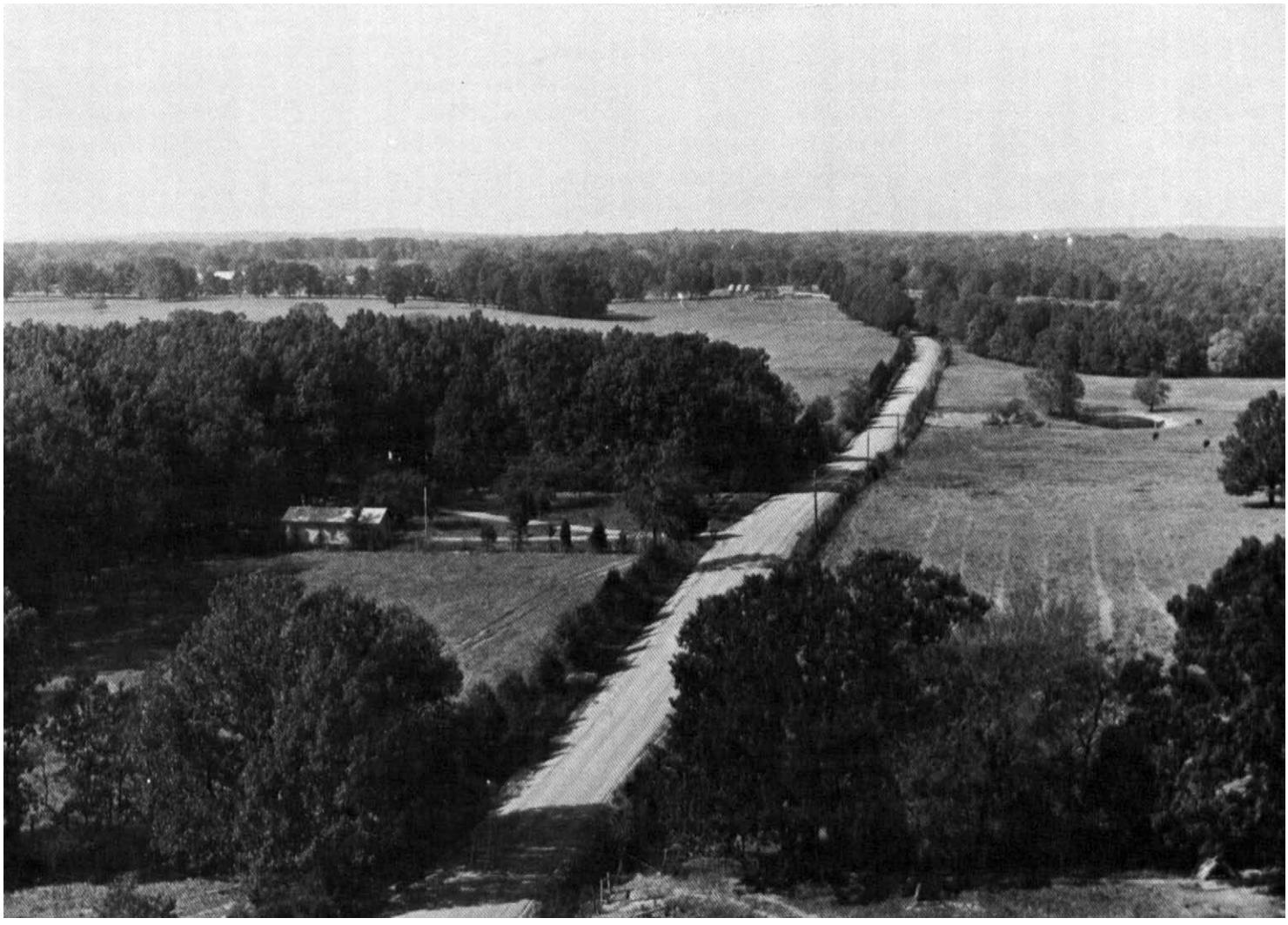
United States Department of Agriculture

Soil Conservation Service

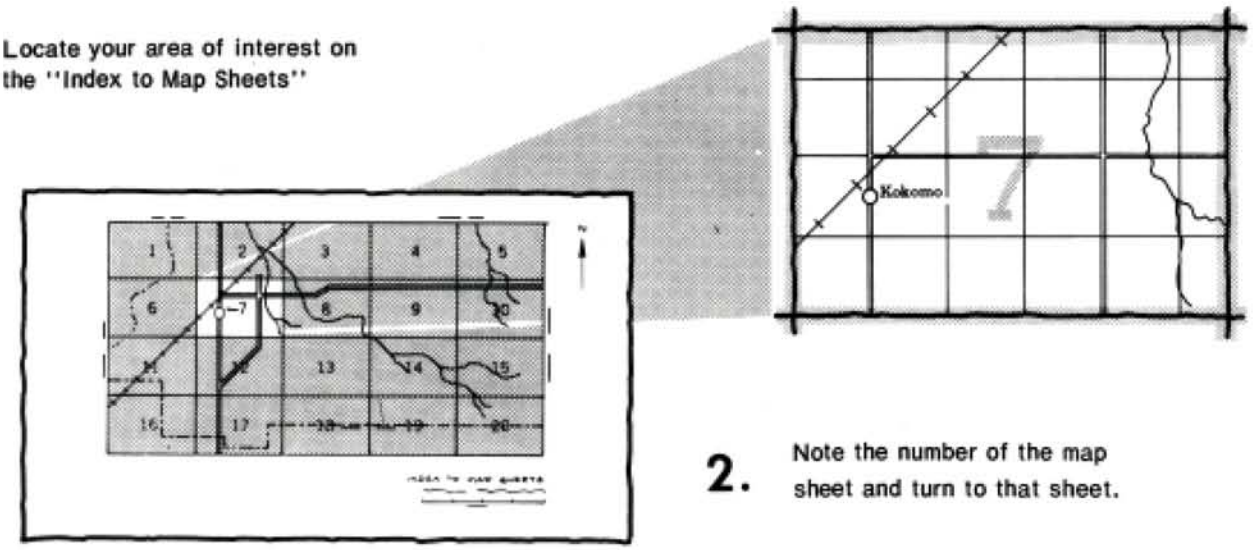
In cooperation with Arkansas Agricultural Experiment Station

Soil Survey of Sharp County Arkansas



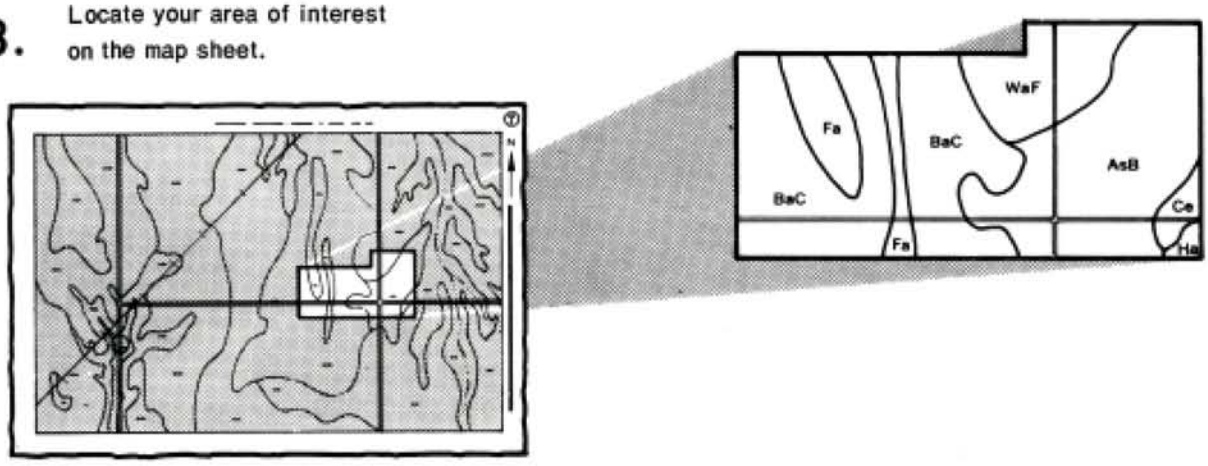
HOW TO USE

1. Locate your area of interest on the "Index to Map Sheets"

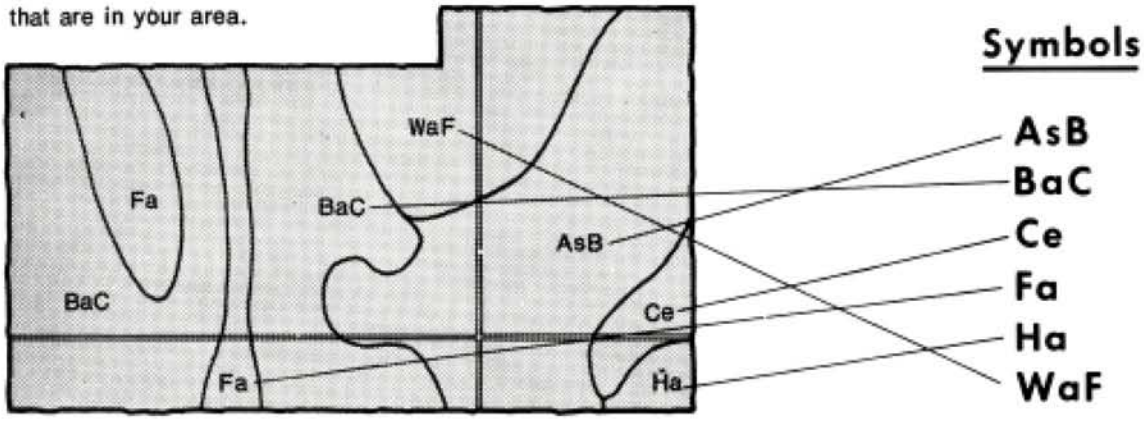


2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.

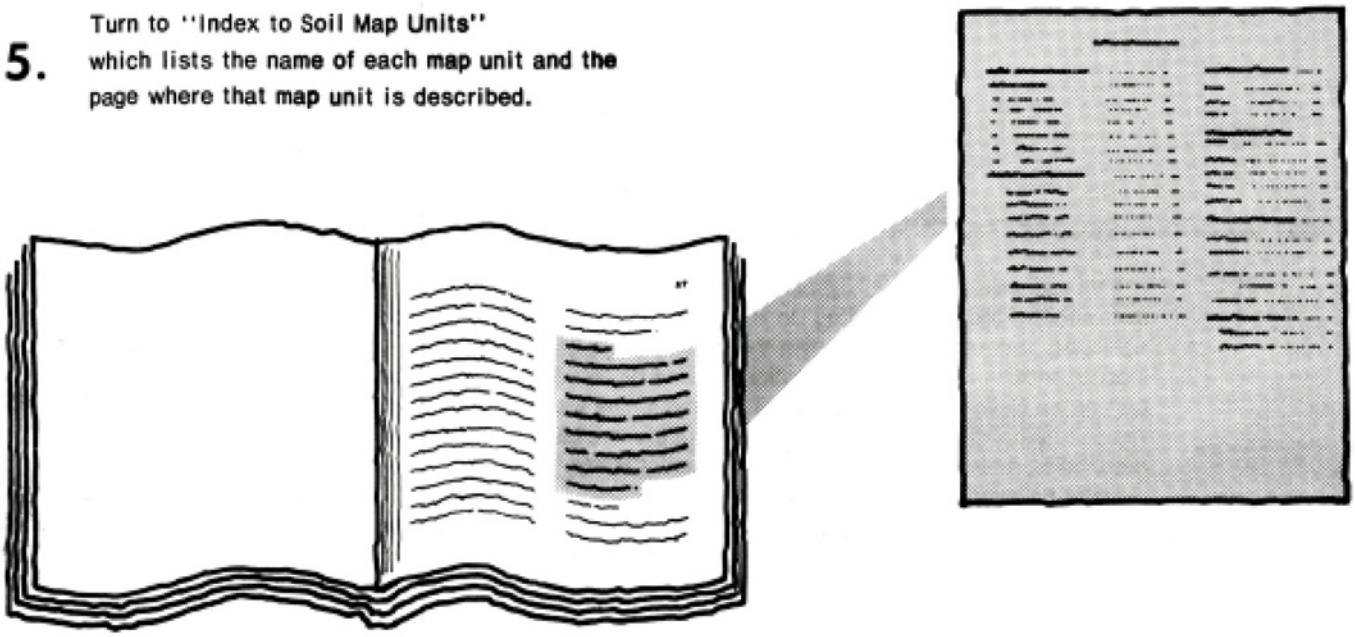


4. List the map unit symbols that are in your area.

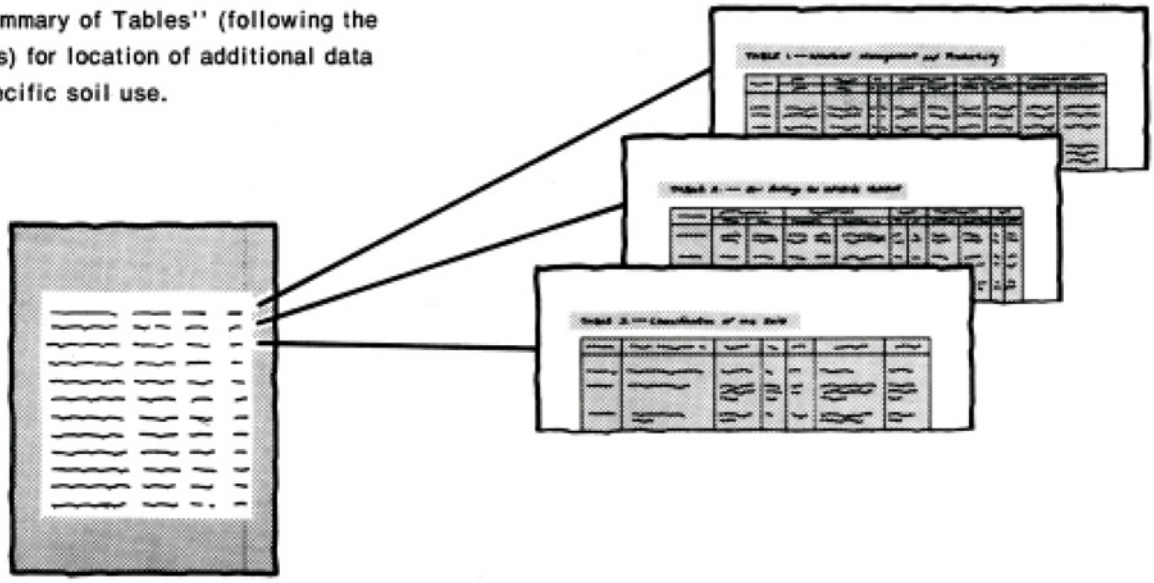


THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in 1981. Soil names and descriptions were approved in 1982. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1982. This survey was made by the Soil Conservation Service in cooperation with the Arkansas Agricultural Experiment Station. It is part of the technical assistance furnished to the Sharp County Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Woodland and pasture make up a typical landscape in Sharp County. The soil in the area shown is Captina silt loam, 2 to 6 percent slopes. It is moderately suited to use as woodland and well suited to use as pasture.

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Soil Series

Issued September 1984

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Summary of Tables

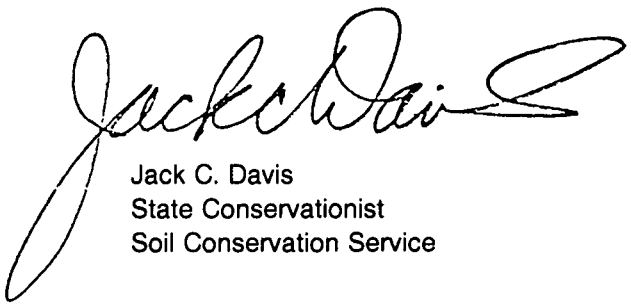
Foreword

This soil survey contains information that can be used in land-planning programs in Sharp County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

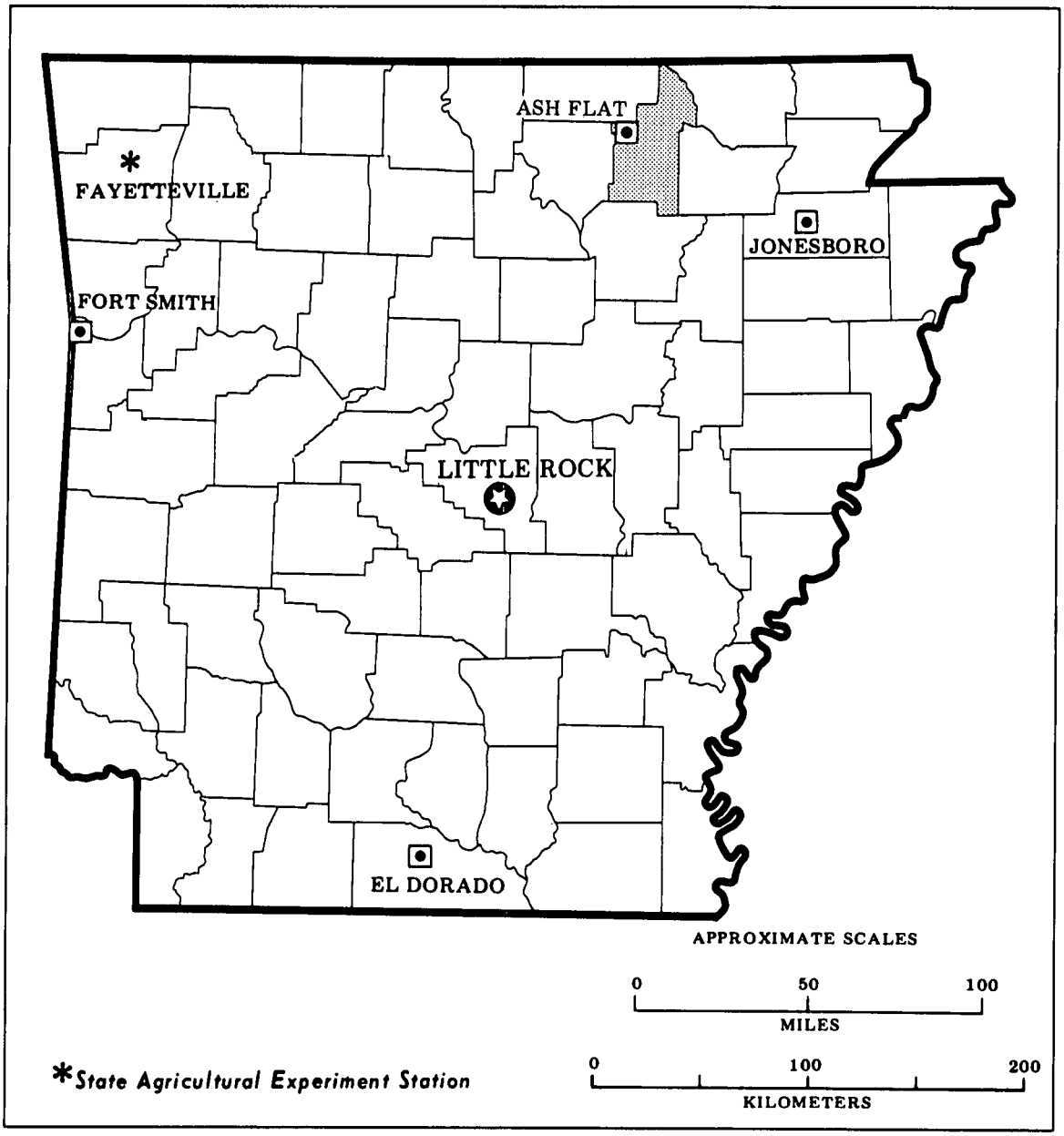
This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.



Jack C. Davis
State Conservationist
Soil Conservation Service



Location of Sharp County in Arkansas.

Soil Survey of
Sharp County, Arkansas

By Dick V. Ferguson, Clarence E. McFadden, and James H. Brown,
Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service
In cooperation with Arkansas Agricultural Experiment Station

SHARP COUNTY is in the northern part of Arkansas. The county is bounded on the east by Randolph and Lawrence Counties, on the south by Independence County, on the west by Izard and Fulton Counties, and on the north by the state of Missouri. According to the U.S. Census, the approximate land area is 387,929 acres, or 606 square miles. The total area, including bodies of water, is 388,429 acres, or 607 square miles. The county ranges in width from about 2 1/2 to 20 miles, and its maximum length is about 41 miles.

In 1980, the population of the county was about 14,607. The population of Ash Flat, the county seat, was 525, and that of Hardy, one of the main trade centers, was 826. The population of Cherokee Village was 3,255, and that of Cave City was 1,405. The economy of the county is based on raising livestock and on woodland farming. Except for the tourist trade and retirement villages, most businesses provide farm services.

Sharp County lies entirely within the Salem and Springfield Plateaus of the Ozark Highlands. The topography is gently rolling to hilly except for nearly vertical bluffs that in some places flank major drainageways (fig. 1). Many V-shaped hollows separating sharp ridges and undulating plateaus converge upon creeks that generally empty into the Spring or Strawberry Rivers. The rivers, which flow in an easterly direction, carry about 90 percent of the watershed. The elevation ranges from about 240 feet on the Strawberry River at the eastern county line to about 960 feet near Pleasant Ridge Church and Cemetery, about one-half mile south of the Arkansas-Missouri line.

Most of the county is too steep or too stony for intensive crop use. Consequently, woodland is the main use. A small acreage in the county is cropland, and that acreage is confined largely to the undulating plateaus and stream bottom lands or terraces, even though erosion on the plateaus and flooding on the bottom lands are moderate to severe hazards. The cropland is used mainly for the production of feed and forage for livestock.

General Nature of the Survey Area

This section discusses climate, farming and physiography and drainage. Statistics in the discussion of farming are from the 1978 Census of Agriculture.

Climate

Prepared by the National Climatic Center, Asheville, North Carolina.

In Sharp County in winter, the higher elevations are cold and snowy. The valleys also frequently are cold, but intermittent thaws preclude a long-lasting snow cover. In summer, the mountain slopes are fairly warm, and the valleys are very warm and occasionally very hot. Rainfall is evenly distributed throughout the year, but it is appreciably heavier on windward, west-facing slopes than in valleys. The normal annual precipitation is adequate for all crops, although in summer the temperature and the length of the growing season, particularly at higher elevations, may be inadequate.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Evening Shade in the period 1964 to 1969. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 39 degrees F, and the average daily minimum temperature is 26 degrees. The lowest temperature on record, which occurred at Evening Shade on January 9, 1970, is -5 degrees. In summer the average temperature is 77

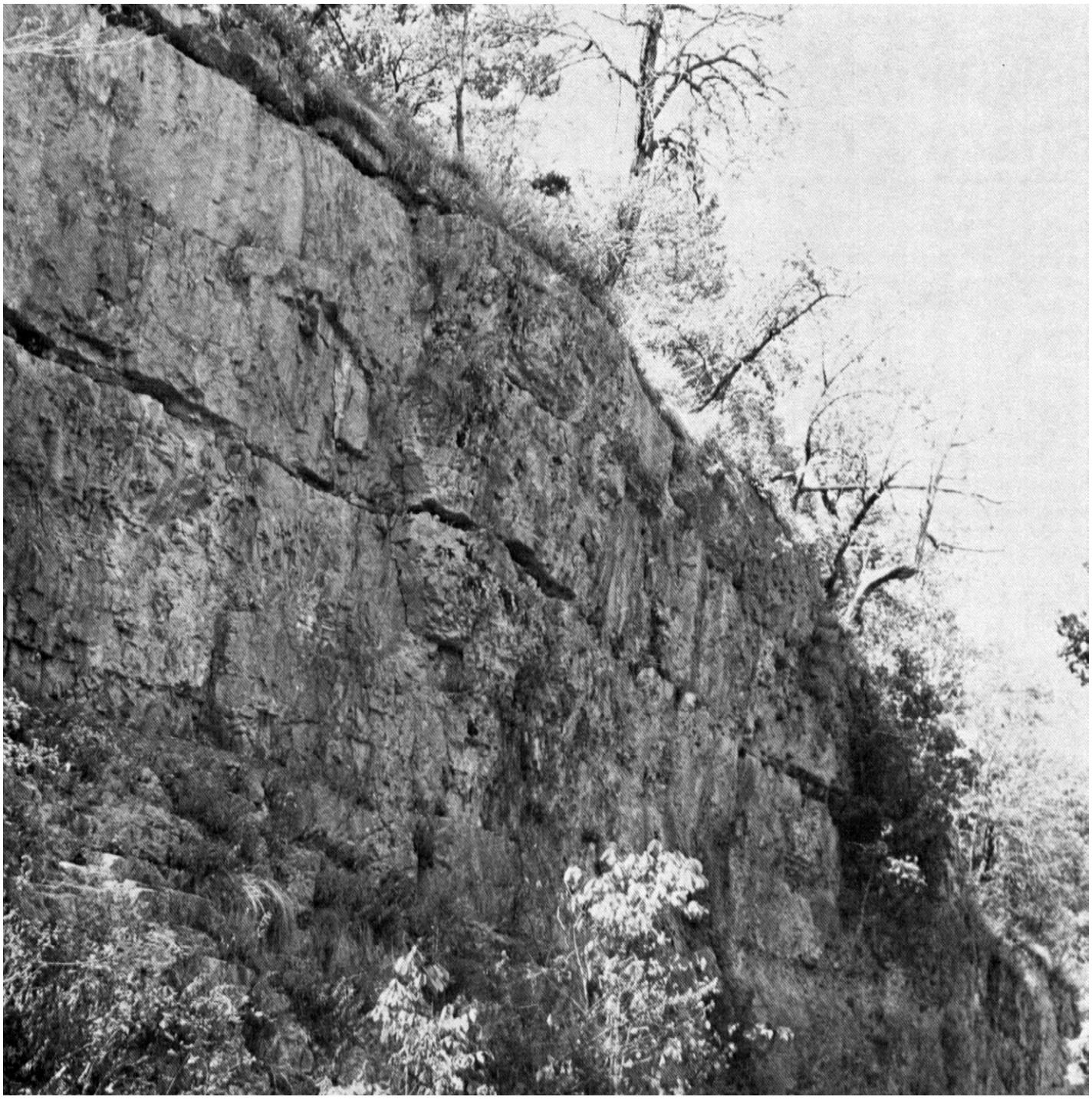


Figure 1.—Vertical bluff of massive dolomite and limestone along the Spring River. Arkana, Moko, and Gepp soils are the major soils above the bluff.

degrees, and the average daily maximum temperature is 90 degrees. The highest recorded temperature, which occurred on July 15, 1966, is 113 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average

temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

Of the total annual precipitation, 25 inches, or 50 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 20 inches. The heaviest 1-day rainfall during the period of record was 4.5 inches at Evening Shade on August 20, 1978. Thunderstorms occur on about 50 days each year, and most occur in summer.

The average seasonal snowfall is 10 inches. The greatest snow depth at any one time during the period of record was 4 inches. On an average, there are no days with at least 1 inch of snow on the ground, but the number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 50 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 75 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 11 miles per hour, in late winter and early spring.

Heavy rains, which occur at any time of the year, and severe thunderstorms in summer sometimes cause flash flooding, particularly in narrow valleys.

Farming

Farming in Sharp County is confined largely to undulating plateaus and to bottom lands or terraces along streams. The cropland is used mainly for the production of feed and forage for livestock. The rest of the county is too steep or too stony for intensive crop use. These areas are woodland.

Farming, nevertheless, continues to be the principal means of livelihood, but farm operations have become more diversified. As machinery has replaced livestock as a source of power, corn and other feed crops have declined in importance in the county.

Pasture and hay for forage have replaced cotton. Beef cattle, dairy cattle, swine, and chickens are the source of most farm income. Timber also is important, and truck crops are grown on some livestock farms to supplement income.

Most of the soils on bottom lands along the Strawberry and Spring Rivers are subject to flooding in winter and in spring. Thus, they are used for warm-season crops. Most of the soils on bottom lands contain moderate to high amounts of plant nutrients. The soils are level, except for those on a few high, undulating, nearly continuous bands of natural levees that are parallel to the Strawberry and Spring Rivers. On the level soils, drainage is slow, and wetness is the main limitation to use of the soils for crops.

Farms in Sharp County are increasing in number but are decreasing in size. Between 1974 and 1978 the number of farms increased from 537 to 585, and the average size of a farm decreased from 348 to 316 acres.

Livestock in the county generally is of good grade. According to the U.S. Census of Agriculture, the number and principal kinds of livestock and poultry in 1974 and 1978 were as follows:

	1974	1978
Cattle and calves	23,905	23,859
Milk cows	293	489
Hogs and pigs	6,307	10,751
Chickens, broilers	333,092	893,500

Physiography and Drainage

The geological deposits or formations at the surface in Sharp County are residuum of sedimentary rock and alluvium.

In the area generally north of the Strawberry River the sedimentary rock consists of limestone, chert, and siltstone. The landscape is characterized by deep hollows and high ridges (fig. 2). The slope ranges from 3 to 40 percent. Most of this area is capped by very cherty material. The major soils are the Clarksville, Gassville, Gepp, and Doniphan soils.

The Moko, Arkana, and Ventris soils are in areas where limestone is shallow to moderately deep. The Captina soils are on the gently sloping and slightly depressed uplands and on terraces along streams.

The Hontas, Razort, Sturkie, and Wideman soils are on bottom lands along streams. The Peridge soils are on the adjacent terraces.

In the area generally south of the Strawberry River the sedimentary rock is primarily sandstone; in small areas it is limestone and chert. The landscape is somewhat more rolling, smoother, and more rounded than the landscape north of the Strawberry River. The major soils are the Boden, Brockwell, Lily, Portia, and Ramsey soils.

The Spring River and Martin's Creek drain the northern part of the county. North Big Creek, Piney Fork, and the Strawberry River drain the central part, and South Big Creek, Reed's Creek, Sullivan Creek, and Sidney Creek drain the southern part.

Figure 2.—Deep hollows and high ridges in an area north of the Strawberry River. Gepp very cherty silt loam on slopes ranging from 3 to 40 percent is the major soil in the area.

Throughout the county, ground water is insufficient for use on a large scale. The most productive aquifers in the county are in the Boone Formation, Cotter Dolomite, and Gunter Member. They have water yields of less than 500 gallons per minute, and could not support heavy use from wells. Domestic water is supplied mainly from drilled wells, dug wells, and ponds. Drilled wells are the most dependable source of drinkable water, although Cave City, Cherokee Village, and Evening Shade have good sources from springs. In most places the water is hard. Most wells are less than 200 feet deep, but some are as much as 500 to 1,100 feet deep. Ponds and streams are the main source of water for livestock.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biologic activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship,

are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, acidity, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed, and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Each map unit is rated for *cultivated crops, pasture crops, woodland, and urban uses. Cultivated crops are those grown extensively in the survey area. Pasture crops are those grown in the production of livestock forage. Woodland refers to areas of native or introduced trees. Urban uses include residential, commercial, and industrial developments.*

Soil Descriptions

Areas dominated by deep, moderately deep, and shallow, gently sloping to steep, loamy, cherty, very cherty, stony, and very stony soils; on uplands

The soils in this group make up about 63 percent of Sharp County. They are in the northern and central parts of the county and in small areas along the Izard County line. The soils formed in residuum of cherty limestone, siltstone, and sandstone on the Salem Plateau.

1. Gepp-Doniphan

Well drained, gently sloping to steep, deep, very cherty and cherty soils

The soils making up this map unit are mainly in the northern two-thirds of the county. They formed in clayey residuum of clayey shale or cherty limestone. Natural drainageways are mainly fast-flowing, intermittent streams and a few perennial streams. The landscape consists of narrow valleys and adjacent moderately steep and steep hillsides and gently sloping to moderately sloping ridgetops, benches, and ridges.

This map unit makes up about 47 percent of the county. It is about 65 percent Gepp soils, 10 percent Doniphan soils, and 25 percent soils of minor extent.

Gepp soils are deep and are gently sloping to steep. They are on hilltops and hillsides. The surface layer is dark brown very cherty silt loam. The subsurface layer is yellowish brown very cherty silt loam. The subsoil is yellowish red cherty silty clay loam, red clay, and mottled, red clay.

Doniphan soils are deep and are gently sloping to moderately sloping. They are on hillsides and narrow ridgetops. The surface layer is brown cherty silt loam. The subsurface layer is light yellowish brown cherty silt loam. The subsoil is strong brown, mottled red and yellowish brown, and variegated red, yellow, and gray clay.

The soils of minor extent are the moderately well drained Captina soils on uplands or stream terraces, the somewhat excessively drained Clarksville soils on hillsides and narrow hilltops, the well drained Gassville soils on hilltops and hillsides, the moderately well drained Ventris soils on foot slopes, the well drained Arkana soils on limestone ridges and side slopes, the well drained Moko soils on benches and ridgetops, and small areas of soils that have stones on the surface.

The soils making up this unit are used mainly as woodland. Some of the less sloping soils are used as pasture.

The soils are moderately suited to not suited to cultivated crops and are well suited to poorly suited to pasture. Steep slope, the severe or very severe hazard of erosion, and the cherty surface layer are the main limitations.

These soils are well suited to use as woodland, except in the steeper areas where slope is a limitation.

These soils are moderately suited to poorly suited to most urban uses. Moderate permeability, the shrink-swell potential, and slope are the main limitations. Most of these limitations can be overcome by proper engineering design and construction techniques.

2. Doniphan-Gepp-Captina

Well drained and moderately well drained, gently sloping to moderately sloping, deep, loamy, cherty, and very cherty soils

The soils making up this map unit are mainly in the northern part of the county. They formed in loamy and clayey residuum of cherty limestone, siltstone, and clayey shale. Natural drainageways are mainly fast-flowing, intermittent streams.

This map unit makes up about 10 percent of the county. It is about 40 percent Doniphan soils, 30 percent Gepp soils, 18 percent Captina soils, and 12 percent soils of minor extent.

Doniphan soils are deep and are gently sloping to moderately sloping. They are on hillsides and narrow ridgetops. The surface layer is brown cherty silt loam. The subsurface layer is light yellowish brown cherty silt loam. The subsoil is strong brown, mottled red and yellowish brown, and variegated red, yellow, and gray clay.

Gepp soils are deep and are gently sloping to moderately sloping. They are on hilltops and hillsides. The surface layer is dark brown very cherty silt loam. The subsurface layer is yellowish brown very cherty silt loam. The subsoil is yellowish red cherty silty clay loam, red clay, and mottled, red clay.

Captina soils are deep and are gently sloping. They are on uplands. The surface layer is brown silt loam. The upper part of the subsoil is mottled, strong brown and yellowish brown, silty clay loam. The lower part is a compact, brittle fragipan of mottled, yellowish brown, silty clay loam and mottled silt loam.

The soils of minor extent are the somewhat excessively drained Clarksville soils on hillsides and narrow hilltops, the well drained Gassville soils on hilltops and hillsides, the well drained Arkana soils on limestone ridges and side slopes, and the well drained Moko soils on benches and ridgetops.

The soils making up this map unit are used mainly as pasture. In the less sloping areas a small acreage is used for cultivated crops.

These soils are moderately suited to poorly suited to cultivated crops. The severe or very severe hazard of erosion, slope, and in some areas the many chert fragments on the surface are the main limitations.

These soils are well suited to moderately suited to pasture. The hazard of erosion and, in some areas, chert fragments on the surface are the main limitations.

The soils are well suited to moderately suited to use as woodland. There are no significant limitations.

Doniphan and Gepp soils are moderately suited to most urban uses. The moderate permeability, the shrink-swell potential, and slope are the main limitations. Most of the limitations can be overcome by proper engineering design and construction techniques. Captina soils are moderately suited to most urban uses. Slope, the slow permeability, and wetness are the main limitations. These limitations generally can be overcome by special design and construction techniques.

3. Boden-Gassville

Well drained, gently sloping to moderately steep, deep to moderately deep, stony and cherty soils

The soils making up this map unit are mainly in the west-central part of the county, bordering Fulton and Izard Counties. The soils formed in residuum over sandstone, cherty limestone, siltstone, and shale. Natural drainageways are mainly fast-flowing, intermittent streams.

This map unit makes up about 3 percent of the county. It is about 55 percent Boden soils, 40 percent Gassville soils, and 5 percent soils of minor extent.

Boden soils are deep and are gently sloping to moderately steep. They are on hilltops and hillsides. The surface layer is dark grayish brown stony fine sandy loam. The subsurface layer is yellowish brown stony fine sandy loam. The subsoil is yellowish red stony sandy clay loam and mottled, red sandy clay and sandy clay loam. The underlying material is mottled, red sandy loam. Below that, there is sandstone bedrock.

Gassville soils are deep to moderately deep and are gently sloping to moderately steep. They are on hilltops and hillsides. The surface layer is brown cherty silt loam. The subsurface layer is light yellowish brown cherty silt loam. The subsoil is mottled, yellowish red cherty silty clay, red clay, and mottled, red clay. The underlying material is mottled red, brownish yellow, and gray cherty silty clay. Below that, there is siltstone bedrock.

The soils of minor extent are the moderately well drained Captina soils on gently sloping uplands, the well drained Gepp soils on gently sloping to moderately sloping uplands, the well drained Peridge soils on broad uplands and stream terraces, the well drained Portia soils on gently sloping to moderately sloping uplands, and the well drained Arkana and Moko soils on gently sloping to moderately sloping limestone ridges and side slopes.

The soils making up this map unit are used mainly as pasture.

In most areas these soils are poorly suited or are not suited to cultivated crops and are well suited to poorly suited to use as pasture. The very severe hazard of erosion, slope, and chert and stones on the surface are the main limitations.

These soils are moderately suited to use as woodland. Stones are a main limitation on Boden soils.

These soils are moderately suited to poorly suited to most urban uses. The moderately slow and very slow permeability, slope, and the shrink-swell potential are limitations. Low strength is a limitation for local roads and streets.

4. Arkana-Moko

Well drained, gently sloping to moderately steep, moderately deep and shallow, cherty and very stony soils

The soils making up this map unit are mainly in the west-central part of the county along the Izard County line. The soils formed in clayey and thin loamy residuum of cherty limestone. Natural drainageways are mainly fast-flowing, intermittent streams.

This map unit makes up about 2 percent of the county. It is about 45 percent Arkana soils, 40 percent Moko soils, and 15 percent soils of minor extent.

Arkana soils are moderately deep and are gently sloping to moderately sloping. They are on ridges and hillsides. The surface layer is very dark grayish brown cherty silt loam. The subsurface layer is dark brown cherty silt loam. The subsoil is yellowish red cherty silty clay loam, red cherty clay, and mottled, red cherty clay. Below that, there is limestone bedrock.

Moko soils are shallow and are gently sloping to moderately steep. They are on benches and ridgetops. The surface layer is very dark grayish brown very stony silt loam. The subsurface layer is very dark grayish brown very stony silty clay loam. Below that, there is limestone bedrock.

The soils of minor extent are the well drained Gassville and Gepp soils on hilltops and hillsides, rock outcrops, and the moderately well drained Ventris soils on foot slopes.

The soils making up this map unit are used mainly as woodland.

The soils are not suited to cultivated crops and are poorly suited or not suited to pasture. Large stones on the surface, the hazard of erosion, the shallowness of the Moko soil, droughtiness, and slope are the main limitations.

These soils are poorly suited to use as woodland. Large stones and boulders on the surface, the hazard of erosion, and the shallowness of the Moko soils are the main limitations.

These soils are poorly suited to most urban uses. Slow permeability, the high shrink-swell potential, and low strength are the main limitations on Arkana soils. Depth to rock, large stones, and slope are the main limitations on Moko soils. The limitations generally are difficult or impractical to overcome.

5. Clarksville-Boden

Somewhat excessively drained and well drained, moderately sloping to steep, deep, very cherty and stony soils

The soils making up this map unit are in the extreme southeastern part of the county. They formed in residuum and colluvium of cherty limestone, or sandstone. Natural drainageways are mainly fast-flowing, intermittent streams.

This unit makes up about 1 percent of the county. It is about 60 percent Clarksville soils, 30 percent Boden soils, and 10 percent soils of minor extent.

Clarksville soils are deep and are moderately sloping to steep. They are on side slopes and narrow ridgetops. The surface layer is dark grayish brown very cherty silt loam. The subsurface layer is yellowish brown very cherty silt loam. The subsoil is strong brown very cherty silty clay loam; mottled, strong brown very cherty silty clay loam; and mottled, yellowish red very cherty silty clay loam and very cherty silty clay.

Boden soils are deep and are moderately sloping to moderately steep. They are on hilltops and hillsides. The surface layer is dark grayish brown stony fine sandy loam. The subsurface layer is yellowish brown stony fine sandy loam. The subsoil is yellowish red stony sandy clay loam and mottled, red sandy clay and sandy clay loam. The underlying material is mottled, red sandy loam. Below that, there is sandstone bedrock.

The soils of minor extent are the moderately well drained Captina soils on uplands or stream terraces, the well drained Gepp soils on hilltops and hillsides, the well drained Lily soils on ridges and side slopes, the well drained Portia soils on side slopes, the somewhat excessively drained Ramsey soils on hills, and the excessively drained Wideman soils on stream bottoms and natural levees.

The soils making up this map unit are used mainly as woodland. In some small, less sloping areas they are used as pasture.

These soils are not suited to cultivated crops. They are moderately suited to not suited to pasture. The severe hazard of erosion where the soils are unprotected, slope, and large stones on the surface are the main limitations.

These soils are moderately suited to use as woodland. Slope, stones, droughtiness, seedling mortality, and the hazard of erosion are moderate limitations.

Clarksville soils, where the slope is less than 15 percent, are moderately suited to most urban uses. Where the slope is more than 15 percent, they are poorly suited. Boden soils are moderately suited to poorly suited to most urban uses. Slope, the shrink-swell potential, low strength, and moderately slow permeability are the main limitations.

Areas dominated by deep and moderately deep, gently sloping to moderately steep, stony and loamy soils; on uplands

The soils in this group make up about 31 percent of Sharp County. They are in the southern part of the county. They are loamy and stony soils that formed in residuum of sandstone, shale, and siltstone.

6. Boden-Portia

Well drained, gently sloping to moderately steep, deep, stony and loamy soils

The soils making up this map unit are mainly in the southern one-third of the county. They formed in residuum of sandstone, siltstone, and limestone. Natural

drainageways are mainly fast-flowing, intermittent streams and creeks.

This unit makes up about 22 percent of the county. It is about 70 percent Boden soils, 25 percent Portia soils, and 5 percent soils of minor extent.

Boden soils are deep and are gently sloping to moderately steep. They are on hilltops and hillsides. The surface layer is dark grayish brown stony fine sandy loam. The subsurface layer is yellowish brown stony fine sandy loam. The subsoil is yellowish red stony sandy clay loam and mottled, red sandy clay and sandy clay loam. The underlying material is mottled, red sandy loam. Below that, there is sandstone bedrock.

Portia soils are deep and are gently sloping to moderately sloping. They are on uplands. The surface layer is brown fine sandy loam. The subsurface layer is yellowish brown fine sandy loam. The subsoil is strong brown loam; mottled, strong brown loam; mottled, strong brown clay loam; and mottled, red sandy clay loam.

The soils of minor extent are the well drained Arkana soils on limestone ridges and hillsides, the well drained Brockwell soils on uplands, the well drained Lily soils on ridges and side slopes, and the excessively drained Wideman soils on flood plains and natural levees.

The soils making up this map unit are used mainly as mixed pasture and woodland. In most of the less sloping and less stony areas they are cleared and are used as pasture. In the moderately steep and stony areas they are used mainly for upland hardwoods.

These soils are moderately suited to not suited to cultivated crops and are well suited to poorly suited to use as pasture. The main limitations are the moderate or severe hazard of erosion and, on Boden soils only, stones on the surface in the steeper areas.

These soils are moderately suited to well suited to use as woodland. Slope and large stones are the main limitations.

Boden soils are moderately suited to poorly suited to most urban uses. Moderately slow permeability, slope, the moderate shrink-swell potential, and low strength are the main limitations. These limitations generally are difficult to overcome. Portia soils are moderately suited to poorly suited to most urban uses. Moderately slow permeability and slope are the main limitations. These limitations generally can be overcome by proper engineering design.

7. Boden-Lily-Brockwell

Well drained, gently sloping to moderately steep, deep and moderately deep, stony and loamy soils

The soils making up this map unit are in the southwestern corner of the county. They formed in residuum of sandstone. Natural drainageways are mainly fast-flowing, intermittent streams and creeks.

This map unit makes up about 9 percent of the county. It is about 50 percent Boden soils, 20 percent Lily soils, 14 percent Brockwell soils, and 16 percent soils of minor extent.

Boden soils are deep and are gently sloping to moderately steep. They are on hilltops and hillsides. The surface layer is dark grayish brown stony fine sandy loam. The subsurface layer is yellowish brown stony fine sandy loam. The subsoil is yellowish red stony sandy clay loam and mottled, red sandy clay and sandy clay loam. The underlying material is mottled, red sandy loam. Below that, there is sandstone bedrock.

Lily soils are moderately deep and gently sloping to moderately sloping. They are on ridges and side slopes. The surface layer is brown fine sandy loam. The subsurface layer is yellowish brown fine sandy loam. The subsoil is brownish yellow loam and yellowish red sandy clay loam. Below that, there is sandstone bedrock.

Brockwell soils are deep and gently sloping. They are on uplands. The surface layer is dark brown fine sandy loam. The subsurface layer is brown fine sandy loam. The subsoil is strong brown fine sandy loam; mottled, strong brown loam; and mottled sandy clay loam.

The soils of minor extent are the well drained Arkana soils on limestone ridges and side slopes, the well drained Peridge soils on broad uplands and stream terraces, the well drained Portia soils on uplands, the well drained Sturkie soils on flood plains and natural levees, and the excessively drained Wideman soils on flood plains and natural levees.

The soils making up this map unit are used mainly as woodland. Some of the gently sloping to moderately sloping soils are used as pasture.

The soils are moderately well suited to not suited to cultivated crops. They are well suited to poorly suited to use as pasture. The moderate or severe hazard of erosion and, on the Boden soils, the large stones on the surface are the main limitations.

The soils are moderately suited to well suited to use as woodland. There are no significant limitations except on the moderately steep, stony Boden soils. On those soils, slope, large stones on the surface, and a moderate hazard of erosion are the main limitations.

Boden soils are poorly suited to moderately suited to most urban uses. Low strength, shrink-swell potential, moderately slow permeability, and slope are the main limitations. Lily soils are poorly suited to moderately suited to most urban uses. Depth to rock and slope are the main limitations. Brockwell soils are moderately suited to well suited to most urban uses. Moderate permeability and slope are the main limitations. These limitations generally can be overcome by proper engineering design.

Areas dominated by deep, level to gently sloping, loamy soils; on flood plains and stream terraces

The soils in this group make up about 6 percent of Sharp County. They are along the Strawberry River,

Spring River, Martin's Creek, South Fork of the Spring River, Big Creek, Piney Fork, and South Big Creek. They are loamy soils that formed in silty and loamy alluvium on flood plains and stream terraces.

8. Sturkie-Razort-Peridge

Well drained, level to gently sloping, deep, loamy soils

The soils making up this map unit are along the major rivers and creeks in the county. They formed in silty alluvium derived from soils that formed in limestone and dolomite material. Natural drainageways are mainly rivers, creeks, and intermittent streams.

This map unit makes up about 6 percent of the county. It is about 35 percent Sturkie soils, 30 percent Razort soils, 25 percent Peridge soils, and 10 percent soils of minor extent.

Sturkie soils are deep and are on level flood plains. The surface layer is dark brown silt loam. The subsoil is dark brown silt loam and dark yellowish brown silty clay loam. The underlying material is mottled, dark brown silty clay loam.

Razort soils are deep and are on level flood plains and low terraces along creeks and intermittent streams. The surface layer is dark brown loam. The subsoil is dark brown silt loam; mottled, dark brown silt loam; and mottled, brown silty clay loam. The underlying material is variegated brown, dark brown, and gray gravelly clay loam and variegated strong brown, dark brown, dark yellowish brown, and gray very gravelly sandy clay loam.

Peridge soils are deep and are on gently sloping terraces along streams. The surface layer is dark brown silt loam. The subsoil is reddish brown silt loam, yellowish red silt loam, and mottled, red silty clay loam and gravelly silty clay loam.

The soils of minor extent are the moderately well drained Captina soils on uplands and stream terraces, the moderately well drained Hontas soils on flood plains, and the excessively drained Wideman soils on flood plains and natural levees.

The soils making up this unit are used mainly as pasture and hayland.

Sturkie soils are poorly suited to cultivated crops. Razort soils are not suited, and Peridge soils are moderately suited. Flooding is the main limitation on Razort and Sturkie soils. Erosion is a severe limitation on Peridge soils.

These soils are well suited to use as pasture and hayland. On Sturkie and Razort soils, frequent flooding is the main limitation, and on Peridge soils, the hazard of erosion is the main limitation.

These soils are well suited to use as woodland. There are no significant limitations.

The Sturkie and Razort soils are poorly suited to most urban uses. Frequent flooding is the main limitation. This limitation is difficult or impractical to overcome. The Peridge soils are moderately suited to most urban uses. Moderate permeability is a moderate limitation for septic tank absorption fields. There are no limitations for dwellings. Slope is a moderate limitation for small commercial buildings. Low strength is a severe limitation for local roads and streets. These limitations generally can be overcome by proper engineering design.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Gepp very cherty silt loam, 3 to 8 percent slopes, is one of several phases in the Gepp series.

Some map units are made up of two or more major soils. These map units are called soil complexes.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Arkana-Moko complex, 3 to 12 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

1—Arkana-Moko complex, 3 to 12 percent slopes. This complex consists of gently sloping to moderately sloping soils on limestone ridges and hillsides. The soils are so intricately mixed or are in areas so small that they could not be mapped separately at the scale selected for mapping. Individual areas range from about 10 to 150 acres in size.

The Arkana soil makes up about 40 percent of the complex, the Moko soil makes up 25 percent, and included soils make up 35 percent.

Typically, the surface layer of the Arkana soil is very dark grayish brown cherty silt loam about 4 inches thick. The subsurface layer, to a depth of about 8 inches, is dark brown cherty silt loam. The subsoil is yellowish red cherty silty clay loam to a depth of about 14 inches and red cherty clay to a depth of about 26 inches. Gray, hard, fractured limestone is below a depth of 26 inches.

The Arkana soil is moderately deep and is well drained. Natural fertility and organic matter content are moderate. Reaction ranges from mildly alkaline to medium acid throughout. Permeability is very slow, and the available water capacity is low.

Typically, the surface layer of the Moko soil is very dark grayish brown very stony silt loam about 3 inches thick. The subsurface layer, to a depth of about 12 inches, is very dark grayish brown very stony silty clay loam. Gray, hard, fractured limestone is below a depth of 12 inches.

The Moko soil is shallow and is well drained. Natural fertility and organic matter content are moderate. Reaction is neutral or mildly alkaline throughout.

Permeability is moderate, and the available water capacity is very low.

Included in mapping this complex are small areas of Gepp soils, rock outcrops, and Ventris soils. Also included are a few small areas of soils that are red throughout and that do not have chert fragments.

The soils making up this complex are used mainly as woodland; consisting of low-grade hardwoods and cedars, and as habitat for wildlife.

The soils are not suited to cultivated crops and are poorly suited to pasture. On the Arkana soil, coarse fragments and the hazard of erosion are the main limitations. On the Moko soil, stones on the surface and shallowness to rock are the main limitations. The Moko soil is usually droughty because of its shallowness, and it generally is difficult to till because of the coarse fragments on the surface.

The Arkana soil is poorly suited to use as woodland. Adapted trees are eastern redcedar, chinkapin oak, and shortleaf pine. The equipment limitation and seedling mortality are moderate.

The Moko soil also is poorly suited to use as woodland. Adapted trees are eastern redcedar and blackjack oak. The equipment limitation is severe, and the hazard of erosion and seedling mortality are moderate.

The Arkana soil is poorly suited to most urban uses. The very slow permeability and the moderate depth to rock are severe limitations for septic tank absorption fields. The high shrink-swell potential is a severe limitation for dwellings and small commercial buildings. Low strength and the high shrink-swell potential are severe limitations for local roads and streets. The limitations generally are difficult or impractical to overcome.

The Moko soil also is poorly suited to most urban uses. Shallowness and large stones are severe limitations for septic tank absorption fields, dwellings, small commercial buildings, and local roads and streets. The limitations generally are difficult or impractical to overcome.

These soils are in capability subclass VIs; the Arkana soil is in woodland suitability group 5c8, and the Moko soil is in woodland suitability group 5x3.

2—Boden fine sandy loam, 3 to 8 percent slopes. This is a deep, well drained, gently sloping soil on hilltops and hillsides. Individual areas range from about 10 to 200 acres in size.

Typically, the surface layer is dark grayish brown fine sandy loam about 2 inches thick. The subsurface layer, to a depth of about 7 inches, is yellowish brown fine sandy loam. The subsoil is yellowish red sandy clay loam to a depth of about 14 inches; mottled, red sandy clay to a depth of about 39 inches; and mottled, red sandy clay loam to a depth of about 45 inches. The underlying material is mottled, red sandy loam to a depth of about 56 inches. Unweathered, hard, acid sandstone is below a depth of 56 inches.

Natural fertility and organic matter content are low. Reaction is strongly acid or very strongly acid throughout. Permeability is moderately slow, and the available water capacity is medium. Runoff is medium and the hazard of erosion is severe if cultivated crops are grown. Crops on this soil respond moderately well to fertilizers.

Included with this soil in mapping are a few small areas of Brockwell, Lily, and Portia soils. Also included are a few small areas of sandstone-limestone outcrops and some areas that are not underlain by hard bedrock within a depth of 60 inches.

This Boden soil is moderately suited to cultivated crops. Erosion is a severe limitation. Proper fertilization, minimum tillage, contour farming, and cover crops help to reduce runoff and to control erosion.

This soil is well suited to use as pasture, and it is used mainly as pasture. Adapted pasture plants are bermudagrass, lovegrass, and tall fescue. There are no significant limitations.

This soil is moderately suited to use as woodland. Adapted trees are southern red oak, eastern redcedar, shortleaf pine, loblolly pine, and black walnut. There are no significant limitations.

This soil is moderately suited to poorly suited to most urban uses. The moderately slow permeability is a severe limitation for septic tank absorption fields. The moderate shrink-swell potential is a moderate limitation for dwellings without basements. The shrink-swell potential and slope are moderate limitations for small commercial buildings, and low strength is a severe limitation for local roads and streets. Most of the limitations can be overcome by proper engineering design.

This soil is in capability subclass IIIe and in woodland suitability group 4o7.

3—Boden fine sandy loam, 8 to 12 percent slopes. This is a deep, well drained, moderately sloping soil on hilltops and hillsides. Individual areas range from about 15 to 200 acres in size.

Typically, the surface layer is dark grayish brown fine sandy loam about 2 inches thick. The subsurface layer, to a depth of about 7 inches, is yellowish brown fine sandy loam. The subsoil is yellowish red sandy clay loam to a depth of about 14 inches; mottled, red sandy clay to a depth of about 39 inches; and mottled, red sandy clay loam to a depth of about 45 inches. The underlying material is mottled, red sandy loam to a depth of about 56 inches. Unweathered, hard acid sandstone bedrock is below a depth of 56 inches.

Natural fertility and organic matter content are low. Reaction is strongly acid or very strongly acid throughout. Permeability is moderately slow, and the available water capacity is medium. Runoff is rapid and

erosion is a very severe hazard if cultivated crops are grown. Grasses on this soil respond moderately well to fertilization.

Included with this soil in mapping are a few small areas of Brockwell, Lily, and Portia soils. Also included are some areas that are not underlain by hard bedrock within a depth of 60 inches.

This Boden soil is poorly suited to cultivated crops because erosion is a very severe hazard. Proper fertilization, minimum tillage, contour farming, and cover crops help to reduce runoff and to control erosion.

This soil is well suited to use as pasture, and it is used mainly as pasture. Adapted pasture plants are lovegrass, bermudagrass, and fescue. There are no significant limitations.

This soil is moderately suited to use as woodland. Adapted species are southern red oak, eastern redcedar, shortleaf pine, loblolly pine, and black walnut. There are no significant limitations.

This soil is poorly suited to most urban uses. Moderately slow permeability is a severe limitation for septic tank absorption fields. The moderate shrink-swell potential and slope are moderate limitations for dwellings without basements. Slope is a severe limitation for small commercial buildings. Low strength is a severe limitation for local roads and streets. Most of the limitations can be overcome by proper engineering design.

This soil is in capability subclass IVe and in woodland suitability group 4o7.

4—Boden stony fine sandy loam, 8 to 20 percent slopes. This is a deep, well drained, moderately sloping to moderately steep soil on hillsides. Individual areas range from about 20 to 650 acres in size.

Typically, the surface layer is dark grayish brown stony fine sandy loam about 2 inches thick. The subsurface layer, to a depth of about 7 inches, is yellowish brown stony fine sandy loam. The subsoil is yellowish red stony sandy clay loam to a depth of about 14 inches; mottled, red sandy clay to a depth of about 39 inches; and mottled, red sandy clay loam to a depth of about 45 inches. The underlying material is mottled, red sandy loam to a depth of about 56 inches. Unweathered, hard acid sandstone bedrock is below a depth of 56 inches.

Natural fertility and organic matter content are low. Reaction is strongly acid or very strongly acid throughout. Permeability is moderately slow, and the available water capacity is medium. Runoff is rapid and erosion is a very severe hazard if the soil is unprotected. Grasses respond moderately well to fertilization.

Included with this soil in mapping are a few small areas of Brockwell, Lily, Portia, and Ramsey soils. Also included are a few small areas of rock outcrops, a few small areas that are underlain by limestone and shale, and some areas that are not underlain by hard bedrock within a depth of 60 inches.

This Boden soil is not suited to cultivated crops because of slope, the very severe hazard of erosion, and large stones on the surface that interfere with tillage operations.

This soil is poorly suited to use as pasture. Adapted pasture plants are bermudagrass, lovegrass, and fescue. Slope and large stones on the surface are limitations.

This soil is moderately suited to use as woodland, and it is used mainly as woodland. Adapted species are southern red oak, eastern redcedar, shortleaf pine, loblolly pine, and black walnut. The equipment limitation and the hazard of erosion are moderate.

This soil is poorly suited to most urban uses. Moderately slow permeability is a severe limitation for septic tank absorption fields. Slope and the moderate shrink-swell potential are moderate limitations for dwellings. Slope is a severe limitation for small commercial buildings. Low strength is a severe limitation for local roads and streets. Most of the limitations are difficult or impractical to overcome.

This soil is in capability unit VIs and in woodland suitability group 4x8.

5—Brockwell fine sandy loam, 3 to 8 percent slopes. This is a deep, well drained, gently sloping soil on uplands. Individual areas range from 20 to 175 acres in size.

Typically, the surface layer is dark brown fine sandy loam about 7 inches thick. The subsurface layer, to a depth of about 15 inches, is brown fine sandy loam. The subsoil is strong brown loam to a depth of about 31 inches; mottled, strong brown, loam to a depth of about 47 inches; mottled red, yellowish red, and strong brown sandy clay loam to a depth of about 69 inches; and mottled red and strong brown sandy clay loam to a depth of about 88 inches. Acid sandstone is below a depth of 88 inches.

Natural fertility and organic matter content are low. Reaction ranges from medium acid to very strongly acid throughout. Permeability is moderate, and the available water capacity is medium. Runoff is medium and erosion is a severe hazard if cultivated crops are grown. Crops respond moderately well to fertilization.

Included with this soil in mapping are a few small areas of Boden, Lily, Portia, and Ramsey soils. Also included are a few small areas of rock outcrops.

This Brockwell soil is moderately suited to cultivated crops. Where it is less sloping, it is suited to corn, wheat, soybeans, melons (fig. 3), small grains, and hay crops. The severe hazard of erosion is the main limitation.

This soil is well suited to use as pasture, and it is used mainly as pasture (fig. 4). Adapted pasture plants include lovegrass, bermudagrass, and tall fescue.

This soil is well suited to use as woodland. Adapted species are shortleaf pine, southern red oak, black oak, and white oak. There are no significant limitations.

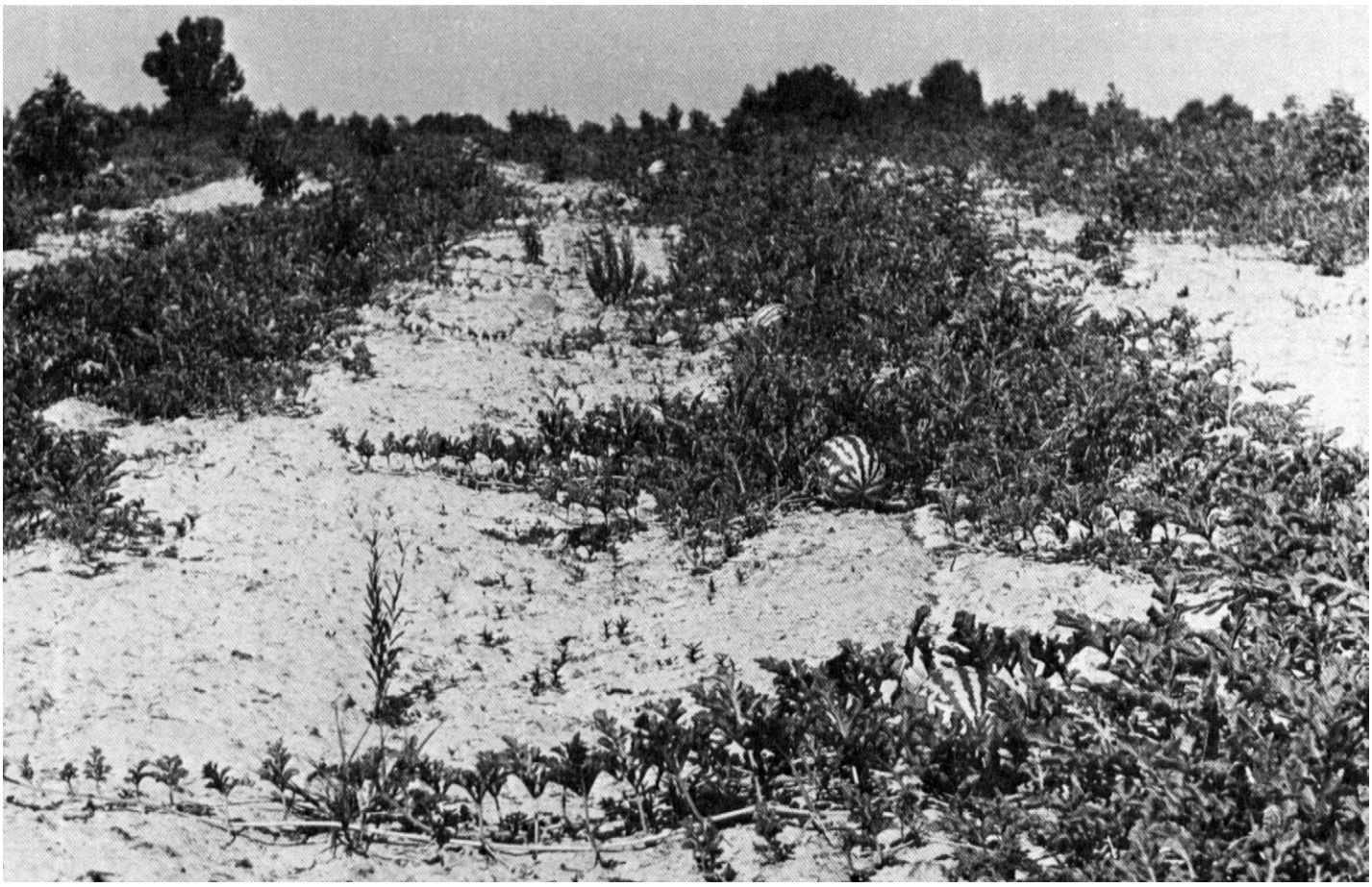


Figure 3.—Watermelons on Brockwell fine sandy loam, 3 to 8 percent slopes. This deep, well drained soil is moderately suited to watermelons.

This soil is well suited to moderately suited to most urban uses. Moderate permeability is a moderate limitation for septic tank absorption fields. There are no significant limitations for dwellings or local roads and streets. Slope is a moderate limitation for small commercial buildings. Most of the limitations can be overcome by proper engineering design.

This soil is in capability subclass IIIe and in woodland suitability group 3o7.

6—Captina silt loam, 2 to 6 percent slopes. This is a deep, moderately well drained, gently sloping soil on uplands and stream terraces. Individual areas range from 15 to 100 acres in size.

Typically, the surface layer is brown silt loam about 5 inches thick. The subsoil is strong brown silty clay loam to a depth of about 13 inches and yellowish brown silty clay loam to a depth of about 24 inches. The lower part of the subsoil, to a depth of 60 inches or more, is compact and brittle, mottled silty clay loam and mottled silt loam. The underlying material is mottled very cherty silt loam to a depth of about 72 inches.

Natural fertility and organic matter content are low. Reaction is medium acid or strongly acid in the surface layer and strongly acid or very strongly acid in the subsoil and underlying material. Permeability is slow, and the available water capacity is medium. A perched water table is at a depth of 2 to 3 feet in winter and early in spring. Runoff is medium and erosion is a severe hazard if cultivated crops are grown. Grasses respond well to fertilization.

Included with this soil in mapping are small areas of Clarksville, Doniphan, Gepp, and Peridge soils. Also included are some areas where the slope is more than 6 percent, and some areas where it is less than 2 percent. Also included are some areas where the surface layer is cherty.

This Captina soil is moderately suited to cultivated crops. The severe hazard of erosion is the main limitation, and erosion control measures are needed. Adapted crops include soybeans and winter small grains.

This soil is well suited to use as pasture, and it is used mainly as pasture. Adapted pasture plants include bermudagrass and fescue. There are no significant limitations.

This soil is moderately suited to use as woodland. Adapted species are shortleaf pine, southern red oak, eastern redcedar, and black walnut. There are no significant limitations.

This soil is moderately suited to most urban uses. Slow permeability and wetness are severe limitations for septic tank absorption fields. Wetness is a moderate limitation for dwellings. Wetness and slope are moderate limitations for small commercial buildings. Low strength and wetness are moderate limitations for local roads and streets. In most places, these limitations can be overcome by proper engineering design.

This soil is in capability subclass IIIe and in woodland suitability group 4o7.

7—Clarksville very cherty silt loam, 8 to 20 percent slopes. This is a deep, somewhat excessively drained, moderately sloping to moderately steep soil on side slopes and narrow ridgetops (fig. 5). Individual areas range from about 20 to 300 acres in size.

Typically, the surface layer is dark grayish brown very cherty silt loam about 2 inches thick. The subsurface layer, to a depth of about 9 inches, is yellowish brown very cherty silt loam. The subsoil is strong brown very cherty silty clay loam to a depth of about 27 inches; mottled, strong brown, very cherty silty clay loam to a depth of about 37 inches; and mottled, yellowish red, very cherty silty clay loam and very cherty silty clay to a depth of 72 inches or more.

Natural fertility and organic matter content are low. Permeability is moderately rapid, and the available water capacity is low. Reaction is strongly acid or very strongly acid throughout.

Included with this soil in mapping are a few small areas of Captina, Doniphan, Gepp, and Ventris soils. Also included are a few small areas where gray mottles are in the upper 24 inches of the subsoil and a few small areas where a fragipan or bedrock is at a depth of 50 inches or less.

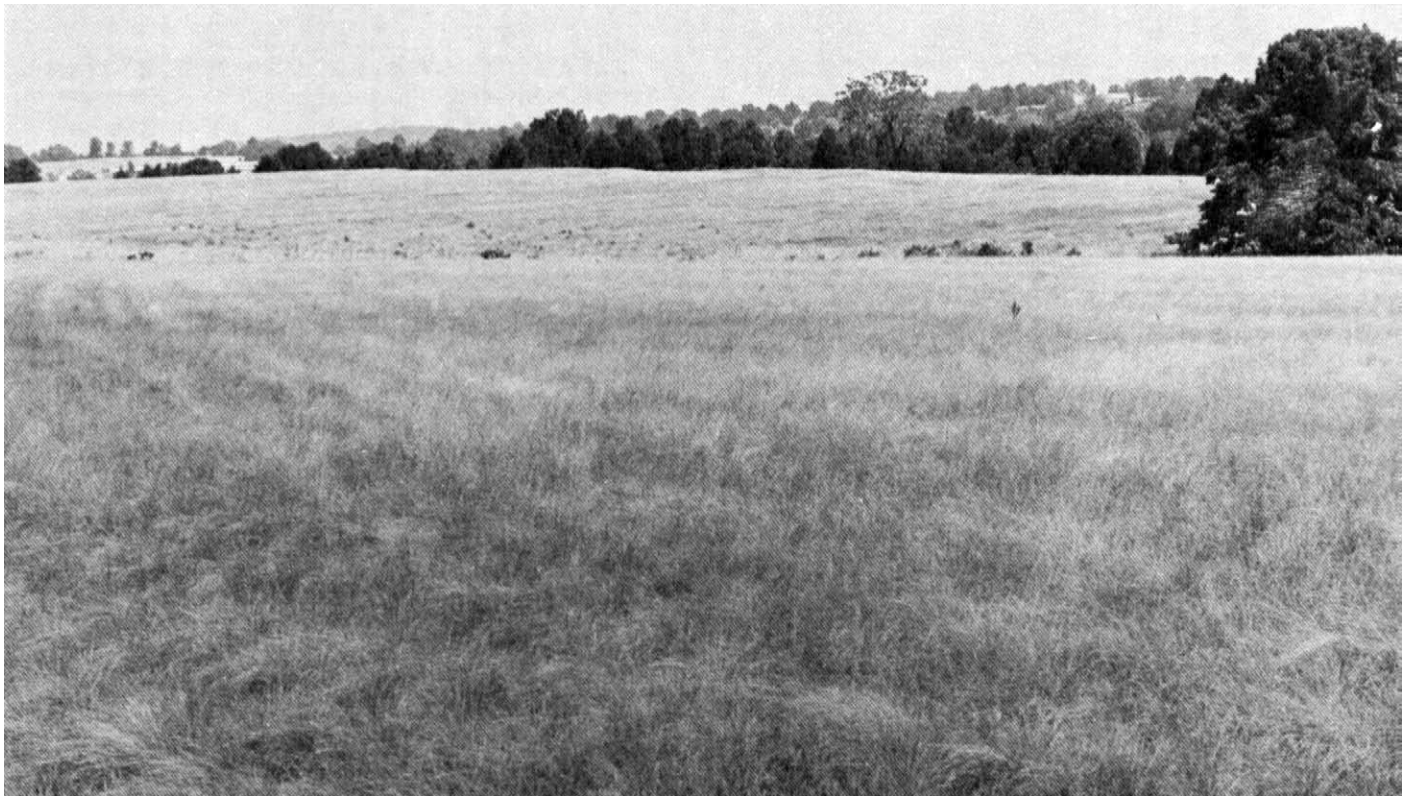


Figure 4.—Lovegrass pasture on Brockwell fine sandy loam, 3 to 8 percent slopes. Lovegrass helps to stabilize areas where erosion is a severe hazard.

Figure 5.—Typical area of Clarksville very cherty silt loam, 8 to 20 percent slopes. In many areas this soil has been cleared and is used as pasture.

This Clarksville soil is not suitable for cultivated crops because of the very severe hazard of erosion, droughtiness, and the very cherty surface layer that interferes with tillage.

This soil is moderately suited to use as pasture. Adapted pasture plants are bermudagrass and fescue. Grasses on this soil respond moderately well to fertilization. Droughtiness, moderately steep slopes, and chert content are moderate limitations.

This soil is moderately suited to use as woodland, and it is used mainly as woodlands. Adapted trees are white oak, sweetgum, shortleaf pine, and black oak. Slope and chert fragments are moderate limitations to operation of logging equipment, and seedling mortality is moderate.

This soil is moderately suited to most urban uses. Slope is a moderate limitation for septic tank absorption fields, dwellings, and local roads and streets. Slope is a severe limitation for small commercial buildings. The limitations generally can be overcome by proper engineering design.

This soil is in capability subclass VIs and in woodland suitability group 4f8.

8—Clarksville very cherty silt loam, 20 to 40 percent slopes. This is a deep, somewhat excessively drained, steep soil on side slopes and narrow ridgetops. Individual areas range from about 10 to 400 acres in size.

Typically, the surface layer is dark grayish brown very cherty silt loam about 2 inches thick. The subsurface layer, to a depth of about 9 inches, is yellowish brown very cherty silt loam. The subsoil is strong brown very cherty silty clay loam to a depth of about 27 inches; mottled, strong brown, very cherty silty clay loam to a depth of about 37 inches; and mottled, yellowish red, very cherty silty clay loam and very cherty silty clay to a depth of 72 inches or more.

Natural fertility and organic matter content are low. Permeability is moderately rapid, and the available water capacity is low. Reaction is strongly acid or very strongly acid throughout.

Included with this soil in mapping are a few small areas of Boden, Captina, Doniphan, Gassville, Gepp, and Ventris soils. Also included are a few small areas where a fragipan is at a depth of less than 50 inches. Also included are a few small areas of a soil that is similar to this Clarksville soil but has less than 35 percent chert fragments throughout.

This Clarksville soil is not suited to cultivated crops because of the very severe hazard of erosion, steep slopes, droughtiness, and the very cherty surface, which interferes with tillage.

This soil is poorly suited to pasture because of the very severe hazard of erosion and steep slopes.

This soil is moderately suited to use as woodland, and it is used mainly as woodland. Adapted trees are white

oak, shortleaf pine, black oak, and sweetgum. The hazard of erosion is a moderate limitation. The equipment limitation and seedling mortality are severe.

This soil is poorly suited to most urban uses. Slope is a severe limitation for septic tank absorption fields, dwellings, small commercial buildings, and local roads and streets. The limitation is generally difficult or impractical to overcome.

This soil is in capability subclass VIIs and in woodland suitability group 4f9.

9—Doniphan cherty silt loam, 3 to 8 percent slopes. This is a deep, well drained, gently sloping soil on broad ridgetops and plateaus. Individual areas range from about 20 to 400 acres in size.

Typically, the surface layer is brown cherty silt loam about 4 inches thick. The subsurface layer, to a depth of about 8 inches, is light yellowish brown cherty silt loam. The subsoil is strong brown clay to a depth of about 40 inches; mottled red and yellowish brown clay to a depth of about 62 inches; and variegated yellow, red, and gray clay to a depth of about 80 inches or more.

Natural fertility and organic matter content are low. Permeability is moderate, and the available water capacity is medium. Reaction is strongly acid or very strongly acid throughout. Runoff is medium and erosion is a severe hazard if cultivated crops are grown.

Included with this soil in mapping are a few small areas of Captina, Clarksville, Gassville, and Gepp soils. Also included are a few small areas of soils that are similar to this Doniphan soil but have gray mottles in the upper part of the subsoil. Also included are a few small areas where the surface is very cherty and a few small areas where the slope is less than 3 percent.

This Doniphan soil is moderately suited to cultivated crops. The severe hazard of erosion and the cherty surface, which interferes with tillage operations, are the main limitations.

This soil is well suited to use as pasture, and it is used mainly as pasture. Adapted pasture plants include bahiagrass, bermudagrass, fescue, and lespedeza. Grasses respond moderately well to fertilizers. There are no significant limitations.

This soil is well suited to use as woodland. Adapted trees include white oak, black oak, shortleaf pine, green ash, and shagbark hickory. There are no significant limitations.

This soil is moderately suited to most urban uses. Moderate permeability is a moderate limitation for septic tank absorption fields. Slope and the moderate shrink-swell potential are moderate limitations for small commercial buildings. The shrink-swell potential is a moderate limitation for dwellings. Low strength is a severe limitation for local roads and streets. Most of the limitations can be overcome by proper engineering design.

This soil is in capability subclass IIIe and in woodland suitability group 3o7.

10—Doniphan cherty silt loam, 8 to 12 percent slopes. This is a deep, well drained, moderately sloping soil on ridgetops, plateaus, and the upper third of hillsides. Individual areas range from about 15 to 125 acres in size.

Typically, the surface layer is brown cherty silt loam about 4 inches thick. The subsurface layer, to a depth of about 8 inches, is light yellowish brown cherty silt loam. The subsoil is strong brown clay to a depth of about 40 inches; mottled red and yellowish brown clay to a depth of about 62 inches; and variegated yellow, red, and gray clay to a depth of about 80 inches or more.

Natural fertility and organic matter content are low. Permeability is moderate, and the available water capacity is medium. The soil is strongly acid or very strongly acid throughout. Runoff is rapid and erosion is a very severe hazard if cultivated crops are grown.

Included with this soil in mapping are a few small areas of Gassville and Gepp soils. Also included are a few small areas where the surface is very cherty or stony and a few small areas where the slope is more than 12 percent.

This Doniphan soil is poorly suited to cultivated crops. Slope, rapid runoff, the very severe hazard of erosion, and the cherty surface are the main limitations.

This soil is moderately suited to use as pasture. Adapted pasture plants include bermudagrass, fescue, bahiagrass, and lespedeza. Grasses respond moderately well to fertilizers. Slope and the hazard of erosion are the main limitations.

This soil is well suited to use as woodland, and it is used mainly as woodland. Adapted trees include white oak, shortleaf pine, sweetgum, green ash, and black oak. There are no significant limitations.

This soil is moderately suited to poorly suited to most urban uses. Moderate permeability and slope are moderate limitations for septic tank absorption fields. Slope is a severe limitation for small commercial buildings. Slope and the moderate shrink-swell potential are moderate limitations for dwellings. Low strength is a severe limitation for local roads and streets. Most of the limitations can be overcome by proper engineering design.

This soil is in capability subclass IVe and in woodland suitability group 3o7.

11—Gassville cherty silt loam, 3 to 12 percent slopes. This is a moderately deep to deep, well drained, gently sloping to moderately sloping soil on hilltops and hillsides. Individual areas range from about 20 to 120 acres in size.

Typically, the surface layer is brown cherty silt loam about 4 inches thick. The subsurface layer, to a depth of about 10 inches, is light yellowish brown cherty silt loam.

The subsoil is yellowish red, mottled cherty silty clay to a depth of about 15 inches and red clay and red, mottled clay to a depth of about 39 inches. The underlying material is mottled red, brownish yellow, and gray cherty silty clay to a depth of about 52 inches. Light-colored, partly weathered, slightly hard siltstone is below a depth of 52 inches.

Natural fertility is low, and the content of organic matter is moderate. The surface and subsurface layers range from strongly acid to slightly acid, and the subsoil and substratum are strongly acid or very strongly acid. Permeability is very slow, and the available water capacity is medium. Runoff is medium to rapid and erosion is a very severe hazard if cultivated crops are grown.

Included with this soil in mapping are a few small areas of Arkana, Clarksville, Doniphan, and Gepp soils. Also included are a few small areas where hard siltstone bedrock is at a depth of more than 60 inches and a few small areas where the surface layer and subsoil have thin lenses of sandy material.

This Gassville soil is poorly suited to cultivated crops because of the very severe hazard of erosion and the cherty surface.

This soil is moderately suited to use as pasture, and it is used mainly as pasture. Adapted pasture plants are improved bermudagrass and tall fescue. Grasses respond well to fertilization. There are no significant limitations.

This soil is moderately suited to use as woodland. Adapted trees are southern red oak, shortleaf pine, eastern redcedar, black walnut, and loblolly pine. There are no significant limitations.

This soil is moderately suited to poorly suited to most urban uses. Very slow permeability is a severe limitation for septic tank absorption fields. The moderate shrink-swell potential is a moderate limitation for dwellings. Low strength is a severe limitation for local roads and streets. Slope and the shrink-swell potential are moderate limitations for small commercial buildings. The limitations generally can be overcome by proper engineering design.

This soil is in capability subclass IVe and in woodland suitability group 4o7.

12—Gassville cherty silt loam, 12 to 20 percent slopes. This is a moderately deep to deep, well drained, moderately steep soil on hilltops and hillsides. Individual areas range from about 15 to 250 acres in size.

Typically, the surface layer is brown cherty silt loam about 4 inches thick. The subsurface layer, to a depth of about 10 inches, is light yellowish brown cherty silt loam. The subsoil is mottled, yellowish red, cherty silty clay to a depth of about 15 inches and red clay and mottled, red clay to a depth of about 39 inches. The underlying material is mottled red, brownish yellow, and gray cherty silty clay to a depth of about 52 inches. Light-colored, partly weathered, slightly hard siltstone is below a depth of 52 inches.

Natural fertility is low, and the organic matter content is moderate. The surface and subsurface layers range from strongly acid to slightly acid, and the subsoil and underlying material are very strongly acid or strongly acid. Permeability is very slow, and the available water capacity is medium. Runoff is rapid, and erosion is a very severe hazard if the soil is not protected.

Included with this soil in mapping are a few small areas of Arkana, Doniphan, and Gepp soils.

This Gassville soil is not suited to cultivated crops because of slope and the very severe hazard of erosion.

This soil is moderately suited to use as pasture. Adapted pasture plants are bermudagrass and tall fescue. Grasses respond well to fertilizers. Slope and the cherty surface are moderate limitations.

This soil is moderately suited to use as woodland, and it is used mainly as woodland. Adapted trees are shortleaf pine, southern red oak, eastern redcedar, loblolly pine, and black walnut. There are no significant limitations.

This soil is poorly suited to most urban uses. Very slow permeability and slope are severe limitations for septic tank absorption fields. Slope is a severe limitation for dwellings and small commercial buildings. Slope and low strength are severe limitations for local roads and streets. Most of the limitations are difficult or impractical to overcome.

This soil is in capability subclass VIe and in woodland suitability group 4o7.

13—Gepp very cherty silt loam, 3 to 8 percent slopes. This is a deep, well drained, gently sloping soil on hilltops and hillsides. Individual areas range from about 10 to 300 acres in size.

Typically, the surface layer is dark brown very cherty silt loam about 2 inches thick. The subsurface layer, to a depth of about 6 inches, is yellowish brown very cherty silt loam. The subsoil is yellowish red cherty silty clay loam to a depth of about 12 inches; red clay to a depth of about 36 inches; and mottled, red clay to a depth of 72 inches or more.

Natural fertility is low, and the organic matter content is moderate. The surface layer is slightly acid to strongly acid, and the subsoil in the upper part is medium acid to very strongly acid and in the lower part is medium acid to strongly acid. Permeability is moderate, and the available water capacity is medium. Runoff is medium, and erosion is a very severe hazard if cultivated crops are grown. Crops on this soil respond well to fertilization, and tilth is difficult to maintain.

Included with this soil in mapping are a few small areas of Arkana, Clarksville, Doniphan, Gassville, Moko, Peridge, Razort, and Ventris soils. Also included are a few small areas where the surface is stony.

This Gepp soil is poorly suited to cultivated crops. The main limitations are the very severe hazard of erosion and chert fragments on the surface, which interfere with tillage operations.

This soil is moderately suited to pasture, and it is used mainly as pasture. Adapted pasture plants are common bermudagrass, tall fescue, big bluestem, and little bluestem. Chert fragments on the surface are the main limitation.

This soil is well suited to use as woodland. Adapted trees are white oak, northern red oak, black walnut, shortleaf pine, loblolly pine, and black oak. There are no significant limitations.

This soil is moderately suited to most urban uses. Moderate permeability is a moderate limitation for septic tank absorption fields. The moderate shrink-swell potential is a moderate limitation for dwellings. Slope and the shrink-swell potential are moderate limitations for small commercial buildings. Low strength is a severe limitation for local roads and streets. The limitations generally can be overcome by proper engineering design.

This soil is in capability subclass IVe and in woodland suitability group 3o7.

14—Gepp very cherty silt loam, 8 to 12 percent slopes. This is a deep, well drained, moderately sloping soil on hilltops and hillsides. Individual areas range from about 15 to 275 acres in size.

Typically, the surface layer is dark brown very cherty silt loam about 2 inches thick. The subsurface layer, to a depth of about 6 inches, is yellowish brown very cherty silt loam. The subsoil is yellowish red cherty silty clay loam to a depth of about 12 inches; red clay to a depth of about 36 inches; and mottled, red clay to a depth of 72 inches or more.

Natural fertility is low, and the organic matter content is moderate. The surface layer is slightly acid to strongly acid, and the subsoil in the upper part is medium acid to very strongly acid and in the lower part is medium acid to strongly acid. Permeability is moderate, and the available water capacity is medium. Runoff is rapid, and erosion is a very severe hazard if cultivated crops are grown. Crops on this soil respond well to fertilization, and tilth is difficult to maintain.

Included with this soil in mapping are a few small areas of Arkana, Clarksville, Doniphan, Gassville, Moko, Peridge, Razort, and Ventris soils. Also included are a few small areas where the surface is stony.

This Gepp soil is not suited to cultivated crops. The main limitations are rapid runoff, the very severe hazard of erosion, and chert fragments on the surface.

This soil is moderately suited to use as pasture, and it is used mainly as pasture (fig. 6). Adapted pasture plants are common bermudagrass and tall fescue. Chert fragments on the surface are the main limitation.

This soil is well suited to use as woodland. Adapted trees are northern red oak, white oak, black walnut, shortleaf pine, loblolly pine, and black oak. There are no significant limitations.

This soil is moderately suited to most urban uses. Moderate permeability and slope are moderate limitations for septic tank absorption fields. The moderate shrink-swell potential and slope are moderate limitations for dwellings. Slope is a severe limitation for small commercial buildings. Low strength is a severe limitation for local roads and streets. These limitations generally can be overcome by proper engineering design.

This soil is in capability subclass VIe and in woodland suitability group 3o7.

15—Gepp very cherty silt loam, 12 to 30 percent slopes. This is a deep, well drained, moderately permeable, moderately steep to steep soil on hilltops and hillsides. Individual areas range from about 20 to 1,200 acres in size.

Typically, the surface layer is dark brown very cherty silt loam about 2 inches thick. The subsurface layer, to a depth of about 6 inches, is yellowish brown very cherty silt loam. The subsoil is yellowish red cherty silty clay loam to a depth of about 12 inches; red clay to a depth of about 36 inches; and mottled, red clay to a depth of 72 inches or more.

Natural fertility is low, and the organic matter content is moderate. The surface layer is slightly acid to strongly acid, and the subsoil in the upper part is medium acid to very strongly acid and in the lower part is medium acid to strongly acid. Permeability is moderate, and the available water capacity is medium. Runoff is rapid, and erosion is a very severe hazard if cultivated crops are grown.

Included with this soil in mapping are a few small areas of Arkana, Clarksville, Doniphan, Gassville, Moko, Peridge, Razort, and Ventris soils. Also included are areas where the surface is stony. Also included are a few small areas where siltstone or limestone bedrock is at a depth of 65 inches or less.

This soil is not suited to cultivated crops because of slope, rapid runoff, the very severe hazard of erosion, and chert fragments on the surface, which interfere with tillage.

This soil is moderately suited to poorly suited to use as pasture. Adapted pasture plants are bermudagrass and fescue. Grasses respond well to fertilizers. Steep slopes and chert fragments are severe limitations.

This soil is well suited to use as woodland, and it is used mainly as woodland. Adapted trees are white oak, northern red oak, black oak, shortleaf pine, and loblolly pine. The equipment limitation is moderate.

This soil is poorly suited to most urban uses. Slope is a severe limitation for septic tank absorption fields, dwellings, and small commercial buildings. Low strength

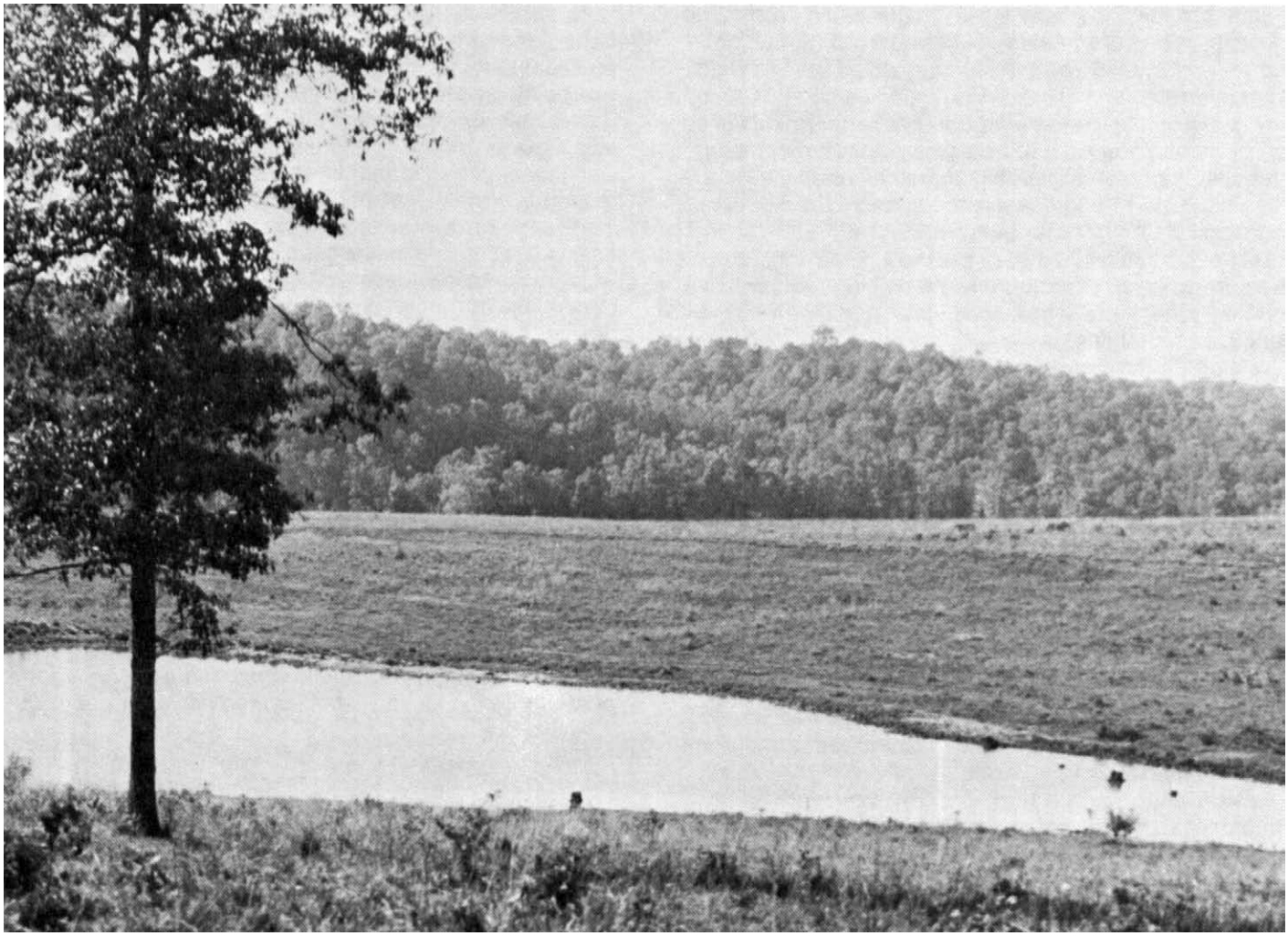


Figure 6.—An area of Gepp very cherty silt loam, 8 to 12 percent slopes. This soil is used mainly as pasture.

and slope are severe limitations for local roads and streets. The limitations are difficult or impractical to overcome.

This soil is in capability subclass VIIe and in woodland suitability group 3r8.

16—Gepp-Ventris complex, 8 to 20 percent slopes. This complex consists of soils on hillsides and foot slopes and at the base of hills and mountains. The soils making up this complex are so intricately mixed that they could not be mapped separately at the scale selected for mapping. Mapped areas of the complex range from about 80 to 600 acres in size. Individual areas of each soil range from 5 acres to several hundred acres in size.

The Gepp soil makes up 35 percent of the complex, the Ventris soil makes up 30 percent, and the included soils make up 35 percent.

Typically, the surface layer of the Gepp soil is dark brown very cherty silt loam about 2 inches thick. The subsurface layer, to a depth of about 6 inches, is yellowish brown very cherty silt loam. The subsoil is yellowish red cherty silty clay loam to a depth of about 12 inches; red clay to a depth of about 36 inches; and mottled, red clay to a depth of 72 inches or more.

The Gepp soil is deep and well drained. Natural fertility is low, and organic matter content is moderate. Permeability is moderate, and the available water capacity is medium. The surface layer is slightly acid to strongly acid, and the subsoil in the upper part is medium acid to very strongly acid and in the lower part is medium acid to strongly acid.

Typically, the surface layer of the Ventris soil is very dark grayish brown cherty silt loam about 2 inches thick. The subsurface layer, to a depth of about 6 inches, is

brown cherty silt loam. The subsoil is light olive brown clay to a depth of about 12 inches and mottled, light olive brown clay to a depth of about 37 inches. Limestone bedrock is below a depth of 37 inches.

The Ventris soil is moderately deep and moderately well drained. Natural fertility and organic matter content are low. Permeability is very slow, and the available water capacity is low. The surface layer and the subsoil in the upper part range from neutral to medium acid, and the subsoil in the lower part ranges from slightly acid to mildly alkaline. The rooting zone is moderately deep and is not easily penetrated by roots.

Included in mapping this complex are small areas of Arkana, Clarksville, Doniphan, Gassville, and Moko soils and a few small areas of rock outcrops.

The soils making up this complex are not suited to cultivated crops. Slope, runoff, chert fragments on the surface, and the very severe hazard of erosion are severe limitations.

In a few areas the Gepp soil has been cleared and is used as improved pasture. Adapted pasture plants include bermudagrass, bahiagrass, lespedeza, tall fescue, and white clover. The Ventris soil is poorly suited to use as improved pasture.

The soils are used mainly as woodland consisting of scrub oak and cedar. The Gepp soil is well suited to use as woodland. Adapted trees include white oak, northern red oak, shortleaf pine, loblolly pine, and redcedar. There are no significant limitations. The Ventris soil is poorly suited to use as woodland. Adapted trees include eastern redcedar, shortleaf pine, and loblolly pine. Seedling mortality is a moderate limitation.

The Gepp soil is moderately suited to poorly suited to most urban uses. Moderate permeability and slope are moderate limitations for septic tank absorption fields. Slope and the moderate shrink-swell potential are moderate limitations for dwellings. Slope is a severe limitation for small commercial buildings. Low strength is a severe limitation for local roads and streets. Most of the limitations can be overcome by proper engineering design.

The Ventris soil is poorly suited to most urban uses. Very slow permeability and depth to rock are severe limitations for septic tank absorption fields. The high shrink-swell potential and slope are severe limitations for commercial buildings. The shrink-swell potential is a severe limitation for dwellings. Low strength and the shrink-swell potential are severe limitations for local roads and streets. The limitations are difficult or impractical to overcome.

These soils are in capability subclass VIe. The Gepp soil is in woodland suitability group 3o7, and the Ventris soil is in woodland suitability group 5c2.

17—Gepp-Ventris complex, 20 to 40 percent slopes. This complex consists of soils on hillsides and footslopes and at the base of hills and mountains. The soils making up this complex are so intricately mixed that they could not be mapped separately at the scale selected for mapping. Mapped areas of the complex range from about 80 to 750 acres in size. Individual areas of each soil range from 5 acres to several hundred acres in size.

The Gepp soil makes up about 30 percent of the complex, the Ventris soil makes up 30 percent, and the included soils make up 40 percent.

Typically, the surface layer of the Gepp soil is dark brown very cherty silt loam about 2 inches thick. The subsurface layer, to a depth of about 6 inches, is yellowish brown very cherty silt loam. The subsoil is yellowish red cherty silty clay loam to a depth of about 12 inches; red clay to a depth of about 36 inches; and mottled, red clay to a depth of 72 inches or more.

The Gepp soil is deep and well drained. Natural fertility is low, and organic matter content is moderate. Permeability is moderate, and the available water capacity is medium. The surface layer is slightly acid to strongly acid, and the subsoil in the upper part is medium acid to very strongly acid and in the lower part is medium acid to strongly acid.

Typically, the surface layer of the Ventris soil is very dark grayish brown cherty silt loam about 2 inches thick. The subsurface layer, to a depth of about 6 inches, is brown cherty silt loam. The subsoil is light olive brown clay to a depth of about 12 inches and mottled, light olive brown clay to a depth of about 37 inches. Limestone bedrock is below a depth of 37 inches.

The Ventris soil is moderately deep and moderately well drained. Natural fertility and organic matter content are low. Permeability is very slow, and the available water capacity is low. The surface layer and the subsoil in the upper part range from neutral to medium acid, and the subsoil in the lower part ranges from slightly acid to mildly alkaline. The rooting zone is moderately deep and is not easily penetrated by deep-rooting plants.

Included in mapping are small areas of Arkana, Clarksville, Gassville, and Moko soils and a few small areas of rock outcrops.

The soils making up this complex are not suited to cultivated crops or improved pasture because of slope, rapid runoff, the very severe hazard of erosion, and large chert fragments on the surface.

These soils are used mainly as woodland and as habitat for wildlife. Some areas have esthetic value. In a few areas the Gepp soil has been cleared and is used as range or native grass pasture.

The Gepp soil is well suited to use as woodland. Adapted trees include white oak, northern red oak, shortleaf pine, loblolly pine, and redcedar. Steep slopes and the very cherty surface are moderate limitations for logging equipment.

The Ventris soil is poorly suited to use as woodland. Adapted trees include eastern redcedar, shortleaf pine, and loblolly pine. The equipment limitation and the

hazard of erosion are moderate, and seedling mortality is severe.

The Gepp soil is poorly suited to most urban uses. Slope is a severe limitation for septic tank absorption fields, dwellings, small commercial buildings, and local roads and streets. Low strength is also a severe limitation for local roads and streets. The limitations are difficult or impractical to overcome.

The Ventris soil is poorly suited to most urban uses. Slope, slow permeability, and depth to rock are severe limitations for septic tank absorption fields. Slope and the high shrink-swell potential are severe limitations for dwellings and small commercial buildings. Low strength, slope, and the shrink-swell potential are severe limitations for local roads and streets. The limitations are difficult or impractical to overcome.

These soils are in capability subclass VIIe. The Gepp soil is in woodland suitability group 3r8, and the Ventris soil is in woodland suitability group 5c3.

18—Hontas silt loam, frequently flooded. This is a deep, moderately well drained, level soil on bottom lands along streams. Individual areas range from about 10 to 80 acres in size. Slopes are 0 to 1 percent.

Typically, the surface layer is brown silt loam about 12 inches thick. The subsoil is brown, mottled silt loam to a depth of 21 inches and grayish brown, mottled silt loam to a depth of about 33 inches. The underlying material is gray, mottled silty clay loam to a depth of about 72 inches or more.

Natural fertility is moderate, and the organic matter content is low to medium. The surface layer ranges from medium acid to neutral, and the subsoil and underlying material range from medium acid to mildly alkaline. Permeability is moderate, and the available water capacity is high. The soil is subject to frequent flooding from December through April. An apparent water table is at a depth of 2 to 2.5 feet in winter and early in spring. Crops on this soil respond well to fertilization, and tilth is easy to maintain.

Included with this soil in mapping are a few small areas of Razort, Sturkie, and Wideman soils and a few small areas where the soil material below the surface layer is gray.

This Hontas soil is poorly suited to cultivated crops, but soybeans and wheat will grow on this soil. Frequent flooding from December through April is a hazard. In spring, wetness can delay planting for several days.

This soil is well suited to use as pasture, and it is used mainly as pasture. Adapted pasture plants are bermudagrass and fescue. From December through April, wetness and flooding are the main limitations. The limitations generally can be overcome by scheduling grazing on this soil during drier seasons.

This soil is well suited to use as woodland. Adapted trees are eastern cottonwood, sweetgum, sycamore, shumard oak, and shortleaf pine. From December through April, wetness and flooding are the main limitations to use of equipment in managing and harvesting tree crops. The limitations generally can be overcome by using special equipment and by logging during drier seasons. Seedling mortality is moderate.

This soil is poorly suited to most urban uses. Flooding and wetness are severe limitations for septic tank absorption fields. Flooding is a severe limitation for dwellings, small commercial buildings, and local roads and streets. The limitations are difficult or impractical to overcome.

This soil is in capability subclass IVw and in woodland suitability group 2w5.

19—Lily fine sandy loam, 3 to 8 percent slopes. This is a moderately deep, well drained, gently sloping soil on ridges and side slopes. Individual areas range from about 10 to 250 acres in size.

Typically, the surface layer is brown fine sandy loam about 3 inches thick. The subsurface layer, to a depth of about 10 inches, is yellowish brown fine sandy loam. The subsoil is brownish yellow loam to a depth of about 22 inches and yellowish red sandy clay loam to a depth of about 34 inches. Acid sandstone is below a depth of 34 inches.

Natural fertility and organic matter content are low. Reaction is strongly acid or very strongly acid throughout. Permeability is moderately rapid, and the available water capacity is low. Runoff is medium, and erosion is a severe hazard if cultivated crops are grown. Grasses respond moderately well to fertilization.

Included with this soil in mapping are a few small areas of Boden, Brockwell, Portia, and Ramsey soils. Also included are a few small areas where bedrock is at a depth of more than 40 inches or where slopes are more than 8 percent.

This Lily soil is moderately suited to close-growing crops and to fruits and vegetables. The severe hazard of erosion is the main limitation. Adapted crops are soybeans and wheat.

This soil is well suited to use as pasture, and it is used mainly as pasture (fig. 7). Adapted pasture plants are bermudagrass, lovegrass, and fescue. There are no significant limitations.

This soil is moderately suited to use as woodland. Adapted trees are southern red oak, shortleaf pine, loblolly pine, and black walnut. There are no significant limitations.

This soil is moderately suited to most urban uses. Depth to rock is a severe limitation for septic tank absorption fields. Slope and depth to rock are moderate limitations for small commercial buildings. Depth to rock is a moderate limitation for dwellings and local roads and streets. The limitations generally can be overcome by proper engineering design.

This soil is in capability subclass IIIe and in woodland suitability group 4o7.

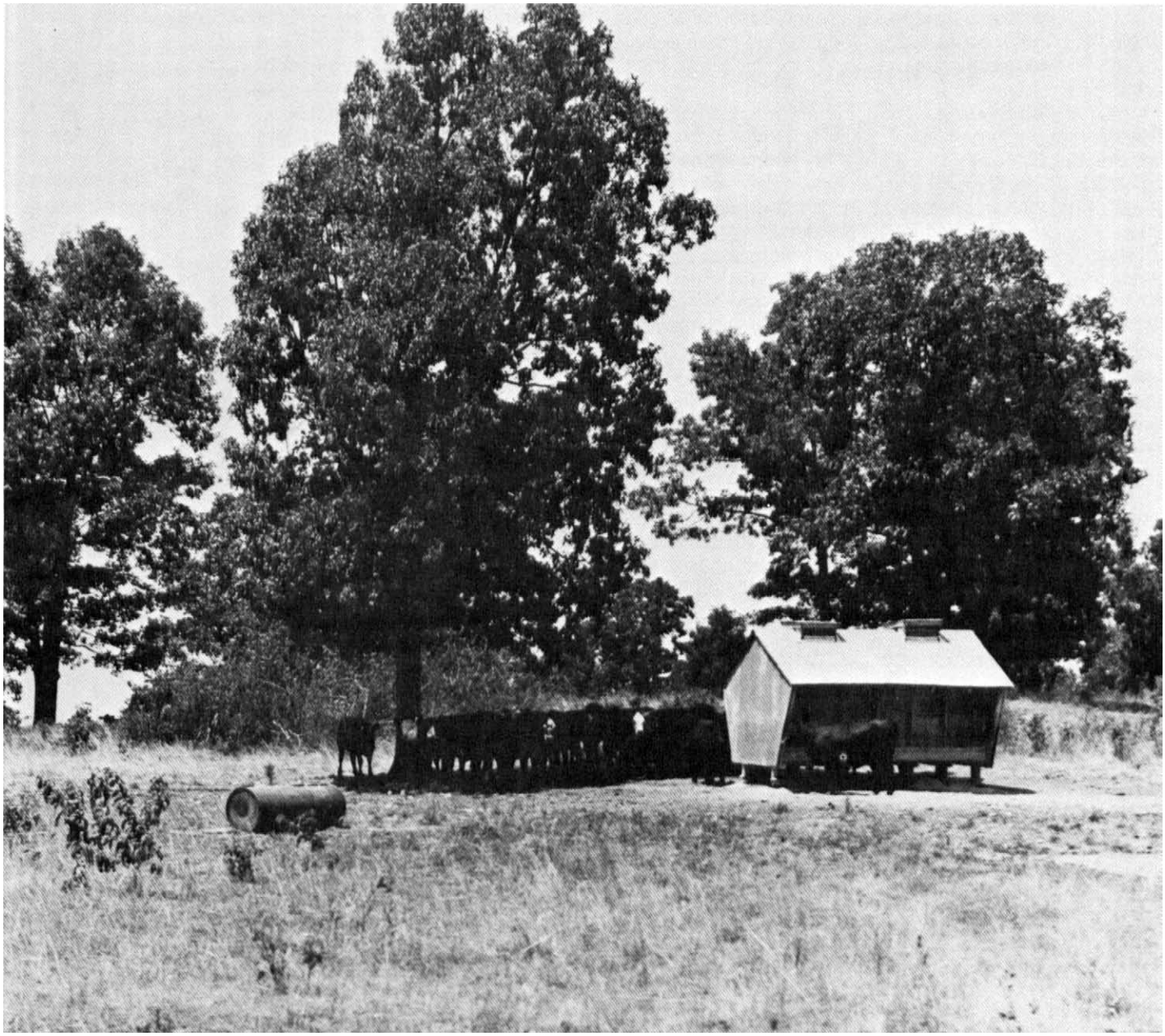


Figure 7.—Fescue pasture on Lily fine sandy loam, 3 to 8 percent slopes. The scattered trees provide shade and resting areas for cattle.

20—Lily fine sandy loam, 8 to 12 percent slopes. This is a moderately deep, well drained, moderately sloping soil on ridges and side slopes. Individual areas range from about 20 to 350 acres in size.

Typically, the surface layer is brown fine sandy loam about 3 inches thick. The subsurface layer, to a depth of about 10 inches, is yellowish brown fine sandy loam. The subsoil is brownish yellow loam to a depth of about 22 inches and yellowish red sandy clay loam to a depth of about 34 inches. Acid sandstone is below a depth of 34 inches.

This soil is low in natural fertility and in content of organic matter. It is strongly acid or very strongly acid throughout. Permeability is moderately rapid, and the

available water capacity is low. Runoff is rapid, and erosion is a very severe hazard if cultivated crops are grown. Grasses on this soil respond moderately well to fertilization.

Included with this soil in mapping are a few small areas of Boden, Brockwell, Clarksville, Portia, and Ramsey soils. Also included are a few small areas of rock outcrops, a few small areas where bedrock is at a depth of more than 40 inches, and a few small areas where slopes are more than 12 percent.

This Lily soil is poorly suited to cultivated crops because of slope and the very severe hazard of erosion. Wheat is a suitable crop for this soil.

This soil is well suited to use as pasture, and it is used mainly as pasture. Adapted pasture plants are bermudagrass, lovegrass, and fescue. There are no significant limitations.

This soil is moderately suited to use as woodland. Adapted trees are red oak, shortleaf pine, loblolly pine, and black walnut. There are no significant limitations.

This soil is moderately suited to poorly suited to most urban uses. Depth to rock is a severe limitation for septic tank absorption fields. Slope and depth to rock are moderate limitations for dwellings and local roads and streets. Slope is a severe limitation for small commercial buildings. The limitations generally can be overcome by proper engineering design.

This soil is in capability subclass IVe and in woodland suitability group 4o7.

21—Moko-Rock outcrop complex, 3 to 20 percent slopes. This complex consists of gently sloping to moderately steep Moko soil and areas of Rock outcrop on limestone benches and ridgetops. The Moko soil and the areas of Rock outcrop are so intricately mixed that they could not be mapped separately at the scale used for mapping. The mapped areas range from about 10 to 125 acres in size.

The Moko soil makes up about 50 percent of the complex, Rock outcrop makes up 25 percent, and the included soils make up 25 percent.

Typically, the surface layer of the Moko soil is very dark grayish brown very stony silt loam about 3 inches thick. The subsurface layer, to a depth of about 12 inches, is very dark grayish brown very stony silty clay loam. Gray, hard limestone bedrock that is fractured in the upper part is below a depth of 12 inches.

The Moko soil is shallow and well drained. Natural fertility and organic matter content are moderate. Reaction is neutral or mildly alkaline throughout. Permeability is moderate, and the available water capacity is very low. Runoff is medium and erosion is a moderate to severe hazard if the soil is unprotected. Droughtiness and shallowness to bedrock are severe limitations for plants.

Typically, Rock outcrop consists of gray, hard limestone that is fractured in the upper part. In some places the outcrops are vertical or nearly vertical cliffs several feet high.

Included in mapping this complex are small areas of Arkana, Gepp, and Ventris soils.

The areas of this complex are used mainly as wildlife habitat and as woodland. The dominant trees are low-grade hardwoods and cedars. Some areas have esthetic value.

The areas are not suitable for cultivated crops. The main limitations are stones, rock outcrops, and droughtiness.

The areas are not suited to use as pasture. They should not be cleared of native vegetation because of droughtiness and the very severe hazard of erosion.

The areas are poorly suited to use as woodland. Adapted trees are eastern redcedar, Ashe juniper, and blackjack oak. The equipment limitation is severe, and the hazard of erosion and seedling mortality are moderate.

The areas are poorly suited to most urban uses. Shallowness and large stones are severe limitations for septic tank absorption fields, dwellings, small commercial buildings, and local roads and streets. Slope is also a severe limitation for small commercial buildings. Most of the limitations are difficult or impractical to overcome.

The Moko soil is in capability subclass VIIs and in woodland suitability group 5x3. Rock outcrop is not assigned to a capability subclass or a woodland suitability group.

22—Peridge silt loam, 3 to 8 percent slopes. This is a deep, well drained soil on broad uplands and stream terraces. Individual areas range from about 20 to 200 acres in size.

Typically, the surface layer is dark brown silt loam about 6 inches thick. The subsoil is reddish brown silt loam to a depth of about 12 inches; yellowish red silt loam to a depth of about 20 inches; mottled, red silty clay loam to a depth of about 36 inches; mottled, red gravelly silty clay loam to a depth of about 55 inches; and mottled, red gravelly silty clay loam to a depth of about 72 inches or more.

Natural fertility and organic matter content are moderate. Reaction is medium acid to very strongly acid throughout. Permeability is moderate, and the available water capacity is high. Runoff is medium and erosion is a severe hazard if cultivated crops are grown. Grasses on this soil respond well to fertilization.

Included with this soil in mapping are a few small areas of Captina, Gepp, Gassville, Hontas, Razort, and Sturkie soils. Also included are a few small areas of a soil that is similar to this Peridge soil except that the surface layer is fine sandy loam.

This Peridge soil is moderately suited to cultivated crops (fig. 8). Adapted crops are soybeans, small grains, and fruits and vegetables. The main limitation is the severe hazard of erosion.

Figure 8.—Soybeans on Peridge silt loam, 3 to 8 percent slopes. Erosion is a severe hazard in cultivated areas of this soil.

This soil is well suited to use as pasture, and it is used mainly as pasture. Adapted pasture plants include bermudagrass, alfalfa, clover, and fescue. There are no significant limitations.

This soil is well suited to use as woodland. Adapted trees are southern red oak, shortleaf pine, loblolly pine, and black walnut. There are no significant limitations.

This soil is moderately suited to most urban uses. Moderate permeability is a moderate limitation for septic tank absorption fields. There are no significant limitations for dwellings. Slope is a moderate limitation for small commercial buildings. Low strength is a severe limitation for local roads and streets. Most of the limitations can be overcome by proper engineering design.

This soil is in capability subclass IIIe and in woodland suitability group 3o7.

23—Portia fine sandy loam, 3 to 8 percent slopes. This is a deep, well drained, gently sloping soil on uplands. Individual areas range from 10 to 300 acres in size.

Typically, the surface layer is brown fine sandy loam about 2 inches thick. The subsurface layer, to a depth of about 8 inches, is yellowish brown fine sandy loam. The subsoil is strong brown loam to a depth of about 18 inches; mottled, strong brown, loam to a depth of about 38 inches; mottled, strong brown, clay loam to a depth of 50 inches; and mottled, red sandy clay loam to a depth of about 72 inches.

Natural fertility is low, and organic matter content is low to moderate. The surface layer is slightly acid to strongly acid, and the subsoil in the upper part is medium acid to very strongly acid and in the lower part is medium acid or strongly acid. Permeability is moderately slow, and the available water capacity is medium to high. Runoff is medium and erosion is a severe hazard if cultivated crops are grown. Grasses on this soil respond well to fertilization.

Included with this soil in mapping are a few small areas of Brockwell, Boden, Lily, and Ramsey soils.

This Portia soil is moderately suited to cultivated crops. Adapted crops are small grains and corn. The main limitation is the severe hazard of erosion.

This soil is well suited to use as pasture, and it is used mainly as pasture. Adapted pasture plants include bermudagrass, lespedeza, and tall fescue. There are no significant limitations.

This soil is well suited to use as woodland. Adapted trees are red and black oak, shortleaf pine, sweetgum, and black walnut. There are no significant limitations.

This soil is well suited to most urban uses. Moderately slow permeability is a severe limitation for septic tank absorption fields. There are no significant limitations for dwellings and local roads and streets. Slope is a moderate limitation for small commercial buildings. The limitations generally can be overcome by proper engineering design.

This soil is in capability subclass IIIe and in woodland suitability group 3o7.

24—Portia fine sandy loam, 8 to 12 percent slopes. This is a deep, well drained, moderately sloping soil on uplands. Individual areas range from about 30 to 200 acres in size.

Typically, the surface layer is brown fine sandy loam about 2 inches thick. The subsurface layer is yellowish brown fine sandy loam to a depth of about 8 inches. The subsoil is strong brown loam to a depth of about 18 inches; mottled, strong brown loam to a depth of about 38 inches; mottled, strong brown clay loam to a depth of about 50 inches; and mottled, red sandy clay loam to a depth of about 72 inches.

Natural fertility is low, and organic matter content is low to moderate. The surface layer is slightly acid to strongly acid, and the subsoil in the upper part is medium acid to very strongly acid and in the lower part is medium acid or strongly acid. Permeability is moderately slow, and the available water capacity is medium to high. Runoff is rapid, and erosion is a severe hazard. Grasses on this soil respond well to fertilization.

Included with this soil in mapping are a few small areas of Boden, Brockwell, Lily, Peridge, and Wideman soils.

This Portia soil is poorly suited to cultivated crops. Adapted crops are small grains. The main limitation is a very severe hazard of erosion.

This soil is moderately suited to use as pasture, and it is used mainly as pasture. Adapted pasture plants include bermudagrass, lespedeza, and tall fescue. There are no significant limitations.

This soil is well suited to use as woodland. Adapted trees are shortleaf pine, sweetgum, loblolly pine, and red and black oak. There are no significant limitations.

This soil is moderately suited to poorly suited to most urban uses. Moderately slow permeability is a severe limitation for septic tank absorption fields. Slope is a moderate limitation for dwellings and local roads and streets. Slope is a severe limitation for small commercial buildings. The limitations generally can be overcome by proper engineering design.

This soil is in capability subclass IVe and in woodland suitability group 3o7.

25—Ramsey-Lily-Rock outcrop complex, 3 to 12 percent slopes. This complex consists of gently sloping to moderately sloping soils and areas of Rock outcrop. The Ramsey soil, Lily soil, and areas of Rock outcrop are so intricately mixed that they could not be mapped separately at the scale selected for mapping. The mapped areas of this complex range from about 10 to 100 acres in size. Individual areas of each soil and of Rock outcrop range from 3 to 20 acres in size.

The Ramsey soil makes up about 40 percent of the complex, the Lily soil makes up 15 percent, Rock outcrop makes up 15 percent, and the included soils make up 30 percent.

Typically, the surface layer of the Ramsey soil is dark brown gravelly fine sandy loam about 3 inches thick. The subsoil is strong brown gravelly loam. It extends to a depth of about 10 inches. Hard, acid sandstone is below a depth of 10 inches.

The Ramsey soil is shallow and somewhat excessively drained. Natural fertility and organic matter content are low. Reaction is strongly acid or very strongly acid throughout. Permeability is rapid, and the available water capacity is very low. Runoff is rapid and erosion is a very severe hazard if this soil is not protected.

Typically, the surface layer of the Lily soil is brown fine sandy loam about 3 inches thick. The subsurface layer, to a depth of 10 inches, is yellowish brown fine sandy loam. The subsoil is brownish yellow loam to a depth of 22 inches and yellowish red sandy clay loam to a depth of about 34 inches. Sandstone in shades of red, brown, yellow, and gray is at a depth of 34 to 37 inches.

The Lily soil is moderately deep and well drained. Natural fertility and organic matter content are low. Reaction is strongly acid or very strongly acid throughout. Permeability is moderately rapid, and the available water capacity is low.

Typically, Rock outcrop consists of exposed soft or hard, acid sandstone. In some areas there are large sandstone boulders on the surface (fig. 9).

Included in mapping this complex are small areas of Boden, Brockwell, and Portia soils. Also included are a few small areas of soils similar to the Ramsey soil except that the subsoil is gray and areas of soils that are shallower to bedrock than the Ramsey soil.

The soils making up this complex generally are not suited to cultivated crops and are poorly suited to pasture. Shallowness to bedrock, surface stones, and rock outcrops limit these soils to use as wildlife habitat, rangeland, woodland, and recreation areas.

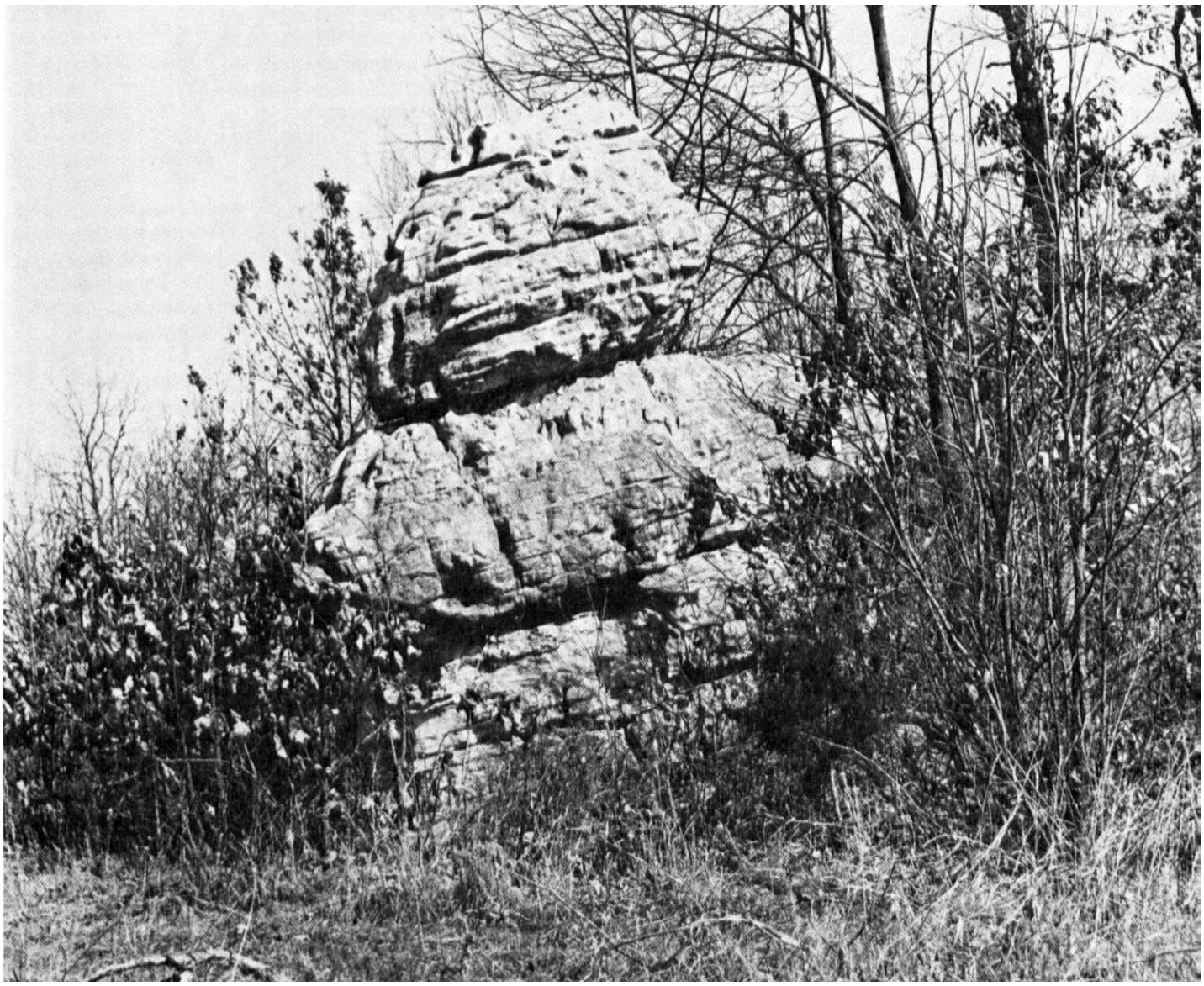


Figure 9.—Sandstone outcrops in an area of Ramsey-Lily-Rock outcrop complex, 3 to 12 percent slopes. The outcrops are a severe limitation to most uses.

These soils are used mainly as woodland consisting of scattered low-grade scrub hardwoods, cedars, and pine and sparse stands of native prairie plants, shrubs, lichens, mosses, cacti, and other succulents in the openings. These soils should not be cleared. The hazard of erosion is severe if the native vegetation is removed.

The Ramsey soil is poorly suited to use as woodland. Adapted trees are shortleaf pine and eastern redcedar. Seedling mortality is severe.

The Lily soil is moderately suited to use as woodland. Adapted trees are red oak, shortleaf pine, loblolly pine, and black walnut. There are only slight limitations.

The Ramsey soil is poorly suited to most urban uses. Shallowness to rock is a severe limitation for septic tank absorption fields, dwellings, small commercial buildings, and local roads and streets. This limitation generally is difficult or impractical to overcome.

The Lily soil is moderately suited to most urban uses. Depth to rock is a severe limitation for septic tank

absorption fields. Depth to rock is a moderate limitation for dwellings, small commercial buildings, and local roads and streets. Slope also is a moderate limitation for small commercial buildings. These limitations generally can be overcome by proper engineering design.

These soils are in capability subclass VIe; the Ramsey soil is in woodland suitability group 5d3, the Lily soil is in woodland suitability group 4o7, and Rock outcrop was not assigned to a woodland suitability group.

26—Razort loam, frequently flooded. This is a deep, well drained, level soil on bottom lands and terraces. Individual areas range from about 15 to 250 acres in size. The slope is 0 to 1 percent.

Typically, the surface layer is dark brown loam about 8 inches thick. The subsoil is dark brown silt loam to a depth of about 19 inches; mottled, dark brown, silt loam to a depth of about 28 inches; and dark brown silty clay loam to a depth of about 38 inches. The underlying material is variegated brown and gray gravelly clay loam and very gravelly sandy clay loam.

Natural fertility is high, and the organic matter content is medium. The surface layer is slightly acid or neutral, and the subsoil and underlying material are medium acid to neutral. Permeability is moderate, and the available water capacity is high. From December through April this soil is subject to frequent flooding for brief periods. Crops on this soil respond well to fertilization, and tilth is easy to maintain.

Included with this soil in mapping are a few small areas of Hontas, Peridge, Sturkie, and Wideman soils. Also included are a few small areas where the surface layer is sandy. Also included are areas where there is gravel throughout and where bedrock is at a depth of 40 to 50 inches.

This soil is not suited to cultivated crops because flooding is a severe hazard.

This soil is well suited to use as pasture, and it is used mainly as pasture. Adapted grasses are fescue and bermudagrass. Flooding is a hazard from December through April. Grazing should be restricted to the drier seasons.

This soil is well suited to use as woodland. Adapted trees are eastern cottonwood, shortleaf pine, southern red oak, American sycamore, and white oak. There are only slight limitations.

This soil is poorly suited to most urban uses. Flooding is a severe limitation for septic tank absorption fields, dwellings, small commercial buildings, and local roads and streets. The limitations generally are difficult or impractical to overcome.

This soil is in capability subclass Vw and in woodland suitability group 2o7.

27—Sturkie silt loam, frequently flooded. This is a deep, well drained, level soil on flood plains and natural levees along streams. Individual areas range from about 20 to 350 acres in size. The slope is 0 to 1 percent.

Typically, the surface layer is dark brown silt loam about 18 inches thick. The subsoil is dark brown silt loam to a depth of about 30 inches and dark yellowish brown silty clay loam to a depth of about 52 inches. The underlying material is mottled, dark brown, silty clay loam to a depth of 72 inches or more.

Natural fertility is high, and the organic matter content is low to medium. Reaction ranges from slightly acid to mildly alkaline throughout. Permeability is moderate, and the available water capacity is high. From late in winter to early in spring, this soil is subject to frequent flooding for short periods. Crops on this soil respond well to fertilization, and tilth is easy to maintain.

Included with this soil in mapping are a few small areas of Hontas, Peridge, Razort, and Wideman soils. Also included are a few small areas where gravel is on the surface and in the subsoil. Also included are a few small areas that are not subject to flooding.

This soil is poorly suited to use as cropland. Adapted crops are corn, soybeans, and grain sorghum. Frequent flooding late in winter and early in spring is the main limitation. In spring, surface wetness can delay planting for several days.

This soil is well suited to use as pasture, and it is used mainly as pasture (fig. 10). Adapted pasture plants are mainly bermudagrass and tall fescue. In late winter and early spring, surface wetness and flooding are the main limitations. These limitations generally can be overcome by scheduling grazing on this soil during drier seasons.

This soil is well suited to use as woodland. Adapted trees are southern red oak, white oak, American sycamore, and eastern cottonwood. There are no significant limitations.

This soil is poorly suited to most urban uses. Flooding is a severe limitation for dwellings, local streets and roads, small commercial buildings, and septic tank absorption fields. The limitations are difficult or impractical to overcome.

This soil is in capability subclass IVw and in woodland suitability group 2o4.

28—Wideman loamy sand-fine sandy loam, frequently flooded. This is a deep, excessively drained, level soil on flood plains and natural levees along streams. The slope is 0 to 1 percent. Individual areas range from about 10 to 300 acres in size.

Typically, the surface layer is dark yellowish brown. It ranges from loamy sand to fine sandy loam. The underlying material to a depth of about 72 inches consists of strata of fine sandy loam, sandy loam, loamy very fine sand, or loamy fine sand that is light yellowish brown, yellowish brown, dark yellowish brown, pale brown, yellow, brownish yellow, or light gray.

Natural fertility and organic matter content are low. Reaction is very strongly acid to medium acid in the

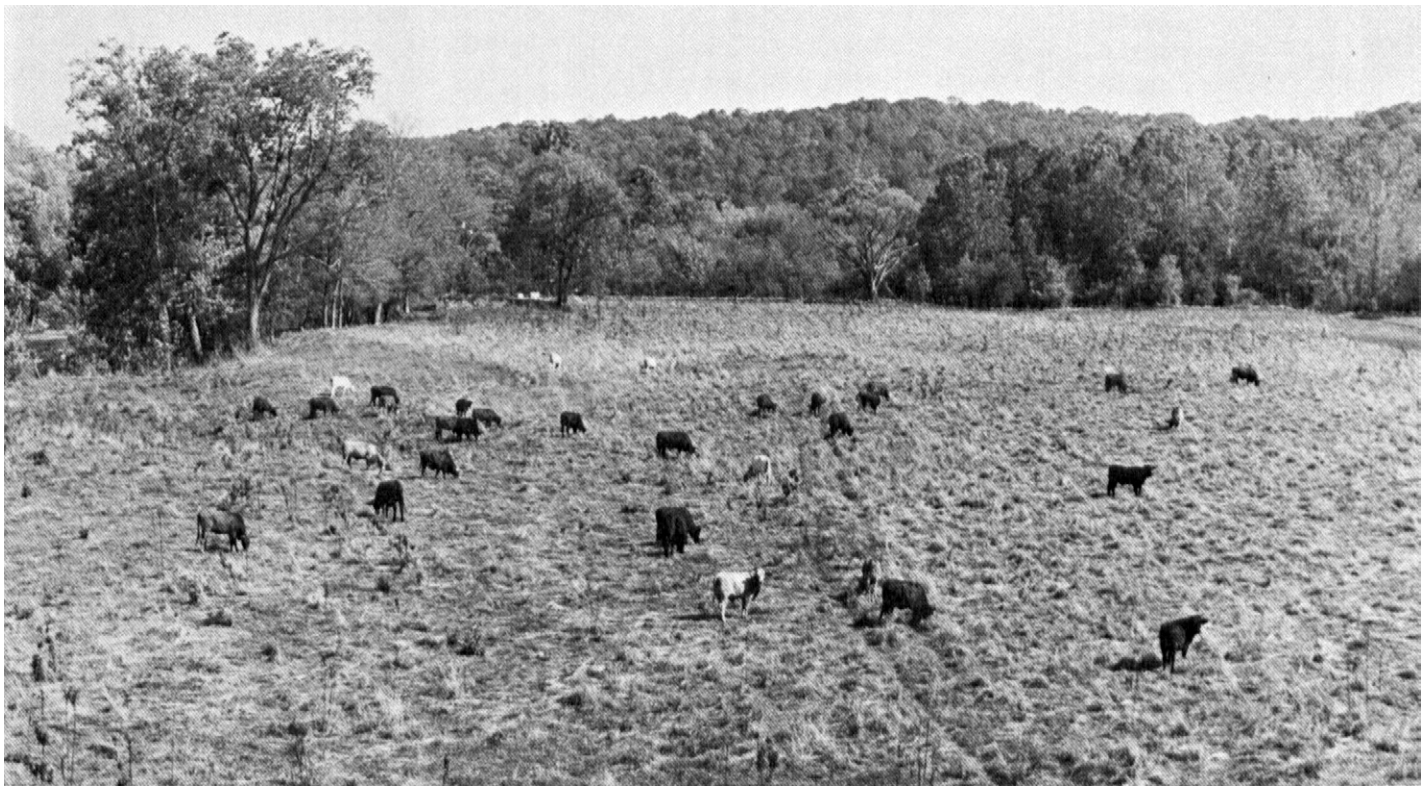


Figure 10.—Bermudagrass pasture on Sturkie silt loam, frequently flooded. The soil is well suited to use as pasture, although late in winter and early in spring it is wet and subject to flooding.

surface layer and strongly acid to neutral in the underlying material. Permeability is moderately rapid, and the available water capacity is low. Runoff is slow. From December through May, the soil is subject to frequent flooding of short duration. Grasses on this soil respond well to fertilizers.

Included with this soil in mapping are a few small areas of Hontas, Razort, and Sturkie soils. Also included are a few small areas of coarse white sand that is stratified with gravel in some places.

This Wideman soil is not suited to cultivated crops because flooding is a severe hazard.

This soil is moderately suited to use as pasture, and it is used mainly as pasture. Adapted pasture plants include bermudagrass and fescue. From December through May, flooding is the main limitation. This limitation generally can be overcome by scheduling grazing during drier seasons.

This soil is well suited to use as woodland. Adapted trees are eastern cottonwood, American sycamore, loblolly pine, shortleaf pine, and sweetgum. The equipment limitation and seedling mortality are moderate.

This soil is poorly suited to most urban uses. Frequent flooding is a severe limitation for septic tank absorption fields, dwellings, small commercial buildings, and local roads and streets. This limitation generally is difficult or impractical to overcome.

This soil is in capability subclass Vw and in woodland suitability group 3s8.

29—Woolper silt loam, 1 to 5 percent slopes. This is a deep, well drained, nearly level to gently sloping soil on foot slopes and fans. Individual areas range from about 18 to 225 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 5 inches thick. The subsoil is very dark grayish brown and dark brown silty clay loam to a depth of about 23 inches; mottled, yellowish brown clay to a depth of about 48 inches; and mottled red, light olive brown, gray, and grayish brown clay to a depth of about 65 inches. Below that, there is partly weathered limestone that has a few pockets of light olive brown, gray, and red clay, grading to hard limestone and shale.

Natural fertility and the organic matter content are high. Reaction ranges from mildly alkaline to slightly acid throughout. Permeability is moderately slow, and the available water capacity is high. Crops on this soil respond well to fertilization, and tilth is easy to maintain.

Included with this soil in mapping are a few small areas of Gassville, Gepp, and Sturkie soils. Also included are a few small areas where the surface is cherty. Also included are a few small areas where limestone and calcareous shale are at a depth of 50 inches or less.

This Woolper soil is well suited to cultivated crops. The moderate hazard of erosion is the main limitation. In spring, wetness can delay planting of crops in lower areas.

This soil is well suited to use as pasture, and it is used mainly as pasture. Adapted grasses are alfalfa, clover, fescue, and improved bermudagrass. There are no significant limitations.

This soil is well suited to use as woodland. Adapted trees are southern red oak, white oak, hickory, black walnut, and eastern redcedar. The equipment limitation is moderate.

This soil is moderately suited to poorly suited to most urban uses. Moderately slow permeability is a severe limitation for septic tank absorption fields. The moderate shrink-swell potential is a moderate limitation for dwellings and small commercial buildings. Low strength is a severe limitation for local roads and streets. Most of the limitations can be overcome by proper engineering design.

This soil is in capability subclass IIe and in woodland suitability group 2c8.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, state, and federal levels, as well as individuals, must encourage and facilitate the wise use of our nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to producing food, feed, forage, fiber, and oilseed crops. Such soils have properties that are favorable for the economic production of sustained high yields of crops. The soils need only to be treated and managed using acceptable farming methods. The moisture supply, of course, must be adequate, and the growing season has to be sufficiently long. Prime farmland soils produce the highest yields with minimal inputs of energy and economic resources, and farming these soils results in the least damage to the environment.

Prime farmland soils may presently be in use as cropland, pasture, or woodland, or they may be in other uses. They either are used for producing food or fiber or are available for these uses. Urban or built-up land and water areas cannot be considered prime farmland. Urban or built-up land is defined as any contiguous unit of land 10 acres or more in size that is used for nonfarm uses including housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water control structures.

Prime farmland soils usually get an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The acidity or alkalinity level of the soils is acceptable. The soils have few or no rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not subject to frequent flooding during the growing season. The slope ranges mainly from 0 to 6 percent.

Soils that have a high water table, are subject to flooding, or are droughty may qualify as prime farmland soils if the limitations or hazards are overcome by drainage, flood control, or irrigation. Onsite evaluation is necessary to determine the effectiveness of corrective measures. More information on the criteria of prime farmland soils can be obtained at the local office of the Soil Conservation Service.

About 26,900 acres, or nearly 7 percent of the county, is prime farmland. The areas are along the larger streams throughout the county, on gently sloping mountaintops and ridgetops in the southeastern part of the county, and on broad uplands in the northeastern part of the county. The areas are mainly in map units 2, 6, and 7 on the general soil map. Most of the acreage is used for pasture and hay. A small acreage is used for truck crops and row crops.

A recent trend in land use nationwide has been the conversion of prime farmland to urban and industrial uses. However, this trend has not affected the prime farmland in Sharp County. Urban expansion in Sharp County has taken place mainly in areas where there is little or no prime farmland. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, or difficult to cultivate and less productive than prime farmland.

The following map units, or soils, make up prime farmland in Sharp County. The location of each map unit is shown on the detailed soil maps at the back of this publication. The extent of each unit is given in table 4. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

6 Captina silt loam, 2 to 6 percent slopes
19 Lily fine sandy loam, 3 to 8 percent slopes
23 Portia fine sandy loam, 3 to 8 percent slopes
28 Woolper silt loam, 1 to 5 percent slopes

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

About 139,000 acres in the survey area is used for crops and pasture. Of this total, about 10,000 acres is harvested cropland and the rest is pasture.

Most cleared areas are used for pasture and hay. The acreage in clean-tilled row crops is small. The soils that are well suited to row crops are those on bottom lands and terraces along the Strawberry River, on terraces above the flood plains along smaller streams, and in gently sloping areas on uplands. The main crops are soybeans, corn, and small grains.

Some gently sloping to moderately sloping soils on uplands are moderately suited to well suited to drilled or sown crops. The main crops are oats, wheat, and grain sorghum.

Most soils in the survey area are poorly suited or not suited to intensive use because of stones on the surface, slope, shallowness to bedrock, the high content of coarse fragments in the soil, or a combination of these limitations.

On sloping soils used for tilled crops, contour farming, grassed waterways, and terraces are needed. Annual cover crops or grasses and legumes should be included regularly in the cropping system if the hazard of erosion is severe or very severe.

If the soils are left bare, in most areas the soils tend to pack and crust over after heavy rains. Cover crops and crop residue help to maintain good tilth. Crop residue should be shredded and spread evenly to provide a protective cover for the soils and to add active organic matter to the soils. Minimum tillage should be practiced to the extent practical for the soil conditions and for the requirements of the crop.

The soils on uplands generally are low in nitrogen, potassium, phosphorus, calcium, and organic matter. The kinds and amounts of fertilizer applied generally should be based on the results of soil tests, kinds of crops, past experience, potential productivity of the soil, and expected yields. On most soils, periodic applications of lime, based on the results of soil tests, help most crops and generally are needed for satisfactory production of

alfalfa, white clover, red clover, vegetables, and other specialty crops.

A small but important acreage is in commercial and home orchards and in home gardens. Homegrown fruit and vegetables are canned or frozen for home use. Specialty crops, such as watermelons, strawberries, tomatoes, and sweet corn, are grown for cash sale at local farmers markets.

Perennial grasses or mixtures of grasses and legumes are grown for pasture and hay. The mixtures consist generally of either a warm-season or a cool-season perennial grass and a suitable legume.

Tall fescue, the pasture grass most commonly grown in the county, is a cool-season perennial. It is propagated by seeding, usually in the fall. Common bermudagrass, hybrid bermudagrasses, and lovegrass are warm-season perennials. Common bermudagrass is propagated by either seeding or sprigging, usually in the spring. The hybrid bermudagrasses are usually sprigged because stands started by seeding are more susceptible to winterkill. Lovegrass is always seeded. Red clover and white clover are the most commonly grown legumes. Alfalfa is suitable on the fertile, well drained Sturkie and Peridge soils on bottom lands and terraces.

Proper grazing is essential to stand survival, erosion control, and the production of high quality forage. Maintaining sufficient topgrowth on the plants during the growing season is essential for vigorous, healthy growth. Restricted grazing of tall fescue and other cool-season grasses may be necessary during the hot, dry summer months. Brush control is essential, and weed control generally is needed. Rotation grazing and renovation of pasture are also important.

Pasture grasses respond well to nitrogen fertilizer. Mixtures of grass and legumes sometimes require phosphate, potash, and agricultural lime at rates based on the results of soil tests.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that insures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 or IIIe-6.

The capability classification of each map unit is given in the section "Detailed Soil Map Units."

Woodland Management and Productivity

Kelly M. Koonce, forester, Soil Conservation Service, helped to prepare this section.

The total area of Sharp County is 388,429 acres. Of this total, 67 percent, or 259,172 acres, is forest (*3*). Public forests cover 13,801 acres, industrial forests cover 14,990 acres, and farmer-owned and other privately owned forests cover 230,381 acres (*3*).

Commercial forests in the county have good to poor stands. Generally, the better stands are on deep soils and on moderately deep soils on north facing slopes. Broadleaved trees are dominant, and needleleaved trees are in scattered stands.

There are 28 manufacturers of wood products in the county. The manufacturers are small in size but have a significant economic impact. Wood products include lumber for furniture, crossties, fenceposts, handles, and fuelwood (fig. 11).

The woodland has significant esthetic and recreational value. It also provides wildlife habitat and grazing areas for domestic animals and protects soil and water resources.

Table 6 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol (woodland suitability) for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low.

The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: x, w, d, c, s, f, and r.

The third element in the symbol, a numeral, indicates the kind of trees for which the soils in the group are best suited and also indicates the severity of the hazard or limitation. The numerals 1, 2, and 3 indicate slight, moderate, and severe limitations, respectively, and suitability for needleleaved trees. The numerals 4, 5, and 6 indicate slight, moderate, and severe limitations, respectively, and suitability for broadleaved trees. The numerals 7, 8, 9 indicate slight, moderate, and severe limitations, respectively, and suitability for both needleaved and broadleaved trees.

In table 6, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Figure 11.—Forest products of the county consist mainly of hardwood lumber for furniture, crossties, fenceposts, handles, and fuelwood.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index was determined at 30 years of age for eastern cottonwood, 35 years for American sycamore, and 50 years for all other species. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suited to the soils and to commercial wood production.

Recreation

Many areas in Sharp County are suited to recreation uses. Areas along the Spring River are used as sites for vacation houses and as picnic areas (fig. 12).

The Spring River, the Strawberry River, other streams, and several large reservoirs in the county are used for boating, swimming, and fishing (fig. 13).

The soils of the survey area are rated in table 7 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning

recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 7, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 7 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 10 and interpretations for dwellings without basements and for local roads and streets in table 9.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Figure 12.—There are numerous picnic areas throughout the county. Most are near streams or small lakes.

Figure 13.—Lakes in the vicinity of Cherokee Village offer opportunities for boating and other water-based recreation.

Wildlife Habitat

Paul M. Brady, biologist, Soil Conservation Service, helped to prepare this section.

Wildlife habitat in Sharp County consists of abundant hardwood forests, interspersed pastures, fence rows, and numerous strips of vegetation along the edges of fields.

About 67 percent of the county, about 259,000 acres, is forest. Oak-hickory type on uplands and oak-gum type on lowlands make up approximately 80 percent of the forested areas. Shortleaf pine and eastern redcedar make up about 20 percent.

Nearly 24 percent of the county, about 94,000 acres, is pasture. The pasture plants are mainly fescue, common bermudagrass, and annual lespedeza. About 35,000 acres is range. The range plants are broomsedge and big and little bluestem.

Approximately 10,000 acres is cropland. The main crops are soybeans, grain sorghum, watermelons, and wheat. Most of the cropland is along the Strawberry River in the southern part of the county.

Local plants that are important to wildlife in the county include woolly croton, bush and annual lespedeza, sericea lespedeza, milk pea, panicgrass, partridge pea, paspalum, ragweed, tick clover, sumac, and vetches. Some overstory and understory woody plants important to wildlife are oak, hickory, hackberry, shortleaf pine, redcedar, elderberry, grapes, dogwood, blackberry, greenbrier, honeysuckle, persimmon, black walnut, and wild cherry.

Habitat is plentiful for white-tailed deer, squirrels, bobwhite quail, raccoon, coyote, opossum, fox, wild turkey, rabbits, owls, hawks, and a multitude of nongame birds, small mammals, reptiles, and other wildlife. Habitat is especially plentiful for deer and turkey. Turkeys, which

are already abundant, are increasing. Deer have been abundant for years.

About 12,000 acres in Cherokee Village are used as a private wildlife refuge, mainly for deer, but also for many other game and nongame species.

The Harold Alexander Wildlife Management Area, owned and managed by the Arkansas Game and Fish Commission, provides habitat for deer, quail, rabbits, squirrels, and other wildlife on 13,006 acres in the central part of the county.

An estimated 1,200 ponds cover about 300 acres in the county. They are used primarily for stock watering and for sportfishing for largemouth bass, bluegill, redear sunfish, and channel catfish. These and other species are also found in nearly 800 acres of lakes that each cover more than 5 acres.

There are about 114 miles of streams in the county. The largest of these are the Spring River, Strawberry River, and South Fork of the Spring River. Other streams are Rock Creek, Big Creek, and Martin's Creek. All of these streams provide habitat and fishing for smallmouth bass, spotted bass, rock bass, white sucker, sculpins, and other cool-water species.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 8, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and grama.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, grapes, hawthorn, dogwood, hickory, and blackberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine and cedar.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow

water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Engineering

James L. Janski, assistant state conservation engineer, Soil Conservation Service, helped prepare this section.

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations must be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 9 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the

year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Sanitary Facilities

Table 10 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 10 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 10 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on

the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 10 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plant growth. Material from the surface layer, therefore, should be stockpiled for use as the final cover.

Construction Materials

Table 11 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 11, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 12 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a

cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 13 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture (*4*). These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The

estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 14 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 14, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 15 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 15 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs, on the average, no more than once in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 15 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 15.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and

electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*5*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 16 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udult (*Ud*, meaning humid, plus *ult*, from Ultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludults (*Hapl*, meaning minimal horizonation, plus *udult*, the suborder of the Ultisols that have an udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, siliceous, mesic Typic Hapludults.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (*4*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*5*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Arkana Series

The Arkana series consists of moderately deep, well drained, very slowly permeable soils on gently sloping to moderately sloping limestone ridges and hillsides. The soils formed in clayey residuum of cherty limestone bedrock. The native vegetation is mainly hardwoods. The dominant trees are eastern red cedar, blackjack oak, post oak, and elm. The slope ranges from 3 to 12 percent.

Arkana soils are near Clarksville, Gepp, Moko, and Ventris soils. Clarksville soils are on adjacent steep side slopes and ridgetops, have a loamy-skeletal control

section, and do not have a mollic surface horizon. Gepp soils are in adjacent hilly areas, are more than 60 inches deep to limestone bedrock, and do not have a mollic surface horizon. Moko soils and Arkana soils are on a similar landscape. Moko soils have a loamy-skeletal control section and are less than 20 inches deep to bedrock. Ventris soils are on adjacent hilltops, hillsides, and benches. They are moderately well drained and do not have a mollic surface horizon.

Typical pedon of Arkana cherty silt loam, in an area of Arkana-Moko complex, 3 to 12 percent slopes, in a moist wooded area, SW1/4SW1/4NW1/4 sec. 25, T. 17 N., R. 5 W.

O—1/2 inch to 0; partly decomposed cedar and hardwood leaves and twigs.
A1—0 to 4 inches; very dark grayish brown (10YR 3/2) cherty silt loam; weak medium granular structure; very friable; about 25 percent, by volume, chert and limestone fragments as much as 10 inches in diameter; medium acid; abrupt smooth boundary.
A2—4 to 8 inches; dark brown (10YR 4/3) cherty silt loam; moderate medium granular structure; friable; many fine and medium roots; many fine pores; about 30 percent, by volume, chert and limestone fragments 1/2 inch to 4 inches in diameter; medium acid; abrupt smooth boundary.
B21t—8 to 14 inches; yellowish red (5YR 4/6) cherty silty clay loam; moderate medium subangular blocky structure; firm; few thin patchy clay films on faces of peds and in pores; about 15 percent, by volume, chert and limestone fragments as much as 4 inches in diameter; slightly acid; clear wavy boundary.
B22t—14 to 20 inches; red (2.5YR 4/6) cherty clay; moderate medium subangular blocky structure; firm; plastic; continuous distinct clay films on faces of peds; about 15 percent, by volume, chert and limestone fragments as much as 4 inches in diameter; few fine dark concretions; neutral; gradual wavy boundary.
B23t—20 to 26 inches; red (2.5YR 4/6) cherty clay; few medium prominent dark yellowish brown (10YR 4/6) mottles; moderate medium subangular blocky structure; firm, plastic; continuous distinct clay films on faces of peds and in pores; about 30 percent, by volume, chert and limestone fragments; mildly alkaline; abrupt smooth boundary.
R—26 to 28 inches; gray, hard, fractured limestone.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. Reaction ranges from mildly alkaline to medium acid throughout.

The A1 or Ap horizon has hue of 10YR, value of 3, and chroma of 2 or 3. The A2 horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. The A horizon is cherty silt loam or very cherty silt loam. It ranges from 7 to 17 inches in thickness. Coarse fragments make up 15 to 50 percent of the volume.

The Bt horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 4, 6, or 8. In some places it has mottles or relict fragments of bedrock that are brown or yellow. It is silty clay loam, silty clay, clay, or the cherty analogs. Coarse fragments make up 0 to 35 percent of the volume.

The C horizon is mottled red, brown, and gray partly weathered limestone. In some pedons there is no C horizon.

Boden Series

The Boden series consists of deep, well drained, moderately slowly permeable, gently sloping to moderately steep soils on hilltops and hillsides. The soils formed in residuum overlying sandstone. The native vegetation is mainly hardwoods. The dominant trees are red oak, blackjack oak, post oak, hickory, and shortleaf pine. The slope ranges from 3 to 20 percent.

Boden soils are near Brockwell, Lily, and Portia soils. Brockwell and Boden soils are on a similar landscape. Brockwell soils are at somewhat lower elevations than Boden soils, have a coarse-loamy control section, and are more than 60 inches deep to bedrock. Lily and Boden soils are on a similar landscape. Lily soils have a fine-loamy control section and are less than 40 inches deep to bedrock. Portia and Boden soils also are on a similar landscape. Lily soils are at lower elevations, have a fine-loamy control section, and are more than 60 inches deep to bedrock.

Typical pedon of Boden stony fine sandy loam, 8 to 20 percent slopes, in a moist wooded area, SW1/4SE1/4NE1/4 sec. 28, T. 17 N., R. 6 W.

A1—0 to 2 inches; dark grayish brown (10YR 4/2) stony fine sandy loam; weak fine granular structure; very friable; about 25 percent, by volume, sandstone fragments 1/2 to 15 inches in diameter; strongly acid; clear smooth boundary.
A2—2 to 7 inches; yellowish brown (10YR 5/4) stony fine sandy loam; weak medium granular structure; very friable; common fine roots; many fine and medium pores; about 20 percent, by volume, sandstone fragments 1/2 to 15 inches in diameter; very strongly acid; clear smooth boundary.
B1—7 to 14 inches; yellowish red (5YR 5/6) stony sandy clay loam; weak medium subangular blocky structure; friable; common fine roots; common fine pores; about 15 percent, by volume, sandstone fragments 3 to 15 inches in diameter; very strongly acid; clear smooth boundary.
B21t—14 to 20 inches; red (2.5YR 4/6) sandy clay; few medium prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; few fine and medium roots; few fine pores; continuous distinct clay films on faces of peds; about 10 percent, by volume, sandstone

fragments 3 to 6 inches in diameter; very strongly acid; clear wavy boundary.
B22t—20 to 39 inches; red (2.5YR 4/6) sandy clay; common medium prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; continuous distinct clay films on faces of peds; about 10 percent, by volume, sandstone fragments 1/2 to 3 inches in diameter; very strongly acid; gradual wavy boundary.
B23t—39 to 45 inches; red (10R 4/6) sandy clay loam; common medium faint red (2.5YR 4/6) and common medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few patchy clay films on faces of peds; about 10 percent, by volume, sandstone fragments; very strongly acid; clear wavy boundary.
C—45 to 56 inches; red (10R 4/6) sandy loam; common medium prominent yellowish brown (10YR 5/8) mottles; streaks or bands of light gray (10YR 7/2) material; massive; friable; about 10 percent, by volume, sandstone fragments; very strongly acid; gradual smooth boundary.
R—56 to 60 inches; unweathered, hard, acid sandstone.

The solum ranges from 36 to 50 inches in thickness. Hard bedrock ranges from 40 to 60 inches in depth. Reaction is strongly acid or very strongly acid throughout.

The A horizon is 5 to 11 inches thick. The A1 horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. The A2 horizon has hue of 10YR, value of 4, 5, or 6, and chroma of 3 or 4; or hue of 7.5R, value of 5, and chroma of 6. The A horizon is fine sandy loam or stony fine sandy loam. Coarse fragments make up 0 to 25 percent of the volume.

The B1 horizon has hue of 7.5YR, value of 5, and chroma of 6 or 8; or hue of 5YR, value of 4 or 5, and chroma of 6 or value of 5, and chroma of 8. It is fine sandy loam or sandy clay loam or their stony analogs. Coarse fragments make up 0 to 20 percent of the volume.

The B2t horizon has hue of 5YR, 2.5YR, or 10R, value of 4 or 5, and chroma of 6 or 8. It has mottles in shades of brown and red. It is sandy clay or clay in the upper part and sandy clay loam, sandy clay, or their gravelly analogs in the lower part. Coarse fragments make up 0 to 10 percent of the volume in the upper part and 0 to 30 percent of the volume in the lower part.

The C horizon is mottled or variegated in shades of red and brown. It is sandy loam or sandy clay loam. Coarse sandstone fragments make up 0 to 10 percent of the volume.

Brockwell Series

The Brockwell series consists of deep, well drained, moderately permeable, gently sloping soils on uplands. The soils formed in residuum of sandstone bedrock. The native vegetation is hardwoods and pine. The slope is 3 to 8 percent.

Brockwell soils are near Boden, Lily, Portia, and Ramsey soils, and all are on a similar landscape. Boden soils are at slightly higher elevations, have a clayey control section, and are less than 60 inches deep to bedrock. Lily soils are at somewhat higher elevations, have a fine-loamy control section, and are less than 40 inches deep to bedrock. Portia soils have a fine-loamy control section. Ramsey soils do not have an argillic horizon and are less than 20 inches deep to bedrock.

Typical pedon of Brockwell fine sandy loam, 3 to 8 percent slopes, in a moist pasture, NE1/4NE1/4SW1/4 sec. 36, T. 16 N., R. 6 W.

Ap—0 to 7 inches; dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable; common fine roots; strongly acid; abrupt smooth boundary.
A2—7 to 15 inches; brown (10YR 5/3) fine sandy loam; weak fine granular structure; very friable; common fine roots; many fine pores; very strongly acid; clear wavy boundary.
B21t—15 to 31 inches; strong brown (7.5YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable; few thin continuous distinct clay films on faces of peds; common fine and medium roots; common fine pores; very strongly acid; gradual wavy boundary.
B22t—31 to 47 inches; strong brown (7.5YR 5/6) loam; common medium prominent pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; friable; continuous distinct clay films on faces of peds; few fine roots; few fine vascular pores; few pockets of uncoated sand grains; very strongly acid; gradual smooth boundary.
B23t—47 to 69 inches; mottled red (2.5YR 4/6), yellowish red (5YR 4/6), and strong brown (7.5YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; thin continuous distinct clay films on faces of peds and clay bridging between sand grains; common fine pores; common pockets and vertical streaks of uncoated sand grains; very strongly acid; gradual smooth boundary.
B24t—69 to 88 inches; mottled red (2.5YR 4/6), red (10R 4/6), and strong brown (7.5YR 5/6) sandy clay loam; massive parting to weak medium subangular blocky structure; very friable; about 15 percent, by volume, angular sandstone fragments; light gray (10YR 7/1) clay balls and streaks of clean sand grains; few vertical cracks filled with material from above; strongly acid; abrupt smooth boundary.
R—88 to 90 inches; acid sandstone.

The solum ranges from 60 to more than 80 inches in thickness. Reaction ranges from medium acid to very strongly acid throughout.

The A horizon has hue of 10YR, value of 4, 5, or 6, and chroma of 3 or 4. It is 8 to 16 inches thick. Coarse fragments make up 0 to 15 percent of the volume.

The B horizon has hue of 7.5YR, 5YR, or 10YR, value of 4 or 5, and chroma of 6. It has mottles in shades of red, brown, or yellow. In some pedons it also has gray mottles in the lower part. It is fine sandy loam or loam, but in the lower part of the B horizon in some places it ranges to sandy clay loam. Coarse fragments make up 0 to 20 percent of the volume.

The C horizon is mottled or variegated red, brown, gray, and yellow. Coarse fragments make up 0 to 25 percent of the volume. In some pedons there is no C horizon.

Captina Series

The Captina series consists of deep, moderately well drained, slowly permeable soils on uplands and stream terraces. The soils formed in material that weathered from cherty limestone or in loess overlying limestone. The native vegetation is hardwoods. The slope is 2 to 6 percent.

Captina soils are near Clarksville, Doniphan, Gepp, and Peridge soils. Clarksville soils are at higher elevations than Captina soils, have a loamy-skeletal control section, and do not have a fragipan. Doniphan soils are at slightly higher elevations, have a clayey control section, and do not have a fragipan. Gepp soils are on hilltops and hillsides, have a very-fine control section, and are well drained. Peridge soils are on broad uplands or on stream terraces, do not have a fragipan, and are redder than Captina soils.

Typical pedon of Captina silt loam, 2 to 6 percent slopes, in a moist pasture, SE1/4SE1/4NW1/4 sec. 16, T. 21 N., R. 4 W.

Ap—0 to 5 inches; brown (10YR 5/3) silt loam; weak medium granular structure; friable; many fine roots; strongly acid; abrupt smooth boundary.

B21t—5 to 13 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; common fine roots; common fine pores; continuous distinct clay films on faces of peds and in pores; very strongly acid; clear wavy boundary.

B22t—13 to 24 inches; yellowish brown (10YR 5/6) silty clay loam; few medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; common fine roots; common fine pores; continuous distinct clay films on faces of peds and in pores; very strongly acid; clear smooth boundary.

Bx1—24 to 32 inches; yellowish brown (10YR 5/6) silty clay loam; few medium distinct gray (10YR 6/1) mottles; moderate medium subangular blocky structure; very firm; hard, compact, and brittle; common nearly vertical streaks or seams of gray material about one-half inch wide; few roots mainly in gray streaks or crevices; few fine pores; few clay films on faces of peds; few fine prominent yellowish red stains; few fine dark concretions; very strongly acid; clear wavy boundary.

Bx2—32 to 42 inches; mottled yellowish red (5YR 5/6), yellowish brown (10YR 5/6), and gray (10YR 6/1) silt loam; moderate medium subangular blocky structure; very firm; hard, compact, and brittle; common nearly vertical streaks of grayish brown material about one-fourth of an inch wide; few fine pores; few clay films on faces of peds; few fine dark concretions; very strongly acid; abrupt irregular boundary.

Bx3—42 to 60 inches; mottled yellowish red (5YR 4/6), yellowish brown (10YR 5/6), and light brownish gray (10YR 6/2) silt loam; moderate medium subangular blocky structure; firm; hard, compact, and brittle; common nearly vertical streaks of grayish brown material about one-half inch wide; few fine pores; few fine dark concretions; very strongly acid; abrupt irregular boundary.

Cr&Bx—60 to 72 inches; 50 percent, by volume, fragments of weathered chert and discontinuous bedded chert; mottled red (2.5YR 4/6), yellowish brown (10YR 5/6), gray (10YR 6/1), and grayish brown (10YR 5/2) very cherty silt loam; prismatic structure parting to weak medium subangular blocky; firm, about 55 percent, hard, compact, and brittle; common fine dark concretions; very strongly acid.

The solum ranges from 36 to 72 inches in thickness. Reaction is medium acid or strongly acid in the A horizon and strongly acid or very strongly acid in the B and C horizons.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is 4 to 10 inches thick.

The Bt horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 6 or 8. In some pedons it has strong brown or yellowish red mottles in the lower part. It is silt loam or silty clay loam.

The Bx horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 6 or 8. It has mottles in shades of gray or red; or it is evenly mottled in shades of red, brown, and gray. The horizon is silt loam or silty clay loam. Coarse fragments make up 0 to 15 percent of the volume in the upper part and 0 to 75 percent of the volume in the lower part.

The Cr&Bx horizon has hue of 10YR, 7.5YR, or 5YR, value of 5, and chroma of 4, 6, or 8; or it is evenly mottled in shades of red, brown, and gray. It is very cherty silt loam, silty clay loam, or silty clay.

Clarksville Series

The Clarksville series consists of deep, somewhat excessively drained, moderately sloping to steep soils on

side slopes and narrow ridgetops. The soils formed in residuum and in locally transported colluvial and alluvial material that weathered from cherty dolomite or cherty limestone. The native vegetation is mainly hardwoods. The dominant trees are black oak, white oak, hickory, ash, and dogwood. The slope ranges from 8 to 40 percent.

Clarksville soils are near Arkana, Captina, Doniphan, Gassville, Gepp, and Ventris soils. Arkana soils are on adjacent limestone ridges and side slopes and have a mollic surface horizon and a very-fine control section. Captina soils are on adjacent uplands and stream terraces and have a fine-silty control section and a fragipan. Doniphan soils are at adjacent slightly lower elevations than Clarksville soils, have a clayey control section, and are well drained. Gassville soils are on adjacent hilltops and hillsides, have a clayey control section, and are shallower to bedrock. Gepp soils are in adjacent hillier areas, have a very-fine control section, and are well drained. Ventris soils are on adjacent uplands and foot slopes around the base of hills, have a very-fine control section, and are shallower to bedrock.

Typical pedon of Clarksville very cherty silt loam, 20 to 40 percent slopes, in a moist pasture, SE1/4NW1/4SE1/4 sec. 18, T. 15 N., R. 5 W.

Ap—0 to 2 inches; dark grayish brown (10YR 4/2) very cherty silt loam; weak fine granular structure; very friable; many fine and medium roots; many fine pores; about 50 percent, by volume, angular and rounded chert fragments; strongly acid; clear smooth boundary.

A2—2 to 9 inches; yellowish brown (10YR 5/4) very cherty silt loam; weak medium granular structure; friable; many fine and medium roots; many fine pores; about 45 percent, by volume, angular and rounded chert fragments; very strongly acid; abrupt smooth boundary.

B21t—9 to 27 inches; strong brown (7.5YR 5/6) very cherty silty clay loam; weak medium subangular blocky structure; friable; few patchy clay films on faces of peds; few fine roots; few fine pores; about 45 percent, by volume, angular and rounded chert fragments; yellowish red stains; very strongly acid; clear wavy boundary.

B22t—27 to 37 inches; strong brown (7.5YR 5/6) very cherty silty clay loam; few medium prominent yellowish red (5YR 4/6) mottles; moderate medium subangular blocky structure; friable; continuous distinct clay films on faces of peds; about 65 percent, by volume, angular chert fragments; very strongly acid; clear wavy boundary.

B23t—37 to 57 inches; yellowish red (5YR 4/6) very cherty silty clay loam; common medium prominent yellowish brown (10YR 5/6) and gray (10YR 6/1) mottles; moderate medium subangular blocky structure; friable; continuous distinct clay films on faces of peds; about 70 percent, by volume, angular chert fragments; very strongly acid; gradual wavy boundary.

B24t—57 to 72 inches; yellowish red (5YR 4/6) very cherty silty clay; common medium prominent red (2.5YR 4/6), yellowish brown (10YR 5/6), and gray (10YR 6/1) mottles; moderate medium subangular blocky structure; firm; continuous distinct clay films on faces of peds; about 75 percent, by volume, angular chert fragments; very strongly acid.

The solum ranges from 60 to more than 100 inches in thickness. Reaction is strongly acid or very strongly acid throughout.

The A horizon ranges from 8 to 22 inches in thickness. The A1 horizon has hue of 10YR, value of 2, 3, 4, or 5, and chroma of 2 or 3. The A2 horizon has hue of 10YR, value of 4, 5, or 6, and chroma of 2, 3, or 4. Chert fragments make up 40 to 60 percent of the volume.

The B2t horizon has hue of 7.5YR, 5YR, or 2.5YR, value of 4 or 5, and chroma of 6. It has mottles in the lower part in shades of red, brown, and gray. It is very cherty silt loam, very cherty silty clay loam, or very cherty silty clay. Coarse fragments make up 35 to 85 percent of the volume.

In some pedons there is a C horizon that is mottled or variegated in shades of red, brown, yellow, and gray. It is silty clay loam, silty clay, or clay. Coarse fragments make up 40 to 90 percent of the volume.

Doniphan Series

The Doniphan series consists of deep, well drained, moderately permeable soils on hillsides, broad ridgetops, and plateaus. The soils formed in residuum of clayey shale or cherty limestone. The native vegetation is hardwood forest. The slope is 3 to 12 percent.

Doniphan soils are near Captina, Clarksville, Gassville, and Gepp soils. Captina soils are on adjacent uplands at a lower elevation and have a fragipan and a fine-silty control section. Clarksville soils are on adjacent higher steep side slopes and narrow ridgetops, have a loamy-skeletal control section, and are somewhat excessively drained. Gassville soils are on adjacent similar landscapes and are shallower to bedrock. Gepp soils are on adjacent similar landscapes and have a very-fine control section and a base saturation of more than 35 percent.

Typical pedon of Doniphan cherty silt loam, 3 to 8 percent slopes, in a moist pasture, SW1/4SW1/4NW1/4 sec. 3, T. 17 N., R. 6 W.

Ap—0 to 4 inches; brown (10YR 5/3) cherty silt loam; moderate fine granular structure; very friable; many fine roots; many fine and medium pores; about 30 percent, by volume, angular chert fragments; strongly acid; abrupt smooth boundary.

A2—4 to 8 inches; light yellowish brown (10YR 6/4) cherty silt loam; weak fine granular structure; very friable; many fine and medium roots; many fine pores; about 30 percent, by volume, angular chert fragments; very strongly acid; clear smooth boundary.

B21t—8 to 22 inches; strong brown (7.5YR 5/6) clay; moderate fine and strong medium subangular blocky structure; firm; few fine roots; few fine pores; few thin patchy clay films on faces of peds; about 5 percent, by volume, chert fragments; very strongly acid; clear wavy boundary.

B22t—22 to 40 inches; strong brown (7.5YR 5/6) clay; few fine distinct red (2.5YR 4/6) mottles; strong medium subangular blocky structure; very firm; few fine pores; continuous distinct clay films on faces of peds; about 5 percent, by volume, chert fragments; very strongly acid; gradual wavy boundary.

B23t—40 to 55 inches; mottled red (2.5YR 4/6) and yellowish brown (10YR 5/8) clay; few fine faint gray mottles; moderate fine subangular blocky structure; firm; plastic; continuous distinct clay films on faces of peds; few small concretions; very strongly acid; gradual wavy boundary.

B24t—55 to 62 inches; mottled red (2.5YR 4/6), yellowish brown (10YR 5/6), and light gray (10YR 7/1) clay; moderate fine and weak medium subangular blocky structure; very firm; few fine pores; continuous distinct clay films on faces of peds; about 5 percent, by volume, chert fragments; very strongly acid; gradual irregular boundary.

B25t&C—62 to 80 inches; variegated red (10R 4/6), light gray (10YR 7/1), gray (10YR 5/1), and brownish yellow (10YR 6/6) clay (B25t); massive parting to weak medium subangular blocky structure; very firm; continuous distinct clay films on faces of peds; about 50 percent, by volume, white weathered shalelike material (C).

The solum ranges from about 60 to more than 100 inches in thickness. Reaction is strongly acid or very strongly acid throughout.

The A1 horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3. The A2 horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. Coarse fragments make up 15 to 35 percent of the volume. The A horizon is 4 to 10 inches thick.

The B2t horizon has hue of 7.5YR, 5YR, and 2.5YR, value of 4 or 5, and chroma of 6 or 8. In the lower part it is mottled or variegated in shades of red, brown, yellow, and gray. It is silty clay or clay. Coarse fragments make up 0 to 10 percent of the volume.

The C horizon is mottled or variegated in shades of red, brown, and gray. It is silty clay or clay. Coarse fragments make up 0 to 20 percent of the volume. In some pedons there is no C horizon.

Gassville Series

The Gassville series consists of moderately deep to deep, well drained, very slowly permeable soils on hilltops and hillsides. The soils formed in material that weathered from limestone, siltstone, and shale. The native vegetation is hardwoods. The dominant trees are mainly blackjack oak, post oak, and hickory. The slope ranges from 3 to 20 percent.

Gassville soils are near Clarksville, Doniphan, Gepp, and Woolper soils. Clarksville soils are on ridgetops and adjacent side slopes in dissected hill areas, have a loamy-skeletal control section, and are deeper to bedrock than Gassville soils. Doniphan soils are on ridgetops, plateaus, and hillsides and are deeper to bedrock. Gepp and Gassville soils are on a similar landscape in hilly areas. Gepp soils have a very-fine control section and are deeper to bedrock. Woolper soils are on foot slopes and fans, have a fine control section, and are not as red as Gassville soils.

Typical pedon of Gassville cherty silt loam, 3 to 12 percent slopes (fig. 14), in a moist pasture, SW1/4SW1/4SE1/4 sec. 18, T. 17 N., R. 4 W.

Ap—0 to 4 inches; brown (10YR 5/3) cherty silt loam; weak fine granular structure; very friable; many fine and medium roots; many fine pores; about 20 percent, by volume, angular chert fragments; very strongly acid; clear wavy boundary.

A2—4 to 10 inches; light yellowish brown (10YR 6/4) cherty silt loam; weak medium granular structure; very friable; many fine and medium roots; many fine and medium pores; about 30 percent, by volume, angular chert fragments; strongly acid; clear smooth boundary.

B21t—10 to 15 inches; yellowish red (5YR 5/6) cherty silty clay; few fine prominent strong brown mottles; moderate medium subangular blocky structure; firm; few fine roots; few fine pores; about 20 percent, by volume, chert fragments; very strongly acid; clear wavy boundary.

B22t—15 to 23 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm; continuous distinct clay films on faces of peds; about 5 percent, by volume, siltstone fragments; very strongly acid; gradual wavy boundary.

B23t—23 to 39 inches; red (2.5YR 4/6) clay; common medium prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; continuous distinct clay films on faces of peds; about 5 percent, by volume, siltstone fragments; strongly acid; gradual irregular boundary.

C—39 to 52 inches; mottled red (2.5YR 4/6), brownish yellow (10YR 6/6), and gray (10YR 6/1) cherty silty clay; massive; firm; about 30 percent, by volume, angular siltstone fragments 1/4 to 6 inches in diameter; strongly acid; gradual wavy boundary.

Figure 14.—Profile of Gassville cherty silt loam, 3 to 12 percent slopes. Siltstone bedrock is at a depth of about 52 inches. The depth is shown in feet.

Cr—52 to 56 inches; partly weathered, slightly hard siltstone (can be cut with a spade).
R—56 to 60 inches; siltstone.

The solum ranges from about 30 to 50 inches in thickness. Hard bedrock is at a depth of 40 to 60 inches. Reaction ranges from strongly acid through slightly acid in the A horizon and is strongly acid or very strongly acid in the B and C horizons.

The A horizon ranges from 3 to 13 inches in thickness. The A1 horizon has hue of 10YR, value of 3, and chroma of 2 or 3. The A2 horizon has hue of 10YR, value of 4, 5, or 6, and chroma of 3 or 4. The Ap horizon has hue of 10YR, value of 5, and chroma of 2 or 3. Coarse fragments make up about 15 to 35 percent of the volume.

The B horizon has hue of 5YR, 2.5YR, or 10R, value of 4 or 5, and chroma of 6 or 8. It has brown mottles in hues of 7.5YR or 10YR. It is silty clay or clay. Coarse fragments make up about 5 to 30 percent of the volume.

The C horizon has colors similar to those of the B horizon and has brown and gray mottles. It is silty clay loam, silty clay, or their cherty analogs. Coarse fragments make up 0 to 30 percent of the volume. In some pedons there is no C horizon.

The R horizon is nearly level or undulating siltstone or shale that can be cut with a spade with difficulty; hardness of the siltstone or shale increases gradually with depth.

Gepp Series

The Gepp series consists of deep, well drained, moderately permeable soils on hilltops and hillsides. The soils formed in clayey residuum and in places in colluvium over cherty limestone bedrock. The native vegetation is hardwood forest. The slope ranges from 3 to 40 percent.

Gepp soils are near Arkana, Clarksville, Doniphan, Gassville, Moko, Ventris, and Woolper soils. Arkana soils are on adjacent limestone ridges and side slopes, have a mollic surface horizon, and are less than 40 inches deep to bedrock. Clarksville soils are on adjacent higher side slopes and narrow ridgetops, have a loamy-skeletal control section, and are somewhat excessively drained. Doniphan soils are on adjacent side slopes and broad ridgetops, have a clayey control section, and have a base saturation of less than 35 percent. Gassville soils are on adjacent hilltops and hillsides, have a clayey control section, and are shallower to bedrock than Gepp soils. Moko soils are on adjacent benches and ridgetops, have a mollic surface horizon, and are less than 20 inches deep to bedrock. Ventris soils are on adjacent uplands and foot slopes around the base of hills, are moderately well drained, and are less than 40 inches deep to bedrock. Woolper soils are on foot slopes and fans, have a fine control section, and are not as red as Gepp soils.

Typical pedon of Gepp very cherty silt loam, 12 to 30 percent slopes, in a moist pasture, SE1/4SW1/4NE1/4 sec. 23, T. 19 N., R. 5 W.

A1—0 to 2 inches; dark brown (10YR 3/3) very cherty silt loam; weak fine granular structure; very friable; many fine and medium roots; many fine and medium pores; about 50 percent, by volume, chert fragments; strongly acid; abrupt smooth boundary.
A2—2 to 6 inches; yellowish brown (10YR 5/4) very cherty silt loam; weak medium granular structure;

very friable; many fine and medium roots; many fine and medium pores; about 35 percent, by volume, angular chert fragments; strongly acid; gradual smooth boundary.

B1—6 to 12 inches; yellowish red (5YR 5/6) cherty silty clay loam; weak medium subangular blocky structure; friable; many fine and medium roots; many fine pores; about 30 percent, by volume, angular chert fragments; very strongly acid; gradual smooth boundary.

B21t—12 to 36 inches; red (2.5YR 4/6) clay; strong moderate medium subangular blocky structure; firm; common fine and medium roots; many fine pores; continuous distinct clay films on faces of peds; about 5 percent, by volume, angular chert fragments; strongly acid; gradual irregular boundary.

B22t—36 to 58 inches: red (2.5YR 4/6) clay; common medium prominent strong brown (7.5YR 5/6) mottles; strong medium subangular blocky structure; firm; few medium roots; common fine pores; continuous distinct clay films on faces of peds; about 5 percent, by volume, chert and siltstone fragments; strongly acid; abrupt irregular boundary.

B23t—58 to 72 inches; red (2.5YR 4/6) clay; common medium prominent strong brown (7.5YR 5/6) and few medium prominent gray (10YR 6/1) mottles; moderate medium blocky structure; firm; slightly plastic; few fine roots; few fine pores; continuous distinct clay films on faces of peds and in pores; about 15 percent, by volume, angular chert and siltstone fragments; medium acid.

The solum ranges from 60 to more than 90 inches in thickness. Reaction ranges from slightly acid to strongly acid in the A horizon and from medium acid to very strongly acid in the B1 and B21t horizons. It is medium acid or strongly acid in the lower part of the B2t horizon.

The A horizon is 5 to 11 inches thick. The A1 horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. The A2 horizon has hue of 10YR, value of 4, 5, or 6, and chroma of 2, 3, or 4. The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2, 3, or 4. Coarse fragments make up about 35 to 50 percent of the volume.

The B horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 or 8. In some pedons it has mottles in shades of gray and brown in the lower part. It is silty clay or clay. Chert and siltstone fragments make up 0 to 30 percent of the volume.

Hontas Series

The Hontas series consists of deep, moderately well drained, moderately permeable soils on flood plains of creeks and rivers. The soils formed in loamy alluvial sediment that washed from areas where the soils formed in predominantly cherty limestone material. The native vegetation is hardwood forest. The slope is 0 to 1 percent.

Hontas soils are near Peridge, Sturkie, Razort, and Wideman soils. Peridge soils are on stream terraces, are redder than Hontas soils, and have an argillic horizon. Sturkie soils are on flood plains and natural levees and are well drained. Razort soils are on low terraces, have a fine-loamy control section, and are well drained. Wideman and Hontas soils are on a similar landscape. Wideman soils have a sandy control section and are excessively drained.

Typical pedon of Hontas silt loam, frequently flooded, in a moist pasture, SW1/4NE1/4NW1/4 sec. 18, T. 17 N., R. 6 W.

Ap—0 to 6 inches; brown (10YR 4/3) silt loam; weak fine granular structure; friable; few fine roots; few fine dark concretions; slightly acid; clear smooth boundary.

A1—6 to 12 inches; brown (10YR 4/3) silt loam; weak medium granular structure; friable; few fine roots; few worm casts; slightly acid; clear smooth boundary.

B21—12 to 21 inches; brown (10YR 4/3) silt loam; common medium distinct grayish brown (10YR 5/2) and gray (10YR 6/1) mottles; weak medium subangular blocky structure; friable; few fine roots; common fine pores; few black concretions; slightly acid; gradual wavy boundary.

B22—21 to 33 inches; grayish brown (10YR 5/2) silt loam; common medium distinct gray (10YR 6/1) and yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; common fine pores; common dark concretions; slightly acid; clear wavy boundary.

C1—33 to 48 inches; gray (10YR 6/1) silty clay loam; common medium distinct yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) mottles; massive; firm; common fine pores; common fine and medium black concretions; neutral; clear wavy boundary.

C2—48 to 72 inches; gray (10YR 6/1) silty clay loam; common medium distinct brown (10YR 4/3) and yellowish brown (10YR 5/4) mottles; massive; firm; common fine pores; common fine and medium black concretions; neutral.

The solum ranges from about 30 to 50 inches in thickness. Reaction ranges from neutral to medium acid in the A horizon and from mildly alkaline to medium acid in the B and C horizons.

The A horizon is 5 to 14 inches thick. It has hue of 10YR, value of 4 or 5, and chroma of 3 or 4.

The B horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. In the lower part, at a depth of more than 20 inches, it is dominantly gray and has brown mottles. The B horizon is silt loam or silty clay loam.

The C horizon has hue of 10YR, value of 4, 5, or 6, and chroma of 1 or 2. It has mottles in shades of brown. It is silt loam or silty clay loam.

Lily Series

The Lily series consists of moderately deep, well drained, moderately rapidly permeable soils on ridges and side slopes. The soils formed in residuum of acid sandstone. The native vegetation is mixed hardwoods. The dominant trees are mainly oak, hickory, and pine. The slope is 3 to 12 percent.

Lily soils are near Clarksville, Boden, Brockwell, Portia, and Ramsey soils. Clarksville soils are on steep side slopes and narrow ridgetops, have a loamy-skeletal control section, and are somewhat excessively drained. Boden soils are on hilltops and hillsides and have a clayey control section. Brockwell soils are on adjacent landscapes, have a coarse-loamy control section, and are more than 60 inches deep to bedrock. Portia soils are on adjacent uplands and stream terraces and are deep to sandstone bedrock. Ramsey soils are on adjacent landscapes, have a loamy control section, do not have an argillic horizon, and are less than 20 inches deep to bedrock.

Typical pedon of Lily fine sandy loam, 8 to 12 percent slopes (fig. 15), at the edge of open woodland, SW1/4SW1/4NW1/4 sec. 27, T. 16 N., R. 6 W.

A1—0 to 3 inches; brown (10YR 5/3) fine sandy loam; weak medium granular structure; very friable; many fine and medium roots; about 5 percent, by volume, angular sandstone fragments; very strongly acid; abrupt smooth boundary.

A2—3 to 10 inches; yellowish brown (10YR 5/4) fine sandy loam; weak medium granular structure; friable; common fine and medium roots; very strongly acid; clear wavy boundary.

B21t—10 to 22 inches; brownish yellow (10YR 6/6) loam; weak medium subangular blocky structure; friable; few fine roots; about 5 percent, by volume, angular sandstone fragments; very strongly acid; clear wavy boundary.

B22t—22 to 34 inches; yellowish red (5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; firm; few fine roots; few fine pores; about 5 percent, by volume, angular sandstone fragments; very strongly acid; abrupt smooth boundary.

R—34 to 37 inches; red, yellow, gray, and brown thinly bedded sandstone that becomes harder with depth.

The thickness of the solum and the depth to sandstone range from 20 to 40 inches. Reaction is strongly acid or very strongly acid throughout.

The A horizon is 5 to 10 inches thick. It has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. Coarse fragments make up 0 to 10 percent of the volume.

Figure 15.—Profile of Lily fine sandy loam, 8 to 12 percent slopes. Sandstone bedrock is at a depth of 20 to 40 inches. The depth is shown in feet.

The B horizon has hue of 10YR, 7.5YR, or 5YR, value of 5 or 6, and chroma of 6. In some pedons it has mottles in shades of red or brown. It is loam, sandy clay loam, or clay loam. Coarse fragments make up 0 to 35 percent of the volume.

In some areas, Lily soils have a C horizon. That horizon has hue of 10YR or 7.5YR, value of 5, and

chroma of 6 or 8. In some pedons it is mottled or variegated in shades of red, brown, yellow, or gray. It is sandy loam, fine sandy loam, loam, or clay loam.

The R horizon is red, yellow, gray, and brown thinly bedded sandstone that becomes harder with depth.

Moko Series

The Moko series consists of shallow, well drained, moderately permeable soils on benches and ridgetops. The soils formed in loamy residuum of limestone. The native vegetation is mainly Eastern redcedar, post oak, and chinkapin oak. The slope ranges from 3 to 20 percent.

Moko soils are near Arkana, Gepp, and Ventris soils. Arkana soils are on an adjacent landscape, have a very-fine control section, and are 20 to 40 inches deep to bedrock. Gepp soils are on adjacent hilltops and side slopes, have a very-fine control section, and are deep to bedrock. Ventris soils are on adjacent hilltops, hillsides, and benches, have a very-fine control section, and are moderately deep to bedrock.

Typical pedon of Moko very stony silt loam (fig. 16), in an area of Moko-Rock outcrop complex, 3 to 20 percent slopes, in a moist wooded area, SE1/4SW1/4NE1/4 sec. 30, T. 18 N., R. 6 W.

A11—0 to 3 inches; very dark grayish brown (10YR 3/2) very stony silt loam; moderate fine granular structure; friable; common fine pores; common fine and coarse roots; 35 percent, by volume, limestone fragments 3 to 15 inches in diameter; about 10 percent, by volume, chert fragments; neutral; clear wavy boundary.

A12—3 to 12 inches; very dark grayish brown (10YR 3/2) very stony silty clay loam; weak medium subangular blocky structure; friable; common fine pores; common medium and coarse roots; 35 percent, by volume, limestone fragments 3 to 15 inches in diameter; 15 percent, by volume, chert fragments; neutral; abrupt smooth boundary.

R—12 to 14 inches; gray, hard, fractured limestone.

The thickness of the solum and the depth to bedrock range from 6 to 20 inches. Reaction is mildly alkaline or neutral throughout.

The A11 horizon has hue of 10YR, value of 3, and chroma of 1 or 2. It is very stony silt loam or very stony silty clay loam. Coarse chert fragments make up 10 to 15 percent of the volume, and limestone fragments more than 3 inches in diameter make up 25 to 60 percent of the volume.

The A12 horizon has hue of 10YR, value of 2 or 3, and chroma of 2. It is very stony loam, very stony silty clay loam, or very stony silt loam. Coarse chert fragments make up 15 to 25 percent of the volume, and limestone fragments more than 3 inches in diameter make up 30 to 60 percent of the volume.

Figure 16.—Profile of Moko very stony silt loam, in an area of Moko-Rock outcrop complex, 3 to 20 percent slopes. Limestone bedrock is at a depth of 6 to 20 inches. The depth is shown in feet.

Peridge Series

The Peridge series consists of deep, well drained, moderately permeable soils on broad uplands and stream terraces. The soils formed in residuum of cherty limestone or interbedded limestone, siltstone, and

sandstone or in alluvium from this material. The native vegetation is hardwoods. The slope is 3 to 8 percent.

Peridge soils are near Captina, Hontas, Razort, Sturkie, and Woolper soils. Captina soils are on adjacent uplands and stream terraces and have a fragipan. Hontas soils are on adjacent bottom lands, have grayer colors than those of Peridge soils, and do not have an argillic horizon. Razort soils are on lower terraces and have a fine-loamy control section. Sturkie soils are on adjacent flood plains and natural levees, have darker colors, and do not have an argillic horizon. Woolper soils are on foot slopes and fans, have a fine control section, and are not as red as Peridge soils.

Typical pedon of Peridge silt loam, 3 to 8 percent slopes, in a moist pasture, SW1/4NW1/4SW1/4 sec. 10, T. 19 N., R. 5 W.

Ap—0 to 6 inches; dark brown (7.5YR 4/4) silt loam; moderate medium granular structure; friable; many fine and medium roots; few fine dark concretions; medium acid; abrupt smooth boundary.

B1—6 to 12 inches; reddish brown (5YR 4/4) silt loam; weak medium subangular blocky structure; friable; many fine and medium roots; few fine dark concretions; medium acid; clear wavy boundary.

B21t—12 to 20 inches; yellowish red (5YR 4/6) silt loam; moderate medium subangular blocky structure; friable; common fine and medium roots; continuous distinct clay films on faces of peds; few black stains; few dark concretions; strongly acid; clear irregular boundary.

B22t—20 to 36 inches; red (2.5YR 4/8) silty clay loam; few medium prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; continuous thin clay films on faces of peds; about 5 percent, by volume, angular chert fragments; few black stains; few dark concretions; strongly acid; clear wavy boundary.

B23t—36 to 55 inches; red (2.5YR 4/6) gravelly silty clay loam; common medium prominent pale brown (10YR 6/3) and yellowish brown (10YR 5/6) mottles; moderate medium and fine subangular blocky structure; firm; continuous distinct thin clay films on faces of peds; about 30 percent, by volume, angular chert and sandstone fragments; many black stains; few dark concretions; strongly acid; clear wavy boundary.

B24t—55 to 72 inches; red (2.5YR 4/6) gravelly silty clay loam; many medium prominent pale brown (10YR 6/3) and strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; firm; few continuous distinct clay films on faces of peds; about 35 percent, by volume, angular chert and sandstone fragments; many black stains; many dark concretions; medium acid.

The solum is 80 inches or more thick. Reaction ranges from medium acid to very strongly acid throughout.

The A horizon is 6 to 12 inches thick. It has hue of 10YR, value of 4, and chroma of 3; or hue of 7.5YR, value of 4, and chroma of 4.

The B1 horizon has hue of 5YR or 7.5YR, value of 4, and chroma of 4. The B2t horizon has hue of 5YR or 2.5YR, value of 4, and chroma of 6 or 8. In the lower part it has mottles in shades of brown and red. The B21t and B22t horizons are silt loam or silty clay loam. The B23t horizon is silty clay loam. Coarse fragments in the B23t horizon make up 0 to 35 percent of the volume. The B24t horizon is silty clay loam or silty clay. Coarse fragments in the B24t horizon make up 0 to 35 percent of the volume.

Portia Series

The Portia series consists of deep, well drained, moderately slowly permeable, gently sloping to moderately sloping soils on uplands. The soils formed in residuum of sandstone, siltstone, and limestone. The native vegetation is hardwoods. The slope is 3 to 12 percent.

Portia soils are near Brockwell, Boden, Lily, and Ramsey soils. Brockwell soils are on gently sloping uplands and have a coarse-loamy control section. Boden soils are on hilltops and hillsides, have a clayey control section, and are less than 60 inches deep to bedrock. Lily soils are on upland ridges and side slopes and are moderately deep to sandstone bedrock. Ramsey soils are on hills and mountains, have a loamy control section, and are shallow to sandstone bedrock.

Typical pedon of Portia fine sandy loam, 3 to 8 percent slopes, in a moist wooded area, NE1/4SW1/4SE1/4 sec. 11, T. 15 N., R. 4 W.

A1—0 to 2 inches; brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable; common fine and medium roots; strongly acid; abrupt smooth boundary.

A2—2 to 8 inches; yellowish brown (10YR 5/4) fine sandy loam; weak medium granular structure; friable; many fine and medium roots; strongly acid; clear smooth boundary.

B21t—8 to 18 inches; strong brown (7.5YR 5/6) loam; moderate medium subangular blocky structure; friable; common fine and medium roots; few fine pores; thin continuous distinct clay films on faces of peds; few chert pebbles; strongly acid; gradual smooth boundary.

B22t—18 to 38 inches; strong brown (7.5YR 5/6) loam; common medium prominent red (2.5YR 4/6) and few medium distinct pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; firm; continuous distinct clay films on faces of peds; few fine pores; few rounded chert pebbles; strongly acid; gradual wavy boundary.

B23t—38 to 50 inches; strong brown (7.5YR 5/6) clay loam; common medium prominent red (2.5YR 4/6) and yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; continuous distinct clay films on faces of peds; few patches of uncoated sand grains along vertical faces; strongly acid; gradual smooth boundary.

B24t—50 to 72 inches; red (2.5YR 4/6) sandy clay loam; moderate medium and coarse prominent strong brown (7.5YR 5/6), yellowish brown (10YR 5/8), and gray (10YR 6/1) mottles; moderate coarse blocky structure parting to weak medium blocky; firm; thin continuous distinct clay films on faces of peds; few patches of uncoated sand grains on vertical faces; medium acid.

The solum ranges from 60 to 80 inches in thickness. Reaction ranges from slightly acid to strongly acid in the A horizon. It ranges from medium acid to very strongly acid in the upper part of the B horizon and is medium acid or strongly acid in the lower part.

The A horizon has hue of 10YR, value of 4, and chroma of 3 or 4 or value of 5 and chroma of 3 or 4. The A2 horizon has hue of 10YR, value of 5, and chroma of 3 or 4. The A horizon ranges from 3 to 14 inches in thickness.

The B2t horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 or 8; or it has hue of 7.5YR, value of 5, and chroma of 6 or 8. It has mottles in shades of red and brown. In some pedons it has gray mottles in the lower part. The horizon is loam, clay loam, sandy clay loam, or sandy clay in the upper part and sandy clay loam, clay loam, sandy clay, or clay in the lower part.

Ramsey Series

The Ramsey series consists of shallow, somewhat excessively drained, rapidly permeable soils on hills and mountains. The soils formed in residuum and in some places in local alluvium of sandstone or quartzite. The native vegetation is mixed hardwoods and pine. The slope is 3 to 12 percent.

Ramsey soils are near Boden, Brockwell, Lily, and Portia soils. Boden soils are on adjacent hilltops and hillsides, have a clayey control section, are deep to bedrock, and are redder than Ramsey soils. Brockwell soils are on adjacent ridges, have an argillic horizon, and are deep to bedrock. Lily soils are on ridges and side slopes, have a fine-loamy control section, have an argillic horizon, and are moderately deep to bedrock. Portia soils are on adjacent terraces and on uplands, have a fine-loamy control section, and are deep.

Typical pedon of Ramsey gravelly fine sandy loam, in an area of Ramsey-Lily-Rock outcrop complex, 3 to 12 percent slopes, in a moist wooded area, NE1/4NE1/4NE1/4 sec. 13, T. 15 N., R. 6 W.

A1—0 to 1 inch; dark brown (10YR 3/3) gravelly fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; about 15 percent, by volume, sandstone fragments one-eighth to 3 inches in diameter; strongly acid; abrupt smooth boundary.

A2—1 inch to 3 inches; brown (10YR 4/3) gravelly fine sandy loam; weak medium granular structure; friable; many fine and medium roots; many fine pores; about 15 percent, by volume, gravel; very strongly acid; gradual irregular boundary.

B2—3 to 10 inches; strong brown (7.5YR 5/6) gravelly loam; weak medium subangular blocky structure; friable; few fine roots; few fine pores; about 20 percent, by volume, gravel; very strongly acid; abrupt smooth boundary.

R—10 to 12 inches; acid, level-bedded sandstone.

The solum ranges from 7 to 20 inches in thickness. Hard bedrock is at a depth of 10 to 20 inches. Reaction is strongly acid or very strongly acid throughout.

The A horizon is 2 to 7 inches thick. The A1 horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. It is gravelly fine sandy loam or fine sandy loam. The A2 horizon has hue of 10YR, value of 4 or 5, and chroma of 2, 3, or 4. It is fine sandy loam, sandy loam, or loam. Coarse fragments in the A horizon make up 0 to 25 percent of the volume.

The B horizon has hue of 10YR or 7.5YR, value of 4, 5, or 6, and chroma of 3, 4, or 6. It is fine sandy loam, sandy loam, or loam. Coarse fragments in the B horizon make up 5 to 30 percent of the volume.

The C horizon has hue of 10YR, value of 4 or 5, and chroma of 2, 3, or 4. In some pedons it has mottles in shades of red, yellow, and gray. It ranges from loam through loamy sand. In some pedons there is no C horizon.

Razort Series

The Razort series consists of deep, well drained, moderately permeable soils on level bottom lands and terraces. The soils formed in silty alluvium overlying nonconforming residuum on bedrock of varying character. The native vegetation is hardwoods. The slope is 0 to 1 percent.

Razort soils are near Hontas, Peridge, Sturkie, and Wideman soils. Hontas soils are on a slightly lower landscape in depressed areas, have a fine-silty control section, and are moderately well drained. Peridge soils are on higher stream terraces and have a fine-silty control section. Sturkie soils are on flood plains and natural levees and have a fine-silty control section. Wideman soils are lower on the landscape than Razort soils; they are on flood plains, have a sandy control section, and are excessively drained.

Typical pedon of Razort loam, frequently flooded, in a moist pasture, NW1/4NW1/4SE1/4 sec. 12, T. 19 N., R. 5 W.

Ap—0 to 8 inches; dark brown (10YR 3/3) loam; moderate medium granular structure; friable; many fine roots; slightly acid; gradual smooth boundary.
B21t—8 to 19 inches; dark brown (10YR 3/3) silt loam; weak medium subangular blocky structure; friable; many fine and medium pores coated with clay films; many worm casts; many fine roots; slightly acid; gradual smooth boundary.
B22t—19 to 28 inches; dark brown (10YR 3/3) silt loam; few fine distinct dark yellowish brown (10YR 3/4) mottles; moderate medium subangular blocky structure; friable; common fine and medium pores coated with clay films; many worm casts; few fine roots; slightly acid; gradual wavy boundary.
B23t—28 to 38 inches; brown (10YR 4/3) silty clay loam; few fine distinct dark brown (10YR 3/3) mottles; moderate medium subangular blocky structure; firm; thin continuous distinct clay films on faces of peds; few fine roots; slightly acid; gradual wavy boundary.
IIC1—38 to 50 inches; variegated brown (10YR 4/3), dark brown (10YR 3/3), and gray (10YR 5/1) gravelly clay loam; massive; firm; about 35 percent, by volume, pebbles less than 2 inches in diameter; neutral; gradual smooth boundary.
IIC2—50 to 72 inches; variegated strong brown (7.5YR 5/6), dark brown (10YR 4/3), dark yellowish brown (10YR 4/4), and gray (10YR 5/1) very gravelly sandy clay loam; massive; friable; about 50 percent, by volume, pebbles less than 2 inches in diameter; neutral.

The solum ranges from 38 to 70 inches in thickness. Reaction is neutral or slightly acid in the A horizon. It ranges from neutral to medium acid in the B and C horizons.

The A horizon has hue of 10YR, value of 3, and chroma of 2, 3, or 4 or value of 2 and chroma of 2. It is 6 to 10 inches thick.

The B horizon has hue of 10YR, value of 3, 4, or 5, and chroma of 3 or 4. In some pedons it has dark yellowish brown mottles. It is silt loam, loam, clay loam, or silty clay loam.

The IIC horizon has hue of 10YR, value of 4 or 5, and chroma of 3, 4, or 6. In some pedons it is variegated brown and gray. It is fine sandy loam, loam, clay loam, or sandy clay loam. Gravel makes up 15 to 50 percent of the volume.

Sturkie Series

The Sturkie series consists of deep, well drained, moderately permeable soils on flood plains and natural levees along streams. The soils formed in silty alluvium. The native vegetation is mainly hardwoods. The dominant trees are southern red oak, white oak, American sycamore, and eastern cottonwood. The slope is 0 to 1 percent.

Sturkie soils are near Hontas, Peridge, Razort, Wideman, and Woolper soils. Hontas soils are on a slightly lower landscape in depressed areas and are moderately well drained. Peridge soils are on higher stream terraces, have redder colors, and have an argillic horizon. Razort soils are on lower terraces and have a fine-loamy control section. Wideman soils are on flood plains and natural levees along streams, have a sandy control section, and are excessively drained. Woolper soils are on foot slopes and fans, have a fine control section, and have an argillic horizon.

Typical pedon of Sturkie silt loam, frequently flooded, in a moist pasture, NW1/4SW1/4NW1/4 sec. 11, T. 19 N., R. 5 W.

Ap—0 to 8 inches; dark brown (10YR 3/3) silt loam; weak medium granular structure; friable; many fine and medium roots; slightly acid; abrupt smooth boundary.
A12—8 to 18 inches; dark brown (10YR 3/3) silt loam; weak medium granular structure; friable; many fine and medium roots; many fine pores; slightly acid; clear wavy boundary.
B21—18 to 30 inches; dark brown (10YR 3/3) silt loam; weak medium subangular blocky structure; friable; few fine roots; common fine and medium pores; slightly acid; clear wavy boundary.
B22—30 to 44 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium subangular blocky structure; friable; few fine roots; few fine pores; slightly acid; gradual smooth boundary.
B23—44 to 52 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium subangular blocky structure; firm; few concretions; many black stains; common medium and coarse pores; slightly acid; gradual smooth boundary.
C—52 to 72 inches; dark brown (7.5YR 4/4) silty clay loam; common medium distinct dark yellowish brown (10YR 3/4) and brown (10YR 5/3) mottles; massive; friable; common medium pores; neutral.

The solum ranges from 50 to 80 inches in thickness. Reaction ranges from mildly alkaline to slightly acid throughout.

The A horizon has hue of 10YR, value of 3, and chroma of 2 or 3. Coarse fragments make up 0 to 5 percent of the volume. The A horizon ranges from 6 to 20 inches in thickness.

The B horizon has hue of 10YR, value of 3, 4, or 5, and chroma of 3 or 4; or it has hue of 7.5YR, value of 4 or 5, and chroma of 4. It is silt loam or silty clay loam. Coarse fragments make up 0 to 10 percent of the volume.

The C horizon has colors similar to those of the B horizon. It has mottles in shades of brown. In a few pedons it has gray coatings in the lower part. It is silt loam, loam, or silty clay loam. Coarse fragments make up 0 to 10 percent of the volume.

Ventris Series

The Ventris series consists of moderately deep, moderately well drained, very slowly permeable soils on benches and foot slopes. The soils formed in colluvium or residuum of limestone or calcareous shale. The native vegetation is hardwoods. The slope ranges from 8 to 40 percent.

Ventris soils are near Arkana, Clarksville, Gepp, and Moko soils. Arkana soils are on adjacent landscapes, are well drained, and have a mollic surface horizon. Clarksville soils are on steep side slopes and narrow ridgetops, have a loamy-skeletal control section, and are deeper to bedrock than Ventris soils. Gepp soils are on adjacent hilltops and side slopes, are deeper to limestone, and are well drained. Moko soils are on adjacent landscapes, have a loamy-skeletal control section, and are less than 20 inches deep to bedrock.

Typical pedon of Ventris cherty silt loam, in an area of Gepp-Ventris complex, 8 to 20 percent slopes, in a moist wooded area, SE1/4SW1/4NE1/4 sec. 11, T. 17 N., R. 6 W.

A1—0 to 2 inches; very dark grayish brown (10YR 3/2) cherty silt loam; weak fine granular structure; friable; many fine roots; approximately 15 percent, by volume, chert fragments; medium acid; abrupt wavy boundary.

A2—2 to 6 inches; brown (10YR 5/3) cherty silt loam; weak medium granular structure; friable; many fine roots; about 15 percent, by volume, chert fragments; medium acid; gradual wavy boundary.

B21t—6 to 12 inches; light olive brown (2.5Y 5/6) clay; moderate medium subangular blocky structure; firm to plastic; few fine roots; common fine pores; few continuous distinct clay films on faces of peds and on walls of pores; few fine distinct yellowish brown (10YR 5/6) coatings; slightly acid; clear wavy boundary.

B22t—12 to 28 inches; light olive brown (2.5Y 5/4) clay; few fine distinct gray (10YR 5/1) mottles; moderate fine and medium subangular blocky structure; firm, plastic; few fine roots; few fine tubular pores; few continuous distinct clay films on faces of peds and on walls of pores; about 10 percent, by volume, limestone fragments, few slickensides; neutral; gradual wavy boundary.

B23t—28 to 37 inches; light olive brown (2.5Y 5/6) clay; common medium distinct gray (10YR 5/1) mottles; moderate fine angular blocky structure; firm, plastic; few fine roots; few continuous distinct clay films on faces of peds and on walls of pores; about 15 percent, by volume, cherty limestone fragments; few strong brown (7.5YR 5/6) stains; few dark concretions; few slickensides; mildly alkaline; abrupt wavy boundary.

R—37 to 39 inches; limestone.

The thickness of the solum and the depth to rock range from about 24 to 40 inches. Reaction ranges from neutral to medium acid in the A horizon and in the upper part of the B horizon and from slightly acid to mildly alkaline in the lower part.

The A1 horizon has hue of 10YR, value of 3, and chroma of 2 or 3. The A2 horizon has hue of 10YR, value of 4 or 5, and chroma of 2, 3, or 4. The A horizon is 4 to 11 inches thick. Coarse fragments make up 5 to 20 percent of the volume.

The B horizon has hue of 2.5Y, 10YR, or 7.5YR, value of 4 or 5, and chroma of 4 or 6. It is mottled in shades of gray or in brown and gray, neither of which is dominant. It is silty clay or clay. Coarse fragments make up 0 to 20 percent of the volume.

In some pedons there is a C horizon. The C horizon is mottled in shades of brown and gray. It is silty clay or clay. Coarse fragments make up 0 to 20 percent of the volume.

In some pedons there is a Cr horizon. The Cr horizon is partly weathered gray and olive limestone, sandstone, or calcareous shale.

The R layer is hard, nearly level limestone, sandstone, or shale.

Wideman Series

The Wideman series consists of deep, excessively drained, moderately rapidly permeable soils on flood plains and natural levees along streams. The soils formed in sandy alluvium that has thin strata of finer textured material. The soils are subject to frequent flooding for short durations from December through May. The native vegetation is mainly hardwoods. The dominant trees are cottonwood, American sycamore, sweetgum, and other hardwoods on bottom lands. The slope is 0 to 1 percent.

Wideman soils are near Boden, Hontas, Lily, Portia, and Razort soils. Boden soils are on nearby hilltops and hillsides and have a clayey control section. Hontas soils are on similar landscapes, have a fine-silty control section, and are moderately well drained. Lily soils are on uplands, have a fine-loamy control section, and are 20 to 40 inches deep to sandstone. Portia soils are in adjacent upland positions and have a fine-loamy control section. Razort soils are on higher flood plains and terraces, have a fine-loamy control section, and are well drained.

Typical pedon of Wideman loamy sand, in an area of Wideman loamy sand-fine sandy loam, frequently

flooded, in a moist wooded area, SW1/4NW1/4SE1/4 sec. 2, T. 15 N., R. 7 W.

Ap—0 to 5 inches; dark yellowish brown (10YR 4/4) loamy sand; weak medium granular structure; very friable; many fine and medium roots; many fine pores; medium acid; abrupt smooth boundary.
C1—5 to 14 inches; light yellowish brown (10YR 6/4) loamy fine sand; massive; loose; many fine and medium roots; many fine pores; medium acid; clear wavy boundary.
C2—14 to 20 inches; yellowish brown (10YR 5/4) loamy very fine sand; massive; loose; many fine and medium roots; many fine pores; medium acid; clear wavy boundary.
C3—20 to 25 inches; light yellowish brown (10YR 6/4) loamy very fine sand; massive; loose; many fine roots; many fine pores; medium acid; clear wavy boundary.
C4—25 to 37 inches; mottled yellowish brown (10YR 5/4) and pale brown (10YR 6/3) loamy fine sand; massive; loose; few fine roots; medium acid; clear smooth boundary.
C5—37 to 43 inches; light yellowish brown (10YR 6/4) loamy fine sand; massive; loose; slightly acid; clear smooth boundary.
C6—43 to 52 inches; variegated light yellowish brown (10YR 6/4), dark yellowish brown (10YR 4/4), yellow (10YR 7/6), and light gray (10YR 7/2) loamy fine sand; massive; loose; slightly acid; clear smooth boundary.
C7—52 to 65 inches; mottled yellowish brown (10YR 5/6) and brownish yellow (10YR 6/6) loamy fine sand; massive; loose; neutral; clear smooth boundary.
C8—65 to 72 inches; mottled brownish yellow (10YR 6/6) and light yellowish brown (10YR 6/4) loamy fine sand; massive; loose; neutral.

The A horizon ranges from medium acid to very strongly acid. The C horizon ranges from strongly acid to neutral.

The A horizon has hue of 10YR, value of 3, 4, or 5, and chroma of 3 or 4. It is fine sandy loam, sandy loam, loamy sand, or loamy fine sand. The A horizon is 4 to 9 inches thick.

The C horizon has hue of 10YR, value of 4 to 7, and chroma of 2, 4, or 6; or it has hue of 7.5YR, value of 4 or 5, and chroma of 4 or 6. In some pedons it has mottles in shades of brown, yellow, and gray. It is sand, sandy loam, loamy fine sand, and loamy very fine sand. In some pedons there are layers less than 1/2 inch thick of sandy loam, fine sandy loam, silt loam, or loam.

Coarse fragments, dominantly gravel, make up 0 to 15 percent of the volume in the lower horizons. In some pedons there is sandstone at a depth of 72 inches or more.

Woolper Series

The Woolper series consists of deep, well drained, moderately slowly permeable soils on foot slopes and fans. The soils formed in residual or colluvial material that weathered from calcareous clay or shale commonly interbedded with limestone. The native vegetation is mainly hardwoods. The slope is 1 to 5 percent.

Woolper soils are near Gassville, Gepp, Peridge, and Sturkie soils. Gassville soils are on an adjacent higher landscape, have a clayey control section, and are redder than Woolper soils. Gepp soils are on a higher landscape, have a very-fine control section, and are redder. Peridge soils are on adjacent stream terraces and have a fine-silty control section. Sturkie soils are on natural levees and stream terraces, have a fine-silty control section, and do not have an argillic horizon.

Typical pedon of Woolper silt loam, 1 to 5 percent slopes, in a moist pasture area, SW1/4NW1/4NE1/4 sec. 20, T. 18 N., R. 6 W.

Ap—0 to 5 inches; very dark grayish brown (10YR 3/2) silt loam; moderate fine and medium granular structure; friable; common fine and medium roots; slightly acid; abrupt smooth boundary.
B1—5 to 15 inches; very dark grayish brown (10YR 3/2) silty clay loam; weak medium subangular blocky structure; firm; common fine roots; slightly acid; abrupt smooth boundary.
B21t—15 to 23 inches; dark brown (10YR 3/3) silty clay loam; few fine prominent red (2.5YR 4/6) and yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; firm; few continuous distinct clay films on faces of peds; many black stains; common fine roots; slightly acid; gradual diffuse boundary.
B22t—23 to 39 inches; yellowish brown (10YR 5/6) clay; common medium prominent red (2.5YR 4/6) mottles; moderate fine and medium angular blocky structure; firm; few continuous distinct clay films on faces of peds; many black stains; few concretions; slightly acid; gradual wavy boundary.
B23t—39 to 48 inches; yellowish brown (10YR 5/4) clay; many medium prominent red (2.5YR 4/6) and grayish brown (2.5Y 5/2) mottles; fine and medium subangular blocky structure; very firm, plastic; few continuous distinct clay films on faces of peds; many black stains; few concretions; slightly acid; diffuse boundary.
B3t—48 to 65 inches; mottled red (2.5YR 4/6), light olive brown (2.5Y 5/4), grayish brown (10YR 5/2), and gray (10YR 6/1) clay; weak medium and coarse subangular blocky structure; firm, plastic; mildly alkaline; gradual irregular boundary.
Cr—65 to 70 inches; partly weathered limestone and shale; few pockets of light olive brown (2.5Y 5/4),

gray (10YR 6/1), and red (2.5YR 4/6) clay in cracks; mildly alkaline; gradual wavy boundary.
R—70 to 72 inches; limestone and shale.

The solum ranges from 40 to 70 inches in thickness. Bedrock is at a depth of 60 to 100 inches or more. Reaction ranges from mildly alkaline to slightly acid throughout.

The A horizon is 4 to 12 inches thick. It has hue of 10YR, value of 2 or 3, and chroma of 2 or 3.

Fragments of limestone, shale, and chert make up 0 to 15 percent of the volume of the A horizon and 0 to 35 percent of the volume of the B horizon.

The B1 horizon has the same colors as the A horizon. The B21t horizon ranges in color from that of the A horizon through that of the B22t horizon. The B21t horizon is silty clay loam, silty clay, or clay. The B22t, B23t, and B3t horizons have hue of 10YR, 7.5YR, or 2.5YR, value of 4 or 5, and chroma of 3, 4, or 6. They are silty clay or clay. They have mottles in shades of red, brown, and gray.

The Cr horizon is mottled in shades of red, brown, and gray. It is silty clay or clay.

Woolper soils in Sharp County are a taxadjunct to the Woolper series because the solum is slightly thicker than that defined for the series. This difference, however, does not affect the use, management, or behavior of the soils.

Formation of the Soils

In this section the factors that influence soil formation in Sharp County are discussed and the processes of soil formation are described.

Factors of Soil Formation

Soil is a natural, three-dimensional body on the earth's surface. The properties of soil are the result of the integrated effect of climate and living matter acting on parent material as conditioned by relief over periods of time.

The five main soil-forming factors are interdependent; each factor modifies the effect of the others. These factors are the chemical and mineralogical composition of the parent material; climate, the particular temperature and precipitation during accumulation of the parent material; the kinds of vegetation and living organisms on and in the soil; relief, which hastens or delays the work of the other factors; and the actual length of time that the parent material has been subjected to weathering.

The effect of one factor could differ locally, but the interaction of all five factors determines the kind of soil that forms.

Climate

The climate in Sharp County is characterized by mild winters, warm or hot summers, and generally abundant rainfall. It is probable that the present climate is similar to the climate during the formation of the soils. The average temperature at Evening Shade in July is about 79 degrees F., and the average temperature in January is about 36 degrees F. The total annual rainfall, 47 inches, is well distributed throughout the year. For additional information about the climate refer to the section "General Nature of the Survey Area."

The warm, moist climate promotes rapid soil formation. The warm temperatures permit rapid chemical reaction. The abundant rainfall supplies a large amount of water that moves dissolved or suspended material downward in the soil. As a result, plant remains decompose rapidly, releasing acid that breaks down base-containing minerals. The process yields soluble nutrients and minerals, such as clay, and removes oxides, such as those of iron and aluminum. Soil development continues almost year round because the soil is frozen only for a short period and only to a shallow depth. The climate throughout the county is relatively uniform, but its effect is modified locally by vegetation and relief. Climate alone does not account for the differences in the soils.

Living Organisms

Living organisms, such as rodents, insects, bacteria, and fungi, are important in the formation of soil. They furnish organic matter to the soil and bring up plant nutrients from the lower horizons to the upper ones. They also change the structure and porosity of soil and add nitrogen to the soil.

At one time, long before Sharp County was settled, the native vegetation influenced soil formation more than animals did. On flood plains the dominant trees were southern red oak, white oak, American sycamore, and eastern cottonwood. On uplands, where the soils formed mainly in residuum, the dominant trees were oak, hickory, elm, ash, dogwood, and eastern redcedar.

Man's activities affecting the future rate of soil formation include clearing the fields and tilling the soil; introducing new varieties of plants; liming and fertilizing; adding chemicals for the control of weeds, insects, and disease; improving drainage and controlling floods; grading and smoothing the surface; and controlling fires. Some results of man's activities are evident now, but many results may not be evident for many centuries. Nevertheless, man's activities have drastically affected soil formation.

Parent Material

Sharp County lies within the Salem and Springfield Plateaus of the Ozark Highlands. The formations in the county are St. Peter Sandstone, interbedded sandstone and limestone of the Everton Formation, Boone Formation, Powell, Cotter, and Jefferson City Dolomites, Cason Shale, Fernvale Limestone, and rocks of the Cretaceous Period. Except in areas capped by deposits of loess, the soils in the county formed mainly in material derived from rocks in these formations.

Captina soils formed partly in loess and partly in material that weathered from cherty limestone of the Mississippian Period.

Boden, Brockwell, Lily, Portia, and Ramsey soils formed in material that weathered from St. Peter Sandstone and the sandstone member of the Everton Formation.

Arkana, Clarksville, Doniphan, Gassville, Gepp, Moko, Ventris, and Woolper soils formed in residual or colluvial material that weathered partly from cherty limestone, limestone, or dolomite and partly from beds of shale and siltstone. The Boone Formation that crops out in the southern part of the county contains more chert than the formations to the north. Clarksville soils are the main soils in the Boone Formation. Arkana, Doniphan, Gassville, Gepp, Moko, Woolper, and Ventris soils are the main soils in the Powell, Cotter, and Jefferson City Dolomites. Limestone weathers more rapidly than chert; consequently, the Clarksville and other soils that contain large quantities of chert generally are on the peaks and point of ridgetops.

The Gepp and other soils that formed in limestone material contain less chert and generally are at lower elevations. The surface layer contains most of the chert, and the subsoil contains few or no chert fragments. The clayey subsoil of Arkana, Doniphan, Gassville, Gepp, Woolper, and Ventris soils is a characteristic inherited from the argillaceous qualities of the parent material.

Deposits from streams flowing through the Ozark Highlands are high in silt and in some places are high in sand. The more readily transported material was washed from the soils on uplands. Most of the chert fragments, which are resistant to weathering, remain in place. Most of the suspended clay particles in runoff were deposited far from their place of origin. Hontas, Peridge, Razort, Sturkie, and Wideman soils formed in the resulting silty, loamy, and sandy, predominantly chert-free material.

Differences in the soils in Sharp County and the wide range in texture of the sediment are caused by differences in the sites of deposition. The alluvial deposits originate from many different kinds of rocks and soils and from unconsolidated sediment in the Ozark Highlands. As creeks and rivers overflow their banks and spread over flood plains, the coarse sediment is deposited first. Consequently, sands are deposited in banks parallel to and near the river. The low ridges of the banks are natural levees. Wideman soils are the major soils in the areas along streams. As the flood waters continue to spread, silt that generally is mixed with small amounts of sand and clay is deposited. Hontas, Razort, and Sturkie soils formed in this sediment of intermediate texture.

The Strawberry and Spring Rivers transport enough sediment to maintain young soils on their flood plains. Thus the soils, mainly Hontas and Sturkie soils, continue to form in the younger loamy sediment. Wideman soils continue to form in the younger sandy deposits on natural levees.

Where the narrow valleys and natural levees merge with the broad flats, the sediment has less sand and more silt. The main soils there are Hontas, Razort, and Sturkie soils.

The watersheds in Sharp County are drained by small, localized streams such as Big Barn Creek, Caney Creek, South Big Creek, North Big Creek, Martin's Creek, Piney Fork, and the Strawberry and Spring Rivers. The discharge from these streams is enough to maintain narrow active flood plains.

Relief

Relief in Sharp County was brought about by the entrenchment of streams into the surface, by faulting, and by deposition. The influence of relief on soil formation stems from its controlling effect on drainage, runoff, and geologic and accelerated erosion.

In some areas relief affects conditions of moisture and air in the soil. In an undulating area where the parent material is the same, runoff from the high spots collects in the low spots, thus causing the low spots to receive more water. In gently sloping to steep areas there is more runoff than infiltration of water into the soil. The soils are generally well drained to excessively drained.

Along the footslopes of the Ozark Highlands, runoff is rapid. In these areas the soils are saturated only briefly when it rains or snows. They are moderately well drained to somewhat excessively drained. Consequently, they are mainly brown or red, an indication of the oxidation of iron.

The highest elevation in the county, about 960 feet above sea level, is near Pleasant Ridge Church and Cemetery, about one-half mile south of the Arkansas-Missouri line. The lowest elevation, about 240 feet above sea level, is along the Strawberry River at the eastern county line.

Relief in Sharp County ranges from steep, dissected, rolling, and hilly areas to gently sloping plateaus, narrow ridgetops, and hillcrests. The difference in elevation is as much as 585 feet. Along the foot slopes of the Ozark Highlands, the difference in elevation ranges from 50 to 250 feet.

The soils on flood plains along creeks and rivers in the county are level to gently undulating. Most of them are subject to frequent flooding. The main soils are Hontas, Razort, Sturkie, and Wideman soils.

There are rock outcrops in areas where geologic erosion has kept pace with the soil-forming processes. Arkana, Gassville, Lily, Moko, Ramsey, and Ventris soils have undergone geologic erosion at a faster rate. They do not have a protective mantle of chert and are shallow to moderately deep to bedrock. Clarksville, Doniphan, and Gepp soils have a mantle of chert or gravel that has retarded geologic erosion. They continue to weather but are deep to bedrock. Brockwell, Captina, and Portia soils are in areas where weathering has proceeded faster than geologic erosion.

Time

The length of time required for the formation of a soil depends largely on the other soil-forming factors. Less time is needed for the formation of a soil in a warm and

humid climate where vegetation is abundant. If all other soil-forming factors are equal, less time is needed for a soil to form in sandy or loamy parent material than in clayey parent material.

The soils in Sharp County range from young to old in terms of geologic time. However, soil development does not always coincide with geologic time. The soils on the flood plains of the Spring and Strawberry Rivers are young. They formed in alluvium that has been accumulating almost continuously. They are the most productive in the county. There are also young soils on bottom lands along all creeks and rivers in the county. Those soils receive fresh sediment occasionally and show evidence of soil development, but they do not show evidence of translocated silicate clay as do more mature soils. Hontas, Sturkie, and Wideman soils are the younger soils and Razort soils are the older soils in these geologically young areas.

Many soils in Sharp County formed in material that weathered from rocks of the Mississippian and Ordovician Periods. These soils are old in terms of geologic time. Most of these soils have a thick argillic horizon and are moderately deep or deep to bedrock. Clarksville and Gepp soils are the older soils and Arkana, Moko, and Ramsey soils are the younger soils in these geologically old areas.

Processes of Soil Formation

In the following paragraphs, the nomenclature of soil horizons and the processes of soil formation are briefly defined.

The soil profile is a record of the effects of the soil-forming factors. It is a succession of layers, or horizons, that extend from the surface to the parent rock. The horizons differ in one or more properties, such as color, texture, structure, consistency, and porosity.

Most soil profiles consist of three major horizons—the A, B, and C horizons. In the profile of a very young soil there is no B horizon.

The A1 horizon, or surface layer, is the horizon of maximum accumulation of organic matter. The A2 horizon, or subsurface layer, is the horizon of maximum leaching of dissolved or suspended material.

The B horizon, or subsoil, is directly below the A horizon (*6*). It is the horizon of maximum accumulation of suspended material, such as clay and iron. It commonly has blocky structure and is firmer than the horizons directly above and below it.

The C horizon is below the B horizon. It has been little affected by the soil-forming processes but can be materially modified by weathering. In some young soils the C horizon is just below the A horizon and has been slightly modified by living organisms as well as by weathering.

Several processes have been active in the formation of soils in Sharp County. Among these are the accumulation of organic matter, the leaching of bases, the oxidation or reduction and transfer of iron, and the formation and translocation of silicate clay minerals. In most of the soils more than one of these processes have been active in soil formation.

The process of physical weathering of rocks, through heating and cooling and wetting and drying, slowly breaks them into small fragments. Such fragments have formed the parent material of the residual soils in the county. Lily and Ramsey soils are residual soils.

The accumulation of organic matter in the upper part of the profile in forming an A1 horizon has been an important process in soil formation.

Leaching of bases has occurred to some degree in nearly all soils in the county. It is generally accepted that bases are leached downward first and then silicate clay minerals. Razort soils are moderately leached. Wideman and Moko soils are only slightly leached. Brockwell and Clarksville soils are strongly leached.

Oxidation of iron is evident in the moderately well drained and well drained soils in the county. This process is indicated by the red and brown colors in the B horizon in the Gepp, Peridge, and Lily soils.

Reduction and transfer of iron has occurred to a significant degree in the moderately well drained Hontas and Ventris soils. In the naturally wet soils this process is called gleying. Gray colors in the horizons below the surface layer indicate the reduction and loss of iron. Some horizons have reddish or yellowish mottles and concretions derived from segregated iron.

Translocation of silicate clay minerals has contributed to horizon development in most of the soils in the county. In cultivated areas most of the eluviated A2 horizon has been destroyed. But where it is present, it has blocky structure, the content of clay is less than that in the lower horizons where clay has accumulated, and the horizon is lighter in color because of leaching. Clay films generally have accumulated in pores and on the surface of peds in the B horizon. The soils probably were leached of carbonates and soluble salts to a great extent before silicate clay minerals were translocated, even though the content of bases is still moderate in some soils on lowlands.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on the contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Bottom land. The normal flood plain of a stream, subject to flooding.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in

diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragile (in tables). A soil that is easily damaged by use or disturbance.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced

by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, alluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Arabic numeral 2 precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as orifices, emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial melt water. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1964-79 at Evening Shade, Arkansas]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	48.4	23.3	35.9	75	-1	24	2.98	1.29	4.41	5	2.6
February---	52.9	26.1	39.5	76	2	33	3.12	1.69	4.37	5	3.3
March------	62.5	35.1	48.8	86	11	162	5.09	2.24	7.51	7	1.9
April------	74.0	45.0	59.5	88	23	285	4.80	2.56	6.75	7	.0
May--------	80.5	52.2	66.4	93	33	508	4.52	2.38	6.40	7	.0
June-------	87.9	60.4	74.2	99	43	726	3.37	1.48	4.97	5	.0
July-------	92.7	65.3	79.0	106	49	899	3.25	2.38	4.04	6	.0
August-----	90.4	62.7	76.6	102	47	825	4.08	1.60	6.15	5	.0
September--	83.7	57.4	70.6	96	36	618	4.97	1.95	7.50	6	.0
October----	74.9	43.2	59.1	91	24	293	2.57	.90	3.97	4	.0
November---	62.1	35.8	49.0	80	10	60	4.37	2.21	6.24	6	.5
December---	52.4	28.1	40.3	75	5	7	4.32	2.54	5.90	7	1.7
Yearly:											
Average--	71.9	44.6	58.2	---	---	---	---	---	---	---	---
Extreme--	---	---	---	106	-2	---	---	---	---	---	---
Total----	---	---	---	---	---	4,440	47.44	39.84	55.23	70	10.0

[1]A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1964-79
at Evening Shade, Arkansas]

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 10	April 19	May 4
2 years in 10 later than--	April 6	April 14	April 28
5 years in 10 later than--	March 27	April 4	April 17
First freezing temperature in fall:			
1 year in 10 earlier than--	October 20	October 12	September 27
2 years in 10 earlier than--	October 26	October 17	October 2
5 years in 10 earlier than--	November 7	October 27	October 11

TABLE 3.--GROWING SEASON

[Recorded in the period 1964-79
at Evening Shade, Arkansas]

Probability	Length of growing season if daily minimum temperature is--		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	202	182	159
8 years in 10	210	190	165
5 years in 10	226	207	177
2 years in 10	243	226	189
1 year in 10	255	240	199

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Arkana-Moko complex, 3 to 12 percent slopes	25,800	6.7
2	Boden fine sandy loam, 3 to 8 percent slopes	14,615	3.8
3	Boden fine sandy loam, 8 to 12 percent slopes	17,848	4.6
4	Boden stony fine sandy loam, 8 to 20 percent slopes	54,593	14.1
5	Brockwell fine sandy loam, 3 to 8 percent slopes	5,298	1.4
6	Captina silt loam, 2 to 6 percent slopes	7,034	1.8
7	Clarksville very cherty silt loam, 8 to 20 percent slopes	2,314	0.6
8	Clarksville very cherty silt loam, 20 to 40 percent slopes	5,562	1.4
9	Doniphan cherty silt loam, 3 to 8 percent slopes	19,915	5.1
10	Doniphan cherty silt loam, 8 to 12 percent slopes	13,549	3.5
11	Gassville cherty silt loam, 3 to 12 percent slopes	5,770	1.5
12	Gassville cherty silt loam, 12 to 20 percent slopes	3,197	0.8
13	Gepp very cherty silt loam, 3 to 8 percent slopes	13,585	3.5
14	Gepp very cherty silt loam, 8 to 12 percent slopes	60,916	15.7
15	Gepp very cherty silt loam, 12 to 30 percent slopes	62,977	16.2
16	Gepp-Ventris complex, 8 to 20 percent slopes	5,288	1.4
17	Gepp-Ventris complex, 20 to 40 percent slopes	3,537	0.9
18	Hontas silt loam, frequently flooded	1,050	0.3
19	Lily fine sandy loam, 3 to 8 percent slopes	1,999	0.5
20	Lily fine sandy loam, 8 to 12 percent slopes	5,481	1.4
21	Moko-Rock outcrop complex, 3 to 20 percent slopes	4,324	1.1
22	Peridge silt loam, 3 to 8 percent slopes	8,033	2.1
23	Portia fine sandy loam, 3 to 8 percent slopes	17,447	4.5
24	Portia fine sandy loam, 8 to 12 percent slopes	5,120	1.3
25	Ramsey-Lily-Rock outcrop complex, 3 to 12 percent slopes	812	0.2
26	Razort loam, frequently flooded	8,302	2.1
27	Sturkie silt loam, frequently flooded	9,261	2.4
28	Wideman loamy sand-fine sandy loam, frequently flooded	3,882	1.0
29	Woolper silt loam, 1 to 5 percent slopes	420	0.1
	Approximate land area	387,929	100.0
	*Large water area	500	
	**Total area	388,429	

*Enclosed areas of water more than 40 acres in size and streams, sloughs, and canals more than one-eighth of a statute mile in width.

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TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Map symbol and soil name	Soybeans	Wheat	Tall fescue	Common bermudagrass
	Bu	Bu	AUM*	AUM*
1---------- Arkana-Moko	---	---	4.0	---
2---------- Boden	20	25	5.0	5.0
3---------- Boden	---	---	4.5	4.5
4---------- Boden	---	---	4.0	4.0
5---------- Brockwell	20	30	6.0	6.0
6---------- Captina	25	30	7.5	7.0
7---------- Clarksville	---	---	3.0	---
8---------- Clarksville	---	---	---	---
9---------- Doniphan	---	30	5.0	4.0
10---------- Doniphan	---	---	4.0	3.0
11---------- Gassville	---	30	5.5	5.5
12---------- Gassville	---	---	5.0	5.0
13---------- Gepp	---	30	5.5	6.5
14---------- Gepp	---	---	5.0	5.5
15---------- Gepp	---	---	4.0	4.0
16---------- Gepp-Ventris	---	---	4.5	4.5
17---------- Gepp-Ventris	---	---	---	---
18---------- Hontas	30	40	8.0	9.0
19---------- Lily	20	35	6.0	6.0
20---------- Lily	---	30	5.5	5.5
21---------- Moko-Rock outcrop	---	---	---	---
22---------- Peridge	25	35	7.5	7.0

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Soybeans	Wheat	Tall fescue	Common bermudagrass
	Bu	Bu	AUM*	AUM*
23---------- Portia	20	35	7.0	7.0
24---------- Portia	---	35	6.0	6.0
25---------- Ramsey-Lily-Rock outcrop	---	---	---	---
26---------- Razort	---	---	10.0	8.0
27---------- Sturkie	30	---	9.0	8.0
28---------- Wideman	---	---	4.5	4.5
29---------- Woolper	30	45	8.0	8.0

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
1*:							
Arkana	5c8	Slight	Moderate	Moderate	Shortleaf pine	55	Shortleaf pine, eastern redcedar.
					Southern red oak	55	
					Eastern redcedar	35	
					White oak	---	
Moko	5x3	Moderate	Severe	Moderate	Eastern redcedar	30	Eastern redcedar.
2, 3 Boden	4o7	Slight	Slight	Slight	Southern red oak	65	Shortleaf pine, loblolly pine, eastern redcedar, black walnut, black locust, southern red oak.
					Eastern redcedar	40	
					Black walnut	---	
					Shortleaf pine	60	
					Black locust	---	
					White oak	---	
					Black cherry	---	
					Loblolly pine	---	
4 Boden	4x8	Moderate	Moderate	Slight	Southern red oak	65	Shortleaf pine, loblolly pine, eastern redcedar.
					Eastern redcedar	40	
					Black walnut	---	
					Shortleaf pine	60	
					Black locust	---	
					White oak	---	
					Black cherry	---	
5 Brockwell	3o7	Slight	Slight	Slight	Shortleaf pine	70	Shortleaf pine, loblolly pine.
					Southern red oak	65	
					Black oak	---	
					White oak	---	
6 Captina	4o7	Slight	Slight	Slight	Shortleaf pine	60	Shortleaf pine, eastern redcedar, black walnut, black locust, southern red oak, loblolly pine.
					Southern red oak	65	
					Eastern redcedar	40	
					Black locust	---	
					Black walnut	---	
7 Clarksville	4f8	Slight	Moderate	Moderate	White oak	55	White oak, shortleaf pine, sweetgum.
					Shortleaf pine	---	
8 Clarksville	4f9	Moderate	Severe	Severe	White oak	55	White oak, shortleaf pine, sweetgum.
					Shortleaf pine	---	
9, 10 Doniphan	3o7	Slight	Slight	Slight	White oak	70	Shortleaf pine, white oak, sweetgum, green ash, black oak, sugar maple, loblolly pine.
					Shortleaf pine	70	
11, 12 Gassville	4o7	Slight	Slight	Slight	Shortleaf pine	55	Shortleaf pine, eastern redcedar, loblolly pine, black walnut, black locust, southern red oak.
					Southern red oak	65	
					Black locust	---	
					Black walnut	---	
					Black cherry	---	
					Loblolly pine	---	
					Eastern redcedar	35	
13, 14 Gepp	3o7	Slight	Slight	Slight	White oak	70	Black walnut, loblolly pine, shortleaf pine.
					Shortleaf pine	75	
					Loblolly pine	80	
					Black oak	70	
					Northern red oak	70	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
15---------- Gepp	3r8	Slight	Moderate	Slight	White oak----------	70	Black walnut, loblolly pine, shortleaf pine.
					Shortleaf pine----------	75	
					Loblolly pine----------	80	
					Black oak----------	70	
					Northern red oak-------	70	
16*:							
Gepp----------	3o7	Slight	Slight	Slight	White oak----------	70	Black walnut, loblolly pine, shortleaf pine.
					Shortleaf pine----------	75	
					Loblolly pine----------	80	
					Black oak----------	70	
					Northern red oak-------	70	
Ventris----------	5c2	Slight	Slight	Moderate	Shortleaf pine----------	55	Shortleaf pine, loblolly pine, eastern redcedar.
					Southern red oak-------	55	
					Eastern redcedar-------	35	
					Loblolly pine----------	---	
17*:							
Gepp----------	3r8	Slight	Moderate	Slight	White oak----------	70	Black walnut, loblolly pine, shortleaf pine.
					Shortleaf pine----------	75	
					Loblolly pine----------	80	
					Black oak----------	70	
					Northern red oak-------	70	
Ventris----------	5c3	Moderate	Moderate	Severe	Shortleaf pine----------	55	Shortleaf pine, loblolly pine, eastern redcedar.
					Southern red oak-------	55	
					Eastern redcedar-------	35	
					Loblolly pine----------	---	
18---------- Hontas	2w5	Slight	Moderate	Moderate	Shortleaf pine----------	80	Shortleaf pine, black walnut, loblolly pine, eastern cottonwood, American sycamore, Shumard oak, sweetgum.
					Shumard oak----------	80	
					Sweetgum----------	80	
					Eastern cottonwood-----	80	
					American sycamore------	75	
					Black walnut----------	---	
					Water oak----------	---	
19, 20---------- Lily	4o7	Slight	Slight	Slight	Shortleaf pine----------	63	Loblolly pine, shortleaf pine, white oak.
					White oak----------	---	
					Red oak----------	60	
					Loblolly pine----------	---	
21*:							
Moko----------	5x3	Moderate	Severe	Moderate	Eastern redcedar-------	30	Eastern redcedar.
Rock outcrop.							
22---------- Peridge	3o7	Slight	Slight	Slight	Shortleaf pine----------	70	Shortleaf pine, loblolly pine, black walnut, black locust, southern red oak, white ash, eastern redcedar.
					Southern red oak-------	70	
					Eastern redcedar-------	50	
					Black walnut----------	---	
					White oak----------	---	
					White ash----------	---	
					Black cherry----------	---	
					Black locust----------	---	
23, 24---------- Portia	3o7	Slight	Slight	Slight	Sweetgum----------	80	Loblolly pine, shortleaf pine.
					Loblolly pine----------	75	
25*:							
Ramsey----------	5d3	Slight	Slight	Severe	Shortleaf pine----------	50	Shortleaf pine, loblolly pine, eastern redcedar.
					Eastern redcedar-------	35	
					White oak----------	50	
Lily----------	4o7	Slight	Slight	Slight	Shortleaf pine----------	63	Loblolly pine, shortleaf pine, white oak.
					White oak----------	---	
					Red oak----------	60	
					Loblolly pine----------	---	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
25*: Rock outcrop.							
26---------- Razort	2o7	Slight	Slight	Slight	Shortleaf pine--------- Southern red oak------- Eastern cottonwood----- American sycamore------ Sweetgum---------- White oak----------	80 80 90 85 80 75	Shortleaf pine, loblolly pine, southern red oak, white oak, black walnut, American sycamore, eastern cottonwood, sweetgum.
27---------- Sturkie	2o4	Slight	Slight	Slight	Southern red oak------- White oak---------- American sycamore------ Eastern cottonwood-----	80 70 80 100	Northern red oak, white oak, American sycamore, eastern cottonwood, black walnut.
28*---------- Wideman	3s8	Slight	Moderate	Moderate	Sweetgum---------- Eastern cottonwood----- American sycamore------	80 90 80	Eastern cottonwood, American sycamore, loblolly pine, shortleaf pine, sweetgum.
29---------- Woolper	2c8	Slight	Moderate	Slight	Northern red oak------- Shortleaf pine---------	80 80	Black walnut, shortleaf pine, loblolly pine.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
1*: Arkana	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, small stones, percs slowly.	Slight.
Moko	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, slope, small stones.	Severe: large stones.
2--- Boden	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight.
3--- Boden	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight.
4--- Boden	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Moderate: large stones.
5--- Brockwell	Slight	Slight	Moderate: slope.	Slight.
6--- Captina	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight.
7--- Clarksville	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.
8--- Clarksville	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
9--- Doniphan	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight.
10--- Doniphan	Moderate: small stones, slope.	Moderate: small stones, slope.	Severe: slope, small stones.	Slight.
11--- Gassville	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, small stones, percs slowly.	Slight.
12--- Gassville	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, small stones, percs slowly.	Moderate: slope.
13--- Gepp	Severe: small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.
14--- Gepp	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
15--- Gepp	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.
16*: Gepp---	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.
Ventris---	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, small stones, percs slowly.	Severe: erodes easily.
17*: Gepp---	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
Ventris---	Severe: percs slowly, slope.	Severe: percs slowly, slope.	Severe: slope, small stones, percs slowly.	Severe: slope, erodes easily.
18--- Hontas	Severe: flooding.	Moderate: flooding, wetness.	Severe: flooding.	Slight.
19--- Lily	Slight---	Slight---	Moderate: slope, depth to rock.	Slight.
20--- Lily	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
21*: Moko---	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, slope, small stones.	Severe: large stones.
Rock outcrop.				
22--- Peridge	Slight---	Slight---	Moderate: slope.	Slight.
23--- Portia	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight.
24--- Portia	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight.
25*: Ramsey---	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
Lily---	Slight---	Slight---	Severe: slope.	Slight.
Rock outcrop.				
26--- Razort	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
27---------- Sturkie	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.
28*---------- Wideman	Severe: flooding.	Moderate: flooding.	Severe: flooding, too sandy.	Flooding.
29---------- Woolper	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly, slope.	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
1*:										
Arkana	Fair	Good	Fair	Good	---	Poor	Very poor.	Fair	Good	Very poor.
Moko	Very poor.	Poor	Poor	---	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
2---- Boden	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
3---- Boden	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
4---- Boden	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
5---- Brockwell	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
6---- Captina	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
7---- Clarksville	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
8---- Clarksville	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
9, 10---- Doniphan	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
11---- Gassville	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
12---- Gassville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
13, 14---- Gepp	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
15---- Gepp	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
16*:										
Gepp	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Ventris	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
17*:										
Gepp	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Ventris	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
18---- Hontas	Poor	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor
19---- Lily	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
20---------- Lily	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
21*: Moko----------	Very poor.	Poor	Poor	---	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Rock outcrop.										
22---------- Peridge	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
23---------- Portia	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
24---------- Portia	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
25*: Ramsey----------	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Lily----------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Rock outcrop.										
26---------- Razort	Poor	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
27---------- Sturkie	Poor	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
28*---------- Wideman	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
29---------- Woolper	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
1*: Arkana	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
Moko	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.
2--- Boden	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
3, 4--- Boden	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.
5--- Brockwell	Slight	Slight	Slight	Moderate: slope.	Slight.
6--- Captina	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: low strength, wetness.
7--- Clarksville	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
8--- Clarksville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
9--- Doniphan	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
10--- Doniphan	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.
11--- Gassville	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
12--- Gassville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
13--- Gepp	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
14--- Gepp	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.
15--- Gepp	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
16*: Gepp	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
16*:					
Ventris	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.
17*:					
Gepp	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
Ventris	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.
18--- Hontas	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.
19--- Lily	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.
20--- Lily	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.
21*:					
Moko	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, large stones.
Rock outcrop.					
22--- Peridge	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Severe: low strength.
23--- Portia	Slight	Slight	Slight	Moderate: slope.	Slight.
24--- Portia	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
25*:					
Ramsey	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Lily	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.
Rock outcrop.					
26--- Razort	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
27--- Sturkie	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
28*--- Wideman	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
29--- Woolper	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1*:					
Arkana	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
Moko	Severe: depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: area reclaim, thin layer.
2 Boden	Severe: percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
3, 4 Boden	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
5 Brockwell	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: small stones.
6 Captina	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: small stones.
7 Clarksville	Moderate: slope.	Severe: seepage, slope.	Severe: seepage, too clayey.	Severe: seepage.	Poor: too clayey, small stones.
8 Clarksville	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too clayey.	Severe: seepage, slope.	Poor: too clayey, small stones, slope.
9 Doniphan	Moderate: percs slowly.	Moderate: seepage, slope, large stones.	Severe: too clayey.	Severe: seepage.	Poor: too clayey, hard to pack.
10 Doniphan	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Severe: seepage.	Poor: too clayey, hard to pack.
11 Gassville	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
12 Gassville	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
13 Gepp	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
14 Gepp	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
15---------- Gepp	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
16*:					
Gepp----------	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Ventris----------	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
17*:					
Gepp----------	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Ventris----------	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
18---------- Hontas	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
19---------- Lily	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.
20---------- Lily	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.
21*:					
Moko----------	Severe: depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: area reclaim, thin layer.
Rock outcrop.					
22---------- Peridge	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight----------	Fair: too clayey, thin layer.
23---------- Portia	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
24---------- Portia	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
25*:					
Ramsey----------	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
25*: Lily	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.
Rock outcrop.					
26--- Razort	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding.	Fair: too clayey.
27--- Sturkie	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
28*--- Wideman	Severe: flooding.	Severe: flooding, seepage.	Severe: seepage, flooding, too sandy.	Severe: flooding, seepage.	Poor: seepage, too sandy.
29--- Woolper	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight---	Poor: too clayey, hard to pack.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
1*:				
Arkana	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Moko	Poor: area reclaim, large stones, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, large stones, thin layer.
2, 3---- Boden	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
4---- Boden	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, thin layer.
5---- Brockwell	Good----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
6---- Captina	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
7---- Clarksville	Good----	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
8---- Clarksville	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
9, 10---- Doniphan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
11---- Gassville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
12---- Gassville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
13, 14---- Gepp	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
15---- Gepp	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
16*:				
Gepp	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Ventris	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
17*:				
Gepp	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
17*: Ventris	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
18 Hontas	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
19, 20 Lily	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
21*: Moko	Poor: area reclaim, large stones, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, large stones, thin layer.
Rock outcrop.				
22 Peridge	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
23 Portia	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
24 Portia	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
25*: Ramsey	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Lily	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
Rock outcrop.				
26 Razort	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
27 Sturkie	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
28*: Wideman	Good	Improbable: thin layer.	Improbable: too sandy.	Fair: too sandy.
Wideman	Good	Improbable: thin layer.	Improbable: too sandy.	Good.
29 Woolper	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1*: Arkana	Moderate: depth to rock.	Severe: hard to pack.	Deep to water	Droughty, percs slowly, depth to rock.	Large stones, depth to rock, percs slowly.	Large stones, depth to rock.
Moko	Severe: depth to rock.	Severe: large stones.	Deep to water	Large stones, droughty, depth to rock.	Large stones, depth to rock.	Large stones, droughty, depth to rock.
2---- Boden	Moderate: seepage, depth to rock.	Moderate: thin layer, hard to pack.	Deep to water	Slope----	Favorable----	Favorable.
3---- Boden	Moderate: seepage, depth to rock.	Moderate: thin layer, hard to pack.	Deep to water	Slope----	Slope----	Slope.
4---- Boden	Moderate: seepage, depth to rock.	Moderate: thin layer, hard to pack, large stones.	Deep to water	Slope----	Slope----	Large stones, slope.
5---- Brockwell	Moderate: seepage.	Severe: piping.	Deep to water	Slope----	Favorable----	Favorable.
6---- Captina	Moderate: seepage, depth to rock.	Severe: piping.	Percs slowly, slope.	Wetness, percs slowly, rooting depth.	Erodes easily, rooting depth, percs slowly.	Erodes easily, rooting depth, percs slowly.
7, 8---- Clarksville	Severe: seepage, slope.	Moderate: large stones.	Deep to water	Droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
9---- Doniphan	Moderate: seepage.	Moderate: hard to pack.	Deep to water	Droughty, slope.	Favorable----	Droughty.
10---- Doniphan	Moderate: seepage.	Moderate: hard to pack.	Deep to water	Droughty, slope.	Slope----	Slope, droughty.
11---- Gassville	Moderate: depth to rock.	Severe: hard to pack.	Deep to water	Percs slowly, slope.	Percs slowly.	Percs slowly.
12---- Gassville	Moderate: depth to rock.	Severe: hard to pack.	Deep to water	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
13---- Gepp	Moderate: seepage.	Severe: hard to pack.	Deep to water	Droughty, slope.	Favorable----	Droughty.
14---- Gepp	Moderate: seepage.	Severe: hard to pack.	Deep to water	Droughty, slope.	Slope----	Slope, droughty.
15---- Gepp	Severe: slope.	Severe: hard to pack.	Deep to water	Droughty, slope.	Slope----	Slope, droughty.
16*: Gepp	Moderate: seepage.	Severe: hard to pack.	Deep to water	Droughty, slope.	Slope----	Slope, droughty.
Ventris	Moderate: depth to rock.	Severe: hard to pack.	Deep to water	Percs slowly, depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
17*:						
Gepp	Severe: slope.	Severe: hard to pack.	Deep to water	Droughty, slope.	Slope	Slope, droughty.
Ventris	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
18--- Hontas	Moderate: seepage.	Severe: piping.	Flooding	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Favorable.
19--- Lily	Severe: seepage.	Severe: piping.	Deep to water	Depth to rock, slope.	Depth to rock	Depth to rock.
20--- Lily	Severe: seepage.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
21*:						
Moko	Severe: depth to rock.	Severe: large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop.						
22--- Peridge	Moderate: seepage.	Moderate: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
23--- Portia	Moderate: seepage.	Moderate: piping.	Deep to water	Slope	Favorable	Favorable.
24--- Portia	Moderate: seepage.	Moderate: piping.	Deep to water	Slope	Slope	Slope.
25*:						
Ramsey	Severe: depth to rock.	Severe: piping.	Deep to water	Droughty, depth to rock, slope.	Depth to rock	Droughty, depth to rock.
Lily	Severe: seepage.	Severe: piping.	Deep to water	Depth to rock, slope.	Depth to rock	Depth to rock.
Rock outcrop.						
26--- Razort	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily, flooding.	Erodes easily	Favorable.
27--- Sturkie	Moderate: seepage.	Severe: piping.	Deep to water	Flooding	Erodes easily	Favorable.
28*--- Wideman	Severe: seepage.	Severe: piping, seepage.	Deep to water	Flooding, fast intake, droughty.	Too sandy	Droughty.
29--- Woolper	Moderate: slope.	Severe: hard to pack.	Deep to water	Percs slowly, erodes easily, slope.	Erodes easily, percs slowly.	Erodes easily, percs slowly.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated. Some soils have Unified classifications and USDA textures in addition to those shown. In general, the dominant classification and texture are shown]

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1*:											
Arkana	0-8	Cherty silt loam	SM, SC, SM-SC	A-4, A-2, A-6	0-25	60-90	55-80	50-75	25-45	<35	NP-15
	8-14	Cherty silty clay loam, cherty silty clay.	CL, CH	A-6, A-7	0-15	70-90	70-80	60-70	50-65	30-65	20-35
	14-26	Clay, cherty clay	CH	A-7	0-10	70-100	70-100	65-95	60-85	51-80	31-50
	26-28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Moko	0-3	Very stony silt loam.	ML, CL, CL-ML, SM-SC	A-4, A-6	35-75	65-90	50-72	45-70	40-60	16-38	3-15
	3-12	Very stony silty clay loam, very stony loam, very stony silt loam.	ML, CL, CL-ML, SM-SC	A-4, A-6	35-75	65-90	50-72	45-70	40-60	16-38	3-15
	12-14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
2, 3	0-7	Fine sandy loam	ML, SM	A-2, A-4	0	75-100	75-100	55-75	20-55	<20	NP
Boden	7-14	Sandy clay loam, fine sandy loam.	ML, CL-ML, SM, SM-SC	A-2, A-4	0	85-100	85-100	75-90	30-60	<25	NP-7
	14-39	Sandy clay, clay	CH, CL	A-6, A-7	0	85-100	85-100	75-90	55-80	35-55	15-30
	39-45	Sandy clay loam, sandy clay, gravelly sandy clay loam.	CL, SC	A-4, A-6	0-20	80-95	75-95	65-90	35-70	25-40	10-20
	45-56	Sandy loam, sandy clay loam.	ML, CL, SM, SC	A-4	0	95-100	90-100	75-90	35-70	<30	NP-10
	56-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
4	0-7	Stony fine sandy loam.	SM, ML	A-2, A-4	10-30	75-100	75-100	65-75	20-50	<20	NP
Boden	7-14	Stony sandy clay loam, fine sandy loam.	ML, CL-ML, SM, SM-SC	A-2, A-4	0-15	85-100	85-100	75-90	30-60	<25	NP-7
	14-39	Sandy clay, clay	CH, CL	A-6, A-7	0-10	85-100	85-100	75-90	55-80	35-55	15-30
	39-45	Sandy clay loam, sandy clay, gravelly sandy clay loam.	CL, SC	A-6	0-20	80-95	75-95	65-90	35-70	25-40	10-20
	45-56	Sandy loam, sandy clay loam.	ML, CL, SM, SC	A-4	0	95-100	90-100	75-90	35-70	<30	NP-10
	56-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
5	0-15	Fine sandy loam	SM, ML, CL-ML, SM-SC	A-4, A-2	0	95-100	75-100	60-95	30-60	<15	NP-5
Brockwell	15-47	Fine sandy loam, loam.	SM, ML, CL-ML, SM-SC	A-4, A-2	0	95-100	75-100	60-95	30-60	<15	NP-5
	47-88	Fine sandy loam, loam, sandy clay loam.	SM, ML, CL-ML, SM-SC	A-4, A-2	0	95-100	75-100	50-95	30-60	<15	NP-5
	88-90	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
6---------- Captina	0-5	Silt loam--------	ML, CL-ML	A-4	0	95-100	90-100	85-100	75-95	<25	NP-7
	5-24	Silty clay loam, silt loam.	CL-ML, CL	A-4, A-6, A-7	0	95-100	95-100	90-100	85-95	20-45	5-20
	24-60	Silty clay loam, silt loam, cherty silty clay loam.	CL, GM-GC, GC, CL-ML	A-4, A-6	0-20	60-100	55-100	45-100	45-95	20-40	5-20
	60-72	Very cherty silty clay loam, very cherty silt loam, very cherty silty clay.	CL, GC, SC	A-6, A-7	35-85	60-95	55-90	45-90	45-85	30-45	15-25
7, 8---------- Clarksville	0-9	Very cherty silt loam.	GC, SC, SM-SC, GP-GC	A-2, A-1	5-20	30-70	10-60	5-50	5-35	20-40	5-15
	9-57	Very cherty silty clay loam, very cherty silty clay, very cherty silt loam.	GC, SC, SP-SC, GP-GC	A-2, A-6	5-20	30-70	10-60	10-50	5-45	30-40	15-25
	57-72	Very cherty silty clay, very cherty clay.	GC, SC, GP-GC, SP-SC	A-2-7, A-7	5-20	30-70	10-60	10-50	10-45	55-75	35-55
9, 10---------- Doniphan	0-8	Cherty silt loam	CL-ML, GM, GM-GC, SM-SC	A-4	5-30	50-80	45-70	45-65	35-60	20-30	2-8
	8-80	Cherty clay, clay	CH, MH	A-7	0-5	85-100	60-100	55-100	50-90	51-70	25-35
11, 12---------- Gassville	0-10	Cherty silt loam	GM, GM-GC, ML, CL-ML	A-2, A-4	5-15	45-65	40-65	35-60	30-55	<25	NP-5
	10-15	Cherty clay, cherty silty clay.	CH	A-7	2-10	70-80	70-80	65-75	55-70	55-80	27-47
	15-52	Clay, silty clay, cherty clay.	CH, MH	A-7	2-10	85-100	70-100	65-100	60-95	55-80	27-47
	52-56	Weathered bedrock	---	---	---	---	---	---	---	---	---
	56-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
13, 14, 15------- Gepp	0-6	Very cherty silt loam.	GM, GC, SM-SC, SM	A-1, A-2	10-30	30-70	20-50	10-40	5-20	<30	NP-10
	6-12	Cherty silty clay loam, cherty silt loam, silty clay loam.	CL	A-6, A-4	0-15	65-100	65-100	55-95	51-90	25-40	8-20
	12-58	Clay----------	MH, CH	A-7	0-5	90-100	90-100	85-100	80-95	51-75	25-40
	58-72	Clay, cherty clay	MH, CH	A-7	0-15	70-100	70-100	65-100	60-95	51-75	25-40
16*, 17*: Gepp----------	0-6	Very cherty silt loam.	GM, GC, SM-SC, SM	A-1, A-2	10-30	30-70	20-50	10-40	5-20	<30	NP-10
	6-12	Cherty silty clay loam, cherty silt loam, silty clay loam.	CL	A-6, A-4	0-15	65-100	65-100	55-95	51-90	25-40	8-20
	12-58	Clay----------	MH, CH	A-7	0-5	90-100	90-100	85-100	80-95	51-75	25-40
	58-72	Clay, cherty clay	MH, CH	A-7	0-15	70-100	70-100	65-100	60-95	51-75	25-40
Ventris----------	0-6	Cherty silt loam	ML, CL, GM, GC	A-4, A-6	3-6	50-85	45-80	40-70	36-65	<35	NP-15
	6-12	Clay, cherty clay	CH	A-7	0	70-95	70-95	65-95	60-90	50-80	35-55
	12-37	Clay, cherty clay	CH	A-7	0	70-95	70-95	65-95	60-90	50-80	35-55
	37-39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
18---------- Hontas	0-12	Silt loam--------	ML, CL-ML	A-4	0	100	100	90-100	80-90	<25	NP-7
	12-72	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	85-95	20-35	5-15

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
19, 20----------	0-10	Fine sandy loam	SM	A-4, A-2	0-5	90-100	85-100	55-80	25-50	<20	NP-4
Lily	10-22	Clay loam, sandy clay loam, loam.	SM, SC, ML, CL	A-4, A-6	0-5	90-100	85-100	75-100	40-80	<35	3-15
	22-34	Sandy clay loam, clay loam, gravelly sandy clay loam.	SM, SC, ML, CL	A-4, A-2, A-6, A-1	0-10	65-100	50-100	40-95	20-75	<35	3-15
	34-37	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
21*:											
Moko----------	0-3	Very stony silt loam.	ML, CL, CL-ML, SM-SC	A-4, A-6	35-75	65-90	50-72	45-70	40-60	16-38	3-15
	3-12	Very stony silty clay loam, very stony loam, very stony silt loam.	ML, CL, CL-ML, SM-SC	A-4, A-6	35-75	65-90	50-72	45-70	40-60	16-38	3-15
	12-14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
22----------	0-6	Silt loam--------	ML, CL-ML	A-4	0	95-100	90-100	85-90	80-85	<20	NP-5
Peridge	6-36	Silty clay loam, silt loam.	CL	A-6	0	95-100	90-100	85-95	80-95	30-40	11-20
	36-55	Gravelly silty clay loam, silty clay loam.	CL, SC, GC	A-6	0	55-100	50-100	45-90	40-85	30-40	11-20
	55-72	Silty clay, gravelly silty clay loam.	CL, SC, GC	A-7, A-6	0	55-100	50-100	45-90	40-85	35-50	15-25
23, 24----------	0-8	Fine sandy loam	SM, ML	A-4	0	100	85-100	70-85	35-60	---	NP
Portia	8-38	Loam, silt loam, sandy clay loam.	CL, ML, CL-ML	A-4, A-6	0	100	85-100	75-95	65-80	18-30	3-12
	38-50	Clay loam, loam, sandy clay loam.	CL	A-4, A-6	0	100	85-100	80-95	65-85	25-40	8-20
	50-72	Sandy clay loam, clay loam, clay.	CL, CH, SC	A-4, A-6, A-7	0	100	85-100	80-95	36-75	25-55	8-30
25*:											
Ramsey----------	0-3	Gravelly fine sandy loam.	SM, CL-ML, ML, CL	A-4, A-2	0-10	85-100	75-95	60-75	34-70	18-25	2-8
	3-10	Loam, gravelly loam, fine sandy loam.	SM, CL-ML, ML, CL	A-4, A-2	0-10	85-100	75-95	60-77	36-70	<25	2-8
	10-12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lily----------	0-10	Fine sandy loam	SM	A-4, A-2	0-5	90-100	85-100	55-80	25-50	<20	NP-4
	10-22	Clay loam, sandy clay loam, loam.	SM, SC, ML, CL	A-4, A-6	0-5	90-100	85-100	75-100	40-80	<35	3-15
	22-34	Sandy clay loam, clay loam, gravelly sandy clay loam.	SM, SC, ML, CL	A-4, A-2, A-6, A-1	0-10	65-100	50-100	40-95	20-75	<35	3-15
	34-37	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
26----------	0-8	Loam----------	ML, CL-ML	A-4	0	80-100	80-100	65-90	65-90	<25	NP-7
Razort	8-38	Silt loam, loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	60-100	60-100	55-85	50-80	25-40	7-15
	38-72	Gravelly clay loam, very gravelly silt loam, very gravelly sandy clay loam.	GM, SM, ML, CL-ML	A-2, A-4, A-1	0	35-75	30-70	25-65	20-60	<20	NP-7

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
27----------	0-18	Silt loam--------	ML, CL-ML	A-4	0	100	90-100	80-100	70-90	<25	NP-7
Sturkie	18-52	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	90-100	85-100	75-95	20-35	5-15
	52-72	Silt loam, silty clay loam, loam.	ML, CL-ML, CL	A-4, A-6	0	100	85-100	80-100	70-95	<30	NP-10
28*:											
Wideman---------	0-5	Loamy sand-------	SM, SP-SM	A-2	0	100	70-100	50-75	10-30	---	NP
	5-37	Sandy loam, loamy fine sand, loamy very fine sand.	SP-SM, SM	A-2, A-3	0	100	100	60-100	10-35	---	NP
	37-72	Loamy sand, loamy fine sand, sand.	SM, SP-SM	A-2	0	90-100	70-100	50-75	10-35	---	NP
Wideman---------	0-5	Fine sandy loam	SM, ML	A-2, A-4	0	100	100	65-90	30-60	<20	NP-3
	5-37	Sandy loam, loamy fine sand, loamy very fine sand.	SP-SM, SM	A-2, A-3	0	100	100	60-100	10-35	---	NP
	37-72	Loamy sand, loamy fine sand, sand.	SM, SP-SM	A-2	0	90-100	70-100	50-75	10-35	---	NP
29----------	0-5	Silt loam--------	CL, CL-ML	A-4, A-6	0-10	95-100	90-100	85-100	75-100	25-35	6-15
Woolper	5-23	Silty clay, silty clay loam, clay.	CL, CH	A-7, A-6	0-10	95-100	90-100	85-100	75-100	35-65	15-40
	23-65	Clay, silty clay	CH, CL	A-7	0-10	95-100	90-100	85-100	75-100	45-75	20-45
	65-70	Weathered bedrock	---	---	---	---	---	---	---	---	---
	70-72	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm³	In/hr	In/in	pH				Pct
1*:										
Arkana	0-8	15-27	1.25-1.50	0.6-2.0	0.10-0.16	5.6-7.8	Low	0.28	2	2-4
	8-14	35-85	1.20-1.45	0.06-0.2	0.06-0.10	5.1-8.4	Moderate	0.24		
	14-26	60-85	1.15-1.45	<0.06	0.12-0.18	5.1-8.4	High	0.32		
	26-28	---	---	---	---	---	---	---		
Moko	0-3	18-27	1.25-1.60	0.6-2.0	0.09-0.14	6.6-7.8	Low	0.24	1	2-4
	3-12	18-35	1.25-1.60	0.6-2.0	0.09-0.14	6.6-7.8	Low	0.32		
	12-14	---	---	---	---	---	---	---		
2, 3	0-7	5-20	1.30-1.50	0.6-6.0	0.07-0.15	4.5-5.5	Low	0.32	3	1-3
Boden	7-14	10-35	1.30-1.50	0.6-2.0	0.09-0.17	4.5-5.5	Low	0.32		
	14-39	35-55	1.15-1.35	0.2-0.6	0.12-0.18	4.5-5.5	Moderate	0.28		
	39-45	30-45	1.25-1.40	0.6-2.0	0.08-0.18	4.5-5.5	Moderate	0.32		
	45-56	15-35	1.30-1.50	0.6-2.0	0.09-0.17	4.5-5.5	Low	0.24		
	56-60	---	---	---	---	---	---	---		
4	0-7	12-20	1.30-1.50	0.6-6.0	0.07-0.15	4.5-6.0	Low	0.24	3	1-2
Boden	7-14	10-35	1.30-1.50	0.6-2.0	0.09-0.17	4.5-6.0	Low	0.32		
	14-39	35-55	1.15-1.35	0.2-0.6	0.12-0.18	4.5-5.5	Moderate	0.28		
	39-45	30-45	1.25-1.40	0.6-2.0	0.08-0.18	4.5-5.5	Moderate	0.32		
	45-56	15-35	1.30-1.50	0.6-2.0	0.09-0.17	4.5-5.5	Low	0.24		
	56-60	---	---	---	---	---	---	---		
5	0-15	3-10	1.30-1.60	0.6-2.0	0.10-0.20	4.5-6.0	Low	0.28	5	0.5-1
Brockwell	15-47	3-15	1.30-1.60	0.6-2.0	0.10-0.20	4.5-6.0	Low	0.28		
	47-88	10-30	1.30-1.60	0.6-2.0	0.12-0.20	4.5-6.0	Low	0.28		
	88-90	---	---	---	---	---	---	---		
6	0-5	10-25	1.30-1.55	0.6-2.0	0.16-0.24	5.1-6.5	Low	0.43	4	1-2
Captina	5-24	25-35	1.25-1.50	0.6-2.0	0.16-0.24	3.6-5.5	Low	0.37		
	24-60	25-40	1.25-1.50	0.06-0.2	0.08-0.12	3.6-5.5	Low	0.32		
	60-72	20-45	1.25-1.50	0.06-0.2	0.01-0.03	3.6-5.5	Low	0.32		
7, 8	0-9	14-20	1.30-1.60	2.0-6.0	0.07-0.12	4.5-6.0	Low	0.28	2	1-2
Clarksville	9-57	20-45	1.40-1.65	2.0-6.0	0.06-0.10	4.5-5.5	Low	0.28		
	57-72	40-75	1.40-1.80	2.0-6.0	0.05-0.08	4.5-5.5	Low	0.28		
9, 10	0-8	18-27	1.10-1.30	2.0-6.0	0.08-0.15	4.5-6.5	Low	0.28	2	0.5-2
Doniphan	8-80	48-70	1.20-1.40	0.6-2.0	0.08-0.10	3.6-5.5	Moderate	0.28		
11, 12	0-10	10-25	1.25-1.50	2.0-6.0	0.12-0.18	5.1-6.5	Low	0.32	3	2-4
Gassville	10-15	60-80	1.15-1.45	<0.06	0.10-0.16	4.5-5.5	Moderate	0.32		
	15-52	60-85	1.15-1.45	<0.06	0.12-0.18	4.5-5.5	Moderate	0.37		
	52-56	---	---	---	---	---	---	---		
	56-60	---	---	---	---	---	---	---		
13, 14, 15	0-6	10-25	1.25-1.45	0.6-2.0	0.06-0.12	5.1-6.5	Low	0.24	4	2-4
Gepp	6-12	20-40	1.20-1.40	0.6-2.0	0.10-0.22	4.5-6.0	Low	0.28		
	12-58	65-85	1.15-1.30	0.6-2.0	0.10-0.18	4.5-6.0	Moderate	0.28		
	58-72	65-85	1.15-1.30	0.6-2.0	0.08-0.18	5.1-6.5	Moderate	0.28		
16*, 17*:										
Gepp	0-6	10-25	1.25-1.45	0.6-2.0	0.06-0.12	5.1-6.5	Low	0.24	4	2-4
	6-12	20-40	1.20-1.40	0.6-2.0	0.10-0.22	4.5-6.0	Low	0.28		
	12-58	65-85	1.15-1.30	0.6-2.0	0.10-0.18	4.5-6.0	Moderate	0.28		
	58-72	65-85	1.15-1.30	0.6-2.0	0.08-0.18	5.1-6.5	Moderate	0.28		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm³	In/hr	In/in	pH				Pct
16*, 17*:										
Ventris	0-6	15-27	1.25-1.50	0.6-2.0	0.12-0.20	5.6-7.3	Low	0.43	2	1-2
	6-12	60-80	1.15-1.45	<0.06	0.10-0.18	5.6-7.3	High	0.37		
	12-37	60-80	1.15-1.45	<0.06	0.10-0.18	6.1-7.8	High	0.37		
	37-39	---	---	---	---	---	---	---		
18	0-12	10-25	1.25-1.45	0.6-2.0	0.16-0.24	5.6-7.3	Low	0.37	5	1-3
Hontas	12-72	15-35	1.25-1.45	0.6-2.0	0.16-0.24	5.6-7.8	Low	0.37		
19, 20	0-10	5-20	1.20-1.40	2.0-6.0	0.09-0.16	3.6-5.5	Low	0.28	3	0.5-2
Lily	10-22	18-35	1.25-1.35	2.0-6.0	0.12-0.18	3.6-5.5	Low	0.28		
	22-34	20-35	1.25-1.35	2.0-6.0	0.08-0.17	3.6-5.5	Low	0.17		
	34-37	---	---	---	---	---	---	---		
21*:										
Moko	0-3	18-27	1.25-1.60	0.6-2.0	0.09-0.14	6.6-7.8	Low	0.24	1	2-4
	3-12	18-35	1.25-1.60	0.6-2.0	0.09-0.14	6.6-7.8	Low	0.32		
	12-14	---	---	---	---	---	---	---		
Rock outcrop.										
22	0-6	10-20	1.25-1.45	0.6-2.0	0.16-0.24	4.5-6.0	Low	0.37	5	1-3
Peridge	6-36	20-35	1.25-1.45	0.6-2.0	0.18-0.22	4.5-6.0	Low	0.32		
	36-55	30-40	1.25-1.40	0.6-2.0	0.13-0.22	4.5-6.0	Low	0.28		
	55-72	30-60	1.15-1.35	0.6-2.0	0.09-0.18	4.5-6.0	Moderate	0.24		
23, 24	0-8	7-20	1.30-1.60	0.6-2.0	0.11-0.15	5.1-6.5	Low	0.24	3	1-3
Portia	8-38	18-35	1.30-1.60	0.6-2.0	0.15-0.24	4.5-6.0	Low	0.32		
	38-40	20-40	1.30-1.60	0.2-2.0	0.10-0.17	4.5-6.0	Low	0.32		
	50-72	20-50	1.20-1.60	0.2-2.0	0.12-0.20	5.1-6.0	Moderate	0.28		
25*:										
Ramsey	0-3	8-25	1.20-1.40	6.0-20	0.09-0.12	4.5-5.5	Low	0.24	1	1-2
	3-10	8-25	1.20-1.40	6.0-20	0.09-0.12	4.5-5.5	Low	0.17		
	10-12	---	---	---	---	---	---	---		
Lily	0-10	5-20	1.20-1.40	2.0-6.0	0.09-0.16	3.6-5.5	Low	0.28	3	0.5-3
	10-22	18-35	1.25-1.35	2.0-6.0	0.12-0.18	3.6-5.5	Low	0.28		
	22-34	20-35	1.25-1.35	2.0-6.0	0.08-0.17	3.6-5.5	Low	0.17		
	34-37	---	---	---	---	---	---	---		
Rock outcrop.										
26	0-8	10-25	1.25-1.60	0.6-2.0	0.10-0.22	6.1-7.3	Low	0.37	5	2-4
Razort	8-38	18-35	1.25-1.60	0.6-2.0	0.13-0.22	5.6-7.3	Low	0.37		
	38-72	10-40	1.25-1.50	2.0-6.0	0.08-0.12	5.6-7.3	Low	0.32		
27	0-18	10-27	1.20-1.40	0.6-2.0	0.14-0.24	5.6-7.8	Low	0.37	5	1-4
Sturkie	18-52	15-35	1.20-1.40	0.6-2.0	0.16-0.24	6.1-8.4	Low	0.37		
	52-72	15-35	1.20-1.40	0.6-2.0	0.13-0.24	6.1-8.4	Low	0.37		
28*:										
Wideman	0-5	2-12	1.40-1.60	>6.0	0.05-0.11	3.6-6.0	Low	0.17	5	0.5-1
	5-37	2-15	1.40-1.60	>6.0	0.06-0.14	5.1-7.3	Low	0.17		
	37-72	2-12	1.40-1.60	>6.0	0.05-0.11	5.1-7.3	Low	0.17		
Wideman	0-5	4-18	1.40-1.60	2.0-6.0	0.07-0.15	3.6-6.0	Low	0.17	5	0.5-1
	5-37	2-15	1.40-1.60	>6.0	0.06-0.14	5.1-7.3	Low	0.17		
	37-72	2-12	1.40-1.60	>6.0	0.05-0.11	5.1-7.3	Low	0.17		
29	0-5	15-27	1.25-1.45	0.6-2.0	0.18-0.22	6.1-7.8	Low	0.37	3	4-6
Woolper	5-18	35-50	1.20-1.40	0.2-2.0	0.13-0.19	6.1-7.8	Moderate	0.28		
	18-65	40-60	1.15-1.30	0.06-0.6	0.12-0.17	6.1-7.8	Moderate	0.28		
	65-72	---	---	---	---	---	---	---		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "brief," "apparent," and "perched" are explained in the text. The symbol > means more than. Absence of an entry indicates that the feature is not a concern]

Map symbol and soil name	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
1*:											
Arkana	C	None	---	---	>6.0	---	---	20-40	Hard	High	Moderate.
Moko	D	None	---	---	>6.0	---	---	6-20	Hard	Low	Low.
2, 3—Boden	C	None	---	---	>6.0	---	---	40-60	Hard	Moderate	High.
4—Boden	C	None	---	---	>6.0	---	---	40-60	Hard	Moderate	High.
5—Brockwell	B	None	---	---	>6.0	---	---	>60	---	Low	Moderate.
6—Captina	C	None	---	---	2.0-3.0	Perched	Dec-Apr	>60	---	High	High.
7, 8—Clarksville	B	None	---	---	>6.0	---	---	>60	---	Low	High.
9, 10—Doniphan	B	None	---	---	>6.0	---	---	>60	---	Moderate	High.
11, 12—Gassville	C	None	---	---	>6.0	---	---	40-60	Hard	High	Moderate.
13, 14, 15—Gepp	B	None	---	---	>6.0	---	---	>60	---	High	High.
16*, 17*:											
Gepp	B	None	---	---	>6.0	---	---	>60	---	High	High.
Ventris	D	None	---	---	>6.0	---	---	24-40	Hard	High	Low.
18—Hontas	B	Frequent	Very brief to brief.	Dec-Apr	2.0-2.5	Apparent	Dec-Apr	>60	---	Moderate	Low.
19, 20—Lily	B	None	---	---	>6.0	---	---	20-40	Hard	Moderate	High.
21*:											
Moko	D	None	---	---	>6.0	---	---	6-20	Hard	Low	Low.
Rock outcrop.											
22—Peridge	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
23, 24—Portia	C	None	---	---	>6.0	---	---	>60	---	High	High.
25*:											
Ramsey	D	None	---	---	>6.0	---	---	10-20	Hard	Low	Moderate.
Lily	B	None	---	---	>6.0	---	---	20-40	Hard	Moderate	High.
Rock outcrop.											
26—Razort	B	Frequent	Brief	Jan-Apr	>6.0	---	---	>60	---	Low	Low.
27—Sturkie	B	Frequent	Brief	Dec-Apr	>6.0	---	---	>60	---	Low	Low.

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
28*---------- Wideman	A	Frequent----	Very brief	Dec-May	>6.0	---	---	>60	---	Low------	Low.
29---------- Woolper	C	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Arkana----------	Very-fine, mixed, mesic Mollic Hapludalfs
Boden----------	Clayey, mixed, mesic Typic Hapludults
Brockwell----------	Coarse-loamy, siliceous, mesic Typic Paleudults
Captina----------	Fine-silty, mixed, mesic Typic Fragiudults
Clarksville----------	Loamy-skeletal, siliceous, mesic Typic Paleudults
Doniphan----------	Clayey, mixed, mesic Typic Paleudults
Gassville----------	Clayey, mixed, mesic Typic Hapludults
Gepp----------	Very-fine, mixed, mesic Typic Paleudalfs
Hontas----------	Fine-silty, mixed, mesic Fluvaquentic Eutrochrepts
Lily----------	Fine-loamy, siliceous, mesic Typic Hapludults
Moko----------	Loamy-skeletal, mixed, mesic Lithic Hapludolls
Peridge----------	Fine-silty, mixed, mesic Typic Paleudalfs
Portia----------	Fine-loamy, siliceous, mesic Typic Paleudalfs
Ramsey----------	Loamy, siliceous, mesic Lithic Dystrochrepts
Razort----------	Fine-loamy, mixed, mesic Mollic Hapludalfs
Sturkie----------	Fine-silty, mixed, mesic Cumulic Hapludolls
Ventris----------	Very-fine, mixed, mesic Albaquic Hapludalfs
Wideman----------	Sandy, siliceous, mesic Typic Udifluvents
*Woolper----------	Fine, mixed, mesic Typic Argiudolls

*The soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series.

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