Where Arkansas Surveys Begin

The Intersection of the Fifth Principal Meridian and the Base Line at a Point in Eastern Arkansas Established in 1815, Is the Origin of Arkansas Land Surveys.

By CLAUDE A. RANKIN.

Everything in life must have a beginning, and the public land survey of Arkansas is no exception.

Over in Eastern Arkansas, where Monroe, Lee, Phillips and Arkansas counties all join at a common point, is located the point where all surveys in Arkansas have their beginning.

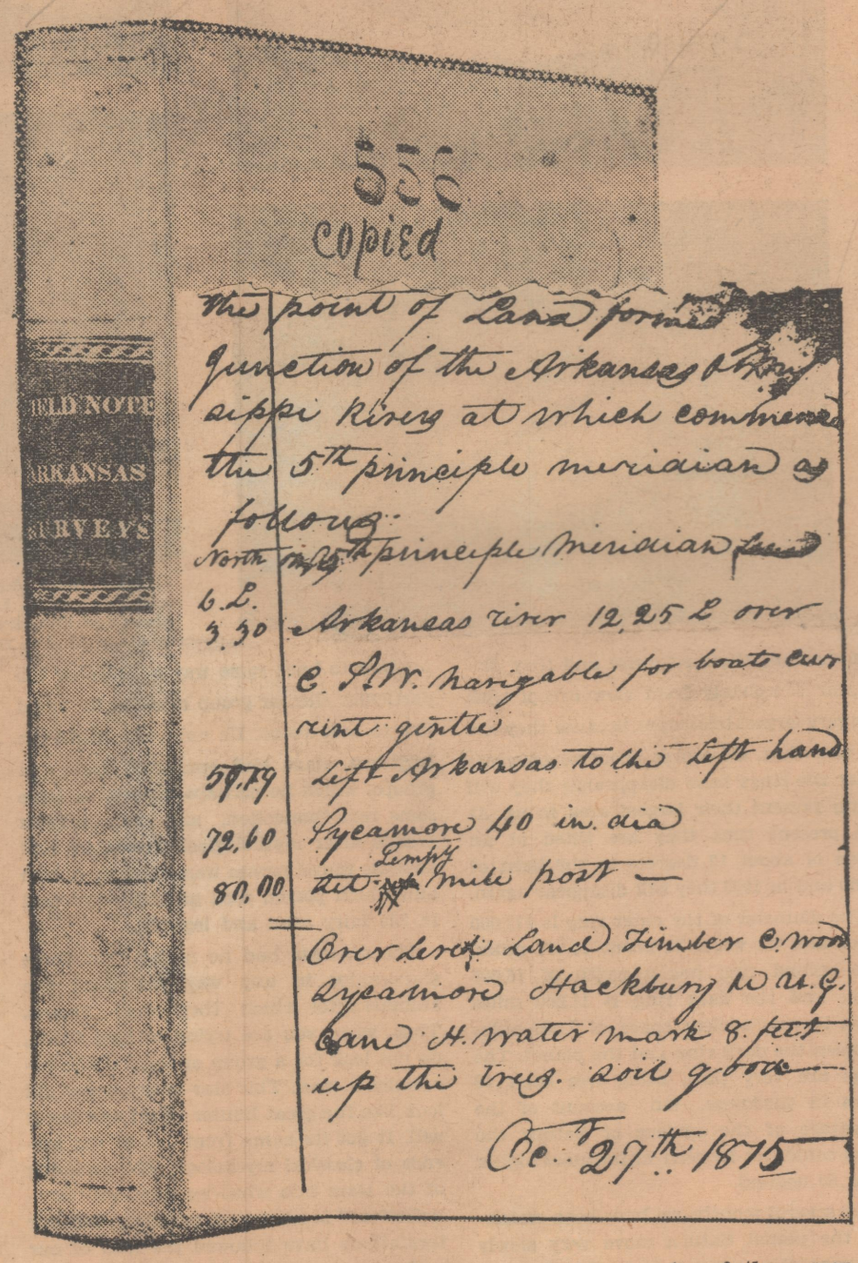
This point is the intersection of the base line and the Fifth principal meridian. From his point the townships range eastward and westward and northward and southward.

The public land survey of Arkansas, upon which is based the legal description of every foot of land in the state is of prime importance to land owners, and the history and workings of the survey should be of interest to other residents. The survey of the public lands of the United States, and this, at one time, included all lands in Arkansas, is inseperably associated with questions relating to the acquisition and disposal of proprietary title to the lands. The term "public domain" applies to all lands that have been subject to survey and disposal by the United States. Twenty-nine states of the Union, Arkansas included, and the District of Alaska were surveyed under the United States rectangular system of land survey.

The rectangular system, of which President Jefferson was the father, was inaugurated by a committee appointed by the Continental Congress. On May 7, 1774, this committee reported "An ordinance for ascertaining the mode of locating and disposing of lands in the Western territory, and for other purposes therein mentioned." The ordinance, as finally passed on May 20, 1775, provided for townships six miles square, containing 36 sections of one mile square each.

The survey in Arkansas, which was at that time embraced in Missouri Territory, was begun in 1815, by William Rector, principal deputy surveyor of Missouri Territory. The first steps necessary were the establishment of a base line running east and west across the territory and a principal meridian running north and south.

The survey of the Fifth principal meridian, the longitude of which is 91 degrees, 3 minutes and 42 seconds west from Greenwich, and which governs the survey of lands in Arkansas, Missouri, Iowa, South Dakota, North Dakota and Minnesota, was begun on October 27, 1815, by Prospect K. Robbins, deputy surveyor, assisted by Alexander Baldridge and Hiram Scott, chainmen, and John Baldridge, marker, at the extremity of the point of land formed by the junction of the Arkansas and Mississippi rivers, and continued north a distance of 317 miles, 35 chains and 76 links, to the Missouri river, which point they reached on December 28, 1815.



Here is a picture of the old book containing the field notes of the survey of the Fifth principal meridian and a facsimile of the first page in the book, written by Prospect K. Robbins, deputy surveyor.

The survey of the base line, the latitude of which is 34 degrees and 44 minutes north of the equator, was begun October 27, 1815, by Joseph C. Brown, deputy surveyor, assisted by Nathan Myers and Richard Lessams, chainmen, and Nathan Gilpin, marker, at the mouth of the St. Francis river, and extended west across the state.

The records kept by the surveyors of the public lands, their field notes now are on file in the State Land Office. These records contain the original notes for each 40-acre tract of land in the state and they contain information of inestimable value to every land owner in the state.

The account given by Robbins in his Field Notes, of the beginning of the survey of the Fifth principal meridian is as follows:

"Set a post at the extremity of the point of land formed by the junction of the Arkansas and Mississippi rivers at which commenced the 5th principal meridian as follows:

3 c. 30 l. Arkansas river 12.25 L. over C. L. W. Navigable for boats. Current gentle.
59.19 Left Arkansas to the left hand.
72.60 Sycamore 40 in. dia.
80.00 Set temp'y post.
Timber C. Wood, Sycamore, Hackberry, W. U. G. cane. H. Water mark 8 feet up on trees.
Soil good. October 27th, 1815.

Thus, he began and closed his first day's work.

Base Line Notes.

The account given by Brown in his field notes, of the beginning of the survey of the base line, is as follows:

West on the Base Line, commencing at a post on the South bank of the St. Francis river at its mouth, from which a Hickory 2 feet diam. bears S. 31 E. 61 links and a Hickory 1 1-2 feet diam. bears N. 87 W. 2 ch. 6 links. The Mississippi here is 50 ch. — links wide and bears S. 12 E. Ch. L.
4.86 River St. Francis running from S. 25 W. 10 ch. 50 L. wide.
19.24 Left St. Francis R.
2336 An elm 20 ins. dia.
40.000 Set 1-2 mile post.
50.25 A cypress 5 feet diam.
80.00 Set mile post.
Land low and sandy and covered with cane, sweet gum, etc. Would be good were it not subject to inundation.
West on the Base Line.
C. L.
3.70 A sweet gum 14 ins. dia.
40.00 Set 1-2 mile post
56.00 A cottonwood 3 feet diam.
80.00 Set mile post.
This mile is very low. Lands mostly cane brake. The growth cottonwood, sweet gum and other low land timber, but a hurricane has passed over the last one-half mile and left scarcely a tree of any sort standing.
27th. October, 1815.

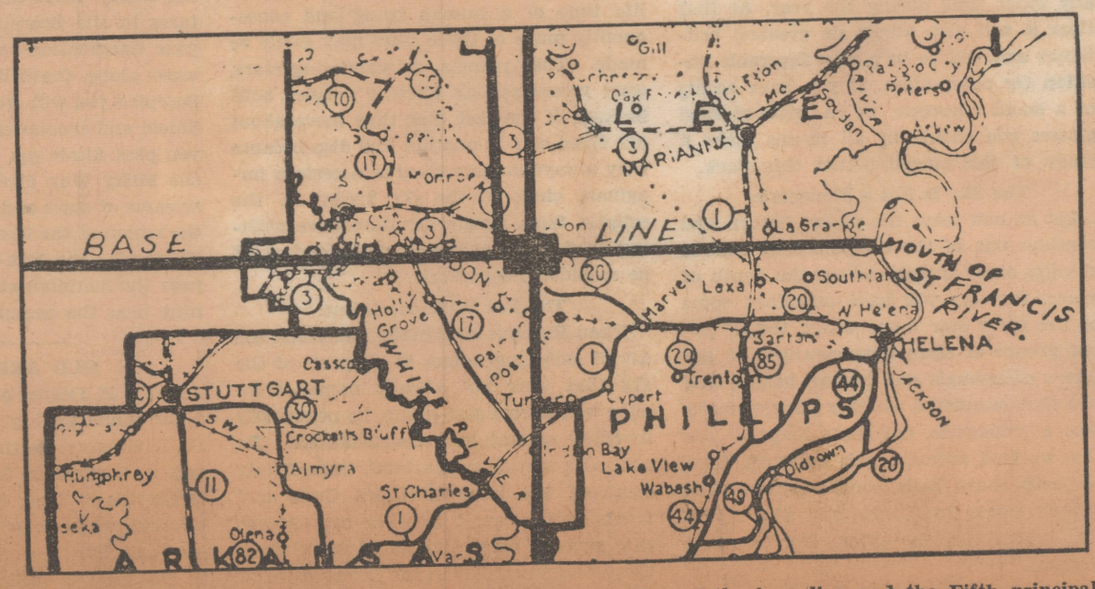
Thus, he began and closed his first day's work.

The point of intersection of the base line and the Fifth principal meridian is on the east side of Monroe county, at the southwest corner of Lee county and the northwest corner of Phillips county, 26 miles and 30 chains west of the Mississippi river, the point of beginning, and 57 miles, 60 chains and 50 links north of the mouth of the Arkansas river, the point of the beginning of the Fifth principal meridian.

Brown reached the point of intersection November 2, 1815, and Robbins reached it November 10. Brown continued west on the base line for 13 miles and 60 links, which point he reached November 4. On November 25 he returned to the point of intersection and began a resurvey of the base line along the south side for 58 miles, 10 chains and 85 links to the Arkansas river, which he reached December 5. The river, he said, "runs south, is 20 chains wide and appears to run about as swiftly as the Ohio," indicating he evidently had been connected with the survey of the public lands north of the Ohio.

When Robbins reached the base line he set a post, corner to Sections 1, 6, 31 and 36, Townships 1 and 1 South and 1 and 1 North, and Ranges 1 East and 1 West, from which a gum 18 inches in diameter bears North 61 degrees, East 44 links and a gum 18 inches in diameter bears South 70 degrees West 10 links. This point is the initial point for the survey of all lands in Arkansas. The land lying north and east is described as being in townships north and ranges east:

(Continued on Page 13.)



This map shows the location of the point of intersection of the base line and the Fifth principal meridian. It is from this point that all land surveys in the state are measured. The heavy black line perpendicular in the center of the map is the Fifth principal meridian.

166

Where Arkansas Surveys Begin

(Continued from Page 1.)

that lying south and east as being in townships south and ranges east; that lying north and west as being in townships north and ranges west, and that lying south and west as being in townships south and ranges west.

From this point Robbins continued north, setting the section and quarter section corners from sections 36, 35, 24, 13, 12 and 1 of each of the townships numbered from 1 upward, in range 1 west, to the Missouri river.

Arkansas at that time was a vast wilderness with very few widely scattered settlements, and the surveyors were forced to maintain what was called "surveying camps," moving from place to place as the work progressed and, in many instances, the field notes recite the name of the cook, as well as the other members of the party.

Townships and Sections.

After the establishment of the base line and the meridian, the next step necessary was to survey and lay off the townships and sections.

The survey of Township 1 North, Range 1 East was begun on November 25, 1815, by Charles Lockhart, deputy surveyor, with Jacob Fyzar and Booker Davis as chainmen, beginning at the point of intersection. This same crew began the survey of the east boundary of this township early in January, 1816.

The survey of the east boundary of Township 1 North, Range 1 West, was begun on November 11, 1815, by Robbins.

The south boundary line of Township 1 North, Range 1 West, was begun by Brown, who surveyed the base line from the Mississippi to the Arkansas river

The survey of the east boundary of Township 1 South, Range 1 East, was begun by William L. May, who failed to list the members of his party, November 26, 1815, at the northeast corner of the township, six miles east of the point of intersection.

The survey of the south boundary of Township 1 South, Range 1 East, was begun by Mr. Brown December 12, 1815, with Nathan Myers and James Lucky as chainmen, and Nathan Gilpin, marker.

The survey of the east boundary line of Township 1 South, Range 1 West, was begun by Thomas Cox, deputy surveyor, with Junius Robinson and Benjamin Fort as chainmen, at the northeast corner of the township, on December 2, 1815, and proceeded south.

The survey of the south boundary line of Township 1 South, Range 1 West, was begun by Stephen Rector, who fails to list the members of his party, on December 1, 1815.

Surveying Sections.

The subdivisional survey of a township was usually begun at a point a mile west of the southeast corner, at the corner of sections 35 and 36, and continued by running north between these sections and establishing the quarter section and sectio corners and marking the witness trees. For the quarter section corners, two trees, generally, were marked, each in an opposite direction from the corner post, and for the section corners four were marked, one in each of the four sections having the common corner. On all north and south lines, generally, only one survey was made; while on the east and west lines, a random line was run, usually east, on which temporary corners were set. After this, the line was re-run west on what was called "the true line" and permanent quarter section corners set.

The subdivision of Township 1 North, Range 1 East, was begun by Byrd Lockhart, deputy surveyor, on March 13, 1816.

The subdivision of Township 1 North, Range 1 West, was begun by Thomas Cox, deputy surveyor, on December 12, 1815.

The subdivision of Township 1 South, Range 1 East, was begun by William L. May, deputy surveyor, on December 15, 1815.

The subdivision of Township 1 South, Range 1 West, was begun by Stephen Rector, deputy surveyor, on December 3, 1815.

Continuation of Base Line.

As previously stated, the base line was run by Mr. Brown to the Arkansas river. Thomas Rector, deputy surveyor, began at this point November 4, 1818, and continued the survey west for a distance of 60 miles, to the line between ranges 18 and 19 west, which is now the west boundary line of Saline county. James Trimble, deputy surveyor, with Walker Trimble and Sampson Price as chain carriers, and John Essary, marker, began at this point January 13, 1837, and continued the survey of the base line west for a distance of 36 miles, to the range line between townships 24 and 25 west, now in Montgomery county. The "Official Oath" was administered to the chainmen and marker by Elisha W. Owens, justice of the peace, in Conway county, January 13, 1837.

John E. Graham, deputy surveyor, began at the point where Trimble quit, on Wednesday, February 7, 1838, and continued the survey 24 miles, to the range line between ranges 28 and 29, now in Scott county. He states in his field notes that all of his assistants, except Martin Imbeau, became dissatisfied with the difficulties they were encountering and he decided to take a respite of about a fortnight to pay and discharge them and depend upon supplying their places with others. Accordingly C. S. Dillon, Jesse Rice, S. F. Gibbins and John Dominac left his service, M. Imbeau continuing, and in their stead Russell McBath, James Dodd, Gibson Robinson and Jesse B. Morgan were employed. The oath was administered to McBath and Dodd by Thomas M. McBath, justice of the peace, Saline county, January 16, 1838, and to Gibson Robinson by G. Whittington, judge of the County Court, Hot Spring county, January 19, 1838. He states that Jesse B. Morgan was only an assistant campkeeper and too young to take the oath or be engaged in any other service.

The boundary line between Arkansas and Louisiana was run by William Pelham, deputy surveyor, with Jeremiah Barnett and R. Munson, chain carriers, Kindwer Edwards and William Frazier, blazers, and Birmingham M. Clark, flagman, the oath of office being administered to each by Pelham. The survey was begun December 10, 1830, and they surveyed 11 miles on that day

VOL. IX. LITTLE ROCK, SUNDAY, OCTOBER 28, 1934. NO. 9.

Making a Map of Little Rock

Engineer R. C. Wilcox Has Encountered Some Difficult Problems — and Some Humorous Situations, Too — in Preparing a Base Map of the City as Part of Zoning Survey Project.

By EDGAR B. CHESNUTT

Did you ever see a landslide slipping? Well I have!

And there was nothing whatsoever about it that would suggest the slightest bit of the kind of romance woven into the familiar dream walking song that begins with just such a lilt as our opening sentence.

There was a scratching noise as an inking pen slipped along the straight edge of a celluloid triangle and came to an abrupt halt near the righthand corner of an enormous drawing board.

And just like that a couple of thousand acres of land in Pulaski Heights went skidding off to the northwest.

Yes sirree. a wholesale landslide. and yet not one little inch of dirt budged.

It was just one of the many "paper" landslides that have occurred—and in all probability will continue to occur—during the process of completing a large base map of the city of Little Rock, part of the city zoning survey being made under the supervision of R. C. Wilcox, an experienced engineer.

Many Causes.

Just exactly who is primarily responsible for the landslides is hard to say; in all probability a group of individuals and a complex series of situations and conditions are to blame.

But be that as it may, the fact remains that Engineer Wilcox and his aides daily are making changes here and there on this and that map of the city drawn in previous years, all because surveys have disclosed actual conditions vastly different from those charted.

There are many individuals who would surmise that a city—especially one as old and that has had so many talented engineers in its midst as has Little Rock—would be laid out with geometrical precision, the streets running due north and south, the blocks all the same length, and the intersecting avenues running due east and west. But nothing ever was any further from the actual truth, as any map of the city will show.

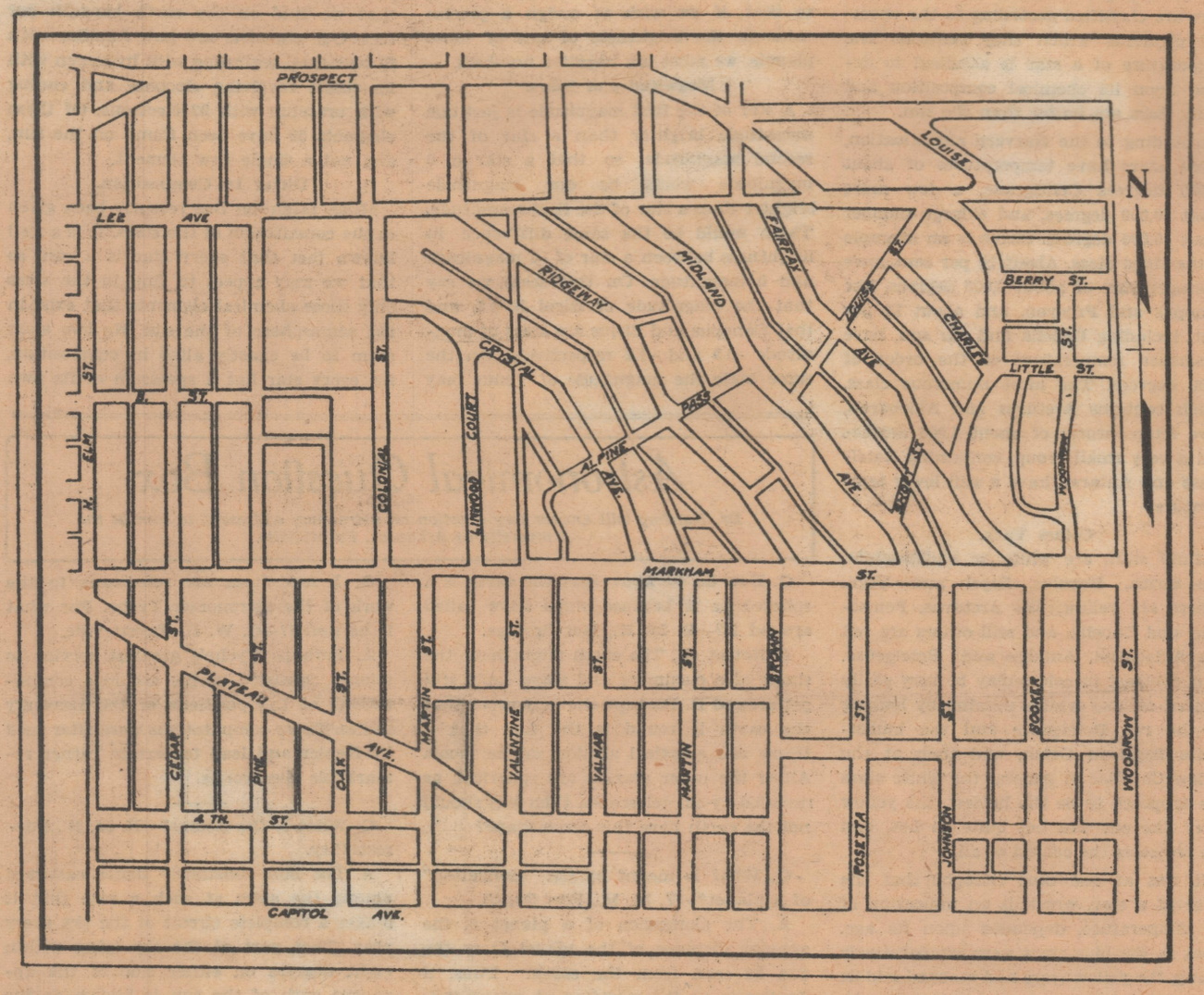
Although possibly with some expectation of contradiction, Engineer Wilcox frankly declares that the base map now under construction probably will be the first absolutely accurate map to be made of Little Rock within the last three-quarters of a century.

Such a statement may appear, at first thought, too brazen to be true, yet, all things taken into consideration, it may be seen easily how it could be possible, and not all blame attaches to the map makers themselves.

How It Happened.

Let's go back to the beginning and see how such errors could be made excusably. Without calling any names or using any dates, we'll tell you about a survey made when Little Rock was in its 'teens, generally speaking. The industrious engineer, confronted with countless handicaps, was conscientious and diligent in his work, but apparently far from complete. In his notes mention is made that his surveys take into consideration certain compass deviations. But he overlooked noting the all important fact of which way the deviation was made, north or south. It can be seen, then that engineers in later years, referring to his notes for basic facts in charting maps, very easily could be led astray.

And so on through the years. A little error here, another there, still a bigger one yonder, and so on, until the accumulated inaccuracies have amassed themselves into a glaring misrepresentation of proportion.



This map of a section of Pulaski Heights, with various curved streets, intersections at angles, and other irregular intersections, shows how easy it could be for errors to be made in making a map of it. It is but one example of difficulty that has been encountered by Engineer R. C. Wilcox in his work on a base map of Little Rock as a part of the city zoning survey he is making.

There was a map, for instance, made some years ago, which Engineer Wilcox dug out to make some of his calculations from in drawing his new map. He followed the scale as given in the legend on the old map, and before he knew it he found that on his new map that particular section on which he was basing the old map calculations was going way out of bounds. Not only did it cause a delay, but made it necessary that a new survey be made of that particular section and new and accurate field notes compiled.

A Street In Wrong.

It was not long before the draftsman got into that part of Pulaski Heights around Lee street. He found from his measurements that the not so very old map of Little Rock to which he was referring seemed to differ somewhat from the field notes made by workers on the City Zoning Survey. The notes and map were checked, and what was found? The entire Lee avenue section of the map already drawn was in reverse gear from Fairfax to Taylor.

This required another visit to the field, where a re-check was made. A summary revealed that the map already drawn had the off-set street intersections in most instances reversed. Too, the street was shown to be of uniform width on the old map, while the measurements in the field revealed blocks where the street varied as much as 60 feet.

Discovery of such an inaccuracy was far greater in the amount of trouble that it caused the map makers than might be imagined. It required not only a check on that particular street, but also necessitated the re-charting of all the territory lying north and west, shifting it over as much as 200 feet in places.

Numerous other faults in maps have been discovered. Street widths are shown inaccurately on the old maps, and re-checking has resulted in the forced re-location of numerous areas.

But inaccuracies in previous maps is only one disconcerting phase of the drawing of the new map, and the discovery of unusual things incident thereto.

Inconsistent Numbering.

For instance, there is the inconsistency in house numbering. For instance, on Midland avenue, in the Heights, the houses are numbered consecutively up to 424. Then they start at 512 and up to 520, dropping back again to 564. Across the street, the numbers run from 401 to 452, without any 500 block numbered.

Out in the White City vicinity another ununiform numbering arrangement was found. On Hays, Grant, Fillmore and Pierce streets the 2600 block is eliminated entirely. On Hays street the numbers run 2400, 25000 and then skip to 2700, while on Pierce street they run 2400, 2500 2700 and 2800.

And so on in various other communities. When he first got word of such mix-ups, Engineer Wilcox said he made an effort to learn what statutes were in existence governing the numbering of houses. There is none that he can find, he reported. He calls attention to the fact that the numbering of streets in the old original City of Little Rock are more uniform than in any other areas.

Alleys Involved.

Alleys have given no end of trouble in drafting the new map. On old maps apparently no attention was given to the city laws defining exactly what alleys are. he said. If there was a strip of empty land running through the middle of the block and it was open and being used, it was designated on the maps as alleys. But Engineer Wilcox contends that any map to be accurate must stick to facts, and he says that until an alley has been opened and dedicated to the city and accepted by the City Council, it is not an alley in the legal sense of the word.

Taking the old maps, and the reports of the field workers, and going back through the old City Council records and other files and attempting to determine accurately just which alleys are alleys has been no easy task, and one that still lacks a lot of being finished, Mr. Wilcox says.

Many Additions.

From the original city of Little Rock, the present Greater Little Rock has evolved itself through innumerable divisions and sub-divisions and additions of some sort or another, without thought of uniformity in streets, alleys or boundaries, and all of these additions have only served to further befuddle things from the standpoint of map making, he says.

It is due to this steady growth of the city that are so many offsets in streets, curves and blind endings in avenues, he thinks.

He cites one instance in particular. Engineers were charting the principal thoroughfare for a new addition. One group started at the north end of the addition and the other at the south. They worked toward each other. When they got even, the centers of the street were nearly as far apart as the width of the street.

Non-Existent Streets.

And there is still something further that the map making has disclosed, something that to Engineer Wilcox is actually humorous. There are streets on previous maps that just don't exist, and others that

(Continued on Page 2)

168

Uniform Maps To Be Drawn For Counties

Arkansas maps of uniform size for use by all state departments making use of maps will be available in the future. An agreement for such uniform maps was reached today at a conference of representatives of five state departments.

Under the arrangement, two sets of tracings of maps of each county in the state will be made on a uniform scale. One tracing will be merely an outline map of the county, while the second will follow this outline on the same scale but will include railroads, highways and similar designations.

The state highway department agreed at the meeting today to provide the two tracings for counties in the western half of the state. The state geological survey will provide maps for the north and eastern counties, and the forestry commission will make tracings for counties in the southern section of the state.

Today's meeting following proposals made several weeks ago for coordination of work in such a way that the various state departments would have access to maps of uniform size. The session was held in the office of Dr. George C. Branner, state geologist.

Represented at the meeting were delegations from the department of education, forestry commission, highway department, planning board and geological survey.

Adoption of Uniform Base Map To Be Considered Today.

April 21, 1936

Representatives of several state departments frequently using county base maps will meet at the office of Dr. George C. Branner, state geologist, today to consider adoption of a uniform base map for all counties. Heretofore the departments have used maps of varying sizes. It is planned to adopt a uniform scale so the same type of map can be used interchangeably by all state departments. The Department of Education, state Forestry Commission, Highway Department, Planning Board and Geological Survey will be represented at the meeting today.

Wealth of Information in These Jig-Saw Maps for Agencies Planning Future Developments in Arkansas

6-17-34 Gazette

Aerial photograph showing Arkansas river (upper left) and part of horseshoe-shaped Belcoe lake, once a part of the river channel, in Desha county. Also visible is the levee running between the lake and river. This is one of the innumerable pictures made from the air which are being used in photo-mapping of Greene, Lincoln and Desha counties.

Results Obtained From Photo-Mapping of Greene, Lincoln and Desha Counties Leaves No Doubt of Advantages That Will Accrue if Similar Projects Carried Out in All Sections of State.

In the office of W. C. Holland, federal geological surveyor, at 219 West Seventh street, are 62 maps with what at first glance seems to be pasted-up jig-saw puzzles, all in shades of gray.

Second glance, and a few words of explanation, reveal that on those 62 pieces of heavy beaver board is information that should be of inestimable value to the state of Arkansas in years to come.

They are aerial photographic mosaics of Greene, Lincoln and Desha counties, and are the product of seven months of arduous work at the hands of a crew approximately 100 highly-trained civil engineers.

Photo-mapping is the familiar name for the work, started last December as a federal CWA project under the direction of the Department of the Interior, United States Geological Survey, and later re-classified as a state CWA project.

Two Main Objectives.

Objects of the survey were two: To provide work for unemployed engineers of the state, and to produce maps and data that will be of permanent value to the federal, state and county governments.

Both objects have been achieved, but the second doubly so. Although the survey will not be completed until July 1 (it's all over but the pasting), many of its results already may be tabulated.

For the maps show, so distinctly that even a jig-saw puzzle fiend of 10 could see it, "the lay of the land," and they show it in a way that cannot be denied, for the maps were made from actual photographs, taken by United States Army engineers.

The entire alluvial valley has been photographed from the air before, but only for flood control purposes, and the results were not put together in mosaics. On the contrary, they were used to build up a base map, and that in turn used to build up a contour map, on the scale of one inch to a mile.

This scale, Mr. Holland said, was too small for detailed study of any worth. Consequently, the mosaics have been "built" on a scale of one inch to 2,000 feet or two and a half inches to a mile.

A Complete Picture.

When completed, the maps will show every detail—woods, streams, fields, buildings, fences, roads, section lines and property owners—of each of the 1,130,880 acres in Greene, Lincoln and

The greatest value of the maps lies in their usefulness as bases for planning, for, said Mr. Holland: "It is a well known fact that federal, state and county activities are badly handicapped by lack of accurate information regarding the character of the land, the distribution of its people, location and size of parcels of land which is now in use or should be in use."

They should be of immeasurable assistance to the newly organized state Planning Board, Mr. Holland thinks, for they give "a picture of the whole thing right before your eyes," which "can't be beat" in planning.

Some Specific Uses.

For planning river development the maps show which streams are navigable, which are not; where the overflows and whirls have occurred; by what tributaries the district is drained; where to stop different courses taken by the river.

For park and playground development the maps show the wooded areas, the open uncultivated areas, the lakes and bayous.

For forest conservation, they show the marginal and sub-marginal lands, the virgin forests and the cutover woods, how much area is wooded, and soil erosion.

Indicating trends in population, the maps show location of all buildings, show over-grown clearings which have been abandoned, show inter-twining of highways and railroads.

As an aid to agricultural development, the maps show soil erosion, terracing, types of soil and sub-marginal lands.

In highway development, the maps will be useful because they locate old roads, show pathways for new routes, so that highways may be planned from the map without even getting into the field until the highways are ready to be laid out.

In appraisal of land for tax assessment or loans, the maps may be consulted to determine land under cultivation, distance of farms from roads and cities, drainage of farms, erosion, and absolute value of that land in relation to other tracts around it.

Still Other Uses.

Other uses to which the maps may be put are: Making soil surveys, making topographic surveys, census enumeration, forest fire control, geological

tion for these uses, Mr. Holland said.

"Agencies planning for the future needs of our country can plan intelligently, and absolutely eliminate guesswork by these means," he said. "After all, a plan made on absolute facts is the best and cheapest plan.

"The use of these maps in planning will save thousands and thousands of dollars for your state because with accurate maps you can plan accurately and intelligently. It is not a hit or miss system."

A Few Tangible Results.

Some of the more tangible results of the maps, as interpreted by Mr. Holland, are:

Cultivation—Greene county, the maps show, is practically all under cultivation, but all by small property owners, farming an average of 60 acres apiece. In Lincoln county, less land is farmed, but in plots averaging 120 acres. In Desha county, less than 25 per cent of the county is under cultivation. The other 75 per cent is densely wooded, with practically a monopoly held on its tracts, all large, by outside interests.

Relocation of the old section lines, laid out by the federal government in 1820 when Arkansas, a new territory, was first surveyed. Many of the old lines existed today only on paper. The photo-mapping survey has relocated them. The results of this relocating of lines are many, chief of which is the definite settlement of property encroachments, long a matter of fierce dispute and mortal feud.

Location of the shifting of the Mississippi river, showing that a good deal of eastern Arkansas now is in western Mississippi and much of western Mississippi in eastern Arkansas. These variations evidently have not been noted before, and certainly not surveyed, Mr. Holland said, for old tax records in Desha county still contain descriptions of the original survey. The present project has been carried up to the original sectional lines, but no attempt has been made to certify the ownership of the accretions because they were not originally sectionalized.

Stupendous Task.

In assembling the mass of information necessary for a complete mosaic, 7,190 property owners were consulted in regard to the property on the 1,130,880 acres or 1,767 square miles in these three counties—no small task for a peak working crew of 137 men.

Federal Workers to Make Air Maps of This Section.

JAN 3 1935

Mapping of this section of the nation as part of a government project to bring all government maps up to date will be started in a few days by Chet Charles, pilot, and T. R. Hurlbut, mechanic, both of the Bureau of Air Commerce, Department of Commerce, and Henry Dilts, checker for the Coast and Geodetic Survey.

The three arrived at Municipal Airport late Tuesday in a Department of Commerce Stinson monoplane. Approximately 80 hours' flying time will be required for the mapping which will include territory 260 miles east and west of Little Rock and 160 miles north and south. All of Arkansas and parts of eastern Oklahoma and western Mississippi will be included.

Jefferson County to Be Mapped From Plane

Democrat 8-25-36

Pine Bluff—The government's work of making an aerial map of Jefferson county to be used in connection with the agricultural conservation program will be started in a few days.

The county will be completely mapped by photographers in airplanes and later when the map is completed, spot checkers will identify the various crops on the map.

A part of the border of Jefferson county was photographed by air-map-makers last year when Arkansas county was photographed in connection with the government program and it will not be necessary to rephotograph this part of the county.

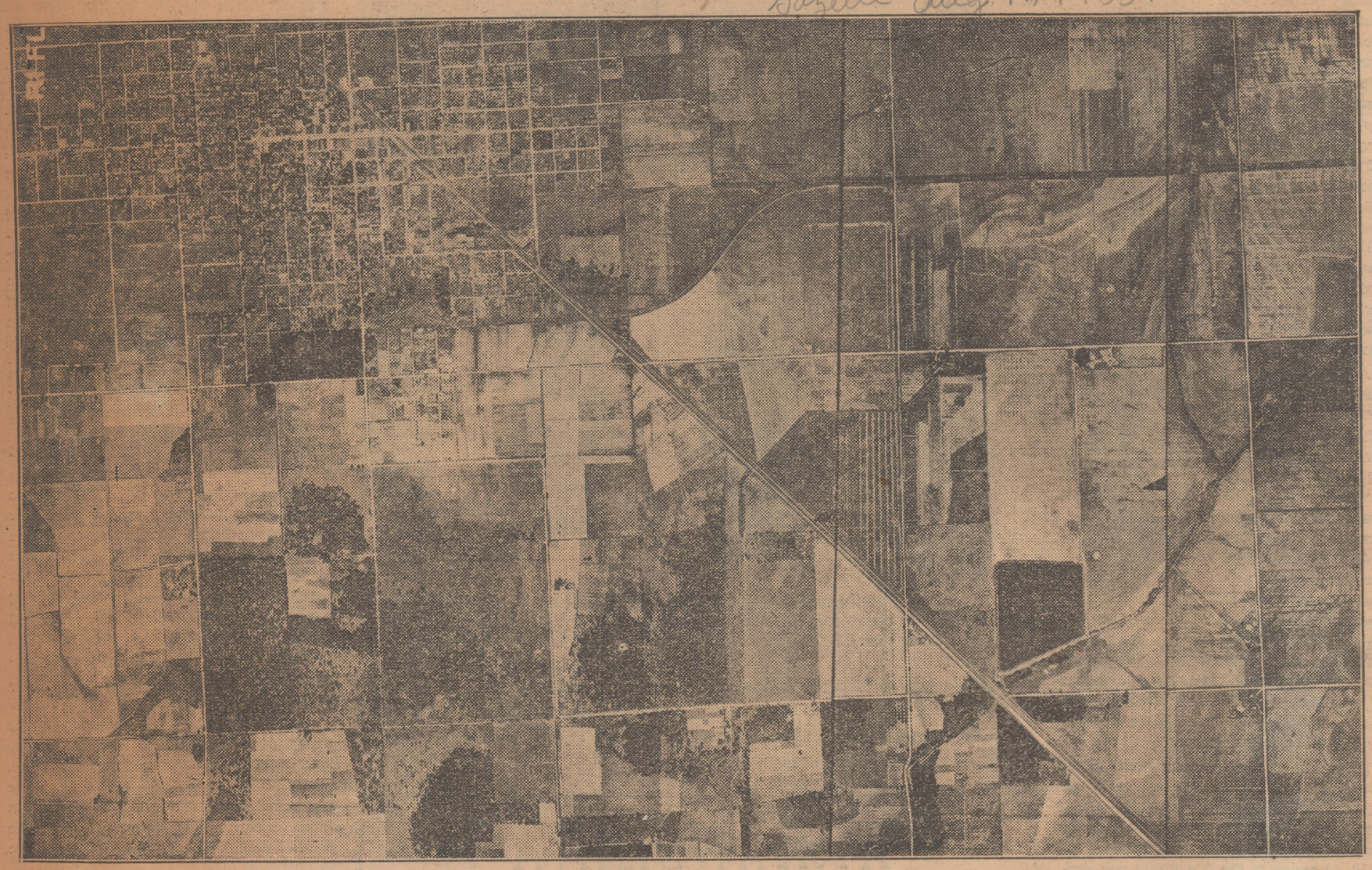
Jefferson is one of about six counties where aerial maps will be made instead of sending out measuring crews.

170

Measuring Land By Air

The Acreage Reduction Agreed to by Arkansas County Rice and Cotton Farmers Are Being Checked This Year by Measurements From Photographs Snapped 14,000 Feet in the Air.

Gazette Aug. 11, 1935



A section of an aerial map of Arkansas county for use in checking rice and cotton compliance contracts. The vertical lines at the right show how the pictures overlap. The town in the upper left is Stuttgart. Note how clearly each tract of land is discernable.

Something new in the way of land measurement is being introduced this year to farmers of Arkansas county who are co-operating with the Agricultural Adjustment Administration in its crop reduction program.

Their acreage contracts are being checked, not by crews of surveyors with chain and compass, but by measuring photographs that were taken from an airplane roaring through the sky three miles from the ground at the rate of 80 miles an hour.

And from what Compliance Supervisor Lloyd D. Dhonau says, this new project is proving highly successful—as well as mighty interesting, to both farmer and compliance worker.

Arkansas county is one of five farm areas in the United States where aerial surveys are being utilized this year in compliance work. Wheat acreage in Washington state, cotton in Texas and Carolina and corn-hog contracts in Missouri are also being checked by this method.

Because of the greatly reduced cost and increased benefits of the aerial survey system it is expected that many more sections will be introduced to the new scheme next year.

This year the rice production quota for Arkansas county was fixed at 70,194 acres and the cotton quota at 23,446 acres. Each farmer contracting to co-operate in the program was allotted a definite acreage of each crop.

It is the duty of Mr. Dhonau as compliance supervisor to see that each farmer fulfills his contract exactly, not growing too much or too little rice or cotton.

The difficulty and expense involved in making land surveys of each of these crops in the county is not hard to understand. Not only has the aerial survey method proven much less expensive, but it has expedited the work far more than had been expected.

The Arkansas county survey was made by the P. R. Papin Aerial Survey Company of St. Louis. The contract was for about $3,700, or several thousand dollars cheaper than the most hurriedly done ground survey could have been made.

During the taking of the pictures the aerial survey company made headquarters at Toney Field, Pine Bluff, where there were hangar facilities, railroad connections and other advantages.

The flying required for making aerial photographs presents difficulties that call for experience and skill on the part of both pilot and photographer. Usually the team has worked together for several years. In the case of the Arkansas county survey James H. Gray, the pilot, and Paul J. Crause, the photographer, or cameraman, have been teamed for three years. Prior to the time they started working together each had done the same work for three years previously. Both are former members of the United States Army Air Corps.

By a little experimenting they discovered that the best pictures of the rice country could be obtained during the morning because of the position of the sun, and they made their pictures from 8:30 a. m. to 12 noon.

Their plane was equipped with special instruments for the photography. An expensive and sensitive altimeter enabled the pilot to remain on a level line of flight at an altitude of 14,000 feet. An unusually sensitive drift indicator made possible a straight line of flight. In addition to the assistance of these instruments, the flights were charted along section lines, assuring still better accuracy.

The photographer sat behind the pilot and operated a $2,000 aerial camera, equipped with a special lens. The camera was capable of snapping a picture encompassing an area 7,000 feet long and 9,000 feet wide. The plane was kept at a constant speed of 80 miles an hour and the shutter on the camera synchronized with the motor so that a picture was snapped every mile. Since the pictures themselves embraced an area nearly two miles wide, it is seen that each contained about half of the area taken in the prececding picture.

Thus, in assembling the finished pictures, the overlapping areas could be trimmed and only that portion of each picture in focus utilized in arranging the composite map of the area photographed.

At a height of 14,000 feet, the pictures conformed to a scale of one inch on the picture representing 1,000 feet on the ground.

Immediately after the pictures were taken, the pilot flying back and forth across the county, each time a mile away and also parallel to the previous flight, the prints were made and assembled on plyboard for field use.

The maps were assembled for each to embrace half a township. Then these half-township maps were given to the various township committees in the county, who took them to the various farmers and obtained from them designations of the fields seen on the pictures. Each plot was numbered.

This done, the maps are being brought back to the office of Mr. Dhonau, where the designated areas are being measured and checked against the quotas as shown in the crop reduction contracts.

The measuring of the various plots on the aerial photographs is another interesting part of the project. In some instances enlargements have been made of particular areas to increase the convenience in handling the maps. These enlargements are made exactly twice as large as the original picture, thus bringing the scale to one inch for each 500 feet of ground surface.

Just as scientific equipment in the airplane made the proper flying possible for the photographs to be made, so is a delicate little piece of mechanism brought into use to measure the areas that have been reduced to paper. This little instrument is a planimeter, one of the most fascinating and useful devices known to engineers. Its only use is for measuring the areas of plane surfaces.

The plainimeter has a stationary base and a movable arm with a pin point end. The arm can be moved about in any direction. Gears transmit to a graduated wheel the distance that the arm moves about. The planimeter operator fastens an aerial photograph securely to his desk, anchors the planimeter beside it and runs the pointed free arm around the boundary of any field he desires to measure, regardless of the irregularity of the border. On completion of the circuit the acreage is automatically registered on the graduated wheel. Each field is measured three times and readings taken each time to insure accuracy.

As is easily seen, the use of the planimeter makes it necessary that photographs be accurately scaled. In order to get the pictures as nearly as is possible to scale, a scale determination test is made, each fourth picture being tested for possible changes in altitude or direction.

The near correctness with which it has been possible to measure areas from aerial photographs has caused considerable favorable comment on the use of this method throughout the country, Supervisor Dhonau says. In Washington state, where wheat acreage areas were measured in this manner last year, he said, a group of check tests revealed a difference of not more than one per cent in areas of several hundred acres. He pointed out, too, that it was possible that the ground survey crews might have been off slightly in their measurements because the territory surveyed was hilly and rough and some variations that should have been might not have been included in the computations made on the ground.

As the measuring of the land from the aerial photographs progresses, field crews of engineers are constantly making tests to prove the measurements where noticeable differences are found to exist in known areas.

When the final acreage of each tract is measured from the aerial map, this plot is checked against the acreage of the individual farmer as shown in his contract. If differences are found a complete check of both contract and map area is made, and if there still is a wide difference, the situation is discussed with the farmer.

In most of the cases, Mr. Dhonau says, the farmers are ready to accept as final the measurements taken from the aerial survey, particularly after the method is explained to them fully.

But there have been some who have been doubtful about it and several tests have had to be made to convince them of the accuracy of the survey computations.

In the cases where there is doubt, Mr. Dhonau explains, it usually is where the farmer has heard the aerial photography plane over his farm, but has been unable to see it because of the great height at which it flew. The farmers are skeptical about a plane so high in the air being able to take pictures big enough for land to be measured from them down to the tenth of an acre. But as a whole there has been little trouble in utilizing the aerial survey successfully in the compliance work, he says.

As the work progresses, more and more uses of the aerial survey pictures are developing. In many instances the photographs have enabled planters to get their first clear and complete conception of what their farms actually are. This fact has caused several to begin planning improvements immediately that would not have been thought of if the map had not been seen.

The pictures reveal clearly the gullies, hilltops, land contours, location of each planted tract, and even large weed patches. Several farmers have ordered enlarged maps with a view of planning future crop rotation operations.

In Washington state last year a county assessor obtained a map of his county for use in fixing land valuation. It was found that by using the map many trips to the country could be eliminated.

In some instances county agents have utilized the maps for measuring the land in their counties to study land utilization, soil erosion control, weed control and other features.

B. E. Balmer, director of the Washington state Extension Service, in an address recently declared the development of the aerial survey maps one of the biggest advancements in recent years in agriculture.

"It parades in view every physical feature of any farm," he said, "It reveals the entire range of man's relations to the earth. It shows man using and living on the earth, involving abode, farmstead, windbreaks, shelter belts, tillage, drainage, irrigation, crops, pastures, meadows, timber, soil types, erosion, farm organization, land utilization, land planning, highways, markets, roads, public utilities, schools, wild life, recreation, social institutions, co-operative action and responsibilites to and service from the government."