast quarter of the section was subdivided normally from 1/16 section corners established at midpoint positions.

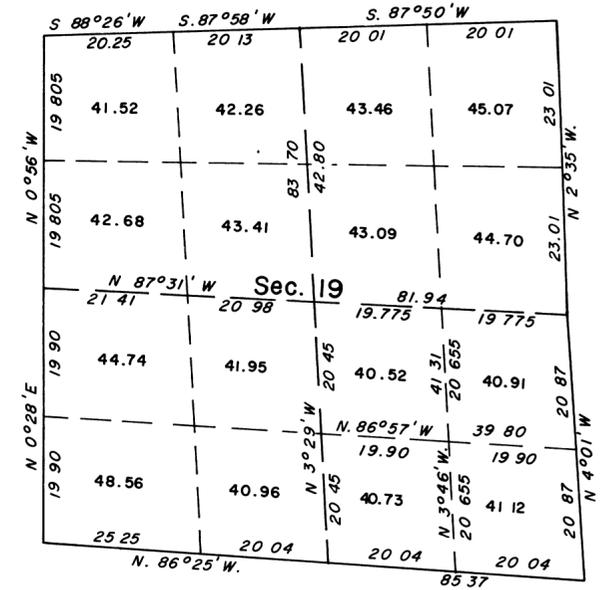


Figure 6 - Normal Subdivision, Section 19

Because of the areas shown on the original plat, a "double" center W1/16 section corner would be necessary if required to delineate public lands. In this survey, the center W1/16 section corners were not required on the ground. The areas of lots in the west half of the section and parenthetical distances are shown on the plat accepted July 25, 1969, figure 7.

SUBDIVISION OF SECTION WITH BROKEN CENTERLINE

TOWNSHIP 22 SOUTH, RANGE 8 WEST, OF THE WILLAMETTE MERIDIAN, OREGON.
DEPENDENT RESURVEY AND SUBDIVISION

Supplemental Topic

The Washington Office accepted the plat, and by memorandum dated July 25, 1969, made the following comment:

"We are accepting this plat with some reservations as to the method of subdivision of sec. 19. The plat of August 11, 1881, showed the centerlines of the section as straight lines although admittedly the areas could not be reconciled. The survey of the NW¼ could have been annulled, as returned on the plat of August 20, 1875, since the area is in public ownership. The effect on the SE¼ SE¼, the only privately owned portion, would be small if the subdivision had been regularly made."

Lot 14 would have been diminished by about 1.16 acres had the Washington Office's suggested procedure been used. The areas would have been approximately as shown in figure 6.

This plat represents a retracement and reestablishment of a portion of the west boundary, subdivisional lines and Donation Land Claim lines, T. 22 S., R. 8 W., Willamette Meridian, Oregon, designed to restore the corners in their true original locations according to the best available evidence, and, the subdivision of sections 19 and 29.

The lottings and areas are as shown on the plats approved February 20, 1856, December 23, 1859, August 11, 1881, and November 28, 1881, except as new or modified hereon.

Portions of the west boundary, subdivisional lines, and meander lines were surveyed by Harvey Gordon and Charles T. Gardner in 1855-56. The boundaries of the Donation Land Claims were surveyed by Dennis Hathorn in 1856. The survey of the township was completed by William H. Byars in 1874 and 1881. The north half mile of the west boundary of section 19 and the line between sections 18 and 19 were resurveyed by George F. Rigby in 1931. A portion of the subdivisional lines were dependently resurveyed by in 1960. In 1963-65, dependently resurveyed a portion of the subdivisional lines.

The resurvey and subdivision of sections 19 and 29 were executed by Cadastral Surveyors, August 16, 1965, to December 1, 1967, under Special Instructions dated August 3, 1965, and September 26, 1967, which provide for the surveys included under Group Nos. 595 and 657, Oregon, respectively.

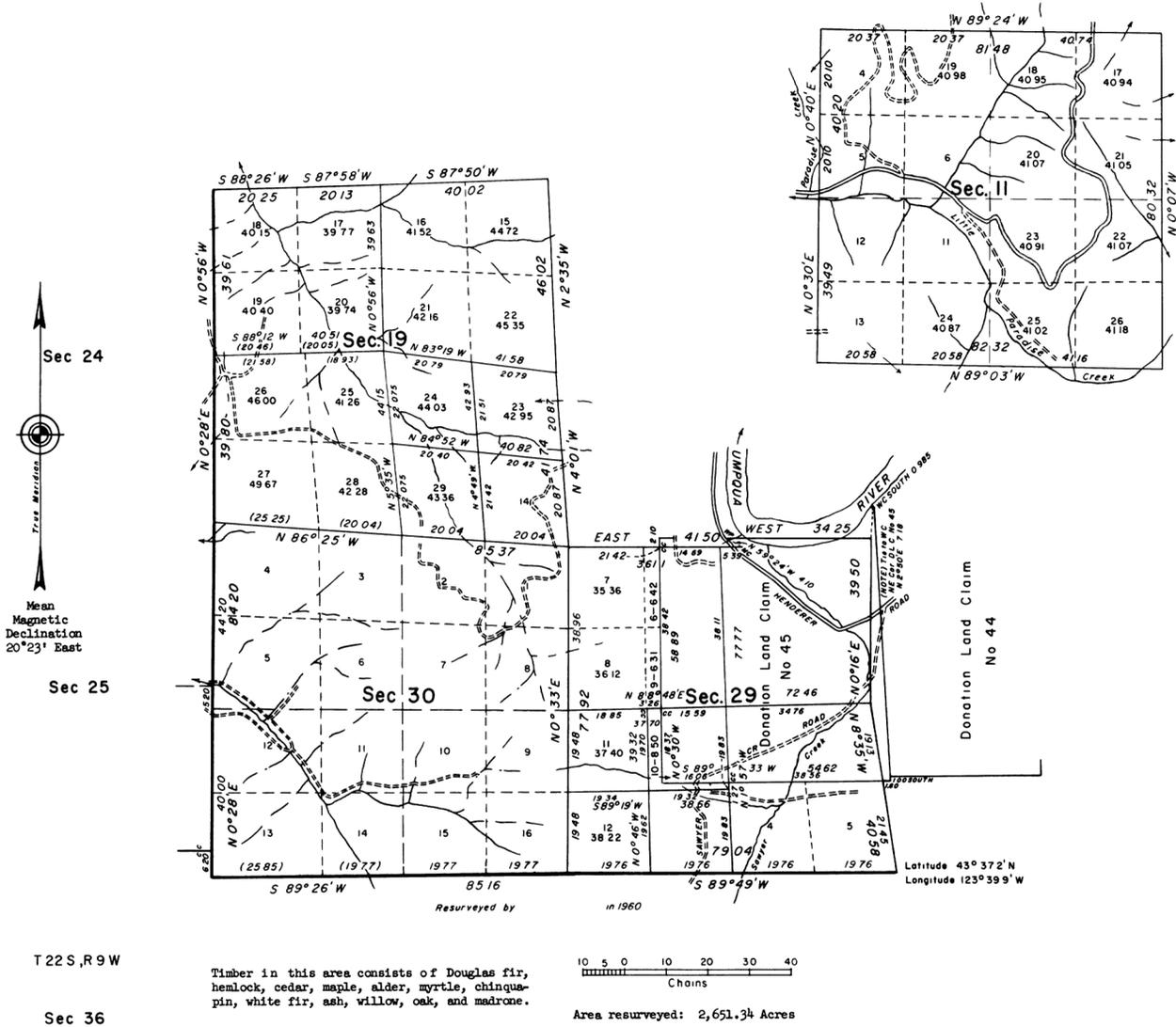
UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
Washington, D. C. July 25, 1969

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

Clark F. Lumm

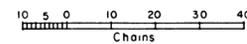
Chief, Division of Cadastral Survey



T 22 S, R 9 W

Sec 36

Timber in this area consists of Douglas fir, hemlock, cedar, maple, alder, myrtle, chinquapin, white fir, ash, willow, oak, and madrone.



Area resurveyed: 2,651.34 Acres

Figure 7 - Accepted Plat

SUBDIVISION OF SECTION WITH BROKEN CENTERLINE

Supplemental Topic No. 2

The areas returned on the Byars plat, approved August 11, 1881, were based on a "normal" subdivision of section 19, disregarding the protracted northwest quarter of the section as shown on the 1875 plat. The only parenthetical distances which will result in the areas shown on the 1881 plat, are shown in Figure 8. The length of the west half of the east-west centerline of the southwest quarter (25.13 chains) is unexplainable, except as a blunder by the draftsman.

Since the 1875 plat was approved with the northwest quarter protracted, containing 161.64 acres, and the remainder of the section was completed as containing 516.81 acres (the individual areas of lots 4 thru 14 total 517.81 acres) the original northwest quarter was not superseded by the 1881 plat. Under the policy of the Bureau of Land Management, the surveys or protractations of the O & C lands are not superseded. Those lands were once patented, are now revested, and did not revert to a full Public Domain status.

It would not be possible to "protect" the protracted NW¼ of section 19 and also "protect" lots 4 thru 14 at the same time when subdividing the section. The draftsman had manifestly blundered when constructing the 1881 plat. By holding the protracted northwest quarter and subdividing the section with a "broken" centerline, the representations on the 1881 plat are more closely adhered to than could be done in any other method of subdivision.

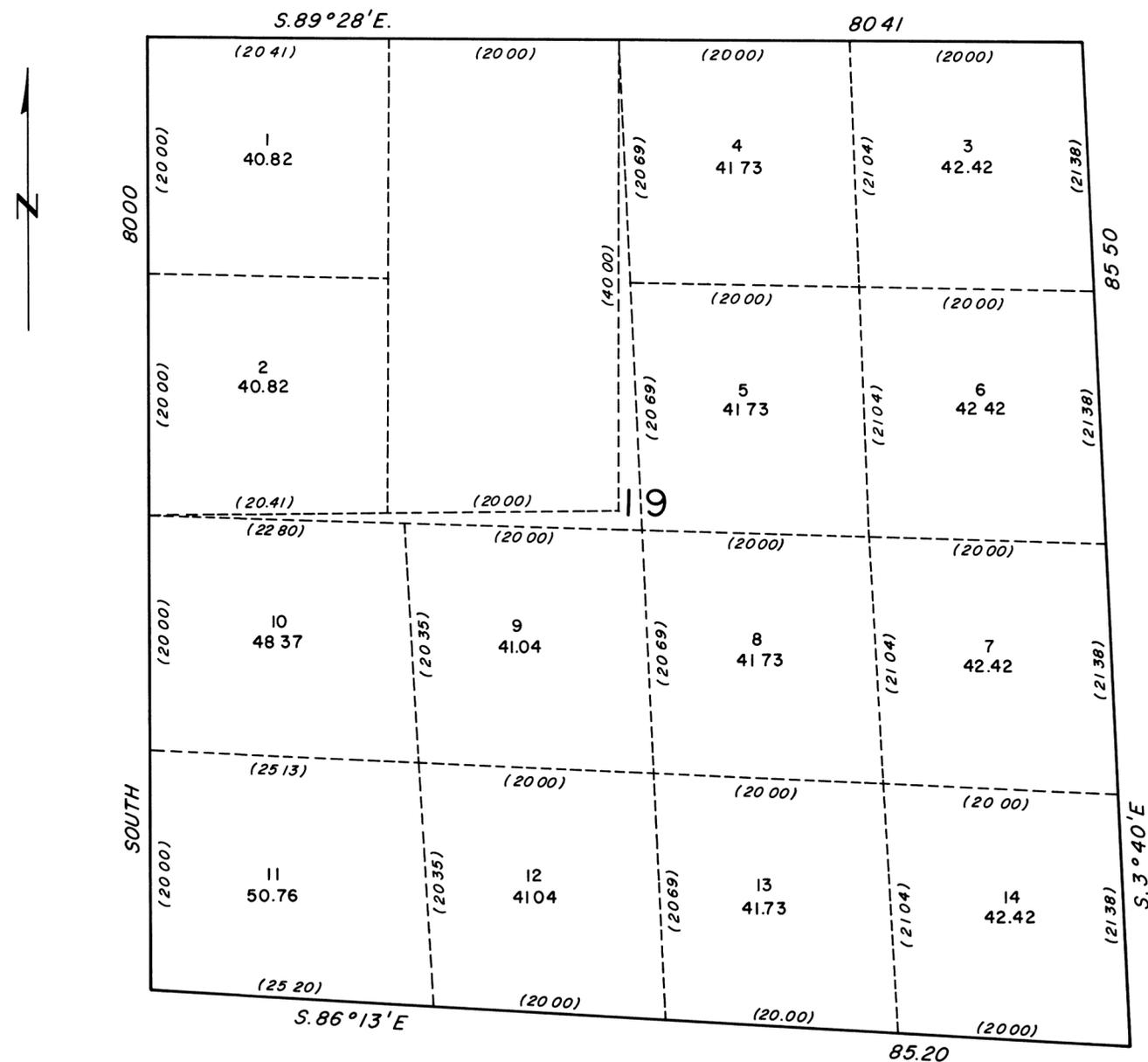


Figure 8 - Reconciliation of Areas

SUBDIVISION OF FRACTIONAL SECTIONS, SEELEY LAKE

Township N^o 17 North Range N^o 15 West of the Principal Meridian Montana.

1890

×

×

1896

1904

History of Surveys

- 1890 Angus McGilloray surveyed the Fourth Standard Parallel North along the south boundary of the township in September, 1890
- 1896 W W McElroy retraced the south boundary and surveyed the east, west, and north boundaries as well as surveyed the subdivisional lines of the township as shown on the plat approved January 29, 1897 See figure 1.
- 1904 W H. Thorn retraced and resurveyed the Fourth Standard Parallel North along the south boundary of the township Thorn was surveying the boundaries of what was then the Lewis and Clark Forest Reserve He set Forest Reserve boundary posts on the standard parallel at a distance of 6 links either east or west of each standard section corner.
- 1960-63 The Forest Service Remonumentation Program was instrumental in remonumentation of many corners in this township

Reasons for Request of this Survey

Most of the lands within the township are in the Lolo National Forest, intermingled with public lands, reconveyed lands, withdrawals and patented lands. The Forest Service requested a resurvey and subdivision of sections to identify the intermingled ownership and status.

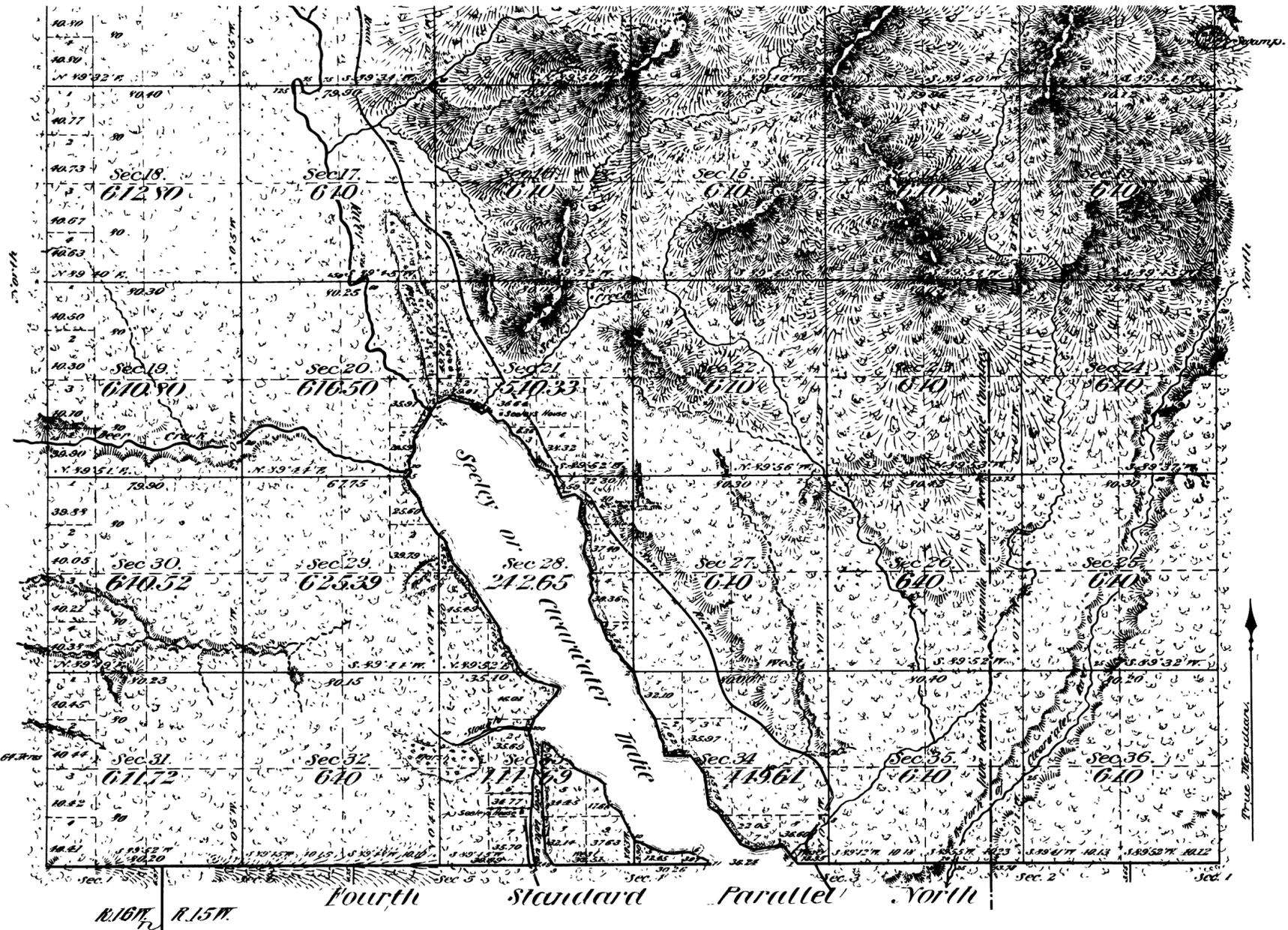


Figure 1 - Portion of Accepted Plat

SUBDIVISION OF FRACTIONAL SECTIONS, SEELEY LAKE

Special Instructions

Special Instructions for Group 534, Montana, were prepared on June 24, 1964. They provided for the dependent resurveys and partial subdivision of sections in six different townships, including T. 17 N., R. 15 W. This discussion is limited to the sections in T. 17 N., R. 15 W., surrounding Seeley Lake. Field work began in this township on July 12, 1966.

Conditions Found on the Ground

Figure 2 shows the recovered original corners and land status in the sections immediately surrounding Seeley Lake. In figure 2 all lands not given special symbols are administered by the Lolo National Forest. Of the corners searched for, only four that are pertinent to this discussion were lost. Figure 3 combines the survey records of the 1890 original survey, the 1896 subdivisional survey by McElroy and 1904 resurvey of the Standard Parallel by Thorn.

Preliminary Statement of the Problem

The surveyor must restore four lost corners and subdivide sections 20, 27, 29, 32, 33 and 34 to the extent necessary to mark and define the boundaries of the National Forest Lands.

Regulations

This survey illustrates the application of the following sections of the Manual of Surveying Instructions, 1973:

3-77 to 3-92	Subdivision of sections
4-42	Special meander corners
5-30, 5-31 and 5-38	Single proportionate measurement
5-40	Meander corners
5-43	Broken boundary adjustment
5-45	Single point control
7-9 and 7-12	Subdivision of sections

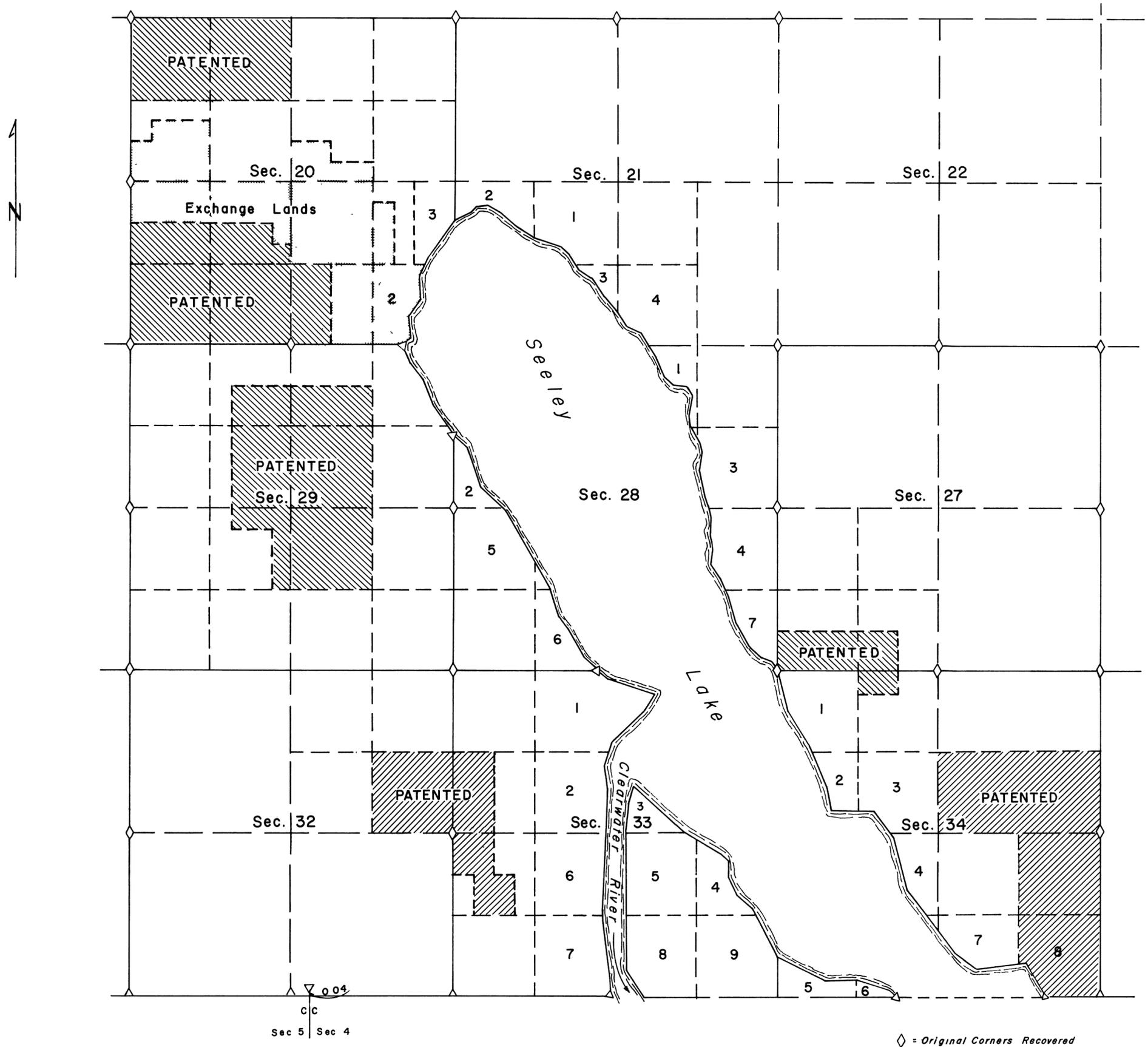


Figure 2 - Status and Corner Recovery

SUBDIVISION OF FRACTIONAL SECTIONS, SEELEY LAKE

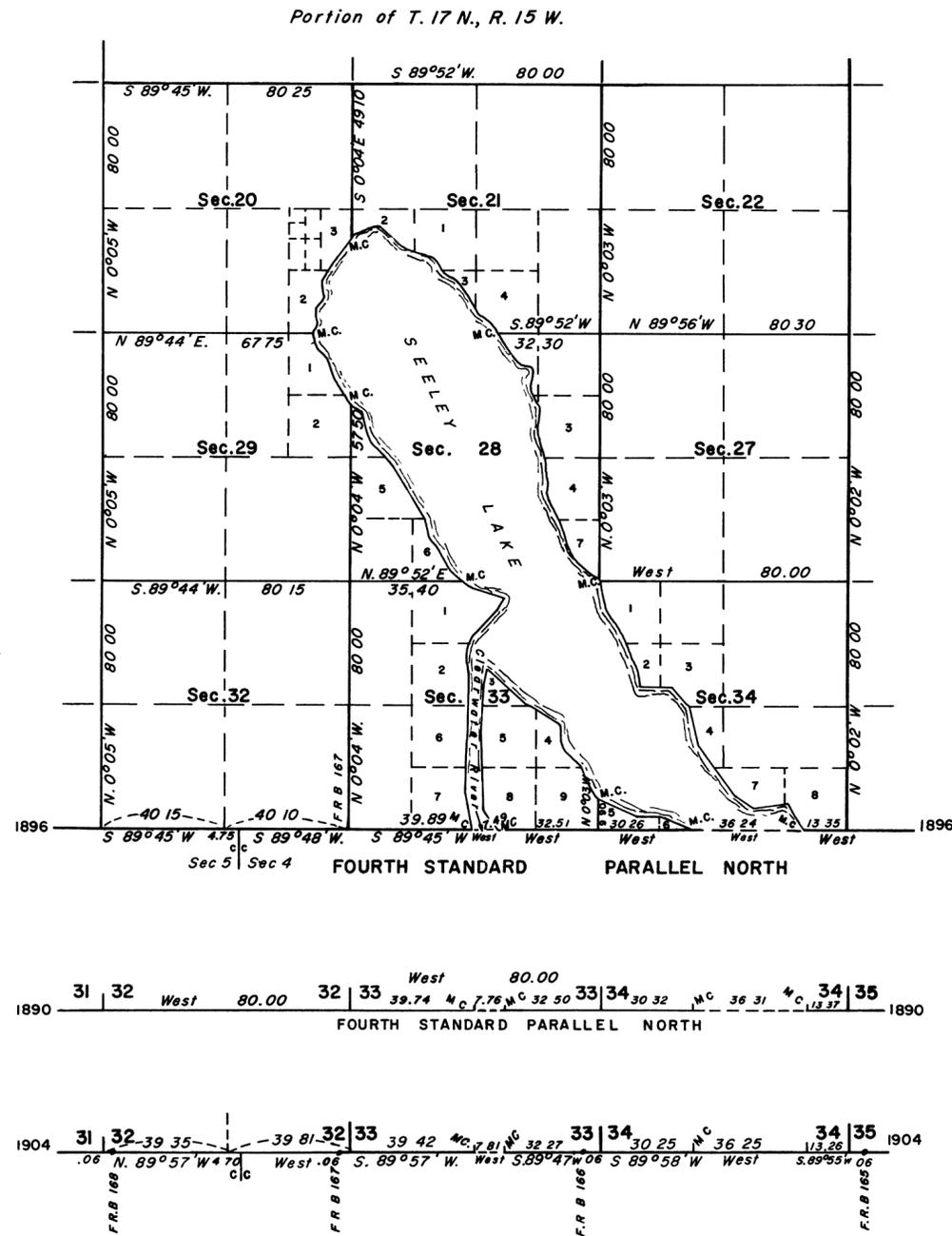


Figure 3 - Combined Survey Record

Changes in Instructions

While the field work was still in progress, the Forest Service made additional requests. Supplemental Special Instructions dated October 11, 1966, added the dependent resurvey of several sections, including the subdivision of sections 29 and 32.

On August 16, 1966, the Forest Service requested the survey of lands in section 20 that had been reacquired through an exchange agreement. The lands were described in the request as follows:

Section 20, T. 17 N., R. 15 W., PMM, containing 173.09 acres, more or less: Lot 2, $S\frac{1}{2}S\frac{1}{2}SW\frac{1}{4}NE\frac{1}{4}$, $N\frac{1}{2}SW\frac{1}{4}SW\frac{1}{4}NE\frac{1}{4}$, $SE\frac{1}{4}NW\frac{1}{4}SW\frac{1}{4}NW\frac{1}{4}$, $S\frac{1}{2}NE\frac{1}{4}SW\frac{1}{4}NW\frac{1}{4}$, $S\frac{1}{2}SW\frac{1}{4}NW\frac{1}{4}$, $N\frac{1}{2}N\frac{1}{2}SW\frac{1}{4}$, $NE\frac{1}{4}SE\frac{1}{4}NE\frac{1}{4}SW\frac{1}{4}$, $NW\frac{1}{4}SE\frac{1}{4}$, $SW\frac{1}{4}NW\frac{1}{4}NE\frac{1}{4}SE\frac{1}{4}$, $W\frac{1}{2}SW\frac{1}{4}NE\frac{1}{4}SE\frac{1}{4}$, $E\frac{1}{2}SW\frac{1}{4}SE\frac{1}{4}$.

On October 14, 1966, the Forest Service made further requests. On May 4, 1967, Supplemental Special Instructions were prepared. They provided for the subdivision of sections 21, 27, 33 and 34 (and others) to the extent necessary to define the forest boundaries.

Final Statement of the Problem

The lost corners must be restored by proper methods, all necessary 1/16 and 1/64 section corners along the section lines established and the sections subdivided by proper methods to the extent necessary to define the boundaries of the Lolo National Forest lands, including the boundaries of the recently acquired lands in section 20. The status is shown in figure 2 as exchange lands.

Solution

Figures 4 and 5 are the final plats accepted April 13, 1972, and show the solution.

The 1/4 section corners of sections 17 and 20, 29 and 32 were restored at midpoint between controlling section corners by single proportionate measurement.

The 1/4 section corner and meander corner of sections 20 and 21 were restored at record bearing and distance (single point control.)

All necessary 1/16 (and lower order) section corners on the section lines were established at midpoint or single proportionate positions.

In section 20, the record meanders were retraced and closing error adjusted by the broken boundary method (compass rule.) The centerlines of the section and centerlines of the NE 1/4, SW 1/4 and NW 1/4 were surveyed between opposite corners in the normal procedure. The N-S centerline of the SE 1/4 was surveyed normally. The E-W centerline of the SE 1/4 was surveyed easterly on a mean bearing between the E-W centerline of the section and easterly portion on the south boundary of the section and terminated at a special meander corner on the adjusted original meander line. All minor subdivisional lines were run on calculated courses and distances. All 1/16 section corners were monumented. Only necessary minor subdivision corners were monumented.

Section 29 was subdivided in a manner similar to that used in section 20.

Section 32 is not fractional and was subdivided in the normal manner.

In section 33, all of lots 1 thru 9 are in the National Forest. The portion of the Standard Parallel between Seeley Lake and the Clearwater River was not resurveyed, nor was the short line between sections 33 and 34. Section 33 has only one 1/4 section corner.

The E-W centerline of section 33 was surveyed easterly on a mean bearing between the controlling north and south boundaries of the section, with the C-W 1/16 section corner established at a mean distance. The N-S centerlines of the SW 1/4 and NW 1/4 were then surveyed, resulting in bearings which were (coincidentally) parallel to the west boundary of the section.

The E-W centerlines of the NW 1/4 and SW 1/4 sections were surveyed on mean bearings, easterly to intersections with the N-S centerlines of those 1/4 sections and the NW 1/16 and SW 1/16 section corners established. The minor subdivision-of-section lines were surveyed on connecting courses or calculated courses and distances.

In section 27, the centerlines of the section and centerlines of the SW 1/4 were surveyed normally. The minor subdivision-of-section lines in the SW 1/4 were surveyed as connecting lines or on calculated courses and distances.

Lots 5 and 6 of section 34 were in the National Forest. The meander corner on the standard parallel to the westerly shore of Seeley Lake had been remonumented in 1963. This corner was flagged and a bearing determined for the segment of the standard parallel across the lake.

The N-S centerline of section 34 was surveyed southerly on a bearing parallel to the mean bearing of the east boundary of the section. The E-W centerline was surveyed westerly on a bearing which was a mean between the mean bearings of the north and south boundaries of the section. The center 1/4 section corner was established at the intersection of the centerlines.

Based on the resurvey of the south, east and north boundaries of section 34, the record meanders were adjusted by calculation, using the compass rule and the first two calculated courses run on the ground.

The N-S centerline of the SE 1/4 of section 34 was surveyed southerly on a mean bearing between the N-S centerline and the south half of the east boundary of the section to an intersection with the calculated adjusted meander line, where a special meander corner was established.

The E-W centerline of the NE 1/4 of section 34 was surveyed on a connecting course.

The minor subdivision-of-section lines in the NW 1/4 were surveyed on calculated courses and distances.

Sections 21 and 28 were not completely resurveyed nor subdivided because they are all National Forest lands.

SUBDIVISION OF FRACTIONAL SECTIONS, SEELEY LAKE

TOWNSHIP 17 NORTH, RANGE 15 WEST OF THE PRINCIPAL MERIDIAN, MONTANA.
DEPENDENT RESURVEY AND SUBDIVISION

Sheet 2 of 3

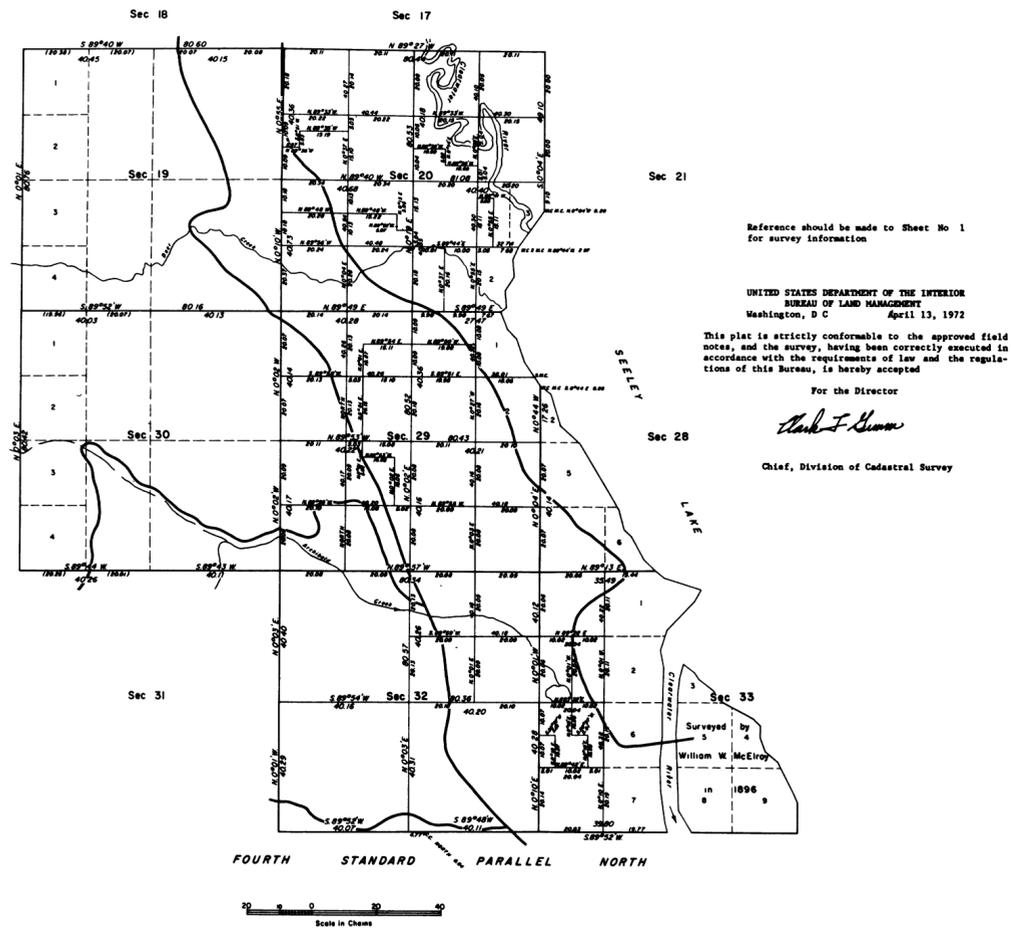


Figure 4 - Portion of Accepted Plat

TOWNSHIP 17 NORTH, RANGE 15 WEST OF THE PRINCIPAL MERIDIAN, MONTANA.
DEPENDENT RESURVEY AND SUBDIVISION

Sheet 3 of 3

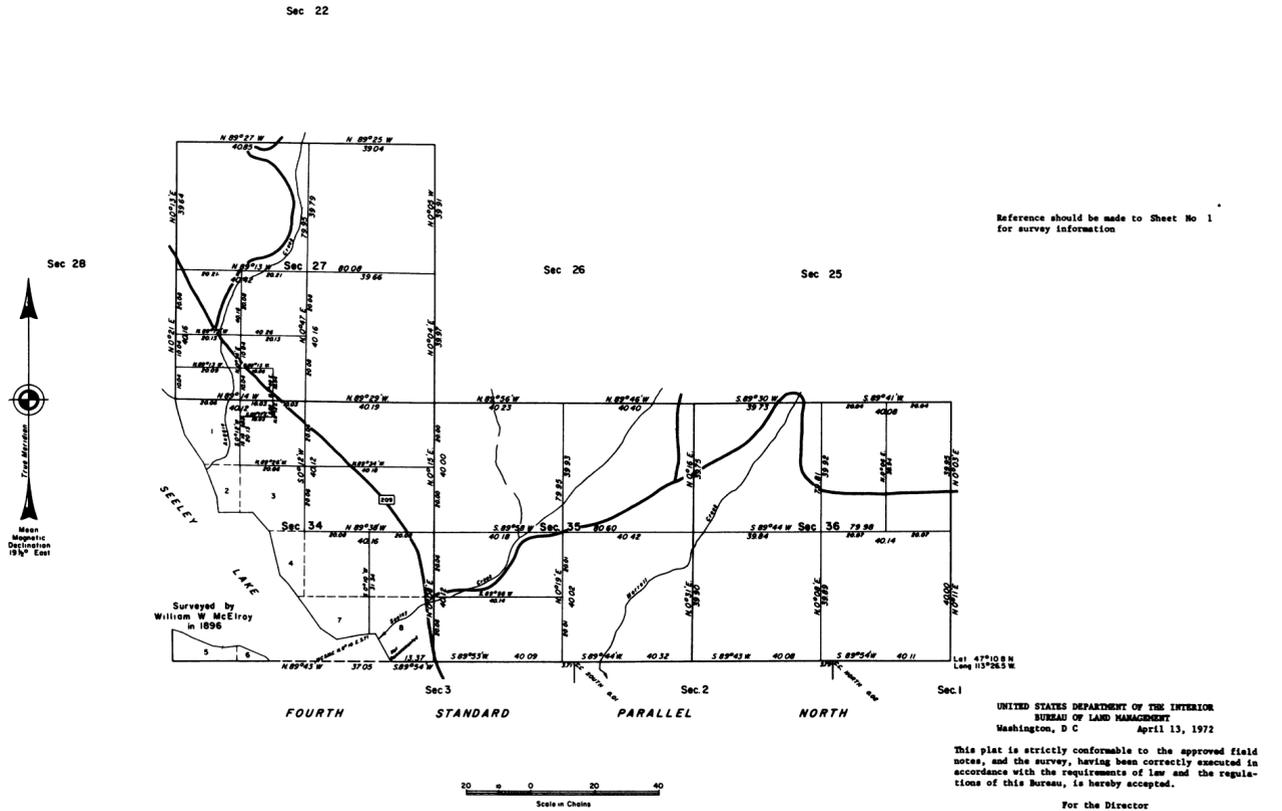


Figure 5 - Portion of Accepted Plat

Supplemental Topic

No areas were returned based on the 1890 survey by McGilloray of the Standard Parallel, nor on the 1904 resurvey by Thorn. The areas of lots 1, 2, 6 and 7 in section 33 are based on the 1896 retracement of the standard parallel by McElroy, shown in figure 1.

The original 1890 survey returned the distance from the standard corner of sections 32 and 33 to the meander corner on the west bank of the Clearwater River as 39.74 chains.

The 1896 retracement returned this same distance as 39.89 chains (figure 1 and figure 3.)

The 1904 resurvey returned a distance of 39.42 chains, (figure 3.)

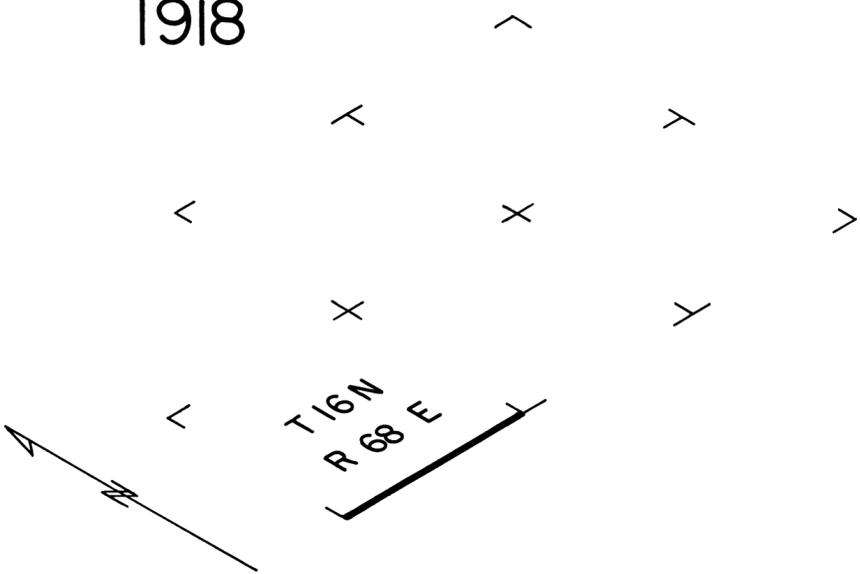
The areas of lots 6 and 7, section 33, are based on the west 1/16 corner being at 20.00 chains with the remainder (to the meander corner) of 19.89 chains.

In the present dependent resurvey the standard W 1/16 section corner was established, based on the original 1890 record (39.74 chains) instead of the 1896 retracement (39.89 chains) and was therefore technically in error. The proportionate distances should have been 19.955 chains and 19.845 chains.

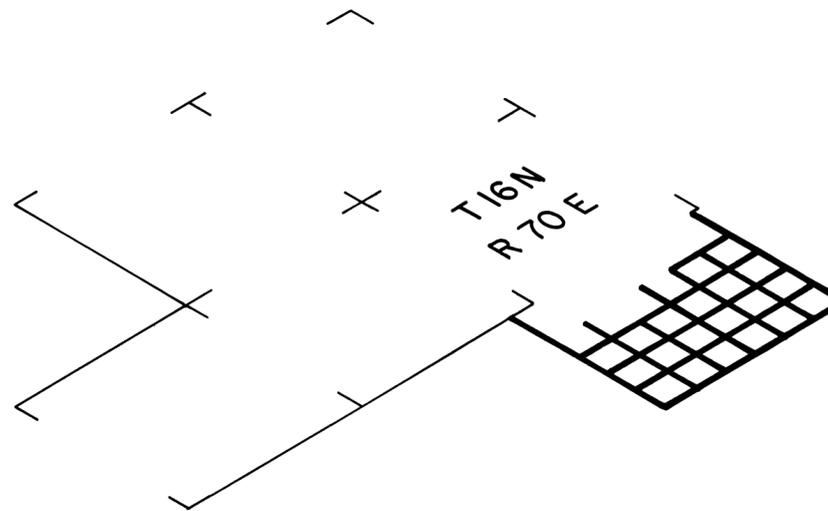
The center W 1/16 section corner of section 33 was established at a distance which was the mean of the distances to the W 1/16 section corners on the north and south boundaries of section 33. This resulted in the N-S centerlines of the NW $\frac{1}{4}$ and SW $\frac{1}{4}$ being parallel to the west boundary, but only because the standard W 1/16 section corner was established in error. Had the standard W 1/16 section corner been properly placed, the center W 1/16 section corner would have been set at 20.00 chains (in this case) instead of 20.04 chains. The centerlines of the NW $\frac{1}{4}$ and SW $\frac{1}{4}$ would not then be parallel to the west boundary of the section.

NEVADA SURVEY BASED ON A PROTRACTION DIAGRAM

1918



1942



1920



History of Surveys

The previous survey records are indicated on the protraction diagrams accepted October 12, 1962, shown in figure 1 and figure 2. Part of T. 15 N., R. 70 E., was subdivided in 1942. The Third Standard Parallel North was surveyed through Range 69 E. in 1920. The east boundary of T. 17 N., R. 68 E., was surveyed in 1920. All corners of the existing surveys are monumented with brass capped iron posts.

Reasons for Request of this Survey

The Mt. Moriah Division of the Humboldt National Forest is a separated portion of the forest, extending approximately 7 miles east, 9 miles south, 7 miles west, and 7 miles north from Mt. Moriah, a 12,000 ft. high peak. The Division boundary is described by section lines. Most of the east and north boundaries of the Mt. Moriah Division are unsurveyed. The Forest Service requested a survey of the unsurveyed portion of the boundary to mark the boundary on the ground.

Special Instructions

On August 27, 1969, Special Instructions were prepared for Group 465, Nevada. They provided for the survey of the following:

T. 15 N., R. 70 E.; The east and west boundaries of section 2.

T. 16 N., R. 70 E.; The Third Standard Parallel North to be surveyed west from the closing corner of sections 1 and 2 to the standard corner of sections 33 and 34, and the second meridional line of the township.

T. 17 N., R. 70 E.; The south 4 miles of the second meridional line; the line between sections 10 and 15; the north two miles of the third meridional line; the west three miles of the north boundary.

T. 17 N., R. 69 E.; The north boundary of the township.

The survey of these lines was to be based upon the protraction diagrams (figures 1 and 2) and controlled by triangulation stations established by the Forest Service. These stations were established by extension of the existing Coast and Geodetic Survey and Geological Survey net, using EDM equipment and third order triangulation methods. The geographic position of the stations are as follows:

SE. cor. T. 16 N., R. 69 E.,
39° 12'00.289" N.
114° 09'10.422" W.

SE. cor. sec. 2, T. 15 N., R. 70 E.,
39° 11'43.510" N.
114° 04'29.493" W.

MM2-005-1 (near the protracted cor. of secs. 10, 11, 14, 15, T. 16 N., R. 70 E.,
39° 15'23.993" N.,
114° 04'41.515" W.

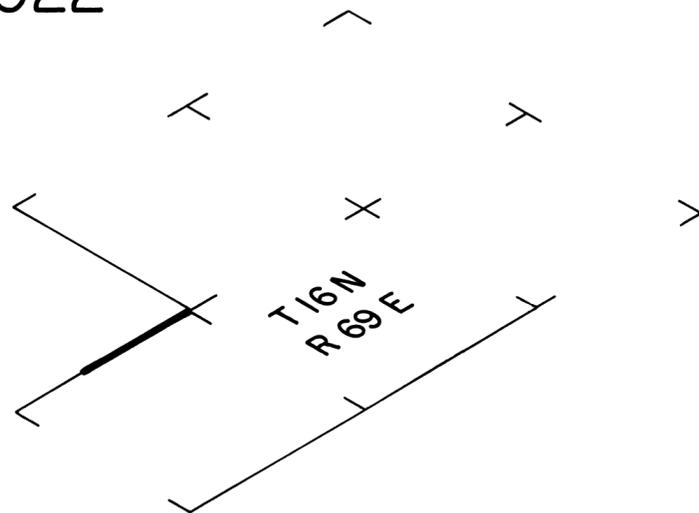
MM2-006-1 (near the protracted cor. of secs. 10, 11, 14, 15, T. 17 N., R. 70 E.,
39° 20'41.507" N.
114° 04'34.1755" W.

MM2-007-1 (near the cor. of secs. 3 and 4, N. bdy of T. 17 N., R. 70 E.,
39° 22'27.036" N.
114° 05'45.995" W.

SE. cor. T. 18 N., R. 68 E.,
39° 22'25.959" N.
114° 15'49.503" W.

Field work was begun on October 13, 1969.

1922



NEVADA SURVEY BASED ON A PROTRACTION DIAGRAM

Conditions Found on the Ground

The corners of section 2, T. 15 N., R. 70 E. and corner of Tps. 17 and 18 N., Rs. 68 and 69 E. were recovered in good condition. The triangulation stations were also recovered without too much difficulty.

Preliminary Statement of the Problem

Using the geographic positions furnished by the Forest Service, the following computations must be made prior to beginning the survey:

1. Length of the line between sections 1 and 2, T. 15 N., R. 70 E., to be run N. 0° 01' W., to a point due east of the southeast corner of T. 16 N., R. 69 E.
2. The length of the standard parallel from the closing corner of sections 1 and 2 to the southeast corner of T. 16 N., R. 69 E.
3. The distance from the closing corner of sections 1 and 2 along the Standard Parallel to the standard corner of sections 33 and 34.
4. When the second meridional lines in Tps. 16 and 17 N., R. 70 E. are surveyed, at what position should the corner of sections 10, 11, 14 and 15 fall, in relation to stations MM 2-005-1 and MM 2-006-1, to be within limits and thus preclude errors in the lines surveyed?
5. The corner of sections 3 and 4 on the north boundary of T. 17 N., R. 70 E. must be established at the intersection of the line between sections 3 and 4 and a line due east of the corner of Tps. 17 and 18 N., Rs. 68 and 69 E. How far south of station MM 2-007-1 should the corner be established and also what departure should be used to remain within limits?
6. After the corner of sections 3 and 4 is acceptably established, the north boundary of T. 17 N., Rs. 69 and 70 E. must be surveyed on the latitudinal curve. The line must run to the corner of Tps. 17 and 18 N., Rs. 68 and 69 E., setting corners (referring to T. 17 N. only) every 40 and 80 chains, with the deficiency in the last half mile. It is desirable to run the line (approximately 9 miles) on the long chord of the curve and make the offsets south to the curve. What should the initial bearing of the chord be at the corner of sections 3 and 4 and what are the required offsets?

Regulations

This survey illustrates the application of the following sections of the Manual of Surveying Instructions, 1973:

- 2-74 to 2-82 Geodesy of large-scale cadastral surveys
- 3-24 and 3-25 Irregular Order on partial surveys

This survey must be made in conformity with the protraction diagrams, as nearly as possible, based on the available data.

Final Statement of the Problem

The surveyor must compute the courses and lengths of lines to be surveyed.

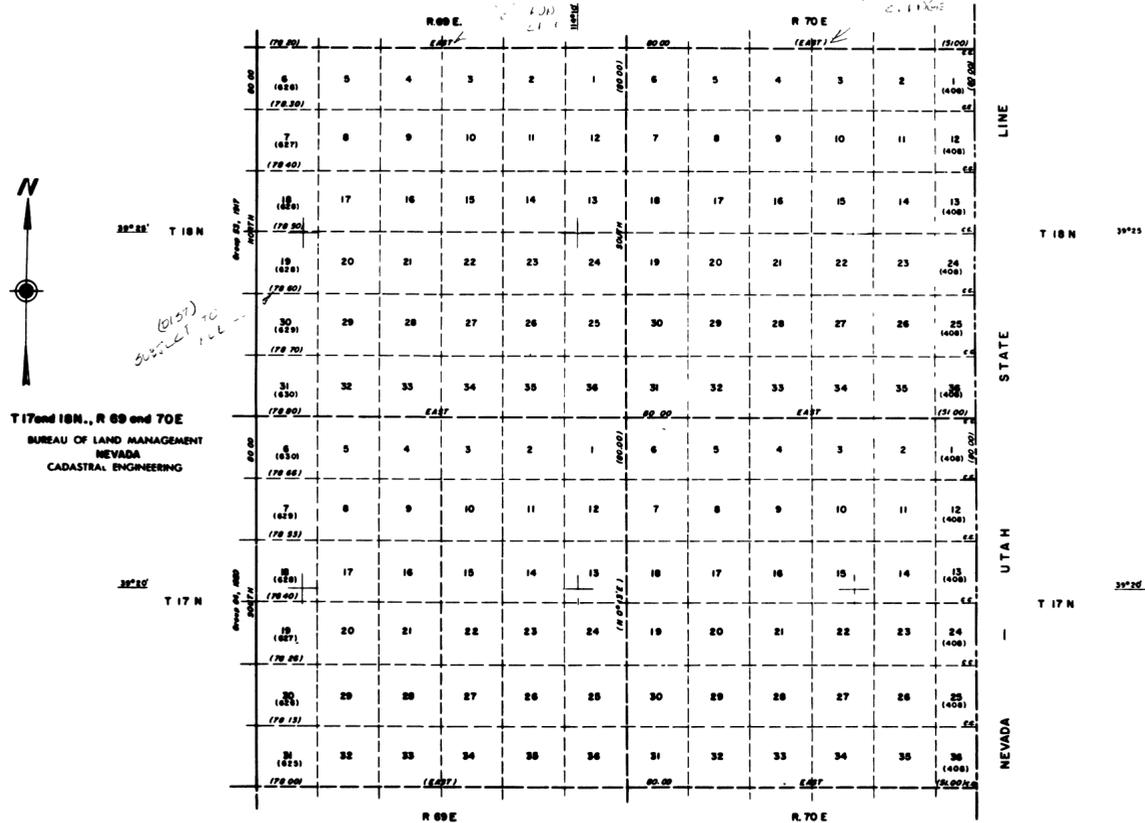


Figure 1 - Protraction Diagram

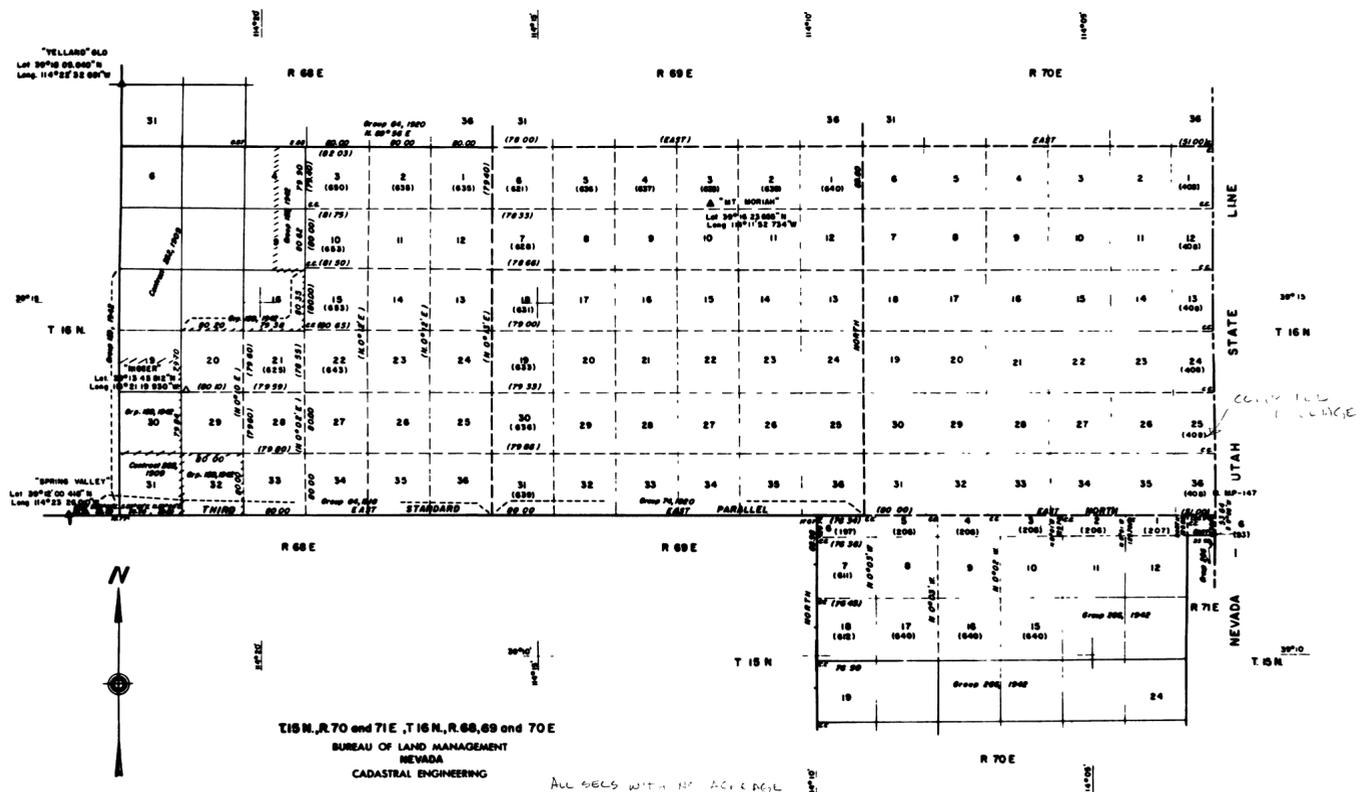


Figure 2 - Protraction Diagram

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
Washington D.C. Oct. 12, 1962
This diagram represents the official protraction of the rectangular system of survey and shows area of surveyed sections T 15 N., R 70 E., T 16 N., R 68, 69, 70 E. and T 17 N., R 68, 69, 70 E. and is hereby approved for the Survey.

[Signature]
Chief, Division of Surveying

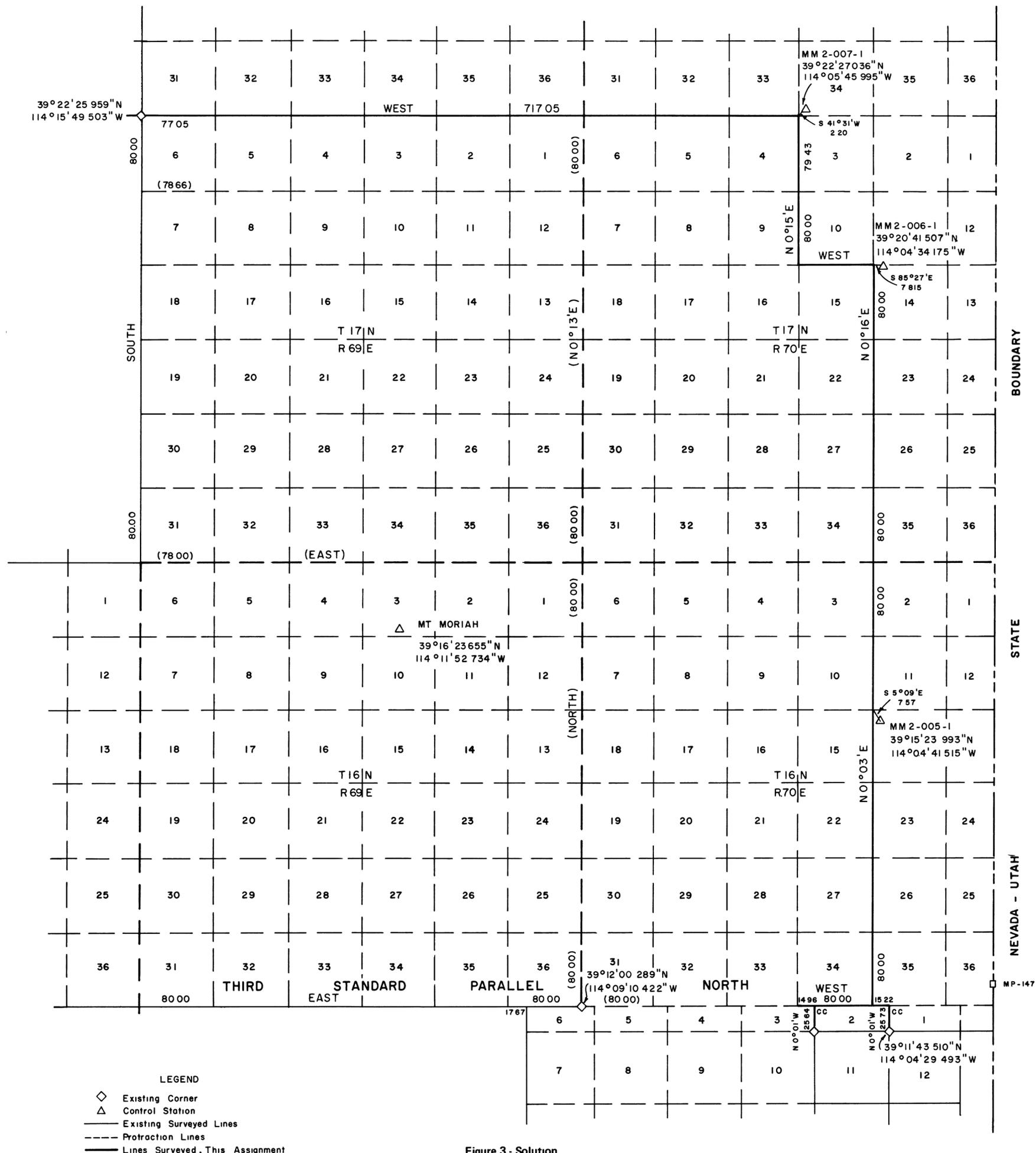
NEVADA SURVEY BASED ON A PROTRACTION DIAGRAM

Solution

Figure 3 illustrates the overall solution. Using the geographic positions of the control points and the "M and P" factor tables to determine line lengths, the surveys were made in the following order:

1. The line between sections 1 and 2, T. 15 N., R. 70 E., was run N. 0° 01' W., 25.73 chains and the closing corner of sections 1 and 2 established. From the closing corner, the Third Standard Parallel was run due west 15.22 chains and the standard corner of sections 34 and 35 established. The standard parallel was extended west to the standard corner of sections 33 and 34. The line between sections 2 and 3 was run N. 0° 01' W., to a closing corner on the standard parallel. The north ¼ section corner of section 2 was established at midpoint between closing corners.
2. The second meridional line in T. 16 N., R. 70 E. was surveyed N. 0° 03' E. (parallel to the protracted west boundary of the township), establishing corners every 40 and 80 chains. A tie was made to station MM 2-005-1, which verified the ground survey.
3. The second meridional line in T. 17 N., R. 70 E. was surveyed N. 0° 16' E. (parallel to the protracted west boundary of the township), establishing corners every 40 and 80 chains, to the corner of sections 10, 11, 14 and 15. The tie to station MM 2-006-1 verified all work up to this point. The line between sections 10 and 15 was surveyed due west, 80 chains. The third meridional line was run N. 0° 15' E. (parallel to the protracted west boundary of the township), establishing corners every 40 and 80 chains, with the deficiency in the last half mile between sections 3 and 4.
4. The corner of sections 3 and 4 was established on the line between sections 3 and 4, at a point 1.65 chains, in latitude, south of station MM 2-007-1.
5. The long chord of the latitudinal curve was computed, with initial bearing, offsets, etc., as shown in figure 4. These values were run on a random line, setting temporary points at each ¼ corner and section corner. The deficiency was placed in the last half mile on the north boundary of section 6, T. 17 N., R. 69 E. A small "falling" at the established corner of Tps. 17 and 18 N., Rs. 68 and 69 E., was then distributed pro-rata, back through the temporary points and the corners then monumented and marked referring to T. 17 N., only.

A plat was made of the work in each township, which required four plats. These plats were accepted on February 3, 1972. The bearings and distances returned on the accepted plat are shown in figure 3.



- LEGEND
- ◇ Existing Corner
 - △ Control Station
 - Existing Surveyed Lines
 - - - Protraction Lines
 - Lines Surveyed, This Assignment

Figure 3 - Solution

NEVADA SURVEY BASED ON A PROTRACTION DIAGRAM

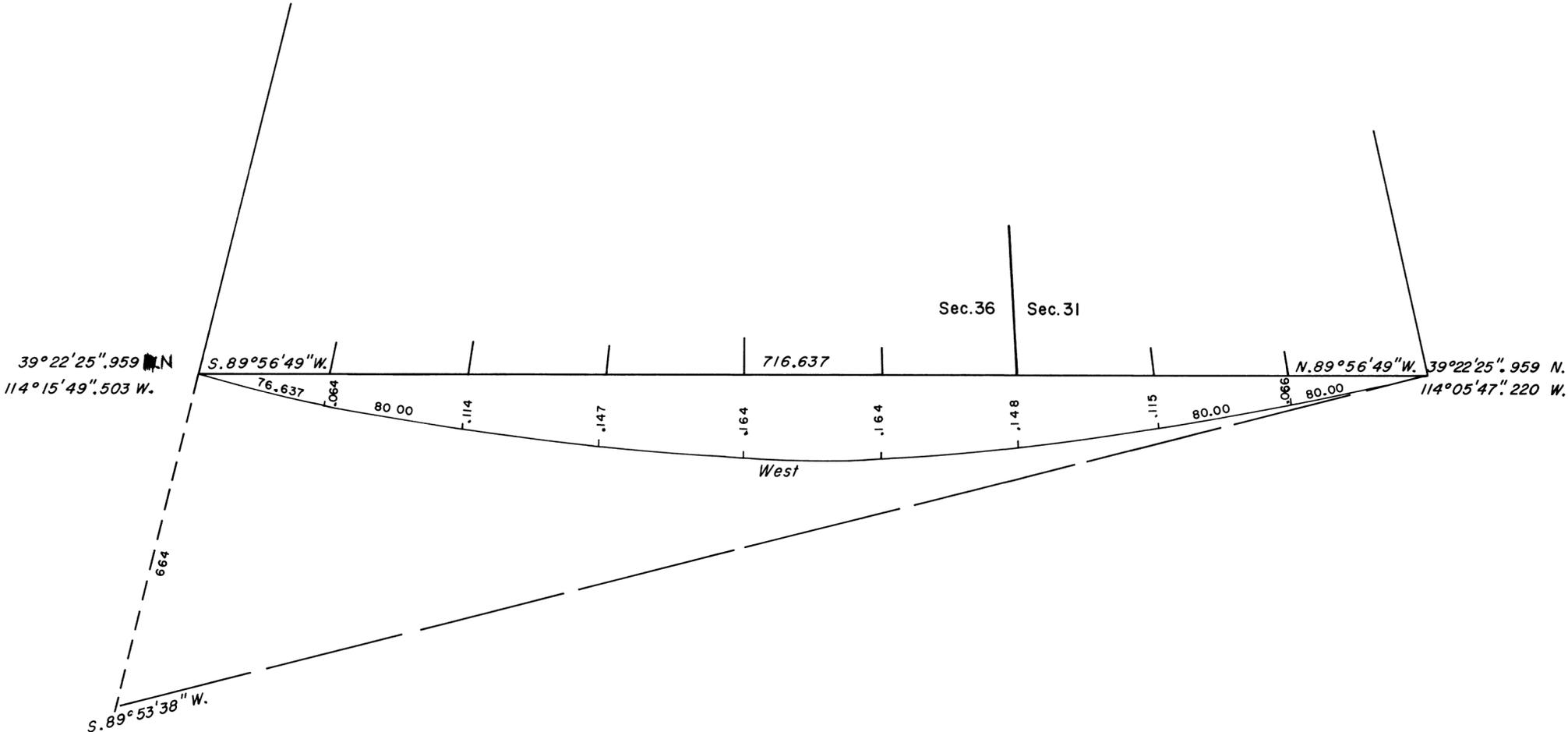


Figure 4 - Latitudinal Curve