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Land Maps From Aerial Photos

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Good maps are of utmost importance in locating property. Details may cover general or one specific purpose. However, accuracy is essential in successful utilization of any printed material. In the last 20 years, aerial photography has developed from a very simple to a highly complex method of detailed mapping for use in a multitude of ways.

Since all of you people deal in real property, you find use for various kinds of maps. Oftentimes, your interest is in a limited area for a specific purpose. You need not be hampered in your operations as aerial photo maps are available for the entire United States. It is my purpose to show you some of the ways you can adapt this material to your specific purpose.

There are a few essentials necessary to know before you can locate the property with which you are concerned. The first one to become acquainted with is the photo index. This index is a mosaic of all the photo maps of a particular county. The photo index map is oriented to the county, and the flight lines and photo numbers are indicated for the portion of the county they cover. A cross index for the section covered by each photo map is essential. Now, with this information, it is possible to locate the photo map which covers the legal description concerned. The identifying number on the photo index will indicate the number on the photo map. With the individual map located, we can locate the legal description of the property in question.

Flight lines over a county may be East and West or North and South, and you must determine from the photo index map what direction the flight lines follow. Since the upper portion of every map is considered North, you will have to orient yourself on the photograph. If the flight was made North and South, the numbers will be at the top, or North. However, if the flight was East and West, the photograph will have to be rotated 90° to the left which will put the numbers on the West side of the photograph. Each photograph is marked with identifying numbers as shown in Figure 1. It is important to know what these figures indicate since they identify one photo from another, and there are no two photos alike.

Most important for the individual concerned is the identification number, COC-4-133. The first is a code or project number, but the second and third numbers determine the flight line and area covered. The flight line and photo number will also appear on the photo index map and will indicate which sections are covered by the photograph. Generally four sections are covered by each photo map. The second thing to recognize is the date of photography in the upper left. This will tell how old the

NOMENCLATURE OF AERIAL PHOTOGRAPHS

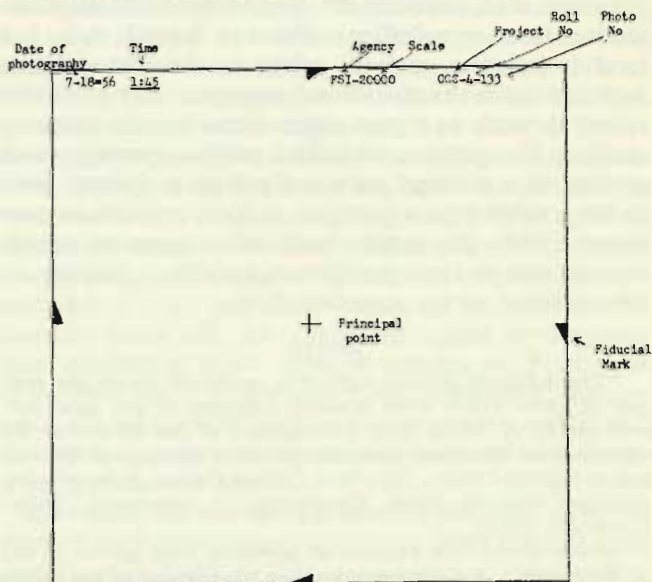


FIGURE 1

photograph is and will aid in determining if changes in locations may have occurred since photographing.

Location of the property in question is of prime importance. Some study of the raw photograph and the land marks that show on it will aid in property location.

Things to look for are buildings, streams, roads, lakes, hills and features of terrain which are common to the property and show on the photograph. Coordinated use of a good plat book and detailed land map will help to pin point the property and boundary lines. A further check of the legal description of the property will definitely establish the property lines.

Aerial photos are made on heavy paper, but care in use is necessary to prolong their usefulness. Each section of land should be prolonged in dead center with India ink or some permanent material. The boundaries of each section should be outlined in soft lead pencil, preferably #1 lead since harder lead tends to cut the paper.

Once a particular property is located, further detail can be picked up from it by use of overlay maps made by placing a sheet of 2 mil mylar over the property and tracing out what information is wanted. Mylar will not take ordinary lead pencil markings. Excellent markings are made by use of a pencil, 2830 Stude-Atler Lumigraph, which makes permanent lines and comes in various colors. By use of different colors, separate information can be coded by color, and several specific bits of information can be recorded on the same overlay map.

Maps from other agencies can be integrated with the aerial photo. Geological Survey quadrangles serve a useful purpose in determining elevations since they are made with contour intervals showing elevations for each 20 foot rise and fall. Rivers, lakes, swamps, hills, roads and buildings are shown on the quadrangle maps. Since these maps are made at a different scale, it becomes necessary to interpolate the material to the scale of 660' to the inch which is the scale of the aerial photo.

Thorough understanding of the aerial photos increases the use to which they can be put. By making overlay maps, information on land classification by soil types and full and true valuations for each parcel can be made. This method is quick, easy and accurate for land measurement since calculations can be made directly from the overlay, thus eliminating the need to carry bulky and expensive photos in the field. Soil maps are not always available, but if they are, the greatest use should be made of them.

Most of you are familiar with highway maps, and a detailed study of these maps will prove of much value since they show the townships on certain selected copies. There is further useful information contained in these maps such as "base lines," "prime meridians," plus range and township numbers.

In Figure 2, you will note a township grid. This information is basic in understanding map reading as well as legal descriptions developed from Rectangular Land Survey System. The rectangular survey system . . . The first step in subdividing public lands is to establish an initial point, the latitude and longitude of which is known. Then, a true North and South line called a "principal meridian" is run through the initial point and marked on the ground. Next, a line is run East and West from the initial point. This line is called a "base line" and it is perpendicular to the principal meridian. There are now 36 principal meridians located in different parts of the United States.

On either side of the principal meridians the land is laid out in approximately square units, looking very much like a checkerboard. These units are called "town-

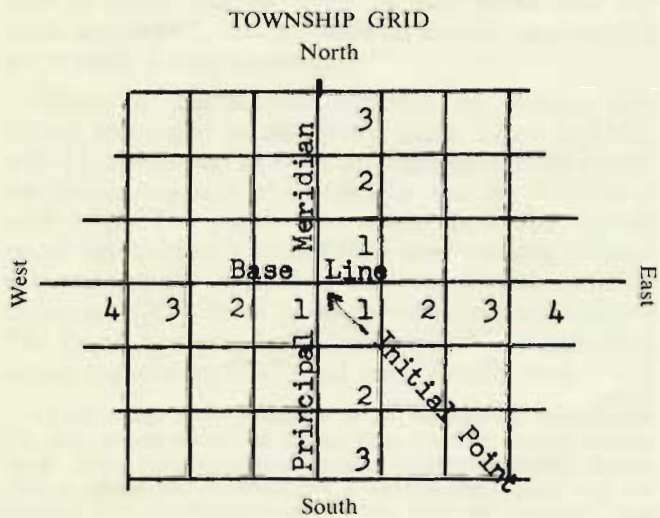


FIGURE 2

ships." Their boundary lines are 6 miles long and run North-South and East-West. A tier of townships running North and South is called a "range."

The townships are described as being so-and-so townships North or South of a named base line and so-and-so townships East or West of a named principal meridian. Each township is divided into 36 "sections" approximately 1 mile square and containing 640 acres. The sections are numbered 1 to 36, starting in the northeast corner and moving alternately left to right then right to left, ending in the southeast section. Each section can be located by its number, township and range.

Sections may be further divided into quarter sections. Each quarter section, (160 acres), is identified by its compass direction NE, SE, SW, NW. The corners of every section and quarter section are permanently located on the ground by monuments. The exact location of the corner is stamped into a brass cap on the top of the monument.

The shaded part of the illustration would be described as "Sec. 14, T. 2 S., R. 3 W." and the name of the principal meridian. Although the name of the state is not required, it is usually added for convenience. One of the advantages of this system of land description is that the method allows land to be described by very small legal subdivisions without an actual detailed field survey. This is illustrated in Figure 3.

TOWNSHIP 2 SOUTH, RANGE 3 WEST

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

FIGURE 3

A quarter section can be divided into quarter-quarters of 40 acres. Quarter-quarters, or "40's" as they are so often called, can be further subdivided into areas as small as 5 acres, or 2½ acres, or 1¼ acres. Normally the smallest legal subdivision is the "40". See illustration in Figure 4.

Because of the shape of the earth, principal meridians come closer together as they extend toward the North

SECTION 14

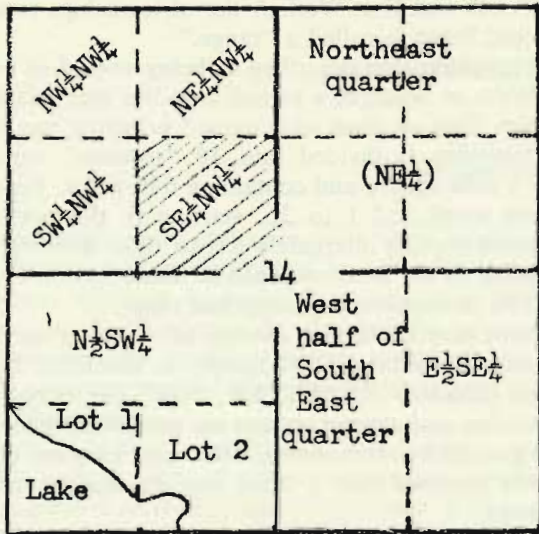


FIGURE 4

and South Poles. To adjust for this, correction lines are run every 24 miles.

Under the rectangular survey system, it is very easy to describe and locate any one parcel of land. There cannot be another parcel of land with the same identification. In order to avoid writing out a lengthy description, a shorthand method of describing has been devised. For example, in the illustration the shaded township is located two townships South of the base line and three ranges West of the principal meridian. In short form, the

location of the shaded township would be written "T. 2 S., R. 3 W." In formal land descriptions, it is also necessary to include the name of the principal meridian.

Quarter divisions of a section of land are known as "aliquot parts." An aliquot part is always described in relation to the four points of the compass. In the illustration, the shaded portion would be described as the Southeast Quarter of the Northwest Quarter (SE 1/4 NW 1/4) sec. 14, T. 2 S., R. 3 W. and the name of the principal meridian.

The equipment for making measurements from aerial photos is rather simple and inexpensive. A "C thru Grid Scale has a 660' = 1" scale for measuring distance. The 660' scale converts readily to rods, and by simple calculations, the acreage of a given rectangular field can be determined. This scale has small division for measuring down to .1 acre. Used by laying scale over area to measure and counting out the number of squares in the area. Also measures 40 acre and 160 acre tracts directly.

Since aerial photos, and numerous maps of various kinds are available, there is no reason why with a little training all of these aids can't be of much more use than they have been to date.

LITERATURE CITED

- WOZLEY, EDWARD. 1960. *Surveying Our Public Lands*. United States Department of Interior, Washington, D.C.
- U. S. DEPT. OF INTERIOR. n.d. Topographic Maps, Descriptive Folder United States Department of Interior, Geological Survey, Washington, D.C.