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FINAL REPORT

FEDERAL AID IN WILDLIFE PROJECT 14-R.

A Survey and Evaluation of existing Wildlife Habitat
in southern Camden County, New Jersey.

January 15, 1943 — February 29, 1944

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NEW JERSEY (STATE) ^{Board of} FISH AND GAME COMMISSIONERS

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FOREWORD

The Lower Camden County Game and Fish Association requested the New Jersey Board of Fish and Game Commissioners to conduct an ecological study of southern Camden County, New Jersey, for the purpose of establishing a basis for future distribution of propagated farm-game species.

The members of this association have displayed a keen interest and enthusiasm in the maintenance and increase of desirable game species in the State, and it has been a pleasure for the Board of Fish and Game Commissioners to cooperate with this outstanding group of sportsmen.

This paper is a final report of the requested study, and it is believed that the distribution of game in accord with the recommendations as set forth herein will result in increased wildlife numbers in southern Camden County to a degree allowed by present habitat conditions.

Grateful appreciation is given to John Pearce, United States Fish and Wildlife Service, who offered helpful criticism; Maurice F. Aaron and Frank C. Schramm, of the New Jersey Forest Fire Service, and Leeson Small, manager of the vast Joseph Wharton Estate, for their generous permission to consult aerial maps of certain sections of the area studied.

Acknowledgment is made to the following residents for their aid in verifying place names for the completion of the cover type map: Oliver Bennett, John Anlage, C. Earl Lounsberry, Raymond Moffett, Nicholas Strock, George E. Reed, Theodore Townsend, Clarence Johnson, Edward Shoemaker, Sr., Joseph Murray, Belmont Batten, William Bishop, Clive Williamson, and others too numerous to list here.

Further acknowledgment is certainly due the many property owners who cheerfully permitted invasion of their lands by the field worker of the Game Management Division of the New Jersey State Fish and Game Commission during the course of the study.

FINAL REPORT
FEDERAL AID IN WILDLIFE PROJECT 14-R.

AN ECOLOGICAL STUDY OF SOUTHERN CAMDEN COUNTY, NEW JERSEY.

The members of the Lower Camden County Game and Fish Association have been of the opinion that a definite need existed for more detailed information concerning the potential habitats of the small game species in southern Camden County, New Jersey. As requested by them, the Game Management Division of the New Jersey Board of Fish and Game Commissioners in cooperation with the United States Fish and Wildlife Service of the Department of the Interior, Washington, D. C. instituted an ecological study confined to that area. This investigation was made possible under the Pittman-Robertson Act, known as the Federal Aid in Wildlife Restoration Act, 50 Statute 917, approved September 2, 1937.

The field work of this project, 14-R of the New Jersey program, began on January 15, 1943. Shortage of man-power for other seasonal work forced the temporary discontinuance of the study during the months of May and June (1943). Work was resumed on July 2, and continued to February 29, 1944, comprising a total study period of eleven and one-half months.

This report contains a brief general description of the physical and topographical characteristics of southern Camden County, as wild game numbers are limited to a considerable degree by soil conditions and the distribution of the plant life. A brief review is presented of the principal industrial and agricultural efforts of the past in relation to their influences in modifying the original environment. Forest and farm practices of the present time are discussed. The principal game species inhabiting the study area and the hunting pressures to which they are subjected are considered. Some principles of the ecological succession of plant life, and what largely determines the kind and extent of the various wild game habitats are reviewed. An explanation is given of the method utilized in applying these principles to the construction of the cover type map of southern Camden County included with this report. Following a detailed evaluation of the various wild game habitats within the study area, recommendations for re-stocking them with small game species are presented.

BRIEF DESCRIPTION OF THE STUDY AREA.

This ecological study was confined to the southern portion of Camden County, as indicated by the cover type map, and constitutes approximately 151 square miles. It includes the townships of Waterford, Winslow, Gloucester, Berlin, and Voorhees; and, the boroughs of Chesilhurst, Berlin, Pine Hill, Clementon, Lindenwold, Laurel Springs, Stratford, Gibbsboro, Somerdale, Pine Valley, and Hi-Nella. It also comprises a part of the borough of Magnolia. The entire area is bounded by the counties of Burlington, Atlantic, and Gloucester, on the east, south, and west, respectively. Evesham road forms its northern boundary.

The population of the study area is 30,992. This figure has been computed by totalling the populations of the seventeen townships and boroughs as based on the 1940 census. Table 1 presents the population, area, and persons per square mile for each municipality. The average population density per square mile of the whole area is 206 persons; a maximum of 2535 is reached in Laurel Springs Borough, and a minimum of 15 exists in the Borough of Chesilhurst. It is to be noted that the combined areas of Winslow and Waterford townships is approximately 91.3 square miles with a population density of 83 persons per square mile; whereas the total area of the other municipalities is approximately 59.4 square miles with

an average of 393 persons per square mile. The comparatively high population density of the fifteen municipalities in the northern half of the study area indicates, to some degree, the extent of land utilization in that portion for industrial and residential purposes.

Table 1.
Area, Population, and Population Density of
municipalities in southern Camden County, N. J.

Municipality (Boroughs)	Area (sq.mi.)	*Population		Population Density	
		1940	1930	1940	1930
Berlin	3.65	1753	1955	480	535
Chesilhurst	1.98	308	298	15	15
Clementon	2.28	2866	2605	1257	1142
Gibbsboro	2.06	713	622	346	301
Hi-Nella	0.22	203	160	922	727
Laurel Spgs.	0.53	1344	1343	2535	2535
Lindenwold	3.52	2552	2523	725	716
Magnolia (part)	0.30	504	495	1670	1650
Pine Hill	3.93	1537	1392	391	354
Pine Valley	0.81	27	40	33	49
Somerdale	1.37	1170	1151	854	840
Stratford	1.45	980	958	675	660
(Townships)					
Berlin	2.63	1771	1537	673	584
Glouster	22.43	6198	5820	276	259
Voorhees	12.28	1450	1405	118	114
Waterford	35.33	2750	2421	77	68
Winslow	55.98	4866	4744	86	84
Total	150.75	30992	29469		

* Federal Censuses.

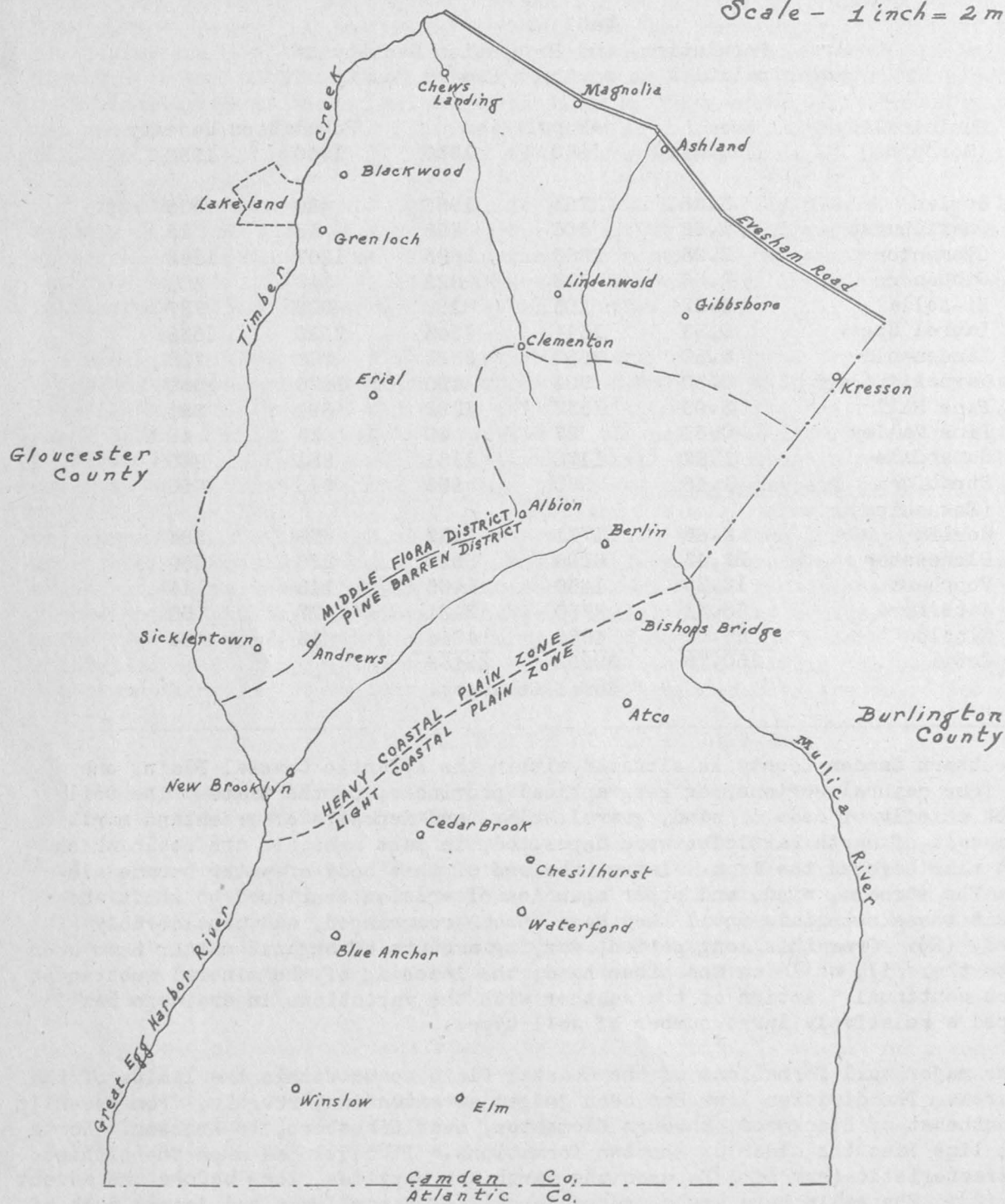
Southern Camden County is situated within the Atlantic Coastal Plain, one of the four natural regions, or geographical provinces, of the State. The soil consists chiefly of beds of sand, gravel, clay, and deposits of greensand marl. These masses of earth particles were deposited, in past ages, in the ocean which at that time covered the area. Later, the bed of this body of water became elevated. The streams, wind, and other agencies of erosion continued to shift and redeposit these materials until they have become rearranged, and considerably modified. (2). Over this long period, varying amounts of organic matter have been added to the soil, while on the other hand, the leaching of the mineral substances has been continual. Action of the weather with the variations in drainage has developed a relatively large number of soil types.

Two major soil formations of the Coastal Plain occur within the limits of the study area. The division line has been judged as extending, roughly, from one-half mile southeast of Blackwood, through Clementon, near Gibbsboro, to Kresson. North of this line lies the older of the two formations. It developed when the highest and characteristic form of life upon the earth was reptiles, long before the advent of man (2). The soils here are composed largely of sandy loams and loams, much of which contains marl and greensand. The surface of the ground is more or less rolling and well-drained, with a fair agricultural productivity. Locally along the principal streams, particularly Big Timber Creek, the land becomes more rolling and steeply sloping. The elevation ranges from the tide-water level of Big Timber

Federal Aid in Wildlife
Project 14-R
Camden County (in part).
New Jersey.

Map of Study Area
showing Coastal Plain
Zones, and Floral Districts.

Scale - 1 inch = 2 miles



New Jersey Fish and Game Commission.

Approved by L.G. MacNamara.
Drawn by Chas. W. Wright.

Creek to a maximum of 198 feet above mean sea level on a knoll situated between Glendale and Kresson in Voorhees township. No rocky eminences occur, and the low rounded hills or knolls are earthy. It has been stated that they are the results of denudation or erosion (2). The streams flow in a general northwesterly direction, and are tributaries of the Delaware River. The tide ebbs and flows in the North and South Branches (and one tributary of the latter) of Big Timber Creek. The extreme reach of normal tide is about one-half mile below Blackwood in Gloucester township. Portions of these branches totalling about six miles in length provide the only tide water within the study area.

The other major soil formation of the Coastal Plain within southern Camden County occurs south of the previously mentioned dividing line. This formation is of a more recent origin. It developed when mammals had become the highest form of life on the earth. The surface of the ground in this portion of the study area is generally low and flat. Only a few low, earthy hills or knolls appear. The entire surface of this formation is believed to have been covered, many years ago, with a drift-clay and gravel. Such surface soils still remain in some places, but the action of rain and water, over an extended period, has removed these substances from many areas. This is said to have given origin to the sandy tracts so common in southern New Jersey (2). Sand and sandy loams of low agricultural productivity are now predominant, and heavier soils are quite limited in distribution. The elevation above mean sea level ranges from approximately sixty feet near the main streams to two hundred fourteen (214) feet on a knoll, known as Stony Mount, in Voorhees township, about one and one-half miles northeast of Berlin. The streams flow in a general southerly direction through this portion of the study area, and eventually drain into the Atlantic Ocean. Because of the nearly level surface the streams flow sluggishly, and are usually bordered by relatively wide swamps and poorly drained areas. It has been stated that the streams, unlike those of the northern part of the State, have no apparent connection with the geological structure of the country and are simply channels worn in the surface of the ground, following the lines of most rapid descent to tide water (2).

The climate of southern Camden County is regarded as temperate with a high humidity. The mean temperature in winter is about 32 degrees F., and in summer, approximately 72 degrees F. Rainfall is generally adequate and fairly well distributed throughout the year. The annual average is approximately forty-four (44) inches. The earliest frosts usually occur about October 18, and the latest about April 25. Snowfall is usually light. It may be said that the climatic advantages possessed by Camden County are favorable to the conservation of its wildlife population.

The forest growth in the study area may be divided into two zones, related to those of the soil formations already discussed. It should be noted, however, that the division line of these vegetational zones does not coincide with that of the soil formations. Map No. 2 provided with this report shows the floral division line as extending across the study area from just south of Kresson, to Clementon, thence to Albion, Andrews, to a point just south of Sicklertown. That portion of the study area north of this line is situated within what is known as the Middle District, while that portion south of the line is called the Pine Barrens (10). There is a considerable variation in the kinds of vegetation inhabiting these two zones.

Approximately two-thirds of southern Camden County is situated within the Pine Barren district. Due to soil conditions, the flora is not so rich and varied; but it may be said that 91 families, 234 genera, and 555 species of native plants are represented, (4), which rather belies the name "barrens". The chief upland species of trees in this zone are those known to the sportsman as pitch pine, and the several species of oak. Red maple, sour gum, white cedar, and magnolia are the

characteristic species of the swampland.

In the Middle district, various species of oak are predominant on the upland. Pitch pine is rare, being replaced, in some instances, by the species commonly called scrub pine. Old fields generally become overgrown by sweet gum. Red maple constitutes the characteristic tree species of the stream bottoms and moist woodland. Beech, tulip, and sweet gum, are fairly common, and may be found oftentimes growing in association with the red maple. Buttonwood, elm, and locust also appear in limited numbers throughout the district.

THE INFLUENCE OF ECONOMIC PROGRESS ON THE WILDLIFE HABITAT.

The development of a wild game population is dependent upon many natural conditions, the true relationship of which must be determined by extensive study. This involves consideration of many factors, which are continuously modifying the environment, directly or indirectly. These factors react upon one another, and the whole study can become very complex. Many sportsmen, when endeavoring to increase wild game populations, overlook a very important and fundamental influence on the solution of their problems. Actually, it is the basis upon which wild game, and man as well, depends for existence. It is the soil. Nature has protected and conserved the soil from the wind, rain, and sun by a mantle of vegetation. Wild game species utilize this vegetation as a place in which to live and to obtain food. As this plant life also provides shelter from the elements and natural enemies, it is often referred to as "wildlife food and cover". Whenever the conditions of the soil are modified by some disturbance, a change can occur likewise in the vegetation growing thereon. This may have a direct and marked effect upon the welfare and numbers of the wild game species in that area.

Among such disturbances can be a lowering or raising of the water table, caused by draining or flooding, which reduces or increases the natural moisture content of the soil. The cutting of timber and the clearing of land exposes the soil to direct sunlight, wind, and rain which under some circumstances, may cause the soil to bake, to wash, or to blow away. Fire can produce similar effects, and under certain circumstances, the fertility of the soil can be reduced to such a degree that the process of revegetation may be very slow.

It is obvious that such disturbances are usually caused by man. In his endeavor to gain a livelihood he has used and misused the soil, often with a detrimental effect upon wild game. When it is recalled that the earliest settlements in southern Camden County were made more than two hundred fifty years ago, one realizes the extent to which the soil and its by-products have been subject to exploitation. The demands made on the timber supply by the early settlers was, of course, necessary and just. The wood was essential for the building of dwellings, ships, and so on. It provided the only available fuel for many years. Agriculture was not possible until the land had been cleared, and most of the men of that day engaged in lumbering as an occupation. It is unfortunate, nonetheless, that this timber supply was harvested in such a manner as to cause damage to the soil, the waterways, and the wild game population. It is even more unfortunate that destructive methods still prevail, both in the woods and on the farms. In recent years, state and national agencies have been guiding some of the farmers in saving their soil and in managing their woodland, through practical methods and advice. This is encouraging to wildlife conservationists. During this long period of economic development, a few compensating factors have been operating and which have been more or less favorable to the increase of certain wild game species; but, an overall picture of the period shows it to be one of considerable waste and mismanagement, with a detrimental rather than a beneficial effect upon the wild game population of the area.

Probably the earliest industrial effort made within the study area and which modified certain wild game habitats was the operation of grist and fulling mills. These were erected first in the northern portion, no doubt due to the advantages offered by the navigable streams. As water-power furnished the necessary means of operation, the mills were situated, necessarily, on the headwaters above tide limits. In order to utilize this power, ponds were formed by the erection of dams across the streams. The impoundments of the water with the accompanying changes in the plant growth of the stream bottoms that must have followed, was probably beneficial to the wildlife of those areas. Several of the present lakes in the area had their origin by this early industry.

In those early days, Camden County was heavily wooded, chiefly with species of pine. White cedar was growing in dense stands along the streams of the Pine Barrens. The timber supply seemed inexhaustable to the comparatively few inhabitants. With the coming of the sawmill, the lavish and indiscriminate cutting began, and proceeded with no apparent consideration of the future supply. The mills increased in number until most of the streams in the County had been utilized, at some time, for this purpose. The names of many such sites still prevail, such as Bate's Mill, Little Mill, Burnt Mill, Hay's Mill, and many others. This flourishing industry continued to make such heavy demands upon the forests that eventually all the virgin timber had been removed. The lumbering of the vast white cedar stands was in full blast in New Jersey more than two centuries ago (3), and continued until after 1900. Such rapid inroads were made in these stands that only remnants remain today (4). Because of the methods used in harvesting this crop, the habitat in which it grew was altered to such a degree as to render it more favorable to the growth of the less valuable red maple. This species is now predominant in most of the swamps and stream bottoms of the area. Wildlife lost an excellent haven from the cold and from its natural enemies by the removal of these dense white cedar stands.

Another old industry in southern Camden County has been the burning of charcoal. It held an important place in connection with other old industries, such as the manufacture of glass and the smelting and forging of bog-iron ore. The widespread occurrence of the old pits of the "cone furnaces" throughout the Pine Barren section of the study area is evidence of the extent of these operations. Probably the most extensive modification of the wild game habitat in this area occurred through the enormous amount of timber that was converted into charcoal. Old inhabitants of the Pine Barrens state that a successful bog-ore furnace, such as was erected at Atsion, required at least 20,000 acres of timber land for its supply of charcoal (1). As in most cases of timber removal, the influence exerted on the environment as a habitat for wild game was determined largely by the topography, location, extent and method of operations. The clear cutting method of removing this pine timber for utilization as charcoal, together with other unsound forestry practices generally had a detrimental effect upon the soil. However, one influence exerted by this pine timber removal has been an increase in the distribution of the oak species. From a standpoint of food supply, this is beneficial to most wild game species. Also, it has temporarily increased the acreage and distribution of brush-land. And in some instances it has provided desirable edge-effects with their greater variety of vegetation.

An examination of portions of the stream-bed of the Mullica (or Atsion) River will reveal the alterations that have occurred through excavations made by a former industry. The eastern boundary of the study area for a distance of nine miles is formed by this stream. For nearly its full length, on either side, lies one of the largest deposits of bog iron ore in New Jersey. A forge and furnace was erected during the Revolutionary War at Atsion, about one mile from the study area, for the utilization of this resource. This plant remained in operation about eighty-five years. During these activities, a canal was dug for a distance of about one and

one-quarter miles, connecting the Mechesautuxen (Hay's Mill) Branch with the Mullica (or Atsion) River, in order to obtain a greater head of water for the forge. This canal is known locally as "Salter's Ditch", and is utilized by deer and other wildlife species. It scarcely needs mention that during the industrial period of this area, the surrounding pine lands were peopled as they never were before or have been since. After the discontinuance of the iron industry, paper and cotton yarn manufacturing plants were erected on this site. These led to the construction of a railroad through the pine woods from Atsion to Atco. It was abandoned after the turn of the century, and did not result in any permanent economic development. Some modification of the vegetation along this road resulted through interruption of the normal drainage in the several low areas through which it passed.

Southern Camden County is fortunate, economically, in possessing extensive deposits of glass and molding sands, and other soil resources. The utilization of glass-sand dates back to the days of the glass-houses, which were in operation at Waterford, Winslow, Jackson, Tansboro, and Atco at various times during the most of the nineteenth century. The sand pits were situated usually near the plants, and later, along the railroads where the transportation was easier and cheaper. It is believed that no mass influence was exerted upon wildlife habitats by this industry. As it operated only locally, probably the only direct disturbances were the excavations made to obtain the sand, the removal of a considerable quantity of timber for use as fuel at the plants, and the activities of a greater concentration of employed persons in the vicinity.

Clay has been dug extensively in Winslow township for the manufacture of bricks. The operation of this industry also involved excavations, about eight of which may be found in the vicinity of the town of Winslow. Most of these water-filled pits are deep, but are not extensive in area. Several are spring-fed, and in close proximity to small streams to which they appear to have some underground connection. The water does not stagnate, and it often assumes a bluish color. A clay deposit has replaced the original top soil along the shores, and the plant growth is sparse and slow. Despite their nature, they are occasionally visited by wild ducks and other species of wildlife. During the operation of these pits, railroad spur lines connected them with the factory. Although abandoned for many years, the vegetation growing along these old spur lines is varied, and decidedly different from undisturbed areas in the vicinity. Two large clay pits occur near Florence, about six miles northwest of Winslow, one of which is deep and covers an area of eight to ten acres. It is used at present as a lake for recreational purposes. The other and older pit, of nearly the same area, is situated a short distance to the north. This one is dry, and practically bare of vegetation despite its abandonment nearly seventy years ago.

Marl was dug locally in southern Camden County fifty to seventy-five years ago. The pits still in evidence are few in number, and are confined to the vicinity of Blackwood, Kirkwood, Glendale, and Fox's Corner. It is stated that the Kirkwood pits yielded 10,000 tons annually about seventy-five years ago for use as a soil improver (2). These pits usually were dug close to streams to which the water from the excavations was drained by means of ditches. Some were kept dry by pumps, and after the marl was extracted, the pits were re-filled with earth. Several of these pits now present a fairly heavy and varied growth of trees and shrubs. Others are in a sedge and reed stage of succession. The banks of the pits usually are slumped down, and the centers are often swampy, boggy, or even actual ponds. The increased moisture and light in connection with the usually good soil conditions appear to accelerate the rate of growth of the vegetation in and around these pits. The definite benefit of these old areas to wildlife is evidenced by the constant degree of utilization by many species.

Commercial sand pits now operating throughout the study area do not exceed six or eight in number. The largest and most extensive pit is situated at New Freedom in Winslow township. Modern machinery is operated day and night at this plant removing tons of earth. Much of the deep pit is refilled after the sand has been removed by pumps. These refilled areas remain practically devoid of plant life for many years. Desirable wild game habitat is necessarily reduced by these operations. Other smaller plants are operated at Penbryn, Gibbsboro, Albion, Grenloch, and Chews Landing.

Considerable attention has been given here to the disturbing effects on the soil and plant life of southern Camden County, as exerted by man during past years. The facts presented clearly reflect that most of these economic processes have produced mass effects on the present wildlife environment of the area, and have placed limitations on future improvement. An understanding of these effects is indispensable to present and future conservation; and, while particular emphasis has been placed on certain mistakes, we are concerned in these only to the extent that the future may be better planned.

EARLY AGRICULTURAL PURSUITS

The early settlers engaged in agriculture in a very crude and inefficient manner. In many cases trees were girdled and left standing, and the crops planted among them. The wooden plow generally drawn by oxen merely scratched the surface, and crop production was meagre. As the cities of Philadelphia and New York developed, the demand for timber and fuel, accelerated by the Revolution, gained the main attention of the residents and lumbering became the chief occupation. The development of agriculture was checked by this activity, as the farmers obtained more money by hauling timber. For the want of manure and fertilizers and a better system of farming, much of the land became poorer each year. The portion tilled was cropped until it was exhausted, when it was abandoned, and new ground cleared, only to go through the same agricultural methods (5). This practice increased in proportion to the increase in population. Corn, buckwheat, and tobacco were the important crops.

After lumbering ceased to be profitable, a new era gradually developed in agriculture. The introduction of the iron plowshare, rotation of crops, new methods of husbandry, application of lime, discovery and use of marl, and other improvements proved a great boon to the farmer (5). General farming in conjunction with dairying prevailed for many years. But previous to the opening of the Camden and Atlantic Railroad connecting Philadelphia and Atlantic City, the farms remained comparatively small and few in number. After this road was opened on July 4, 1854, the effects upon the surrounding countryside were profound. The size and number of farms increased. The facilities afforded in transporting farm products stimulated an increase in the acreage devoted to the production of truck crops, and general farming began to decline. Large tracts near this railroad were cleared for development, factories were built, and the sites of many of the present towns were established. Within twenty-five years, hundreds of acres of woodland had been converted permanently to agricultural and other economic use.

As an early agricultural pursuit, the cultivation of the cranberry deserves attention. The development of these bogs began about the middle of the nineteenth century. While their establishment was expensive, the profits derived were enormous. This enterprise grew until bogs had been developed in parts of most of the stream valleys in the Pine Barren district (2). A considerable reduction in the area of cedar and maple swamp bottoms has resulted because the cranberry plant appears to produce more abundantly on these soils. Direct and often far-reaching influences have been exerted upon the natural drainage systems of these areas by the grubbing and ditching necessary to this pursuit. The reservoirs maintained by the operators for the purpose of flooding the bogs in winter are of some benefit to certain species of

wild game; but the cultivated bog is of small value to most forms of wildlife. In southern Camden County cranberry production is decreasing. New bogs are not being developed, and many of the older ones are abandoned. Several of them are in stages of reverting to swampland, and their value to wildlife is increasing annually.

PRESENT FARM-LAND UTILIZATION AND AGRICULTURAL PRACTICES.

A close relationship exists between permanent agricultural development and the character of the soil. All sportsmen should seriously consider the importance of proper land utilization, as the farm is the very foundation upon which future improvement to farm-game habitats must be based. After two hundred fifty years of settlement, those engaged in agriculture in southern Camden County are tending to recognize that certain soils are more adaptable to the maximum production of certain crops. A decided trend is now evident toward the purchase and utilization of the more fertile land in the northern part of the study area by farmers residing in the southern portion. There are considerable differences in the productiveness of the land, topography, and kinds of crop production between these two portions of the area studied.

In the northern portion of the study area where the soils are fairly heavy, the growing of general farm crops in combination with truck crops is the principal interest. Fruit production is local, and confined chiefly to apples. Dairying is important in some locations. Due to the fair proportions of hay and grain crops, the average size of the farms is greater than those farther south in the County.

The soil in the southern part of the area under consideration is generally more adapted to truck farming. Fruit production is important and confined mainly to peaches and small fruits. Dairying is at a minimum. Poultry raising is increasing. Due to the intensive tillage required, these truck farms are considerably reduced in average acreage. It is evident that land utilization is not properly balanced in this section. A large number of farms have been abandoned; in some cases, because the land was utilized for a purpose to which it was not adapted, and in other instances, because of abuse to the already meagre soil. The productive power of much of the soil here is apparently of a character better suited to forestry than to agriculture.

The number, acreage, and value of Camden County farms for the past twenty years is presented in table 2. It is evident that the farms here have been decreasing in number, acreage and value for a considerable period.

Table 2
*Number, acreage, and value of Camden County, N.J. farms.

Year	No. of farms	Total acre- age	Avg. acres per farm	Total value (land- bldgs) \$	Avg. value per farm \$	Avg. value per acre \$
1920	1035	39,433	38.1	8,997,000.	8634.	226.
1930	882	33,504	38.1	8,394,224.	9517.	249.
1940	759	28,896	38.0	3,806,667.	5015.	131.

* New Jersey Farm Censuses.

As comparative data, table 3 presents the number, acreage, and value of all New Jersey farms in 1930 and 1940. It is evident that the average value of all the farms in the State was reduced approximately 28% during that ten-year period, while the average value of the Camden County farm dropped over 47% during the same years.

Table 3

* Number, acreage, and value of New Jersey farms.

Year	No. of farms	Total acreage	Avg. acres per farm	Total value (land- bldgs) \$	Avg. value per farm \$	Avg. value per acre \$
1930	25,378	1,758,027	69.2	298,845,113.	11,774.	169.
1940	25,835	1,874,402	72.6	227,805,686.	8,818.	121.

* New Jersey Farm Censuses.

Modern farm practices are a vitally important influence on the distribution and numbers of several small game species. In an endeavor to be successful, farmers throughout the study area often apply what are thought to be economical methods toward that end, with little or no consideration for the welfare of wild game. So-called "clean farming" and the utilization of all available land on the farm for the production of crops, regardless of its degree of adaptation to the conservation of the soil and other resources, may increase crop production for a few years. But in the long run, it proves usually the least economical. The farmer begins then to realize that his soil has lost much of its natural fertility; that evaporation of the soil moisture has become excessive; that the production of crops has been reduced; and, that his profits are becoming smaller each year. Correction of these injurious practices are seldom made. The farm either is rented out, sold, or eventually abandoned, because of decreased income.

Intensive tillage of truck crops necessarily reduces the amount of wild life cover on the farm; but, when it is combined with the removal of hedgerows and other small brushy areas, the habitat is usually lost. This is particularly true of the large adjacent farm fields often seen throughout much of the northern half of the study area. Table 4 presents data on the distribution of field hedgerows having some degree of value to farm game in the area studied. While the greater proportion of hedgerows is situated north of Berlin, it may be said, nevertheless, that much of the northern half of the study area is quite inadequate in the provision of winter protection to game. Such cover lanes are being removed throughout the whole County almost daily, leaving extensive acreages devoid of proper protection to the soil and wild game. Many of the farmers are losing tons of their already meagre topsoil by wind erosion through the lack of hedgerows. High winds, sweeping over broad sandy fields left bare of vegetative cover, carry off tremendous quantities of topsoil, organic matter, and fertilizer. Losses as high as sixty tons to the acre have been measured after a South Jersey storm (9). Such waste of the soil contributes to the silting of streams, reservoirs and ditches, and intensifies the menace of further erosion by water and floods. It is not uncommon in the study area to see surface soil deposited in drifts along highways and at the edges of woodland. This detrimental effect may be arrested to some extent by the utilization of rye and wheat as winter cover crops, but the fall plowing required by this method consider-

ably reduces the availability of natural weed and grass seeds for wildlife winter food.

The farmer cultivates his land for crop production, not game production. But interviews with several of them during the course of this study revealed that they did not always realize the extent of injury to the welfare of wild game by some of their practices, or that crops and game can be raised on the same land if properly coordinated. Among the methods usually detrimental to the game resources of the farms in southern Camden County, the practices of which could often be avoided or lessened in extent, are: Destruction of nesting cover, nests, and young by late spring burning; destruction of nests and young by late spring and early summer plowing; plowing over the shoulders of small draws and ravines, and along the very edges of woodlots and timbered areas; plowing of entire stubble fields in late summer; lack of flushing bars on mowing machines. There are indications that sound soil conservation advice with the welfare of game in mind, together with the full cooperation of the sportsmen would go far toward the goal desired by all wildlife conservationists in southern Camden County.

Table 4
Distribution of field and roadside hedgerows in Study Area.

Portion of study area	Field hedgerows (ft.)	Roadside hedgerows (ft.)	Greatest number of linear ft. per 1080 ac.	Approx. avg. no. of linear ft. to 1 sq. mi.
North of Berlin *(Taunton Rd.)	114,937	22,098	8910	152
South of Berlin (Taunton Rd.)	10,806	5,899	1280	14
Total-	125,743	27,997		

* Taunton road is an approximate division line between the northern and southern portions of the study area.

PRESENT LACK OF PROPER WOODLAND MANAGEMENT

The deterioration of wild game habitat through the present lack of sound forestry practice on privately owned woodland in southern Camden County is similar to that of past years, already discussed. The woodland is being cut off in such a manner that regard for the effects wrought upon the soil, natural reproduction of the timber, and wild game, is ignored. Complete timber removal from headwaters and slopes of stream valleys is resulting in the drying up of many of the smaller streams, and is creating a potential menace of flood and erosion. In most instances the debris and slash from the cutting of the timber in the stream valleys is carelessly left, and eventually it becomes deposited in the streams. Due to immoderate openings made in the swamplands, windfalls are increasing and adding to the debris. On the upland, this debris and improperly handled slash adds to the fire hazard. In various woodlands of the study area, large oak trees of merchantable size may be observed lying upon the ground in a decaying condition, where they have been felled by an axe, and left merely to rot. While responsibility for all this lack of proper management lies with the property owner, the loss is not suffered by him alone, but

by the entire public, the sportsmen in particular. The State of New Jersey offers the assistance of its foresters with their recommendations as to cutting practices and reforestation.

Considerable destruction of wild game and its protective cover occurs annually by fire in southern Camden County. About two hundred grass and woods fires are reported each year. Most of them are caused by railroads, and by persons burning refuse about their homes and farms. Table 5 presents the number of fires reported annually in the study area, with the acreage of grassland and woodland consumed, and the cost of extinguishment, over a five year period.

Table 5
*Reported forest fires in southern Camden County, N. J.
over a five year period.

Year	Number of fires	Grass (ac.)	Woods (ac.)	Cost of extinguishment
1939	226	182.	598.	\$ 1902.85
1940	155	216.7	350.7	1353.90
1941	209	156.7	5835.7	3769.11
1942	208	105.	588.	2071.05
1943	195	304.	750.5	2123.00
Total	993	964.5	8123.	\$ 11219.91
Avg.	198	192.9	1624.6	\$ 2243.98

The disastrous effects of ravaging forest fires are numerous and far-reaching, many of which are now known through extensive studies. The subject is too involved to include but a small portion in this report. Several effects have already been mentioned. In addition, many fires destroy the surface layer of humus with a resulting loss of soil fertility. Fires may also cause a removal of the plant nutrients from the soil, change the soil structure, and increase evaporation. Fire-scarred woodland provides a haven for wood-boring insects and fungi, and it can be shown that insects destroy a considerable percentage of the acorn crops in southern New Jersey, and that among those which survive, the rate of germination is usually low (13). This seriously retards the reproduction of a healthy stand of timber. Some areas in southern Camden County have been burned so repeatedly that the fertility of the soil is at a minimum, and as a result, the wild game cover is reduced to such a degree as to be practically worthless as winter protection. Most of the fires occur during the months of April and May which may cause extreme losses to the young of both game birds and animals. Fire remains a potential menace to every objective that game restoration may strive to attain. Its control is a basic conservation problem in this part of the State, and its prevention should always be a first consideration of the sportsman.

* Courtesy of the New Jersey Forest Fire Service.

PRINCIPAL SPECIES OF NATIVE WILD GAME, AND DEGREE OF HUNTING.

The important native wild game species inhabiting southern Camden County may be enumerated as follows:

Virginia or white-tailed deer	(<i>Odocoileus virginianus</i>)
Cottontail rabbit	(<i>Sylvilagus floridanus</i>)
Eastern gray squirrel	(<i>Sciurus carolinensis</i>)
Eastern raccoon	(<i>Procyon lotor lotor</i>)
Bobwhite quail	(<i>Colinus virginianus</i>)
Eastern ruffed grouse	(<i>Bonasa umbellus umbellus</i>)
Woodcock	(<i>Philohela minor</i>)
Black duck	(<i>Anas rubripes</i>)
Mallard duck	(<i>Anas platyrhynchos</i>)
Wood duck	(<i>Aix sponsa</i>)

The principal fur-bearing animals consist of the following species:

Canada otter	(<i>Lutra canadensis</i>)
Muskrat	(<i>Ondatra zibethica</i>)
American mink	(<i>Mustela vison vison</i>)
Long-tailed weasel	(<i>Mustela noveboracensis</i>)
Northeastern gray fox	(<i>Urocyon cinereoargenteus</i>)
Eastern striped skunk	(<i>Mephitis mephitis putida</i>)
Virginia opossum	(<i>Didelphis virginiana virginiana</i>)

The absence of a very interesting animal, the beaver (*Castor canadensis carolinensis*, Rhoads), is regrettable. It is believed to have been fairly common in southern Camden County many years ago. Rhoads (8) states that they were exterminated here before the year 1820, one of their latest haunts being Beaver Branch of Big Timber Creek. This branch is situated about one mile north of the study area. Within the past few years, the New Jersey Fish and Game Commission was successful in establishing a beaver colony on Wildcat Branch, a tributary of the Mechesautuxen, or Hay's Mill stream, within the present study area. Because of some interference to the water level of a private lake, the colony was removed upon complaint of the owner.

The well-known Ring-necked pheasant has not been included in the list of game species in the study area. It is, of course, not a native species, but an introduced hybrid. It has been stated that there were not many pheasants in New Jersey prior to the year 1912, except for a few birds on private preserves (7). In southern Camden County, the pheasant does not find the area acceptable. Its numbers are small, and its occurrence is irregular.

The degree of hunting to which certain game species in the study area are subjected is indicated, to some extent, by the number of hunting licenses that are issued annually. Deer must be excepted, as hunters travel widely during the open season for that game species and reliable figures relative to this activity are not available. *Records show that the number of hunting and fishing licenses issued in Camden County during the year 1943 totalled 8817. The number of each kind of license follows: Resident Hunting and Fishing, 1156; Resident Hunting, 5437; Resident Fishing, 1931; Non-resident Hunting and Fishing, 182; Non-resident Fishing, 111. These licenses are valid in any part of the State, thus the fact must not be ignored that considerable hunting may, and usually does, occur in this County by hunters residing elsewhere in the State. License data applying to Camden County as a whole are presented here as most of the land open to hunting is situated within the study area.

* New Jersey Board of Fish and Game Commissioners.

In order to determine the percentages of hunters who devote their efforts to birds, to rabbits, and to miscellaneous species of game (the latter usually without the aid of dogs), observations were carried on at the State Public Shooting Grounds at Glassboro, Gloucester County, New Jersey, for several open seasons. As these Grounds are approximately four miles from the western boundary of the study area, and as the two areas are similar in most characteristics, these data are presented in table 6.

* Table 6

The types of hunters using southern New Jersey areas as indicated by the following observations at the Glassboro Public Shooting Grounds.

Year	Total hunters checked	No. of bird hunters	Percent	No. of rabbit hunters	Percent	No. of misc. hunters	Percent
1940	555	116	20.9	369	66.4	70	12.6
1941	723	136	19.8	504	68.2	83	12.
1942	425	74	17.4	278	65.4	73	17.1
Avg.	568	142	19.3	384	66.6	75	13.9

* N. J. Board of Fish and Game Commissioners, Ann. Rep. 1942-43.

METHOD UTILIZED IN THE GATHERING OF DATA ON
WILD GAME COVER CONDITIONS IN THE STUDY AREA.

To properly locate and evaluate the existing wildlife habitats in southern Camden County, complete data on the various cover conditions throughout the entire area were required. Such cover included the location and extent of all woodland, brushland, grassland, marshland; areas utilized for production of various agricultural crops; residential and restricted areas. For the fulfilment of these requirements, a method of classification of the various cover types within the study area was developed. It is based upon origin and ecological succession as outlined by Wight (12), insofar as that was found adaptable to southern Camden County.

The process of cover typing the study area involved the construction of 110 field or base maps, nine by twelve inches in size, and each embracing an area of 1080 acres. The scale utilized is one inch equaling 660 feet, or eight inches to one mile. All streams, lakes, ponds, roads, dwellings, and the extent, interspersion, and relationship of all cover types was recorded on these maps. Symbols were plotted representing the classifications of vegetation in regard to species, age, and density. These data were obtained by utilization of an automobile, and by walking through the areas for direct inspection. Direction of lines was determined by a compass. Distance was computed by automobile speedometer, and by pacing. Acreages presented in the accompanying tables was calculated by a planimeter. Upon completion of the field maps, tracings were made for the reproduction of the completed cover type map presented with this report.

INTRODUCTION TO THE PRINCIPLES OF ECOLOGICAL SUCCESSION OF PLANT LIFE AS INVOLVED
IN THIS STUDY.

Some of the principles of plant succession are presented briefly in order to assist in the interpretation of the evaluation of the various cover types in relat-

ion to wild game species, and of the detailed record of vegetation as plotted on the cover type map.

It has been stated that as vegetation develops, the same area becomes successively occupied by different plant communities. This process is termed plant succession (11). Such successive stages may start in open water, river bars, bogs, on solid rock, denuded land, sand dunes, and other extreme or disturbed places. Each stage, or wave, of plant population, in its turn, holds possession of a habitat. It begins slowly, increases to a maximum, then gradually recedes to be replaced by the next wave of plant life. This occurs because each stage produces profound effects upon the habitat, which becomes more and more unfit for the present vegetation. These inhabitants are gradually driven from the area by the incoming invaders of the next succeeding stage and which are more adapted to the modified habitat. This process is repeated a varying number of times, until finally a climax stage is reached. The stability of this last stage is permanent, barring interference by man, because it is in entire harmony with the stable climate of the region in which it grows. Climaxes display superficial changes with the season, year, or cycle, but even successive years of abnormal rainfall or unusual temperatures have little or no permanent effect upon their composition and structure (11). The habitat by this time has developed into one of medium water relations, and the vegetation of this final stage is composed of similar species of trees regardless whether the successive stages originated from a water area or a dry land area. Thus, under the influence of vegetation, a lake area tends to diminish in water and the rock or dry land area tends to become more wet, until each of them develops into a similar type of habitat of medium water relations. Just as each stage of the succession had its temporary dominant species of plant, the climax stage likewise has its controlling or dominant tree species.

Any area that remains undisturbed over a sufficient period will develop a climax stage typical of the region in which it is situated. The successive stages in the development of climax woodland may be recognized nearly everywhere; in fallow and abandoned fields, in lakes, ponds, and in the woodland itself. Natural succession is always progressive. It may be interrupted, held in check, set back, or even reversed by man through the aid of fire, cutting, plowing, draining, flooding, and so on, but as soon as these influences are removed, succession begins to progress at once toward the climax stage. The species of the plants that occupy the area during these developmental stages are determined largely by the soil, moisture content, and other environmental conditions. The duration of these stages varies greatly owing to the many complex factors involved. The complete development may require a comparatively short period to many years, or even centuries.

For example it will be shown that a forest may develop on bare exposed rock. Such a surface is an extremely difficult place for vegetation to become established. Crust-like lichens are the only known forms of plant life adapted to this condition. The reproductive bodies, or asci, of this species of lichen arrive upon the rock by action of the wind. After germination, these plants, scarcely distinguishable from the rock itself, establish themselves by living in a complex association with minute algae from which both forms of life are benefited. A weak acid is formed that slowly eats into the rock and aids in converting the surface into sufficient soil as to permit it to be invaded by a more leaf-like lichen. This plant, in turn, continues to modify the rock surface until the habitat is more adapted to the growth of moss, which follows the lichens. After a time, the moss is replaced by certain short-lived annual herbs. Then, biennial and perennial herbs follow. Finally, the shrub stage and the climax forest appears.

Another example of plant succession may be seen occurring in fields. After plowing, the pioneer plants appear as weeds. With no further disturbance, these are followed by various species of grass. Later, small shrubs appear, such as sweet fern, dewberry, and upland sumac. Young pines, red cedar, white birch, sassafras, or wild

cherry may be found growing throughout the field. As these trees develop and the shade increases, the grasses disappear along with several species of shrubs. Finally the field is transformed into woodland.

The succession of plant communities is actually a shifting of the wild life habitat. It must be emphasized that the succession of animal communities is very closely related to that of plant communities. The wild game species present in an area undergoing the early stages of plant succession are often replaced by other species of wild game as the plant community develops.

EXPLANATION OF COVER TYPE SYMBOLS, AND DATA PERTINENT
TO THE INTERPRETATION OF THE COVER TYPE MAP.

AC (Cultivated land). This symbol represents cropped land. The numbers that follow this symbol indicate the kind of crop produced.

Ac-1 - truck crops	Ac-9 - millet
Ac-2 - corn	Ac-10- vetch
Ac-3 - wheat	Ac-12- clover
Ac-4 - rye	Ac-13- clover and timothy
Ac-5 - oats	Ac-14- timothy and alfalfa
Ac-6 - alfalfa	Ac-15- kafir corn
Ac-7 - timothy	Ac-16- sudan grass and soybeans
Ac-8 - soybeans	

P	-pasture
BB	-cultivated blueberries
CB	-cranberry bog producing commercially
FL	-flowers (dahlias, gladiolus, etc.) grown commercially
Nu	-nursery (ornamental trees and shrubs)
Or-a	-apple orchard
Or-p	-peach orchard
Or-c	-cherry orchard
Or-pr	-pear orchard

Af (Fallow land). This symbol indicates a field that has been retired from cultivation for not more than two years. The chief pioneers the first year are usually crabgrass (*Digitaria sanguinalis*) and goosegrass (*Eleusine indica*). Warty panic-grass (*Panicum verrucosum*) may appear in moist situations. The chief weeds are usually ragweed (*Ambrosia artemisiifolia*), pigweed (*Amaranthus* spp.), lamb's quarters (*Chenopodium album*), tumbleweed (*Panicum capillare*), and buttonweed (*Diodia teres*). Under certain conditions the plantains (*Plantago* spp.), lady's thumb (*Polygonum persicaria*), and yellow foxtail (*Setaria glauca*) may appear the first year. The second year's growth may consist of slender bullgrass (*Paspalum setaceum*), panic-grasses (*Panicum columbianum*, *Lindheimeri*, *meridionale*), horseweed (*Erigeron canadensis*), wild carrot (*Daucus carota*), thoroughworts (*Eupatorium* spp.), goldenrods (*Solidago* spp.), sandbur (*Cenchrus tribuloides*), asters (*Aster* spp.), and partridge pea (*Cassia Chamaecrista*).

A4 (mixed herbaceous and grass, other than so-called Indian Grass (*Andropogon virginicus*)). This symbol indicates a field that has been retired from cultivation for a number of years. Much variation occurs in this type of field in regard to the species and density of the grass and weeds present, influence of soil moisture and fertility,

method and length of time of former cultivation. Among the many characteristic grasses may be the following species: Bent grass (*Agrostis* spp.), poverty grass (*Aristida* spp.), love grass (*Eragrostis* spp.), fescue grass (*Festuca* spp.), panic grasses (*Panicum* spp.), blue grass (*Poa* spp.), orchard grass (*Dactylis glomerata*), and foxtail (*Setaria* spp.).

Characteristic herbaceous vegetation may consist of white sweet clover (*Melilotus alba*), goldenrods (*Solidago* spp.), milkweeds (*Asclepias* spp.), St. John's wort (*Hypericum* spp.), and thoroughworts (*Eupatorium* spp.). Pioneer shrubs are usually similar to those which invade "Indian grass" (*Andropogon*).

Aa (Indian, or Beard grass)(*Andropogon virginicus*). This symbol represents the well-known "Indian grass" or "Broomsedge" fields of southern Camden County, where it generally dominates the final grassland stage of succession previous to the development of brushland. It appears usually about three years after cultivation has been discontinued, depending upon soil and other conditions. After becoming dominant, generally in six to eight years, the heavy growth excludes all wildlife food plants. Among other species often found in association with it during the first few years of its growth are: American panic-grass (*Panicum columbianum*), Lindheimeri's panic-grass (*Panicum Lindheimeri*), slender bullgrass (*Paspalum setaceum*), bush clovers (*Lespedeza* spp.), tick trefoils (*Desmodium* spp.), partridge pea (*Cassia Chamaecrista*), and goat's rue (*Tephrosia virginiana*). The first shrubs to invade are usually dewberry (*Rubus villosus*), sand blackberry (*Rubus cuneifolius*), greenbriers (*Smilax* spp.), and sweet fern (*Myrica asplenifolia*).

A5 (Shrub and herbaceous). This symbol indicates an upland area containing an undergrowth of shrubs, and a variable number of herbs. Such an area is characterized by the following species of shrubs:

Black huckleberry	(<i>Gaylussacia baccata</i>)
Blue dangles	(<i>Gaylussacia frondosa</i>)
Sugar blueberry	(<i>Vaccinium pennsylvanicum</i>)
Low blueberry	(<i>Vaccinium vacillans</i>)
Hudsonia	(<i>Hudsonia ericoides</i>)
Sweet fern	(<i>Myrica asplenifolia</i>)
Upland sumac	(<i>Rhus copallina</i>)
Greenbrier	(<i>Smilax glauca</i>)
Teaberry	(<i>Gaultheria procumbens</i>)
Sand blackberry	(<i>Rubus cuneifolius</i>)
Dewberry	(<i>Rubus villosus</i>)

Other species of shrubs that may occur in such an area, depending upon locality and soil conditions, are:

Sweet pepperbush	(<i>Clethra alnifolia</i>)
Staggerbush	(<i>Lyonia mariana</i>)
Wild grape	(<i>Vitis</i> spp.)
Wild rose	(<i>Rosa</i> spp.)
Dwarf thorn	(<i>Crataegus tomentosa</i>)
Shadbush	(<i>Amelanchier canadensis</i>)
Bayberry	(<i>Myrica carolinensis</i>)

P5 (Shrub and herbaceous). This symbol signifies a low sandy area often locally, and erroneously, termed "savanna land". There are no true savannas in New Jersey (4). The topography of such an area retards the run-off of water, and heavy rains are held long enough to favor certain species of plant life. It must be classified as a portion of the upland, even though it is situated usually adjacent to swampland, and may be intermittently wet for extended periods*. The shrubby and herbaceous vegetation most typical of this area consists of the following species:

Sheep laurel	(<i>Kalmia angustifolia</i>)
Sand myrtle	(<i>Leiophyllum buxifolium</i>)
Bayberry	(<i>Myrica carolinensis</i>)
Swamp leucothoe	(<i>Leucothoe racemosa</i>)
Swamp andromeda	(<i>Lyonia ligustrina</i>)
Chokeberry	(<i>Pyrus arbutifolia</i>)
Greenbrier	(<i>Smilax</i> spp.)
Inkberry	(<i>Ilex glabra</i>)
Sweet pepperbush	(<i>Clethra alnifolia</i>)
Teaberry	(<i>Gaultheria procumbens</i>)
Turkeybeard	(<i>Xerophyllum asphodeloides</i>)

Scrub oak (*Quercus ilicifolia*) may appear in small numbers in the portions of these areas where the soil moisture does not exceed the tolerance of this species.

L (Laurel)(*Kalmia latifolia*). This symbol represents the well-known mountain laurel. This evergreen shrub has been given a symbol because it may be found growing in the understory nearly any place in relation to the topography, from the top of a hill to the depths of a swamp. Only in a few instances in southern Camden County does it grow in sufficient abundance to warrant a density rating.

A7 to A34- These symbols indicate wooded upland areas. The number represents the species of tree dominant upon that particular area. These species are listed under "Summary of Cover Type Classification". Several of these symbols indicate a group of species composing a community in which they are all co-dominants.

SWAMP PHASE:

B4 (Sedge-grass). This symbol represents a low area where the dominant vegetation is composed of sedges, rushes, and coarse grasses. Such a low area may be a roadside excavation, meadow, wet pasture land, an abandoned cranberry bog, or may be situated along the edge of a pond, or in open swampland. The vegetation typical of this area may be composed of the following species:

Sedge family:

Sedges	(<i>Carex</i> spp., <i>Cyperus</i> spp.)
Spike rushes	(<i>Eleocharis</i> spp.)
Beaked rushes	(<i>Rynchospora</i> spp.)
Bulrushes	(<i>Scirpus</i> spp.)
Nut rushes	(<i>Scleria</i> spp.)
Cotton grass	(<i>Eriophorum</i> spp.)

* Dr. Warren S. Bourn, U. S. Fish and Wildlife Service.

Grass family:

Rush grasses	(Sporobolus spp.)
Panic grasses	(Panicum spp.)
Manna grasses	(Glyceria spp.)
Plume grass	(Erianthus saccharoides)
Bushy beard grass	(Andropogon glomeratus)
Oat grass	(Danthonia epilis)

Rush family:

Rushes	(Juncus spp.)
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B5 (Shrub and herbaceous). This symbol indicates an area of low land inhabited by swamp species of shrubs. Such shrubs are typical of the undergrowth in swampland dominated by trees, or they may compose the "shrub swamp" stage of succession in low areas not yet dominated by tree growth. It must be emphasized that the group of shrub species presented here is merely representative of such areas, and several or many of these species may not be present on any one area.

Highbush blueberry	(Vaccinium corymbosum)
Swamp blueberry	(Vaccinium atrococcum)
White swamp honeysuckle	(Azalea viscosum)
Common elder	(Sambucus canadensis)
Viburnum species	(Viburnum spp.)
Spicebush	(Benzoin aestivale)
Poison sumac	(Rhus vernix)
Shadbush	(Amelanchier oblongifolia)
Inkberry	(Ilex glabra)
Sweet pepperbush	(Clethra alnifolia)
Swamp leucothoe	(Leucothoe racemosa)
Swamp andromeda	(Lyonia ligustrina)
Staggerbush	(Lyonia mariana)
Buttonbush	(Cephalanthus occidentalis)
Greenbrier	(Smilax rotundifolia)

The characteristic swamp herbs are wild sarsaparilla (*Aralia nudicaulis*), fireweed (*Epilobium angustifolium*), Joe-Pye weed (*Eupatorium purpureum*), jewelweed (*Impatiens biflora*), swamp pinks (*Helonias bullata*), Skunk cabbage (*Symplocarpus foetidus*) is found only in stream bottoms of tributaries of the Delaware River in the study area. The cinnamon fern (*Osmunda cinnamomea*) and marsh fern (*Aspidium Thelpteris*) are common throughout the swamps.

B7 to B17-

These symbols represent wooded lowland, usually swamps or stream bottoms. The number indicates the species of tree dominant upon that particular area. These species are listed under "Summary of Cover Type Classification". The symbol B9 signifies a group of species composing a community in which those named are co-dominants.

There should be some distinction made here between the terms "swamp" and "stream-bottom" as utilized in this report and applied to southern Camden County. A swamp is typical of the Pine Barren zone, and the term may be defined, for this purpose, as a low flat area saturated with water and dominated by tree growth.

Most of the stream-beds in the Middle District of southern Camden County are situated in ravines or valleys with steep slopes. These

slopes are well-drained, and assume the character of a wet woodland, or even dry upland. For this study they have been termed "stream-bottoms". This accounts for the upland classification of many of the species of trees found growing in these areas.

BOG PHASE:

B6 (Bog shrub and herbaceous). This symbol represents a bog in which the succession has advanced to a shrub stage. Species characterizing such an area may be:

Cassandra or leatherleaf	(<i>Chamaedaphne calyculata</i>)
Swamp loosestrife	(<i>Decodon verticillatus</i>)
Sheep laurel	(<i>Kalmia angustifolia</i>)
Cranberry	(<i>Vaccinium macrocarpon</i>)

These shrubs are often accompanied by several herbaceous species such as pitcher plant (*Sarracenia purpurea*), sphagnum mosses, and various orchids (*Orchidaceae*).

MARSH PHASE:

M2 (Cat-tail)(*Typha latifolia*). This symbol represents an area usually covered by only a few inches of water, at or near the edge of a pond or slow stream, that is dominated by a growth of this plant.

M3 (Wild rice)(*Zizania palustris*). This symbol signifies an area of fresh-water marsh dominated by a growth of this species.

M4 (Pickerel weed)(*Pontederia cordata*). This symbol indicates an area of shallow water, two feet or less in depth, in ponds, and along edges of streams where the water flows very slowly, and which is dominated by a growth of pickerel weed.

Other miscellaneous symbols listed under "Summary of Cover Type Classification" are self-explanatory.

Symbols representing dwellings or other structures within a small area without a cover type classification indicate that such areas are utilized for residential purposes. In many instances, it may be noted that the portion of a farm utilized as a yard, or for outbuildings, and so on, is not delineated on the map separately from the balance of the farm. It shall be implied that an average of one acre is utilized for these purposes, and has been classified as a residential area under "miscellaneous".

Railroad right-of-way areas have usually been delineated upon the map without cover type classification because of the several undesirable features connected with railroads relative to wild game. Such features may be: Ownership strictly private with trespassing forbidden; casualties occurring to wild game due to trains; frequent burning of the right-of-way and adjacent land due to uncontrolled sparks from locomotives.

In no instance have any lines upon the map been intended to represent property lines.

Those areas designated as boroughs and townships are not intended to signify boundary lines of such municipalities, but merely to indicate those portions too populated.

Density of bog shrubs (designated as B6) and lowland sedges and coarse grasses (designated as B4) has not been recorded upon the map. Due to the nature of their growth, density may be regarded as heavy in all instances.

Scrub oak, sometimes locally called ground-oak (*Quercus ilicifolia*), is designated by the symbol A10, the same symbol as is used for oak trees. But where it is intended to represent scrub oak the symbol is given a shrub density (A10=, etc.) and is placed beneath the classification line. In areas where this species grows sufficiently abundant in association with other typical shrubs of the area, it is separately recorded, although it may occupy a subordinate position. For the purpose of this study, no distinction has been recorded between scrub oak and other species of oak of a similar height.

Tolerance in relation to soil moisture is exhibited by several shrubs concerned in this study. As a result, these species are included in more than one group classification.

Tree species, age, and density is recorded in that order, as: A9-5-11 indicates pine of various ages of medium density.

When two tree species are recorded above the classification line, it indicates that there are two co-dominant species within the area. Any dominance of one species over the other is revealed by the greater density recorded.

In all instances, when one species of tree is recorded, it denotes the dominant tree species of the area.

Undergrowth of shrubs or young trees of a similar height is always indicated by the symbol beneath the classification line.

Age or size of shrub species is not recorded. Species and density is symbolized as follows: (examples)

A10= denotes scrub oak of a medium density.

A5- " a light or scattered growth of shrubs typical of that group.

A9- " a light or scattered stand of young pines of a "shrub" height.

The density of grasses is not recorded.

EVALUATION OF THE EXISTING WILD GAME HABITATS

To properly evaluate the wild game cover in southern Camden County, and to determine the locations of farm-game habitats, it was necessary to establish the total acreages of each cover type throughout. Table 7 presents these data for each numbered segment map. The total acreages and percentages of all cover types for the entire study area is given in table 8. It is to be noted that more than one-half of the area is in woods or brushland, about 8% in truck crops, and less than 5% devoted to the production of grain.

It is generally conceded that wild game, over all the seasons, requires proper proportions of certain cover types, depending on the species and varying somewhat with the season and circumstance. Farm-game, with which this study is concerned, thrives best on farm lands displaying these properly proportioned areas of food and cover. Thus, agricultural land largely determines the location of the wild game habitats in the study area.

Evaluation of the cover throughout the entire area, in relation to the proportions of the various types, is based upon "Habitat Classification of American Game Species", as listed in table 1 of U.S.D.A. Circular 636, 1942 (6). This classification

of game as applied to this study is presented here in table 10.

An evaluation upon this basis resulted in the determination of 180 areas of 100 acres each, and all displaying some degree of suitability as habitats of farm-game species. The locations of these habitats appear on the cover type map as large circles (approximately $3\frac{1}{2}$ inches in diameter). The plot number is placed within the circle, also the symbols representing the proper re-stocking points for the game species to which the area is favorable. Table 9 lists each habitat number and location with the acreages of the various cover types of which it is composed. Nearly all these habitats lack optimum proportions, to a varying degree, of one or more of the principal cover types required by farm-game species. The efficiency of such areas as proper habitats is thereby lowered.

The percentage of efficiency of each of the principal cover types required by the rabbit, quail and pheasant is determined by acreage, as shown by tables 11, 12, and 13. It is to be noted that a decrease in efficiency is proportionate to a decrease in acreage of that cover type.

A final evaluation rating for each habitat is obtained by adding the percentage of efficiency of each of the principal cover types according to acreage, as given in tables 11, 12, and 13. The evaluation ratings have been divided into five groups of ten numbers each, from 51 to 100, as is shown by table 14. These groups determine the final classification of the habitat for each game species concerned. An evaluation rating of 95, for instance, constitutes a first class habitat; one with a rating of 75 is considered fourth class, and so on.

These evaluation ratings and classes for each habitat in the study area are presented in table 15, and the number and percentage of wild game habitats in each class relative to each game species is shown by table 16. Each of the 180 habitats is suitable to some degree for rabbits, 152 for quail, and 19 for pheasants. Approximately 85 per cent of the habitats are third class or lower.

The number of habitats by class is presented in table 17 for both those portions of the study area situated north and south of Berlin. These sections are similar in size, and vary but little in the number of habitats. This indicates a fairly uniform distribution of potential game producing areas.

But there are considerable differences between the north and south portions in regard to the total acreages of certain important cover types. It is estimated that the northern half possesses 31 per cent of all the woodland in the study area, 32 per cent of the brushland, 81 per cent of the grassland (A4 group), 76 per cent of the "Indian grass (*Andropogon*), 36 per cent of the acreage devoted to the production of truck crops, and 68 per cent of the grain crop acreage. It is evident from these data, and from observations made during the course of the study, that the northern half as a unit, lacks sufficient acreages of woodland and brushland to provide adequate winter protective cover for farm-game species. While it possesses an excess of grassland, much of this is not available to game species because of insufficient nearby escape cover. The same may be said for the agricultural land, where large contiguous fields leave extensive acreages devoid of winter cover.

The greatest deficiency in cover types in the area south of Berlin, in relation to wild game, is the lack of sufficient acreage devoted to the production of grain. Soil types and conditions are largely responsible for only 22 per cent of that type of crop being produced in this section. While 69 per cent of the woodland, and 68 per cent of the brushland of the entire study area is situated within this portion, it must be realized that much of this cover is in large unbroken areas, with only such portions available to farm-game as may be in proximity to agricultural land. On this land used for agricultural purposes, 64 per cent of all the truck crops in the entire study area are produced, but the intensive tillage maintains protective

cover at a minimum. Only about eight per cent of the field hedgerows of the study area have been permitted to remain in this section. Woodland adjacent to some of the farms is repeatedly burned with the result that the protective cover for game is inadequate. This condition may place a limitation on the numbers of farm-game in these instances.

RECOMMENDATIONS FOR THE PROPER DISTRIBUTION OF FARM-GAME SPECIES IN SOUTHERN CAMDEN COUNTY, WITH GENERAL SUGGESTIONS TOWARD THE PROPER MANAGEMENT OF THE AREA.

Propagated game should be distributed only in such areas that constitute habitats for the species and which are favorable to its maintenance and reproduction. While southern Camden County wild game habitat is generally far below the optimum, this study has revealed the most favorable locations within the area for farm-game species. Thus, it is recommended that such species be distributed only at those locations listed in table 15. Those habitats displaying the higher ratings should be utilized for this purpose first. A fifth class habitat should certainly not be stocked with game so long as one in a higher class is in need of replenishment. Proper locations for the release of the game within each habitat have been placed on the cover type map. These locations should be utilized for this purpose in so far as they may be found feasible.

The statutes of the State provide that the Board of Fish and Game Commissioners may stock birds and game only on such lands as are open to all licensed hunters, or areas specifically designated as public sanctuaries under jurisdiction of the State and closed to all hunting. Portions of certain wild game habitats as listed in table 15 may be privately posted during some years. Under such circumstances, those portions cannot be utilized for the distribution of propagated game. It may be said, nevertheless, that this should not necessarily eliminate the entire habitat from the re-stocking program. A game population depends upon adequate environment, whether or not the land is posted or open to hunting. Posting of an area does not restrict its utilization by game. In fact, these small areas might provide the food or cover especially needed to maintain the efficiency of the surrounding land as a game habitat. It must be emphasized that posted land is no assurance of the presence of game. The southern portion of the area studied is practically free of land prohibited to hunting, but the northern half had a considerable acreage posted at the time of this study. Signs on these properties were generally so inadequate in number that, in order to ascertain the total acreage of posted land, it would have consumed more time than could have been afforded by this study. It remains the duty of the game warden of the County and the interested sportsmen to keep as much of the land open to hunting as is possible.

In regard to ring-necked pheasants, southern Camden County constitutes very poor habitat, indeed. Only nineteen areas exhibit a certain degree of suitability, and all are in the third class. If pheasants are to be distributed in the study area, these chosen habitats prove the most favorable from an environmental standpoint. Little benefit to the sportsmen can be expected from the liberation of these birds into third class range.

Environmental conditions are too varied throughout the area under consideration as to permit only general suggestions toward proper game management methods. Improvement plans must vary with the type and location of the potential areas. The limiting factor in the northern half of the study area appears to be the lack of adequate winter cover. Where foods are present, this inadequate cover should be supplemented by group plantings of conifers and shrubs. Large idle fields could be improved by networks of strip and spot plantings of pines and shrubs. Present field hedgerows should be maintained. The proper planting of new hedgerows between the large cropped fields should be encouraged. A considerably larger portion of the agricultural land would thus be made available to desirable farm-game species. Properly distributed, they would greatly enhance the carrying capacity of many of these farms. Large areas of

grassland, particularly the "Indian grass" (*Andropogon*) species, should be broken up by strips of *Lespedeza sericea*, which would provide both food and cover for rabbits and quail. Areas of standing unhusked corn in winter should be increased. Food patches should be used to supplement the farmed areas where little or no crop residue is permitted to remain upon the ground in winter.

The limiting factor in the portion of the study area south of Berlin appears to be the lack of adequate proper food. As grain production here is limited chiefly by soil conditions, with no likely future increase in acreage, many food patches are needed to supplement the existing food supply. In many instances, old fields in this section should not be permitted to revert to woodland. The larger "Indian grass" fields should be broken up by strips of *Lespedeza sericea* to supplement the food supply and reduce the fire hazard. The promiscuous use of fire in early spring farm operations should be discouraged as much as is possible. Grass fields, or rather portions of them, should be burned in late winter, instead of during the spring nesting season, as is generally practiced. The larger farm areas which may be devoid of sufficient cover should be supplemented by properly distributed hedgerows.

The re-stocking or distribution of farm-game species should be purely an emergency measure. It would be to the advantage of the sportsman to concentrate more of his time and effort on environmental improvements and corrections of habitat deficiencies. It must be emphasized that each of the one hundred eighty existing habitats in southern Camden County could be immeasurably improved for farm-game species thereby raising the evaluation rating and classification of those areas. An indication of the present cover type deficiencies may be obtained by use of the tables 9 to 14. Improved and closer relations between the sportsmen and the farmers in southern Camden County appears necessary, particularly in the northern half. A considerable number of properties in that section are posted to hunting, partly due to inconsideration for the farmers' rights on the part of a few irresponsible hunters.

SUMMARY

Southern Camden County, New Jersey, embracing an area of approximately 151 square miles (96,487 acres), was mapped and cover typed for the purpose of obtaining detailed information concerning the potential habitats of farm-game species.

A classification of cover types was developed that might also prove adaptable to many other areas in New Jersey.

A cover type map of the entire area was constructed which would prove valuable for any future game management plans. It should also prove valuable in future years as a check on the area from an ecological standpoint.

This study has shown that the present wildlife environment in southern Camden County is far below the optimum, and that it is the result, principally, of improper land utilization and economic processes of former years.

The extent and efficiency of the environment as a wild game habitat is still being reduced through unsound farm and woodland practices, accompanied by a serious depletion of the soils.

Woods and grass fires remain a serious menace, particularly in the southern portion. A heavy mortality, especially of the young, is believed to occur annually. Over a five-year period, an average of 1816 acres of grass and brushland (potential game habitat) was destroyed annually.

One hundred eighty 100-acre plots, uniformly distributed throughout the area, were determined as exhibiting some degree of suitability as habitats of farm-game species. Only five of these habitats (2.7%) may be considered first class ranges for

rabbits and quail; twenty-four (24) second class (13.3%); fifty (50) third class (27.7%); seventy-three (73) fourth class (40.5%); and twenty-eight (28) fifth class (15.5%).

No first or second class pheasant ranges occur at present within the area. Nineteen (19) habitats were determined, all in the third class.

Of the 96,487 acres in the area, 26 per cent is in woodland; 30 per cent in brushland; 14.4 per cent in grassland; 13.8 per cent under cultivation; 0.5 per cent in bog; 0.4 per cent in ponds; 0.2 per cent in marshland; and 14.2 per cent in miscellaneous.

The study shows that an important limiting factor in the northern portion of the area is inadequate winter protective cover. Supplementing this deficiency by hedge-rows, conifer and shrub plantings, and strips of *Lespedeza sericea* is required to increase the carrying capacity of this portion.

It has been shown that the probable limiting factor in the southern part of the area is the insufficient food supply. The small acreage devoted to the production of grain should be supplemented by many properly distributed food patches. Protective cover here is not a problem, except locally. The conversion of portions of the larger "Indian grass" (*Andropogon*) fields to *Lespedeza sericea* is desirable.

* * * * *

FARMER-SPORTSMAN COOPERATIVE PLAN

The approximate total acreage in Camden County, N. J. under the Farmer-Sportsman Cooperative Plan is 7600. Approximately 48 per cent, or 3700 acres are listed in southern Camden County. Winslow township heads the list with 2681 acres, Gloucester township with more than 710 acres, Voorhees township with 222 acres, and Pine Hill Borough with 65 acres. The property owners listed under the plan, and the location and acreage of the areas in southern Camden County follow:

Winslow township:

George Pierson	Sicklertown	120 acres
Fred Sickler	"	250 "
Russell Sickler	"	30 "
Ernest Sickler	"	75 "
Harry Sickler	"	80 "
John Toll	"	175 "
Albert Johnson	"	175 "
W. Edwin Andrews	"	175 "
J. E. Jennings	"	50 "
Albert Ware	"	50 "
Edward P. Scott	"	56 "
Wilbert Sneathen	"	50 "
Thomas Andrews	"	40 "
Harry Hurff	"	85 "
Charles W. Pierson	"	120 "
J. Roe Warren	"	109 "
Mark Jennings	"	90 "
Wilbur S. Davis	"	130 "
Samuel S. Davis	"	80 "
Robert J. Donaldson	"	50 "

Charles L. Albertson	Winslow	25 acres
John Sampson	"	75 "
George Manerva	"	12 "
John Pytrk	"	14 "
Raymond Moffett	"	20 "
Carmon Simonetti	"	20 "
Dennis Kennedy	"	10 "
Harry Sampson	"	40 "
Santo Giaugaglio	"	20 "
Eugene Formeron	"	25 "
E. Pritchard, Inc.	"	130 "
Hydraulic Press Brick Co.	"	300 "

Gloucester township:

Charles Conover		87 acres
Everett M. Murphy	(no acreage listed)	
Franklin Eyres		80 "
Preston T. Roberts		250 "
Charles C. Bee		97 "
Herbert I. Clement		196 "

Pine Hill Borough:

Paul E. Holloway	65 acres
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Voorhees township:

Clarence J. Engle	50 acres
Charles W. Hulfish	47 "
Roger M. Smith	125 "

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SUMMARY OF COVER TYPE CLASSIFICATION

Based on origin and succession. Developed for southern Camden County, New Jersey.
For further explanation of symbols see text pages 15-19.

UPLAND PHASE:

AC - Cultivated land.

- | | |
|--------------------|---------------------------------|
| Ac-1 - truck crops | Ac-9 - millet |
| Ac-2 - corn | Ac-10- vetch |
| Ac-3 - wheat | Ac-12- clover |
| Ac-4 - rye | Ac-13- clover and timothy |
| Ac-5 - oats | Ac-14- timothy and alfalfa |
| Ac-6 - alfalfa | Ac-15- kafir corn |
| Ac-7 - timothy | Ac-16- sudan grass and soybeans |
| Ac-8 - soybeans | |

- P - pasture
BB - cultivated blueberries
CB - cranberry bog producing commercially
FL - commercial flowers
Nu - nursery
Or - orchard

Af - Fallow field

Aa - "Indian grass" field (*Andropogon virginicus*).

A4 - mixed herbaceous and grass, other than *Andropogon virginicus*.

A5 - shrub and herbaceous.

A7 to A34- wooded upland areas with species of trees as follows:

- | | |
|--|---|
| A7 - red cedar | (<i>Juniperus virginiana</i> , L.) |
| A8 - sweet gum | (<i>Liquidambar Styraciflua</i> , L.) |
| A9 - pine species | (<i>Pinus</i> species) |
| A10- oak " | (<i>Quercus</i> ") |
| A12- beech | (<i>Fagus grandifolia</i> , Ehrh.) |
| A13- elm | (<i>Ulmus americana</i> , L.) |
| A14- holly | (<i>Ilex opaca</i> , Ait.) |
| A15- wild black cherry | (<i>Prunus serotina</i> , Ehrh.) |
| A16- sassafras | (<i>Sassafras variifolium</i> , Ktze.) |
| A17- white birch | (<i>Betula populifolia</i> , Marsh.) |
| A18- poplar species | (<i>Populus</i> species) |
| A20- mixed community of wild black cherry, sour gum, sweet gum, and red maple. | |
| A21- mixed community of oak, pine, sassafras, and sour gum. | |
| A22- locust | (<i>Robinia Pseudo-Acacia</i> , L.) |
| A23- tulip tree | (<i>Liriodendron Tulipifera</i> , L.) |
| A24- black walnut | (<i>Juglans nigra</i> , L.) |
| A25- mixed community of pine, birch, sweet gum, and red maple. | |
| A26- " " " | elm, sweet gum, and willow. |
| A27- " " " | beech, elm, buttonwood, red maple and willow. |
| A28- " " " | tulip, beech, and red maple. |
| A29- " " " | " " " buttonwood. |
| A30- " " " | beech, red maple, and sweet gum. |

- A31- mixed community of oak, sweet gum, and white birch.
- A32- " " " pine, tulip, and sweet gum.
- A33- " " " oak, beech, and red maple.
- A34- " " " tulip, sweet gum, and red maple.

P5 - shrub and herbaceous (areas situated on lower land usually adjacent to swamps.

L - Areas dominated by a growth of laurel (*Kalmia latifolia*).

SWAMP PHASE:

B4 - sedges and coarse grasses.

B5 - shrub and herbaceous.

B7 to B17- wooded lowland areas, usually swamps or stream-bottoms, with dominant species of trees as follows:

- B7 - white cedar (*Chamaecyparis thyoides*, L., B.S.P.)
- B8 - red maple (*Acer rubrum*, L.)
- B9 - mixed community of red maple, sour gum, magnolia, etc.
- B10 - magnolia
- B12 - alder (*Alnus rugosa*, DuRoi, Spreng.)
- B15 - sour gum (*Nyssa sylvatica*, Marsh.)
- B16 - willow species (*Salix* species)
- B17 - swamp white oak (*Quercus bicolor*, Willd.)

BOG PHASE:

B6 - shrub and herbaceous.

MARSH PHASE:

- M2 - cat-tail (*Typha latifolia*, L.)
- M3 - wild rice (*Zizania palustris*, L.)
- M4 - pickerel weed (*Pontederia cordata*, L.)

MISCELLANEOUS SYMBOLS:

- G.P. - gravel pit
- S.P. - sand pit
- P.F. - poultry farm (usually fenced)
- CEM. - cemetery
- A.F. - athletic field
- F.P. - wildlife food patch (artificial)
- F.S. - Farmer-Sportsman area.
- So. - sand hill (practically devoid of vegetation)
- △ - church
- - dwelling (occupied)
- - unoccupied structures, other than farm buildings.
- - school, factory, or public building
- - bridge
- ≡ - bridge
- +++++ - railroad
- ===== - main or surfaced road
- ==== - unsurfaced road or trail
- == - dyke, or path
- county boundary line

- ~~~~~ - river or stream
- - cover type area boundary
- oooooo - hedgerow
- x - end of trail (or no longer passable)
- - - - - boundary of designated area
- (AI) - segment map sheet number
- - proper re-stocking location for cottontail rabbits.
- ⊙ - " " " " bobwhite quail.
- ⊖ - " " " " ring-necked pheasants.

PLOT #3 (#4, etc.) within a large circle indicates an evaluated and classified farm-game habitat.

TIMBER SIZE:

- 1 - reproduction, up to 6 feet in height.
- 2 - 6 feet in height to 4 inches in diameter breast high (D.B.H.)
- 3 - 5 inches to 8 inches d.b.h.
- 4 - over 9 inches d.b.h. (merchantable timber)
- 5 - various sizes (or ages).

TIMBER DENSITY:

- 1 - light or scattered
- 11 - medium
- 111 - heavy

SHRUB (UNDERBRUSH) DENSITY:

- - - - - light or scattered
- = = = - medium
- ≡ ≡ ≡ - heavy

Table 7
COVER TYPE ABBREVIATIONS IN SOUTHERN CAMDEN COUNTY, NEW JERSEY

(a)

Map No.	Woods	Brush	B4	A4	Aa	Af	P	Ac-1	Grain	CB	B6	Pond	M2	Misc.	Total area mapped
1A	395.	430.	35.	-	-	-	-	-	-	25.	5.	-	-	-	890
2A	486.	369.	62.5	1.5	-	-	-	-	-	26.	33.	1.	-	22.	1001
3A	565.5	320.5	17.5	10.	9.	2.	-	50.5	14.	1.	5.	-	-	6.	1001
4A	430.5	451.	.5	22.5	59.	3.	-	31.	-	-	.5	-	-	3.	1001
5A	170.	173.	5.	9.	48.	80.	-	324.	21.	-	12.	-	-	159.	1001
6A	196.5	192.	1.	10.	45.5	27.5	1.5	210.	20.	25.5	1.5	5.	-	265.	1001
7A	220.	110.5	-	23.	49.5	14.	-	266.5	25.	-	-	1.	.5	291.	1001
8A	420.	349.	10.	9.	26.	14.5	-	102.	53.	-	1.	5.	-	10.5	1001
9A	254.	478.5	2.	-	65.	7.	3.	93.	37.	-	3.	1.	-	57.5	1001
10A	260.	628.	2.	-	1.	-	-	-	-	-	1.	-	-	2.	894
1B	574.5	318.5	-	8.	-	-	-	-	-	-	4.	6.	-	-	911
2B	668.	399.	5.	-	-	-	-	-	-	-	8.	-	-	-	1080
3B	841.5	237.	1.	-	-	-	-	-	-	-	.5	-	-	-	1080
4B	562.5	261.5	.5	-	35.	16.	-	127.	34.5	25.	6.	-	-	12.	1080
5B	289.5	470.	4.5	6.5	10.	25.	-	75.	52.5	80.	2.5	13.	-	51.5	1080
6B	271.	328.	4.	13.	45.	47.	-	170.	59.5	11.	4.	23.5	-	104.	1080
7B	320.	495.	1.	20.	14.	12.5	1.	122.5	21.	-	-	5.	-	68.	1080
8B	188.	595.5	6.	6.	39.	38.5	-	111.	25.	4.5	.5	-	-	66.	1080
9B	366.	646.	.5	-	21.	2.5	-	14.	-	-	25.	3.	-	2.	1080
10B	332.	205.5	-	-	-	-	-	-	-	-	15.5	-	-	-	553
1C	559.	448.	6.	.5	-	-	-	-	-	-	12.5	-	-	-	1026
2C	599.	481.	-	-	-	-	-	-	-	-	-	-	-	-	1080
3C	448.	619.	1.5	-	-	-	-	-	-	-	1.5	7.	-	3.	1080
4C	110.	297.	-	3.	42.	70.	1.	373.	77.	-	-	-	-	107.	1080
5C	195.	313.	1.	26.5	62.5	20.	-	215.	44.	-	.5	-	-	202.5	1080
6C	152.	247.	13.	22.	36.	45.	-	312.	106.	-	32.	-	-	115.	1080
7C	182.	236.	-	21.	27.5	24.5	-	316.5	61.	-	-	-	-	211.5	1080
8C	257.	576.	-	25.	23.	4.	-	118.	27.	-	1.	-	-	49.	1080
9C	455.	271.	-	-	-	-	-	-	-	-	8.	1.	-	-	735
10C	15.	-	-	-	-	-	-	-	-	-	-	-	-	-	15
1Da	1.5	15.5	-	-	-	-	-	-	-	-	-	-	-	-	17
1D	488.	507.	2.	12.	-	-	-	-	-	-	1.	-	-	-	1010
2D	312.	564.	-	3.5	48.5	33.	2.5	60.5	15.	-	7.	-	-	34.	1080
3D	502.	508.	8.	-	8.	6.	-	6.	-	-	10.	21.	-	11.	1080
4D	177.	372.	24.	27.	81.	42.5	-	167.	40.5	-	13.	19.	-	117.	1080
5D	101.	449.5	-	30.	63.	24.5	-	173.	42.5	-	-	-	-	196.5	1080
6D	188.5	482.	11.	13.5	38.	38.5	2.	146.	47.	-	2.	-	-	111.5	1080

Table 7 (con't)
COVER TYPE ACREAGES IN SOUTHERN CAMDEN COUNTY, NEW JERSEY

(b)

Map No.	Woods	Brush	B4	A4	Aa	Af	P	Ac-1	Grain	CB	B6	Pond	M2	Misc.	Total area mapped
7D	159.	355.	2.5	47.	77.	33.	4.5	219.	61.	-	.5	-	-	121.5	1080
8D	431.	494.	-	7.	10.5	-	-	71.	4.	-	-	-	-	22.5	1040
9D	70.	-	-	-	-	-	-	-	-	-	-	-	-	-	70
1E	185.	295.	11.	3.	-	-	-	-	-	-	10.	-	-	-	504
2E	360.	520.	-	24.5	97.	-	-	18.5	-	-	5.5	-	-	30.5	1056
3E	223.	316.	3.	38.	147.	60.5	2.5	102.	33.	-	.5	-	-	154.5	1080
4E	138.	255.	3.5	37.	165.	104.	-	106.5	22.	-	8.	17.	-	224.	1080
5E	126.	565.5	-	4.	76.	27.	-	68.	43.	-	-	-	-	170.5	1080
6E	323.	265.	7.	20.	107.	29.	-	166.	67.	-	9.	-	-	87.	1080
7E	285.	374.	1.5	25.	102.5	36.	-	81.5	64.	-	.5	-	-	110.	1080
8E	463.5	244.5	22.	23.	69.	32.	-	61.	26.	-	14.	33.	1.	53.	1042
9E	53.5	36.	.5	-	16.5	-	-	-	-	-	2.5	-	-	1.	110
2F	29.	49.	-	-	23.	-	-	-	-	11.	-	-	-	2.	114
3F	81.	116.	3.	38.	148.	14.	-	55.	23.	-	7.	2.	-	237.	724
4F	115.	237.	6.	72.	154.5	15.	-	58.	17.	-	6.	7.	-	392.5	1080
5F	158.	346.5	3.	82.	117.	55.	-	84.	69.	-	-	5.	-	160.5	1080
6F	461.	431.	5.	12.	111.	-	-	5.	-	-	2.	9.	-	44.	1080
7F	441.	493.	5.5	6.	99.	-	-	1.5	-	-	16.	-	-	18.	1080
8F	385.	204.	8.	56.	8.	50.	-	143.	159.	-	10.	-	-	57.	1080
9F	273.	233.5	2.	27.	32.	17.	-	118.	118.	-	-	-	-	54.5	855
3G	73.	278.	5.	22.	131.5	16.	-	28.5	3.5	1.	2.5	-	-	102.	663
4G	67.	133.	6.5	96.	132.	21.	75.5	97.	80.	-	-	-	-	372.	1080
5G	308.	226.	4.	82.	138.	22.	14.	64.	69.	-	5.	6.	-	142.	1080
6G	578.	367.	4.	13.	89.	-	-	3.	2.	-	4.	2.	-	18.	1080
7G	768.	141.	-	51.	41.	45.	10.	12.	8.	-	1.	-	-	3.	1080
8G	191.	416.	5.	51.	29.	61.	32.	121.	149.	-	-	-	-	25.	1080
9G	178.	135.	3.	44.	116.	120.	11.5	152.5	143.	-	-	-	1.	53.	957
10G	2.	1.	-	-	-	-	-	-	-	-	-	-	-	-	3
2H	286.	145.	-	12.	18.	-	-	5.	-	-	-	-	-	11.	477
3H	160.	490.	-	75.	81.	27.	8.	18.5	33.	-	-	.5	-	187.	1080
4H	21.	54.	7.	132.	97.	11.	35.	29.	99.	-	-	-	-	595.	1080
5H	136.	58.	-	72.	155.	49.	-	45.5	135.	-	-	.5	-	429.	1080
6H	314.5	393.	.5	42.	115.	-	-	-	-	-	1.	-	-	214.	1080
7H	358.	422.	-	44.	183.	6.	-	14.	9.	-	1.	-	-	43.	1080
8H	150.5	478.	.5	84.	97.	55.	19.	64.	103.	-	-	-	-	29.	1080
9H	104.	149.	2.	124.	86.	42.	34.	107.	254.	-	-	1.	-	64	967
10H	9.5	8.	-	9.5	-	8.	-	47.	7.	-	-	-	-	-	89

Table 7 (con't)
COVER TYPE ACREAGES IN SOUTHERN CAMDEN COUNTY, NEW JERSEY

(c)

Map No.	Woods	Brush	B4	A4	Aa	Af	P	Ac-1	Grain	B6	Pond	M2	M3	M4	Misc.	Total area mapped
1I	75.	69.	6.5	37.	59.	5.	41.	45.	13.	-	5.5	-	-	-	61.	417
2I	309.	346.	7.	63.	76.	20.	20.	65.	14.	1.	4.	-	-	-	151.	1076
3I	242.	521.	2.5	55.	113.	7.	5.	22.	10.	.5	1.	-	-	-	101.	1080
4I	299.	403.	2.	87.	102.	3.	-	1.	4.	1.	5.	-	-	-	173.	1080
5I	123.	113.	1.	38.	57.	-	-	5.	-	-	57.	-	-	-	686.	1080
6I	134.	203.	-	2.	12.	1.	-	-	-	-	2.	-	-	-	726.	1080
7I	190.	374.	-	80.	301.	2.5	-	5.5	22.	-	-	-	-	-	105.	1080
8I	262.	424.	1.	59.	196.	7.	-	46.	34.	-	4.	-	-	-	47.	1080
9I	87.	42.	-	43.	49.	16.	29.	41.	63.	-	4.	-	-	-	24.	398
1Ja	25.	10.	-	25.	-	-	-	7.	18.	-	-	-	-	-	-	85
1J	143.	164.	14.	107.	10.	-	75.	65.	86.	-	-	-	-	-	226.	890
2J	223.	380.	2.	14.	22.	-	-	2.	-	-	-	-	-	-	437.	1080
3J	184.	248.	18.	37.	85.	44.	68.	24.	34.	-	14.	7.	-	-	317.	1080
4J	148.	274.	18.	58.	83.	10.	5.	21.	27.	-	16.	-	-	-	420.	1080
5J	75.	67.	10.	52.	42.	-	23.	2.	6.	-	18.	-	-	-	785.	1080
6J	179.	299.	14.	112.	17.	20.	37.	52.	82.	-	9.	-	-	-	259.	1080
7J	272.	298.	34.	81.	142.	24.	9.	103.	77.	4.5	6.5	1.	-	-	28.	1080
8J	247.	291.	20.5	31.	47.	23.	29.	38.	35.	-	4.	6.5	-	-	261.	1033
9J	40.	32.	3.	6.	10.	6.	-	18.	-	-	3.	-	-	-	18.	136
2K	10.	-	-	-	-	-	-	14.	3.	-	-	-	-	-	195.	222
3K	81.	54.	27.	93.	4.	11.	120.	86.	255.	-	-	-	-	-	147.	878
4K	69.	109.	62.	192.	94.	14.	75.	42.	70.	-	25.	-	-	-	328.	1080
5K	26.	39.	16.	142.	28.	8.	63.	20.	121.	-	6.	-	-	-	611.	1080
6K	195.	42.	3.	114.	92.5	75.	.5	330.	98.	-	-	-	-	-	130.	1080
7K	68.	84.	25.	194.	33.	79.	41.	283.	213.	-	1.	1.	-	-	58.	1080
8K	30.	42.	38.	110.	27.	8.	12.	185.	176.	-	15.	13.	-	-	275.	931
3L	-	-	-	5.	-	-	-	7.	11.	-	-	-	-	-	14.	37
4L	24.	64.	32.	35.	19.	1.	-	6.	25.	-	-	-	-	-	329.	535
5L	99.	115.	7.	111.	32.	10.	82.	66.	234.	-	-	-	-	-	217.	973
6L	216.	118.	33.	157.	39.	10.	48.	118.	118.	-	2.	2.	22.	16.	181.	1080
7L	116.	145.	17.	142.	60.	22.	1.	162.5	145.	-	-	-	3.	2.5	264.	1080
8L	24.	47.	8.	62.	56.	17.	-	33.	23.	-	6.	-	29.	-	242.	547
5M	1.5	1.5	.5	3.5	-	-	-	7.	6.	-	-	-	-	-	1.	21
6M	-	7.5	.5	34.	-	-	-	73.	38.	-	-	-	-	-	206.	359
7M	71.	45.	2.	59.	-	-	-	46.	14.	-	-	-	80.	1.	55.	373
8M	2.5	-	-	3.	.5	-	-	-	1.	-	-	-	9.	-	-	16

*For total acreages see table 8

Table 8
Total Acreages and Percentages of Cover Types in Southern Camden County

	Acres	Total acres	Percent
Woodland		25307.	26.2
Brushland		29038.5	30.
Grassland		13921.	14.4
B4	770.		0.8
A4	4241.		4.4
Aa	5873.		6.1
Af	1996.5		2.
P	1040.5		1.
Cultivated Land-		13366.5	13.8
Ac-1	7790.5		8.1
Grain	4699.		4.9
Ru	526.		0.5
P.F.	196.5		0.2
Nu.	33.5		0.003
Fl.	93.5		0.01
BB.	27.5		0.003
Bog		539.5	0.5
CB	210.		0.2
B6	329.5		0.3
Pond		402.5	0.4
Marshland		195.5	0.2
M2	33.		0.03
M3	143.		0.14
M4	19.5		0.02
Miscellaneous		13716.5	14.2
Total-		96487.	99.7

Table 9
COVER TYPE ACREAGES OF THE WILD GAME HABITATS IN SOUTHERN CAMDEN COUNTY.
(each habitat comprising 100 acres)

Plot No.	Map No.	Woods	Brush	B4	A4	Aa	Af	Ac-1	Grain	Ru	Or	CB	B6	Pond	Misc.
1	3A	25.	21.	5.	2.5	6.5	-	30.	3.	-	4.	1.	-	-	2.
2	3A	43.5	35.	2.5	6.	-	-	8.	5.	-	-	-	-	-	-
3	4A	17.5	28.5	-	12.	24.5	-	17.5	-	-	-	-	-	-	-
4	4A-5A	15.	37.	-	4.	3.	15.	14.	3.	-	8.	-	-	-	1.
5	5A	13.	38.5	-	-	11.5	-	25.	4.	-	7.	-	-	-	1.
6	6A-7A	3.5	24.5	-	13.5	9.5	2.	39.	-	-	7.5	-	-	-	.5
7	6A-7A	32.	34.	1.	2.	1.5	1.5	19.	-	-	2.5	1.5	-	5.	-
8	7A	38.5	13.5	-	2.5	12.	3.5	12.	1.5	2.5	5.	-	-	-	8.5
9	8A	11.	19.	.5	9.	-	3.5	17.	31.5	2.	-	-	.5	-	6.
10	8A-9A	24.	46.	2.5	-	-	-	11.5	14.5	.5	-	-	-	-	1.
11	9A	15.	21.5	1.	-	24.5	1.	15.5	12.	2.	4.5	-	-	1.	2.
12	4B-5B	19.	36.	-	-	-	-	29.	16.	-	-	-	-	-	-
13	4B	37.5	40.	-	-	15.5	-	4.	1.	-	-	-	.5	-	1.5
14	4B-5B	11.	30.5	-	-	11.	4.	6.	29.5	-	-	6.	1.	-	1.
15	5B	39.	4.	-	6.	3.	7.	20.	7.	-	7.	5.	-	-	2.
16	6B	19.	21.	-	-	8.	3.	40.	9.	-	-	-	-	-	-
17	7A-7B	32.	52.	-	12.	-	-	-	-	-	-	-	-	-	4.
18	7B	25.	40.	-	3.	5.	7.5	15.5	4.	-	-	-	-	-	-
19	8A	44.5	13.	2.5	-	7.5	-	27.	5.5	-	-	-	-	-	-
20	8A-8B	17.	37.	9.	-	9.	-	17.	7.	-	-	-	-	2.	2.
21	3C-4C	14.5	35.	-	-	9.	.5	28.	11.	1.	-	-	-	-	1.
22	3C-4C	11.	35.	-	-	5.	16.	21.	11.	-	-	-	-	-	1.
23	5C	4.	51.	-	-	9.5	-	27.5	8.	-	-	-	-	-	-
24	5C	24.	10.5	-	-	5.	12.	17.	11.	3.	17.	-	-	-	.5
25	6C	9.5	42.	-	5.	3.5	-	25.	3.	3.5	-	8.5	-	-	-
26	5C-6C	33.5	35.5	-	-	6.	2.	14.	4.	1.	3.	-	-	-	1.
27	6C	35.5	37.	.5	1.	1.5	-	13.	3.5	2.	-	5.	.5	-	.5
28	6B-6C	23.	44.	2.	8.	-	1.	14.	7.	-	-	1.	-	-	-
29	6C	6.	20.5	-	-	4.	13.	25.	30.5	-	-	-	-	-	1.
30	7C	16.	57.	-	-	2.5	3.	7.5	7.5	-	-	-	-	-	6.5
31	6C-7C	7.	27.	-	5.	-	-	45.	9.	6.5	-	-	-	-	.5
32	7B-8B	5.	44.	-	-	12.	-	21.	13.	5.	-	-	-	-	-
33	7C-8C	1.5	41.	-	9.5	9.5	7.5	17.	5.	-	5.	-	-	-	4.
34	8C	2.	56.	-	10.5	3.5	-	17.	9.	1.	-	-	-	-	1.
35	8B	15.	49.	-	-	5.	20.	6.5	-	1.5	-	-	-	-	3.
36	5B	16.	47.	3.	-	-	-	22.	1.	-	-	-	-	11.	-

Table 9 (con't)
COVER TYPE ACREAGES OF THE WILD GAME HABITATS IN SOUTHERN CAMDEN COUNTY
(each habitat comprising 100 acres)

(b)

Plot No.	Map. No.	Woods	Brush	B4	A4	Aa	Af	Ac-1	Grain	Ru	Or	B6	Pond	Misc.
37	2D	7.	42.	-	4.	4.	10.	18.	11.	-	-	2.	-	2.
38	4C	3.	57.	-	-	-	10.	14.	10.	-	6.	-	-	-
39	4D	8.	11.	12.	-	14.	10.	32.	1.	6.	-	2.	-	4.
40	4D	15.5	34.	-	4.	15.5	2.	13.	9.5	2.5	-	2.	-	2.
41	4D	27.	54.	-	3.	3.	5.	-	3.5	-	-	-	-	4.5
42	5D	33.5	14.5	-	9.	3.	-	28.	4.5	2.	5.5	-	-	-
43	5D	.5	47.	-	-	1.	3.	35.	3.	4.5	2.	-	-	4.
44	5c-6C- 5D-6D	22.5	10.	-	16.	1.	-	21.	21.5	1.5	6.	-	-	.5
45	6D	10.	64.	-	-	2.	7.	11.	1.	-	4.	-	-	1.
46	6D	-	61.	-	-	-	1.	16.	17.	4.	.5	-	-	.5
47	5D-6D	6.	36.	1.	4.	1.5	11.5	24.	1.5	5.	8.	.5	-	1.
48	6C-6D	38.	27.	12.5	1.5	1.5	-	15.	1.5	-	-	-	-	3.
49	5D-6D	.5	86.	-	-	5.5	2.	-	5.	-	-	-	-	1.
50	6D-7D	10.	55.	1.	2.	10.	-	19.	-	-	-	2.	-	1.
51	7D	29.	46.	-	-	3.5	-	17.	2.5	2.	-	-	-	-
52	8D	.5	52.	-	-	-	-	42.	-	-	4.5	-	-	1.
53	7D-7E	10.	18.	-	29.	-	7.	20.	7.	5.	-	-	-	4.
54	7D-8D	15.	36.	-	2.5	18.5	2.	15.	10.5	-	-	-	-	.5
55	2E-3E	27.	44.	-	-	22.	3.	1.	-	-	-	-	-	3.
56	2D-2E	33.	41.5	-	5.	11.	7.	-	-	-	-	-	-	2.5
57	3E	27.	16.	-	2.	22.	3.	19.	6.5	-	-	-	-	4.5
58	3D-3E	33.	42.	-	-	10.	12.5	-	-	-	-	-	-	1.5
59	4E	13.	45.	3.	-	13.	6.	7.	5.	-	-	6.	-	2.
60	3E-4E	34.	18.	1.	-	12.	.5	21.5	9.	-	-	4.	-	-
61	4E-5E	7.	36.	-	8.	15.5	-	5.	14.5	10.5	1.5	-	-	2.
62	4E-5E	6.	51.	-	-	17.	11.	3.	-	12.	-	-	-	-
63	5E	7.	35.	-	-	16.	-	17.	14.	2.	-	-	-	9.
64	6D-6E	9.	32.	2.	2.5	-	-	29.	11.	1.5	10.	-	-	3.
65	5E-6E	26.	40.	-	.5	3.5	1.5	20.	7.	1.5	-	-	-	-
66	6E	14.	9.	2.	-	17.	5.	38.	8.	-	4.	3.	-	-
67	6E-6F	40.	28.	-	3.	18.	3.	-	3.	.5	-	-	-	4.5
68	5E-5F	3.	67.	-	3.	14.	2.	8.	2.	.5	-	-	-	.5
69	6E-7E	23.	25.	-	3.	10.	-	28.	7.	3.	-	1.	-	-
70	6E-7E	46.	25.	3.	-	17.	-	.5	5.5	-	-	3.	-	-
71	7E	38.	33.	-	2.	26.	-	-	-	-	-	-	-	1.

Table 9 (con't)
COVER TYPE ACREAGES OF THE WILD GAME HABITATS IN SOUTHERN CAMDEN COUNTY
(each habitat comprising 100 acres)

(c)

Plot No.	Map No.	Woods	Brush	B4	A4	Aa	Af	P	Ac-1	Grain	Ru	Or	B6	Pond	Misc.
72	7E	11.	48.	-	2.5	3.	11.	-	11.	12.	.5	-	-	-	1.
73	7E-8E	30.	38.	-	9.	8.	8.5	-	.5	3.	-	1.5	-	-	1.5
74	8E	25.	28.5	-	4.5	12.5	2.5	-	6.	13.5	7.5	-	-	-	1.
75	2F-3F	32.	12.5	-	-	36.5	-	-	5.5	5.	-	-	-	-	8.5
76	3F	14.	14.	-	-	29.	12.	-	15.	8.	-	1.5	-	-	6.5
77	3F-4F	10.	33.	-	32.	15.	.5	-	1.	-	.5	-	-	-	8.
78	4F	36.	33.	1.	2.	3.	-	-	20.	-	-	-	-	.5	4.5
79	4F	16.	34.	4.	10.5	9.	6.	-	17.	-	-	-	-	1.5	2.
80	5E-5F	6.5	77.	-	-	15.	-	-	-	-	-	-	-	-	1.5
81	5F	35.	48.	-	-	7.	7.	-	1.5	1.5	-	-	-	-	-
82	4F-5F	26.	21.	2.	7.	15.	3.	-	10.	14.	-	1.	-	1.	-
83	5F	27.	22.	-	13.5	12.	4.5	-	4.5	8.	-	-	-	-	8.5
84	5F-6F	27.	40.	-	2.	18.	3.	-	5.	3.	-	-	-	-	2.
85	6F	19.	39.	-	-	27.	-	-	-	-	-	-	-	-	15.
86	6F	49.	31.	1.5	-	17.	-	-	-	-	-	-	1.5	-	-
87	7F	35.	33.	-	2.5	26.	-	-	-	-	-	-	1.	-	2.5
88	7F	18.	63.	-	-	17.	-	-	-	-	-	-	-	-	2.
89	8F	48.	14.	-	8.	-	-	-	21.5	7.	-	-	.5	-	1.
90	8F	5.5	20.	4.	3.	1.	10.	-	18.5	33.	-	-	-	-	5.
91	8F	17.5	21.5	-	9.	2.	9.	-	22.	14.	-	-	1.	-	4.
92	8E-9E	43.	30.	-	-	25.	-	-	-	-	-	-	-	-	2.
93	9F	9.	35.	-	-	-	7.	-	9.	36.	-	1.	-	-	3.
94	9F	12.5	28.	-	8.	8.	-	-	13.	29.	-	-	-	-	.5
95	3G	13.	56.	1.	-	16.5	5.	-	3.	-	-	-	1.	-	4.5
96	4G-5G	7.	17.	.5	12.5	7.	-	17.	3.5	19.	2.	5.5	-	-	9.
97	5G	7.	15.	3.5	13.	7.	-	4.	21.5	7.	-	11.	-	-	11.
98	5G	31.	42.	-	-	5.	-	-	2.	10.	-	-	5.	-	5.
99	5G	32.	31.	-	5.	14.	6.	-	4.	6.	1.	-	-	-	1.
100	5G	27.	25.	-	-	34.	2.	-	11.	-	-	-	-	-	1.
101	4G-5G	38.	34.5	-	5.	21.	-	-	-	1.5	-	-	-	-	-
102	4G-4H	-	44.	-	17.	9.	-	-	11.	12.	-	-	-	-	7.
103	6G	33.	43.	-	1.	18.	-	-	3.	1.	-	-	-	-	1.
104	6G	42.	35.	3.5	-	15.	-	-	-	-	-	-	3.5	-	1.
105	7G-8G	18.	27.	-	10.	.5	28.5	5.5	1.	9.	-	.5	-	-	-
106	8F-8G	32.5	15.	1.	18.	1.5	4.5	-	20.5	5.	-	-	-	-	2.
107	8G	22.	37.	.5	1.5	.5	14.5	-	-	22.5	-	-	-	-	1.5
108	7G	49.	23.	-	7.	10.	-	-	10.	-	-	-	-	-	1

Table 9 (con't)
COVER TYPE ACREAGES OF THE WILD GAME HABITATS IN SOUTHERN CAMDEN COUNTY
(each habitat comprising 100 acres)

(d)

Plot No.	Map No.	Woods	Brush	B4	A4	Aa	Af	P	Ac-1	Grain	Ru	Or	B6	Pond	M2	Misc.
109	8G-9G	7.5	43.	-	-	2.5	6.5	-	28.5	7.	-	-	-	-	-	5.
110	8G-9G	4.5	51.5	-	6.5	4.	4.	-	4.	24.	-	-	-	-	-	1.5
111	9F-9G	22.	28.	1.	17.	11.	-	-	21.	-	-	-	-	-	-	-
112	9F-9G	34.5	10.	-	-	27.	-	3.	2.	18.	-	3.	-	-	-	2.5
113	9G	34.	11.	3.	10.	25.	-	-	4.	11.	-	-	-	-	1.	1.
114	9G	36.	4.	-	6.	10.	4.	-	32.	5.	-	1.	-	-	-	2.
115	8G-8H	4.	66.5	-	-	-	4.	-	8.	17.	-	-	-	-	-	.5
116	3H	15.	29.	-	12.	22.	-	-	3.	4.	-	-	-	-	-	15.
117	2H	45.5	37.5	-	5.5	5.5	-	-	-	-	-	-	-	-	-	6.
118	4H-5H	8.	5.5	-	27.	26.	-	-	10.	14.	8.	1.5	-	-	-	-
119	5H	4.	13.	-	-	10.5	15.	-	19.5	2.	-	-	-	-	-	36.
120	5G-5H	42.	14.	-	-	18.	4.	-	9.	13.	-	-	-	-	-	-
121	6H	28.	51.	-	5.	15.	-	-	-	-	-	-	-	-	-	1.
122	8G-8H	38.	28.	-	6.	2.	-	12.	8.5	5.5	-	-	-	-	-	-
123	9G-9H	.5	42.	-	-	10.5	-	-	15.	32.	-	1.	-	-	-	-
124	8H	-	41.	-	5.	8.	6.	12.	17.	11.	-	-	-	-	-	-
125	9H	7.	14.	-	11.	42.	10.	-	6.	9.	-	-	-	-	-	1.
126	2I	18.	18.	7.5	4.5	9.	1.	8.	25.	2.	-	-	-	2.	-	5.
127	2I	20.	31.	-	22.	-	5.	6.	3.	6.	-	-	1.	-	-	6.
128	3H-4H	1.	41.	-	-	7.	-	7.	-	27.	-	-	-	-	-	17.
129	4I	25.	54.	-	8.	2.	1.5	-	-	-	2.	-	-	-	-	7.5
130	4I	31.	29.5	-	21.	13.5	-	-	-	-	-	-	.5	-	-	4.5
131	8I	16.	28.	-	15.	31.	1.	-	6.	-	-	-	-	-	-	3.
132	7I-8I	48.	13.	-	4.	11.	-	-	14.	4.	-	-	-	-	-	6.
133	8H-9H- 8I-9I	9.	11.5	2.	8.	20.	1.5	-	8.	33.	-	-	-	-	-	7.
134	9H	12.	6.	2.	10.5	-	5.	18.	31.	12.	-	2.	-	1.5	-	-
135	8H-9H	16.	43.5	-	5.5	13.5	1.	-	3.	16.5	-	-	-	-	-	1.
136	8I-9I	20.	31.	-	19.	2.5	-	6.	6.	8.	-	7.5	-	-	-	-
137	8I-9I	33.	16.	-	3.	15.	2.	1.	5.	10.	-	5.5	-	2.	-	7.5
138	1J-1Ja	28.	6.	1.	25.	-	-	10.	4.	23.	-	3.	-	-	-	-
139	1J	17.	1.	.5	26.	-	-	23.	.5	16.	-	16.	-	-	-	-
140	1I-2I- 1J-2J	27.	61.	-	5.	7.	-	-	-	-	-	-	-	-	-	-
141	4I-4J	30.5	46.	-	-	14.	2.5	-	-	7.	-	-	-	-	-	-
142	3J	4.5	17.	4.5	12.5	9.	13.	31.5	3.	5.	-	-	-	-	-	-

Table 9 (con't)
COVER TYPE ACREAGES OF THE WILD GAME HABITATS IN SOUTHERN CAMDEN COUNTY
(each habitat comprising 100 acres)

(e)

Plot No.	Map No.	Woods	Brush	B4	A4	Aa	Af	P	Ac-1	Grain	Ru	Or	Pond	M2	M3	Misc.
143	4J	7.	67.5	7.5	9.	-	-	5.	4.	-	-	-	-	-	-	-
144	6J	.5	23.	2.5	29.	1.	-	2.	9.	14.	-	-	-	-	-	19.
145	6J	8.	25.	2.	35.	3.	2.	11.	2.	12.	-	-	-	-	-	-
146	7J	28.5	23.	-	12.	19.	-	-	11.	3.	1.5	2.	-	-	-	-
147	7J	16.	44.	10.5	5.5	13.	-	-	11.	-	-	-	-	-	-	-
148	7J	10.	19.	13.	13.	14.	-	-	17.	14.	-	-	-	-	-	-
149	7J-8J	43.	39.	-	.5	14.5	-	-	-	-	-	-	1.	-	-	2.
150	8J-9J	16.	47.	8.	-	2.	18.	5.	2.	-	-	-	-	-	-	2.
151	8I-9I 8J-9J	21.	28.	1.	17.5	-	4.	-	15.	10.	-	-	1.	-	-	2.5
152	3K	6.	15.	16.	21.	-	6.	12.	9.	11.	-	-	-	-	-	4.
153	3K	10.	12.	8.	6.	-	1.	-	1.	57.	-	-	-	-	-	5.
154	4K	-	9.5	26.	27.	-	-	17.	7.	11.	-	-	-	-	-	2.5
155	4K	14.	27.	14.	25.	8.	-	-	2.	6.	-	-	-	-	-	4.
156	3J-4J 3K-4K	25.	40.	2.	4.	1.	4.	-	6.	14.	-	-	-	-	-	4.
157	6K	47.	11.	-	11.	14.	2.	-	14.	-	-	-	-	-	-	1.
158	6J-6K	18.	8.5	-	.5	24.	9.5	-	18.	18.	-	-	-	-	-	3.5
159	6K	32.	7.5	-	5.5	2.	6.5	-	31.	12.5	-	-	-	-	-	3.
160	6K-7K	3.	7.	1.5	14.	-	5.	-	42.5	23.	-	-	-	-	-	4.
161	7J-7K	1.5	21.	2.	7.5	15.	.5	-	40.	10.	-	-	.5	-	-	2.
162	7K-8K	-	8.5	35.5	7.5	5.	5.	1.5	4.5	24.	-	3.	-	4.5	-	1.
163	7J-8J 7K-8K	-	12.5	-	25.	6.	5.	-	17.5	20.5	-	-	-	-	-	13.5
164	8J	7.5	17.5	8.	9.	10.	2.5	13.5	-	12.	-	-	-	9.	-	11.
165	8K	3.	11.	4.	14.	5.	-	3.5	7.	43.5	-	-	-	9.	-	-
166	4L	10.5	34.	20.5	11.	6.5	1.	-	3.	5.	-	-	-	-	-	8.5
167	5L	9.	40.	-	3.	-	2.	15.	-	31.	-	-	-	-	-	-
168	6K-6L	21.	7.	4.5	20.5	12.	4.	-	1.	21.	.5	8.	-	-	-	.5
169	5K-6K 5L-6L	20.	18.	5.	11.	2.	-	-	1.	43.	-	-	-	-	-	-
170	6L	18.	13.	4.5	16.	1.5	7.	-	14.	15.	-	-	1.5	1.5	4.5	3.5
171	5L-6L	1.	9.	-	43.	5.	-	-	6.	27.	-	-	-	-	-	9.
172	6L	19.	4.	4.	5.	-	-	30.	14.	23.	-	-	-	-	-	1.
173	7K-7L	3.	15.5	-	13.	10.5	3.5	5.	.5	45.	-	-	-	-	-	4.
174	7L	10.	29.	4.5	27.	4.	3.	-	3.	10.	-	-	-	-	-	9.5

Table 9 (con't)
COVER TYPE ACREAGES OF THE WILD GAME HABITATS IN SOUTHERN CAMDEN COUNTY
(each habitat comprising 100 acres)

(f)

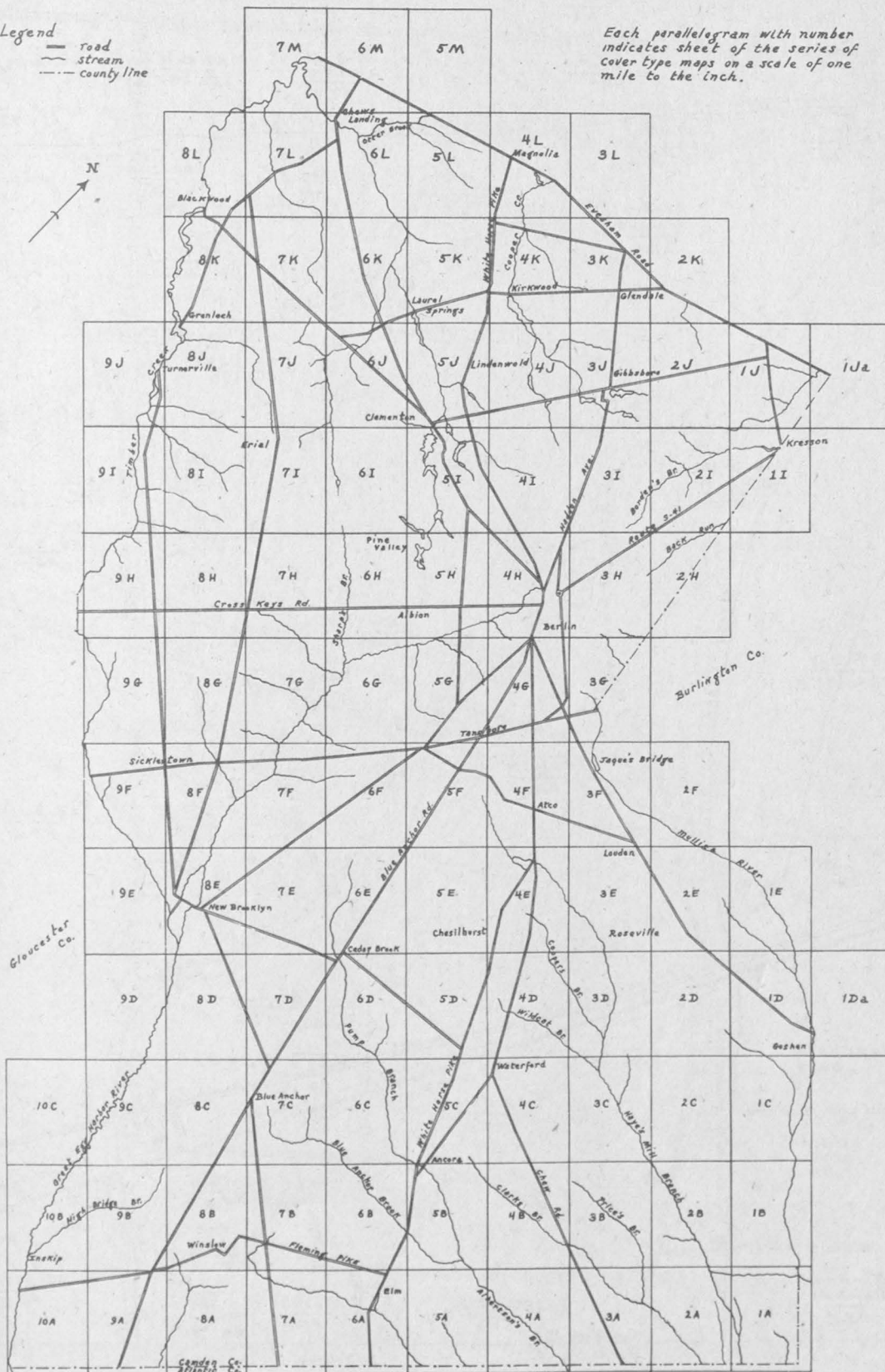
Plot No.	Map No.	Woods	Brush	B4	A4	Aa	Af	P	Ac-1	Grain	Ru	Or	Pond	M2	M3	Misc.
175	7K-8K 7L-8L	5.5	13.5	2.5	36.5	3.5	-	3.5	14.5	20.5	-	-	-	-	-	-
176	5L-6L 5M-6M	28.5	20.	9.5	5.	7.5	-	-	14.	15.	-	-	-	-	-	.5
177	6L-6M	7.5	28.	7.5	12.	.5	-	-	32.	11.	-	-	-	-	-	1.
178	7L-7M	32.5	3.	2.5	7.	4.5	2.5	-	34.5	8.	-	-	-	-	4.5	1.
179	8L	7.	8.	-	8.5	3.	15.	-	21.	19.	-	-	-	-	11.	7.5
180	7H	3.5	55.	-	-	24.	-	-	4.	4.	-	2.	-	-	-	7.5

KEY MAP to FEDERAL Aid to WILDLIFE PROJECT 14-R.

Camden County, N.J., southeast of Evesham Road.

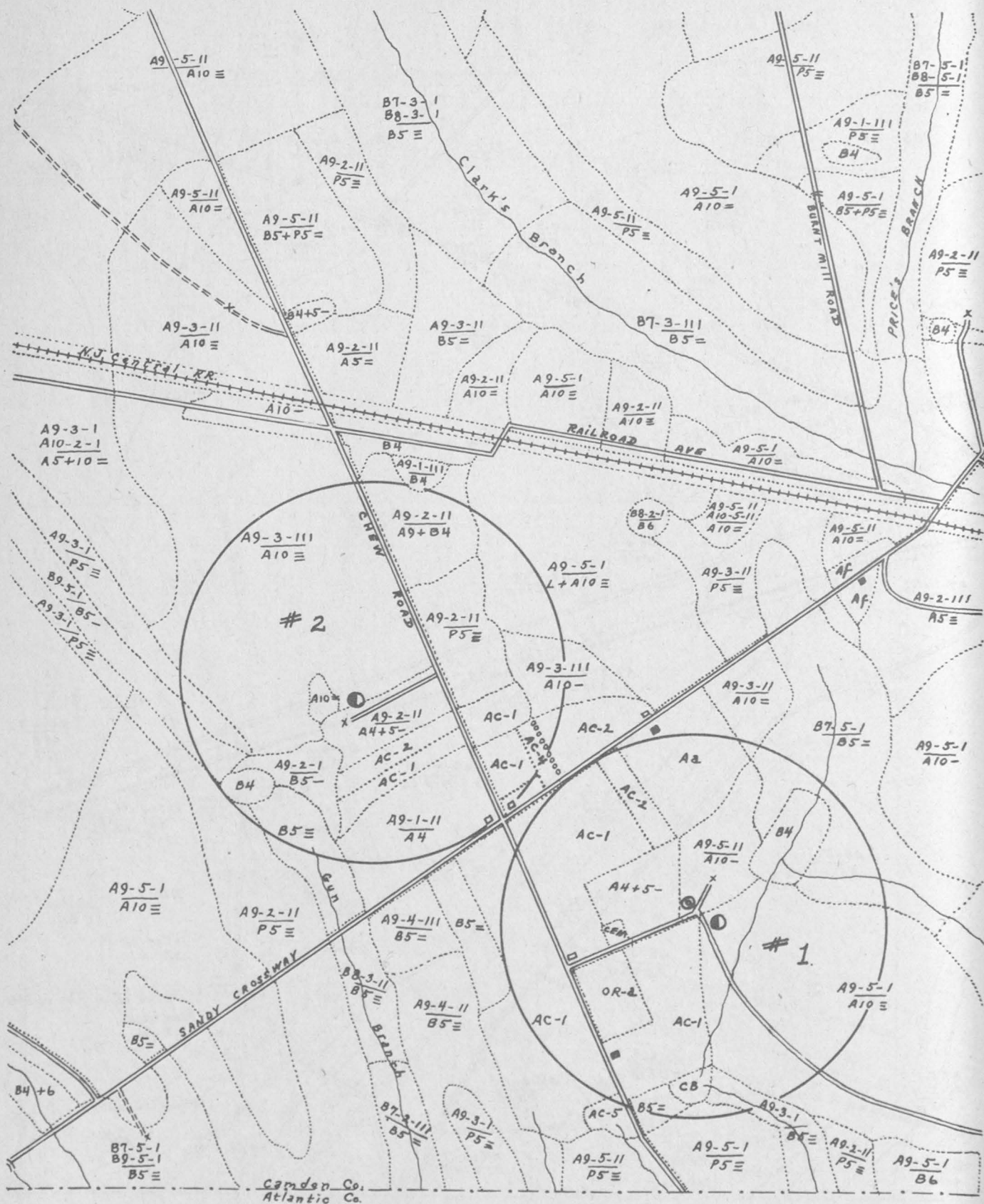
Legend
 — road
 ~ stream
 --- county line

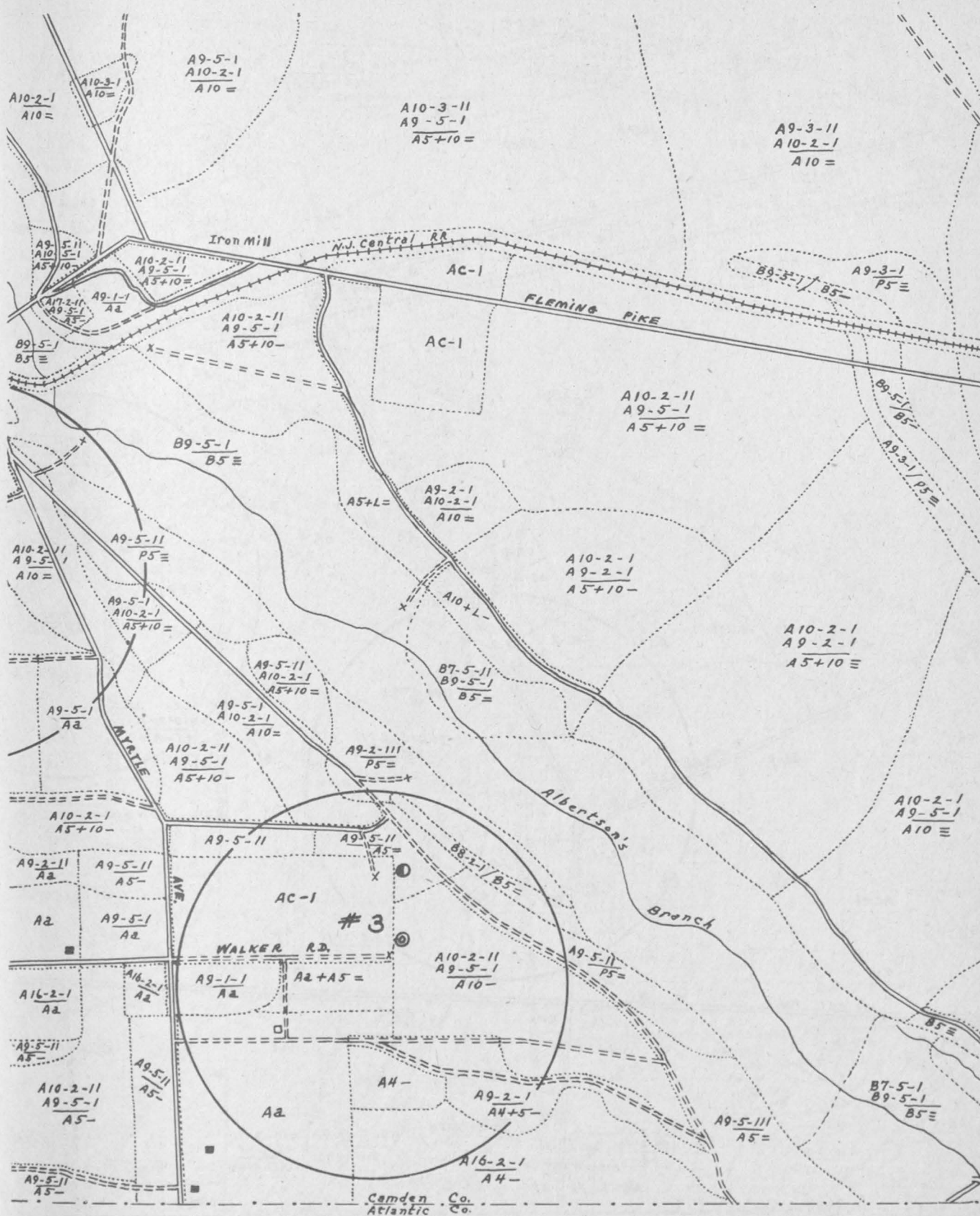
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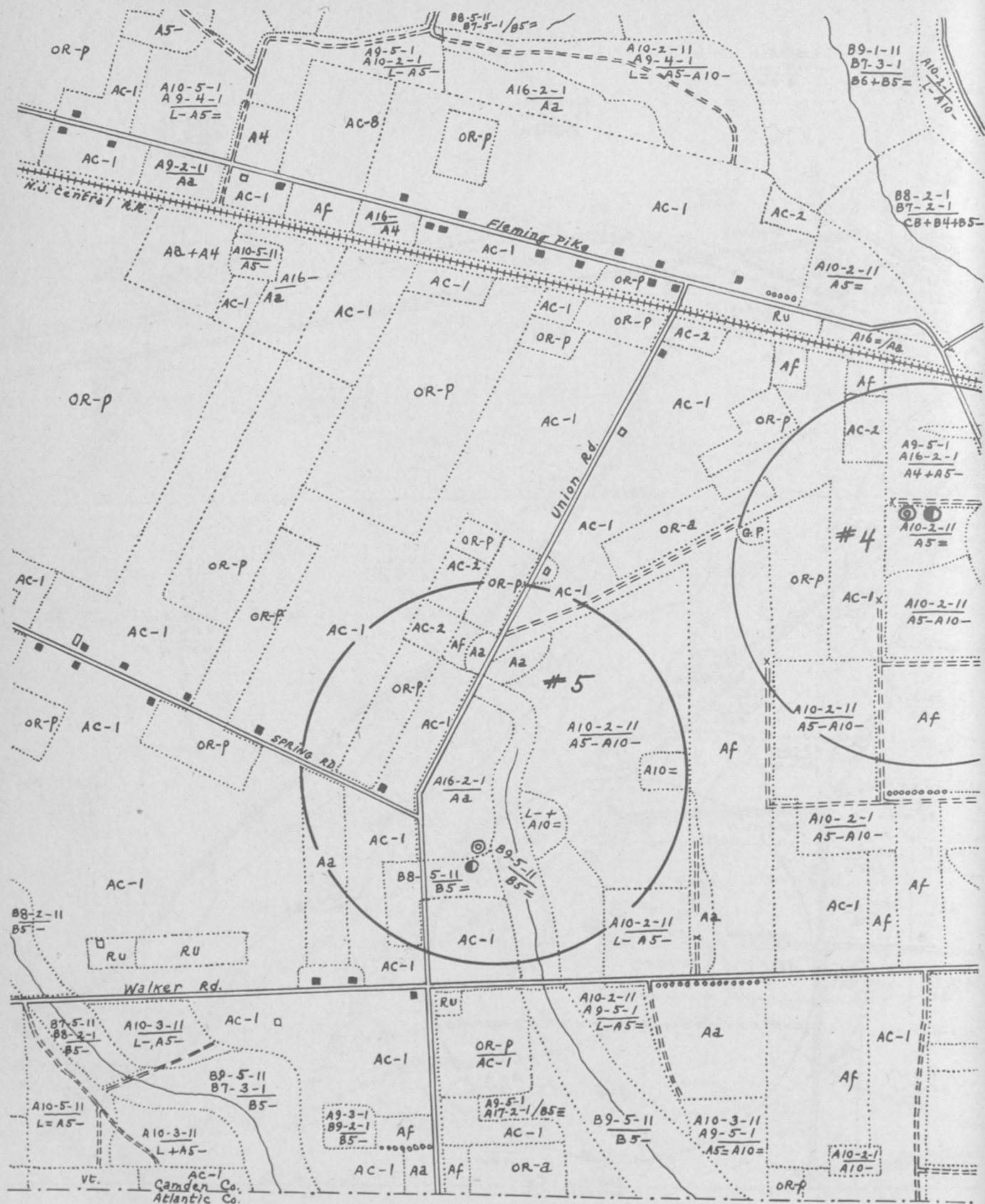


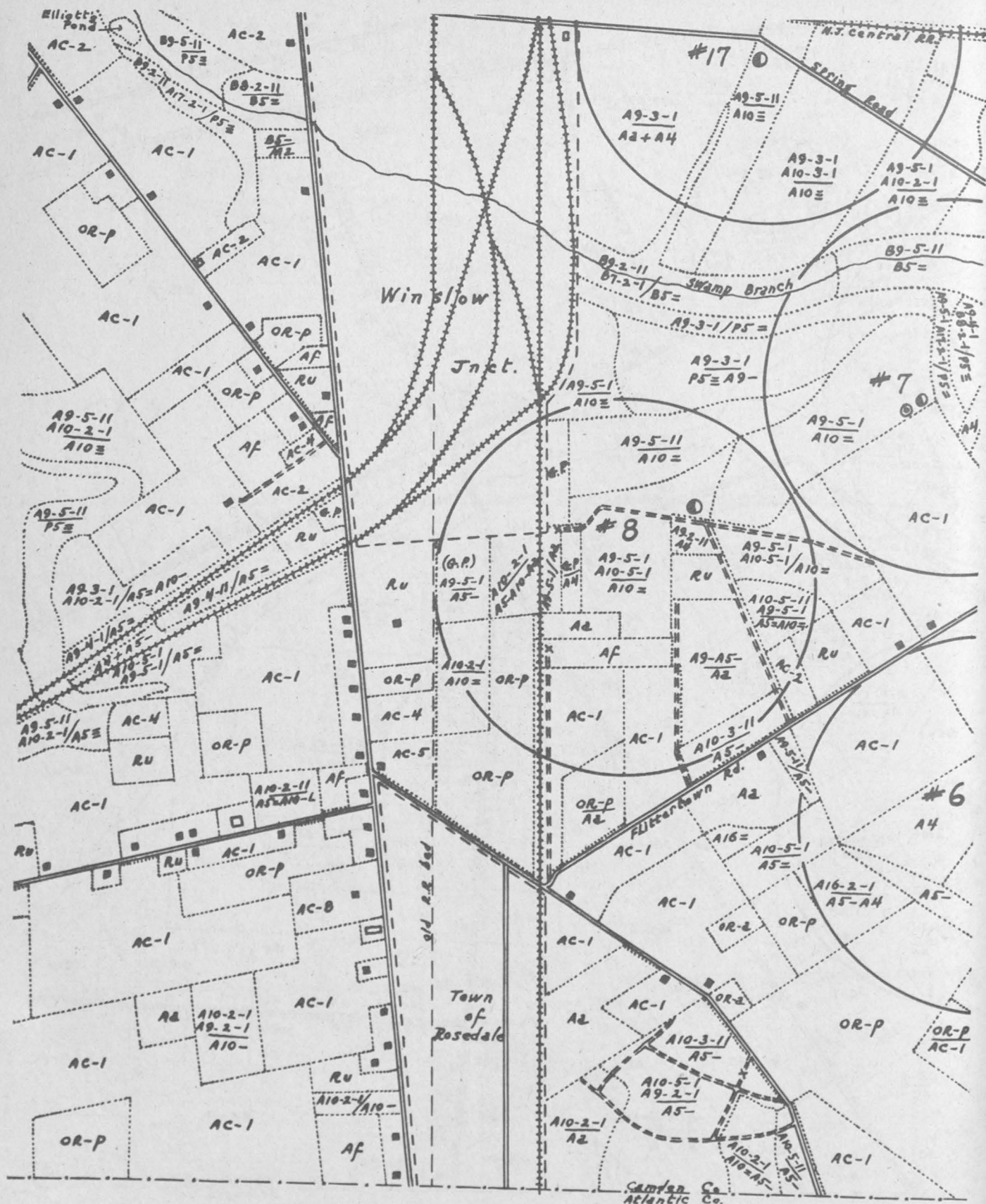
New Jersey Fish and Game Commission

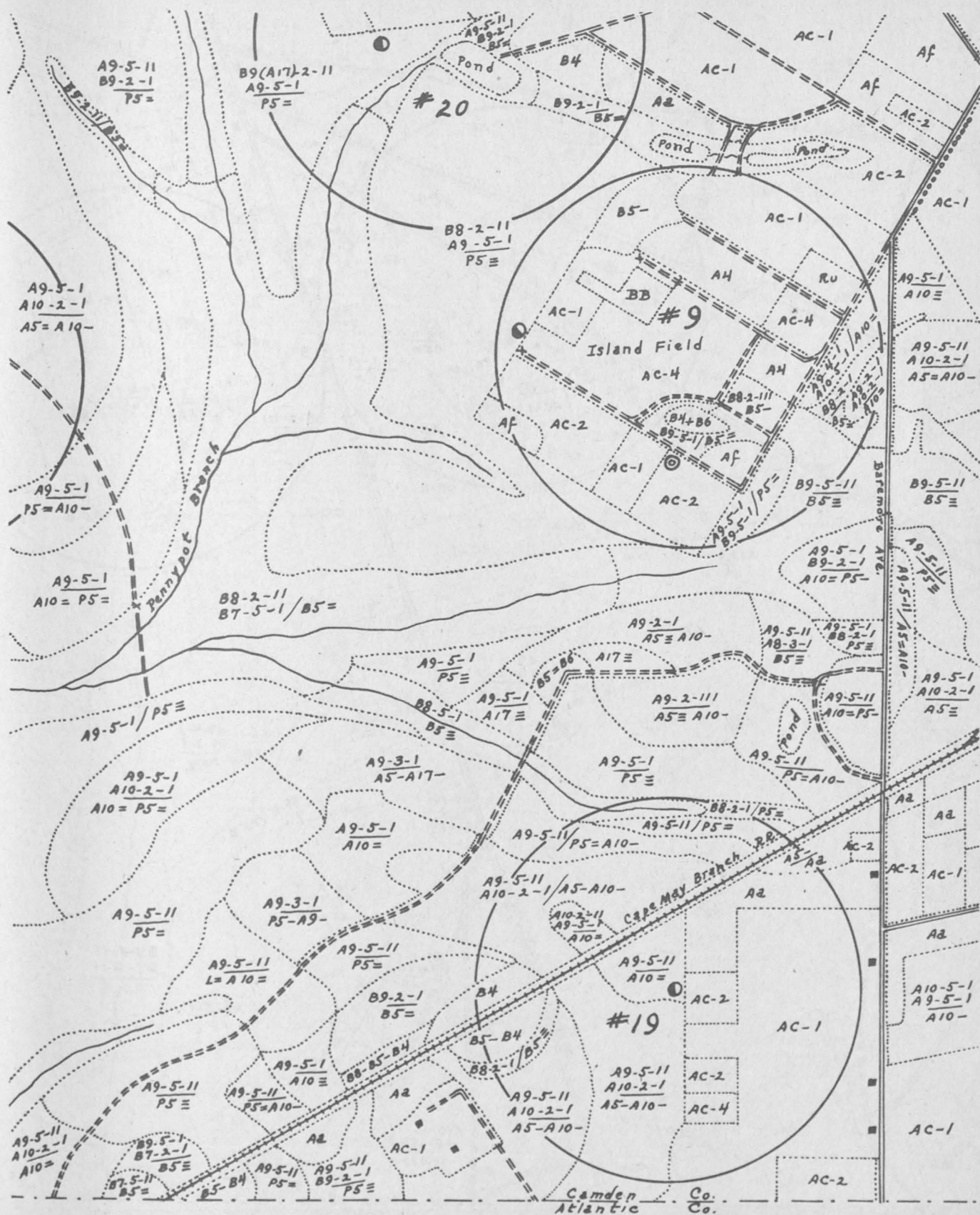
Drawn by - Chas. W. Wright.
 Approved by - L. G. MacNamara.
 Date - April 30, 1943.

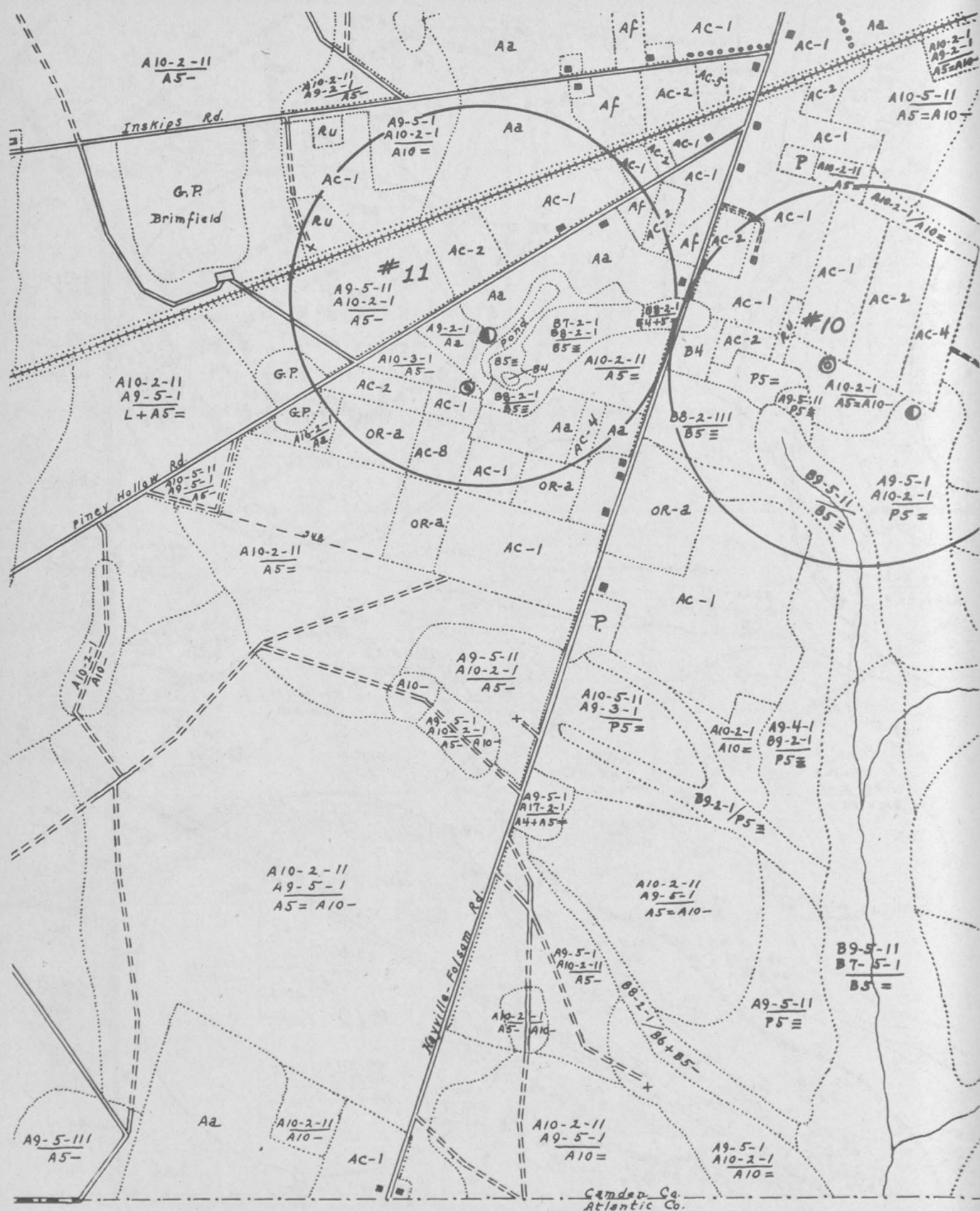


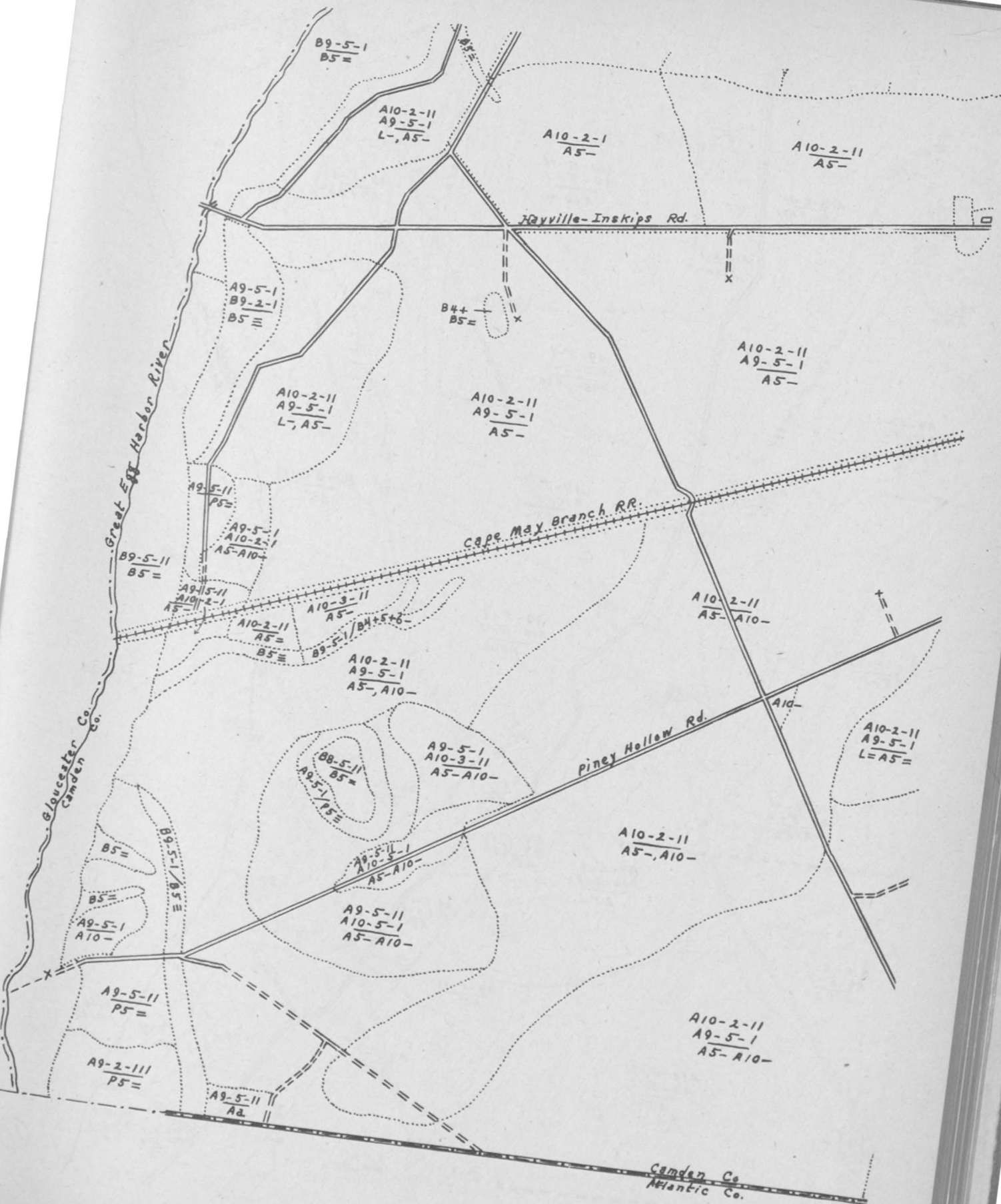


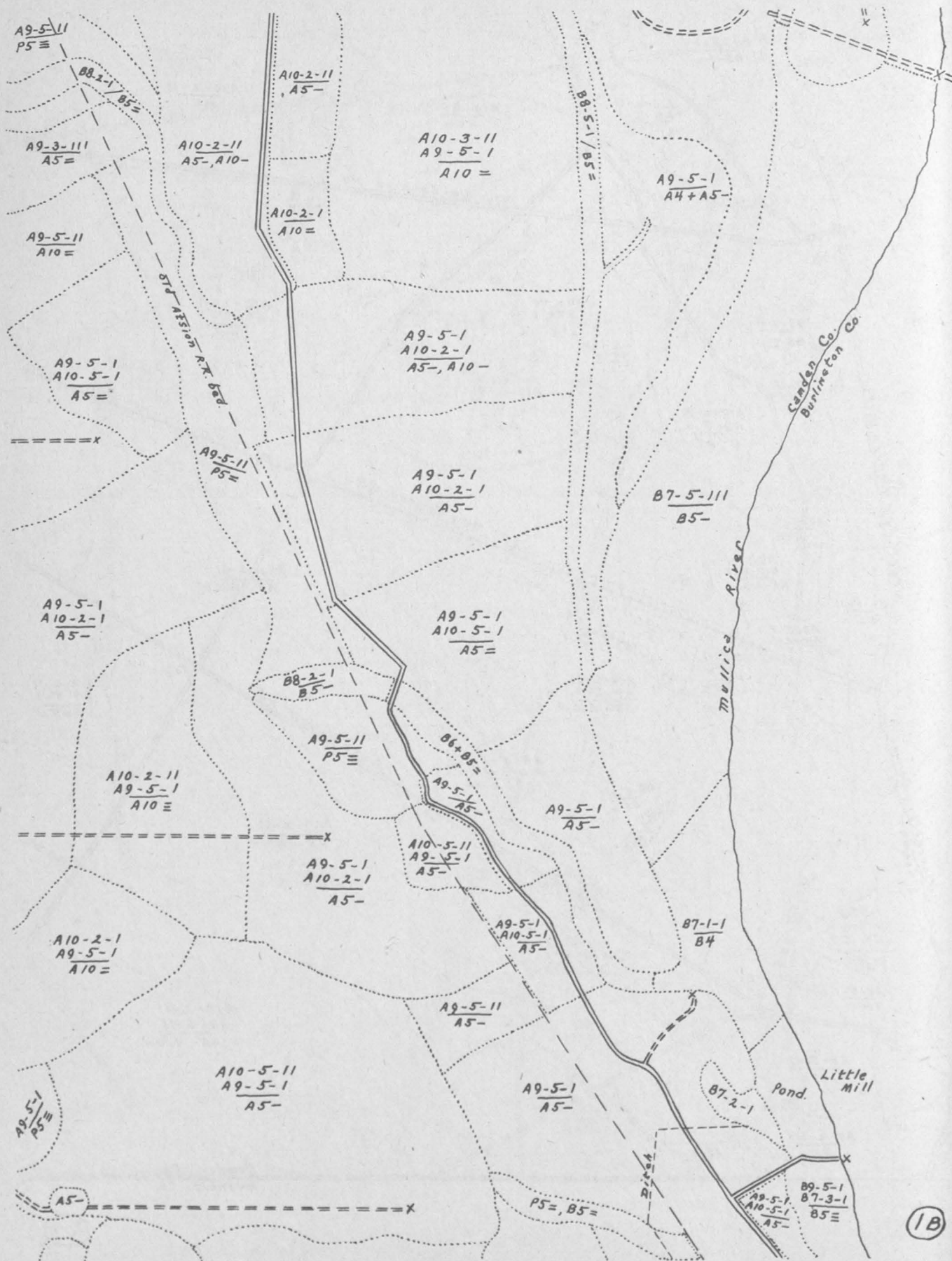


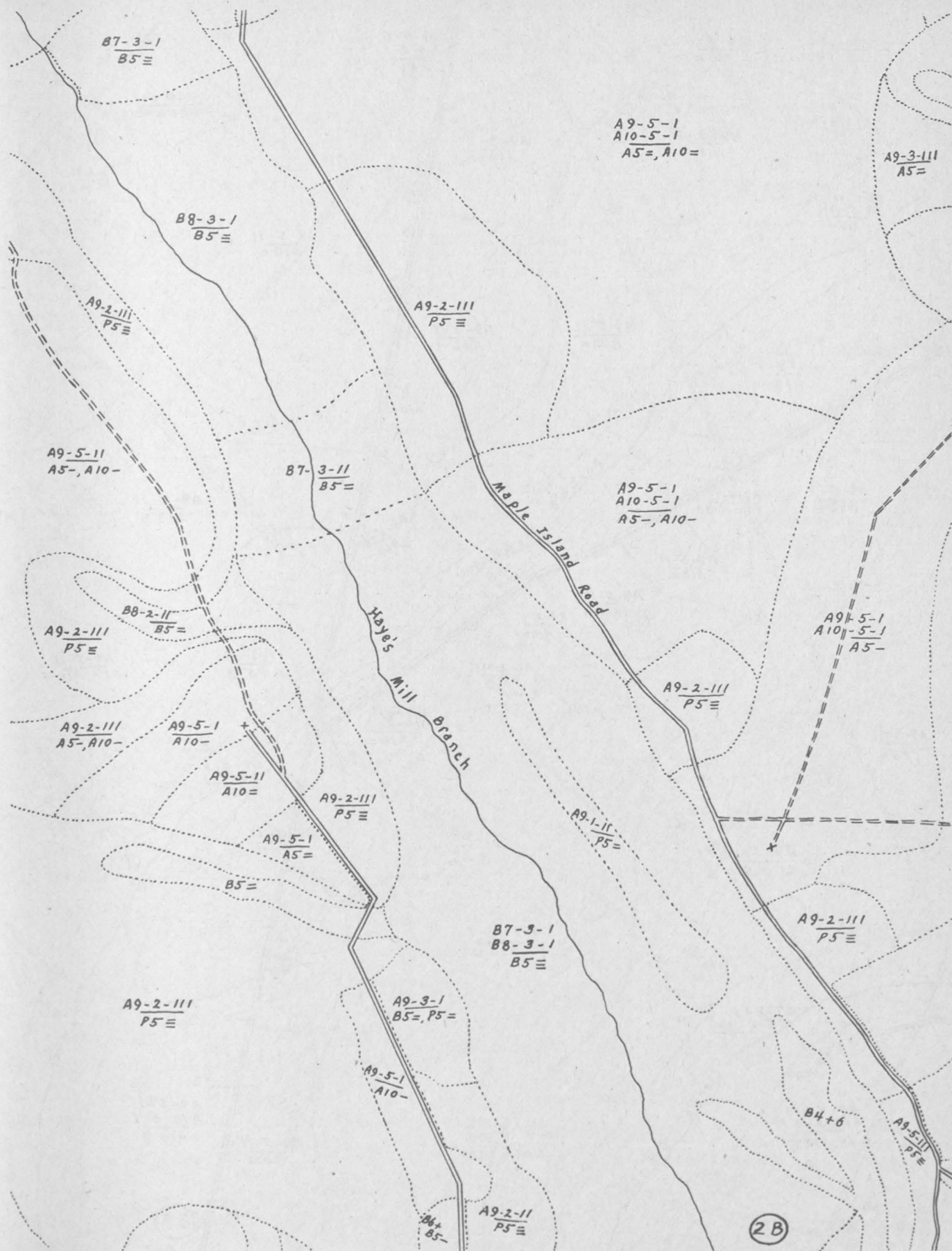


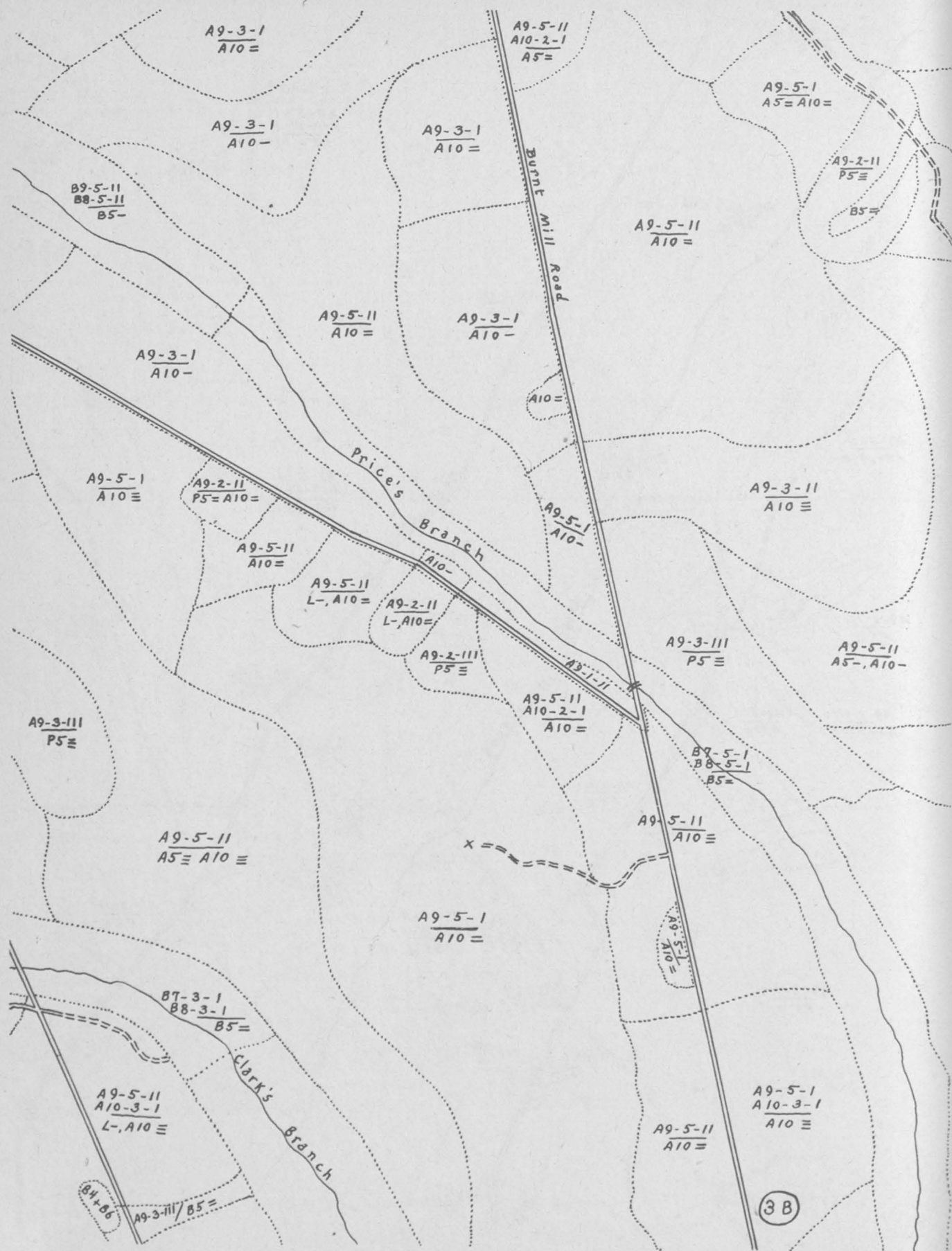


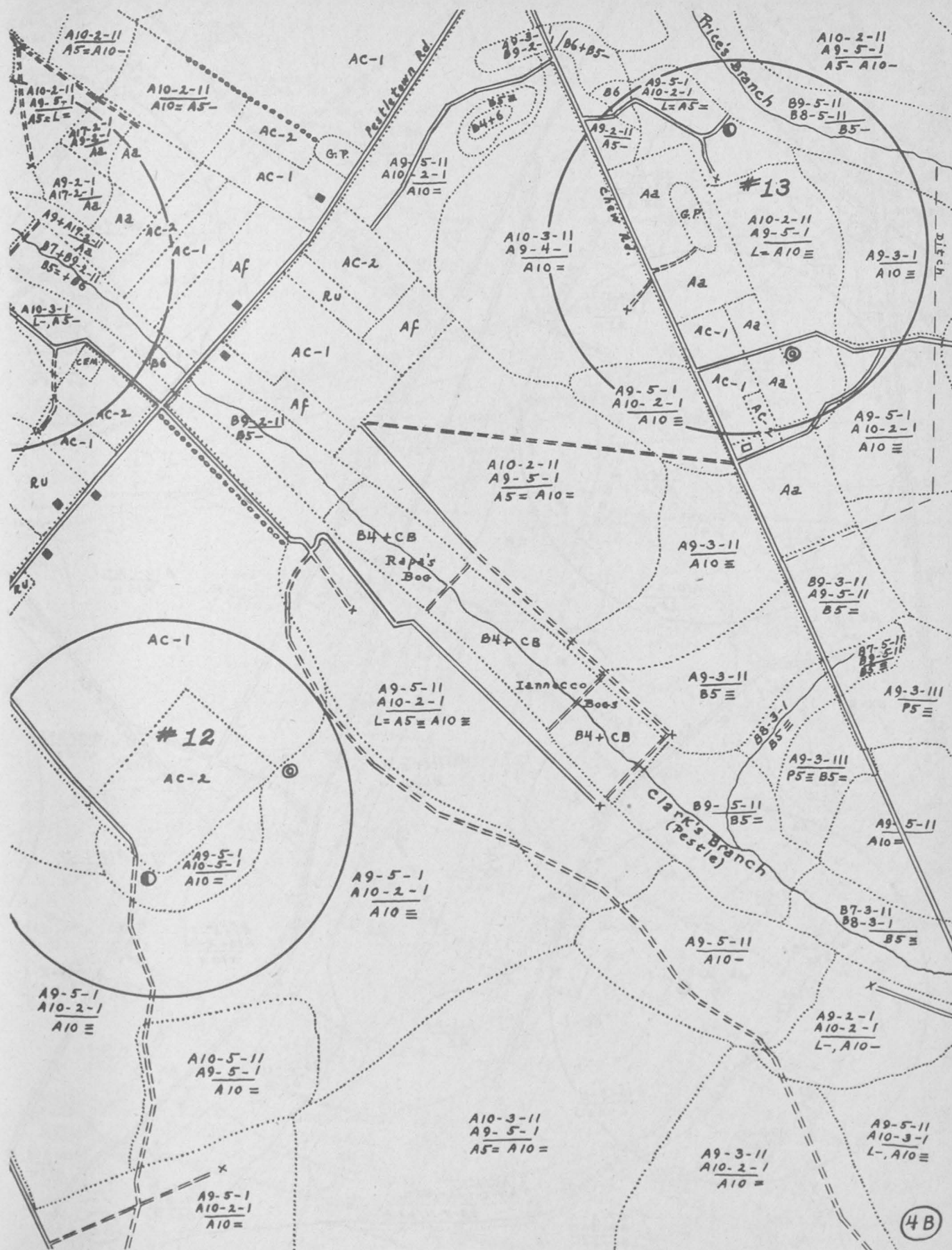


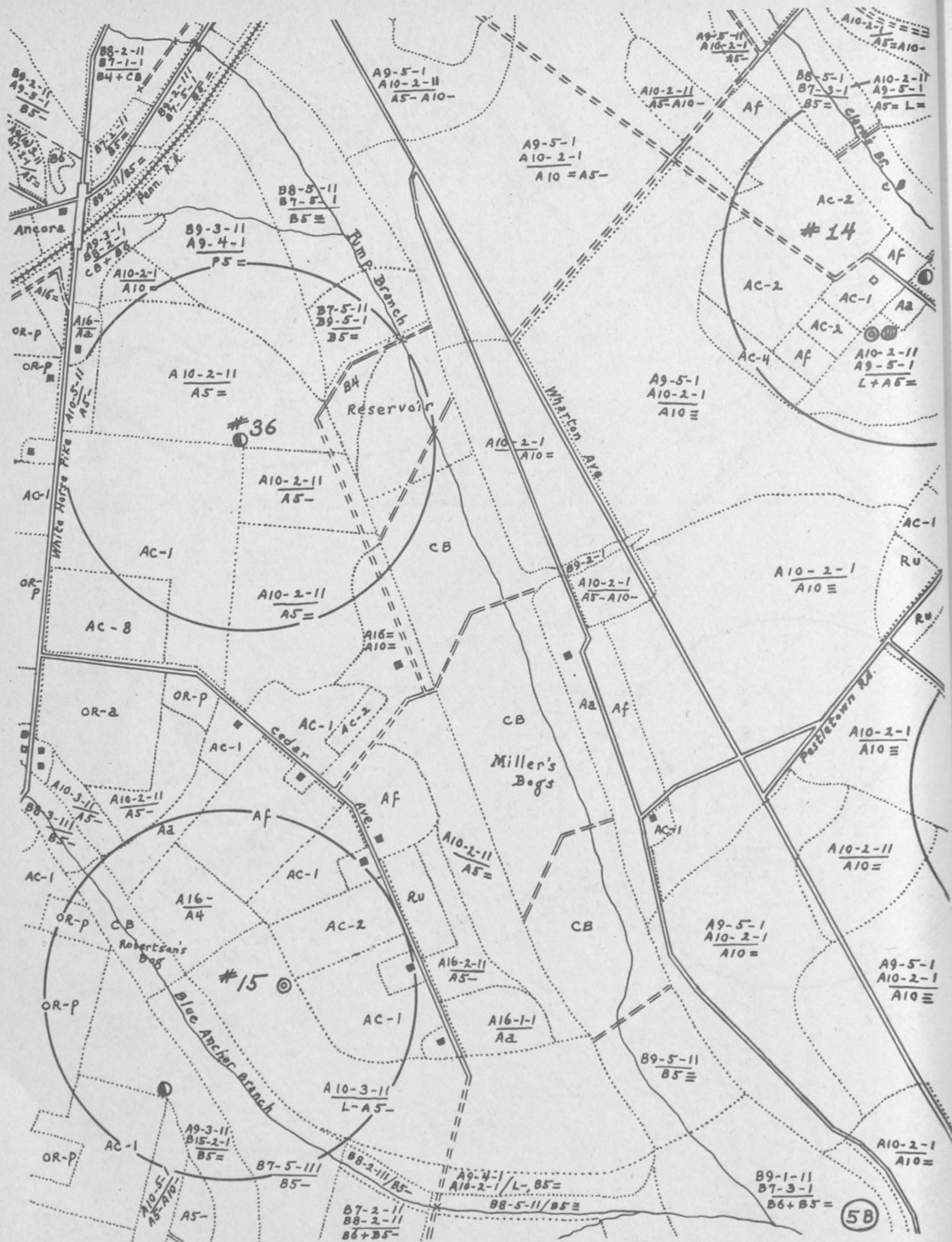


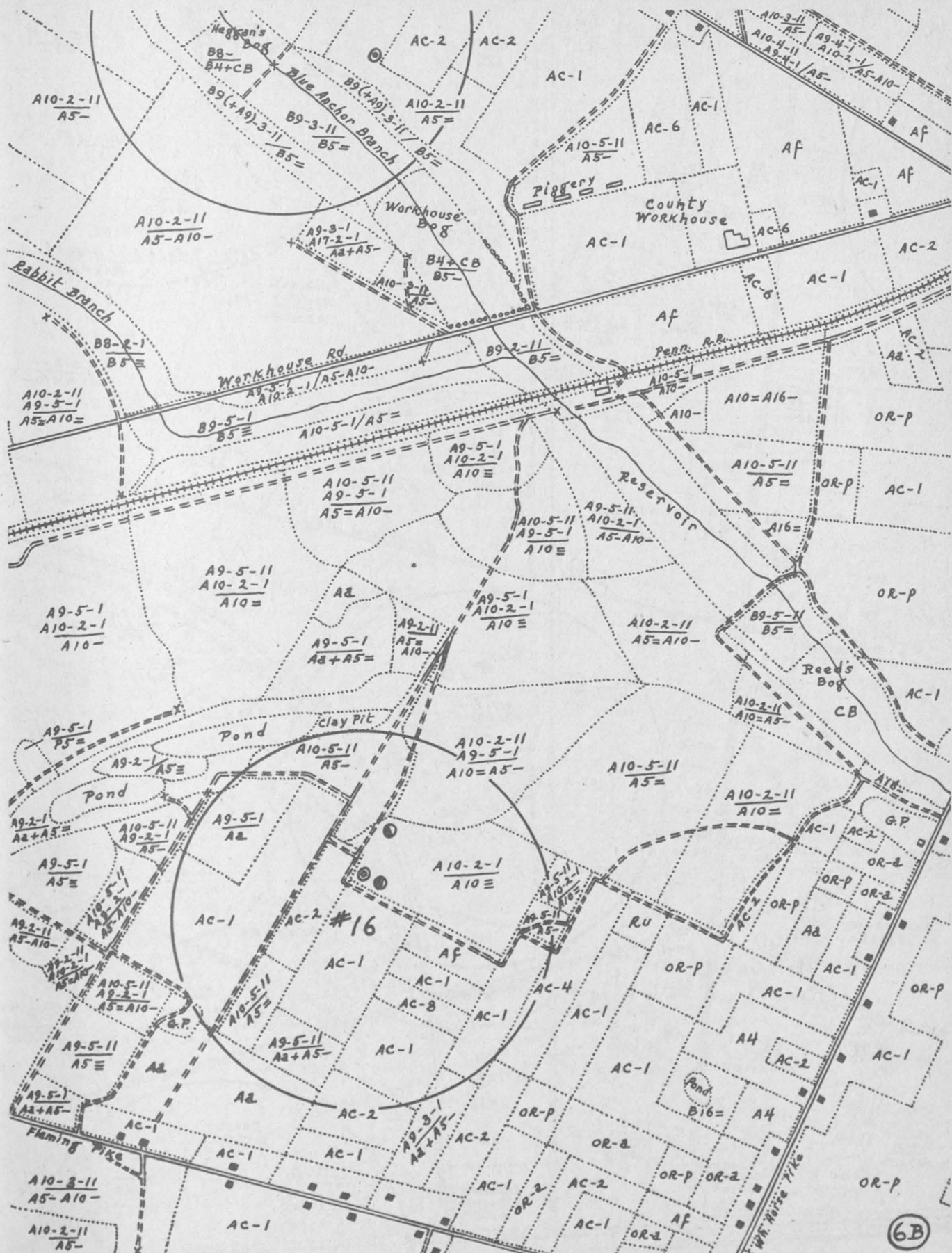






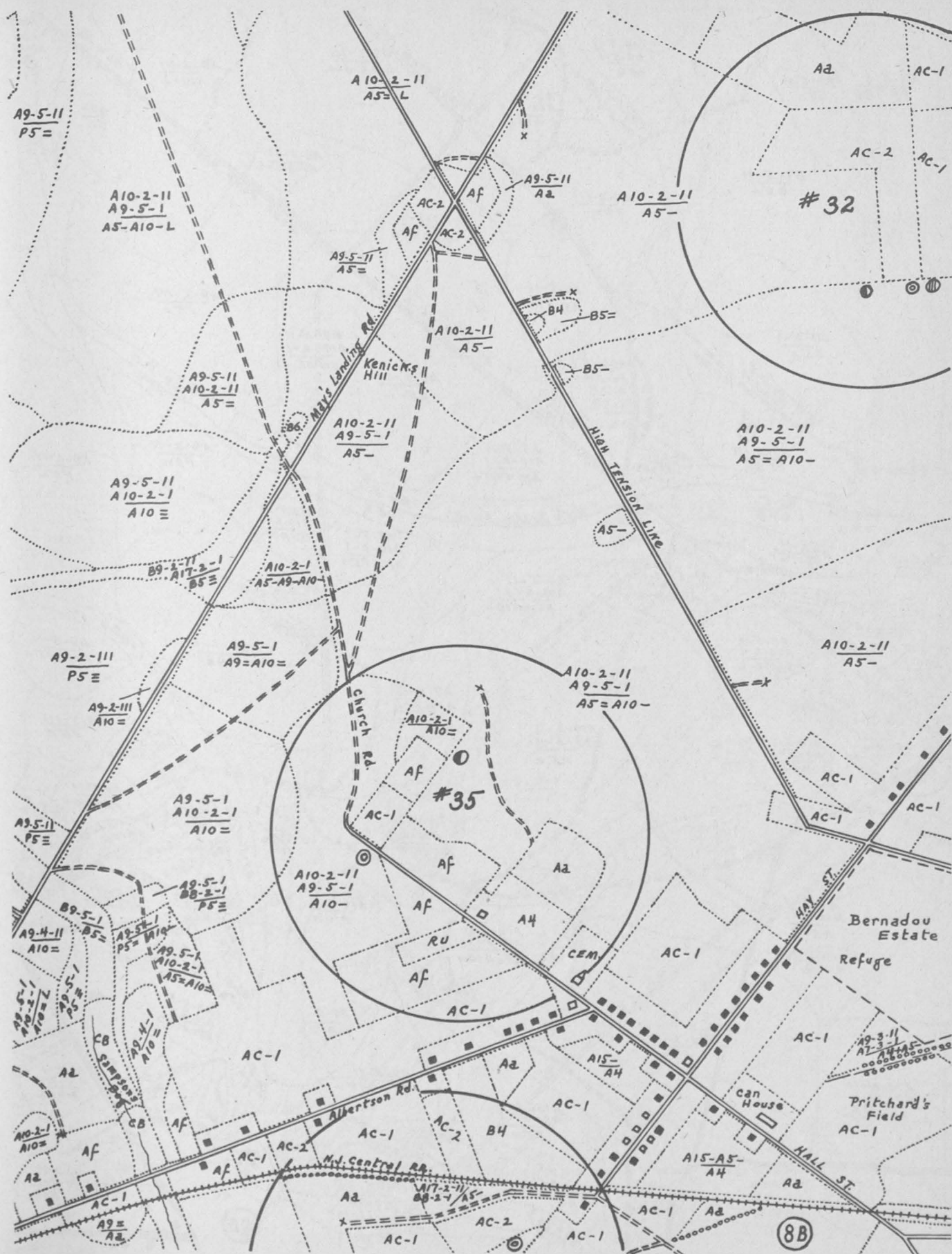


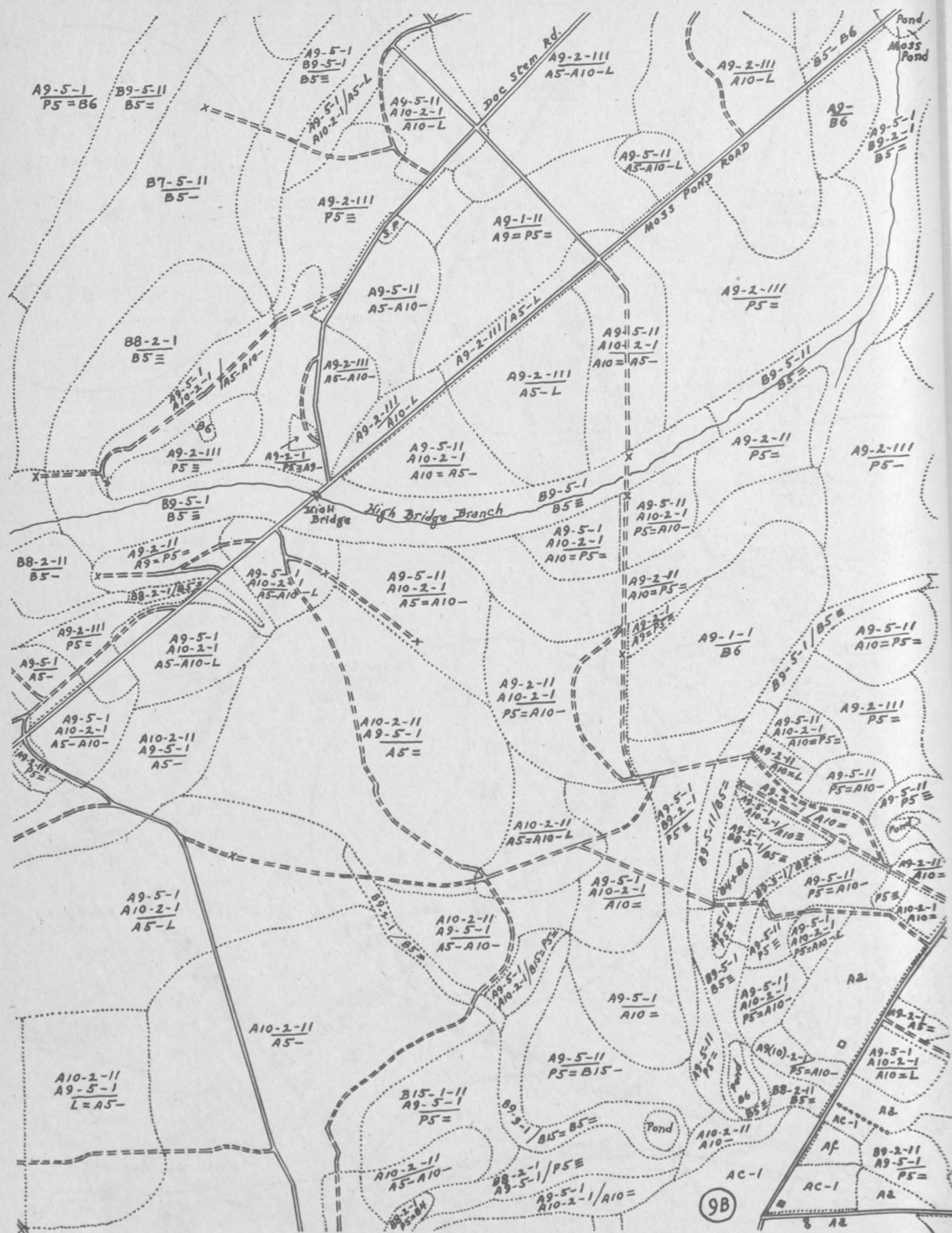


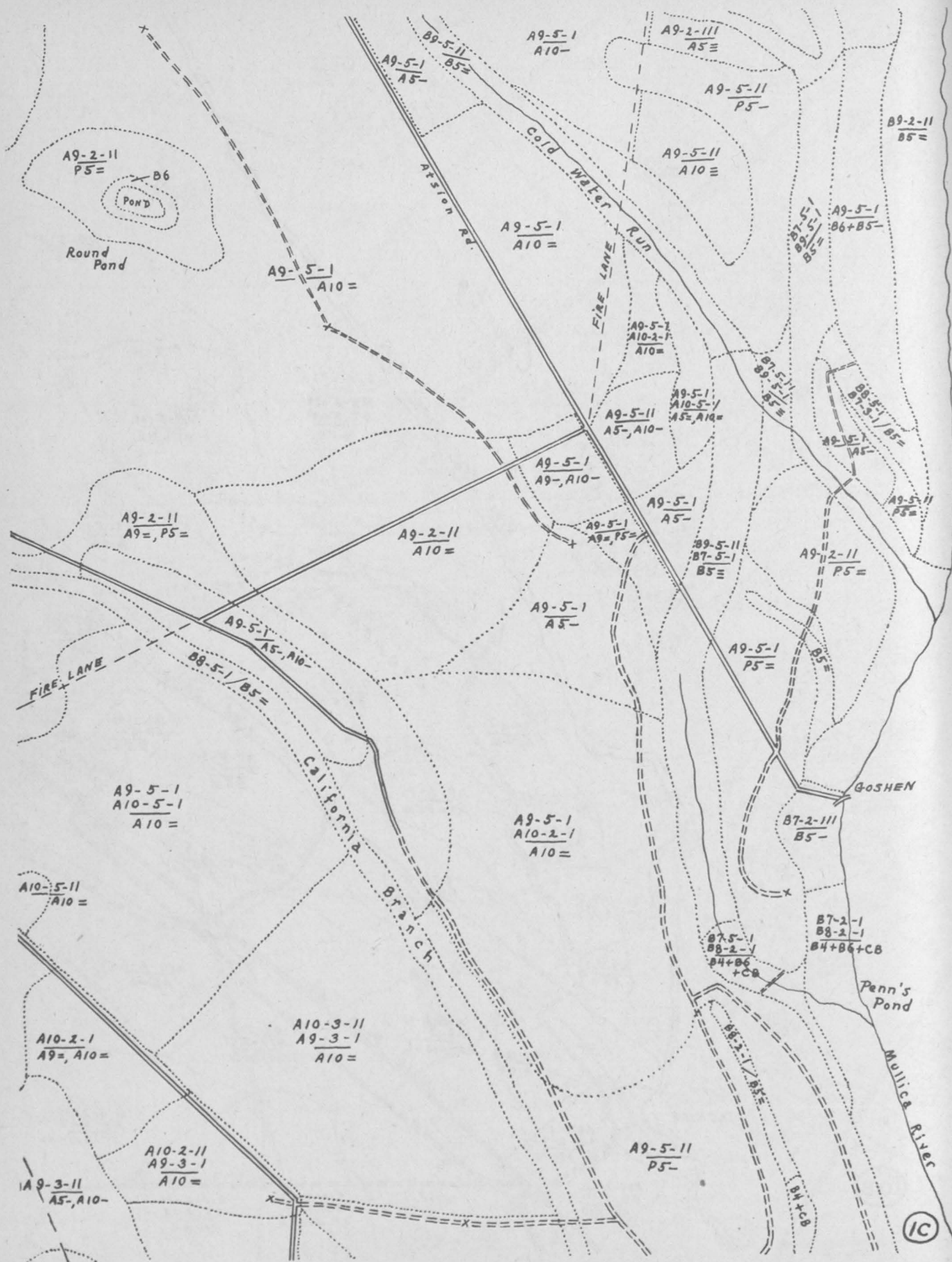


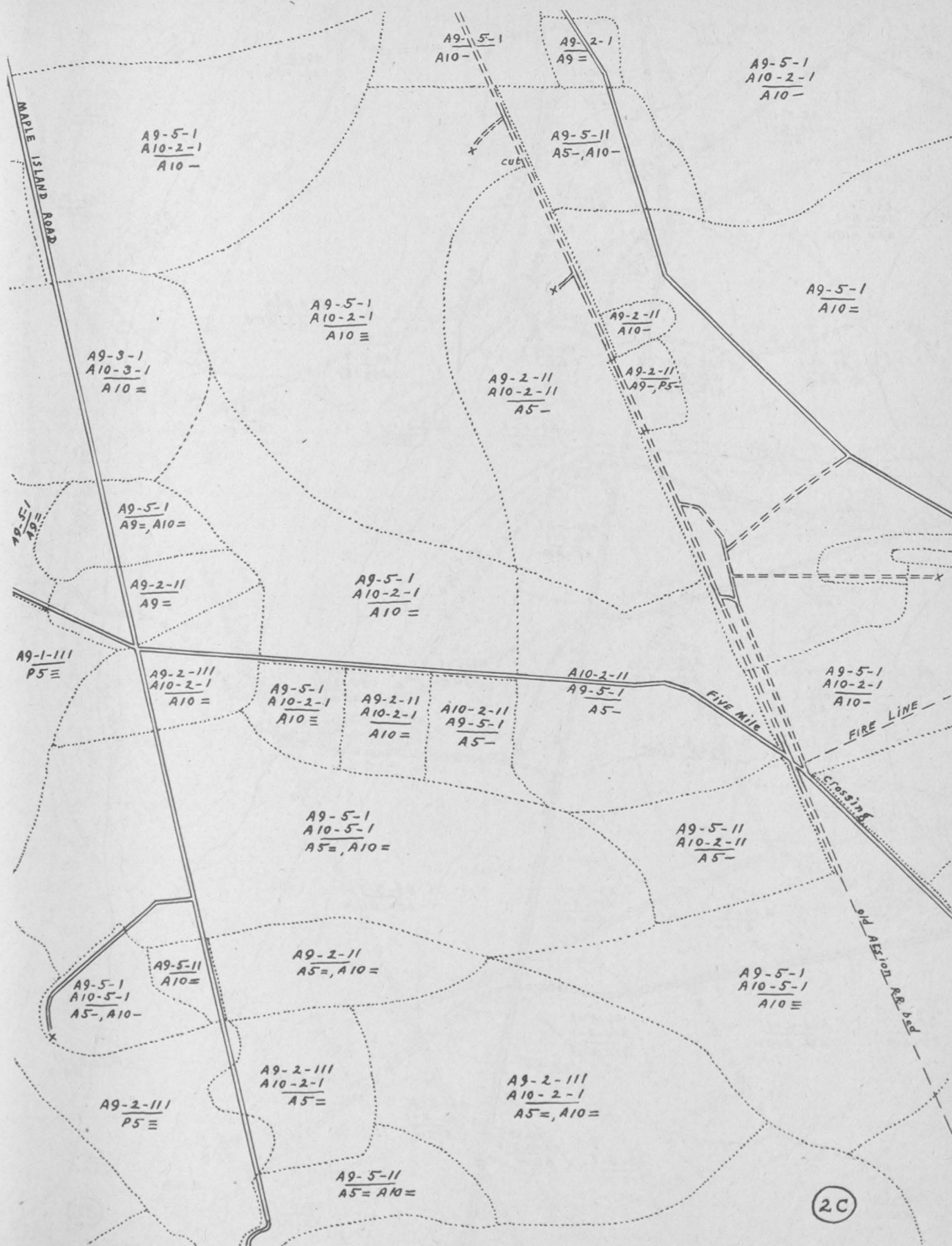
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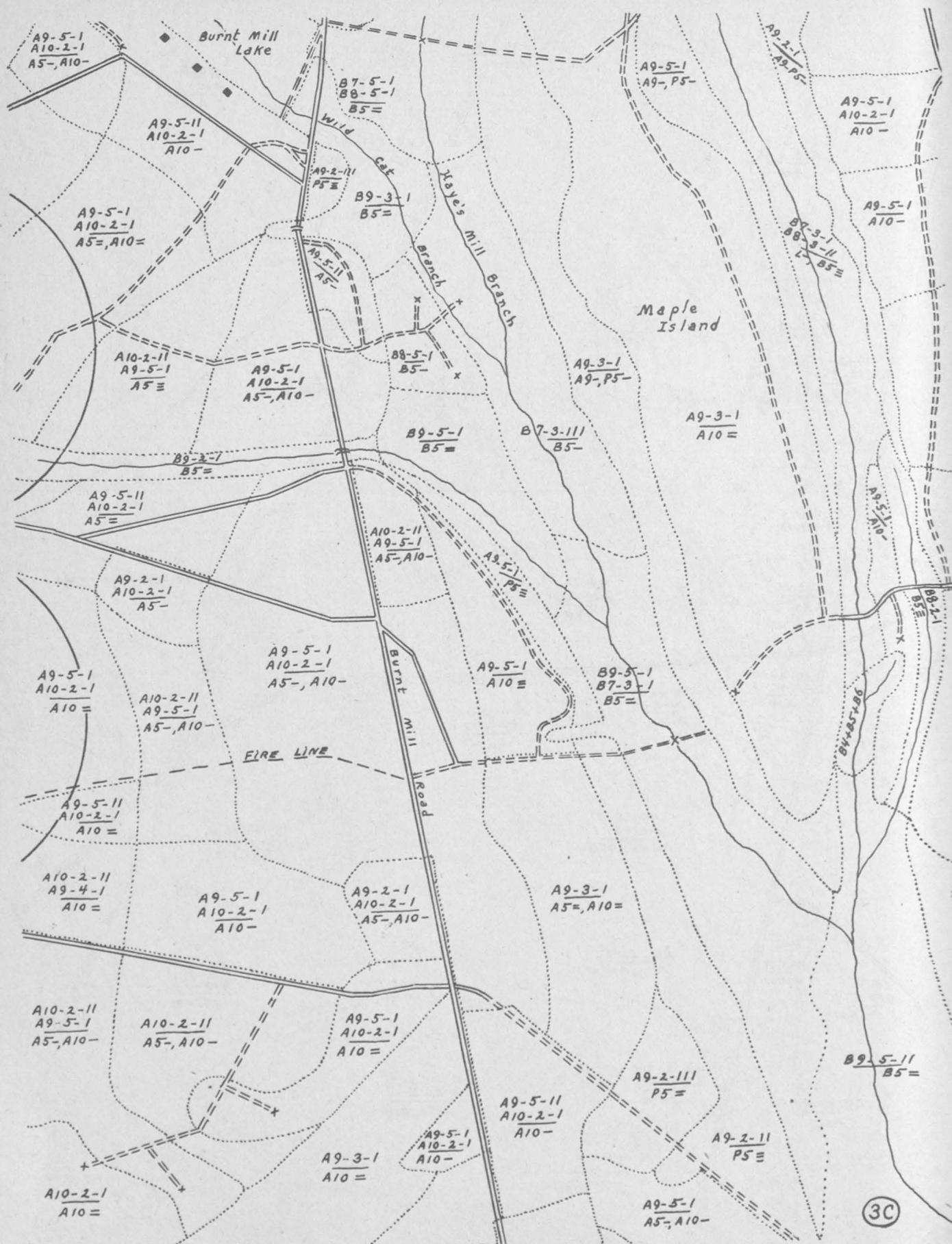


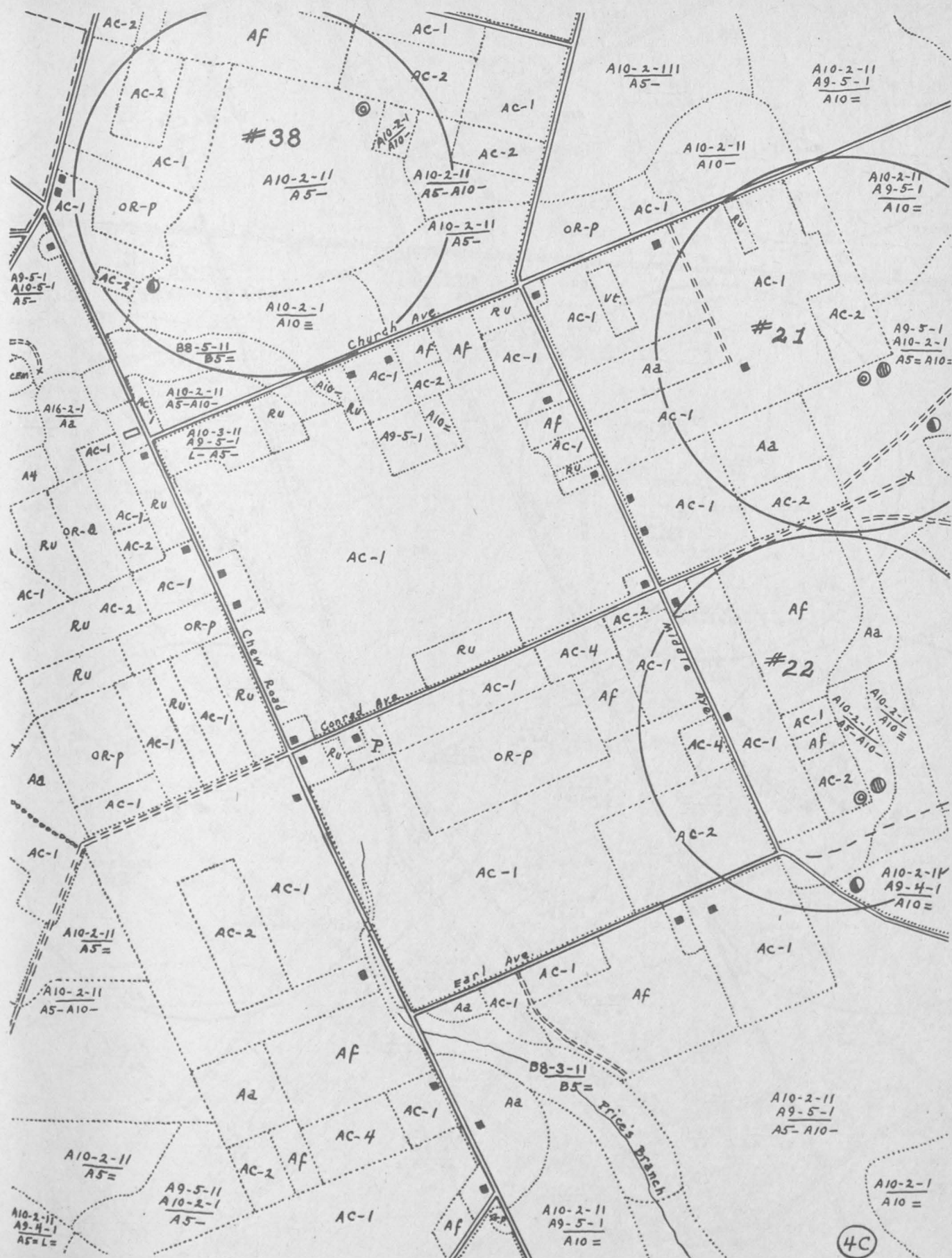






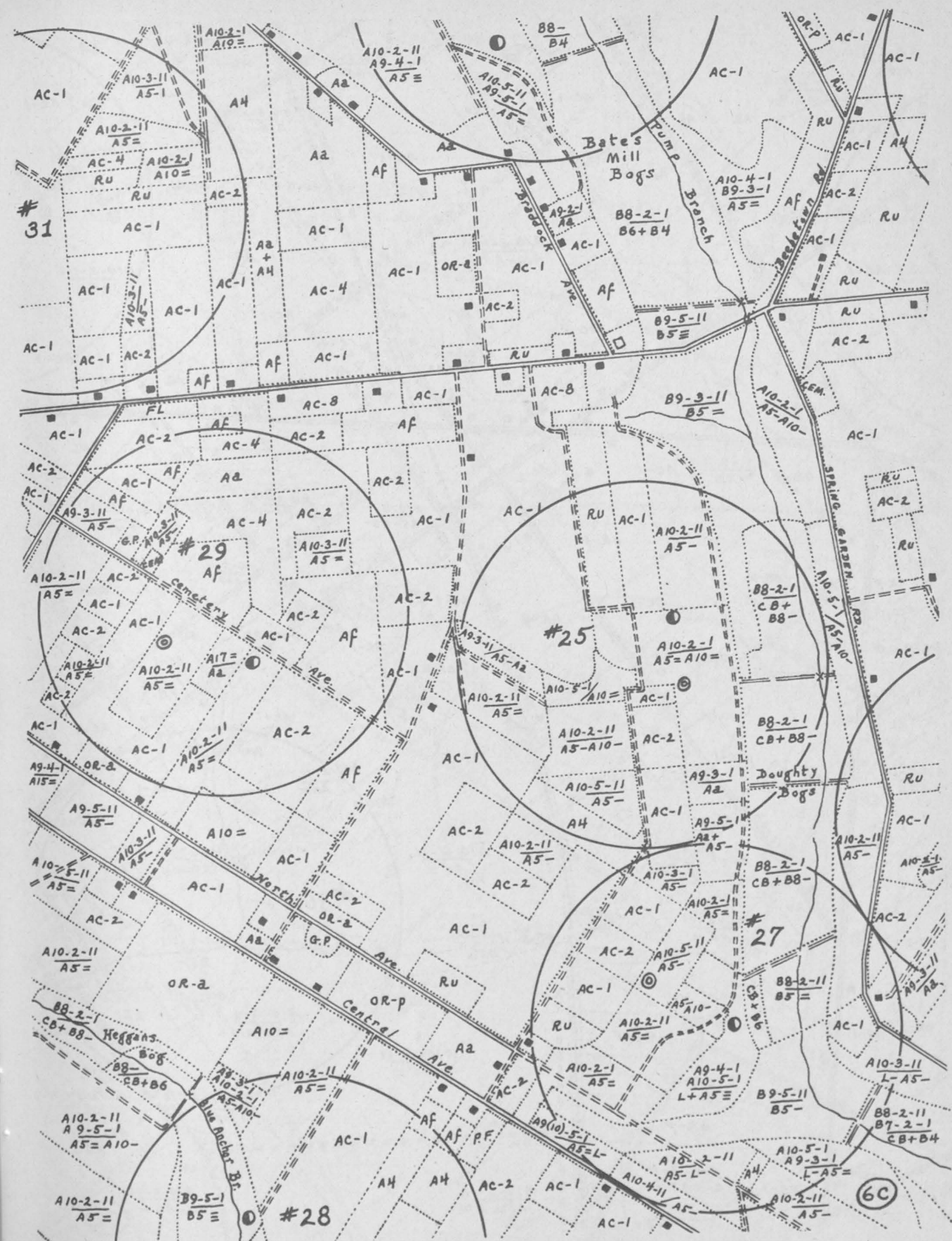


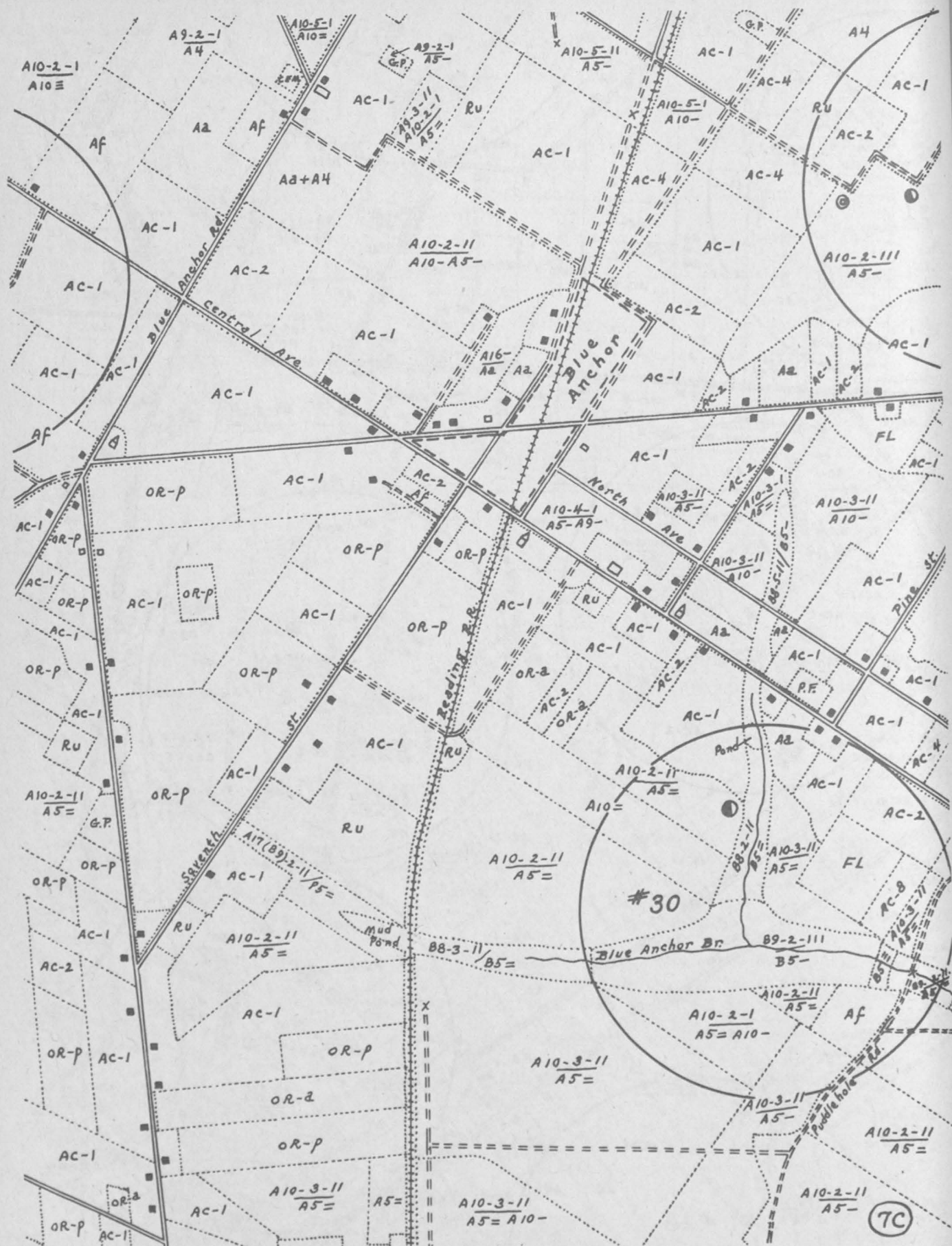


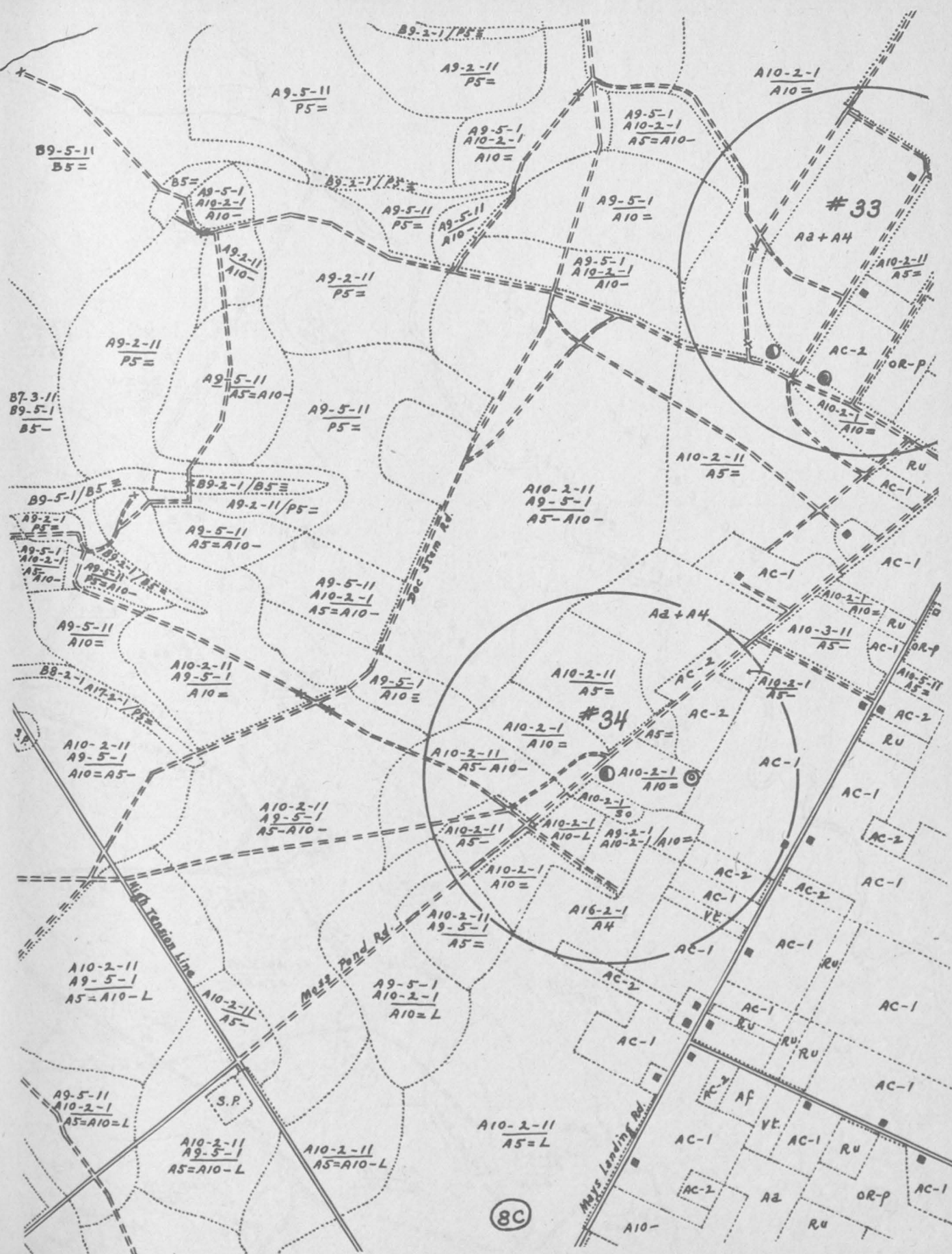


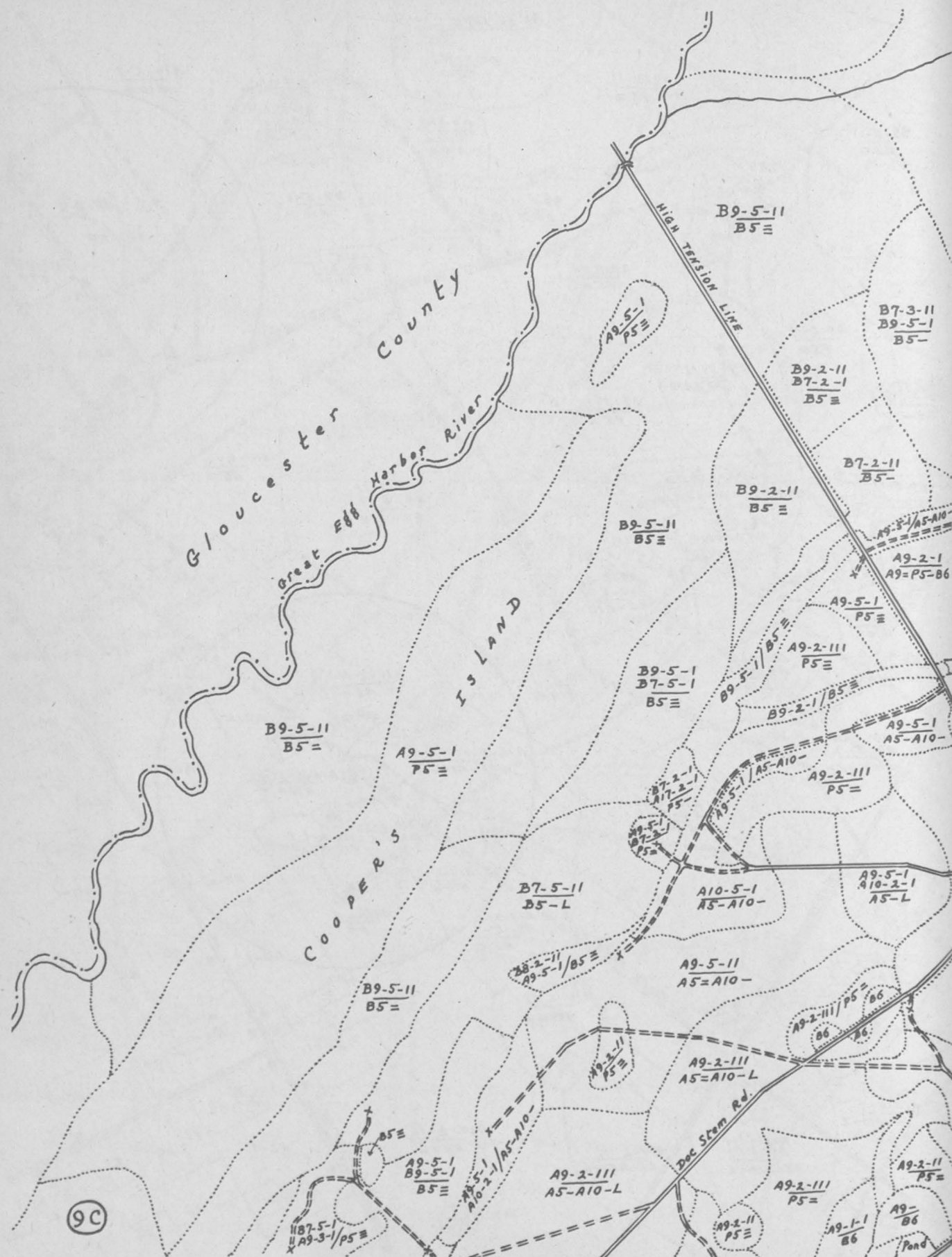
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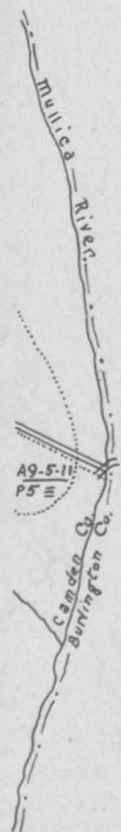


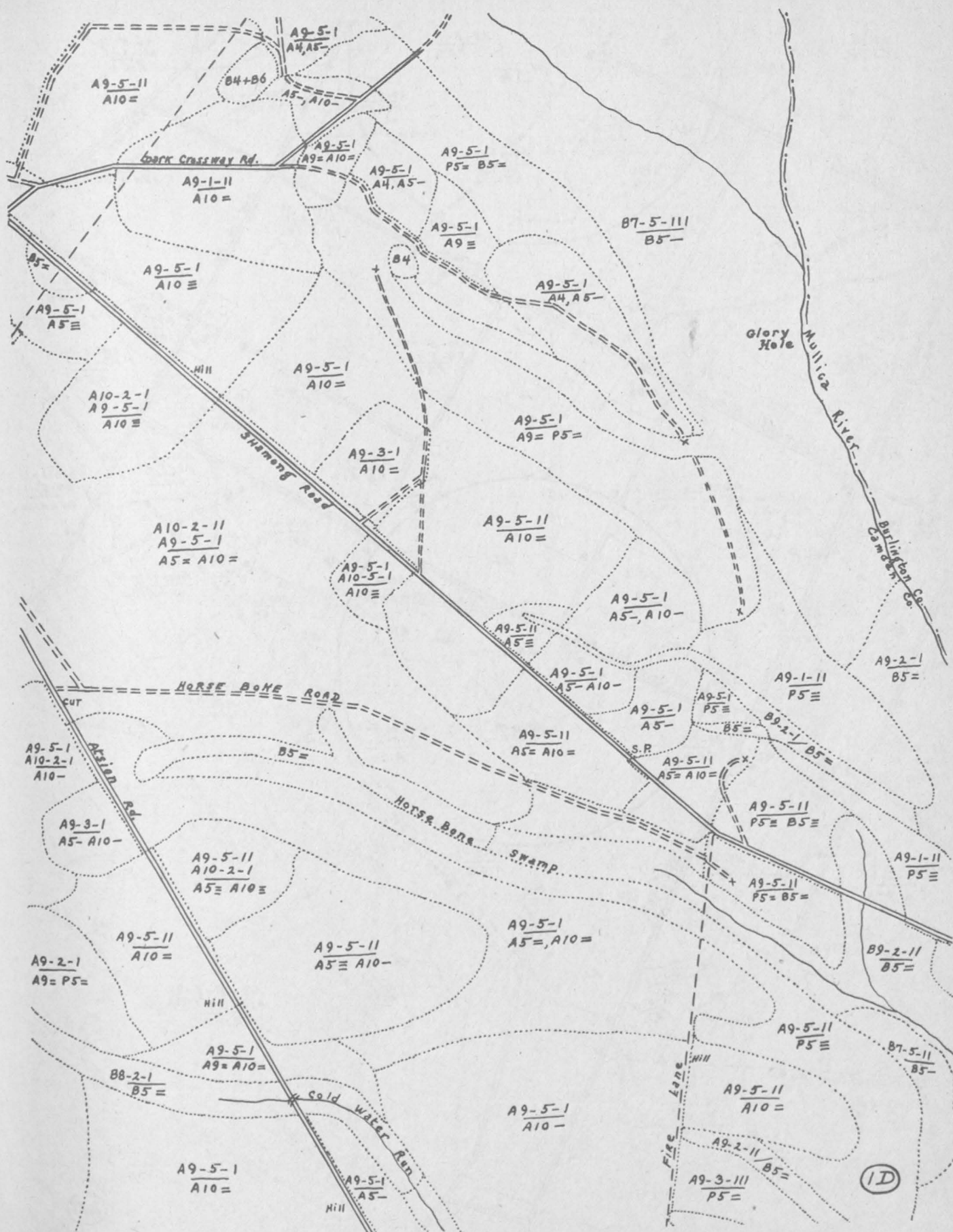


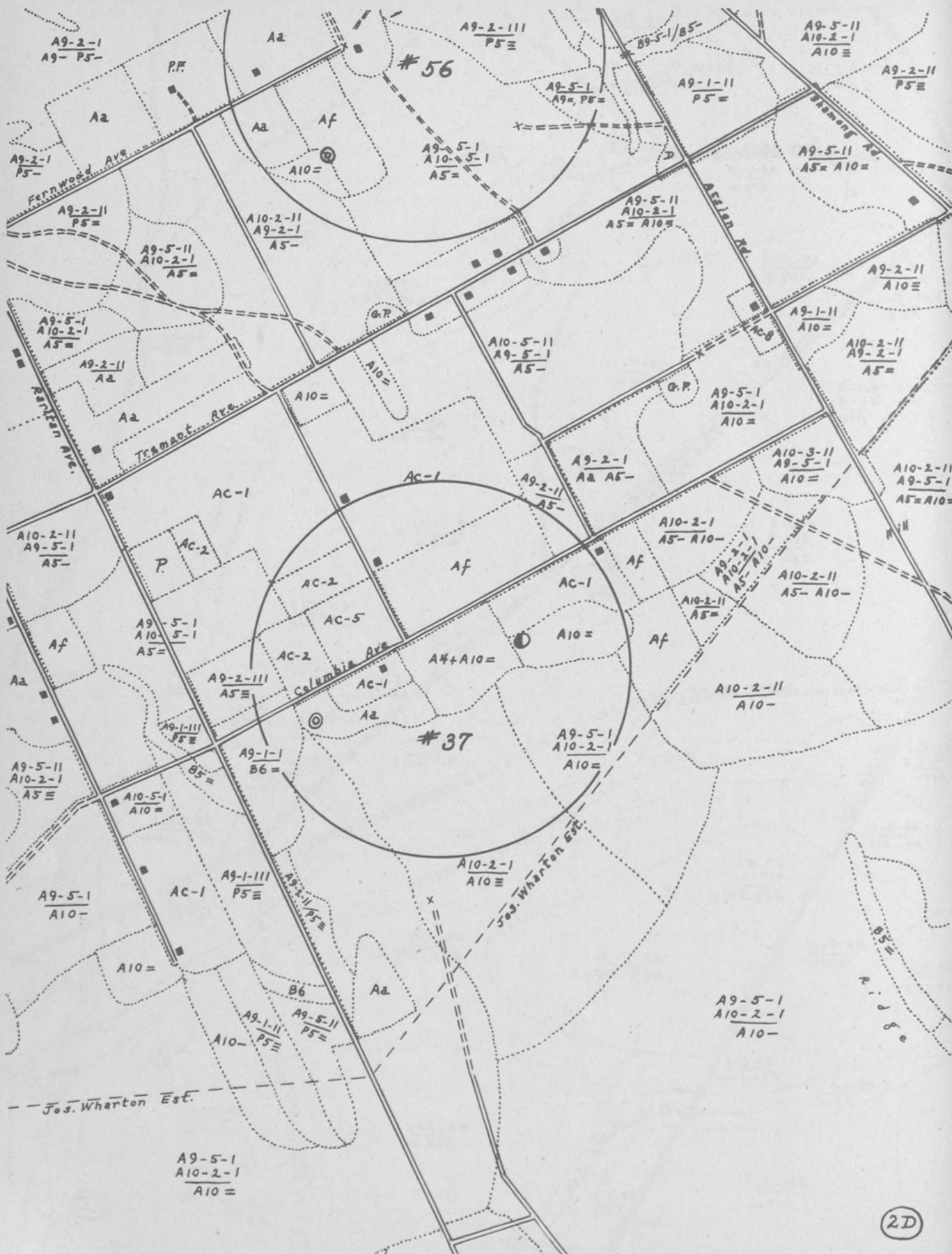
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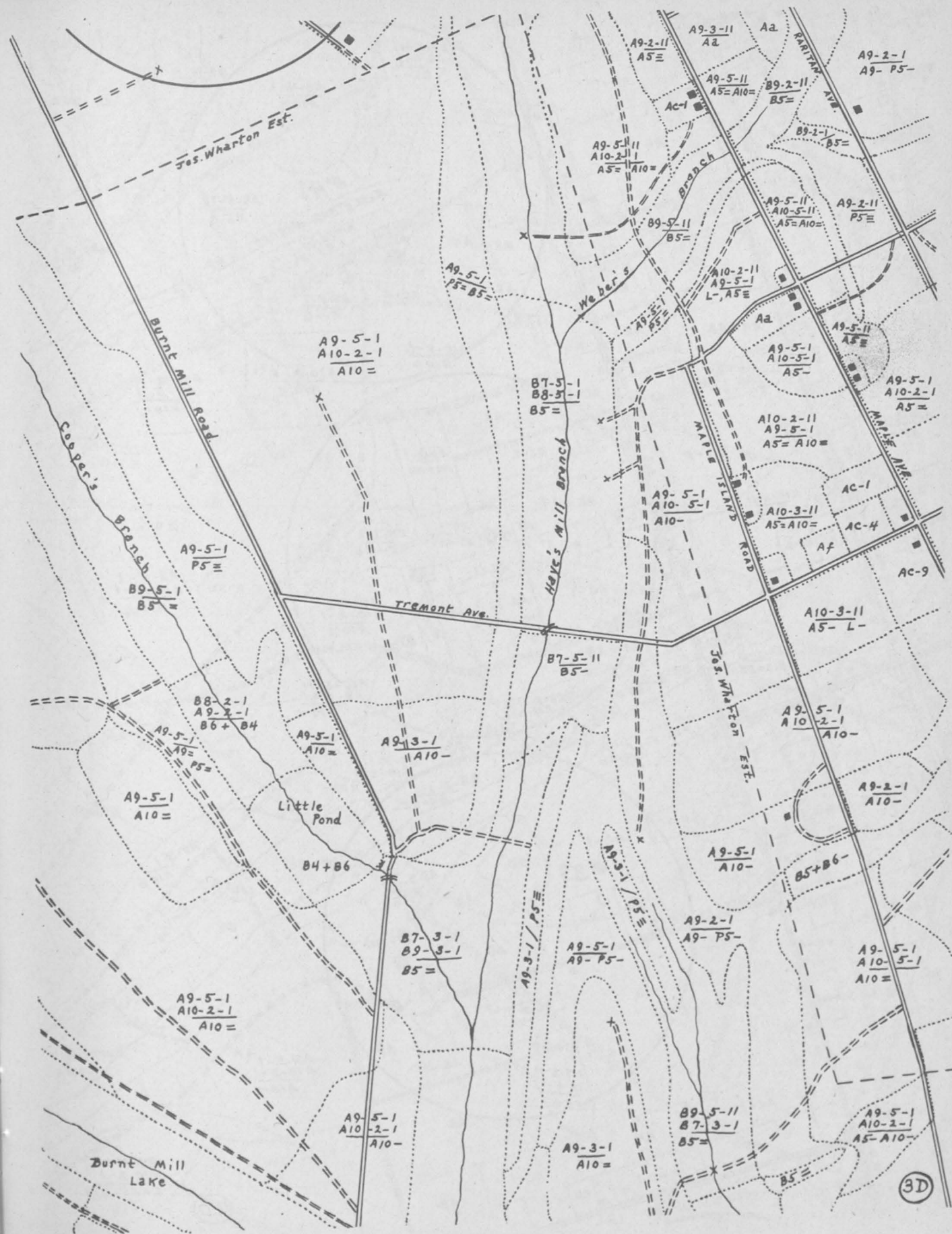
Gloucester
County
Great Egg Harbor River

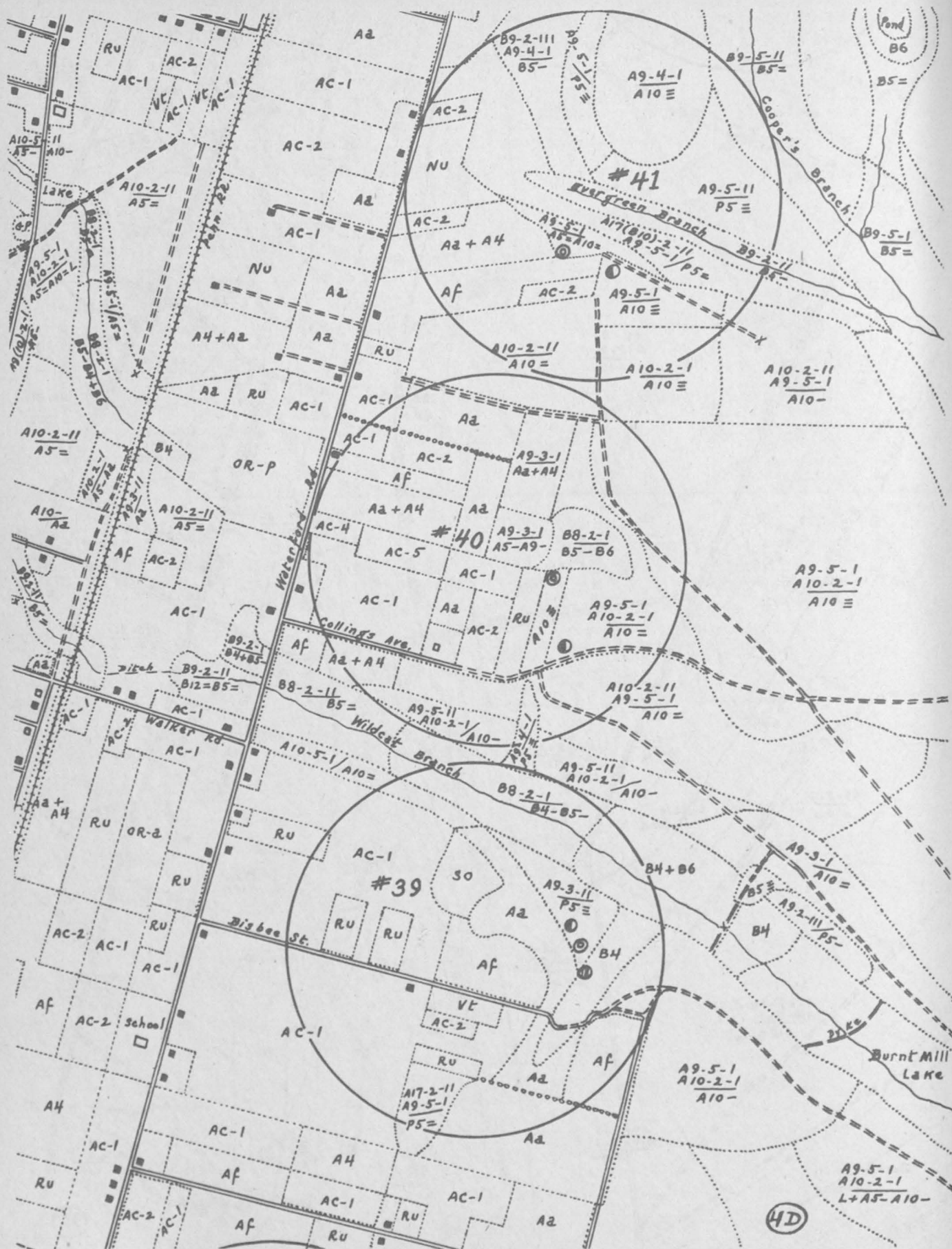
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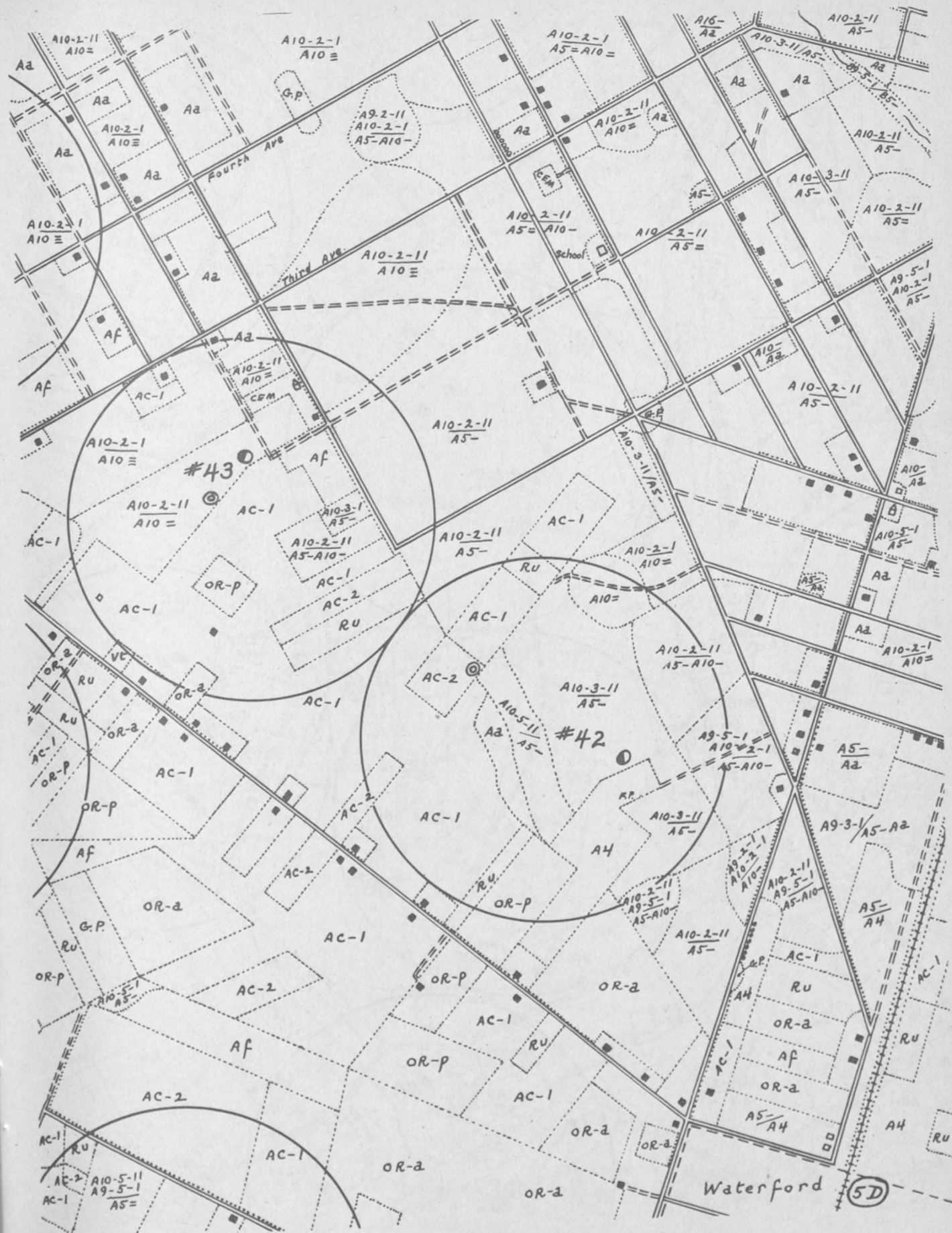


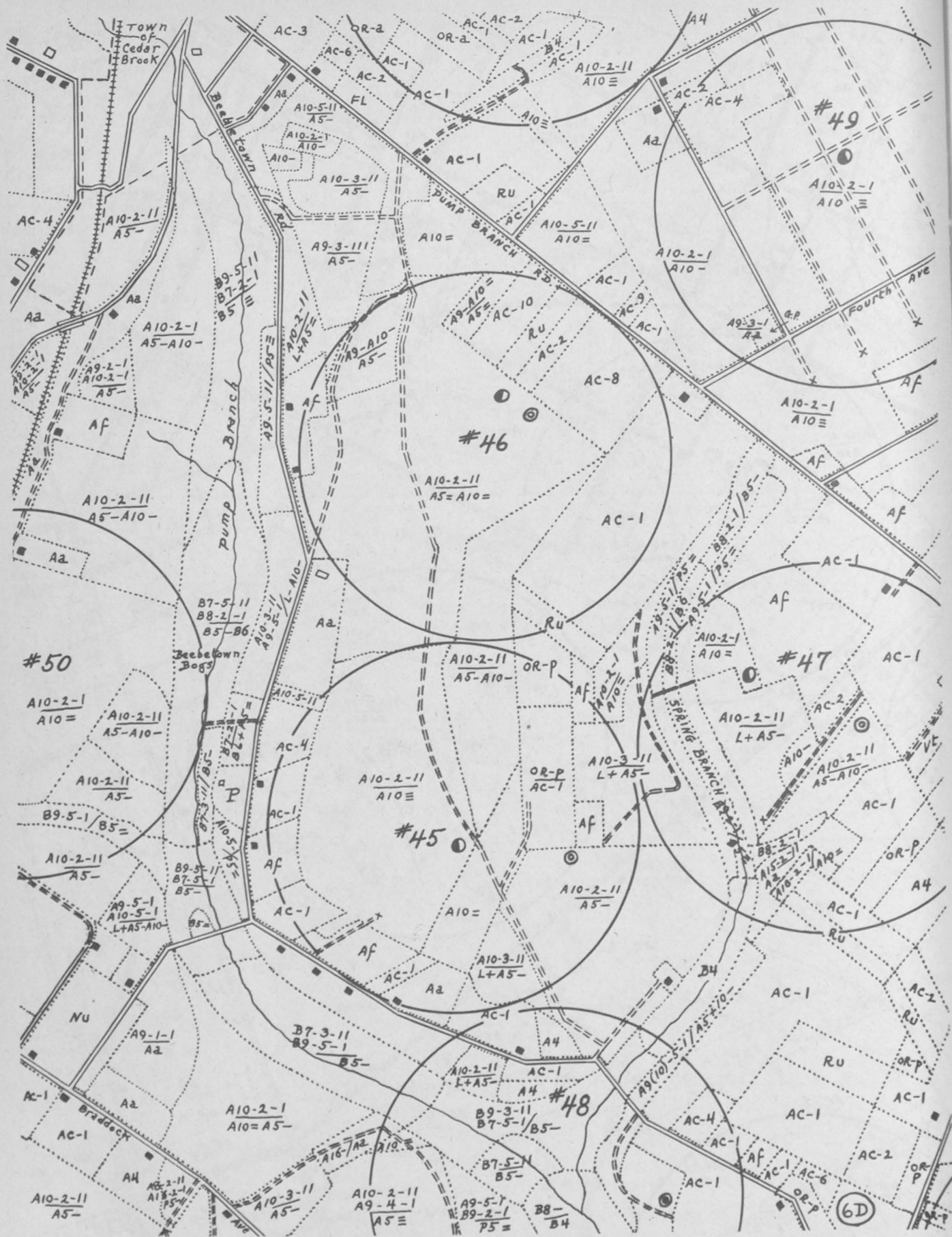














Gloucester County

Great Harbor River

FL

New Brooklyn - Blue Anchor

AB + AH

AC-1

AC-2

OR-P

AC-1

Pantaloons Field

Clay Hole

Davis Ave

#52

Clay Hole

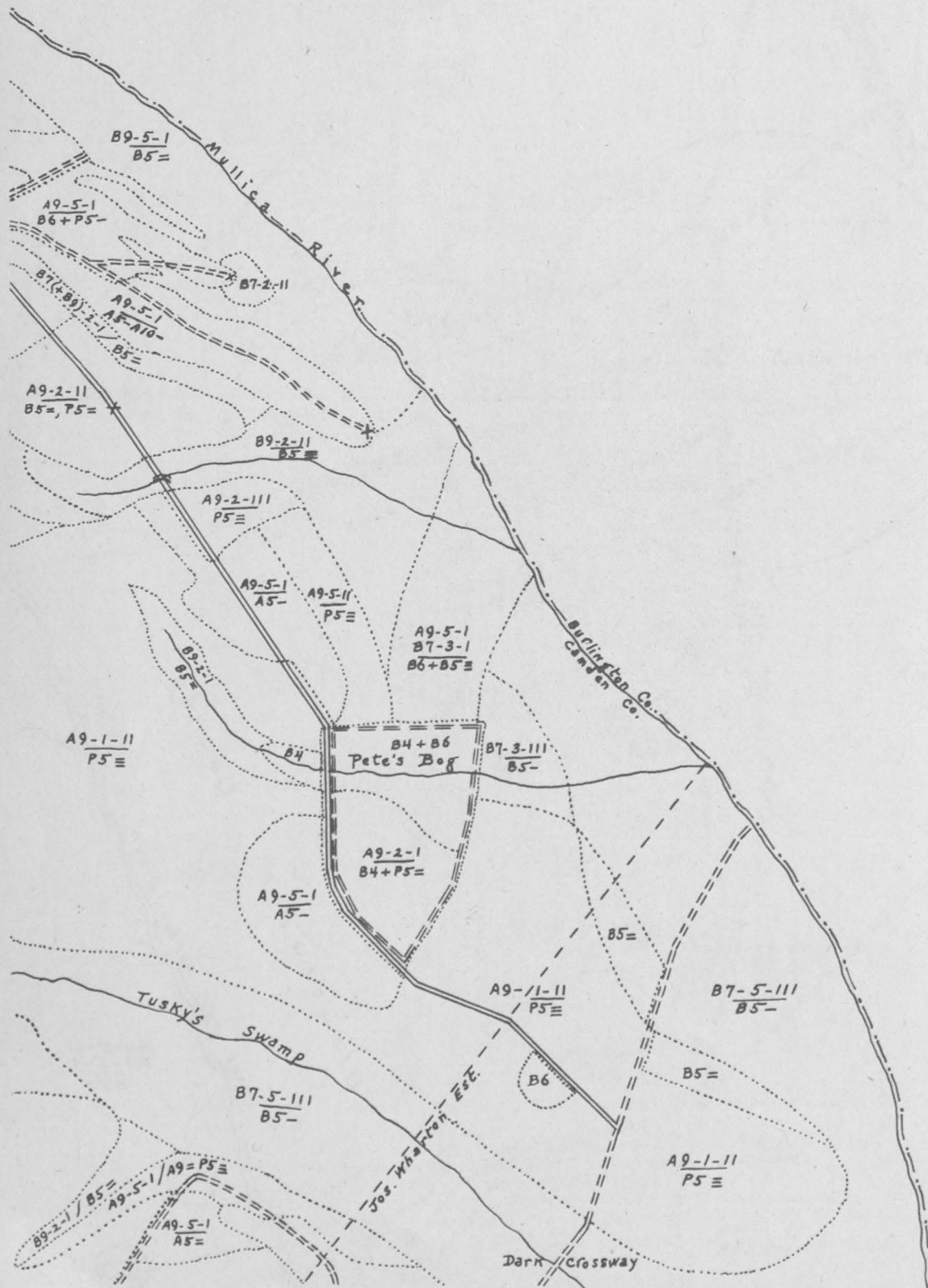
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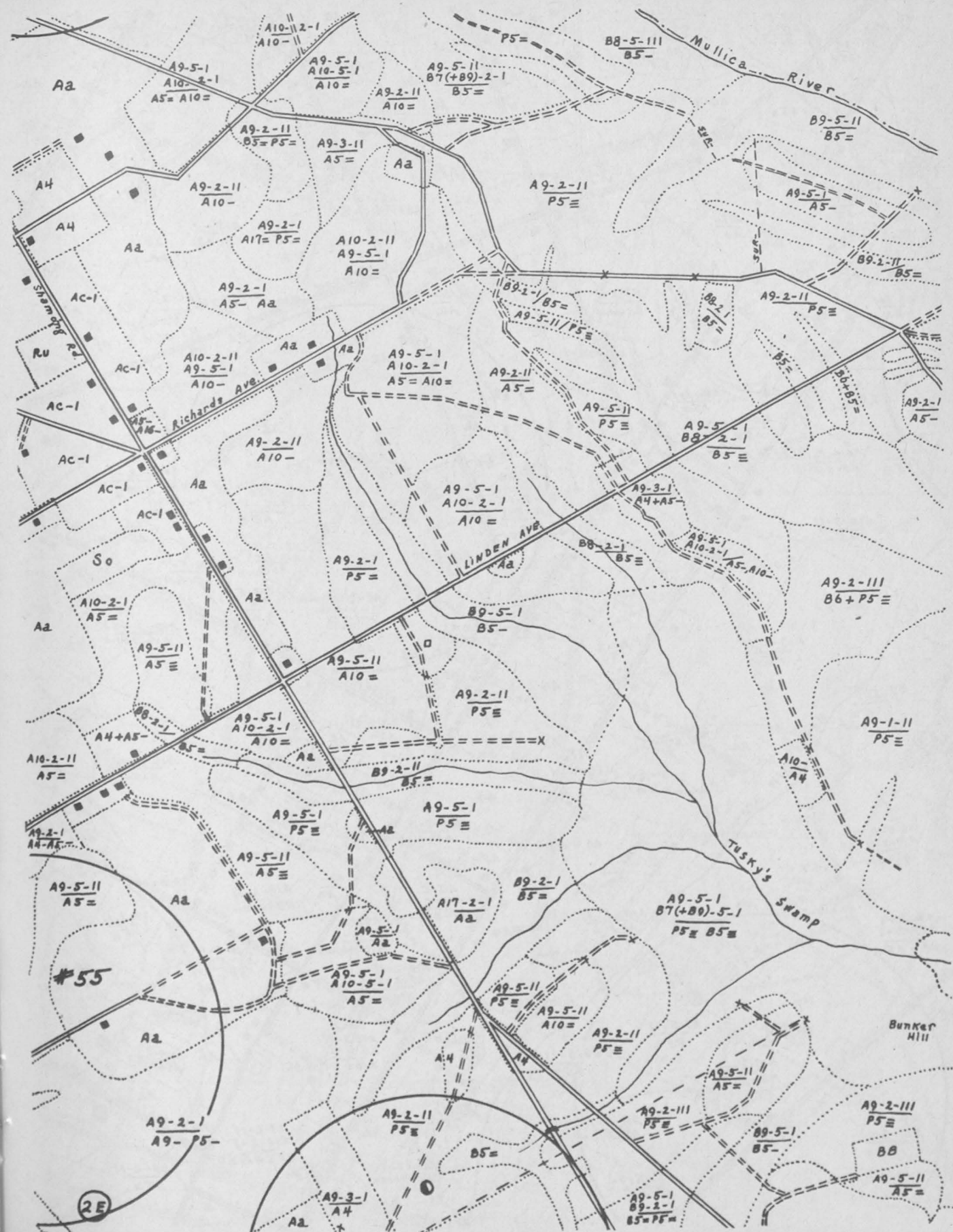
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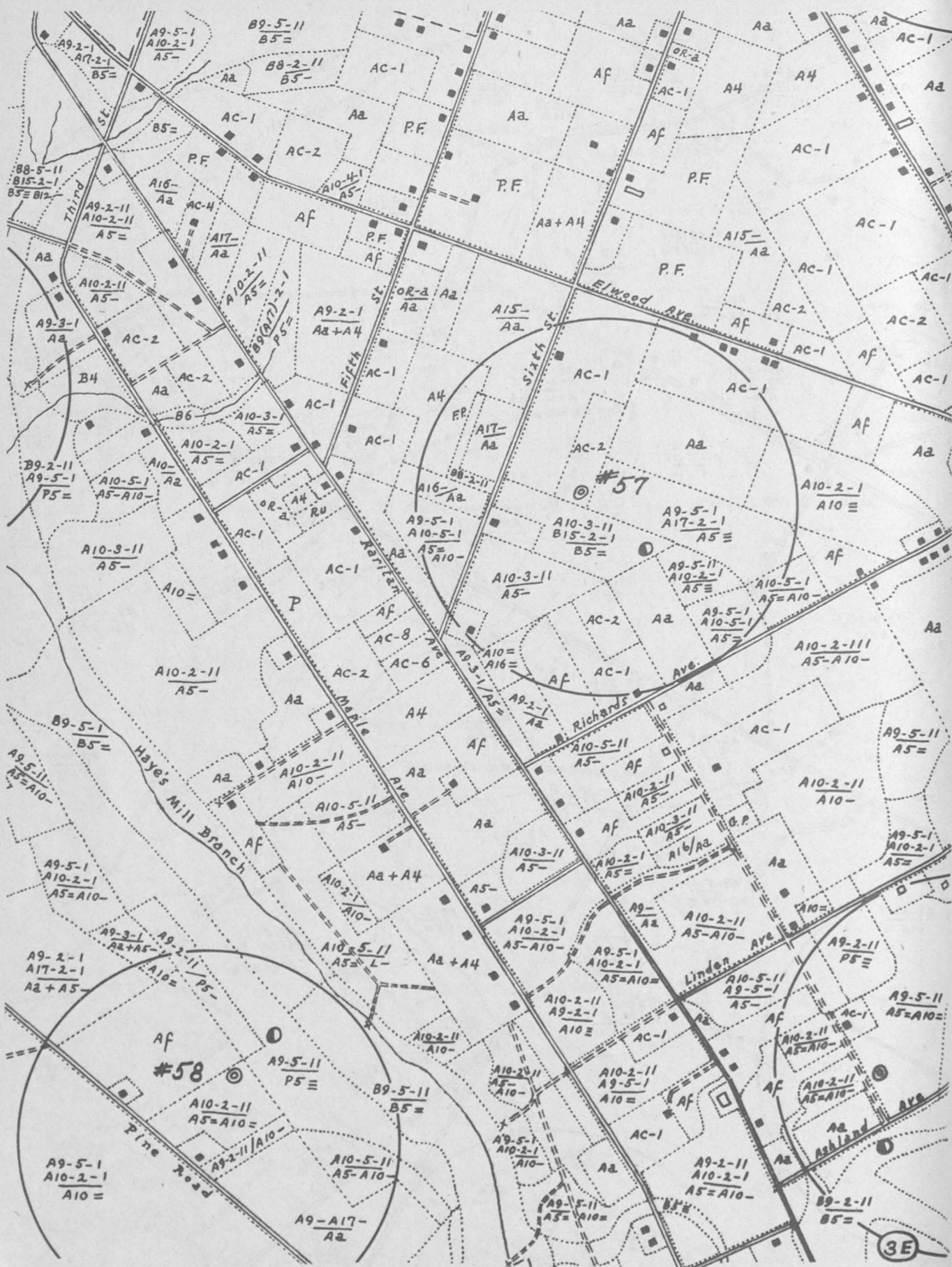
Gloucester
County
Great Neck Harbor River

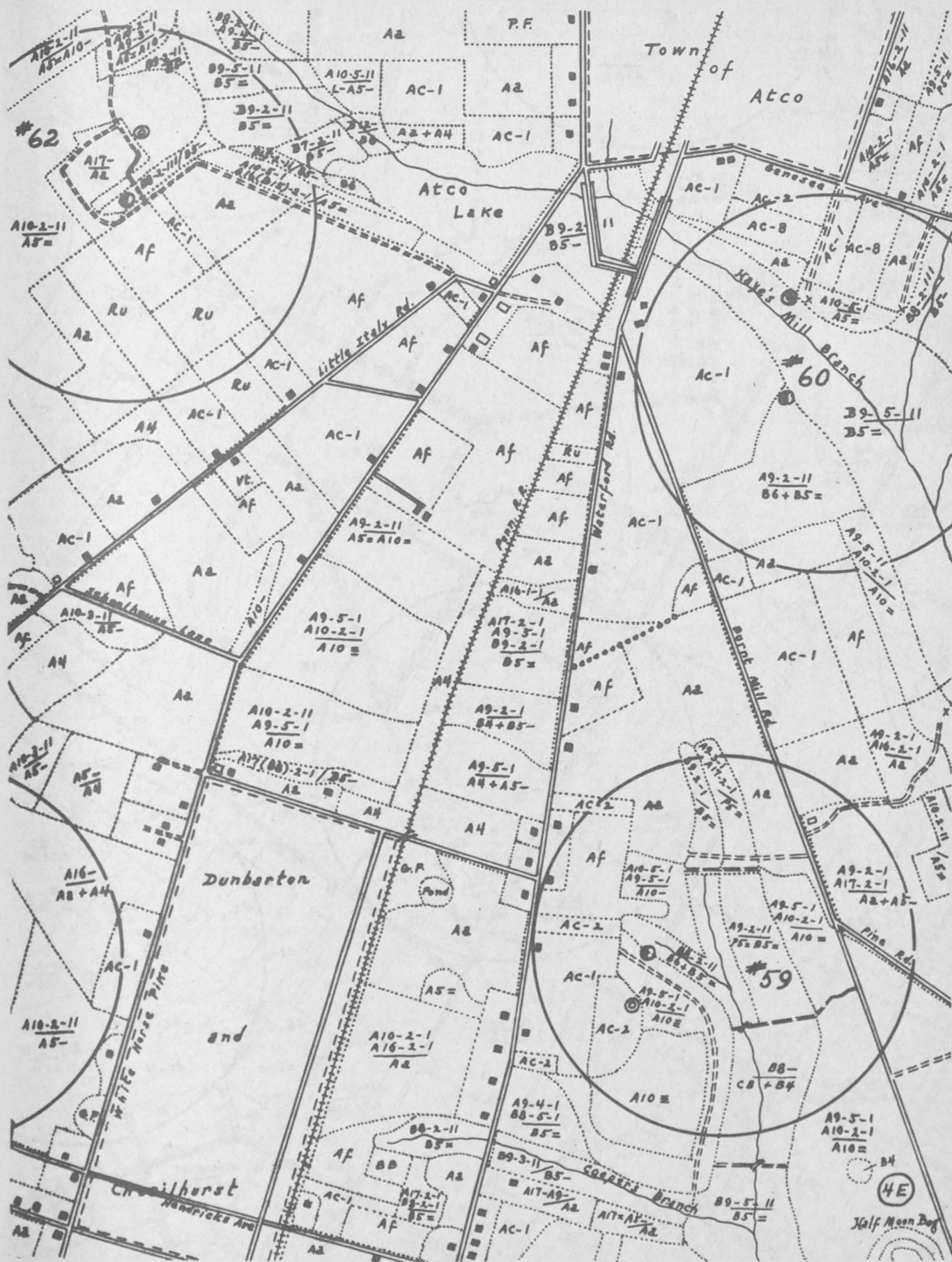
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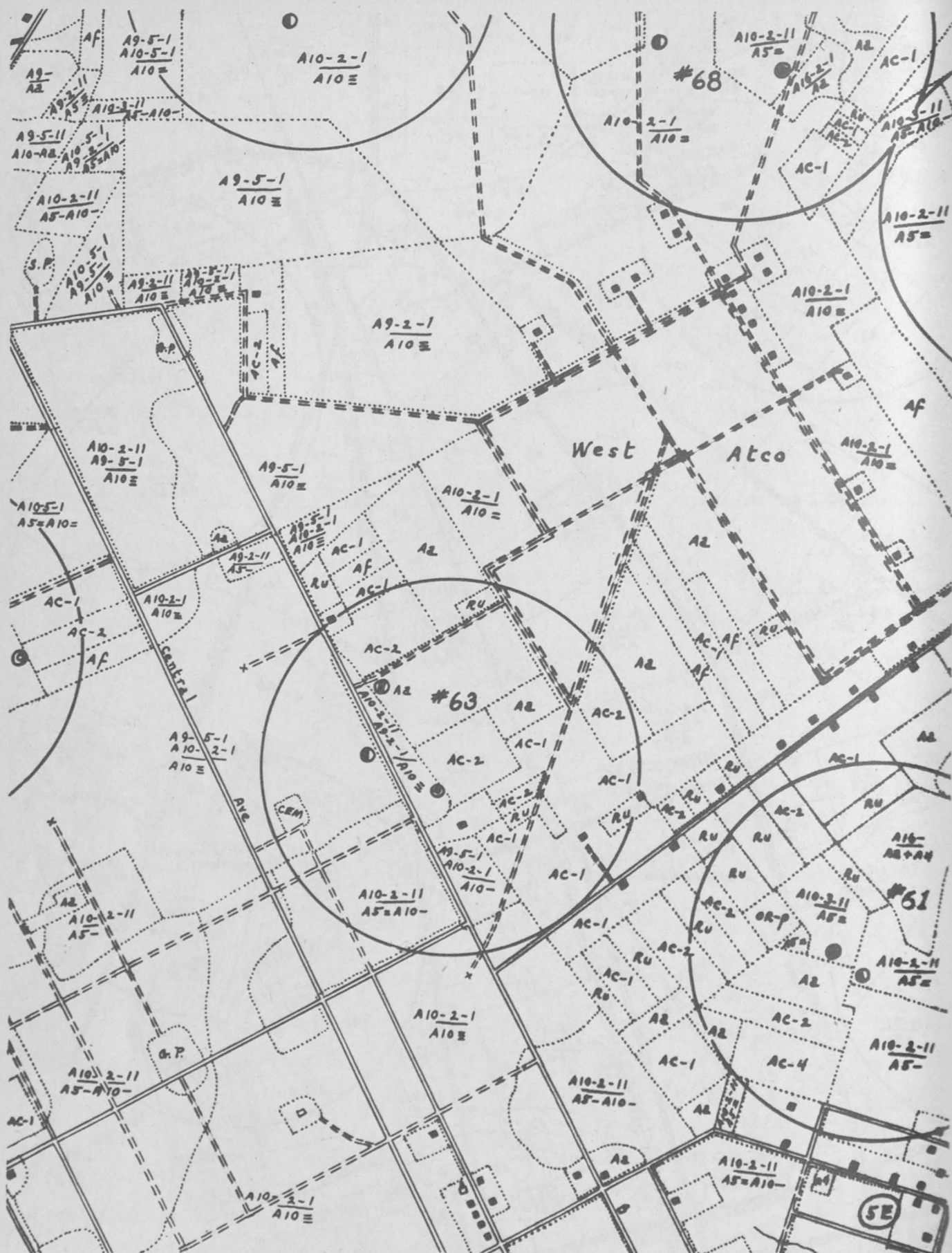
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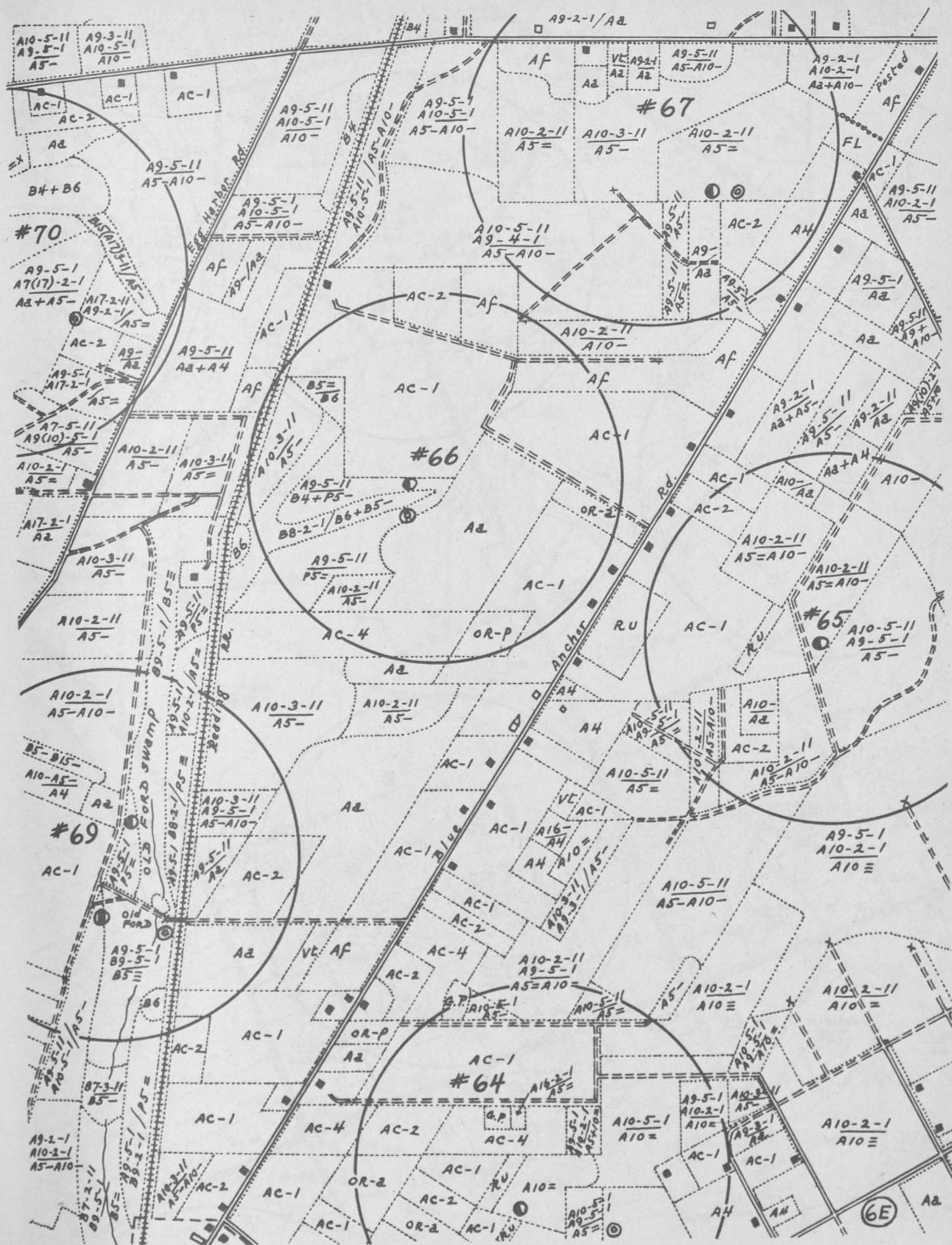


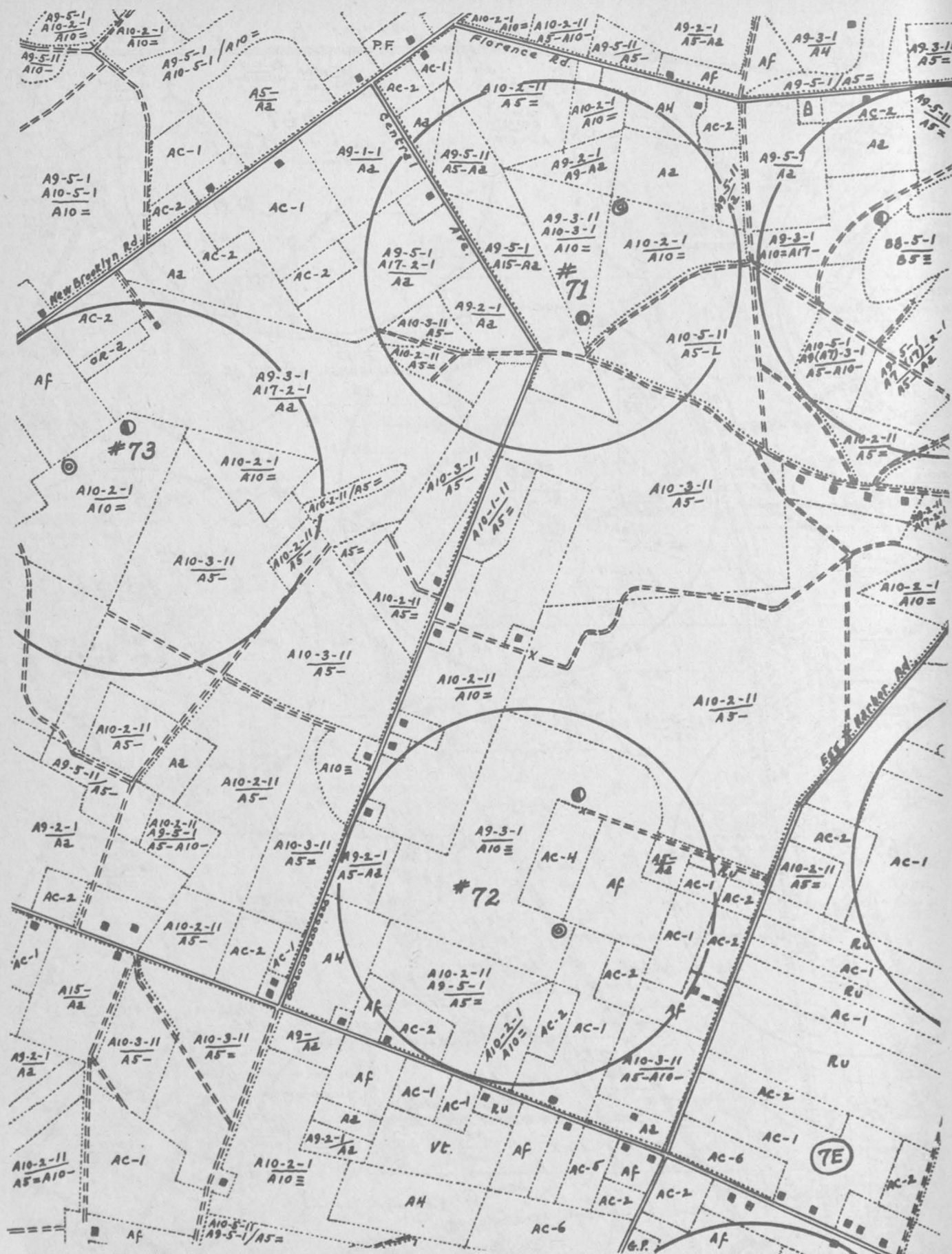


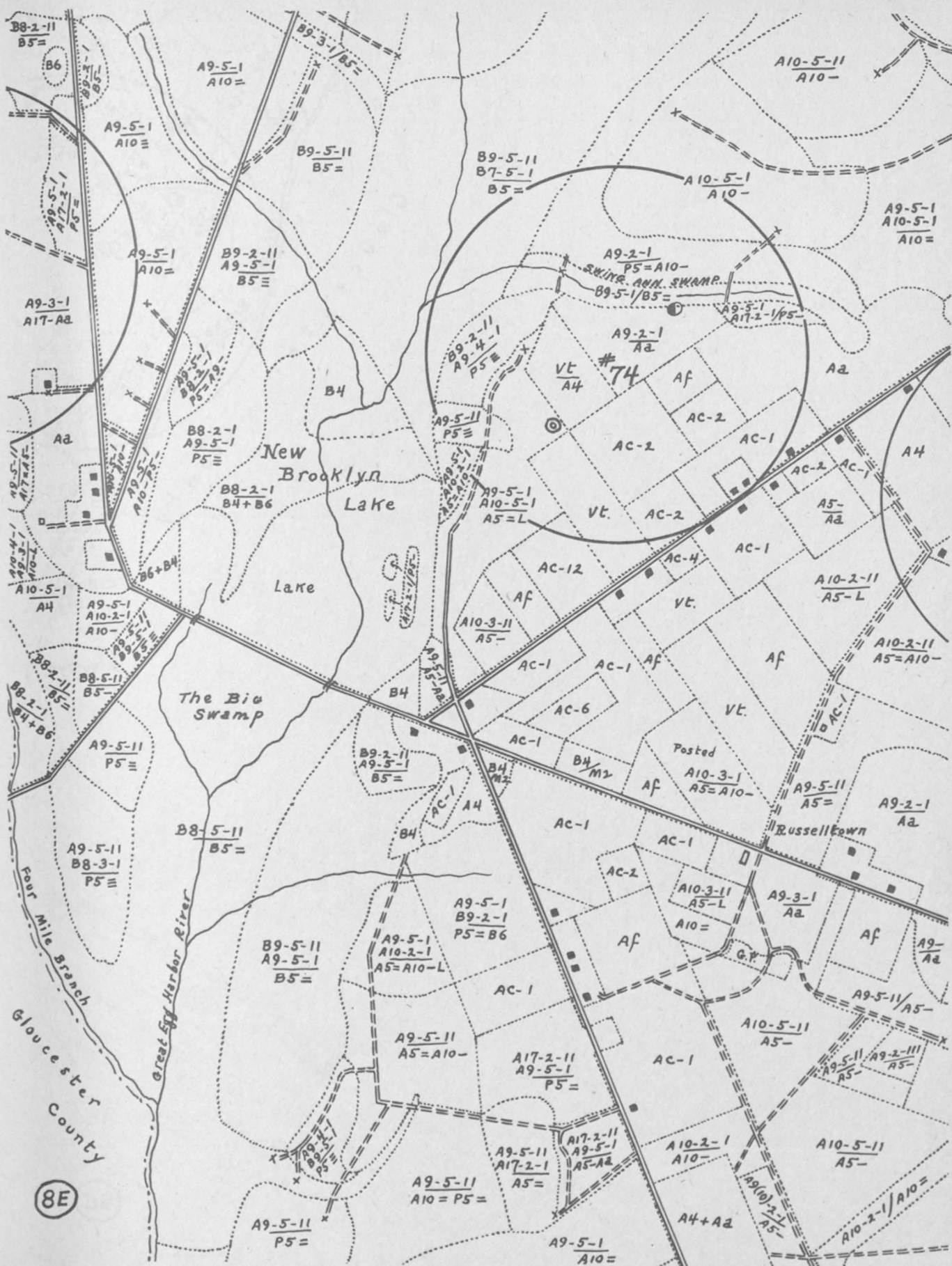


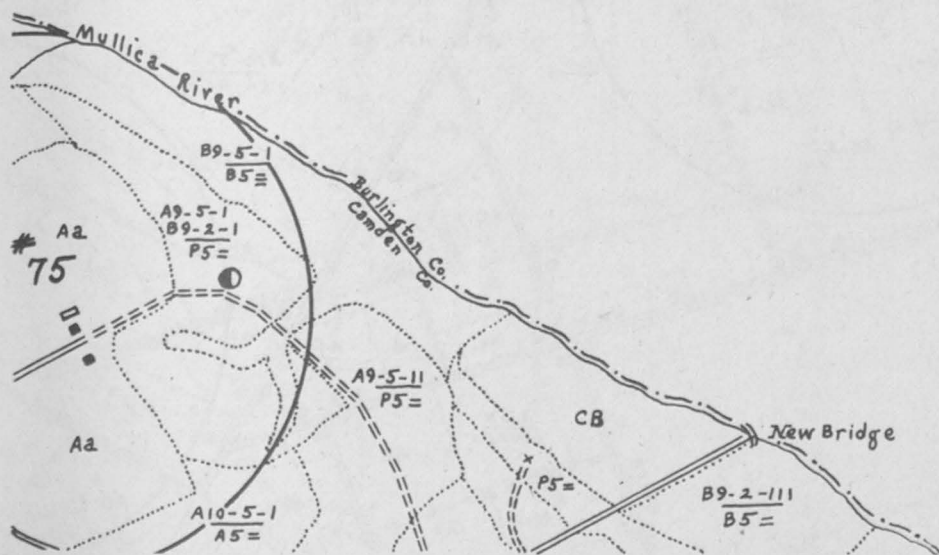


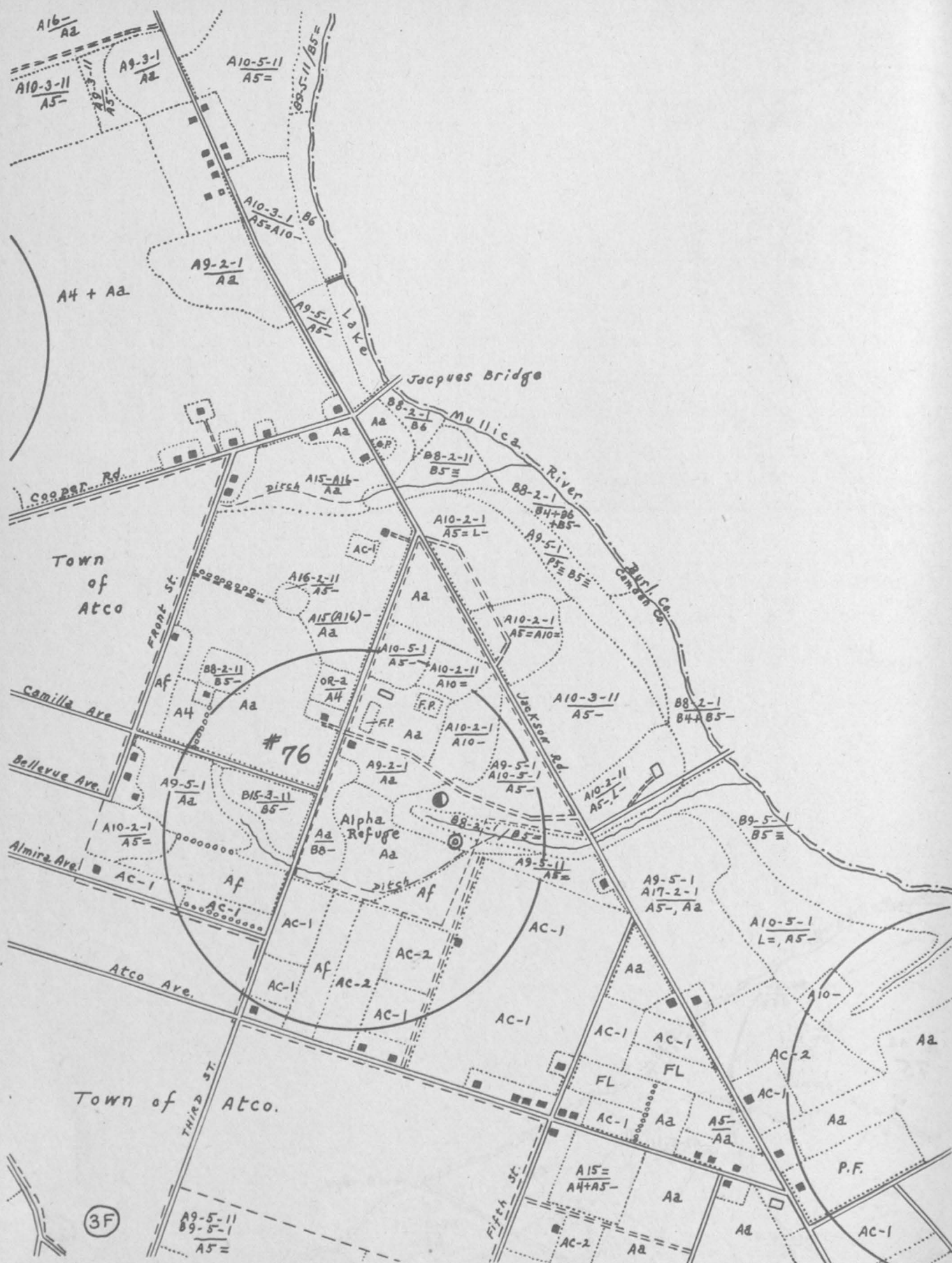


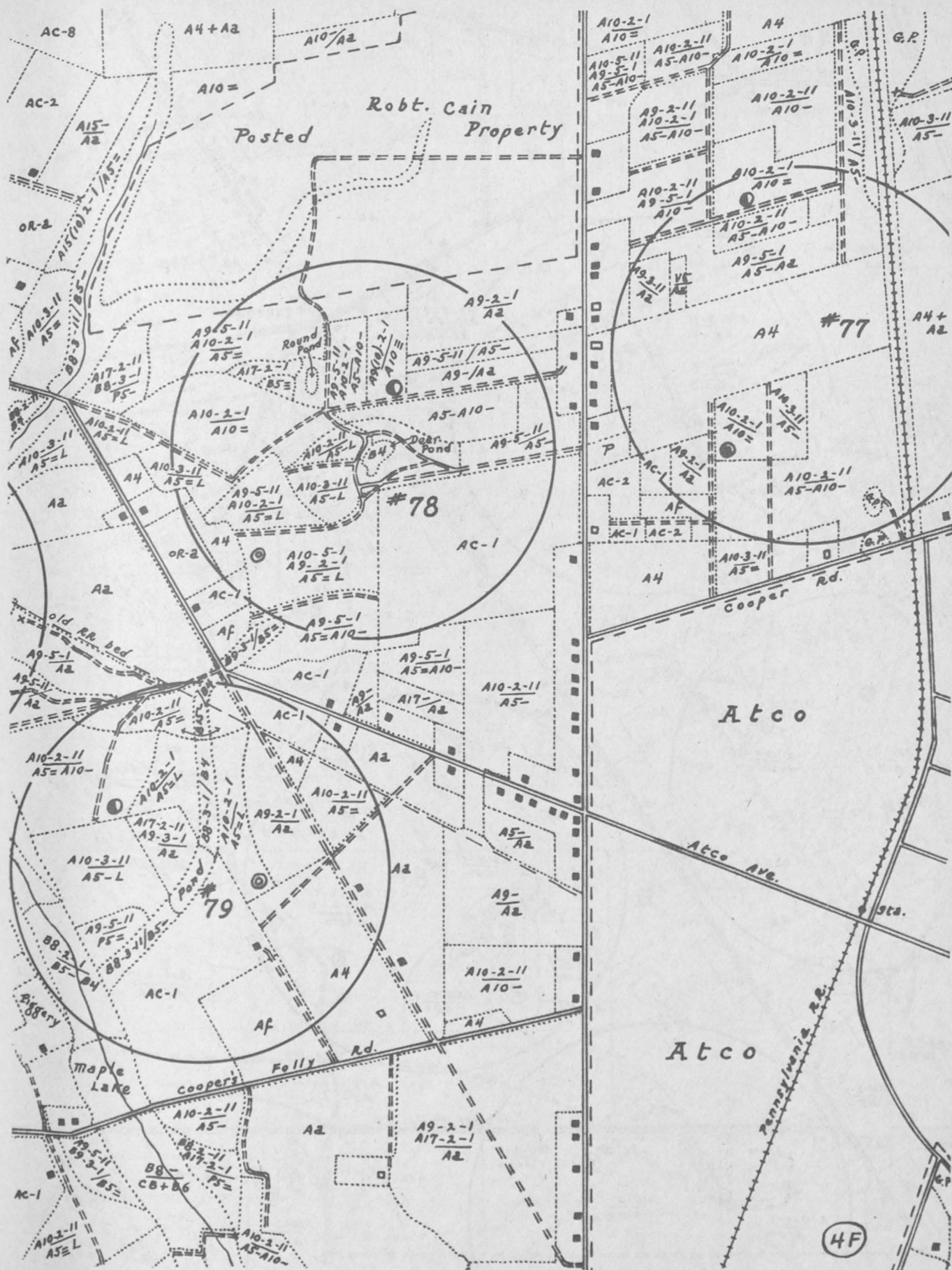


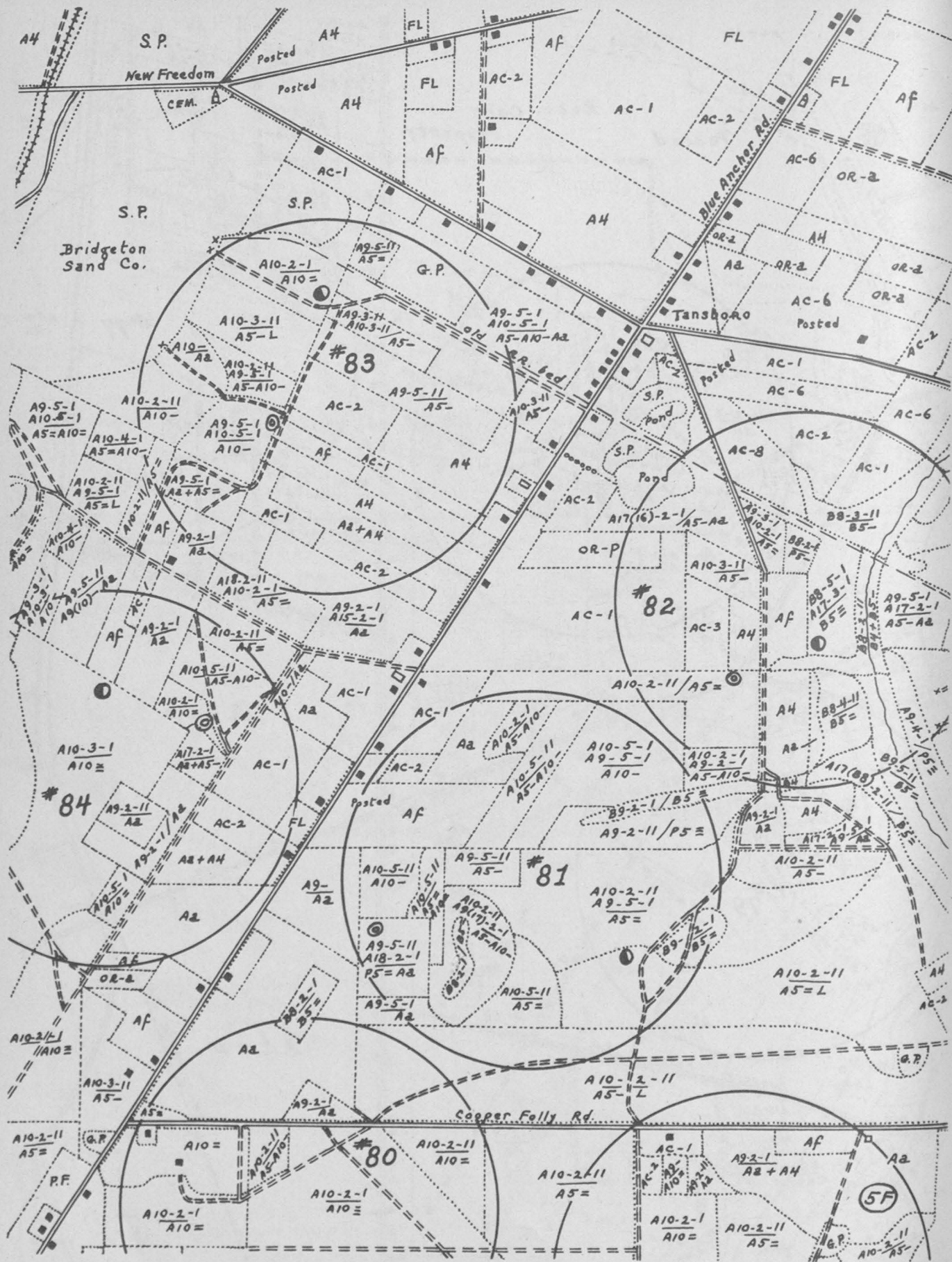


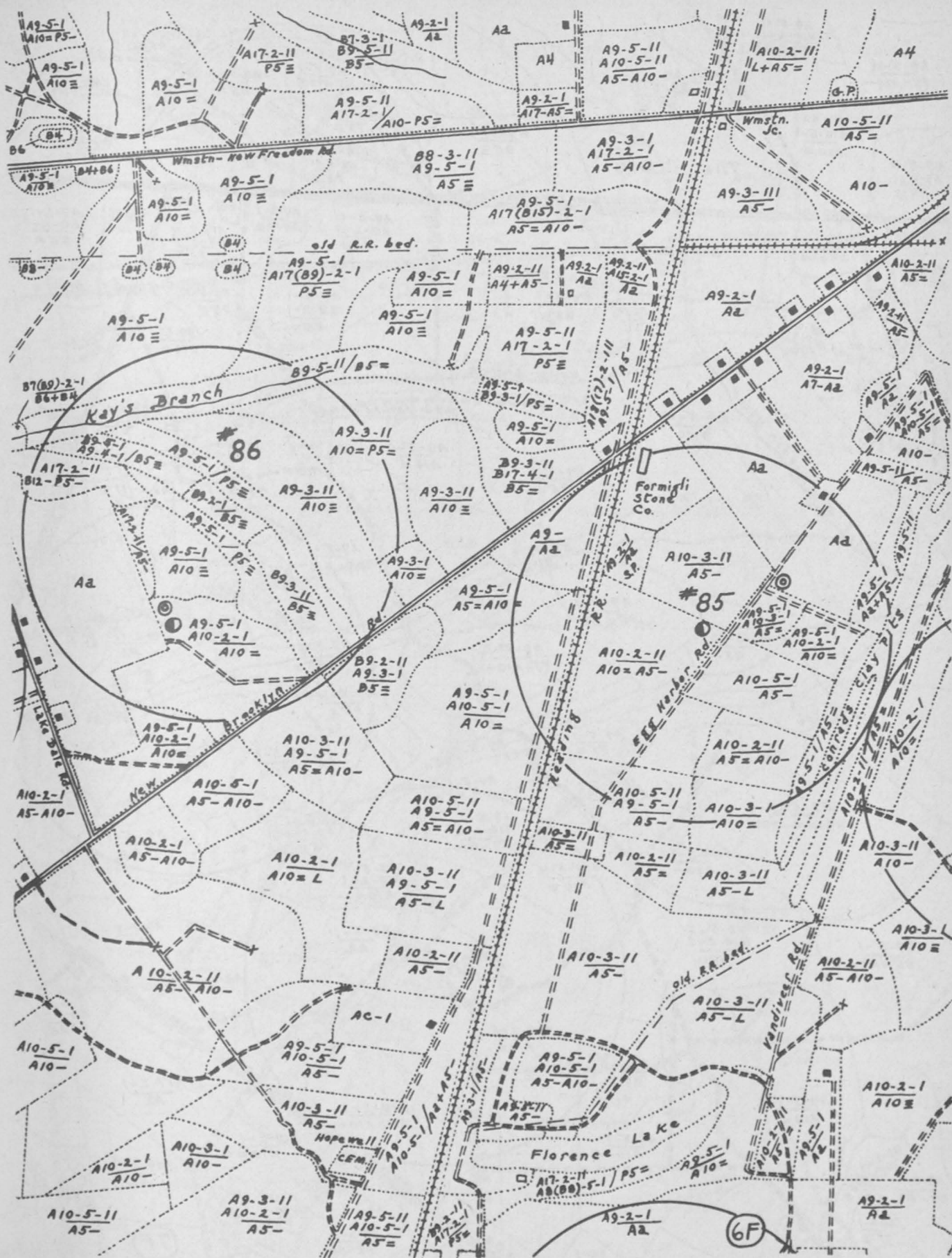


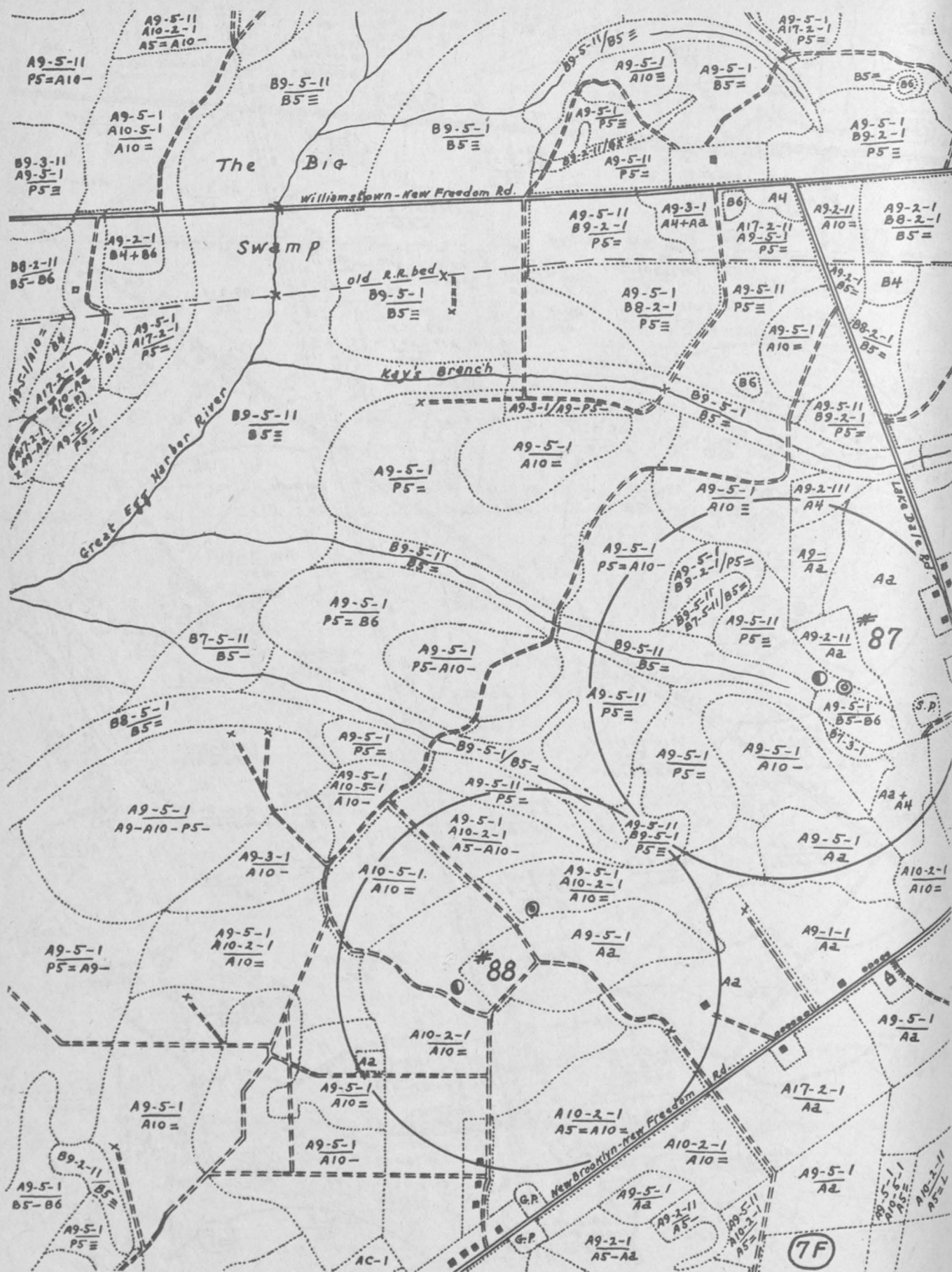




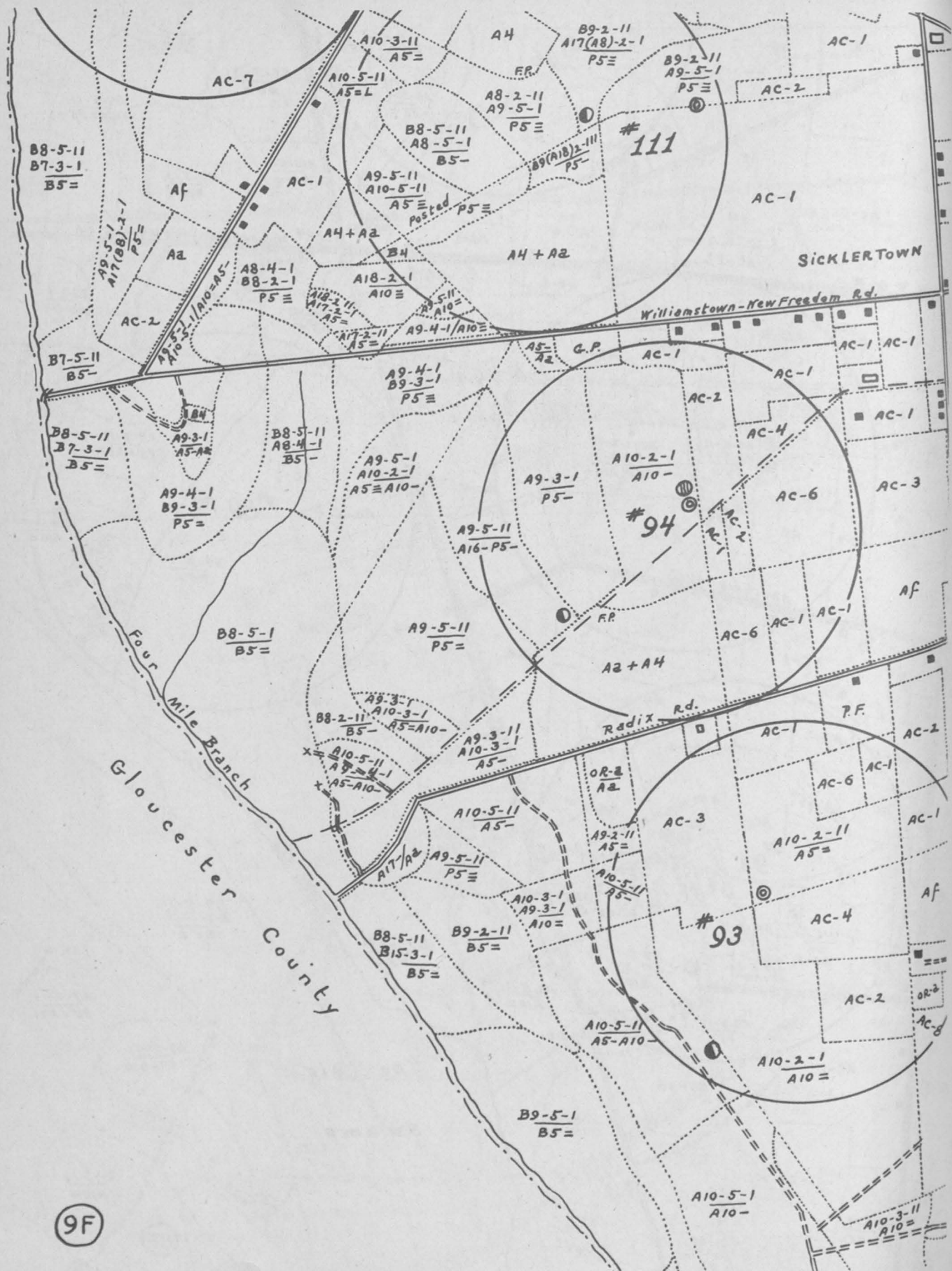




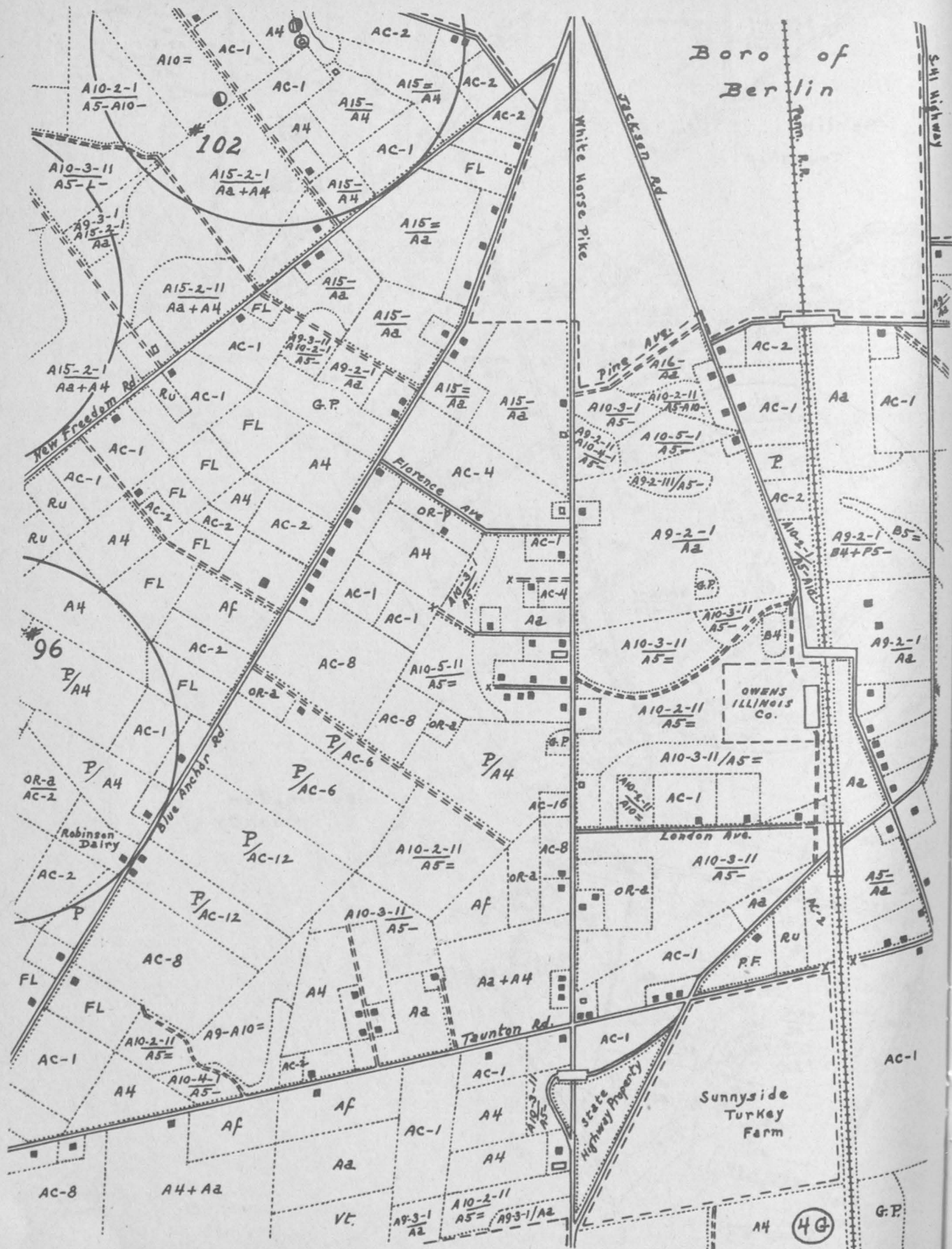


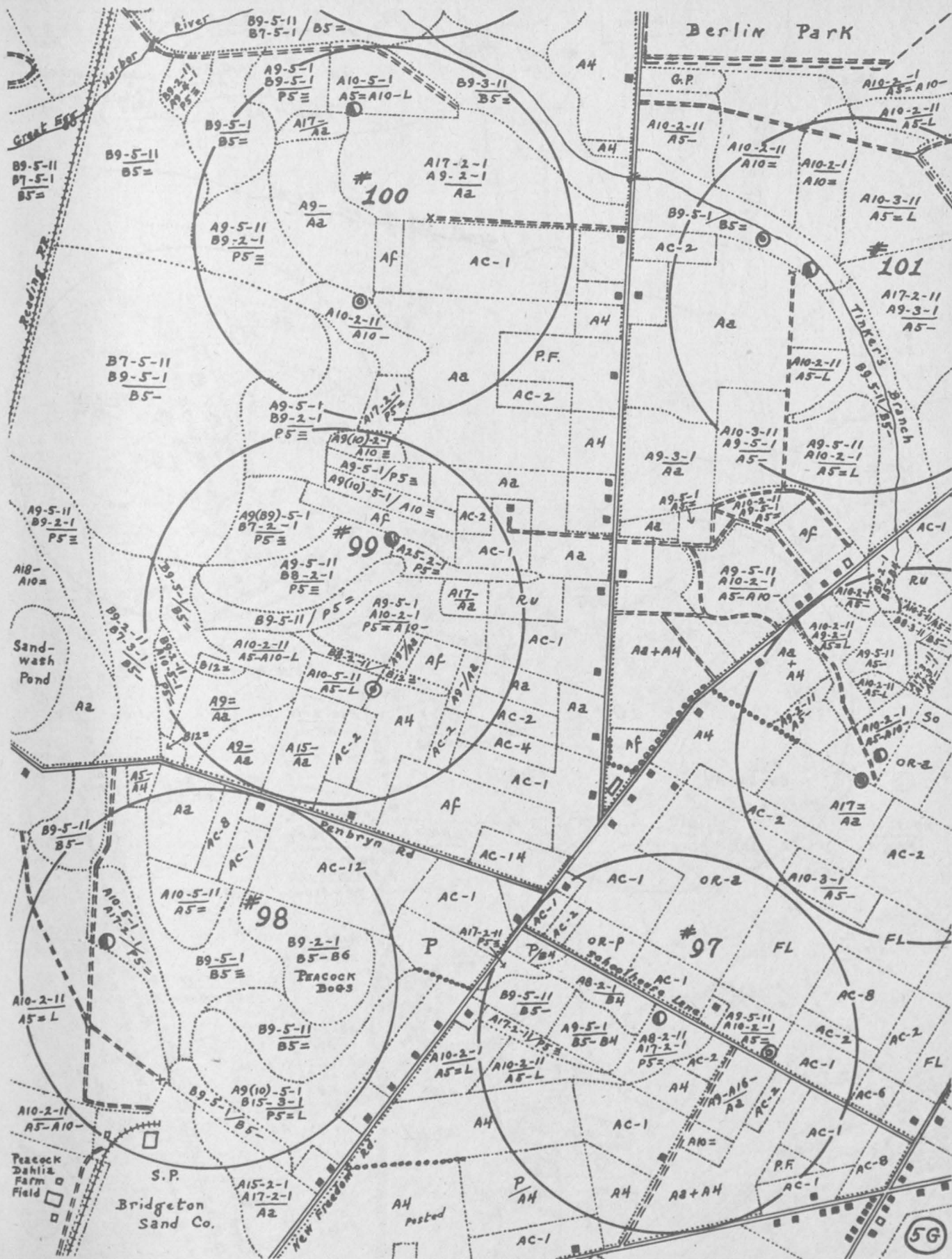


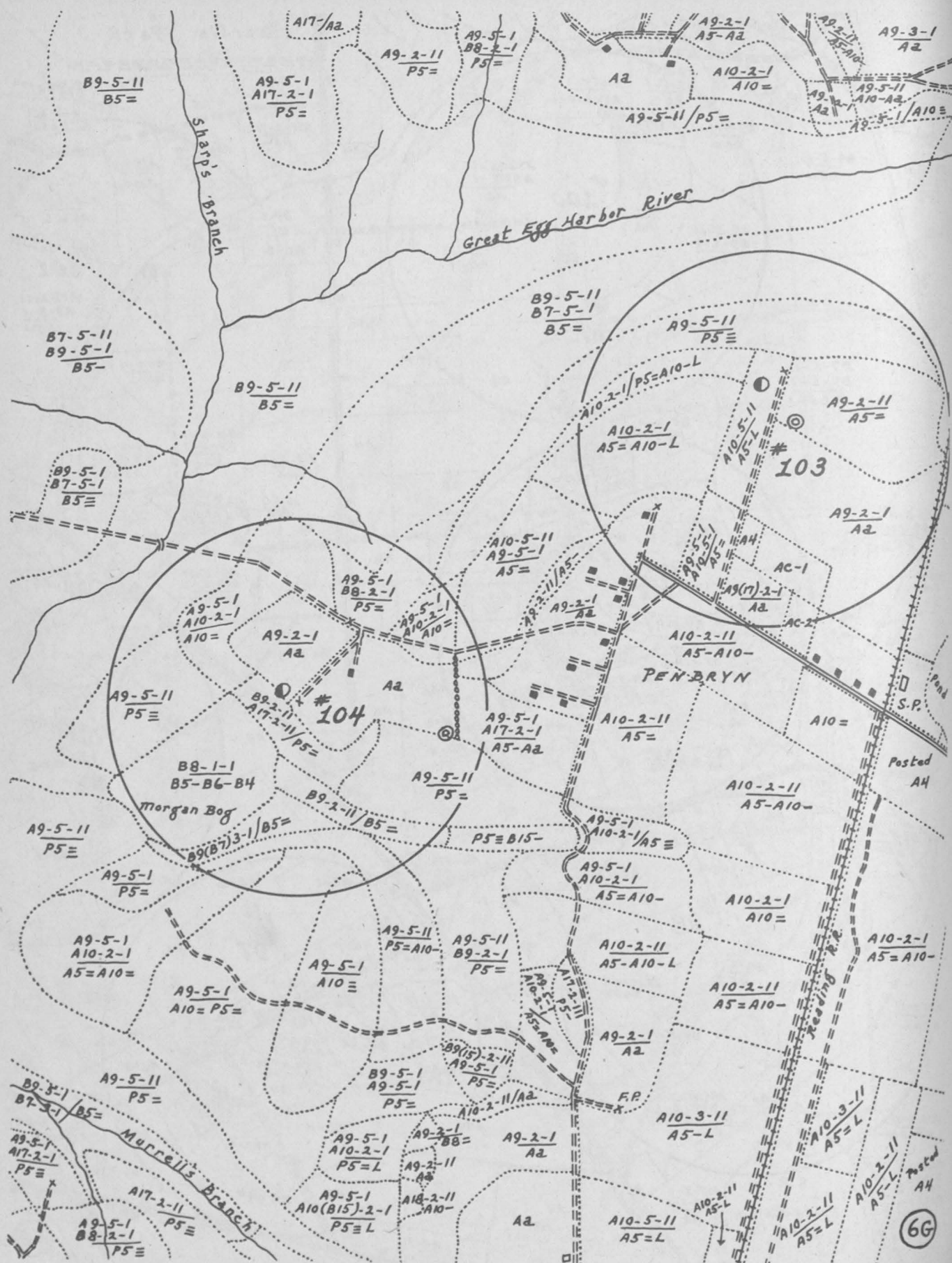


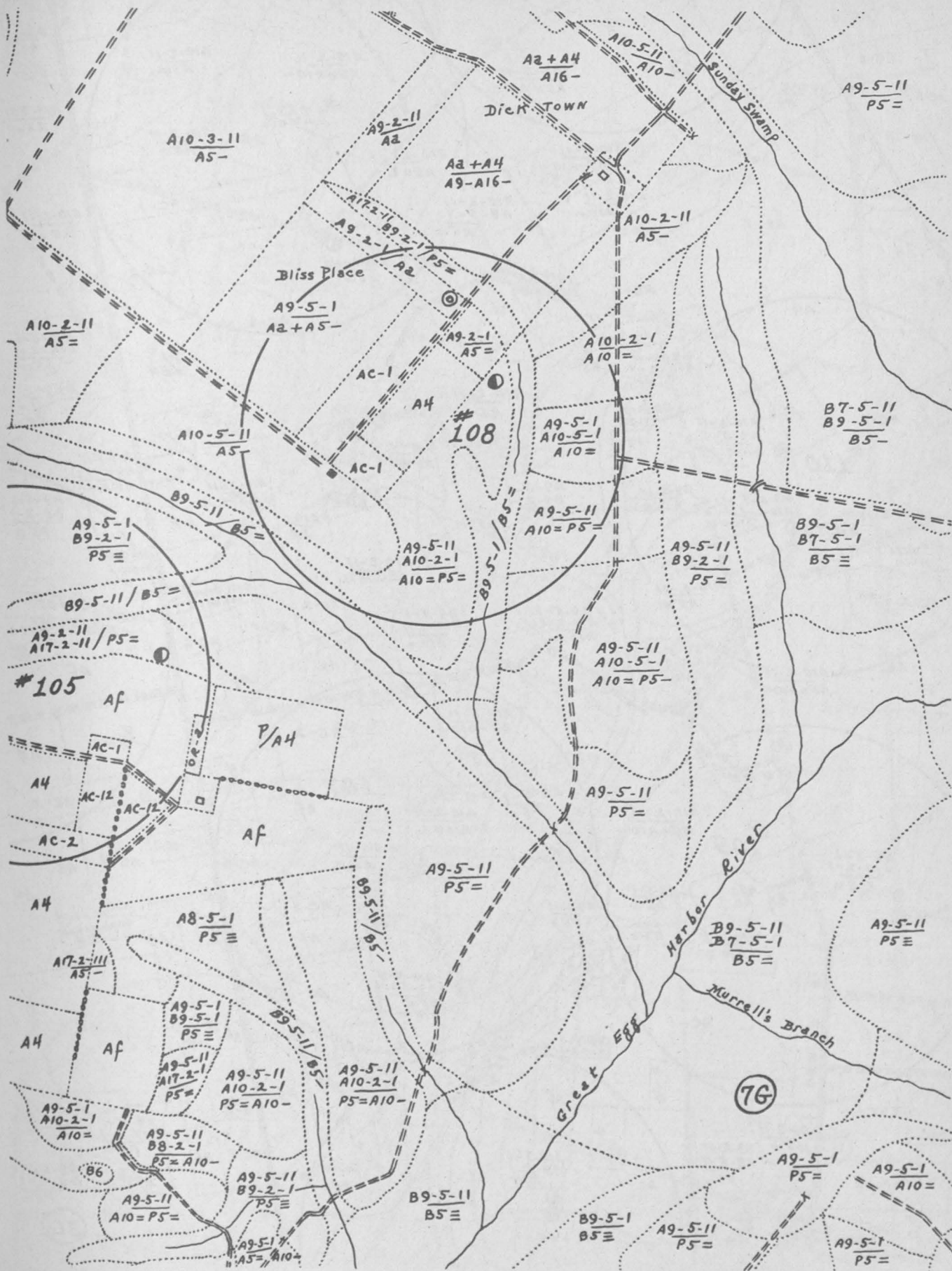


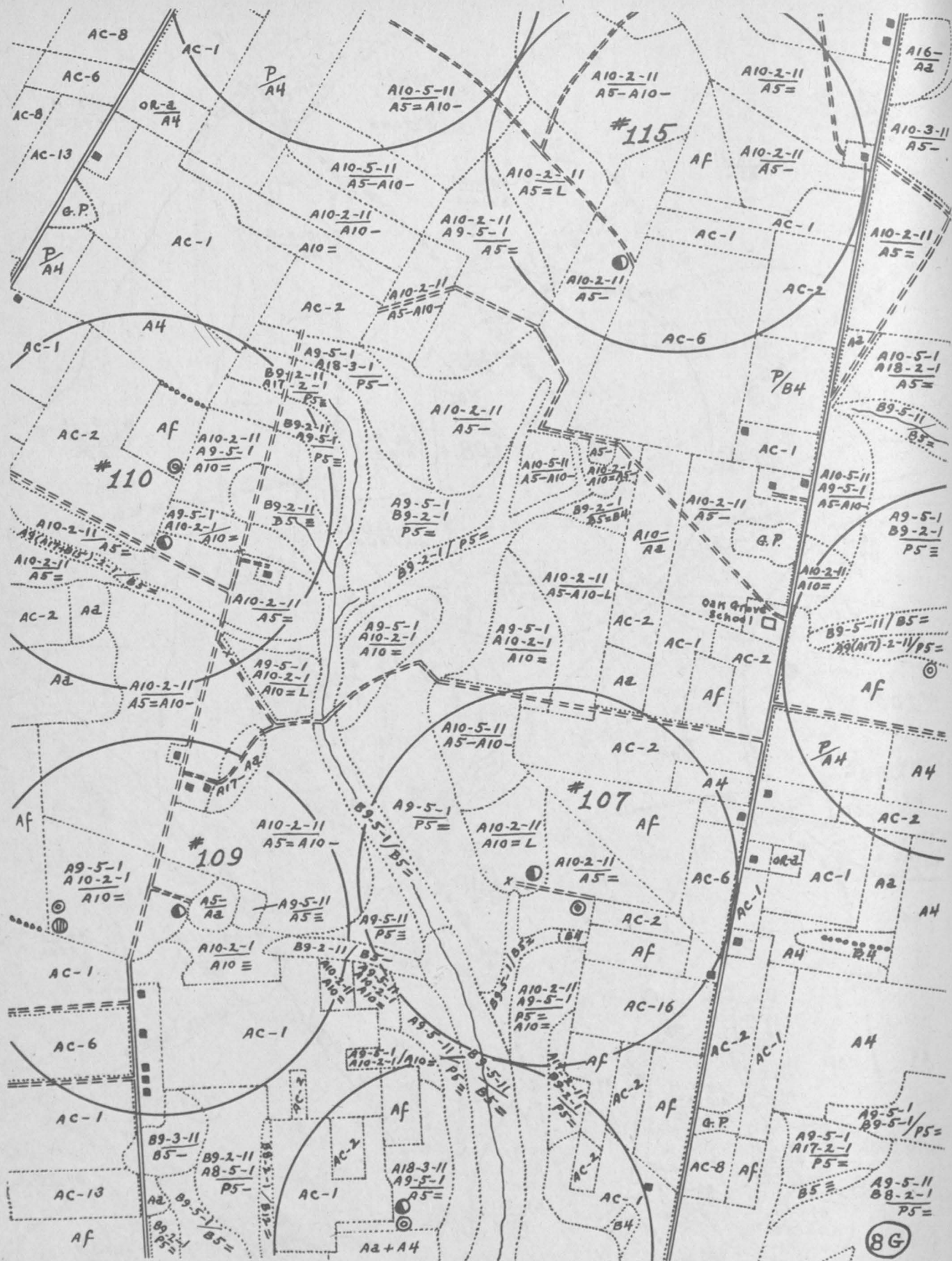
S-41 Highway







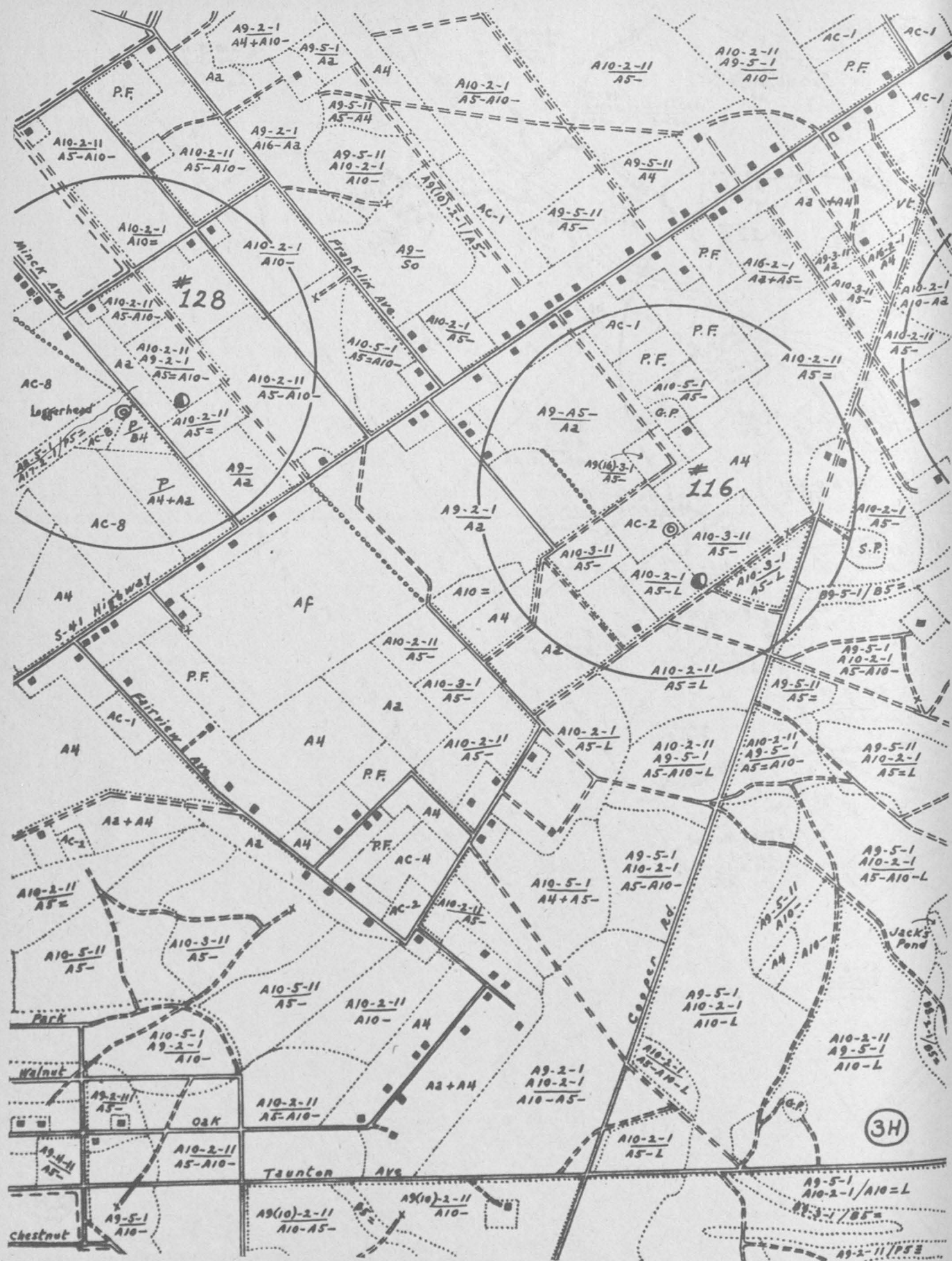


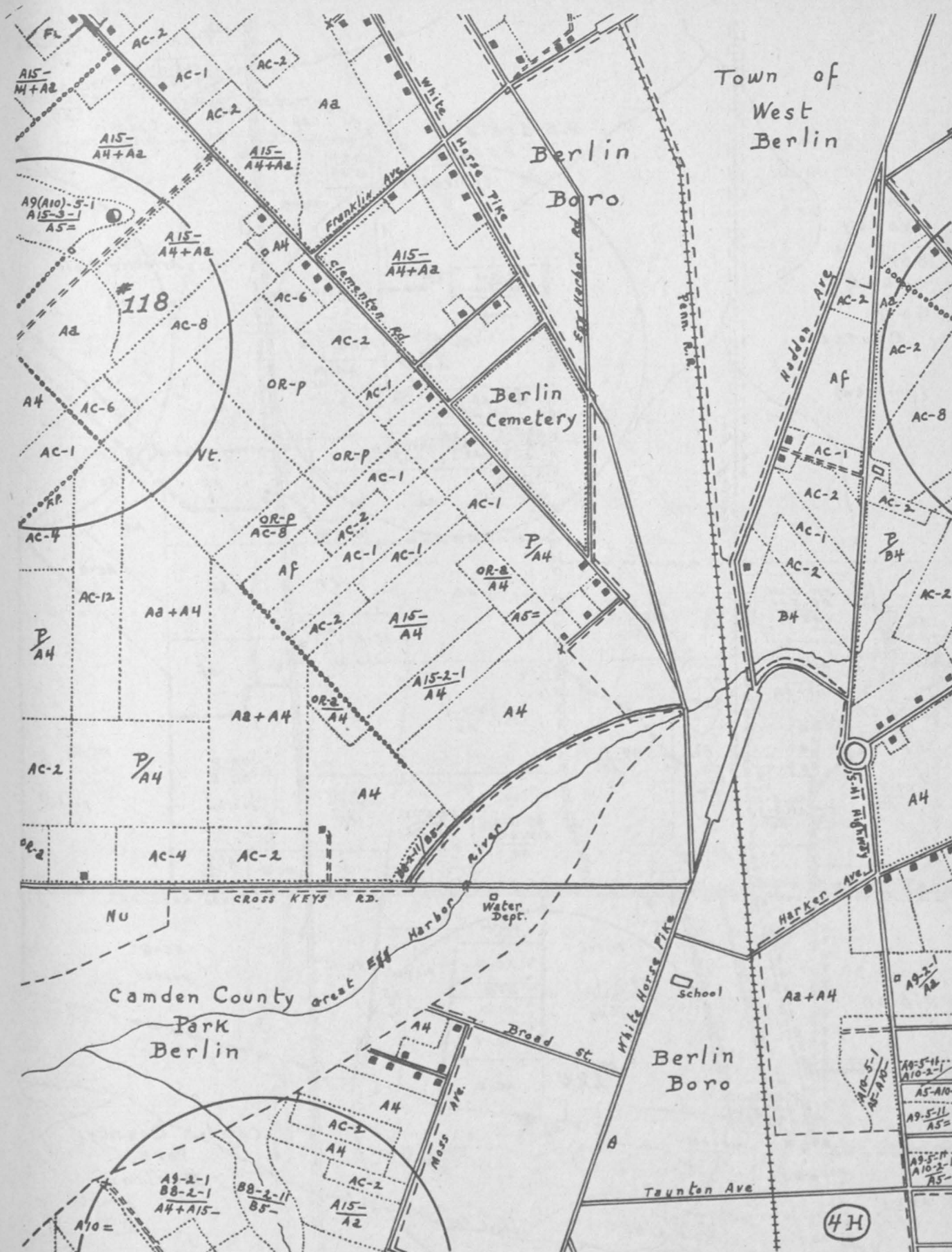


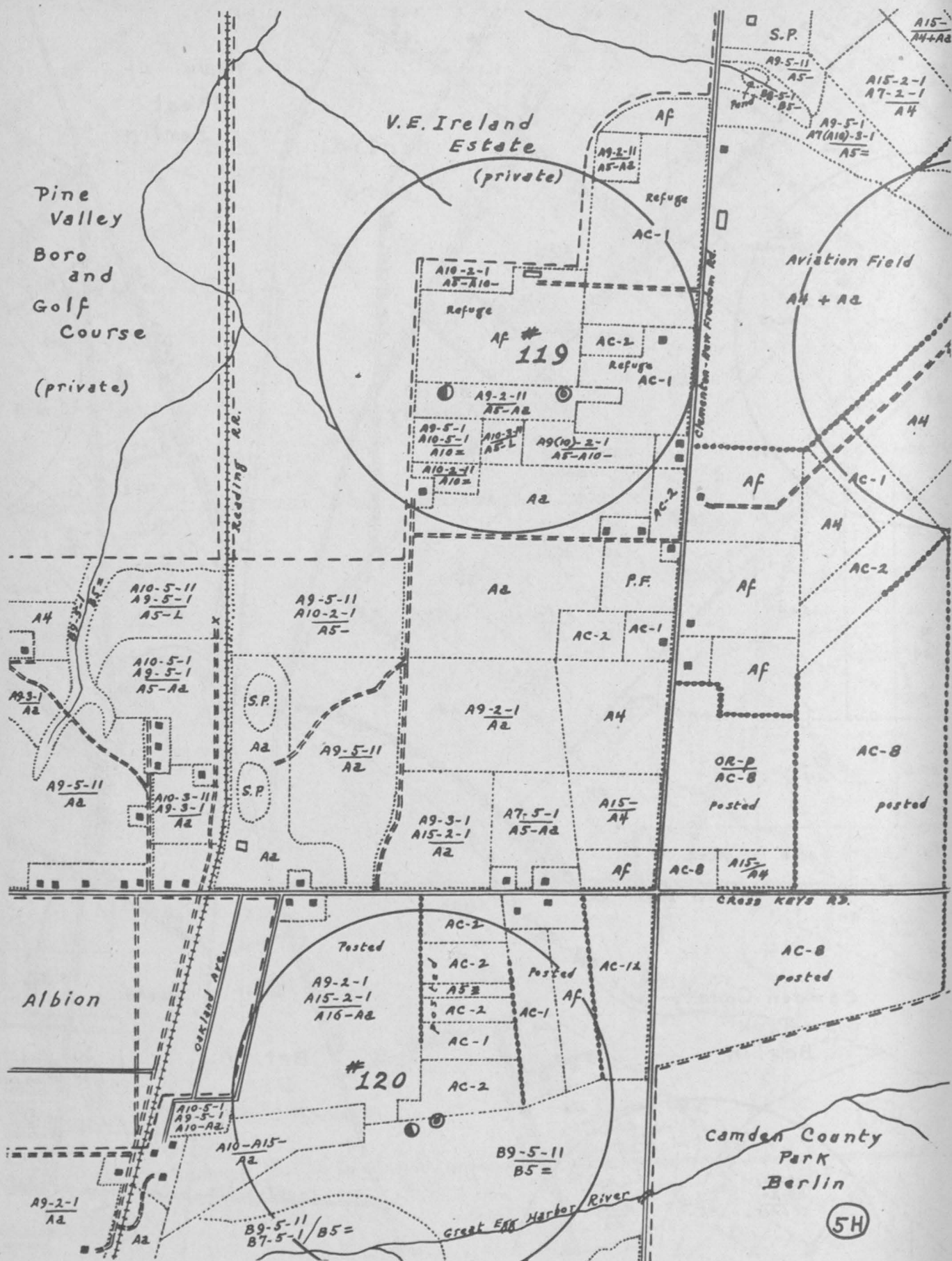


A10-3-11
A5-

Gloucester
Co.

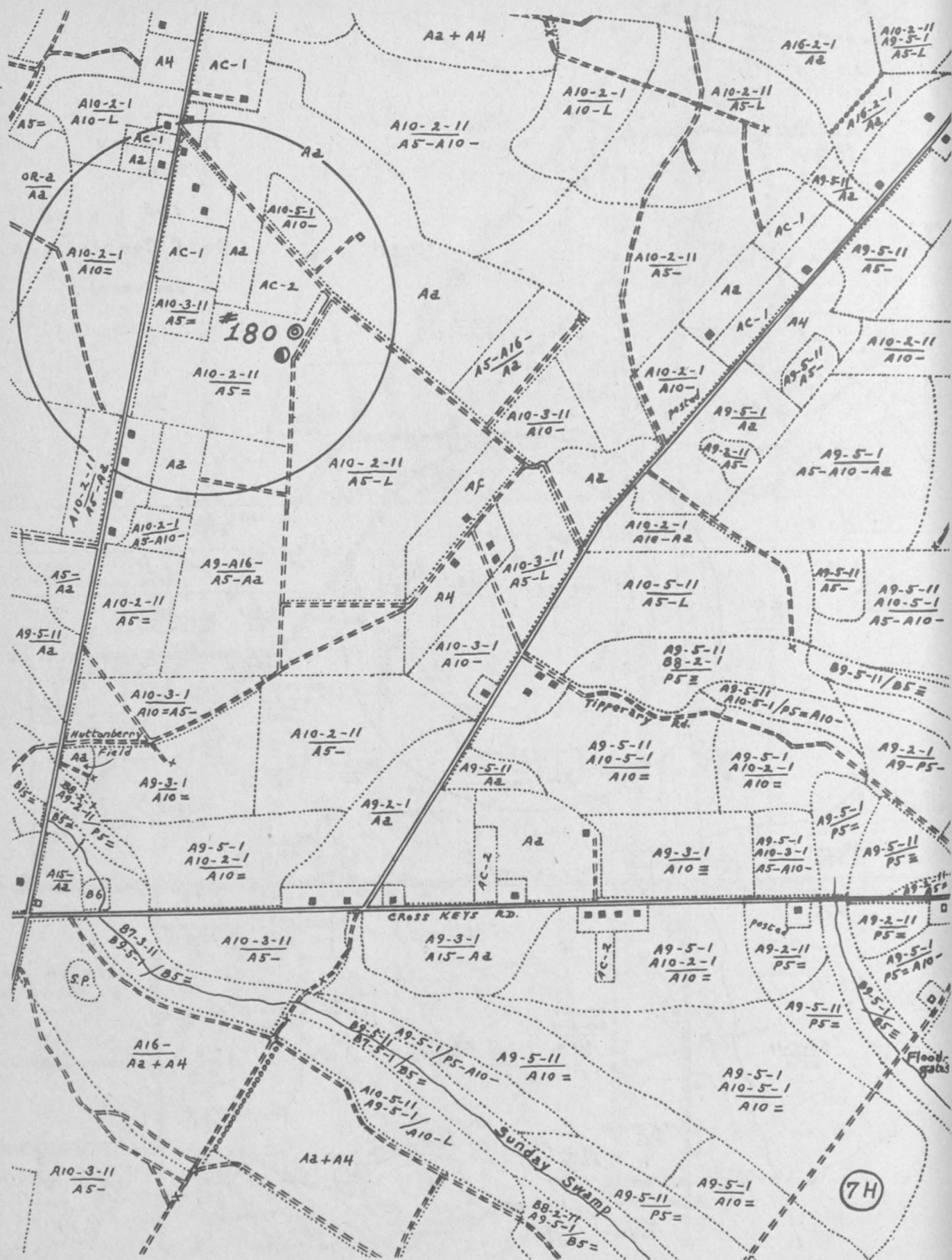


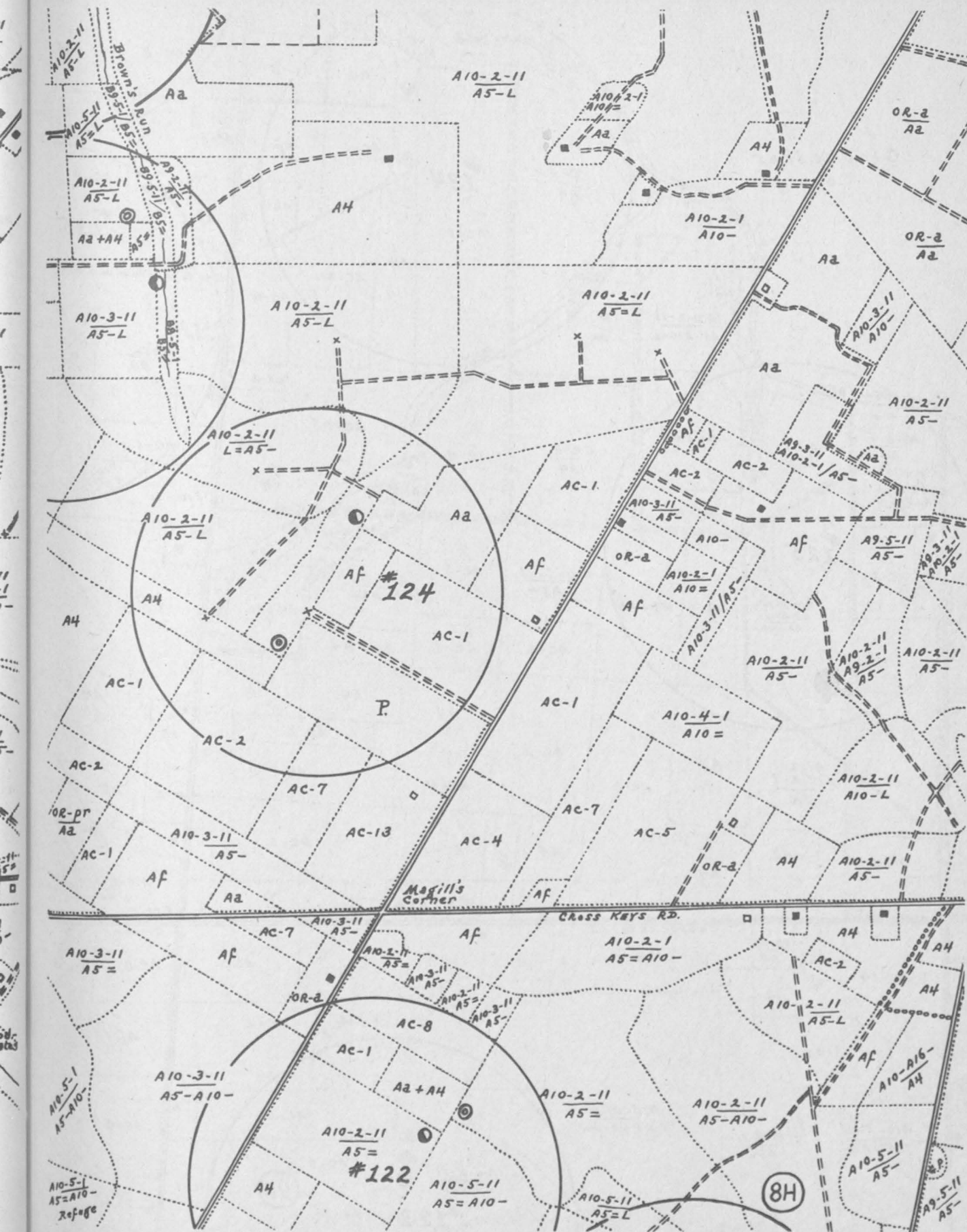




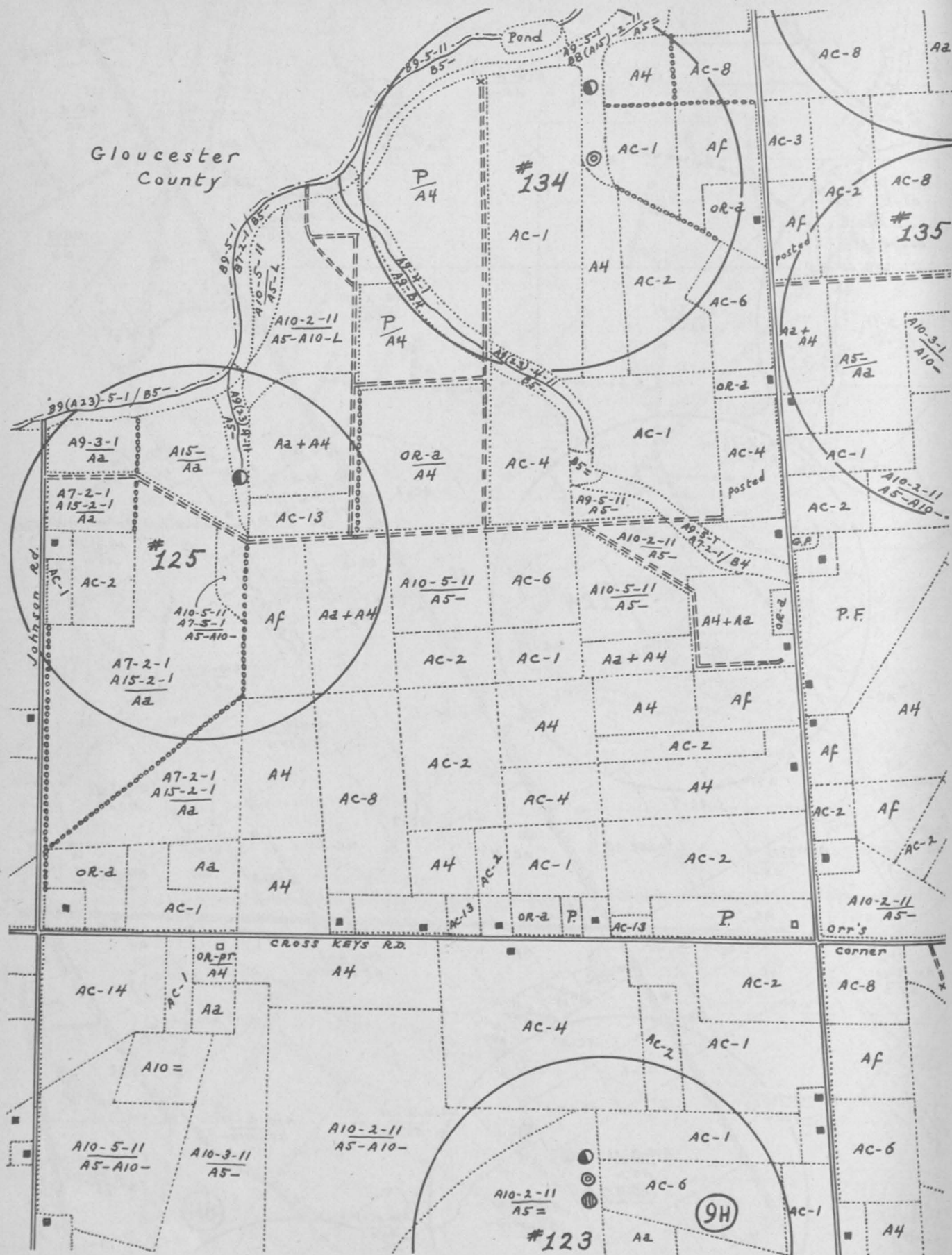
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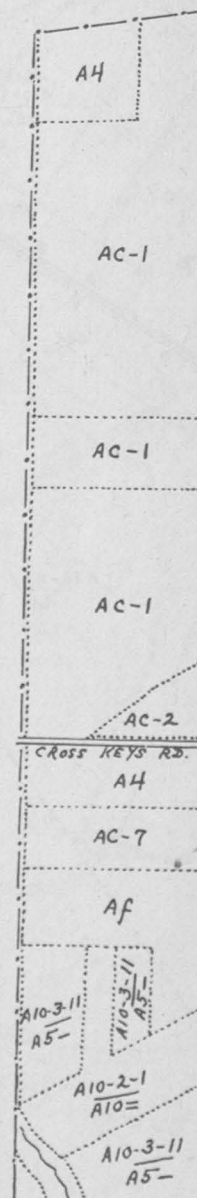


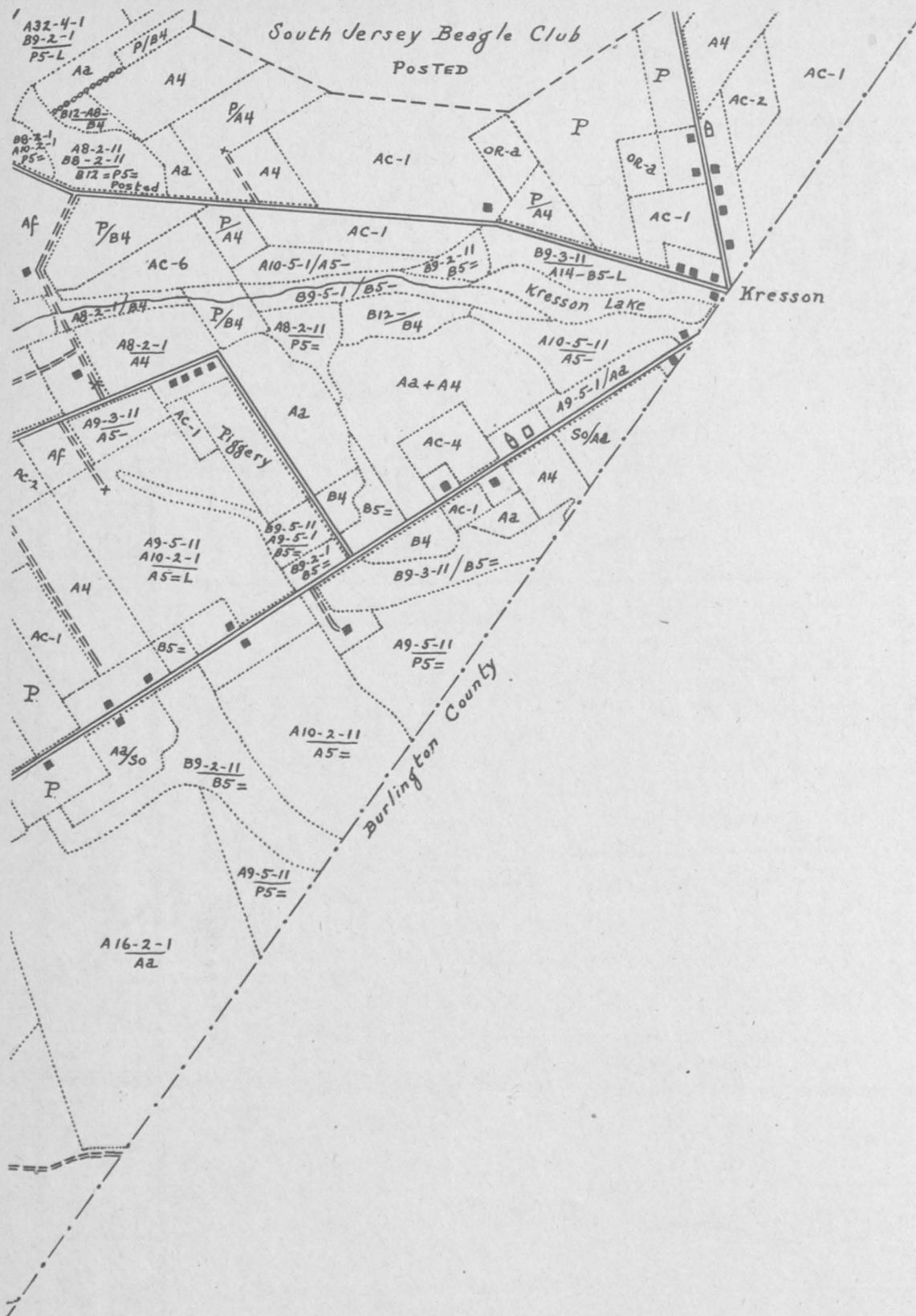


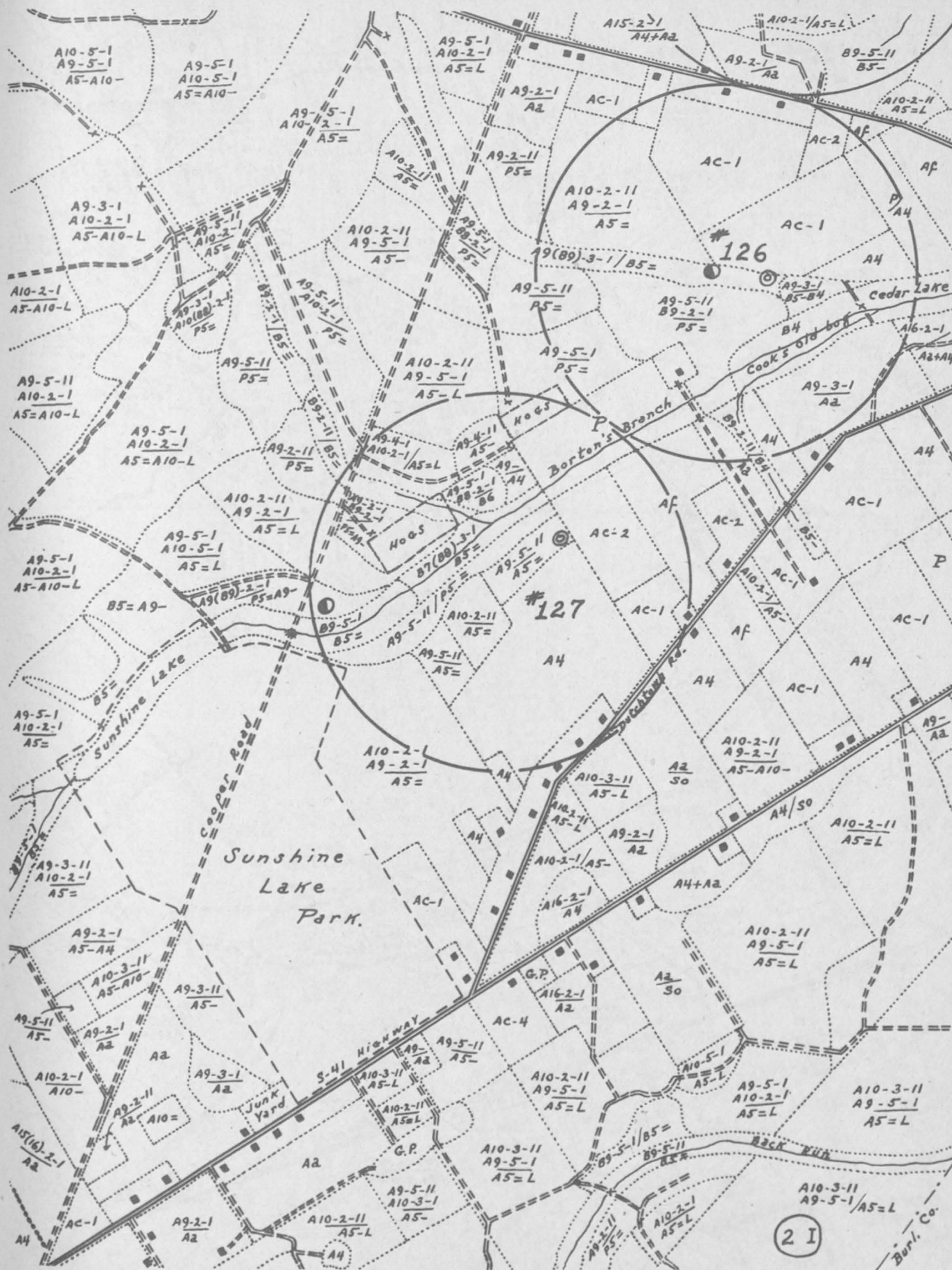
Gloucester
County



Gloucester County

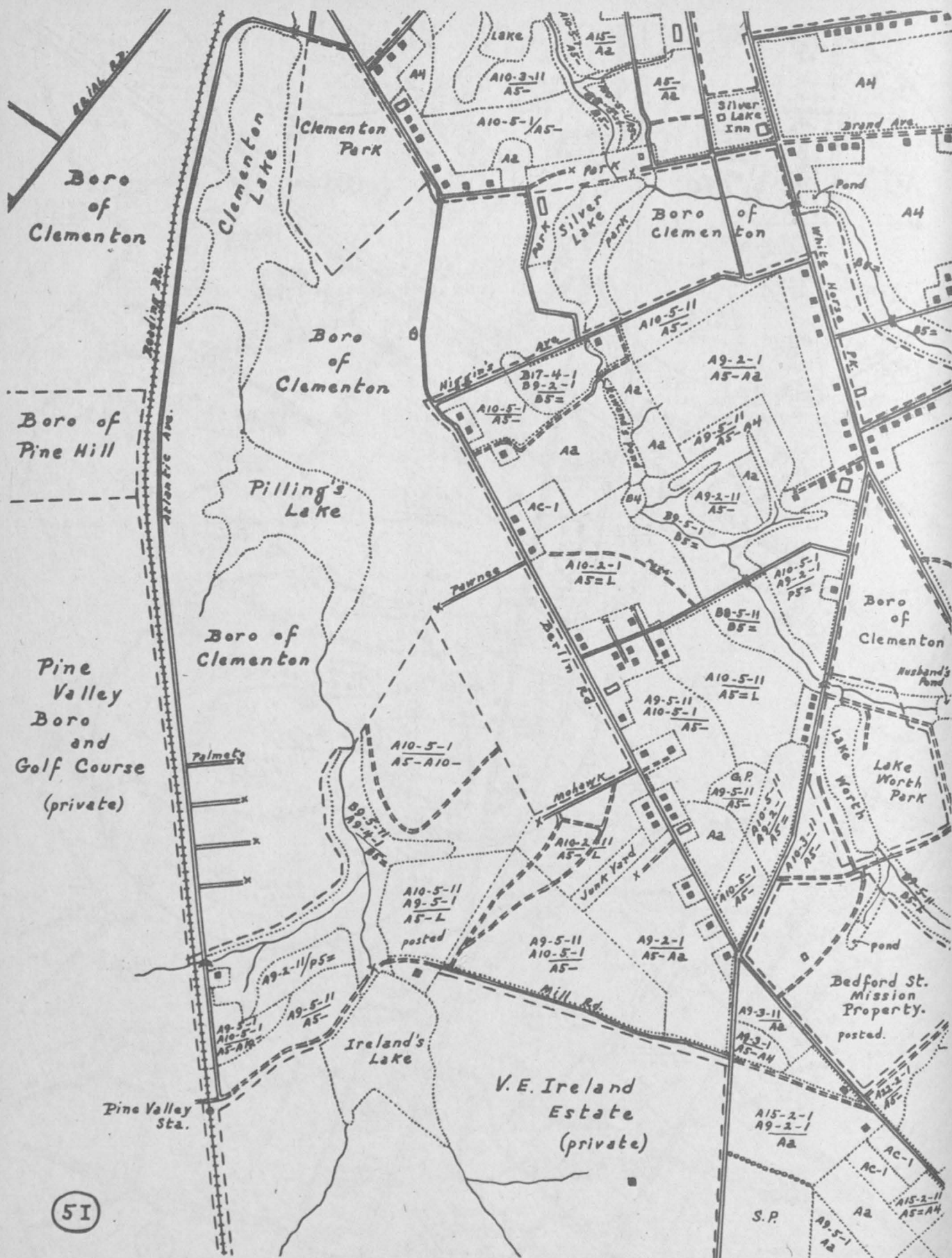


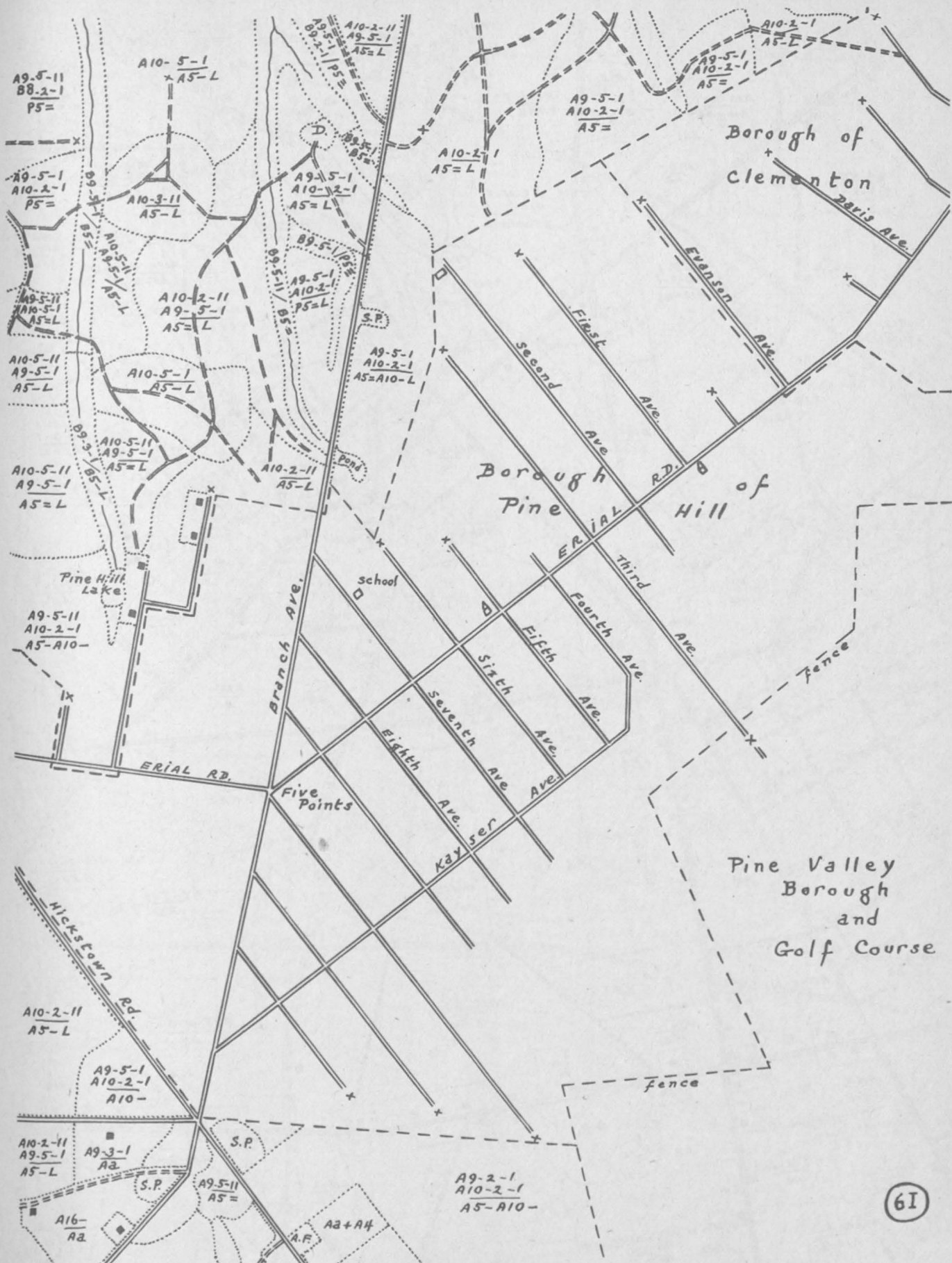


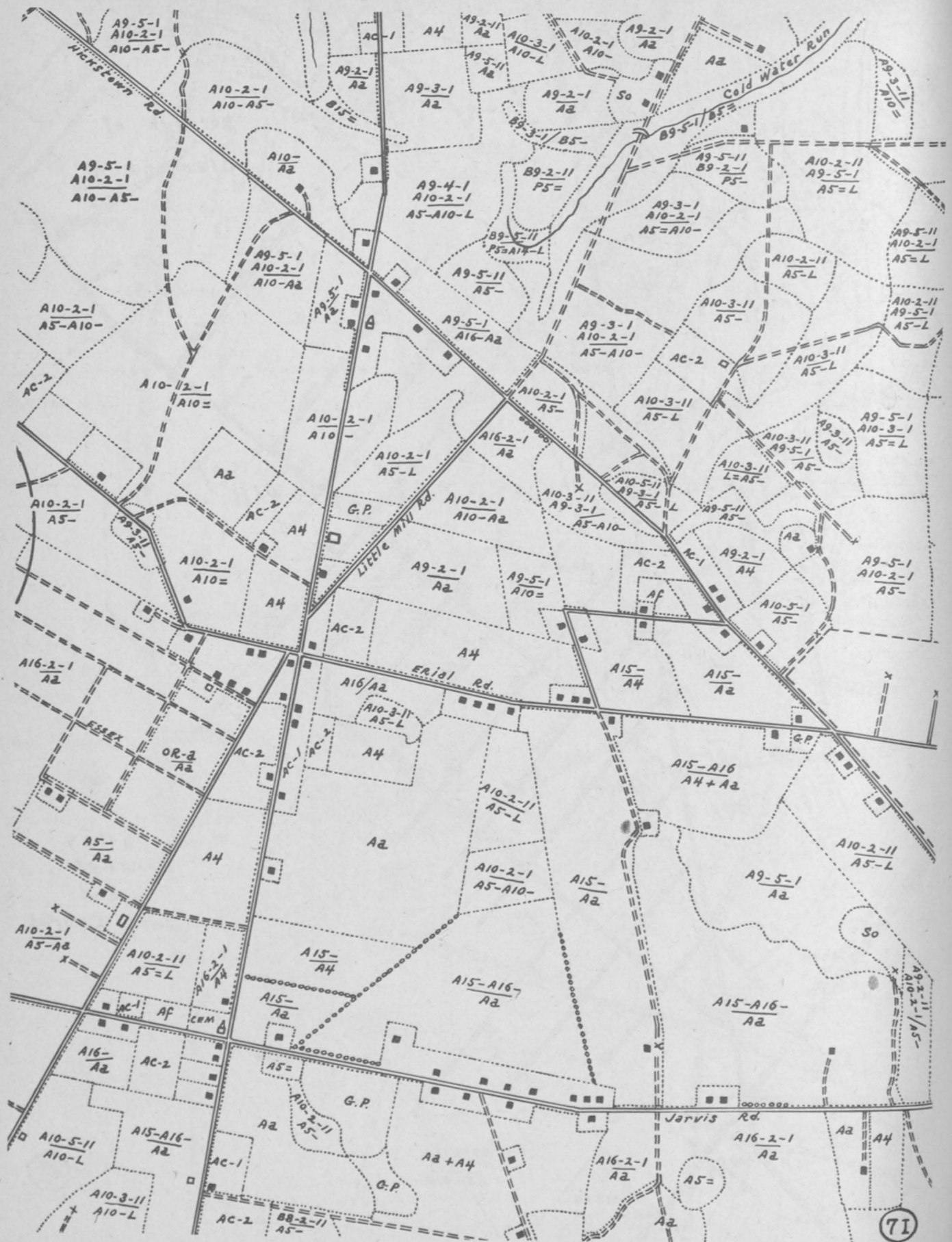


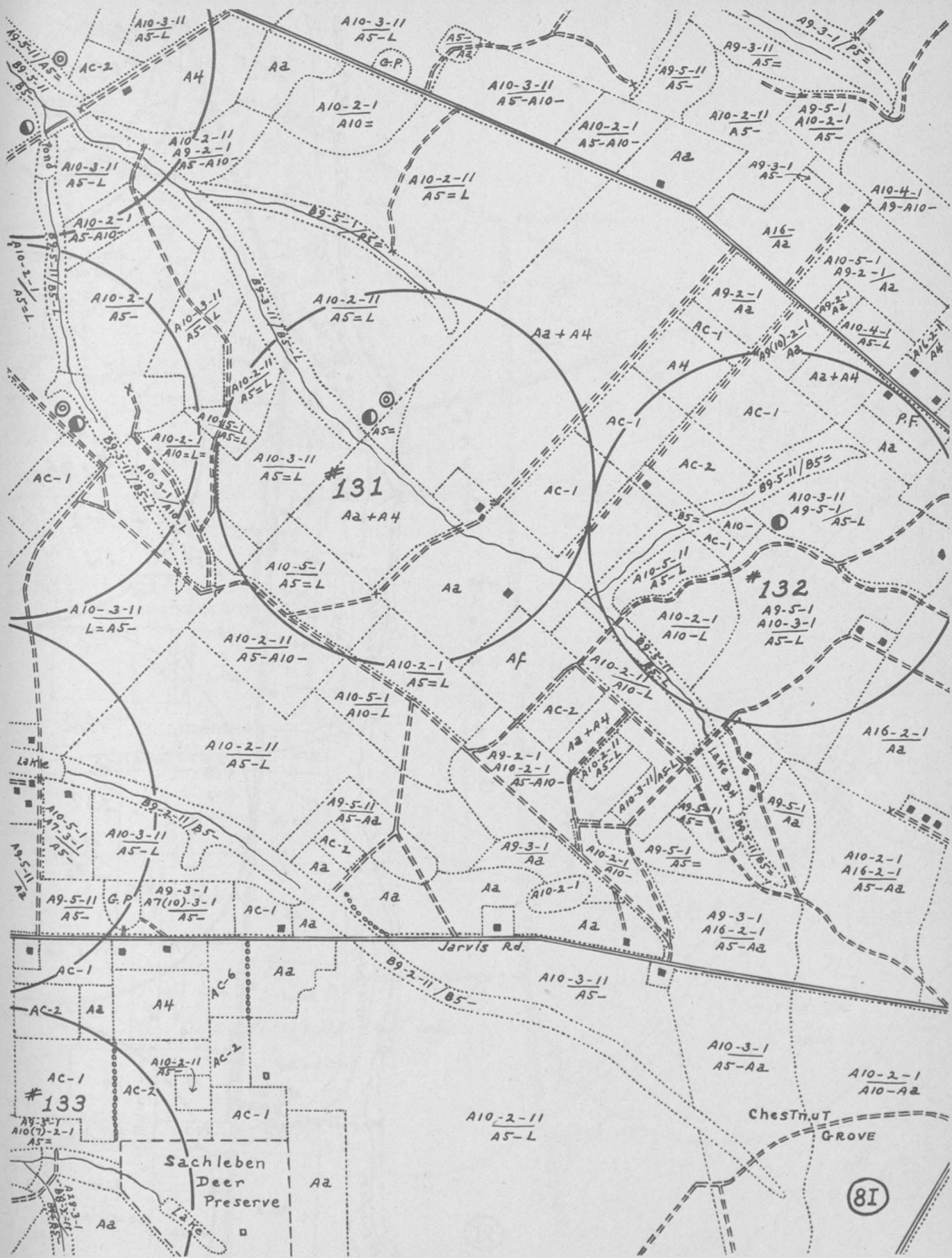




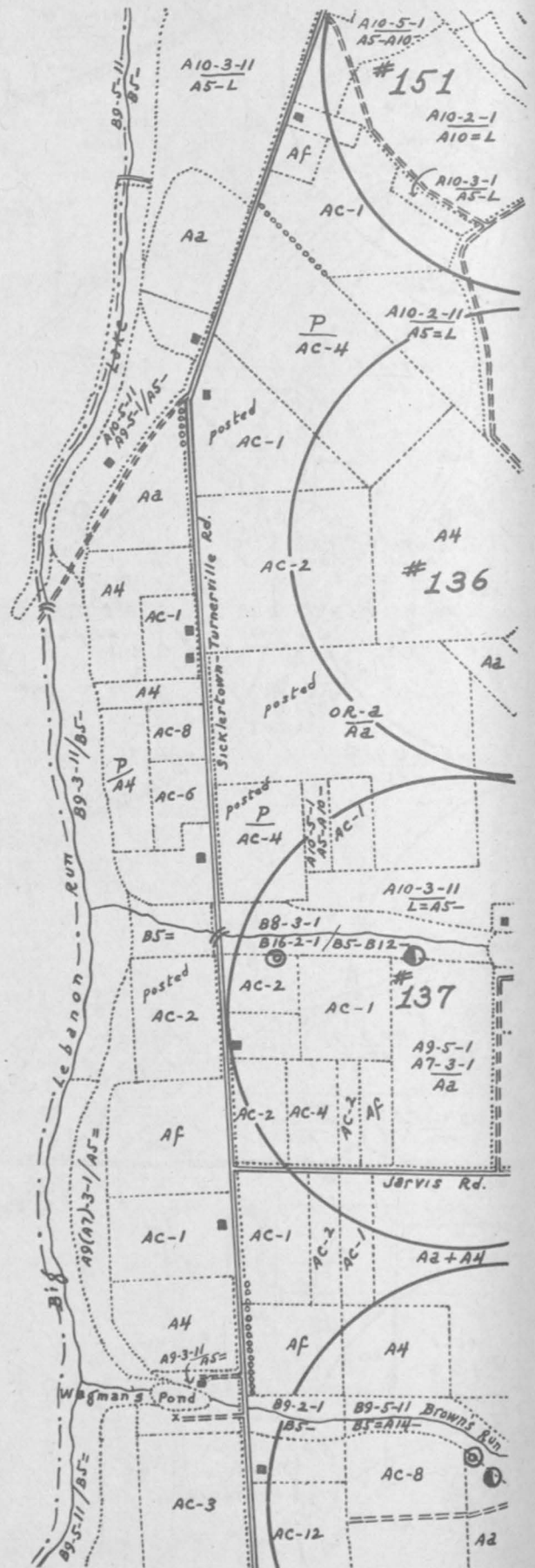


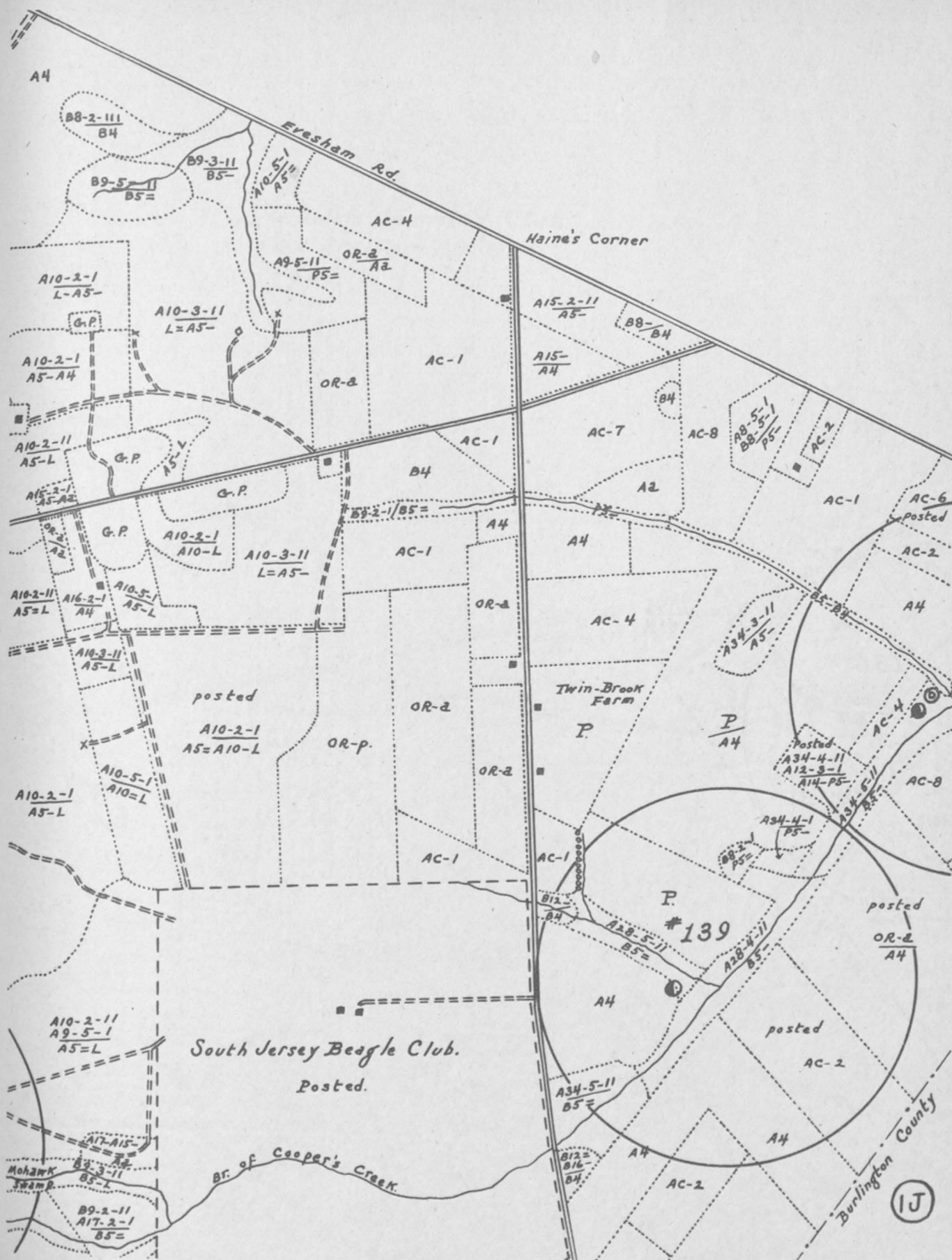


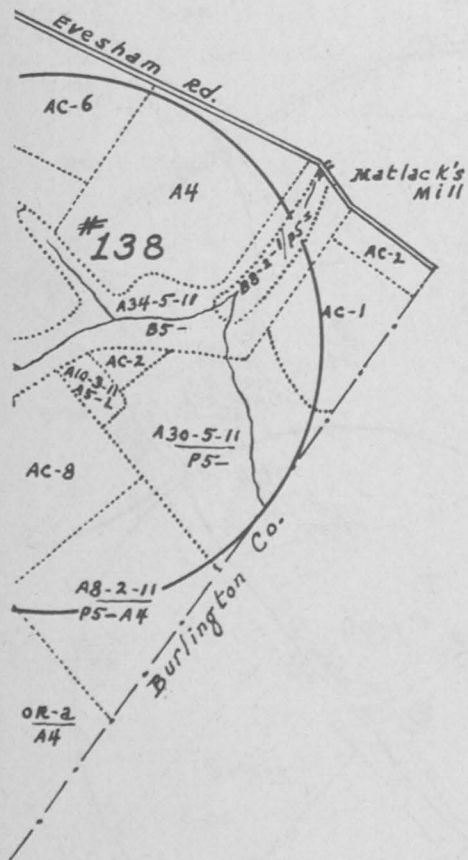




Gloucester County



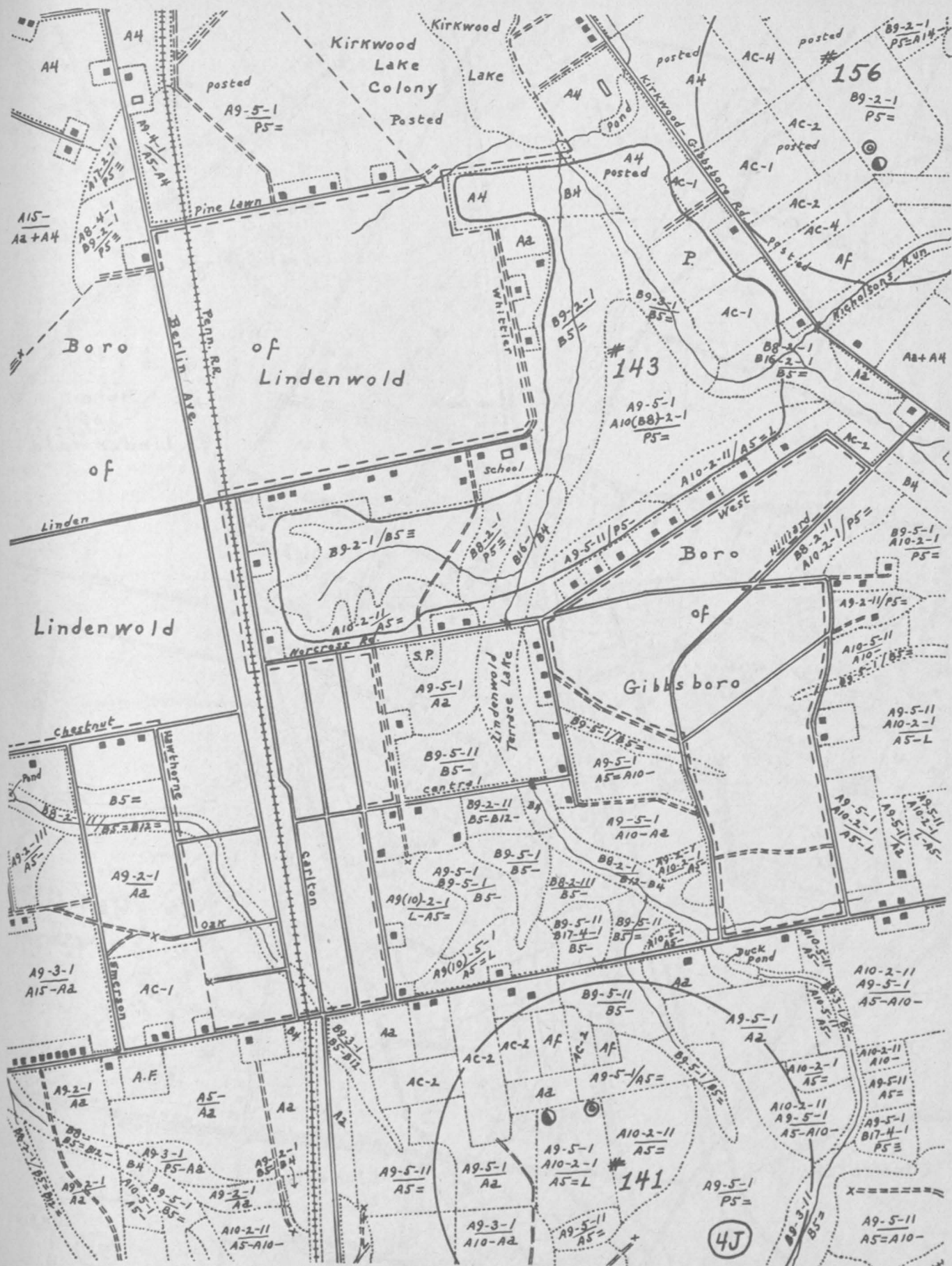


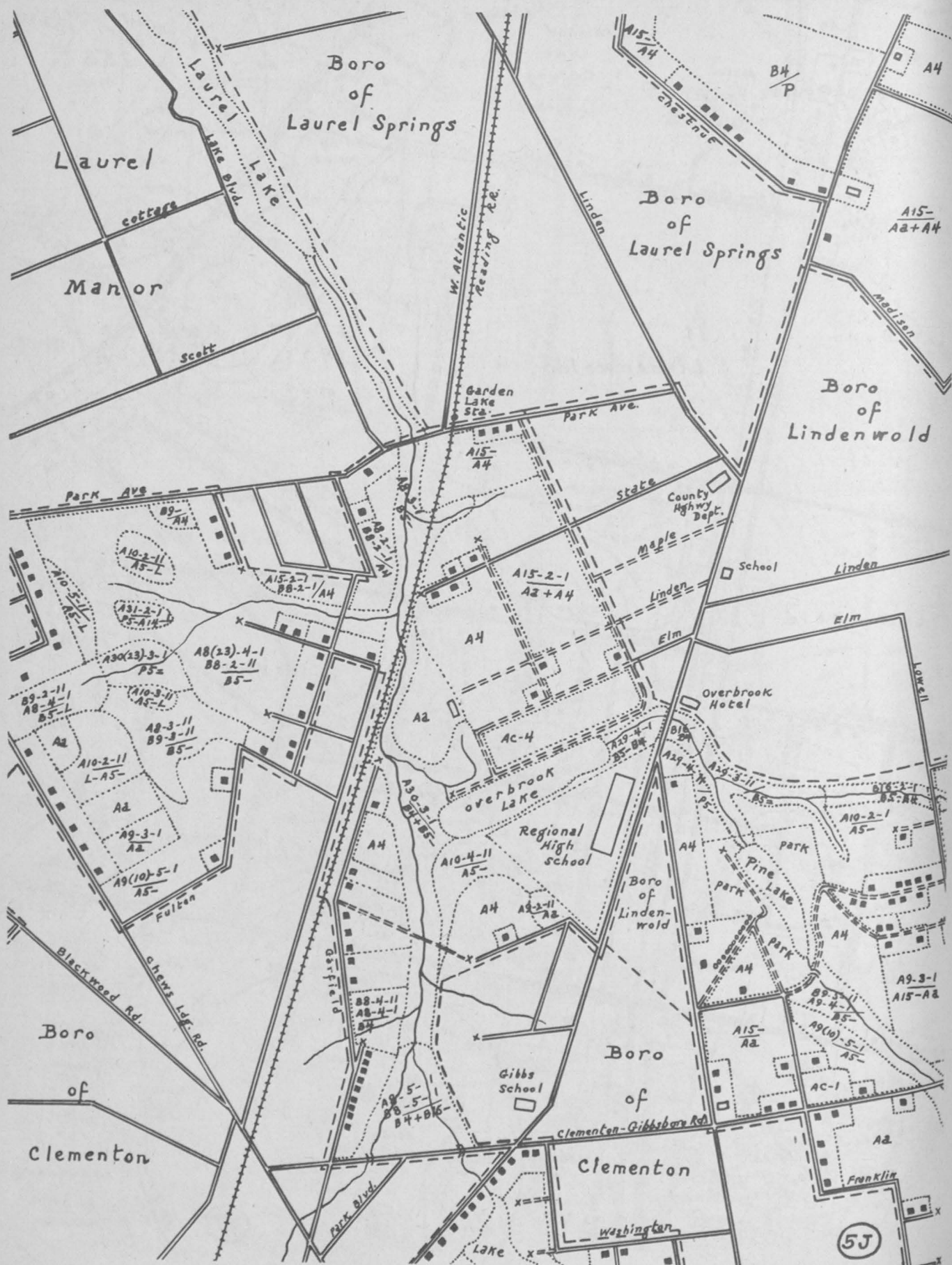


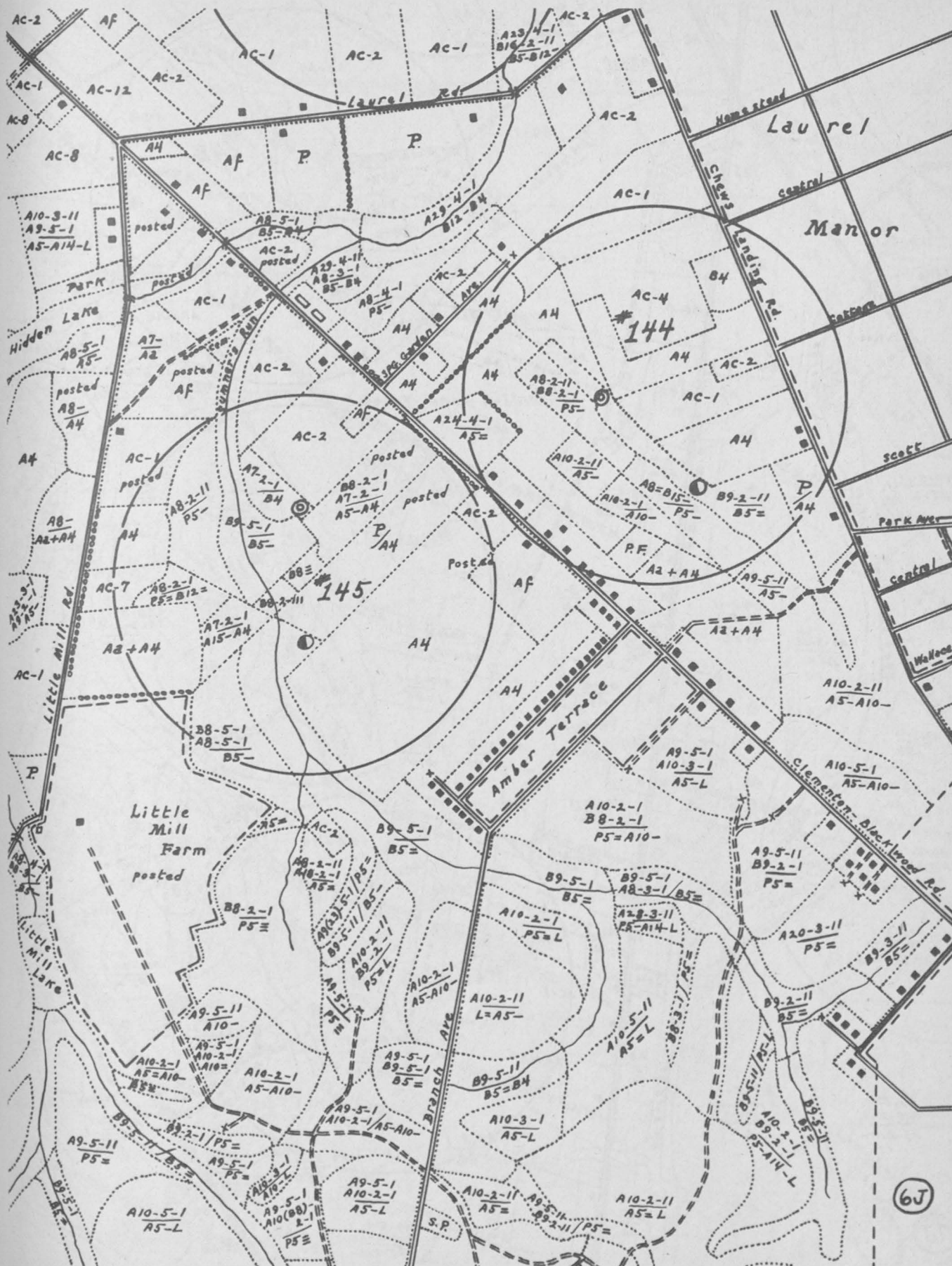
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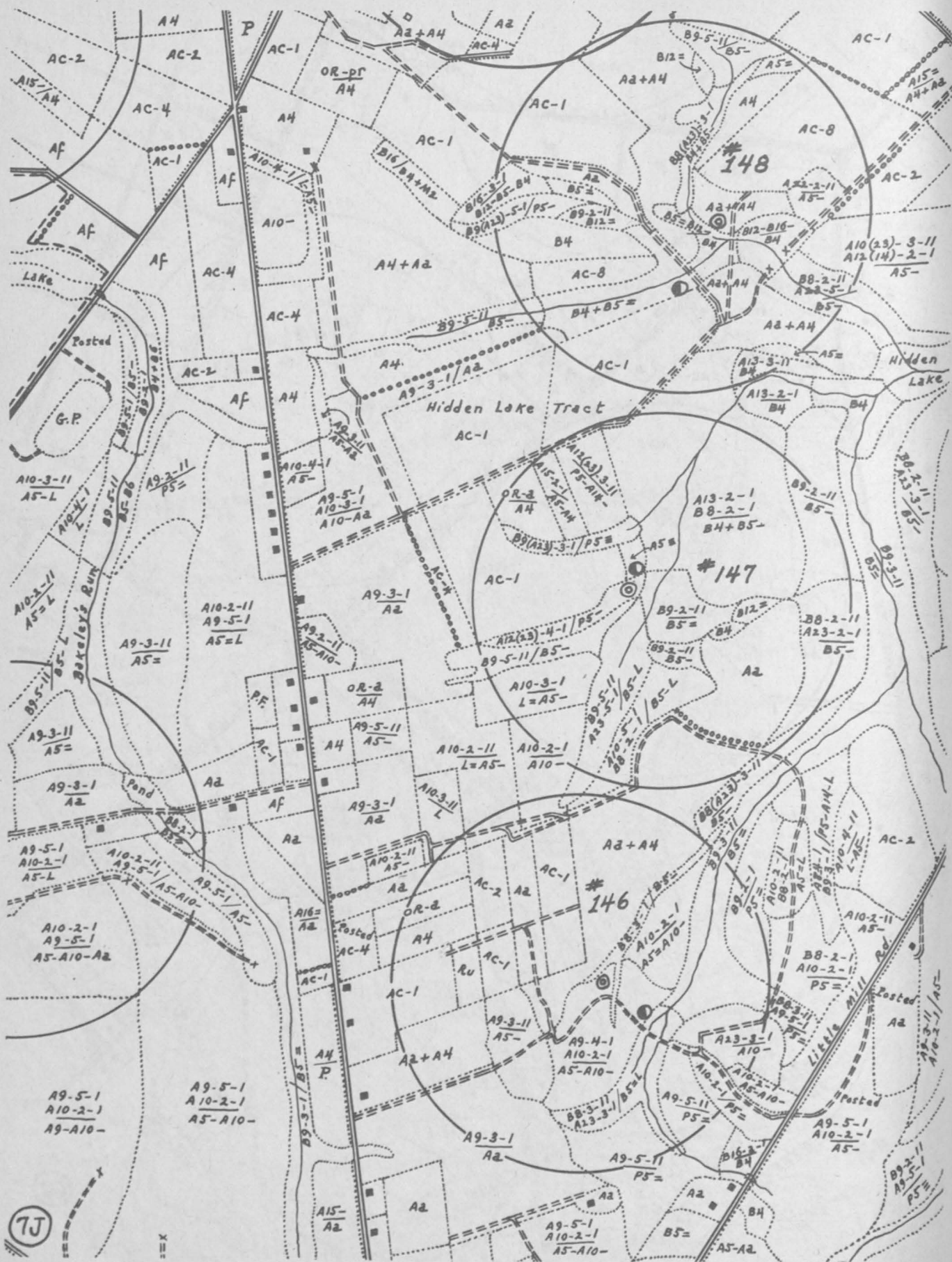
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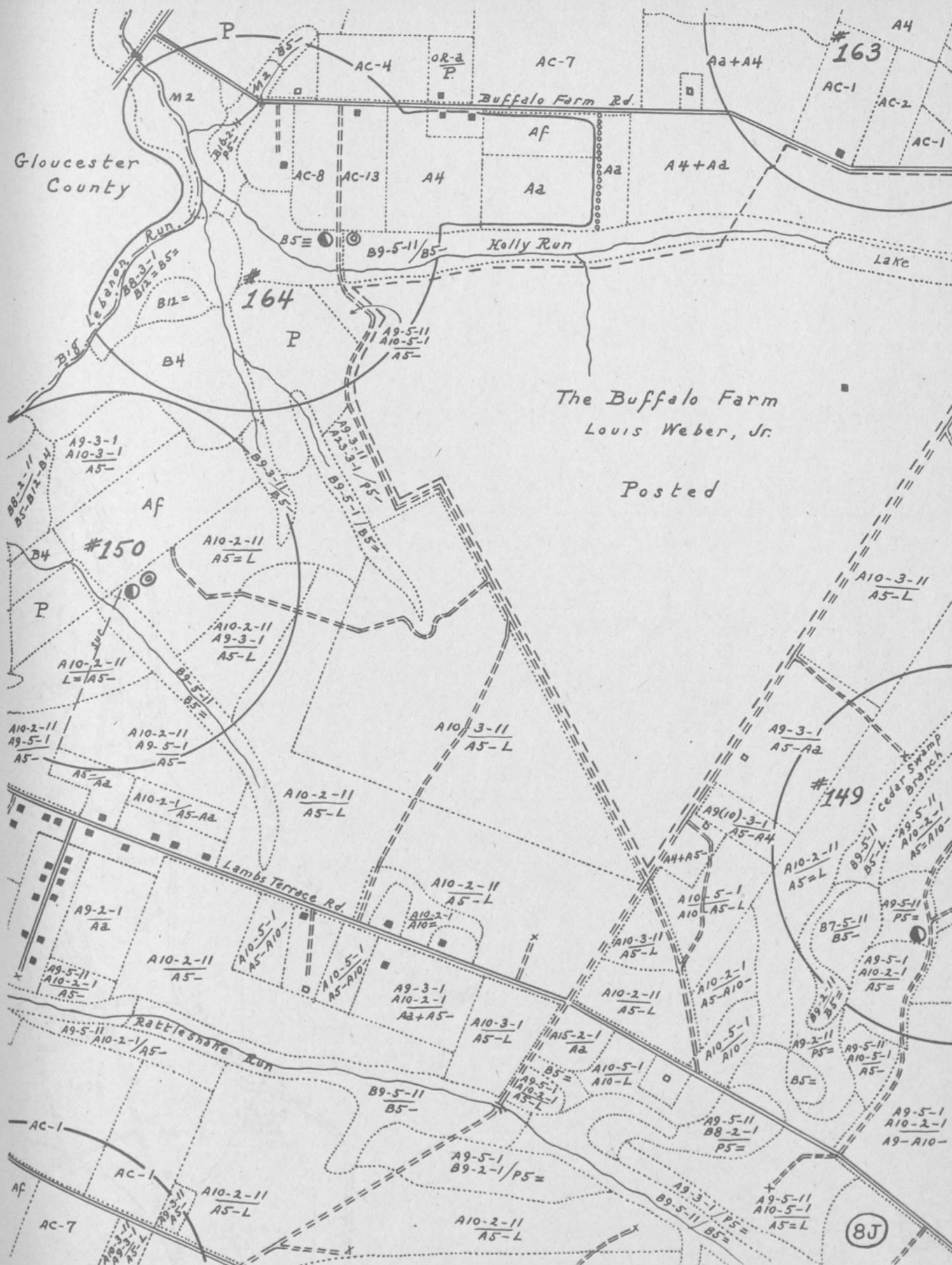
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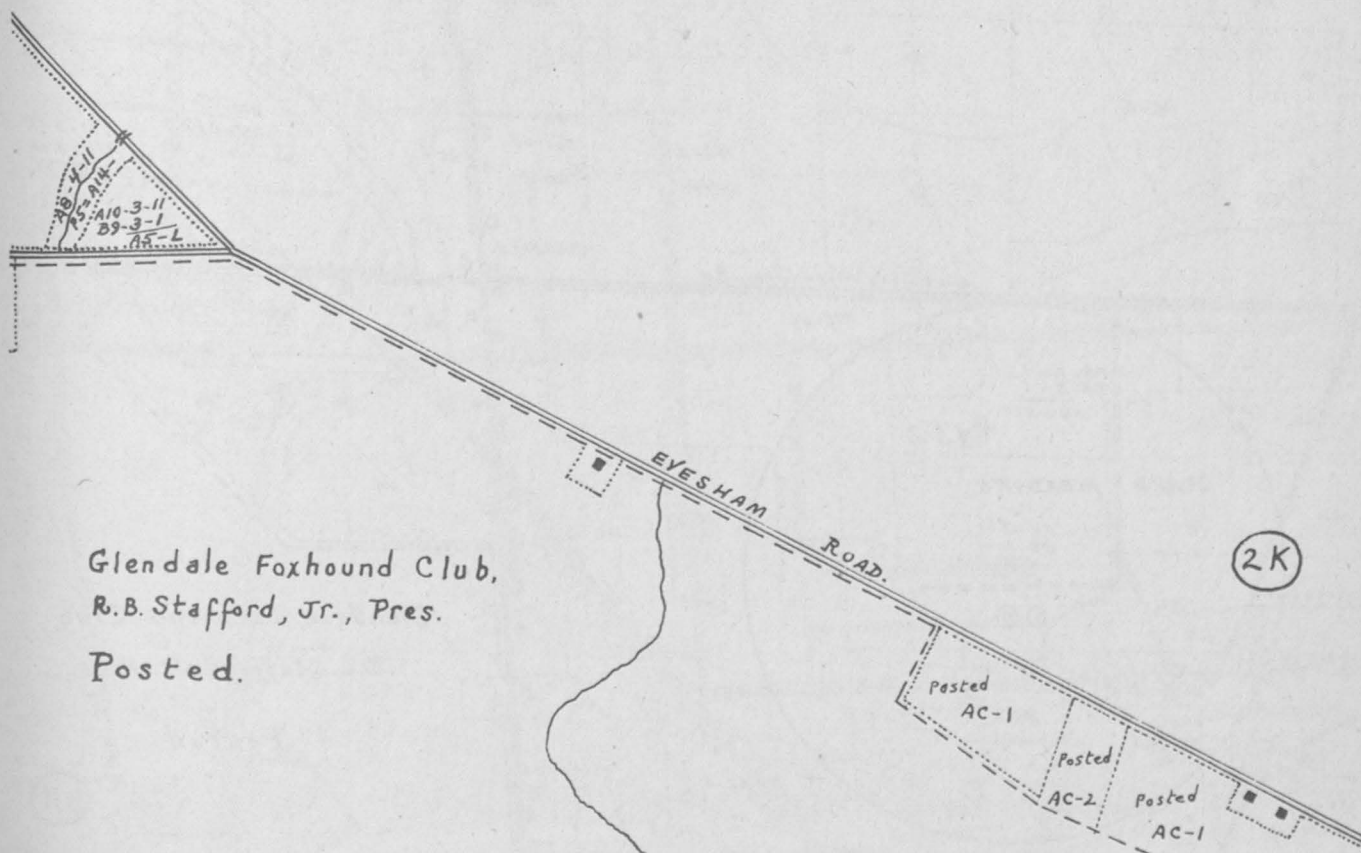








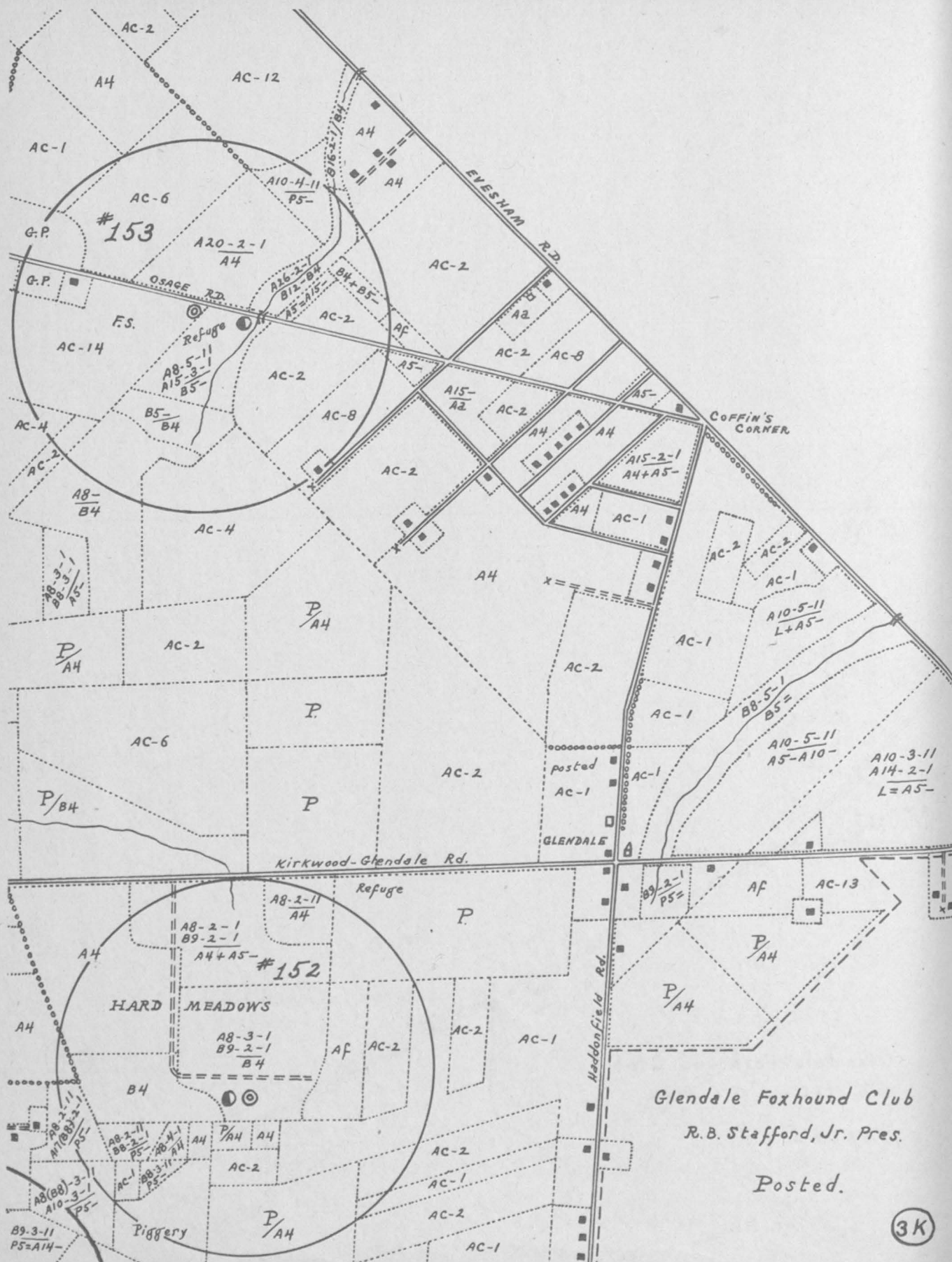
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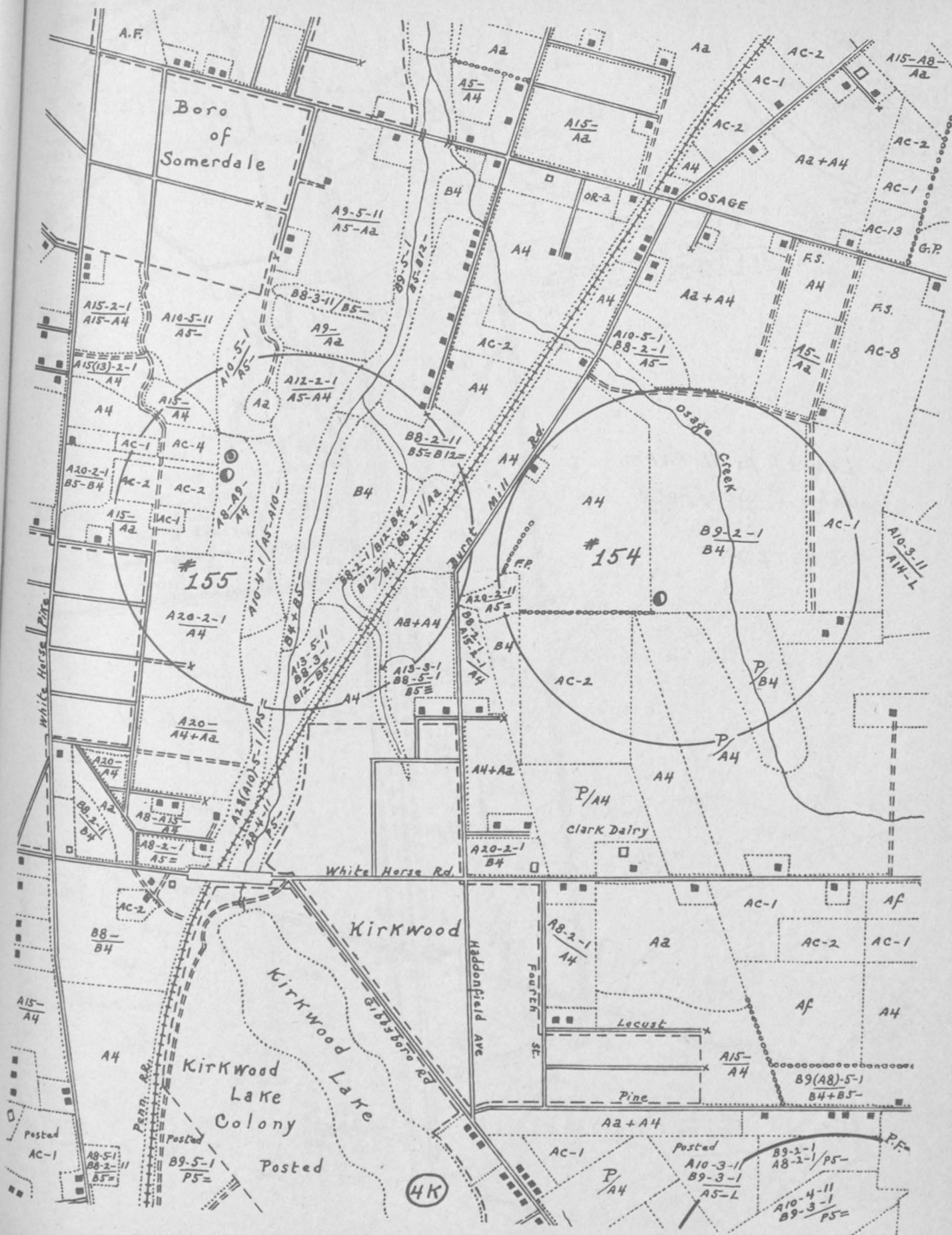


Glendale Foxhound Club,
R.B. Stafford, Jr., Pres.

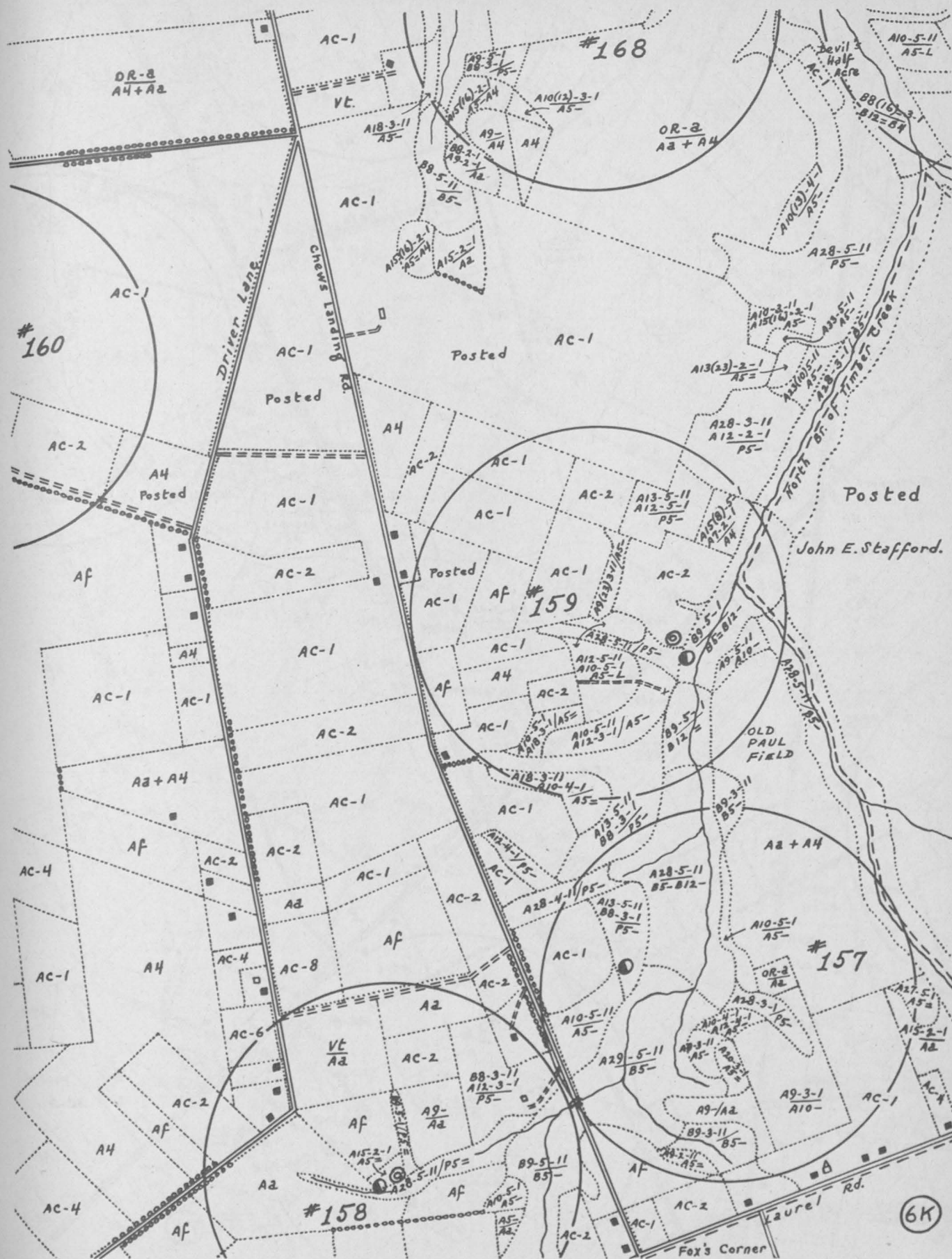
Posted.

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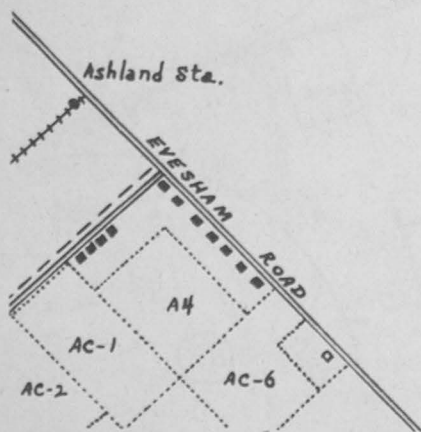




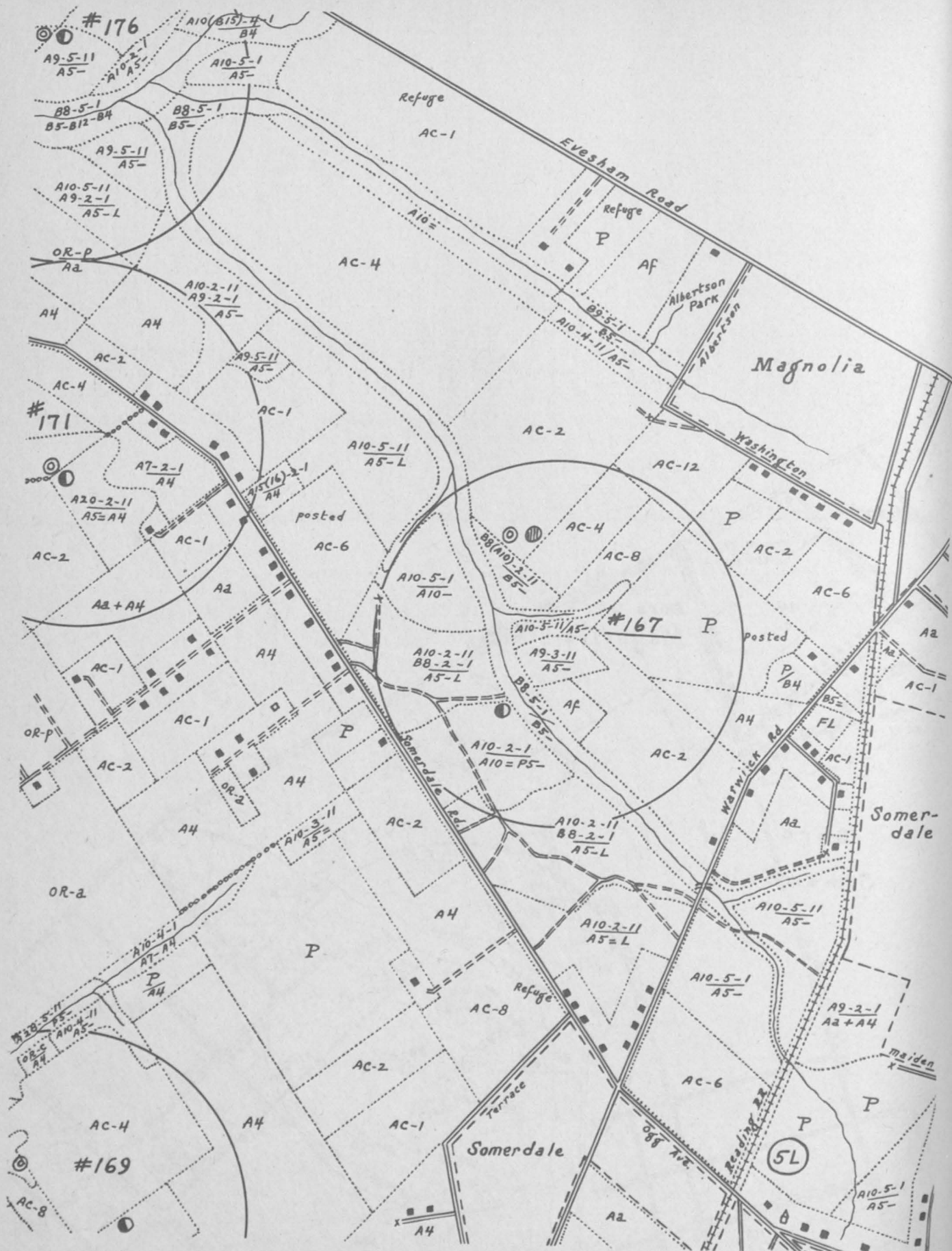


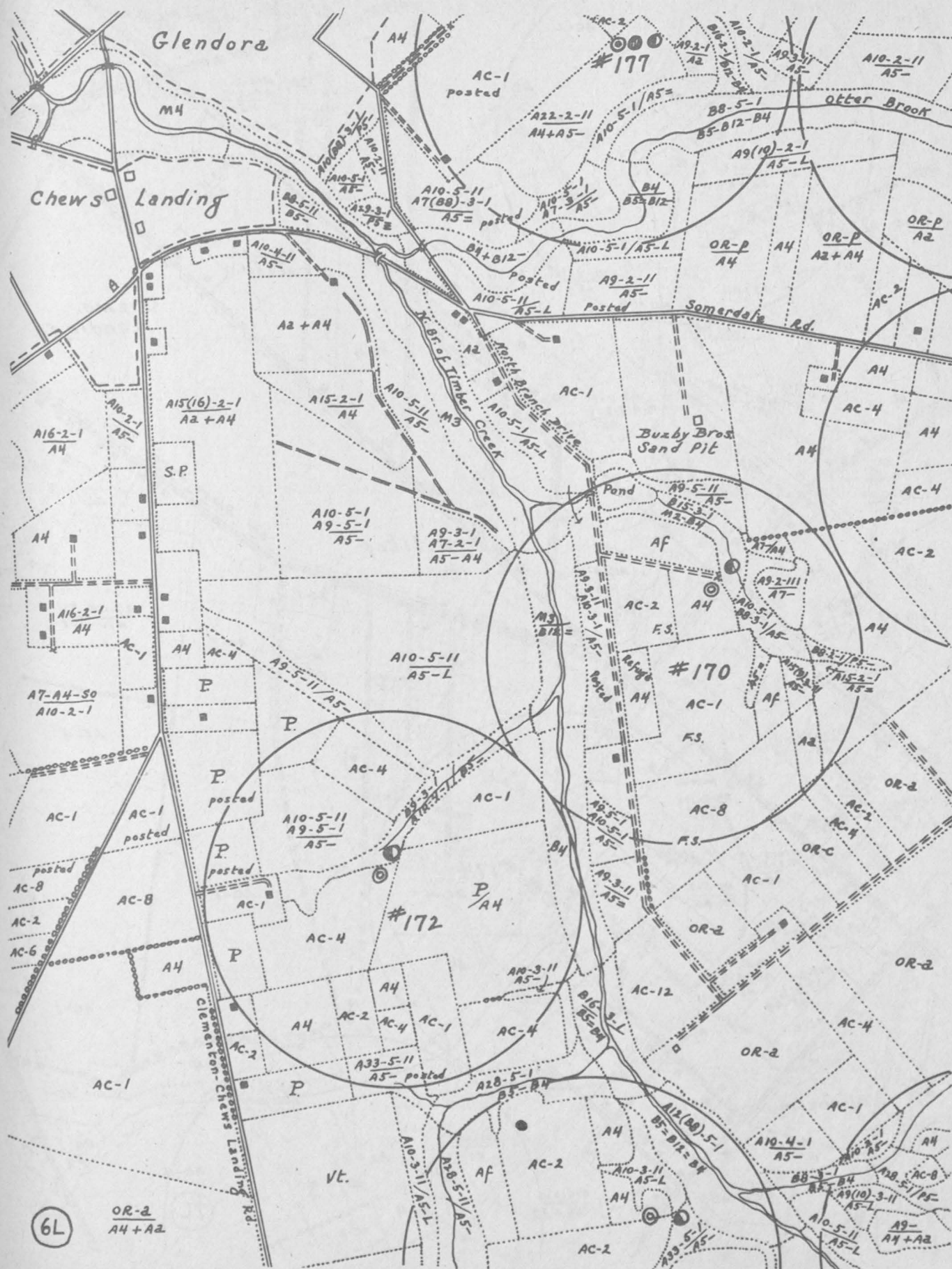


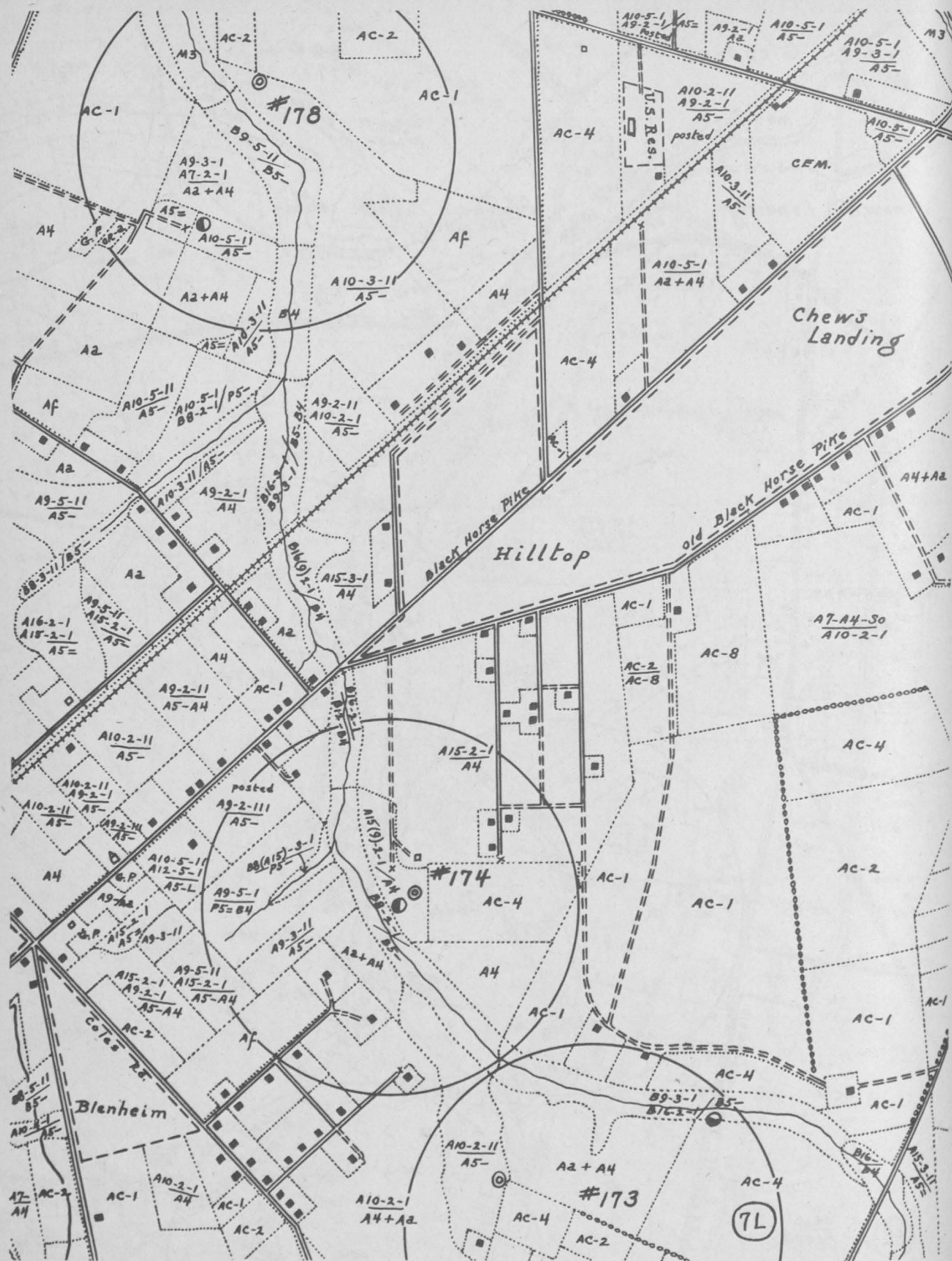












Gloucester County

South Br. of Big Timber Creek

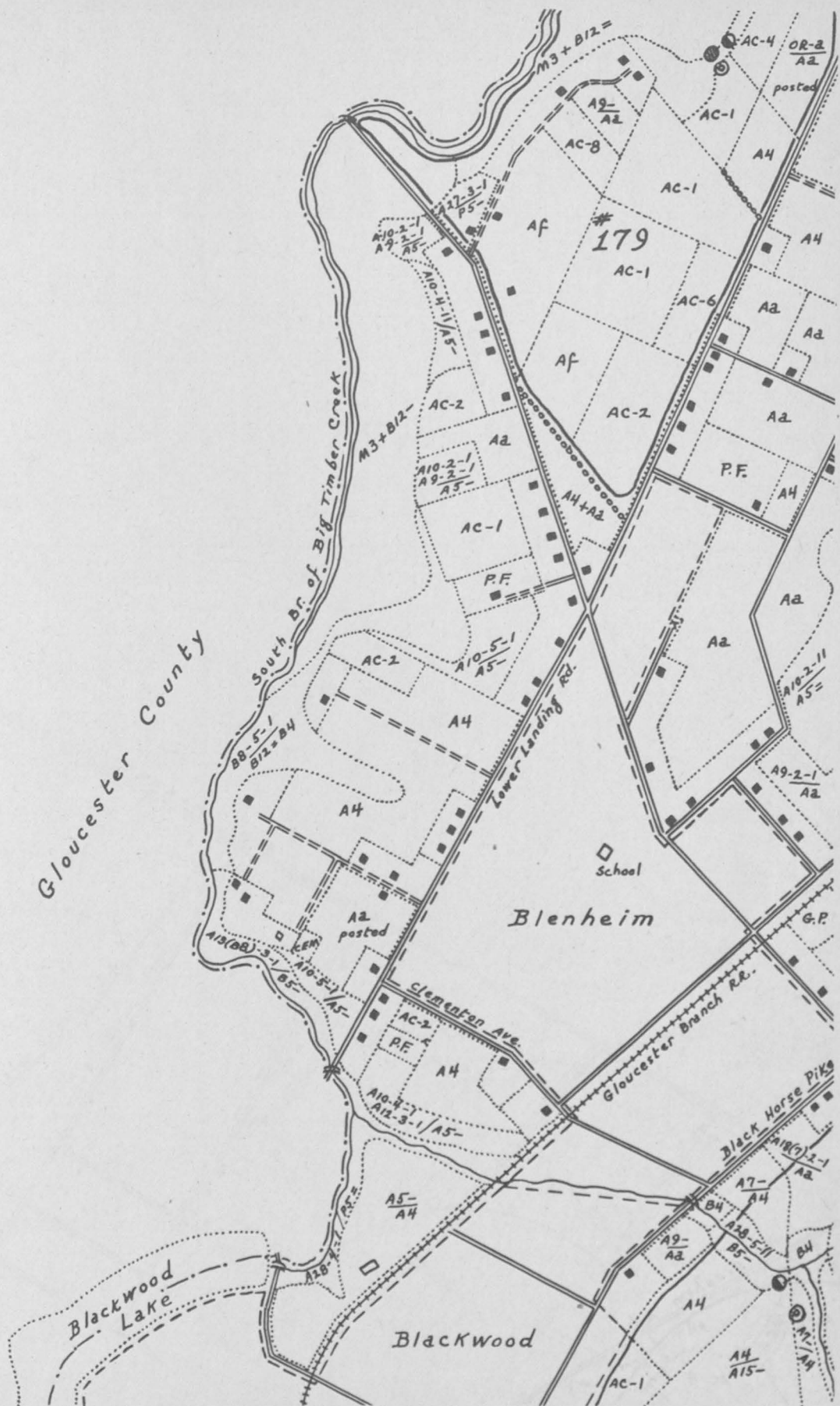
M3+B12=

179

Blenheim

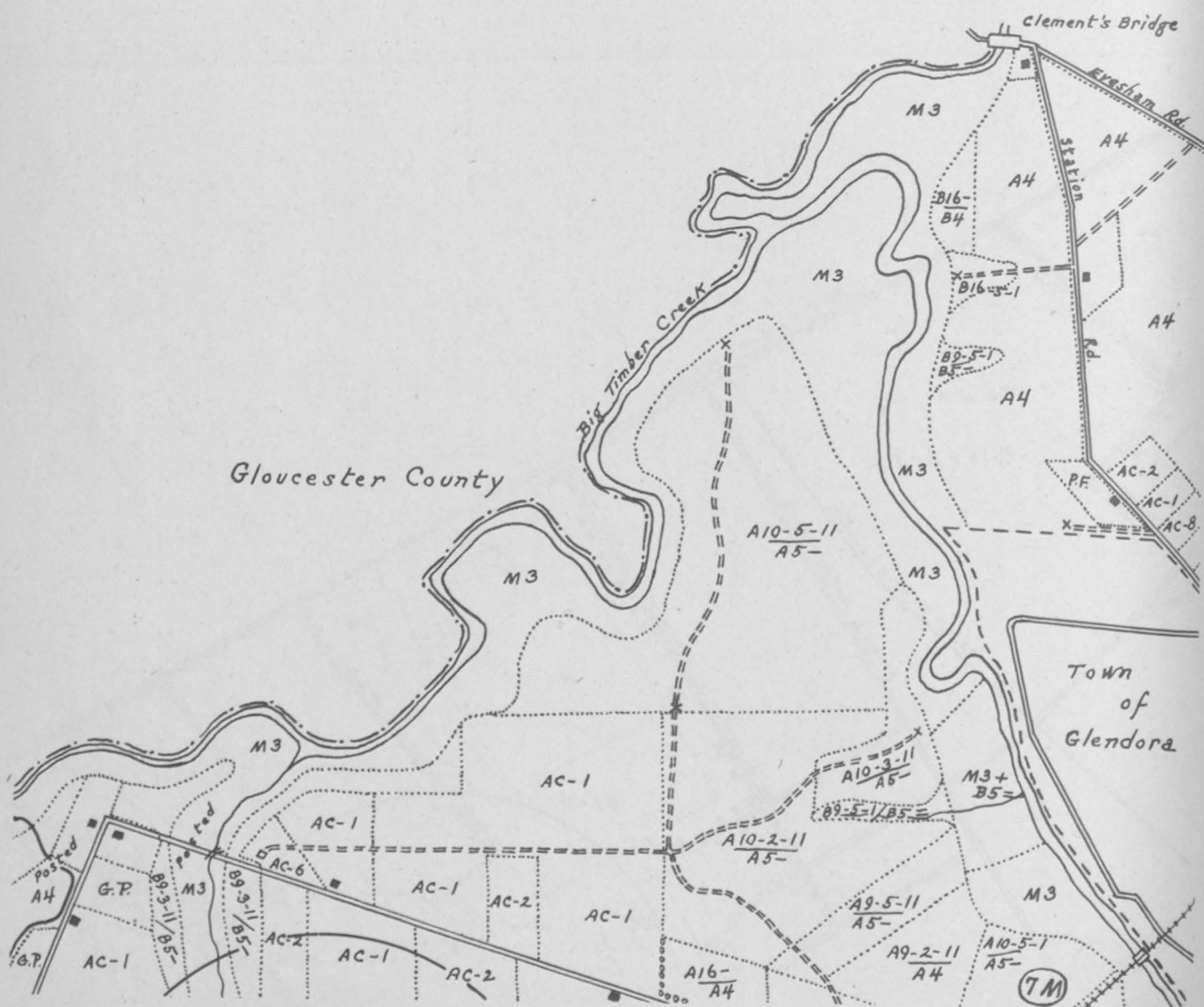
Blackwood

Blackwood Lake









8M

Gloucester County

South Br. of Big Timber Creek.
M3 + B12 =
A10-S-11/A5-
A4

Table 10
HABITAT CLASSIFICATION OF AMERICAN GAME SPECIES*

Species	Estimated composition of optimum range					
	Culti- vated land	Grass land	Brush land	Wood land	Marsh land	Water
	%	%	%	%	%	%
Bobwhite Quail	40	20	40	-	-	-
Cottontail Rabbit	40	20	40	-	-	-
Ring-necked Pheasant	40	10	25	-	25	-

* Data adapted from Transactions of the Seventeenth American Game Conference, p. 309, 1930.

This table was derived from Miller, J. P. and B. B. Powell, Game and Wild-Fur Production and Utilization on Agricultural Land. U.S. Dept. Agric. Circ. 636, p. 25.

Table 11

PERCENT OF EFFICIENCY OF EACH OF THE PRINCIPAL COVER TYPES
UTILIZED BY THE COTTONTAIL RABBIT, AS DETERMINED BY ACREAGE.

Acreage	Percent of Efficiency		
	Brush	Grass	Cultivated
40-36	* 33.3	33.3	* 33.3
35-31	28.8	33.3	28.8
30-26	24.7	33.3	24.7
25-21	20.6	33.3	20.6
20-16	16.5	* 33.3	16.5
15-11	12.3	24.7	12.3
10- 6	8.2	16.5	8.2
5- 0	4.1	8.2	4.1

* Optimum

Table 12

PERCENT OF EFFICIENCY OF EACH OF THE PRINCIPAL COVER TYPES
UTILIZED BY THE BOBWHITE QUAIL, AS DETERMINED BY ACREAGE.

Acreage	Percent of Efficiency		
	Brush	Grass	Cultivated
40-36	* 33.3	33.3	* 33.3
35-31	28.8	33.3	28.8
30-26	24.7	33.3	24.7
25-21	20.6	33.3	20.6
20-16	16.5	* 33.3	16.5
15-11	12.3	24.7	12.3
10- 6	8.2	16.5	8.2
5- 0	4.1	8.2	4.1

* Optimum

Table 13

PERCENT OF EFFICIENCY OF EACH OF THE PRINCIPAL COVER TYPES
UTILIZED BY THE RING-NECKED PHEASANT, AS DETERMINED BY ACREAGE.

Acreage	Percent of Efficiency			
	Brush	Grass	Marsh	Cultivated
40-36	25.	25.	25.	* 25.
35-31	25.	25.	25.	20.9
30-26	25.	25.	25.	16.7
25-21	* 25.	25.	* 25.	12.5
20-16	20.	25.	20.	10.
15-11	15.	25.	15.	7.5
10	10.	* 25.	10.	5.
9	9.	22.5	9.	4.5
8	8.	20.	8.	4.
7	7.	17.5	7.	3.5
6	6.	15.	6.	3.
5	5.	12.5	5.	2.5
4	4.	10.	4.	2.
3	3.	7.5	3.	1.5
2	2.	5.	2.	1.
1	1.	2.5	1.	.5

* Optimum

Table 14
CLASSIFICATION OF WILD GAME HABITATS BASED ON TOTAL
PERCENT OF EFFICIENCY OF THE PRINCIPAL COVER TYPES
WITHIN THE HABITAT AND UTILIZED BY FARM-GAME SPECIES

Evaluation Rating (total percent of efficiency of all cover types)	Classification of Habitat		
	Cottontail Rabbit	Bobwhite Quail	Ring-necked Pheasant
100-91	I	I	I
90-81	II	II	II
80-71	III	III	III
70-61	IV	IV	* -
60-51	V	* -	* -

* Areas having an evaluation rating less than those given a classification numeral are not considered desirable for distribution of that species of game.

Table I5' (con't)
EVALUATION RATINGS AND CLASSIFICATION OF WILD GAME HABITATS
IN SOUTHERN CAMDEN COUNTY

(b) - 42 -

Plot No.	Map No.	Cottontail Rabbits		Bobwhite Quail		Ring-necked Pheasants	
		* Rating	Class	* Rating	Class	* Rating	Class
49	5D-6D	53	V	-	-	-	-
50	6D-7D	74	III	74	III	-	-
51	7D	55	V	-	-	-	-
52	8D	66	IV	66	IV	-	-
53	7D-7E	74	III	74	III	-	-
54	7D-8D	87	II	87	II	-	-
55	2E-3E	66	IV	66	IV	-	-
56	2D-2E	66	IV	66	IV	-	-
57	3E	70	IV	70	IV	-	-
58	3D-3E	66	IV	66	IV	-	-
59	4E	78	III	78	III	-	-
60	3E-4E	65	IV	65	IV	-	-
61	4E-5E	83	II	83	II	-	-
62	4E-5E	70	IV	70	IV	-	-
63	5E	90	II	90	II	71	III
64	6D-6E	70	IV	70	IV	-	-
65	5E-6E	66	IV	66	IV	-	-
66	6E	74	III	74	III	-	-
67	6E-6F	62	IV	62	IV	-	-
68	5E-5F	74	III	74	III	-	-
69	6E-7E	74	III	74	III	71	III
70	6E-7E	74	III	74	III	-	-
71	7E	62	IV	62	IV	-	-
72	7E	87	II	87	II	-	-
73	7E-8E	72	III	72	III	-	-
74	8E	74	III	74	III	-	-
75	2F-3F	53	V	-	-	-	-
76	3F	66	IV	66	IV	-	-
77	3F-4F	66	IV	66	IV	-	-
78	4F	61	IV	61	IV	-	-
79	4F	78	III	78	III	-	-
80	5E-5F	58	V	-	-	-	-
81	5F	62	IV	62	IV	-	-
82	4F-5F	74	III	74	III	-	-
83	5F	66	IV	66	IV	-	-
84	5F-6F	74	III	74	III	-	-
85	6F	66	IV	66	IV	-	-
86	6F	62	IV	62	IV	-	-
87	7F	62	IV	62	IV	-	-
88	7F	66	IV	66	IV	-	-
89	8F	53	V	-	-	-	-
90	8F	83	II	83	II	-	-
91	8F	87	II	87	II	75	III
92	8E-9E	58	V	-	-	-	-
93	9F	78	III	78	III	-	-
94	9F	91	I	91	I	75	III
95	3G	70	IV	70	IV	-	-
96	4G-5G	70	IV	70	IV	-	-

Table 15 (con't)
EVALUATION RATINGS AND CLASSIFICATION OF WILD GAME HABITATS
IN SOUTHERN CAMDEN COUNTY

(c)

- 43 -

Plot No.	Map No.	Cottontail Rabbits		Bobwhite Quail		Ring-necked Pheasants	
		* Rating	Class	* Rating	Class	* Rating	Class
97	5G	70	IV	70	IV	-	-
98	5G	53	V	-	-	-	-
99	5G	70	IV	70	IV	-	-
100	5G	66	IV	66	IV	-	-
101	4G-5G	64	IV	64	IV	-	-
102	4G-4H	87	II	87	II	71	III
103	6G	70	IV	70	IV	-	-
104	6G	62	IV	62	IV	-	-
105	7G-8G	66	IV	66	IV	-	-
106	8F-8G	66	IV	66	IV	-	-
107	8G	87	II	87	II	-	-
108	7G	62	IV	62	IV	-	-
109	8G-9G	78	III	78	III	72	III
110	8G-9G	82	II	82	II	-	-
111	9F-9G	78	III	78	III	-	-
112	9F-9G	58	V	-	-	-	-
113	9G	57	V	-	-	-	-
114	9G	70	IV	70	IV	-	-
115	8G-8H	59	V	-	-	-	-
116	3H	66	IV	66	IV	-	-
117	2H	58	V	-	-	-	-
118	4H-5H	58	V	-	-	-	-
119	5H	66	IV	66	IV	-	-
120	5G -5H	66	IV	66	IV	-	-
121	6H	66	IV	66	IV	-	-
122	8G-8H	70	IV	70	IV	-	-
123	9G-9H	83	II	83	II	75	III
124	8H	91	I	91	I	-	-
125	9H	57	V	-	-	-	-
126	2I	74	III	74	III	-	-
127	2I	70	IV	70	IV	-	-
128	3H-4H	82	II	82	II	-	-
129	4I	58	V	-	-	-	-
130	4I	58	V	-	-	-	-
131	8I	66	IV	66	IV	-	-
132	7I-8I	53	V	-	-	-	-
133	8H-9H	78	III	78	III	-	-
	8I-9I						
134	9H	74	III	74	III	-	-
135	8H-9H	74	III	74	III	-	-
136	8I-9I	74	III	74	III	-	-
137	8I-9I	62	IV	62	IV	-	-
138	1J-1Ja	66	IV	66	IV	-	-
139	1J	53	V	-	-	-	-
140	1I-2I	58	V	-	-	-	-
	1J-2J						
141	4I-4J	74	III	74	III	-	-
142	3J	58	V	-	-	-	-
143	4J	70	IV	70	IV	-	-
144	6J	74	III	74	III	-	-

Table 15 (cont)
EVALUATION RATINGS AND CLASSIFICATION OF WILD GAME HABITATS
IN SOUTHERN CAMDEN COUNTY

(d) - 44 -

Plot No.	Map No.	Cottontail Rabbits		Bobwhite Quail		Ring-necked Pheasants	
		* Rating	Class	* Rating	Class	* Rating	Class
145	6J	66	IV	66	IV	-	-
146	7J	66	IV	66	IV	-	-
147	7J	78	III	78	III	-	-
148	7J	78	III	78	III	-	-
149	7J-8J	58	V	-	-	-	-
150	8J-9J	70	IV	70	IV	-	-
151	8I-9I	74	III	74	III	-	-
152	3K	62	IV	62	IV	-	-
153	3K	70	IV	70	IV	-	-
154	4K	58	V	-	-	-	-
155	4K	66	IV	66	IV	-	-
156	3J-4J	74	III	74	III	-	-
157	6K	57	V	-	-	-	-
158	6J-6K	74	III	74	III	-	-
159	6K	66	IV	66	IV	-	-
160	6K-7K	74	III	74	III	-	-
161	7J-7K	87	II	87	II	75	III
162	7K-8K	66	IV	66	IV	-	-
163	7J-8J	78	III	78	III	-	-
	7K-8K						
164	8J	62	IV	62	IV	-	-
165	8K	78	III	78	III	75	III
166	4L	70	IV	70	IV	-	-
167	5L	95	I	95	I	71	III
168	6K-6L	62	IV	62	IV	-	-
169	5K-6K	83	II	83	II	-	-
	5L-6L						
170	6L	70	IV	70	IV	-	-
171	5L-6L	70	IV	70	IV	-	-
172	6L	70	IV	70	IV	-	-
173	7K-7L	78	III	78	III	-	-
174	7L	70	IV	70	IV	-	-
175	7K-8K	74	III	74	III	-	-
	7L-8L						
176	5L-6L	74	III	74	III	-	-
	5M-6M						
177	6L-6M	91	I	91	I	75	III
178	7L-7M	70	IV	70	IV	-	-
179	8L	74	III	74	III	76	III
180	7H	74	III	74	III	-	-

* The evaluation rating represents the sum of the percents of efficiency of each of the principal cover types within the habitat, as listed in tables 11, 12, and 13.

Table 15
EVALUATION RATINGS AND CLASSIFICATION OF WILD GAME HABITATS
IN SOUTHERN CAMDEN COUNTY

(a)

- 45 -

Plot No.	Map No.	Cottontail rabbit		Bobwhite quail		Ring-necked pheasant	
		* Rating	Class	* Rating	Class	* Rating	Class
1	3A	74	III	74	III	-	-
2	3A	57	V	-	-	-	-
3	4A	74	III	74	III	-	-
4	4A-5A	83	II	83	II	-	-
5	5A	82	II	82	II	-	-
6	6A-7A	87	II	87	II	75	III
7	6A-7A	61	IV	61	IV	-	-
8	7A	57	V	-	-	-	-
9	8A	74	III	74	III	-	-
10	8A-9A	62	IV	62	IV	-	-
11	9A	78	III	78	III	-	-
12	4B-5B	66	IV	66	IV	-	-
13	4B	62	IV	62	IV	-	-
14	4B-5B	78	III	78	III	71	III
15	5B	62	IV	62	IV	-	-
16	6B	78	III	78	III	75	III
17	7A-7B	58	V	-	-	-	-
18	7B	74	III	74	III	-	-
19	8A	57	V	-	-	-	-
20	8A-8B	87	II	87	II	-	-
21	3C-4C	78	III	78	III	72	III
22	3C-4C	90	II	90	II	71	III
23	5C	78	III	78	III	-	-
24	5C	66	IV	66	IV	-	-
25	6C	74	III	74	III	-	-
26	5C-6C	66	IV	66	IV	-	-
27	6C	63	IV	63	IV	-	-
28	6B-6C	78	III	78	III	-	-
29	6C	87	II	87	II	-	-
30	7C	53	V	-	-	-	-
31	6C-7C	66	IV	66	IV	-	-
32	7B-8B	86	II	86	II	71	III
33	7C-8C	87	II	87	II	-	-
34	8C	82	II	82	II	-	-
35	8B	74	III	74	III	-	-
36	5B	57	V	-	-	-	-
37	2D	91	I	91	I	-	-
38	4C	70	IV	70	IV	-	-
39	4D	74	III	74	III	75	III
40	4D	82	II	82	II	-	-
41	4D	64	IV	64	IV	-	-
42	5D	65	IV	65	IV	-	-
43	5D	72	III	72	III	-	-
44	5C-6C	74	III	74	III	-	-
	5D-6D						
45	6D	62	IV	62	IV	-	-
46	6D	62	IV	62	IV	-	-
47	5D-6D	87	II	87	II	-	-
48	6C-6D	65	IV	65	IV	-	-

Table 16
NUMBER AND PERCENTAGE OF WILD GAME HABITATS IN EACH CLASSIFICATION

Cottontail rabbits and Bobwhite quail			Ring-necked pheasants		
Class	Number of habitats	Per cent	Class	Number of habitats	Per cent
I	5	2.7	I	0	0
II	24	13.3	II	0	0
III	50	27.7	III	19	10.5
IV	73	40.5	IV	-	-
* V	28	15.5	V	-	-
Total-	180	99.7	Total-	19	10.5

* Fifth class (V) includes rabbits only.

Table 17
DISTRIBUTION AND PERCENTAGE OF WILD GAME HABITATS BY CLASSES

Cottontail rabbit and Bobwhite quail habitats.					
* North of Berlin			South of Berlin		
Class	No. of habitats	Per cent	Class	No. of habitats	Per cent
I	3	1.6	I	2	1.1
II	7	3.9	II	17	9.4
III	22	12.2	III	28	15.5
IV	38	21.1	IV	35	19.4
V	16	8.9	V	12	6.6
Total-	86	47.7	Total-	94	52.

Ring-necked pheasant habitats					
Class	No. of habitats	Per cent	Class	No. of habitats	Per cent
I	0	0	I	0	0
II	0	0	II	0	0
III	8	4.4	III	11	6.1
Total-	8	4.4	Total-	11	6.1

* Berlin (Taunton Rd.) is an approximate division line between the northern and southern portions of the study area.

LITERATURE CITED

1. BOYER, CHARLES S. 1931. Early Forges and Furnaces in New Jersey. Philadelphia: University of Pennsylvania Press.
2. COOK, GEORGE H. 1868. Geology of New Jersey. 449 p. Newark.
3. HALL, WILLIAM L. and HU MAXWELL. 1911. Uses of Commercial Woods of the United States. I. U. S. For. Ser. Bul. 95: 13.
4. HARSHBERGER, JOHN W. 1916. The Vegetation of the New Jersey Pine-Barrens. 329 p., 284 fig. Philadelphia: Christopher Sower Company.
5. HESTON, ALFRED M. 1924. South Jersey. A History. Vol. 1. 516 p. New York: Lewis Historical Publishing Company, Inc.
6. MILLER, J. PAUL and BURWELL B. POWELL. 1942. Game and Wild-Fur Production and Utilization on Agricultural Land. U. S. Dept. of Agric. Circular 636, 1-58.
7. NEW JERSEY BOARD OF FISH AND GAME COMMISSIONERS. 1937. The Outdoor Heritage of New Jersey. 82 p. Trenton.
8. RHOADS, SAMUEL N. 1903. The Mammals of Pennsylvania and New Jersey. 266 p., 9 pl. Philadelphia.
9. STATE SOIL CONSERVATION COMMITTEE, NEW JERSEY. 1939. Trees and Shrubs as Soil Savers. Bul. 4. New Brunswick.
10. STONE, WITMER. 1911. The Plants of Southern New Jersey with Especial Reference to the Flora of the Pine Barrens and the Geographic Distribution of the Species. New Jersey State Museum Annual Report of 1910. 828 p., 129 pl. Trenton.
11. WEAVER, JOHN E. and FREDERICK E. CLEMENTS. 1938. Plant Ecology. 2nd ed., xxii-801 p., 271 fig. New York: McGraw-Hill Book Company.
12. WIGHT, HOWARD M. 1938. Field and Laboratory Technic in Wildlife Management. viii-107 p., 34 fig. Ann Arbor: University of Michigan Press.
13. WOOD, O. M. 1938. Seedling Reproduction of Oak in Southern New Jersey. Ecology 19: 2.

