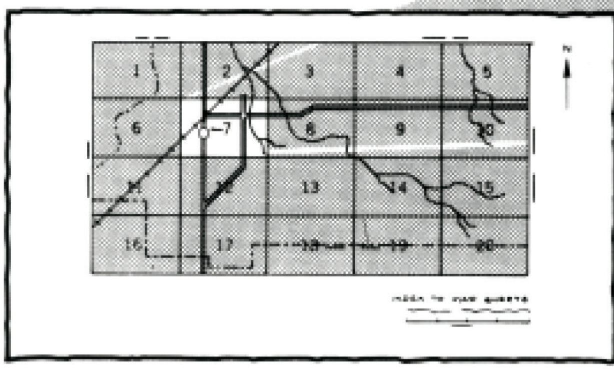
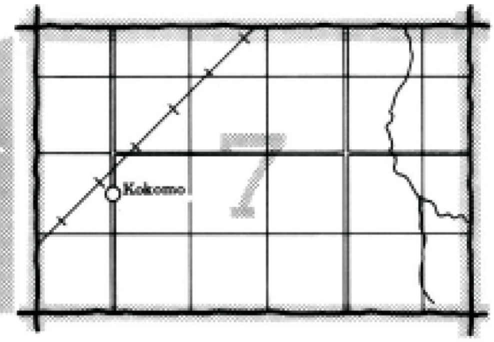
SOIL SURVEY OF
RANDOLPH COUNTY, ARKANSAS

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE,
IN COOPERATION WITH ARKANSAS AGRICULTURAL EXPERIMENT STATION

HOW TO USE

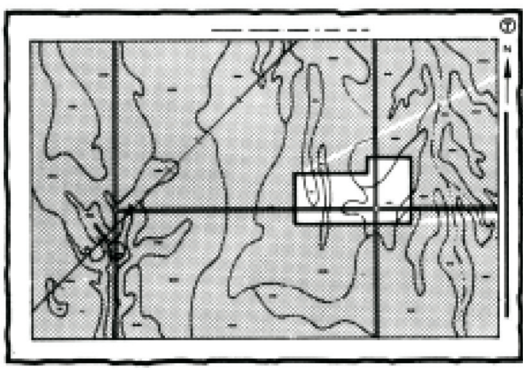
1. Locate your area of interest on the "Index to Map Sheets"

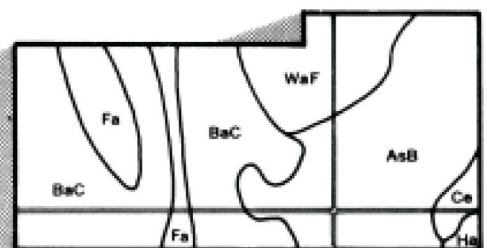




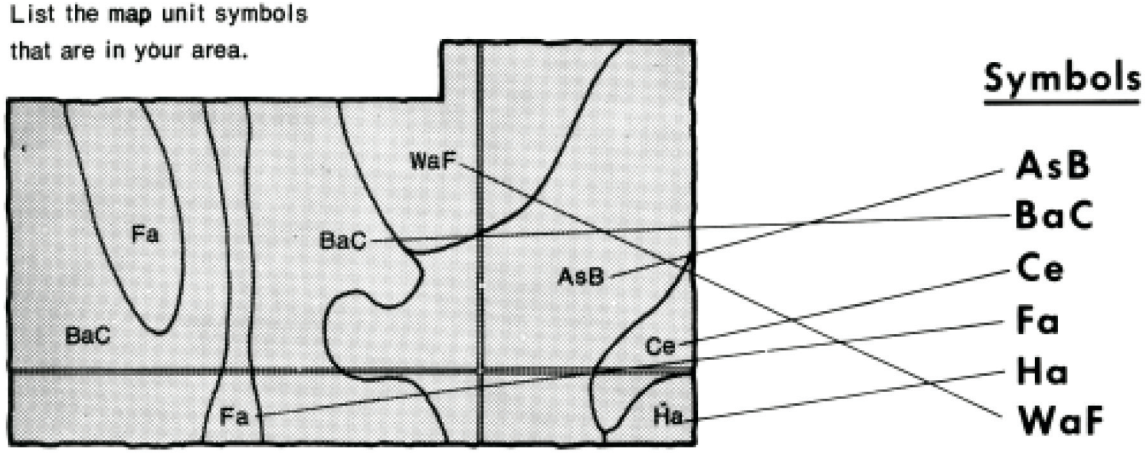
2. Note the number of the map sheet and turn to that sheet.

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



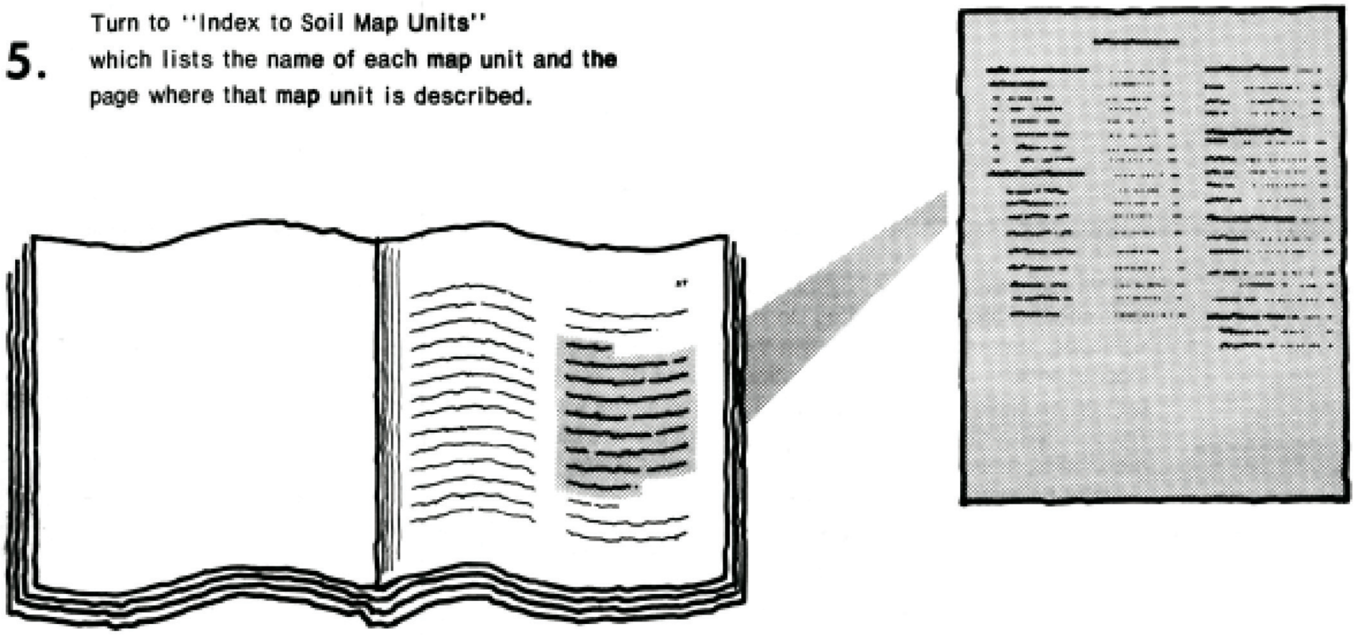


4. List the map unit symbols that are in your area.

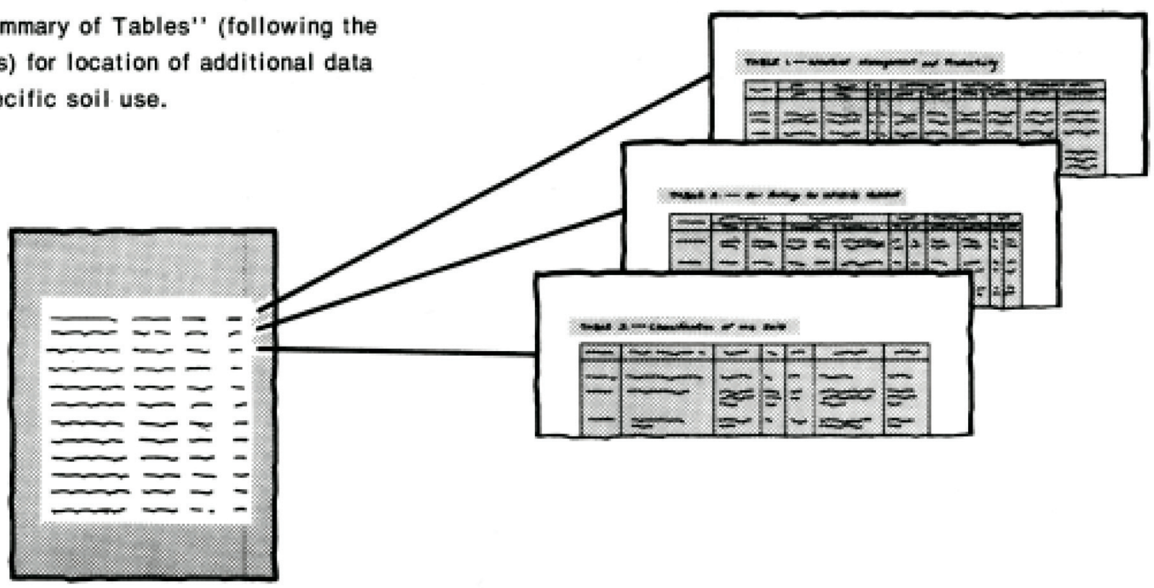


THIS SOIL SURVEY

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 is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. 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 the period 1972-1975. Soil names and descriptions were approved in 1976. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1976. This survey was made cooperatively by the Soil Conservation Service and the Arkansas Agricultural Experiment Station. It is part of the technical assistance furnished to the Randolph County Conservation District.

Soil maps in this survey may be copied without permission, but any enlargement of these maps could cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

Cover: Soybeans on McCrory fine sandy loam; one of the most productive row crops in the county.

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Issued April 1980

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Summary of Tables

Foreword

This Soil Survey contains much information useful in land-planning programs in Randolph County, Arkansas. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that selected land uses will have on the environment.

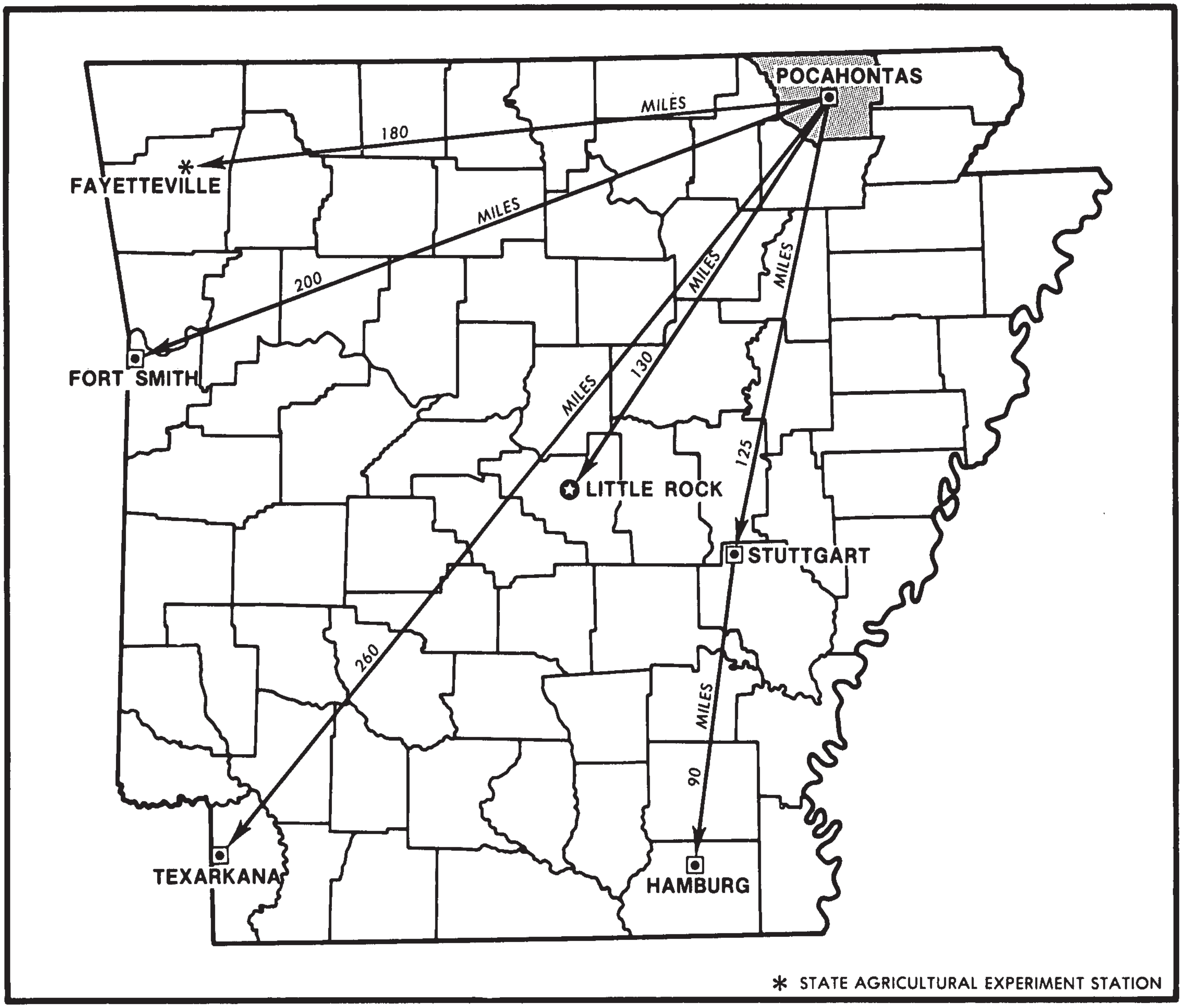
This soil survey has been prepared for many different users. Farmers, ranchers, foresters, and agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community officials, engineers, developers, builders, and homebuyers can use it to plan land use, select sites for construction, develop soil resources, or identify any special practices that may be needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the soil survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur even within short distances. Soils may be seasonally wet or subject to flooding. They may be shallow to bedrock. They may be too unstable to be used as a foundation for buildings or roads. Very clayey or wet soils are poorly suited to 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 kind of soil is shown on detailed soil maps. Each kind of soil in the survey area is described, and much information is given about each soil for specific uses. Additional information or assistance in using this publication can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

This soil survey can be useful in the conservation, development, and productive use of soil, water, and other resources.

M. J. Spears
State Conservationist
Soil Conservation Service



Location of Randolph County in Arkansas

SOIL SURVEY OF RANDOLPH COUNTY, ARKANSAS

Soils surveyed by James H. Brown, Clarence E. McFadden, and Warren A. Gore

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

RANDOLPH COUNTY is in the northeastern part of Arkansas (see map facing). It is irregular in shape and, except for a small tip, is about 18 to 35 miles from east to west and 24 miles from north to south. The county is bounded on the north by Missouri, on the east of Clay and Greene Counties, on the south by Lawrence County, and on the west by Sharp County. The Black River and Current River form part of the eastern boundary. The Spring River and Black River form part of the southern boundary. According to United States Census report, the area is approximately 413,952 acres, or 647 square miles.

In 1970, the population was about 12,645. Pocahontas, the county seat and the main trading center, had a population of 4,544. The economy of the area is based on farming. Except for a few manufacturing plants in the vicinity of Pocahontas, most of the businesses provide farm services.

General nature of the county

This section describes, in a general way, how the land is used, and in more detail, the farming, physiography and drainage, and climate of Randolph County. Statistics on farming are from the 1974 Census of Agriculture.

About 70 percent of the county, making up the western and northeastern parts, is mainly hilly. Elevations range from the 240 feet near the mouth of Spring River to 880 feet at the Arkansas—Missouri line in the northwestern part of the county. About half of this area is suitable for grazing and pasture, but erosion is a moderate to very severe hazard. The other half, too steep or too stony for intensive use, is used for woodland.

The remaining 30 percent of the county, is level and undulating, alluvial sediment that extends from the flood plains of the Black and Current Rivers eastward across the county. Elevation of this area ranges from about 240 feet near the mouth of the Spring River to 290 feet on top of natural levees near the town oт Biggers in the northeastern part of the county.

On the bottom lands, the use of flood control and improved drainage outlets, along with improved crop varieties and other technology, has caused a rapid expansion of cropland into wetter areas and an equivalent reduction in woodland. With the exception of about 7,000 acres in the Black River game management area, most of the bottom land has been cleared. On most farms the natural drainage has been improved for more reliable crop production.

On the bottom-land farms, the main crops are soybeans, cotton, and rice. Grain sorghum and winter small grain are other important crops, and some farms produce truck crops. A few farms have herds of beef or dairy cattle. Fish farming and swine production are other enterprises on some farms used mainly for row crops.

The acreage in soybeans, cotton, and corn decreased from 1969 to 1974, but the acreage in wheat, grain sorghum, and hay increased. Soybeans harvested for beans decreased from 58,896 acres in 1969 to 44,772 acres in 1974; cotton decreased from 9,151 acres to 6,290 acres; and corn decreased from 1,695 acres to 142 acres. Crops that increased in acreage from 1969 to 1974 were wheat, which went up from 5,124 to 5,305 acres; grain sorghum, up from 4,501 to 8,702 acres; and hay, up from 9,995 to 12,200 acres.

The number of livestock produced in the county generally has increased in recent years. In 1969 there were 22,539 cattle and calves; 10,046 hogs and pigs; and 46,606 chickens 3 months old or older. In 1974 there were 30,444 cattle and calves; 17,229 hogs and pigs; and 56,982 chickens.

According to the 1974 Census of Agriculture, about 56 percent of the county land area was used for farming. The rest consisted of wooded areas, cities and built-up areas, and roads and highways.

Farming

Early settlers in Randolph County began farming the soils that have good natural drainage. These soils are on natural levees above the flood plains of the rivers and are on hills in the western part of the county. Cotton was the main cash crop. Most of the better drained soils were cleared for cotton production if they were not too steep or too stony. The steep, stony, or wetter soils remained in woodland.

Farming is still the principal means of livelihood, but cropping systems have become more diversified. Since acreage allotments have been placed on cotton, importance of this crop has declined. As machinery replaced livestock as a source of power, corn and other feed crops also declined in importance in the bottom-land area.

In the hilly areas, forage crops of pasture and hay have replaced cotton. Beef cattle, dairy cattle, swine, chicken, and timber sales now provide most of the farm income. Some livestock farmers grow truck crops for supplemental income.

Most of the soils on the bottom lands contain moderate to high amounts of plant nutrients; some are among the most productive soils in the county. The most important crops are soybeans, rice, and cotton. Wheat and other small grain, including oats, grain sorghum, and corn, are also grown. Some farmers grow okra, green beans, melons, strawberries, and other truck crops. There are several commercial pecan groves and a few large areas of sunflowers grown commercially for oil (fig. 1).

On the bottom lands along the Black River and Current River, a small acreage is subject to flooding in winter and in spring; but this generally does not prevent the growth or limit the choice of warm-season crops. With the exception of a high, undulating, nearly continuous band of natural levees and dunes east of and parallel to the Black and Current Rivers, most of the soils in this area are level. Water drains slowly or is ponded in the level part of the area, and surface drainage is the main limitation.

Farms in Randolph County are decreasing in number while remaining about constant in size. Between 1969 and 1974 the number of farms decreased from 898 to 782 and the average size was about 295 acres.

In 1974, 536 of the farm managers in the county were full owners, 165 were part owners, and 81 were tenants. Of these managers, 360 held jobs off the farm.

Livestock in the county is generally of good grade. The number of livestock has been increasing for several years.

Physiography and drainage

Black River and Current River are graded streams in well defined channels. Black River flows southwest, then southward in the eastern part of the county. Current River begins at the northeastern boundary of the county and flows south before discharging its waters into the Black River. The flood plain of these rivers is the approximate boundary between the Ozark Highlands to the west and the Southern Mississippi Valley Alluvium to the east. From out of the Ozark Highlands, the Eleven Point, Fourche, and Spring Rivers meander across these flood plains before discharging their water into the Black River.

All of these rivers provide recreational facilities for fishing, boating, and waterfowl hunting. The Black River and Current River yield fish and mussel shells in commercial quantities. The many brakes, creeks, lakes, and sloughs on the flood plain also provide excellent fishing and hunting and are important sources of wood crops.

The topography of the Black River and Current River flood plains is generally flat except for a few undulating areas in the river bends. Slopes seldom are more than 1 percent except on the sides of low ridges and escarpments, where they are as much as 3 percent. Local differences in elevation are minor, except where insular areas of materials, generally in deposits further eastward, rise 10 to 20 feet above the flood plain.

The surface water drains from the area through artificial drainageways and through natural drainageways that follow the course of abandoned river channels. There is a good supply of ground water for irrigation.

The alluvial sediment in the Black River and Current River flood plain is 50 feet or more thick and becomes thicker eastward throughout the county. It is a mixture of minerals derived from many kinds of soils, rocks, and unconsolidated sediment that came from more than 24 States in the Mississippi River Basin. On the Black River and Current River flood plain, the major soils that formed in this sediment were the Amagon, Dundee, and Kobel soils.

The foot slopes of the Ozark Highland are long, undulating to gently rolling hills that have rounded crests. Some areas are capped by loess, which is thickest near the flood plain of the Black River and Current River. This material becomes thinner westward, or with gains in altitude, and merges with material weathered from cherty limestone, limestone, or sandstone country rock. The main soils in this area are Brocket, Captina, and Loring soils.

The hillsides rise 50 to 150 feet from narrow bottom lands of intermittent streams to hillcrests. Slopes predominantly range from 3 to 12 percent except for a few, steep limestone bluffs. Surface water collects in V-shaped draws that empty into intermittent streams. These streams discharge into Eleven Point River, Fourche River, or the drainageways within the Black River and Current River flood plain. The discharge of some of the small streams is regulated by floodwater-retarding structures.

In the western part of the county, topography of the Ozark Highland is characterized by deep hollows and high ridges. The longest and highest of the ridges is the divide between Eleven Point River and Jane's Creek. This divide, known as Nubbin Ridge, has Spring River as its southern limit and extends northward into Missouri. Slopes on top of the divide range from 1 to 20 percent, and differences in local elevation are 10 to 100 feet. Most of this ridge is capped with very cherty material. The main soils are the Clarksville and Doniphan soils.

Away from the divide, the ridges narrow and differences in local elevation are as much as 400 feet. Slope on the ridges predominantly ranges from 8 to 40 percent. Surface water falls as much as 500 feet before reaching the levels of Eleven Point and Spring Rivers, which are fed by Dile's, Dry, Jane's, and Weldon Creeks. Streams that flow through the uplands have steep gradients, particularly in the upper reaches, and runoff is rapid. Floodwaters rise and recede quickly on the bottom lands of the creeks and rivers.

The rock in this area is cherty limestone or limestone, interbedded with sandstone and siltstone in some places. Soils in the area formed in material weathered from these rocks and from some local shale. Materials with the highest content of chert are mainly on the peaks and points of the higher ridges, and Clarksville is the main soil.

Such soils as those of the Arkana, Doniphan, Gepp, and Ventris series are on the hillsides and lower ridges and formed in more easily weathered material. The alluvium in the valleys of Eleven Point, Fourche, and Spring Rivers and their major tributaries came from these or other similar soils. The broader valleys are winding and, except for the flood plains, are alternating gentle slopes of alluvial material and steep slopes or limestone bluffs. The main soils on the flood plain are in the Ashton, Hontas, and Razort series. Peridge soils formed mainly in the older, gently sloping alluvial deposits. The steeper soils along the valleys are mainly in the Arkana, Gepp, and Ventris series. Rock outcrops are common along the valley walls.

Throughout the Ozark Highland, ground water is insufficient for large scale irrigation. Domestic water is supplied mainly from dug wells, drilled wells, and ponds. Drilled wells are the most dependable source of potable water. Most of the water is hard. Most wells in the area are less than 200 feet deep, but some are as much as 700 feet deep. Ponds and creeks are the main source of livestock water.

Undulating natural levees are adjacent to the flood plains east of the Black River and Current River. These levees separate the lower Black River flood plain from broad flats of older alluvium, and they separate the Current River flood plain from the younger alluvium of the Black River flood plain. These natural levees extend diagonally throughout the eastern part of the county except where the Black and Current Rivers converge. Except for a few low escarpments, slope is less than 8 percent, and local differences in elevation seldom are more than 15 feet. Surface water collects in low places and drains through a system of artificial channels or through the improved channels of natural drainageways that flow into the Black River or Current River. The main soils in this area of natural levees are in the Bosket, Brosely, McCrory, and Patterson series.

East of the high natural levee of the Black River is a broad, alluvial flat that is capped by wind-blown sediment in places. This flat makes up the extreme southeastern part of the county. The general slope is about 1 foot per mile in a southerly direction, but the predominantly level landscape is broken by old, abandoned river channels. Narrow escarpments, 5 to 15 feet high, mark the banks of these old channels. Crowley and Jackport soils are the major soils in this area.

Surface water drains through a network of artificial drainageways and improved channels of natural drainageways that empty into Big Running Water Creek and Village Creek. These streams follow abandoned channels of large rivers and, except where they have been improved, are shallow and sluggish.

Throughout the alluvial area there is a good supply of ground water. Adequately spaced wells with a 12-inch diameter, drilled to a depth of 75 to 150 feet, yield about 2,000 gallons per minute of fair to good quality water for irrigation.

Climate

Randolph County is hot in summer, especially at low elevations, and moderately cool in winter, especially on mountains and high hills. Rainfall is fairly heavy and well distributed throughout the year. Snow falls nearly every winter, but snow cover lasts only a few days.

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Pocahontas, Arkansas for the period 1951 to 1974. 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 29 degrees. The lowest temperature on record, minus 15 degrees, occurred at Pocahontas on February 2, 1951. In summer the average temperature is 78 degrees, and the average daily maximum temperature is 90 degrees. The highest recorded temperature, 108 degrees, was recorded on July 13, 1954.

Growing degree days, shown in table 1, 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 of 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, 24 inches, or 51 percent, generally falls from April to September, which includes the growing season for most crops. In 2 years out of 10, the April to September rainfall is less than 18 inches. The heaviest 1-day rainfall during the period of record was 7.00 inches at Pocahontas on January 1, 1966. Thunderstorms number 57 each year, 22 of which occur in summer.

Average seasonal snowfall is 8 inches. The greatest snow depth at any one time during the period of record was 7 inches. On the average, 1 day has 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 less than 60 percent. Humidity is higher at night in all seasons, and the average at dawn is about 85 percent. The percentage of possible sunshine is 72 in summer and 60 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 10 miles per hour, in March.

How this survey was made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material, which has been changed very little by leaching or by the action of plant roots.

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with others in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures.

After a guide for classifying and naming the soils was worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, roads, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called soil map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. Map units are discussed in the sections "General soil map for broad land use planning" and "Soil maps for detailed planning."

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. The soils are field tested, and interpretations of their behavior are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. For example, data on crop yields under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it is readily available to different groups of users, among them farmers, managers of rangeland and woodland, engineers, planners, developers and builders, homebuyers, and those seeking recreation.

General soil map for broad land use planning

The general soil map at the back of this publication shows, in color, map units that have a distinct pattern of soils and of relief and drainage. Each map unit 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 provides a broad perspective of the soils and landscapes in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. Areas that are, for the most part, suited to certain kinds of farming or to other land uses can be identified on the map. Likewise, areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of its small scale, the map does not show the kind of soil at a specific site. Thus, it 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 kinds of soil in any one map unit differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

The soils in the survey area vary widely in their potential for major land uses. Soil properties that pose limitations to the use are indicated in the descriptions of the soil units that follow. The ratings of soil potential are based on the assumption that practices in common use in the survey area are being used to overcome soil limitations. These ratings reflect the ease of overcoming the soil limitations and the probability of soil problems persisting after such practices are used.

Each map unit is rated for cultivated farm crops, pasture, woodland, urban uses, and wildlife habitat development. Cultivated farm crops include soybeans, cotton, rice, grain sorghum, and wheat. Pasture refers to land that is in improved grasses, such as bermudagrass, bahiagrass, or tall fescue. Woodland refers to land that is managed for the production of trees crops, such as pine and certain hardwoods. Urban uses include residential, commercial, and industrial developments. Wildlife habitat refers to the development of food, cover, and water for various species that are native either to uplands or to wetland.

When properly drained, the Amagon-Dundee map unit has good potential for cultivated crops. The Hontas-Ashton-Razort map unit has poor potential for cultivated crops because of flooding.

The Loring map unit has good potential for pasture, as do most other map units in the county. However, the Gepp-Doniphan-Ventris unit has poor potential for pasture because of slope, Rock outcrop, and droughtiness.

There are no map units in the county that have poor potential for woodland. Most have good potential for woodland, as does the Captina-Gepp map unit, when properly managed. On others, such as the Brocket-Doniphan map unit, the use of equipment is limited because of surface gravel and high seedling mortality caused by droughtiness.

About 21,000 acres in Randolph County has been developed for urban uses. The Bosket-Broseley map unit has good potential for urban uses. Conversely, the Crowley-Jackport map unit has poor potential because the limitations of wetness and very slow permeability are difficult to overcome. Most map units in the county have limitations that affect urban development but that generally can be ovecome by proper engineering design.

Most map units in the county have good potential for development of wildlife habitat, and no units have poor potential. The Kobel-Amagon map unit has good potential for the development of wetland wildlife habitat, and the Gepp-Doniphan-Ventris map unit has good potential for development of upland wildlife habitat.

The 10 soil map units in Randolph County are described on the following pages.

Soils that formed in residual material on gently sloping to steep uplands characterized by deep hollows, ridges, and dissected hills

Two map units are in this group. These map units are mainly in the western part of the county. The soils in these units make up about 35 percent of the county. They are on most of the higher parts of the landscape in the Ozark Highlands. These gently sloping to steep, well drained and moderately well drained soils have a cherty or stony loamy surface layer over a clayey subsoil. They formed in material weathered from cherty limestone, limestone, sandstone, siltstone, and some shale.

1. Gepp-Doniphan-Ventris

Deep and moderately deep, gently sloping to steep, well drained and moderately well drained soils that have a clayey subsoil and that formed in material weathered predominantly from cherty limestone

These gently sloping to steep soils are mainly in the western part of the county. A few areas of these soils are in the central and north-central part. The landscape is one of narrow valleys and adjacent moderately steep to steep hillsides and gently sloping to moderately sloping ridges.

This map unit makes up about 30 percent of the county. It is about 60 percent Gepp soils, 20 percent Doniphan soils, and 10 percent Ventris soils and Rock outcrop. The rest is soils of minor extent.

In most places, Gepp soils are on the steeper hilltops and hillsides. Doniphan soils are mainly on broad ridgetops, plateaus, and the upper parts of hillsides. Ventris soils are on the lower parts of hilltops, on hillsides, and on benches. Gepp and Doniphan soils are well drained, and Ventris soils are moderately well drained. Gepp and Doniphan soils are deep and have a cherty, loamy surface layer over a clayey subsoil. Ventris soils are moderately deep and have a loamy surface layer over a clayey subsoil. Limestone bedrock is at a depth of about 32 inches. Rock outcrop is intermingled with Ventris soils in this unit.

The minor soils in this unit are the well drained Arkana soils on hillsides and benches, the well drained Brocket soils on hilltops and hillsides at lower elevations, and the somewhat excessively drained Clarksville soils on ridgetops and adjacent side slopes at higher elevations.

This map unit is used mainly for woodland, but some areas are used for pasture. Slope, surface stones, chert fragments, and rock outcrop severely restrict the use of equipment. Most of the soils in this unit are droughty.

This map unit is unsuitable for cultivated crops and has poor potential for pasture. When properly managed, it has fair potential for woodland. Slope is such a severe limitation and so difficult to overcome that the potential is poor for residential and other urban uses of the soils. The potential is good for development of wildlife habitat.

2. Brocket-Doniphan

Deep, gently sloping to moderately steep, well drained soils that have a loamy or clayey subsoil and that formed in material weathered predominantly from cherty limestone or sandstone

These gently sloping to moderately steep soils are in the central and northeastern part of the county. The landscape consists of broad ridgetops and moderately sloping hillsides and gently sloping hill crests.

This map unit makes up about 5 percent of the county. It is about 65 percent Brocket soils and 15 percent Doniphan soils. The rest is soils of minor extent.

In most places, Brocket soils are on hill crests and upper parts of hillsides. Doniphan soils are mainly on broad ridgetops, plateaus, and the upper parts of hillsides. Brocket and Doniphan soils are well drained. Brocket soils have a gravelly fine sandy loam surface layer over a loamy subsoil. Doniphan soils have a cherty loam surface layer over a clayey subsoil.

The minor soils in this unit are the moderately well drained, nearly level to sloping Captina soils on uplands and stream terraces; the well drained, steeper Gepp soils on hilltops and hillsides; and the somewhat excessively drained Clarksville soils at the higher elevations on ridgetops and adjacent side slopes.

This map unit is used mainly for pasture, but some large areas are used for woodland. Slope and surface gravel severely restrict the use of equipment. Most of the soils in the unit are droughty.

This map unit is unsuitable for cultivated crops. When properly managed, it has fair potential for pasture and woodland. Because slope and low strength are moderate limitations that generally can be overcome, the potential is fair for residential and other urban uses. The potential is good for development of wildlife habitat.

Soils that formed in residual and transported material on gently sloping to moderately steep uplands characterized by low hills and valleys on foot slopes and broad ridges

Two map units are in this group. The soils in these units make up about 25 percent of the county. They are on broad ridges, foot slopes, and the escarpment of the Ozark Highlands. These gently sloping to moderately steep, loamy and clayey soils are well drained and moderately well drained. They formed in material weathered from cherty limestone or in loessal deposits.

3. Captina-Gepp

Deep, gently sloping to moderately steep, well drained and moderately well drained soils that have a loamy or clayey subsoil and that formed in material weathered predominantly from cherty limestone

These gently sloping to moderately steep soils are in the northeastern part of the county. The landscape is one of gently sloping to moderately steep hilltops and hillsides and gently sloping valleys.

This map unit makes up about 20 percent of the county. It is about 60 percent Captina soils and 30 percent Gepp soils. The rest is soils of minor extent.

Captina soils are on hill crests and sides of hills and valleys. Gepp soils are mainly on hilltops and hillsides. Captina soils are moderately well drained, and Gepp soils are well drained. Captina soils have a silt loam surface layer over a loamy subsoil and have a fragipan. Gepp soils have a very cherty silt loam surface layer over a clayey subsoil.

The minor soils in this unit are the well drained Brocket soils on hilltops and hillsides at lower elevations; the somewhat excessively drained Clarksville soils on ridgetops and adjacent side slopes at higher elevations; and the moderately well drained Ventris soils on the lower parts of hilltops, on hillsides, and on benches.

The map unit is used mainly for pasture, but a small acreage of the less sloping soil is used for cultivated crops. Runoff is rapid, and the hazard of erosion is very severe.

This map unit has fair to poor potential for cultivated crops and good potential for pasture. When properly managed, this unit has good potential for woodland. Slow permeability and slope are severe limitations. They are so difficult to overcome that the potential is poor for residential and other urban uses. The potential is good for development of wildlife habitat.

4. Loring

Deep, gently sloping to moderately sloping, moderately well drained soils that have a loamy subsoil and that formed in loessal deposits

These gently sloping to moderately sloping soils are in a long, narrow, broken band across the eastern half of the county. These areas consist of loess deposits that are at higher elevations than the adjacent bottom land.

This map unit makes up about 5 percent of the county. It is about 80 percent Loring soils. The rest is soils of minor extent.

Loring soils are on hillsides, hilltops, and terraces on uplands. They are moderately well drained. They have a silt loam surface layer and a loamy subsoil. They have a fragipan.

The minor soils in this unit are the poorly drained Amagon soils on broad flats and in depressions along natural drainageways and the somewhat poorly drained Dundee soils on old natural levees along streams and abandoned river channels.

This map unit is used mainly for pasture, but some areas are used for cultivated crops. Most of the acreage has been cleared. Runoff is medium to rapid, and the hazard of erosion is very severe.

This map unit has poor potential for cultivated crops and good potential for pasture and woodland. It has fair potential for residential and other urban uses. Moderate permeability and low strength are limitations. The potential is fair for development of wildlife habitat.

Soils that formed in alluvial sediment on level to nearly level flood plains characterized by stream channels, low natural levees, and slack-water areas

Two map units make up this group. The soils in these units make up about 20 percent of the county. They are on the flood plains of the Spring, Eleven Point, and Fourche la Fave Rivers, and their few small tributaries within the Ozark Highlands and the flood plain of the Black and Current Rivers in areas of Southern Mississippi Valley alluvium. These level to nearly level soils are loamy and clayey. They formed in sediment deposited by these rivers or larger rivers that once crossed this area.

5. Hontas-Ashton-Razort

Deep, level to nearly level, well drained and moderately well drained soils that have a loamy subsoil and that formed in loamy alluvial sediment

These level to nearly level soils are in the western two-thirds of the county. They are on flood plains and in long, narrow strips along creeks and small rivers that drain uplands.

This map unit makes up about 10 percent of the county. It is about 30 percent Hontas soils, 25 percent Ashton soils, and 20 percent Razort soils. The rest is soils of minor extent.

In most places, Hontas soils are in wider parts of flood plains of creeks and rivers. Ashton soils are mainly in long, narrow strips along major streams. Razort soils are on narrow flood plains and are parallel to small streams in uplands. Hontas soils are moderately well drained, and Ashton and Razort soils are well drained. Hontas and Ashton soils have a silt loam surface layer over a loamy subsoil. Razort soils have a silt loam surface layer over a loamy subsoil that is underlain by gravelly or chert material.

The minor soils in this unit are moderately well drained Captina soils and the well drained Peridge soils on adjacent terraces.

This map unit is used mainly for pasture, but some areas are used for cultivated crops where flood control measures are installed or where flooding is less frequent. Flooding is the main limitation for farming and for most other uses of these soils.

This map unit has poor potential for cultivated crops and good potential for pasture and woodland. It has poor potential for residential and other urban uses because of a severe hazard of flooding that can only be overcome by major flood control measures. The potential is good for development of wetland wildlife habitat.

6. Amagon-Dundee

Deep, level to nearly level, somewhat poorly drained soils that have a loamy subsoil and that formed in loamy alluvial sediment

These level to nearly level soils are in a wide band diagonally across the eastern one-third of the county. These areas are in the lower parts of old natural levees and in shallow depressions along natural drainageways.

This map unit makes up about 10 percent of the county. It is about 35 percent Amagon soils and 30 percent Dundee soils. The rest is soils of minor extent.

Amagon soils are lower in elevation than Dundee soils. Amagon soils are poorly drained, and Dundee soils are somewhat poorly drained. Both soils have a silt loam surface layer and a loamy subsoil.

The minor soils in this unit are the well drained Bosket soils on higher and older natural levees; the poorly drained Kobel soils on flood plains of rivers and in backswamps; and the moderately well drained Loring soils on adjacent hillsides, hilltops, and terraces of uplands.

This map unit is used mainly for cultivated crops (fig. 2). Surface runoff is slow, and excess water is a limitation for farming. Farming operations are delayed several days after rain unless surface drains are installed.

When adequately drained, this map unit has good potential for cultivated crops. The potential is good for pasture and woodland. Wetness and slow permeability are severe limitations so difficult or impractical to overcome that the potential is poor for residential and other urban uses. The potential is fair for development of wetland wildlife habitat.

Soils that formed in alluvial sediment on high natural levees characterized by level to undulating topography

Two map units are in this group. The soils in these units make up about 10 percent of the county. They are on the high natural levees east of the flood plains along the Black and Current Rivers in areas of Southern Mississippi Valley alluvium. These are level to undulating, loamy soils. They formed in sediment deposited by the Mississippi River or its tributaries west of Crowley Ridge.

7. Bosket-Broseley

Deep, undulating, well drained and somewhat excessively drained soils that have a loamy subsoil and that formed in stratified loamy and sandy alluvial sediment

These undulating soils are in the southeastern quarter of the county. They are scattered, diagonal bands east of the flood plains along the Black and Current Rivers. The landscape is one of old natural levees along abandoned and active river channels.

This map unit makes up about 5 percent of the county. It is about 40 percent Bosket soils and 30 percent Broseley soils. The rest is soils of minor extent.

In most places, Bosket soils are lower in elevation than Broseley soils. Bosket soils are well drained, and Broseley soils are somewhat excessively drained. Bosket soils have a fine sandy loam surface layer over a loamy subsoil. Broseley soils have a loamy fine sand surface layer and a thick loamy fine sand subsurface layer over a loamy subsoil.

The minor soils in this unit are the somewhat poorly drained Dundee soils and the poorly drained McCrory soils on lower parts of old natural levees, and the somewhat poorly drained Patterson soils in depressions on natural levees.

This map unit is used mainly for cultivated crops. All of the acreage has been cleared except a few areas that have been replanted in pecan orchards. If these soils have no vegetative cover in spring, soil blowing is a hazard. Most areas are droughty during summer.

This map unit has good potential for cultivated crops, pasture, and woodland. It has good potential for residential and other urban uses. Most limitations can be overcome by proper engineering design. The potential is fair for development of wildlife habitat.

8. McCrory-Patterson

Deep, level, somewhat poorly drained and poorly drained soils that have a loamy subsoil and that formed in loamy and sandy alluvial sediment

These level soils are in scattered, small bands in the southeastern quarter of the county. Areas of these soils are on broad flats, in depressions of natural levees, and on lower parts of natural levees.

This map unit makes up about 5 percent of the county. It is about 45 percent McCrory soils and 15 percent Patterson soils. The rest is soils of minor extent.

McCrory soils are on broad flats and lower parts of natural levees, and Patterson soils are in depressions of natural levees. McCrory soils are poorly drained, and Patterson soils are somewhat poorly drained. Both soils have a seasonal high water table. They have a fine sandy loam surface layer over a loamy subsoil. McCrory soils have a high concentration of sodium and magnesium in the subsoil.

The minor soils in this unit are the well drained Bosket soils and the somewhat excessively drained Broseley soils on old natural levees and the somewhat poorly drained Crowley soils on broad flats above adjacent natural drainageways and abandoned backswamps.

This map unit is used mainly for cultivated crops. Most of the acreage has been cleared except for a few small wet areas. Wetness is the main limitation for farming and for most other uses of these soils. Droughtiness is also a severe limitation in some areas during the drier summer months.

This map unit has good potential for cultivated crops, pasture, and woodland. Because wetness is a severe limitation that is so difficult or impractical to overcome, the potential is poor for residential and other urban uses. The potential is good for development of wetland wildlife.

Soils that formed in eolian and alluvial sediment on level flood plains and in slack-water areas characterized by broad flats and low terraces

Two map units are in this group. The soils in these units make up about 10 percent of the county. They are on the northern part of the flood plain and on the broad slack-water flats east of natural levees along Black River in areas of Southern Mississippi Valley alluvium. They are level, somewhat poorly drained and poorly drained, loamy and clayey soils. They formed in sediment of the Mississippi River and its local tributaries or such sediment capped by loess deposits. Because there are few significant natural drainageways, surface water stands for long periods or is removed through improved drainageways.

9. Kobel-Amagon

Deep, level, poorly drained soils that have a loamy or clayey subsoil and that formed in loamy and clayey alluvial sediment

These level soils are on the Black River flood plain in the eastern part of the county. They are on broad flats on the lower parts of old natural levees, in shallow depressions, and in backswamps.

This map unit makes up about 5 percent of the county. It is about 45 percent Kobel soils and 25 percent Amagon soils. The rest is soils of minor extent.

In most places, Kobel soils are on flood plains and in backswamps and are lower in elevation than Amagon soils. Both soils are poorly drained and have a seasonal high water table. Kobel soils have a silty clay loam surface layer over a clayey subsoil, and Amagon soils have a silt loam surface layer over a loamy subsoil.

The minor soils in this unit are the somewhat poorly drained Crowley and Dundee soils and the poorly drained Jackport soils. The Crowley and Jackport soils are on broad flats at higher elevations and in abandoned backswamps, and the Dundee soils are on the lower parts of old natural levees.

This map unit is used mainly for cultivated crops, except for a large area of woodland in a State-owned wildlife management area. There are some swampy, undrained areas. Wetness is the main limitation for farming and for most other uses of these soils. Farming operations are delayed several days after rain unless surface drains are installed.

When adequately drained, this map unit has good potential for cultivated crops and pasture. The potential is good for woodland. Wetness and very slow permeability are such severe limitations and so difficult to overcome that the potential is poor for residential and other urban uses. The potential is good for development of wetland wildlife habitat (fig. 3).

10. Crowley-Jackport

Deep, level, somewhat poorly drained and poorly drained soils that have a clayey subsoil and that formed in loamy and clayey alluvial sediment

These level soils are in the southeastern part of the county. The landscape is one of broad flats and adjacent lower-lying natural drainageways and abandoned backswamps of former streams.

This map unit makes up about 5 percent of the county. It is about 35 percent Crowley soils and 28 percent Jackport soils. The rest is soils of minor extent.

Crowley soils are slightly higher in elevation than Jackport soils. Crowley soils are somewhat poorly drained, and Jackport soils are poorly drained. Crowley soils have a silt loam surface layer, and Jackport soils have a silty clay loam surface layer. Both soils have a clayey subsoil and a seasonal high water table.

The minor soils in this unit are the poorly drained Kobel soils on flood plains and in backswamps and the poorly drained McCrory soils on broad flats and lower parts of natural levees.

This map unit is used mainly for cultivated crops. Most of the acreage has been cleared, and some has been drained. There are some swampy, undrained areas. Wetness is the main limitations for farming and most other uses of these soils. Farming operations are delayed several days after rain, and excess water is a severe hazard unless surface drains are installed to prevent ponding.

This map unit has good potential for cultivated crops, pasture, and woodland. Because wetness and very slow permeability are severe limitations and are difficult to overcome, the potential is poor for residential and other urban uses. The potential is good for development of wetland wildlife habitat.

Soil maps for detailed planning

The map units shown on the detailed soil maps at the back of this publication represent the kinds of soil in the survey area. They are described in this section. The descriptions together with the soil maps can be useful in determining the potential of a soil and in managing it for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. More information for each map unit, or soil, is given in the section "Use and management of the soils."

Preceding the name of each map unit is the symbol that identifies the soil on the detailed soil maps. Each soil description includes general facts about the soil and a brief description of the soil profile. In each description, the principal hazards and limitations are indicated, and the management concerns and practices needed are discussed.

The map units on the detailed soil maps represent an area on the landscape made up mostly of the soil or soils for which the unit is named. Most of the delineations shown on the detailed soil map are phases of soil series.

Soils that have profiles that are almost alike make up a *soil series.* Except for allowable differences in texture of the surface layer or of the underlying substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped.

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, erosion, stoniness, salinity, wetness, or other characteristics that affect their use. On the basis of such differences, a soil series is divided into phases. The name of a *soil phase* commonly indicates a feature that affects use or management. For example, Captina silt loam, 3 to 8 percent slopes, is one of several phases within the Captina series.

Some map units are made up of two or more dominant kinds of soil. Two such map units are called soil complexes and soil associations.

A *soil complex* consists of areas of two or more soils that are so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area includes some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. Arkana-Rock outcrop complex, 3 to 12 percent slopes, is an example.

A *soil association* is made up of soils that are geographically associated and are shown as one unit on the map because it is not practical to separate them. A soil association has considerable regularity in geographic pattern and in the kinds of soil that are a part of it. The extent of the soils can differ appreciably from one delineation to another; nevertheless, interpretations can be made for use and management of the soils. Doniphan-Gepp association, undulating, is an example.

Most map units include small, scattered areas of soils other than those that appear in the name of the map unit. Some of these soils have properties that differ substantially from those of the dominant soil or soils and thus could significantly affect use and management of the map unit. These soils are described in the description of each map unit. Some of the more unusual or strongly contrasting soils that are included are identified by a special symbol on the soil map.

Most mapped areas include places that have little or no soil material and support little or no vegetation. Such places are called *miscellaneous areas*; they are delineated on the soil map and given descriptive names. Pits is an example. Some of these areas are too small to be delineated and are identified by a special symbol on the soil map.

The acreage and proportionate extent of each map unit are given in table 4, and additional information on properties, limitations, capabilities, and potentials for many soil uses is given for each kind of soil in other tables in this survey. (See "Summary of tables.") Many of the terms used in describing soils are defined in the Glossary.

Soil descriptions and potentials

1—Amagon silt loam. This deep, poorly drained, level soil is on broad flats on the lower parts of old natural levees and in shallow depressions along natural drainageways. Slope is 0 to 1 percent. Individual areas range from about 50 to 500 acres in size.

Typically, the surface layer is grayish brown silt loam about 6 inches thick. The subsurface layer and upper part of the subsoil are light brownish gray, mottled silt loam that extends to a depth of about 20 inches. The middle part of the subsoil is gray, mottled silty clay loam to a depth of 30 inches; and the lower part of the subsoil is grayish brown, mottled silty clay loam that extends to a depth of about 56 inches. The underlying material is gray, mottled silty clay loam to a depth of 72 inches or more.

Included with this soil in mapping are a few small areas of Dundee, Kobel, and Loring soils. These soils make up about 15 percent of the map unit.

This soil is medium in natural fertility and low in organic-matter content. The surface layer and upper part of the subsoil are medium acid to very strongly acid, and the lower part of the subsoil and underlying material are strongly acid to neutral. Permeability is slow, and available water capacity is high. The seasonal high water table is within 12 inches of the surface late in winter and early in spring. Tilth is easy to maintain.

This soil has good potential for cultivated crops. Most of the acreage is cultivated. The principal crops are soybeans, rice, and grain sorghum (fig. 4). Cotton and winter small grain are other suitable crops. Crops respond well to fertilizer. Runoff is slow, and excess water is a hazard. Farming operations are delayed several days after rain unless surface drains are installed. A plowpan is formed below plow depth, in places, and restricts root penetration and movement of water through the soil. This soil has good potential for pasture. Adapted pasture plants include bermudagrass, tall fescue, and white clover. Seasonal wetness is the main limitation.

This soil has good potential for cottonwood, cherrybark oak, Nuttall oak, and sweetgum. Wetness is the main limitation for woodland use and management, but this limitation can be overcome by logging during the drier seasons.

This soil has poor potential for most urban uses. Wetness is a severe limitation for dwellings, roads and streets, and industrial sites. This limitation generally can be overcome by proper engineering design. The slow permeability and wetness are severe limitations for septic tank absorption fields and are difficult or impractical to overcome. Capability unit IIIw-1, woodland suitability group 1w6, pasture and hayland group 2B.

2—Arkana-Rock outcrop complex, 3 to 12 percent slopes. This complex consists of Arkana soils and Rock outcrop that are so intermingled that it is not practical to map them separately. This gently sloping to moderately sloping complex is on side slopes and benches. Individual areas range from about 10 to 120 acres in size.

Arkana silty clay loam makes up about 50 percent of each mapped area. Typically, the surface layer is very dark grayish brown silty clay loam about 8 inches thick. The subsoil extends to a depth of 33 inches. The upper 9 inches is reddish brown silty clay; and the lower part is red, mottled clay. Hard, undulating, fractured limestone bedrock is at a depth of about 33 inches.

This soil is medium in natural fertility and in organic-matter content. It is mildly alkaline to medium acid throughout. Permeability is very slow, and available water capacity is low.

Rock outcrop makes up about 25 percent of each mapped area. Typically, Rock outcrop consists of narrow limestone ledges and small areas of outcrop exposed through natural erosion. The soil material within areas of Rock outcrop is less than 4 inches thick, except in small fractures filled with clay.

Included with this complex in mapping are a few small areas of Peridge and Ventris soils.

This complex is not suitable for cultivated crops or for pasture.

It is best suited to woodland and wildlife habitat. Rock outcrop and stones on the surface (fig. 5) restrict the use of farm equipment. Most of the soils in the area are droughty.

This complex is used mainly for woodland. It has poor potential for shortleaf pine, southern red oak, and eastern redcedar. Droughtiness causes moderate seedling mortality. Rock outcrop and stones on the surface restrict the use of equipment.

This complex has poor potential for urban uses. Shrink-swell potential, low strength, and the moderate depth to rock of the Arkana soil are severe limitations for dwellings and roads and streets. The very slow permeability and the moderate depth to rock of the Arkana soil are severe limitations for septic tank absorption fields. These limitations are difficult or impractical to overcome.

Capability unit VIe-4, woodland suitability group 5c2, not in a pasture and hayland group.

3—Ashton silt loam, occasionally flooded. This deep, well drained, level soil is in long, narrow strips along major streams that drain upland areas. Slope is 0 to 1 percent. Individual areas range from 20 to 200 acres in size.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil extends to a depth of 58 inches. The upper 28 inches is brown silt loam, and the lower part is brown, mottled silt loam. The underlying material is brown, mottled silt loam to a depth of 72 inches or more.

Included with this soil in mapping are a few small areas of Hontas, Peridge, and Razort soils, and areas of gravel and sand bars, which make up about 20 percent of the map unit.

This soil is high in natural fertility and organic-matter content. It is medium acid to neutral throughout. Permeability is moderate, and available water capacity is high. This soil is flooded at least once in every 3 years between December and June.

This map unit is used mainly for pasture. It has poor potential for cultivated crops, because it is subject to occasional flooding. Planting is often delayed because of flooding, and in some years flooding severely damages or destroys the crop. A few small areas are protected by flood-control impoundments upstream. In protected areas, the principal crops are soybeans and grain sorghum. This soil has good potential for pasture (fig. 6). Adapted pasture plants include bermudagrass, orchardgrass, redtop, tall fescue, and white clover. Pasture plants respond well to fertilization.

This soil has no significant limitations for woodland. It has good potential for black walnut, sycamore, and cottonwood.

This soil has poor potential for urban uses. Flooding is a severe hazard and can be overcome only by major flood control measures. Capability unit IIw-1, woodland suitability group 1o7, pasture and hayland group 2A.

4—Bosket fine sandy loam, undulating. This deep, well drained, undulating soil is on natural levees along active and abandoned river channels. Slope is 0 to 3 percent. Individual areas range from about 20 to 300 acres in size.

Typically, the surface layer is dark brown fine sandy loam about 8 inches thick. The subsurface layer is dark yellowish brown fine sandy loam about 6 inches thick. The subsoil is brown fine sandy loam to a depth of about 26 inches and brown clay loam to a depth of about 44 inches. The underlying material is dark brown fine sandy loam to a depth of about 58 inches and yellowish brown loamy fine sand to a depth of about 72 inches or more.

Included with this soil in mapping are few small areas of Broseley, Dundee, McCrory, and Patterson soils. These soils make up about 10 percent of the map unit.

This soil is medium in natural fertility and organic-matter content. It is slightly acid to strongly acid throughout. Permeability is moderate, and available water capacity is medium. Tilth is easy to maintain.

This soil is used mainly for cultivated crops, and it has good potential for this use. The principal crops are cotton (fig. 7) and soybeans. Other suitable crops are winter small grain, grain sorghum, corn, peanuts; and truck crops, such as okra, green beans, potatoes, tomatoes, sweet corn, melons, and strawberries. Crops respond well to fertilization. If this soil does not have vegetative cover in spring, the hazard of soil blowing is moderate (fig. 8). This soil has good potential for pasture. Adapted pasture plants include bermudagrass, bahiagrass, tall fescue, and white clover.

This soil has no significant limitations for woodland. It has good potential for eastern cottonwood, green ash, and sweetgum.

This soil has good potential for most urban uses. It has no significant limitations for septic tank absorption fields, dwellings, and industrial sites. Low strength is a moderate limitation for roads and streets but can be overcome by proper engineering design. Capability unit IIe-1, woodland suitability group 2o4, pasture and hayland group 2A.

5—Brocket gravelly fine sandy loam, 3 to 8 percent slopes. This deep, well drained, gently sloping soil is on crests and upper side slopes of hills. Individual areas range from about 20 to 200 acres in size.

Typically, the surface layer is dark yellowish brown gravelly fine sandy loam about 6 inches thick. The subsoil is strong brown fine sandy loam to a depth of about 16 inches; yellowish red loam to a depth of 30 inches; mottled, yellowish red sandy clay loam to a depth of about 58 inches; and yellowish red, mottled fine sandy loam to a depth of 72 inches or more.

Included with this soil in mapping are a few small areas of Captina, Doniphan, and Gepp soils. Also included are a few small areas of soils that are similar to Brocket soils but are gravelly in the lower part of the subsoil. These soils make up about 15 percent of the map unit.

This soil is low in natural fertility and organic-matter content. The surface layer is slightly acid to very strongly acid, and the subsoil is medium acid to very strongly acid. Permeability is moderate, and available water capacity is high. Tilth is easy to maintain.

This map unit is used mainly for pasture. It has fair potential for cultivated crops. The gravelly surface layer makes cultivation of row crops somewhat difficult. Runoff is medium, and the hazard of erosion is severe. This soil has good potential for pasture and no significant limitations. Adapted pasture plants are bahiagrass, bermudagrass, tall fescue, white clover, annual lespedeza, and sericea lespedeza. Crops respond well to fertilization.

This soil has no significant limitations for woodland. It has good potential for yellow-poplar, sweetgum, and shortleaf pine.

This soil has good potential for most urban uses. It has no significant limitations for septic tank absorption fields, dwellings, and industrial sites. Low strength is a moderate limitation for roads and streets but generally can be overcome by proper engineering design. Capability unit IIIe-2, woodland suitability group 3o7, pasture and hayland group 8A.

6—Brocket gravelly fine sandy loam, 8 to 12 percent slopes. This deep, well drained, moderately sloping soil is on crests and upper side slopes of hills. Individual areas range from 20 to 300 acres in size.

Typically, the surface layer is dark yellowish brown gravelly fine sandy loam about 6 inches thick. The subsoil is strong brown fine sandy loam to a depth of about 16 inches; yellowish red loam to a depth of 30 inches; mottled, yellowish red sandy clay loam to a depth of about 58 inches; and yellowish red, mottled fine sandy loam to a depth of 72 inches or more.

Included with this soil in mapping are a few small areas of Captina, Doniphan, and Gepp soils. Also included are a few small areas of soils that are similar to Brocket soils but are gravelly in the lower part of the subsoil. These soils make up about 15 percent of the map unit.

This soil is low in natural fertility and organic-matter content. The surface layer is slightly acid to very strongly acid, and the subsoil is medium acid to very strongly acid. Permeability is moderate, and available water capacity is high. Tilth is easy to maintain.

This map unit is used mainly for pasture. It has poor potential for cultivated crops. Slope and the gravelly surface layer make tillage of cultivated row crops difficult. Runoff is rapid, and the hazard of erosion is very severe. This soil has good potential for pasture. Adapted pasture plants are bahiagrass, bermudagrass, tall fescue, white clover, annual lespedeza, and sericea lespedeza. Pasture plants respond well to fertilization.

This soil has no significant limitations for woodland. It has good potential for yellow-poplar, sweetgum, and shortleaf pine.

This soil has fair potential for most urban uses. Slope is a moderate limitation for septic tank absorption fields, dwellings, and industrial sites. Slope and low strength are severe limitations for roads and streets. These limitations generally can be overcome by proper engineering design. Capability unit IVe-2, woodland suitability group 3o7, pasture and hayland group 8A.

7—Broseley loamy fine sand, undulating. This deep, somewhat excessively drained, undulating soil is on the higher parts of old natural levees along abandoned river channels. Slope is 0 to 3 percent. Individual areas range from about 20 to 400 acres in size.

Typically, the surface layer is brown loamy fine sand about 8 inches thick. The subsurface layer is dark yellowish brown loamy fine sand about 18 inches thick. The subsoil extends to a depth of 60 inches. It is dark brown sandy clay loam to a depth of about 34 inches; dark brown, mottled fine sandy loam to a depth of about 44 inches; and yellowish brown loamy fine sand to a depth of 60 inches. The underlying material is pale brown loamy fine sand to a depth of 72 inches or more.

Included with this soil in mapping are a few small areas of Bosket, McCrory, and Patterson soils. These soils make up about 15 percent of the map unit.

This soil is medium in natural fertility and in organic-matter content. It is medium acid or strongly acid throughout, except where the surface layer has been limed. Permeability is moderately rapid, and available water capacity is medium to low. Tilth is easy to maintain.

This map unit is used mainly for cultivated crops, and it has good potential for this use. The principal crops are cotton and soybeans. Other suitable crops are grain sorghum, peanuts, corn, sunflower, and winter small grain. The hazard of soil blowing is moderate if this soil has no vegetative cover in spring. Because of the medium to low available water capacity, droughtiness is a moderate limitation. This soil has good potential for pasture and no significant limitations. Adapted pasture plants are bermudagrass and bahiagrass. Crops respond well to fertilizer.

This soil has no significant limitations for woodland. It has fair potential for eastern cottonwood, pin oak, and cherrybark oak.

This soil has good potential for most urban uses. It has no significant limitations for septic tank absorption fields, dwellings, and industrial sites. Low strength is a moderate limitation for roads and streets but can be overcome with proper engineering design. Capability unit IIs-1, woodland suitability group 4s5, pasture and hayland group 2A.

8—Captina silt loam, 3 to 8 percent slopes. This deep, moderately well drained, gently sloping soil is on lower side slopes of valleys and hills. Individual areas range from about 20 to 300 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 4 inches thick. The subsoil extends to a depth of 58 inches. It is yellowish brown and strong brown silt loam to a depth of about 20 inches; yellowish brown, mottled silt loam to a depth of about 46 inches; and mottled yellowish brown, grayish brown, and yellowish red silty clay loam to a depth of about 58 inches. The underlying material is brown, mottled silt loam to a depth of about 72 inches or more.

Included with this soil in mapping are a few small areas of Brocket, Peridge, and Razort soils. Also included are a few small areas of soils that are similar to

Captina soils but have a fine sandy loam surface layer. These soils make up about 20 percent of the map unit.

This soil is low in natural fertility and organic-matter content. The surface layer is slightly acid to strongly acid, and the subsoil is strongly acid or very strongly acid. Permeability is slow, and available water capacity is medium. Tilth is easy to maintain.

This map unit is used mainly for pasture. It has fair potential for cultivated crops. The principal crops are soybeans, grain sorghum, and winter small grain. Such truck crops as okra, strawberries, melons, potatoes, tomatoes, and green beans and such fruit crops as peaches, apples, pears, and grapes are also suitable. Runoff is medium, and the hazard of erosion is severe. With good management, including terracing and contour cultivation, clean tilled crops that leave large amounts of residue can be safely grown year after year on the milder slopes. This soil has good potential for pasture and no significant limitations. Adapted pasture plants include bahiagrass, bermudagrass, tall fescue, white clover, annual lespedeza, and sericea lespedeza. Crops respond well to fertilization.

This soil has no significant limitations for woodland. It has fair potential for shortleaf pine, southern red oak, and eastern redcedar.

This soil has fair potential for most urban uses. The slow permeability is a severe limitation for septic tank absorption fields and is difficult to overcome. Low strength is a moderate limitation for dwellings, industrial sites, and roads and streets. This limitation generally can be overcome by proper engineering design. Capability unit IIIe-1, woodland suitability group 4o7, pasture and hayland group 8A.

9—Captina silt loam, 8 to 12 percent slopes. This deep, moderately well drained, moderately sloping soil is on lower side slopes of valleys and hills. Individual areas range from about 20 to 300 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 4 inches thick. The subsoil extends to a depth of 58 inches. It is yellowish brown and strong brown silt loam to a depth of about 20 inches; yellowish brown mottled silt loam to a depth of about 46 inches; and mottled yellowish brown, grayish brown, and yellowish red silty clay loam to a depth of about 58 inches. The underlying material is brown, mottled silt loam to a depth of about 72 inches or more.

Included with this soil in mapping are a few small areas of Brocket, Peridge, and Razort soils. Also included are a few small areas of soils that are similar to Captina soils but have a fine sandy loam surface layer. These soils make up about 20 percent of the map unit.

This soil is low in natural fertility and organic-matter content. The surface layer is slightly acid to strongly acid, and the subsoil is strongly acid to very strongly acid. Permeability is slow, and available water capacity is medium. The surface layer is easy to till.

This map unit is used mainly for pasture. It has poor potential for cultivated crops. Runoff is rapid, and the hazard of erosion is very severe. This soil has good potential for pasture and no significant limitations. Adapted pasture plants are bahiagrass, bermudagrass, tall fescue, white clover, annual lespedeza, and sericea lespedeza. Pasture plants respond well to fertilization.

This soil has no significant limitations for woodland. It has fair potential for shortleaf pine, southern red oak, and eastern redcedar.

This soil has poor potential for most urban uses. The slow permeability is a severe limitation for septic tank absorption fields and is difficult to overcome. Slope is a severe limitation for industrial sites, and the slope and low strength are moderate limitations for dwellings and roads and streets. These limitations generally can be overcome by proper engineering design. Capability unit IVe-1, woodland suitability group 4o7, pasture and hayland group 8A.

10—Clarksville cherty silt loam, 8 to 12 percent slopes. This deep, somewhat excessively drained, moderately sloping soil is on high ridgetops and adjacent side slopes. Individual areas range from about 20 to 100 acres in size.

Typically, the surface layer is brown cherty silt loam about 4 inches thick. The subsurface layer is pale brown cherty silt loam about 12 inches thick. The subsoil is yellowish red, mottled very cherty silty clay loam to a depth of about 40 inches; red, mottled very cherty silty clay to a depth of about 52 inches; and mottled red, yellowish brown, and light gray very cherty silty clay to a depth of 72 inches or more.

Included with this soil in mapping are a few small areas of Doniphan and Gepp soils. These soils make up about 10 percent of the map unit.

This soil is low in natural fertility and organic-matter content. It is very strongly acid throughout, except where the surface has been limed. Permeability is moderately rapid, and available water capacity is low. Tilth is somewhat difficult to maintain.

This map unit is used mainly for pasture. It has poor potential for cultivated crops. Runoff is rapid, and the hazard of erosion is very severe. This soil has fair potential for pasture. Adapted pasture plants include bermudagrass, bahiagrass, weeping lovegrass, tall fescue, annual lespedeza, and sericea lespedeza. Droughtiness is the main limitation. Pasture plants respond fairly well to fertilization.

This soil has no significant limitations for woodland. It has fair potential for shortleaf pine, red oak, and eastern redcedar.

This soil has fair potential for urban uses. Slope is a moderate limitation for septic tank absorption fields and dwellings, and frost action is a moderate limitation for roads and streets. Slope is a severe limitation for industrial sites. These limitations generally can be overcome by proper engineering design. Capability unit VIs-1, woodland suitability group 4f7, pasture and hayland group 8G.

11—Clarksville cherty silt loam, 12 to 20 percent slopes. This deep, somewhat excessively drained, moderately steep soil is on high ridgetops and adjacent side slopes. Individual areas range from about 20 to 150 acres in size.

Typically, the surface layer is brown cherty silt loam about 4 inches thick. The subsurface layer is pale brown cherty silt loam about 12 inches thick. The subsoil is yellowish red, mottled very cherty silty clay loam to a depth of about 40 inches; red, mottled very cherty silty clay to a depth of about 52 inches; and mottled red, yellowish brown, and light gray very cherty silty clay to a depth of 72 inches or more.

Included with this soil in mapping are a few small areas of Doniphan and Gepp soils. These soils make up about 15 percent of the map unit.

This soil is low in natural fertility and organic-matter content. It is very strongly acid throughout, except where the surface layer has been limed. Permeability is moderately rapid, and available water capacity is low. Tilth is difficult to maintain.

This soil is not suited to cultivated crops and has poor potential for pasture. The slope and cherty surface layer severely restrict the use of farm equipment. Runoff is rapid, and the hazard of erosion is very severe. Pasture plants respond poorly to irrigation.

This soil is used mainly for woodland. It has fair potential for shortleaf pine, red oak, and eastern redcedar. Restricted use of equipment because of slope and seedling mortality are moderate limitations for woodland use or management.

This soil has poor potential for urban uses. Slope is a severe limitation for septic tank absorption fields, dwellings, industrial sites, and roads and streets. This limitation generally can be overcome by proper engineering design. Capability unit VIIs-3, woodland suitability group 4f8, pasture and hayland group 8G.

12—Crowley silt loam. This deep, somewhat poorly drained, level soil is on broad flats that are at higher elevations than adjacent natural drainageways and abandoned backswamps. Slope is 0 to 1 percent. Individual areas range from about 20 to 200 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 6 inches thick. The subsurface layer is gray, mottled silt loam about 10 inches thick. The subsoil is grayish brown, mottled silty clay to a depth of more than 60 inches.

Included with this soil in mapping are a few small areas of Jackport, Kobel, and McCrory soils. Also included are a few small areas of soils that are similar to Crowley soils but do not have mottles in the subsoil. These soils make up about 15 percent of the map unit.

This soil is medium in natural fertility and low in organic-matter content. It is slightly acid to very strongly acid throughout. Permeability is very slow, and available water capacity is high. The seasonal high water table is within 12 inches of the surface late in winter and early in spring. Tilth is easy to maintain.

This map unit is used mainly for cultivated crops, and it has good potential for this use. The principal crops are soybeans and rice. Other suitable crops are grain sorghum, corn, and cotton. Winter small grain can be grown where surface drainage is adequate. Farming operations are delayed several days after rain, and excess water is a severe hazard unless surface drains are installed. The clayey subsoil is difficult to till if it is exposed to the surface by grading. Crops respond well to fertilization. This soil has good potential for pasture. Adapted pasture plants include bermudagrass, tall fescue, bahiagrass, annual lespedeza, and white clover. The main limitation is wetness late in winter and early in spring.

This soil has good potential for cottonwood, sweetgum, and loblolly pine. Wetness is a severe equipment limitation for woodland, but it can be overcome by logging during the drier seasons.

This soil has poor potential for urban uses. Wetness and very slow permeability are severe limitations for septic tank absorption fields, and high shrink-swell potential, low strength, and wetness are severe limitations for dwellings, industrial sites, and roads and streets. These limitations are difficult or impractical to overcome. Capability unit IIIw-2, woodland suitability group 3w9, pasture and hayland group 1A.

13—Doniphan cherty silt loam, 3 to 8 percent slopes. This deep, well drained, gently sloping soil is on hilltops and upper parts of hillsides. Individual areas range from about 10 to 100 acres in size.

Typically, the surface layer is dark grayish brown cherty silt loam about 2 inches thick. The subsurface layer is yellowish brown cherty silt loam about 7 inches thick. The subsoil is yellowish brown silt loam to a depth of about 16 inches; strong brown, mottled silty clay to a depth of about 32 inches; strong brown, mottled clay to a depth of about 47 inches; and yellowish brown, mottled clay to a depth of 72 inches or more.

Included with this soil in mapping are a few small areas of Brocket, Clarksville, Gepp, and Ventris soils. These soils make up about 15 percent of the map unit.

This soil is low in natural fertility and in organic-matter content. The surface layer ranges from slightly acid to very strongly acid, and the subsoil ranges from strongly acid to extremely acid. Permeability is moderate, and available water capacity is medium.

This soil has poor potential for cultivated crops. Runoff is rapid, and the hazard of erosion is very severe. With good management, including terraces and contour cultivation, crops that leave large amounts of residue can be safely grown year after year in the less sloping areas.

This soil has fair potential for pasture. The main limitation is droughtiness. Adapted pasture plants are bahiagrass, bermudagrass, tall fescue, annual lespedeza, and sericea lespedeza.

This soil is used mainly for woodland and has no significant limitations. It has fair potential for shortleaf pine, loblolly pine, and eastern redcedar.

This soil has fair potential for most urban uses. Low strength is a severe limitation for dwellings, industrial sites, and roads and streets. This limitation generally can be overcome with proper engineering design. There are no significant limitations for septic tank absorption fields. Capability unit IIIs-1, woodland suitability group 4o1, pasture and hayland group 8C.

14—Doniphan cherty silt loam, 8 to 12 percent slopes. This deep, well drained, moderately sloping soil is on hilltops and upper parts of hillsides. Individual areas range from about 20 to 200 acres in size.

Typically, the surface layer is dark grayish brown cherty silt loam about 2 inches thick. The subsurface layer is yellowish brown cherty silt loam about 7 inches thick. The subsoil is yellowish brown cherty silt loam to a depth of about 16 inches; strong brown, mottled silty clay to a depth of 32 inches; strong brown, mottled clay to a depth of about 47 inches; and yellowish brown, mottled clay to a depth of 72 inches or more.

Included with this soil in mapping are a few small areas of Brocket, Clarksville, Gepp, and Ventris soils. These soils make up about 20 percent of the map unit.

This soil is low in natural fertility and organic-matter content. The surface layer ranges from slightly acid to very strongly acid, and the subsoil ranges from strongly acid to extremely acid. Permeability is moderate, and available water capacity is medium.

This soil has poor potential for cultivated crops. Runoff is rapid, and the hazard of erosion is very severe. This soil has fair potential for pasture. Adapted pasture plants include bahiagrass, bermudagrass, tall fescue, annual lespedeza, and sericea lespedeza. Crops respond fairly well to fertilization.

This map unit is used mainly for woodland and has no significant limitations. It has fair potential for shortleaf pine, loblolly pine, and eastern redcedar.

This soil has fair potential for urban uses. Slope is a moderate limitation for septic tank absorption fields, and the slope and low strength are severe limitations for dwellings, industrial sites, and roads and streets. These limitations generally can be overcome by proper engineering design. Capability unit IVs-2, woodland suitability group 4o1, pasture and hayland group 8C.

15—Doniphan-Gepp association, undulating. This association consists of deep, well drained soils on broad ridgetops and plateaus in a regular pattern on the landscape. Doniphan soils are in the less sloping parts of broad ridges and plateaus. They formed in a thin layer of cherty, loamy material and in the underlying clayey material weathered from siltstone, cherty limestone, and shale. Gepp soils are on steeper sides of ridges and plateaus. They formed in a thin layer of cherty, loamy material and in the underlying clayey material weathered from chert limestone or limestone. Slope is 3 to 12 percent. Areas range from 80 to 500 acres in size.

The deep and well drained Doniphan soils make up about 45 percent of this association. Typically, the surface layer is dark grayish brown cherty silt loam about 2 inches thick. The subsurface layer is yellowish brown cherty silt loam about 7 inches thick. The subsoil is yellowish brown silt loam to a depth of about 16 inches; strong brown, mottled silty clay to a depth of about 32 inches; strong brown, mottled clay to a depth of about 47 inches; and yellowish brown, mottled clay to a depth of 72 inches or more.

Doniphan soils have moderate permeability and medium available water capacity. Natural fertility and organic-matter content are low. The surface layer ranges from slightly acid to very strongly acid, and the subsoil ranges from strongly acid to extremely acid.

This deep and well drained Gepp soil makes up about 30 percent of this association. Typically, the surface layer is dark grayish brown very cherty silt loam about 1 inch thick. The subsurface layer is yellowish brown very cherty silt loam about 6 inches thick. The subsoil is yellowish red silty clay loam to a depth of about 13 inches; red clay to a depth of about 28 inches; mottled, red clay to a depth of 53 inches; and mottled, yellowish red clay to a depth of 72 inches or more.

Gepp soils have moderate permeability and medium available water capacity. Natural fertility and organic-matter content are low. The surface layer and lower part of the subsoil are medium acid or strongly acid, and the upper part of the subsoil is strongly acid or very strongly acid.

Included with Doniphan and Gepp soils in mapping are a few areas of Clarksville and Ventris soils. The somewhat excessively drained Clarksville soils formed in residuum from cherty limestone and are on ridgetops. The moderately well drained Ventris soils formed from clayey material weathered from limestone or mixed limestone and shale and are on hilltops, side slopes, and benches. Also included are a few small areas of Rock outcrop. The included soils and Rock outcrop make up about 25 percent of this association.

This association has poor potential for cultivated crops and fair potential for pasture. Adapted pasture plants are bahiagrass, bermudagrass, annual lespedeza, and sericea lespedeza. Runoff is rapid, and the hazard of erosion is very severe. Crops respond fairly well to fertilization on the Doniphan soils, and respond well to fertilization on the Gepp soils.

This association is used mainly as woodland (fig. 9) and has no significant limitations. Doniphan soils have fair potential for shortleaf pine, loblolly pine, and eastern redcedar; and Gepp soils have good potential for loblolly pine, white oak, and shortleaf pine.

This association has fair potential for most urban uses. Doniphan soils have severe limitations for dwellings, industrial sites, and roads and streets because of low strength and slope. Where slopes are more than 8 percent, they have a moderate limitation for septic tank absorption fields. These limitations generally can be overcome with proper engineering design.

Gepp soils have moderate limitations for dwellings, industrial sites, and roads and streets because of low strength and high shrink-swell potential. The moderate permeability and slope are moderate limitations for septic tank filter fields. These limitations generally can be overcome with proper engineering design. Pasture and hayland group 8C; Doniphan soil in capability unit IVs-2, woodland suitability group 4o1; Gepp soil in capability unit IVe-3, woodland suitability group 3o7.

16—Dundee silt loam. This deep, somewhat poorly drained, level soil is on the lower parts of older natural levees along streams and abandoned river channels. Slope is 0 to 2 percent. Individual areas range from about 20 to 200 acres in size.

Typically, the surface layer is brown silt loam about 4 inches thick. The subsoil extends to a depth of 40 inches. The upper 24 inches is grayish brown, mottled silt loam, and the lower part is light brownish gray, mottled silty clay loam. The underlying material is light brownish gray, mottled, stratified silt loam and silty clay to a depth of more than 72 inches.

Included with this soil in mapping are a few small areas of Amagon, Bosket, Kobel, and Loring soils. These soils make up about 20 percent of the map unit.

This soil is high in natural fertility and low in organic-matter content. The surface layer and subsoil are medium acid to very strongly acid, and the underlying material is neutral to very strongly acid. Permeability is moderately slow, and available water capacity is high. Tilth is easy to maintain, but puddles and crusts form on the surface after a rain.

This map unit is used mainly for cultivated crops, and it has good potential for this use. The principal crops are soybeans (fig. 10) and grain sorghum. Other suitable crops are cotton, rice, peanuts, winter small grain, and truck crops. Farming operations are often delayed for several days after rain unless surface drains are installed. This soil has good potential for pasture and no significant limitations. Adapted pasture plants include bermudagrass, bahiagrass, tall fescue, and white clover. Crops respond well to fertilization.

This soil has no significant limitations for woodland. It has good potential for cherrybark oak, eastern cottonwood, and sweetgum.

This soil has fair potential for most urban uses. The moderately slow permeability and wetness are severe limitations for septic tank absorption fields. These limitations are difficult or impractical to overcome. Wetness and high shrink-swell potential are moderate limitations for dwellings, industrial sites, and roads and streets. These limitations generally can be overcome by proper engineering design. Capability unit IIw-1, woodland suitability group 2w5, pasture and hayland group 2B.

17—Gepp very cherty silt loam, 8 to 12 percent slopes. This deep, well drained, moderately sloping soil is on hilltops and hillsides. Individual areas range from about 10 to 100 acres in size.

Typically, the surface layer is dark grayish brown very cherty silt loam about 1 inch thick. The subsurface layer is yellowish brown very cherty silt loam about 6 inches thick. The subsoil is yellowish red silty clay loam to a depth of about 13 inches, red clay to a depth of about 28 inches, mottled, red clay to a depth of 53 inches, and mottled, yellowish red clay to a depth of 72 inches or more.

Included with this soil in mapping are a few small areas of Brocket, Clarksville, Doniphan, and Ventris soils. These soils make up about 15 percent of the map unit.

This soil is low in natural fertility and in organic-matter content. The surface layer and lower part of the subsoil are medium acid or strongly acid, and the upper part of the subsoil is strongly acid or very strongly acid. Permeability is moderate, and available water capacity is medium. Tilth is difficult to maintain.

This map unit is used mainly for pasture. It has poor potential for cultivated crops. Runoff is rapid, and the hazard of erosion is very severe if this soil is cropped. This soil has fair potential for pasture and no significant limitations. Adapted pasture plants include bahiagrass, bermudagrass, tall fescue, orchardgrass, white clover, annual lespedeza, and sericea lespedeza. Pasture plants respond well to fertilization.

This soil has no significant limitations for woodland. It has good potential for loblolly pine, white oak, and shortleaf pine.

This soil has fair potential for urban uses. The moderate permeability and the slope are moderate limitations for septic tank absorption fields. Low strength and moderate shrink-swell potential are moderate limitations for dwellings, industrial sites, and roads and streets. These limitations generally can be overcome by proper engineering design. Capability unit IVe-3, woodland suitability group 3o7, pasture and hayland group 4A.

18—Gepp very cherty silt loam, 12 to 20 percent slopes. This deep, well drained, moderately steep soil is on hilltops and hillsides. Individual areas range from about 10 to 300 acres in size.

Typically, the surface layer is dark grayish brown very cherty silt loam about 1 inch thick. The subsurface layer is yellowish brown very cherty silt loam about 6 inches thick. The subsoil is yellowish red silty clay loam to a depth of about 13 inches, red clay to a depth of about

28 inches, mottled, red clay to a depth of 53 inches, and mottled, yellowish red clay to a depth of 72 inches or more.

Included with this soil in mapping are a few small areas of Brocket, Clarksville, Doniphan, and Ventris soils. These soils make up about 10 percent of the map unit.

This soil is low in natural fertility and in organic-matter content. The surface layer and lower part of the subsoil are medium acid or strongly acid, and the upper part of the subsoil is strongly acid or very strongly acid. Permeability is moderate, and available water capacity is medium.

This soil has poor potential for cultivated crops. Chert fragments on the surface and the moderately steep slopes restrict the use of farm equipment. Runoff is rapid, and the hazard of erosion is very severe. This soil has fair potential for pasture. Adapted pasture plants include bahiagrass, bermudagrass, tall fescue, orchardgrass, white clover, annual lespedeza, and sericea lespedeza. Pasture plants respond well to fertilization. Erosion is the main management concern for pasture.

This soil is used mainly for woodland, and has no significant limitations for this use. It has good potential for loblolly pine, white oak, and shortleaf pine.

This soil has poor potential for urban uses. Slope is a severe limitation for septic tank absorption fields, dwellings, industrial sites, and roads and streets. This limitation generally can be overcome by proper engineering design. Capability unit VIe-2, woodland suitability group 3o7, pasture and hayland group 8B.

19—Gepp-Doniphan association, rolling. This association consists of deep, well drained soils on rolling side slopes and narrow ridges in a regular pattern on the landscape. Gepp soils are on the lower parts of hillsides and the steeper sides of narrow ridges. They formed in residuum from a thin layer of cherty, loamy material and in the underlying clayey material weathered from cherty limestone or limestone. Doniphan soils are on the upper parts of less sloping hillsides and on narrow ridgetops. They formed in a thin layer of cherty, loamy material and in the underlying clayey material weathered from siltstone, cherty limestone, and shale. Slope is 12 to 20 percent. Areas are more than 1,000 acres in size.

The deep, well drained Gepp soils make up about 50 percent of this association. Typically, the surface layer is dark grayish brown very cherty silt loam about 1 inch thick. The subsurface layer is yellowish brown very cherty silt loam about 6 inches thick. The subsoil is yellowish red silty clay loam to a depth of about 13 inches, red clay to a depth of about 28 inches, mottled, red clay to a depth of 53 inches, and mottled, yellowish red clay to a depth of 72 inches or more.

Gepp soils have moderate permeability and medium available water capacity. Natural fertility and organic-matter content are low. The surface layer and the lower part of the subsoil are medium acid or strongly acid, and the upper part of the subsoil is strongly acid or very strongly acid.

The deep, well drained Doniphan soils make up about 25 percent of this association. Typically, the surface layer is dark grayish brown cherty silt loam about 2 inches thick. The subsurface layer is yellowish brown cherty silt loam about 7 inches thick. The subsoil is yellowish brown silt loam to a depth of about 16 inches; strong brown, mottled silty clay to a depth of about 32 inches; mottled, strong brown clay to a depth of about 47 inches; and yellowish brown, mottled clay to a depth of 72 inches or more.

Doniphan soils have moderate permeability and medium available water capacity. Natural fertility and organic-matter content are low. The surface layer ranges from slightly acid to very strongly acid, and the subsoil ranges from strongly acid to extremely acid.

Included with Gepp and Doniphan soils in mapping are a few areas of Clarksville and Ventris soils. The somewhat excessively drained Clarksville soils formed in residuum weathered from cherty limestone on higher, narrow ridgetops. The moderately well drained Ventris soils formed in clayey material weathered from limestone or mixed limestone and shale and are on benches. Also included are a few small areas of Rock outcrop. The included soils and Rock outcrop make up about 25 percent of this association.

This association has poor potential for cultivated crops and fair potential for native pasture and tall fescue. Adapted native pasture plants are big bluestem, little bluestem, and indiangrass. Pasture plants respond fairly well to fertilization. Slope and chert fragments severely restrict the use of equipment. Runoff is rapid, and the hazard of erosion is very severe.

The association is used for woodland. Gepp soils have good potential for loblolly pine, white oak, and shortleaf pine, but plant competition is a moderate limitation. Doniphan soils have fair potential for shortleaf pine, loblolly pine, and eastern redcedar. The use of this association is moderately limited by slope, which restricts the use of equipment, and by the hazard of erosion.

This association has poor potential for urban uses. Where the slope is less than 15 percent, the Gepp soils have moderate limitations for septic tank absorption fields because of moderate permeability and the slope. The less sloping Gepp soils also are moderately limited for dwellings, industrial sites, and roads and streets by low strength and moderate shrink-swell potential. Where the slope is more than 15 percent, Gepp soils have severe limitations for all urban uses.

Doniphan soils have moderate limitations for septic tank absorption fields where the slope is less than 15 percent, and they have severe limitations where the slope is more than 15 percent. Low strength and slope are severe limitations for dwellings, industrial sites, and roads and streets. The limitations of both soils generally can be overcome by proper engineering design, but they are more difficult to overcome as the slope increases. Pasture and hayland group 8C; Gepp soils in capability unit VIe-2, woodland suitability group 3o7; Doniphan soils in capability unit VIs-1, woodland suitability group 4r2.

20—Gepp-Ventris association, rolling. This association consists of deep and moderately deep, well drained and moderately well drained soils on rolling side slopes, narrow ridges, and benches in a regular pattern on the landscape. Gepp soils are on upper parts of side slopes and on narrow ridges. They formed in a thin layer of cherty, loamy material and in the underlying clayey material weathered from cherty limestone or limestone. Ventris soils are on benches and less sloping hillsides. They formed in clayey material weathered from limestone or mixed limestone and shale. Slope is 12 to 20 percent. Mapped areas range from 80 to 600 acres in size.

The deep, well drained Gepp soils make up about 60 percent of this association. Typically, the surface layer is dark grayish brown very cherty silt loam about 1 inch thick. The subsurface layer is yellowish brown very cherty silt loam about 6 inches thick. The subsoil is yellowish red silty clay loam to a depth of about 13 inches, red clay to a depth of about 28 inches, mottled, red clay to a depth of 53 inches, and mottled, yellowish red clay to a depth of 72 inches or more.

Gepp soils have moderate permeability and medium available water capacity. Natural fertility and organic-matter content are low. The surface layer and the lower part of the subsoil are medium acid or strongly acid, and the upper part of the subsoil is strongly acid or very strongly acid.

The moderately deep, moderately well drained Ventris soils make up about 20 percent of this association. Typically, the surface layer is very dark grayish brown silt loam about 5 inches thick. The subsoil extends to a depth of 32 inches. The upper 9 inches is light olive brown, mottled silty clay; and the lower part is yellowish brown, mottled clay. Hard, undulating, fractured limestone bedrock is at a depth of about 32 inches.

Ventris soils have very slow permeability and low available water capacity. Natural fertility and organic-matter content are moderate. The surface layer is neutral to medium acid, and the subsoil is mildly alkaline to slightly acid.

Included with Gepp and Ventris soils in mapping are a few areas of Clarksville and Doniphan soils. The somewhat excessively drained Clarksville soils formed in residuum of cherty limestone and are on higher, narrow ridgetops. The well drained Doniphan soils formed in a thin layer of cherty, loamy material and in the underlying clayey material weathered from siltstone, cherty limestone, and shale. They are on less sloping, upper side slopes in areas of Rock outcrop. Also included are small areas of Ventris soils that have slopes of less than 12 percent. The included soils and Rock outcrop make up about 20 percent of this association.

This association is not suitable for cultivated crops and has poor potential for pasture. Slope, surface stones, chert fragments, and Rock outcrop severely restrict the use of equipment; and most of the soils are droughty. Pasture plants, however, respond well to fertilizer on Gepp soils, but respond poorly to fertilization on Ventris soils.

This association is used mainly for woodland. Gepp soils have good potential for loblolly pine, white oak, and shortleaf pine, but plant competition is a moderate limitation to management. Ventris soils have poor potential for shortleaf pine, loblolly pine, southern red oak, and eastern redcedar. Moderate seedling mortality and restricted use of equipment are the main limitations for Ventris soils.

This association has poor potential for most urban uses. Where slopes are less than 15 percent, Gepp soils have moderate limitations for septic tank absorption fields because of the moderate permeability and the slope. They also have moderate limitations for dwellings, industrial sites, and roads and streets because of low strength and moderate shrink-swell potential. Where the slope is more than 15 percent, Gepp soils have severe limitations for all urban uses.

Ventris soils are severely limited for all urban uses by very slow permeability, low strength, high shrink-swell potential, and moderate depth to bedrock. Where the slope is more than 15 percent, it is an additional limitation for urban uses.

On the less sloping Gepp soils, limitations for urban uses generally can be overcome by proper engineering design. On the rest of the association, limitations for septic tank absorption fields are very difficult to overcome, but limitations for dwellings, industrial sites, and roads and streets generally can be overcome by proper engineering design. Gepp soil in capability unit VIe-2, woodland suitability group 3o7, pasture and hayland group 8B; Ventris soil in capability unit VIIs-2, woodland suitability group 5c2, pasture and hayland group 14C.

21—Gepp-Ventris association, steep. This association consists of deep and moderately deep, well drained and moderately well drained soils on steep side slopes, narrow ridges, and benches that face primary and secondary drainageways. The hills and drainageways form a regular pattern on the landscape. Gepp soils are on upper parts of side slopes and on narrow ridges. They formed in residuum from a thin layer of cherty, loamy material and the underlying clayey material weathered from cherty limestone or limestone. Ventris soils are on benches and less sloping side slopes of hills. They formed in clayey material weathered from limestone or mixed limestone and shale. Slope is 20 to 30 percent. Areas range from 80 to more than 600 acres in size.

The deep, well drained Gepp soils make up about 55 percent of this association. Typically, the surface layer is dark grayish brown very cherty silt loam about 1 inch thick. The subsurface layer is yellowish brown very cherty silt loam about 6 inches thick. The subsoil is yellowish red silty clay loam to a depth of about 13 inches, red clay to a depth of about 28 inches, mottled, red clay to a depth of 53 inches, and mottled, yellowish red clay to a depth of 72 inches or more.

Gepp soils have moderate permeability and medium available water capacity. Natural fertility and organic-matter content are low. The surface layer and lower part of the subsoil are medium acid or strongly acid, and the upper part of the subsoil is strongly acid or very strongly acid.

The moderately deep, moderately well drained Ventris soils make up about 20 percent of this association. Typically, the surface layer is very dark grayish brown silt loam about 5 inches thick. The subsoil extends to a depth of 32 inches. The upper 9 inches is light olive brown, mottled silty clay; and the lower part is yellowish brown, mottled clay. Hard, undulating fractured limestone bedrock is at a depth of about 32 inches.

Permeability is very slow, and available water capacity is low. Natural fertility and organic-matter content are moderate. The surface layer is neutral to medium acid, and the subsoil is mildly alkaline to slightly acid.

Included with Gepp and Ventris soils in mapping are a few areas of Clarksville and Doniphan soils. The somewhat excessively drained Clarksville soils formed in residuum weathered from chert limestone and are on higher, narrow ridgetops. The well drained Doniphan soils formed in a thin layer of cherty, loamy material and in the underlying clayey material weathered from siltstone, cherty limestone, and shale. They are on the upper parts of less sloping hillsides and on ridgetops. Also included are a few small areas of Rock outcrop and a few small areas of Ventris soils that have slopes of less than 20 percent. The included soils and Rock outcrop make up about 25 percent of this association.

This association is not suitable for cultivated crops and has poor potential for pasture. Slope, surface stones, chert fragments, and Rock outcrop severely restrict the use of equipment; and most of the soils are droughty. Pasture plants, however, respond well to fertilization on the Gepp soils but respond poorly on the Ventris soils.

This association is used mainly for woodland. Gepp soils have good potential for loblolly pine, white oak, and shortleaf pine. Plant competition is a moderate management concern. Ventris soils have poor potential for shortleaf pine, loblolly pine, and eastern redcedar. Seedling mortality is a severe limitation to management.

These soils have poor potential for urban uses. They have severe limitations for all urban uses. Slope is a severe limitation, and Ventris soils also are limited by very slow permeability, low strength, high shrink-swell potential, and moderate depth to bedrock. These limitations are very difficult to overcome. Gepp soil in capability unit VIIe-1, woodland suitability group 3o7, pasture and hayland group 8B; Ventris soil in capability unit VIIs-2, woodland suitability group 5c2, pasture and hayland group 14C.

22—Hontas silt loam, frequently flooded. This deep, moderately well drained, level soil is on flood plains of creeks and rivers. Slope is 0 to 1 percent. Individual areas range from 20 acres to more than 200 acres.

Typically, the surface layer is brown silt loam about 6 inches thick. The subsoil extends to a depth of 30 inches. The upper 8 inches is dark yellowish brown mottled silt loam, and the lower part is yellowish brown, mottled silt loam. The underlying material is grayish brown and gray, mottled silt loam and silty clay loam to a depth of about 72 inches or more.

Included with this soil in mapping are a few areas of Ashton and Razort soils. These soils make up about 15 percent of the map unit.

This soil is high in natural fertility and medium in organic-matter content. It is medium acid to mildly alkaline throughout. Permeability is moderate, and available water capacity is high. This soil is flooded at least once in every 2 years and sometimes more than once during a year between the months of December and June. Tilth is easy to maintain.

This map unit is used mainly for pasture. It has poor potential for cultivated crops because of frequent flooding. Flooding often delays planting, and in some years severely damages or destroys the crop. With good management, short season crops that leave large amounts of residue can be grown in most years. The principal crops are soybeans and grain sorghum. Crops respond well to fertilization. This soil has good potential for pasture. Adapted pasture plants include bermudagrass, tall fescue, and white clover. Frequent flooding is the main limitation for pasture management.

This soil has good potential for shortleaf pine, Shumard oak, and sweetgum. Seedling mortality and equipment limitations caused by flooding are moderate limitations.

This soil has poor potential for urban uses. Flooding and wetness are severe limitations for dwellings, roads and streets, industrial sites, and septic tank absorption fields. These limitations can be overcome only by major flood control measures. Capability unit IVw-1; woodland suitability group 2w8, pasture and hayland group 2A.

23—Jackport silty clay loam. This deep, poorly drained, level soil is in abandoned backswamps of former streams. Slope is 0 to 1 percent. Individual areas range from about 20 to 500 acres.

Typically, the surface layer is dark grayish brown silty clay loam about 5 inches thick. The subsurface layer is gray, mottled silty clay loam about 7 inches thick. The subsoil is dark grayish brown silty clay to a depth of about 17 inches; grayish brown, mottled clay to a depth of about 48 inches; and olive gray silty clay to a depth of about 58 inches. The underlying material is olive gray, mottled silty clay loam to a depth of more than 72 inches.

Included with this soil in mapping are a few small areas of Crowley and Kobel soils. These soils make up about 10 percent of the map unit.

This soil is moderate in natural fertility and in organic-matter content. The surface and subsurface layers range from medium acid to very strongly acid, the subsoil is strongly acid or very strongly acid, and the underlying material ranges from mildly alkaline to slightly acid. Permeability is very slow, and available water capacity is high. The seasonal high water table is within 12 inches of the surface late in winter and early in spring. Tilth is somewhat difficult to maintain. The surface layer forms clods if it is plowed when too wet, and seedbed preparation is difficult.

This map unit is used mainly for cultivated crops, and it has good potential for this use. The principal crops are rice and soybeans. Where surface drainage is adequate, other suitable crops are grain sorghum and winter small grain. Farming operations are delayed several days after rain, and excess water is a severe hazard unless surface drains are installed to prevent ponding. Crops respond well to fertilization. This soil has good potential for pasture. Adapted pasture plants include bermudagrass, tall fescue, and white clover. The main limitation is wetness late in winter and early in spring.

This soil has good potential for water oak, willow oak, and sweetgum. Wetness interferes with the operation of equipment and is a severe limitation to woodland use and management, but this limitation can be overcome by logging during drier seasons.

This soil has poor potential for urban uses. Wetness and the very slow permeability are severe limitations for septic tank absorption fields; and low strength, high shrink-swell potential, and wetness are severe limitations for dwellings, industrial sites, and roads and streets. These limitations are very difficult or impractical to overcome. Capability unit IIIw-4, woodland suitability group 2w6, pasture and hayland group IA.

24—Kobel silty clay loam. This deep, poorly drained, level soil is on flood plains of rivers and backswamps. Almost one-half of the acreage is in the Black River Wildlife Management Area. Slope is 0 to 1 percent. Individual areas range from about 20 to 200 acres in size.

Typically, the upper part of the surface layer is very dark grayish brown silty clay loam about 6 inches thick. The lower part is gray silty clay loam about 4 inches thick. The subsoil is gray, mottled silty clay that extends to a depth of about 36 inches. The underlying material is gray, mottled silty clay to a depth of more than 72 inches.

Included with this soil in mapping are a few small areas of Amagon, Crowley, Dundee, and Jackport soils. These soils make up about 15 percent of the map unit.

This soil has a high natural fertility and organic-matter content. The surface layer ranges from neutral to strongly acid, and the subsoil and underlying material range from moderately acid to slightly acid. Permeability is very slow, and available water capacity is high. The seasonal high water table is within 12 inches of the surface late in winter and early in spring. Tilth is somewhat difficult to maintain. If plowed when it is too wet, the soil forms clods.

This map unit is used mainly for cultivated crops, and it has good potential for this use. The principal crops are soybeans and rice. Grain sorghum and cotton are other suitable crops. Crops respond well to fertilization. Excess water is a severe hazard, and farming operations are delayed several days after rain unless surface drains are installed. This soil has good potential for pasture. Adapted pasture plants include bermudagrass, tall fescue, and white clover. Wetness is the main limitation late in winter and early in spring.

This soil has good potential for cottonwood, cherrybark oak, and sweetgum. Most of the woodland on this soil is in a State owned wildlife management area and is used only for wildlife habitat. Wetness is the main limitation for woodland, but this limitation can be overcome by logging during the drier seasons.

This soil has poor potential for urban uses. Wetness and the very slow permeability are severe limitations for septic tank absorption fields; and wetness, low strength, and very high shrink-swell potential are severe limitations for dwellings, industrial sites, and roads and streets. These limitations are difficult or impractical to overcome. Capability unit IIIw-3, woodland suitability group 2w6, pasture and hayland group 1A.

25—Loring silt loam, 3 to 8 percent slopes. This deep, moderately well drained, gently sloping soil is on hilltops, hillsides, and terraces of uplands adjacent to the bottom lands. Individual areas range from 20 to 200 acres.

Typically, the surface layer is yellowish brown silt loam about 4 inches thick. The subsoil is strong brown silt loam and silty clay loam to a depth of about 14 inches; yellowish brown, mottled silty clay loam to a depth of about 40 inches; and strong brown and brown, mottled silt loam to a depth of 72 inches or more.

Included with this soil in mapping are a few small areas of Amagon and Dundee soils. These soils make up about 15 percent of the map unit.

This soil is moderate in natural fertility and low in organic-matter content. It ranges from medium acid to very strongly acid throughout. Permeability is moderately slow, and available water capacity is medium. Tilth is easy to maintain.

This map unit is used mainly for pasture. It has fair potential for cultivated crops. The principal crops are soybeans, grain sorghum, and winter small grain. Such truck crops as okra, strawberries, melons, potatoes, tomatoes, and green beans and such fruit crops as peaches, apples, pears, and grapes are also suitable. Runoff is medium, and the hazard of erosion is severe. With good management, including terraces and contour cultivation, clean tilled crops that leave large amounts of residue can be safely grown year after year in the less sloping areas. This soil has good potential for pasture and has no significant limitations. Adapted pasture plants include bahiagrass, bermudagrass, tall fescue, white clover, annual lespedeza, and sericea lespedeza. Crops respond well to fertilization.

This soil has no significant limitations for woodland. It has good potential for yellow-poplar, shortleaf pine, and loblolly pine.

This soil has fair potential for urban uses. Moderately slow permeability is a severe limitation for septic tank absorption fields and is difficult to overcome. Low strength is a moderate limitation for dwellings, industrial sites, and roads and streets and generally can be overcome by proper engineering design. Capability unit IIIe-1, woodland suitability group 3o7, pasture and hayland group 8A.

26—Loring silt loam, 8 to 12 percent slopes. This deep, moderately well drained, moderately sloping soil is on hilltops, hillsides, and terraces of uplands adjacent to the bottom lands. Individual areas range from 20 to 300 acres.

Typically, the surface layer is yellowish brown silt loam about 4 inches thick. The subsoil is strong brown silt loam and silty clay loam to a depth of about 14 inches; yellowish brown, mottled silty clay loam to a depth of about 40 inches; and strong brown and brown, mottled silt loam to a depth of 72 inches or more.

Included in mapping are a few small areas of Amagon and Dundee soils. Also included are a few small areas where slopes are as much as 16 percent, and a few small areas of severely eroded soils. These soils make up about 15 percent of the map unit.

This soil is moderate in natural fertility and low in organic-matter content. It ranges from medium acid to very strongly acid throughout. Permeability is moderately slow, and available water capacity is medium. Tilth is easy to maintain.

This map unit is used mainly for pasture. It has poor potential for cultivated crops. Runoff is rapid, and the hazard of erosion is very severe. This soil has good potential for pasture and has no significant limitations. Adapted pasture plants include bahiagrass, bermudagrass, tall fescue, white clover, annual lespedeza, and sericea lespedeza. Crops respond well to fertilization.

This soil has no significant limitations for woodland. It has good potential for yellow-poplar, shortleaf pine, and southern red oak.

This soil has fair potential for urban uses. The moderately slow permeability is a severe limitation for septic tank absorption fields and is difficult to overcome. Low strength and the slope are moderate limitations for dwellings, industrial sites, and roads and streets and generally can be overcome by proper engineering design. Capability unit IVe-1, woodland suitability group 3o7, pasture and hayland group 8A.

27—McCrory fine sandy loam. This deep, poorly drained, nearly level soil is on broad flats and the lower parts of natural levees. Slope is 0 to 1 percent. Individual areas range from about 20 to 100 acres.

Typically, the surface layer is dark grayish brown fine sandy loam about 8 inches thick. The subsurface layer is mottled, grayish brown and gray fine sandy loam about 11 inches thick. The subsoil is gray, mottled sandy clay loam to a depth of about 36 inches and gray, mottled fine sandy loam to a depth of about 49 inches. The underlying material is gray loamy fine sand to a depth of 72 inches or more.

Included with this soil in mapping are a few small areas of Bosket, Broseley, Crowley, and Patterson soils. Also included are a few small areas of soils that are similar to McCrory soils but that are not sandy throughout. These soils make up about 15 percent of the map unit.

This soil is moderate in natural fertility and low in organic-matter content. The surface layer ranges from neutral to very strongly acid, the upper part of the subsoil ranges from neutral to strongly acid, and the lower subsoil and the underlying material are moderately alkaline to neutral. Permeability is moderately slow, and available water capacity is medium. The seasonal high water table is within 12 inches of the surface late in winter and early in spring. Tilth is easy to maintain. This soil has a high concentration of sodium and magnesium in the subsoil.

This map unit is used mainly for cultivated crops, and it has good potential for this use. The principal crops are soybeans and grain sorghum. Other suitable crops are cotton and winter small grain. Farming operations are delayed several days after rain, and excess water is a severe hazard unless surface drains are installed. With good management, including adequate drainage, clean tilled crops that leave large amounts of residue can be safely grown year after year. This soil has good potential for pasture. Adapted pasture plants include bermudagrass, bahiagrass, tall fescue, annual lespedeza, and white clover. Crops respond well to fertilization.

This soil has good potential for American sycamore, sweetgum, and water oak. Wetness is a severe limitation for woodland use and management, but this can be overcome by logging during the drier seasons.

This soil has poor potential for urban uses. Wetness is a severe limitation for all urban uses. This limitation is difficult or impractical to overcome. Capability unit IIIw-3, woodland suitability group 3w6, pasture and hayland group 2B.

28—Patterson fine sandy loam. This deep, somewhat poorly drained, level soil is in depressions of natural levees. Slope is less than 1 percent. Individual areas range from about 10 to 100 acres.

Typically, the surface layer is dark grayish brown fine sandy loam about 8 inches thick. The subsurface layer is dark grayish brown, mottled fine sandy loam about 6 inches thick. The subsoil is grayish brown, mottled fine sandy loam and sandy loam that extends to a depth of about 34 inches. The underlying material is gray loamy fine sand and light brownish gray, mottled loamy sand to a depth of 72 inches or more.

Included with this soil in mapping are a few small areas of Bosket, Broseley, and McCrory soils. Also included are a few small areas that are grayer throughout. These soils make up about 10 percent of the map unit.

This soil is moderate in natural fertility and low in organic-matter content. The surface layer is medium acid to very strongly acid, and the subsoil and underlying material are strongly acid or very strongly acid. Permeability is moderately rapid, and available water capacity is low. The seasonal high water table is within 12 inches of the surface late in winter and early in spring. This soil is somewhat droughty during summer. Tilth is easy to maintain. Wetness delays seedbed preparation and planting in spring.

This map unit is used mainly for cultivated crops, and it has good potential for this use. The principal crops are soybeans and grain sorghum. Other suitable crops are cotton and corn. Winter small grain can be grown where surface drainage is adequate. Farming operations are delayed several days after rain, and excess water is a severe hazard, unless surface drains are installed. Droughtiness is a severe limitation during the drier summer months. This soil has good potential for pasture. Adapted pasture plants include bermudagrass, bahiagrass, tall fescue, and white clover. Droughtiness is the main limitation for pasture. Crops respond well to fertilization.

This soil has no significant limitations for woodland. It has good potential for cherrybark oak, willow oak, and sweetgum.

This soil has poor potential for urban uses. Wetness is a moderate limitation for roads and streets and a severe limitation for septic tank absorption fields, dwellings, and industrial sites. These limitations are difficult or impractical to overcome. Capability unit IIw-1, woodland suitability group 2s5, pasture and hayland group 2B.

29—Peridge silt loam, 3 to 8 percent slopes. This deep, well drained, gently sloping soil is on stream terraces. Individual areas range from about 15 to 100 acres.

Typically, the surface layer is brown silt loam about 5 inches thick. The subsoil is yellowish red silty clay loam to a depth of about 36 inches; mottled, red silty clay loam to a depth of about 48 inches; and yellowish red, mottled silty clay loam to a depth of 72 inches or more.

Included with this soil in mapping are a few small areas of Arkana, Ashton, Captina, and Razort soils. Also included are a few small areas where slopes are as much as 12 percent. These soils make up about 15 percent of the map unit.

This soil is moderate in natural fertility and low in organic-matter content. It is medium acid to very strongly acid throughout. Permeability is moderate, and available water capacity is high. Tilth is easy to maintain, except where the subsoil is within plow depth.

This map unit is used mainly for pasture. It has fair potential for cultivated crops. The principal crops are soybeans, grain sorghum, winter small grain, and such truck crops as okra and cucumbers. Truck crops, such as strawberries, green beans, and melons, and fruit crops, such as peaches, apples, and pears, are also suitable. Runoff is medium, and the hazard of erosion is moderate. With good management, including contour cultivation and terraces, clean tilled crops that leave large amounts of residue can be safely cultivated year after year in the less sloping areas. This soil has good potential for pasture and no significant limitations. Adapted pasture plants include bahiagrass, bermudagrass, orchardgrass, white clover, annual lespedeza, and sericea lespedeza. Crops respond well to fertilization on this soil.

This soil has no significant limitations for woodland. It has good potential for shortleaf pine, southern red oak, and redcedar.

This soil has good potential for urban uses. There are no significant limitations for dwellings. The moderate permeability is a moderate limitation for septic tank absorption fields, and slope and low strength are moderate limitations for industrial sites and roads and streets. These limitations generally can be overcome by proper engineering design. Capability unit IIIe-2, woodland suitability group 3o7, pasture and hayland group 8A.

30—Pits. This map unit consists of excavated areas 100 to 400 feet wide on hilltops and upper side slopes above the loess escarpment in the county. The areas are between 5 and 80 acres in size. Included in mapping are spots of Brocket, Gepp, and Loring soils and a soil that is similar to Brocket soils except that it has an abundance of gravel in the surface layer and subsoil.

The vertical sides of the excavations in this unit are 6 to 50 feet deep. The material in the excavations is a loose mass of rounded pebbles, sandstone fragments, and friable loamy fine sand and sand. The rounded pebbles make up 80 to 90 percent of the mass.

Pits are not suitable for agricultural use. Their main value is to furnish borrow material—gravel and sand to be used in roadfill and construction (fig. 11).

31—Razort silt loam, frequently flooded. This deep, well drained, level to nearly level soil is on narrow flood plains along small streams on uplands. Slope is 0 to 3 percent. Individual areas range from 10 to 100 acres.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is brown silt loam and loam to a depth of about 22 inches; dark brown clay loam to a depth of about 36 inches; and dark brown, mottled loam to a depth of about 46 inches. The underlying material is dark brown, mottled very cherty silty clay loam and dark yellowish brown gravelly sandy loam to a depth of more than 66 inches.

Included with this soil in mapping are a few small areas of Ashton and Hontas soils and areas of gravel and sand bars along the streams. These soils and gravel and sandbars make up about 15 percent of the map unit.

This soil has high natural fertility and organic-matter content. The surface layer is neutral or slightly acid, and the subsoil is slightly acid or medium acid. Permeability is moderate, and available water capacity is high. This soil is flooded at least once in every 2 years between January and April.

This map unit is used mainly for pasture. It has poor potential for cultivated crops because of frequent flooding. It has good potential for pasture. Adapted pasture plants include bahiagrass, bermudagrass, tall fescue, annual lespedeza, dallisgrass, and bromegrass. Frequent flooding is the main limitation. Pasture plants respond well to fertilization.

This soil has no significant limitations for woodland. It has good potential for shortleaf pine, black walnut, sycamore, cottonwood, and sweetgum.

This soil has poor potential for urban uses. Frequent flooding is a severe hazard and can be overcome only by major flood control measures. Capability unit Vw-1, woodland suitability group 2o7, and pasture and hayland group 2A.

32—Ventris-Rock outcrop complex, 3 to 12 percent slopes. This complex consists of Ventris soils and Rock outcrop so intermingled that it was not practical to map them separately. These gently sloping and moderately sloping soils and rock outcrops are on the lower parts of hilltops, on side slopes, and on benches. Individual areas range from about 10 to 100 acres in size.

Ventris silt loam makes up about 50 percent of each mapped area. Typically, the surface layer is very dark grayish brown silt loam about 5 inches thick. The subsoil extends to a depth of 32 inches. The upper 9 inches is light olive brown, mottled silty clay and the lower part is yellowish brown, mottled clay. Limestone bedrock is at a depth of about 32 inches.

This soil is moderate in natural fertility and organic-matter content. The surface layer is medium acid to neutral, and the subsoil is mildly alkaline to slightly acid. Permeability is very slow, and available water capacity is low.

Rock outcrop makes up about 20 percent of each mapped area. Typically, Rock outcrop consists of narrow limestone ledges and small areas of outcrop exposed through natural erosion. The soil material within areas of Rock outcrop is less than 4 inches thick, except in small fractures filled with clay.

Included with this complex in mapping are a few small areas of Arkana, Doniphan, and Gepp soils. These soils make up about 30 percent of the map unit.

This complex is not suitable for cultivated crops or for pasture. It is best suited to woodland or wildlife habitat. Rock outcrop and stones on the surface restrict the use of farm equipment. Most areas of the soil are droughty.

This complex is used mainly for woodland. It has poor potential for loblolly pine, shortleaf pine, and eastern redcedar. Droughtiness causes moderate loss of seedlings. Rock outcrop and surface stones restrict the use of equipment.

This complex has poor potential for urban uses. The moderate depth to rock and low strength are severe limitations for dwellings, industrial sites, and roads and streets. The very slow permeability and moderate depth to rock are severe limitations for septic tank absorption fields. These limitations are difficult or impractical to overcome. Capability unit VIe-4, woodland suitability group 5c2, not assigned to a pasture and hayland group.

Use and management of the soils

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic tank disposal systems, and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section is useful in planning use and management of soils for crops and pasture, rangeland, and woodland, as sites for buildings, highways and other transportation systems, sanitary facilities, and parks and other recreation facilities, and for wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in houses and other structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, and trees and shrubs are influenced by the nature of the soil.

Crops and pasture

W. Wilson Ferguson, conservation agronomist, Soil Conservation Service, helped prepare this section.

The major management concerns in the use of the soils for crops and pasture are described in this section. The crops or pasture plants best suited to the soil are discussed; 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 presented for each soil.

This section provides information about the overall agricultural potential of the survey area and about the management practices that are needed. The information is useful to equipment dealers, land improvement contractors, fertilizer companies, processing companies, planners, conservationists, and others. For each kind of soil, information about management is presented in the section "Soil maps for detailed planning." Planners of management systems for individual fields or farms should also consider the detailed information given in the description of each soil.

In 1967, about 23 percent of the survey area was used for crops, and about 22 percent was used for pasture and hayland. The potential of the soils in Randolph County is good for increased production of food. A considerable acreage of potentially good cropland currently is used as woodland or pasture. In addition to the reserve capacity represented by this land, food production could also be increased by extending the latest crop production technology to all cropland in the county. This survey can be used to facilitate the application of such technology.

Except for the Black River and Current River bottom lands, the soils in Randolph County are low in nitrogen, potassium, phosphorus, calcium, and organic matter. Many of the soils that are suitable for cultivation are erodible. In places, poor surface or internal drainage and the susceptibility to flooding are limitations.

Contour farming, terraces, and grassed waterways are needed on sloping soils that are used for clean-tilled crops. Proper arrangement of rows and suitable drainage are needed for dependable growth in wet areas.

Annual cover crops or grasses and legumes should be grown regularly in the cropping system if the hazard of erosion is severe or if the crops leave only a small amount of residue. Crop residue should be left on the surface to provide a protective cover for the soil. Minimum tillage methods also leave crop residue on or near the surface. Annual cover crops that follow a harvest leave a small amount of residue that protects the soil from erosion and adds organic matter.

A plowpan commonly forms in loamy soils that are improperly tilled or are tilled frequently with heavy equipment. Keeping tillage to a minimum, varying the depth of tillage, and tilling at the proper moisture content help to prevent formation of a plowpan.

If left bare, the loamy soils tend to crust and pack during periods of heavy rainfall. Growing cover crops and managing crop residue help to maintain good tilth. The soils that have a clayey surface layer can be tilled only within a narrow moisture range.

Soybeans are the main row crop in the county. Small acreages of grain sorghum, corn, cotton, wheat, and oats are grown. Major truck crops are watermelons and cantaloups.

The amount of fertilizer and lime to be applied is determined by soil test and depends upon the kind of crops to be grown.

Coastal bermudagrass and common bermudagrass are the summer perennials commonly grown in the county. Coastal bermudagrass is fairly new to the county, but it is forage of highly satisfactory quality. Johnsongrass is also suited to many of the soils in the county. Tall fescue is the principal winter perennial grass currently grown. Annual lespedeza and white clover are the most commonly grown legumes and generally are grown in combination with grass.

Proper grazing is essential for the production of high quality forage, for stand survival, and for erosion control. It includes maintaining sufficient topgrowth on the plants during the growing season to provide for vigorous healthy growth and restricting or not grazing tall fescue in summer. Brush control is essential, and weed control is often needed.

Grass pastures respond well to nitrogen fertilizer. Pastures of grass and legume mixtures may require phosphate and potash fertilizers and lime at rates based on soil test results.

The soils of Randolph County have been placed in pasture and hayland suitability groups. These groups are prepared to assist land users in the selection and management of suitable forage plants. The soils included in each group grow similar kinds of forage plants and require similar treatment and management. Forage production for one soil in the group is essentially the same as for other soils in the group when management and treatment are the same. The pasture and hayland suitability groups are identified in the description of each unit in the section, "Soil map for detailed planning."

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. Absence of an estimated yield indicates that the soil is not suited to the crop or the crop is not commonly grown on the soil or that a given crop is not commonly irrigated.

The estimated yields were based mainly on the experience and records of farmers, conservationists, and extension agents. Results of field trials and demonstrations and available yield data from nearby counties were also considered.

The yields were estimated assuming that the latest soil and crop management practices were used. Hay and pasture yields were estimated for the most productive varieties of grasses suited to the climate and the soil. A few farmers may be obtaining average yields higher than those shown in table 5.

The management needed to achieve the indicated yields of the various crops depends on the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; 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 residues, barnyard manure, and green-manure crops; harvesting crops with the smallest possible loss; and timeliness of all fieldwork.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown; that good quality irrigation water is uniformly applied in proper amounts as needed; and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of the soils 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 included because the acreage of these crops is small. The local offices of the Soil Conservation Service and the Cooperative Extension Service can provide information about the management concerns and productivity of the soils for these crops.

Capability classes and subclasses

Capability classes and subclasses show, in a general way, the suitability of soils for most kinds of field crops. The soils are classed according to their limitations when they are used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, horticultural crops, or other crops that require special management. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forest trees, or for engineering purposes.

In the capability system, all kinds of soil are grouped at three levels: capability class, subclass, and unit. These levels are defined in the following paragraphs. A survey area may not have soils of all classes.

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 landforms 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 too cold or too 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, though they have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The capability unit is identified in the description of each soil map unit in the section "Soil maps for detailed planning." Capability units are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-2 or IIIe-4.

Woodland management and productivity

J. T. Beene, woodland conservationist, Soil Conservation Service, helped prepare this section.

Originally, forest covered all of Randolph County. On the uplands the predominant trees were upland oaks, hickory, eastern redcedar, and some shortleaf pine. In the lowlands were bottom-land oaks, sweetgum, pecan, baldcypress, water tupelo, ash, cottonwood, and sycamore.

Woodland now makes up less than 200,000 acres, and most of it is on the uplands. All the woodland is privately owned, except for about 7,000 acres belonging to the Arkansas Game and Fish Commission.

Table 6 contains information useful to woodland owners or forest managers planning use of the soils for wood crops. Only those soils suitable for wood crops are listed, and the woodland suitability group symbol for each soil is given. All soils bearing the same symbol require the same general kinds of woodland management and have about the same potential productivity.

The first part of the *suitability 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; *t*, toxic substances in 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 insignificant limitations or restrictions. If a soil has more than one limitation, priority in placing the soil into a limitation class is in the following order: x, w, t, 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 suitability for needleleaf trees, and limitations are, 1—slight; 2—moderate; 3—severe. The numerals 4, 5, and 6 indicate suitability for broadleaf trees, and limitations are, 4—slight; 5—moderate; 6—severe. The numerals 7, 8, and 9 indicate suitability for both needleleaf and broadleaf trees, and limitations are, 7—slight; 8—moderate; 9—severe.

In table 6 the soils are also rated for a number of factors to be considered in management. *Slight, moderate,* and *severe* are used to indicate the degree of major soil limitations.

Ratings of the *erosion hazards* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if some 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 used 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 equipment; *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 that the soil affects expected mortality of planted tree seedlings. Plant competition is not considered in the ratings. Seedlings from good planting stock that are properly planted during a period of sufficient rainfall are rated. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

The *potential productivity* of merchantable or *important trees* on a soil is expressed as a *site index*. This index is the average height, in feet, of the dominant and codominant trees at age 30 for cottonwood, age 35 for sycamore, and age 50 for all other species. The site index applies to fully stocked, even-aged, unmanaged stands. Important 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 suitable for commercial wood production and that are suited to the soils.

Wildlife habitat

Roy A. Grizzell, Jr., biologist, Soil Conservation Service, helped prepare this section.

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the construction of water impoundments. The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, is inadequate, or is inaccessible, wildlife either are scarce or do not inhabit the area.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by helping the natural establishment of desirable plants.

In table 7, the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in planning for parks, wildlife refuges, nature study areas, and other developments for wildlife; selecting areas that are suitable for wildlife; selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat; and 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* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of habitat are very severe and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

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

Grain and seed crops are seed-producing annuals used by wildlife. The major soil properties 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 and wheat.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Major soil properties 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, clover and lespedeza.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Major soil properties 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 beggarweed and honeysuckle.

Hardwood trees and the associated woody understory provide cover for wildlife and produce nuts or other fruit, buds, catkins, twigs, bark, or foliage that wildlife eat. Major soil properties that affect growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of hardwoods are oak, cherry and hickory. Examples of fruit-producing shrubs that are commercially available and suitable for planting on soils rated *good* are autumn-olive and crabapple.

Coniferous plants are cone-bearing trees, shrubs, or ground cover plants that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Soil properties that have a major effect on the growth of coniferous plants are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine and cypress.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, or foliage used by wildlife or that provide cover and shade for some species of wildlife. Major soil properties that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and moisture. Examples of shrubs are dogwood, sumac, and hazelnut.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetland as habitat. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, and cattail.

Shallow water areas are bodies of water that have an average depth of less than 5 feet and that are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control structures in marshes or streams. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Openland habitat 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 kinds of wildlife attracted to these areas include bobwhite quail, meadowlark, and cottontail rabbit.

Woodland habitat consists of areas of hardwoods or conifers, or a mixture of both, and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, woodpeckers, squirrels, and deer.

Wetland habitat consists of open, marshy or swampy, shallow water areas where water-tolerant plants grow. Some of the wildlife attracted to such areas are ducks, geese, muskrat, mink, and beaver.

Engineering

James L. Janski, civil engineer, Soil Conservation Service, helped prepare this section.

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management. Among those who can benefit from this information are engineers, landowners, community planners, town and city managers, land developers, builders, contractors, and farmers and ranchers.

The ratings in the engineering tables are based on test data and estimated data in the "Soil properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock that is within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to (1) select potential residential, commercial, industrial, and recreational areas; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations, testing, and analysis by personnel having expertise in the specific use contemplated.

The information is presented mainly in tables. Table 8 shows, for each kind of soil, the degree and kind of limitations for building site development; table 9, for sanitary facilities; and table 11, for water management. Table 10 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

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

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 8. A *slight* limitation indicates that soil properties generally are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Shallow excavations are made for pipelines, sewerlines, communications and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by soil wetness caused by a seasonal high water table; the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is given, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and *small commercial buildings* referred to in table 8 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious hazard.

Local roads and streets referred to in table 8 have an all-weather surface that can carry light to medium traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones affect stability and ease of excavation.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 9 shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as *slight*, soils are generally favorable for the specified use and limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required. Soil suitability is rated by the terms *good*, *fair*, and *poor*, which mean about the same as *slight*, *moderate*, and *severe*.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope can cause lateral seepage and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a system to lower the seasonal water table can be installed or the size of the absorption field can be increased so that performance is satisfactory.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted soil material. Aerobic lagoons generally are designed to hold 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. Soils that are very high in content of organic matter and those that have cobbles, stones, or boulders are not suitable. Unless the soil has very slow permeability, contamination of ground water is a hazard where the seasonal high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soil material affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness can be a limitation, because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

Ease of excavation affects the suitability of a soil for the trench type of landfill. A suitable soil is deep to bedrock and free of large stones and boulders. If the seasonal water table is high, water will seep into trenches.

Unless otherwise stated, the limitations in table 9 apply only to the soil material within a depth of about 6 feet. If the trench is deeper, a limitation of slight or moderate may not be valid. Site investigation is needed before a site is selected.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill in wet and dry periods. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

If it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

Construction materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 10 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction material. Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in table 13 provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Soils rated *good* are coarse grained. They have low shrink-swell potential, low frost action potential, and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as moderate shrink-swell potential, moderately steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor*.

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 10 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 13.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plantlife. Also considered is the damage that can result at the area from which the topsoil is taken.

The ease of excavation is influenced by the thickness of suitable material, wetness, slope, and amount of stones. The ability of the soil to support plantlife is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the A1 or Ap horizon greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are free of stones and cobbles, are low in content of gravel, and have gentle slopes. They are low in soluble salts that can restrict plant growth. They are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy soils or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salt.

Soils rated *poor* are very sandy soils or very firm clayey soils; soils that have suitable layers less than 8 inches thick; soils that have large amounts of gravel, stones, or soluble salt; steep soils; and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon is generally preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter.

Water management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 11 the degree of soil limitation and soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Soil and site limitations are expressed as slight, moderate, and severe. *Slight* means that the soil properties and site features are generally favorable for the specified use and that any limitation is minor and easily overcome. *Moderate* means that some soil properties or site features are unfavorable for the specified use but can be overcome or modified by special planning and design. *Severe* means that the soil properties and site features are so unfavorable and so difficult to correct or overcome that major soil reclamation, special design, or intensive maintenance is required.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have a low seepage potential, which is determined by permeability and the depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Large stones and organic matter in a soil downgrade the suitability of the soil for use in embankments, dikes, and levees.

Aquifer-fed excavated ponds are bodies of water made by excavating a pit or dugout into a ground-water aquifer. Excluded are ponds that are fed by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Ratings in table 11 are for ponds that are properly designed, located, and constructed. Soil properties and site features that affect aquifer-fed ponds are depth to a permanent water table, permeability of the aquifer, quality of the water, and ease of excavation.

Drainage of soil is affected by such soil properties as permeability; texture; depth to bedrock, hardpan, or other layers that affect the rate of water movement; depth to the water table; slope; stability of ditchbanks; susceptibility to flooding; salinity and alkalinity; and availability of outlets for drainage.

Irrigation is affected by such features as slope, susceptibility to flooding, hazards of water erosion and soil blowing, texture, presence of salts and alkali, depth of root zone, rate of water intake at the surface, permeability of the soil below the surface layer, available water capacity, need for drainage, and depth to the water table.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to intercept runoff. They allow water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock, hardpan, or other unfavorable material; large stones; permeability; ease of establishing vegetation; and resistance to water erosion, soil blowing, soil slipping, and piping.

Grassed waterways are constructed to channel runoff to outlets at a nonerosive velocity. Features that affect the use of soils for waterways are slope, permeability, erodibility, wetness, and suitability for permanent vegetation.

Recreation

The soils of the survey area are rated in table 12 according to limitations that affect their suitability for recreation uses. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for recreation use by the duration and intensity of flooding and the season when flooding occurs. Onsite assessment of height, duration, intensity, and frequency of flooding is essential in planning recreation facilities.

The degree of the limitation of the soils is expressed as slight, moderate, or severe. *Slight* means that the soil properties are generally favorable and that the limitations are minor and easily overcome. *Moderate* means that the 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 12 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 9, and interpretations for dwellings without basements and for local roads and streets, given in table 8.

Camp areas require such site preparation as shaping and leveling for 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 for this use 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 camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as 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 will 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 or boulders, is firm after rains, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over bedrock or hardpan should be enough to allow necessary grading.

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

Soil properties

Extensive data about soil properties are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, determine the pH or reaction of the soil, and identify any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many soil series not tested are available from nearby survey areas.

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classifications, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present data about pertinent soil and water features, engineering test data, and data obtained from physical and chemical laboratory analyses of soils.

Engineering properties

Table 13 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Table 13 gives information for each of these contrasting horizons in a typical profile. *Depth* to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Soil series and morphology."

Texture is described in table 13 in the standard terms used by the U.S. Department of Agriculture (*5*). These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*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, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The *AASHTO* system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging 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. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The estimated classification, without group index numbers, is given in table 13. Also in table 13 the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil. These indexes are used in the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and in plasticity index is estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

Physical and chemical properties

Table 14 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems. It is commonly expressed as inches of water per inch of soil.

Soil reaction is expressed as a range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Soil and water features

Table 15 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received 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 chiefly of deep, well drained to excessively drained sands or gravels. 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 that have a layer that impedes the downward movement of water or soils that have 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 clay soils 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 is the temporary covering of soil with water from overflowing streams, with runoff from adjacent slopes, and by tides. Water standing for short periods after rains or after snow melts is not considered flooding, nor is water in swamps and marshes. Flooding is rated in general terms that describe the frequency and duration of flooding and the time of year when flooding is most likely. The ratings are based on evidence in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding. The ratings are also based on local information about floodwater levels in the area and the extent of flooding; and on information that relates the position of each soil on the landscape to historic floods.

The generalized description of flood hazards is of value in land-use planning and provides a valid basis for land-use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table is the highest level of a saturated zone more than 6 inches thick for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed in many borings made during the course of the soil survey. Indicated in table 15 are the depth to the seasonal high water table; the kind of water table, that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. Only saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not construction of basements is feasible and to determine how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the mapping of the soils. The kind of bedrock and its hardness as related to ease of excavation are also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Physical and chemical analyses of selected soils

Physical and chemical data resulting from laboratory analyses are useful to the soil scientist in classifying soils. These data are helpful in estimating available water capacity, acidity, cation exchange capacity, mineralogical composition, organic-matter content, and other soil characteristics that affect management needs. The data are also helpful in developing concepts of soil formation. More recently, laboratory data have proved helpful in rating soils for such nonfarm uses as residential, industrial, recreational, or transportation development.

Several factors are involved in selecting soils for laboratory analyses. Soils that are extensive and most important in the survey area are considered first, and available laboratory data are revised to determine the need for additional information. Generally, priority is given to soils for which little or no laboratory data is available.

In Randolph County, soils representative of two series were selected for laboratory analyses. Profiles of these soils are described in the section "Soil series and morphology." The analyses were made by the University of Arkansas in Fayetteville. Tables 16 and 17 show the results.

Silt and clay particle-size distribution was determined by the hydrometer method (*3*). Sands were measured by sieving (*6*).

Content of organic matter was determined by a modified Wakley-Black method. The organic matter is digested with potassium dichromate-sulfuric acid, and the quantity of chromic acid reduced is measured colorimetrically.

Soil pH was determined on a 1:1 soil-to-water basis. Available phosphorus was extracted with the Bray No. 1 solution (0.03 normal ammonium fluoride and 0.025 normal hydrochloric acid) and measured colorimetrically.

The bases were extracted with 1*N*, pH 7.0, ammonium acetate. Calcium, potassium, and sodium were determined with a flame-photometer, and magnesium was measured by atomic absorption. The extractable acidity was determined by the barium chloride-triethanolamine method (*6*).

The total of the extractable bases calcium, potassium, magnesium, and sodium and extractable acidity is an approximation of the cation-exchange capacity of the soil. Except in soils that contain soluble salts, base saturation was determined by dividing this total into the sum of calcium, potassium, magnesium, and sodium and multiplying by 100.

Soil series and morphology

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

Characteristics of the soil and the material in which it formed are discussed for each series. The soil is then compared to similar soils and to nearby soils of other series. Then a pedon, a small three-dimensional area of soil that is typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (*5*). Unless otherwise noted, colors described are for moist soil.

Following the pedon description is the range of important characteristics of the soil series in this survey area. Phases, or mapping units, of each soil series are described in the section "Soil maps for detailed planning."

Amagon series

The Amagon series consists of deep, poorly drained, slowly permeable, level soils. These soils formed in beds of loamy alluvial sediment. They are on broad flats on the lower parts of old natural levees and in shallow depressions along natural drainageways. These soils are saturated with water late in winter and early in spring. The native vegetation is hardwoods, mainly water-tolerant species of oak. Slope is dominantly less than 1 percent.

Amagon soils are geographically associated with Dundee, Kobel, and Loring soils. Dundee soils are on the lower parts of older natural levees that border abandoned stream channels. They are better drained than Amagon soils. Loring soils are on adjacent hillsides, hilltops, and terraces on uplands. They are better drained than Amagon soils and have a fragipan. Kobel soils are in backswamps and have a clayey control section.

Typical pedon of Amagon silt loam, in a cultivated area, in SE1/4NW1/4SW1/4 sec. 35, T. 20 N., R. 2 E.:

Ap—0 to 6 inches; grayish brown (10YR 5/2) silt loam; weak fine granular structure; friable; many fine roots; common brown stains covered by organic matter; few dark concretions; medium acid; clear smooth boundary.

A2—6 to 12 inches; light brownish gray (10YR 6/2) silt loam; common medium distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; few dark concretions; very strongly acid; clear wavy boundary.

B21tg—12 to 20 inches; light brownish gray (10YR 6/2) silt loam; common medium distinct yellowish brown

(10YR 5/8) and few medium distinct brown (10YR 4/3) mottles; moderate medium subangular blocky structure; friable; patchy distinct clay films on faces of peds; common small dark concretions; strongly acid; clear wavy boundary.

B22tg—20 to 30 inches; gray (10YR 6/1) silty clay loam; common medium distinct yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm; common pores; continuous distinct clay films on faces of peds; common small dark concretions; strongly acid; clear wavy boundary.

B3g—30 to 56 inches; grayish brown (10YR 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; firm; common light brownish gray (10YR 6/2) silt coatings; many small dark accretions; medium acid; clear wavy boundary.

Cg—56 to 72 inches; gray (10YR 6/1) silty clay loam; many coarse distinct yellowish brown (10YR 5/8) mottles; massive; firm; common dark brown stains of organic matter; few small dark concretions; neutral.

The solum ranges from 50 inches to more than 70 inches in thickness. Reaction is medium acid to very strongly acid throughout the A and B2t horizons and strongly acid to neutral in the B3 and C horizons.

The A horizon is dominantly less than 15 inches thick but ranges to as much as 20 inches. The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2. The A2g horizon has hue of 10YR, value of 6, and chroma of 1 or 2. Mottles are in shades of brown.

The B2t horizon has hue of 10YR, value of 6, and chroma of 1 or 2; or it has hue of 2.5Y, value of 5 or 6, and chroma of 2. The B3 horizon has hue of 10YR. Either value is 6 or 7 and chroma is 1, or value is 5 and chroma is 2. The B horizon is mottled in shades of yellow and brown. It is silt loam or silty clay loam.

The Cg horizon has colors similar to the B horizon. It has common medium to coarse mottles in shades of yellow or brown. Texture is fine sandy loam, silt loam, silty clay loam, or silty clay.

Arkana series

The Arkana series consists of moderately deep, well drained, very slowly permeable, gently sloping to moderately sloping soils. These soils formed in clayey residuum from cherty limestone. They are on side slopes and benches. The native vegetation is redcedar and a few scattered upland oaks of poor quality and an understory of vines, cacti, and lichens. Slope is 3 to 12 percent.

Arkana soils are geographically associated with Peridge and Ventris soils. Peridge soils are on lower terraces than Arkana soils. They are deeper than Arkana soils and have a fine-silty control section. Ventris soils are on adjacent benches and side slopes. They are not so well drained as Arkana soils and do not have a mollic epipedon.

Typical pedon of Arkana silty clay loam, in a moist wooded area of Arkana-Rock outcrop complex, 3 to 12 percent slopes, in NW1/4SE1/4NW1/4 sec. 20, T. 19 N., R. 2 W.:

O—1/2 inch to 0; partly decomposed leaf litter from deciduous trees.

A1—0 to 8 inches; very dark grayish brown (10YR 3/2) silty clay loam; weak medium subangular blocky structure; friable; many fine and medium roots; many fine pores; about 10 percent by volume flat limestone fragments; neutral; clear wavy boundary.

B21t—8 to 17 inches; reddish brown (5YR 4/3) silty clay; moderate medium subangular blocky structure; firm; many fine and medium roots; many fine pores; patchy distinct clay films on faces of peds; about 10 percent by volume limestone fragments; many black stains; neutral; gradual wavy boundary.

B22t—17 to 33 inches; red (2.5YR 4/6) clay; common medium prominent reddish brown (5YR 4/3) and yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm; few fine pores; patchy distinct clay films on faces of peds; few slickensides; about 10 percent by volume limestone fragments; many black stains; neutral; gradual irregular boundary.

R—33 inches; limestone bedrock.

The solum ranges from 20 to 36 inches in thickness over limestone bedrock. Reaction is mildly alkaline to medium acid throughout.

The A horizon is 6 to 10 inches thick. The A1 horizon has hue of 10YR, value of 3, and chroma of 1 to 3. Where present, the A2 horizon has hue of 10YR, value of 5, and chroma of 4. Content of chert or flat limestone fragments less than 6 inches in length ranges from 0 to 15 percent.

Where the B2t horizon has hue of 5YR or 2.5YR, value is 4 and chroma is 4, 6, or 8 or value is 5 and chroma is 6 or 8; where hue is 5YR, value is 4, and chroma is 3. Content of chert or flat limestone fragments less than 6 inches in length ranges from 0 to 15 percent. Mottles in shades of brown are in the lower part of the B2t horizon. Texture is silty clay or clay.

Ashton series

The Ashton series consists of deep, well drained, moderately permeable, level soils. These soils formed in loamy alluvium derived from limestone, cherty limestone, and shale. They are in long narrow strips along major streams that drain the uplands. The native vegetation is hardwoods and an understory of vines and canes. Slope is 0 to 1 percent.

Ashton soils are geographically associated with Hontas and Peridge soils. Hontas soils are in wider parts of flood plains of creeks and rivers. They are not so well drained as Ashton soils. Peridge soils are on adjacent terraces. They have a redder B horizon than Ashton soils. Neither Hontas nor Peridge soils have the mollic epipedon that Ashton soils have.

Typical pedon of Ashton silt loam, occasionally flooded, in a moist cultivated area, in NW1/4NE1/4NE1/4 sec. 29, T. 19 N., R. 2 W.:

Ap—0 to 8 inches; dark brown (10YR 3/3) silt loam; weak medium granular structure; friable; many fine roots; many fine pores; slightly acid; abrupt wavy boundary.

B21t—8 to 20 inches; brown (7.5YR 4/4) silt loam; weak medium subangular blocky structure; friable; many fine roots; many fine and medium pores; patchy distinct clay films on faces of peds; medium acid; gradual wavy boundary.

B22t—20 to 36 inches; brown (7.5YR 4/4) silt loam; moderate medium subangular blocky structure; firm; few fine roots; common fine pores; patchy distinct clay films on faces of peds; medium acid; clear wavy boundary.

B23t—36 to 58 inches; brown (7.5YR 4/4) silt loam; few medium distinct pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; firm, many fine pores; patchy distinct clay films on faces of peds; medium acid; gradual wavy boundary.

C—58 to 72 inches; brown (7.5YR 4/4) silt loam; common medium distinct pale brown (10YR 6/3) mottles; massive; friable; many fine pores; slightly acid.

The solum ranges from 40 to 60 inches in thickness. Reaction is medium acid to neutral throughout.

The A horizon is 7 to 10 inches thick. It has hue of 10YR, value of 3, and chroma of 2 or 3.

The B2t horizon has hue of 7.5YR, value of 4, and chroma of 4 or hue of 10YR, value of 4, and chroma of 3 or 4. It is silt loam or silty clay loam.

The C horizon is silt loam, loam, or fine sandy loam.

Bosket series

The Bosket series consists of deep, well drained, moderately permeable undulating soils. These soils formed in stratified beds of predominantly loamy alluvial sediment on natural levees along active and abandoned river channels. The native vegetation is mixed hardwoods and an understory of vines and canes. Slope is 0 to 3 percent.

Bosket soils are geographically associated with Broseley, Dundee, McCrory, and Patterson soils. Broseley soils are on higher and older natural levees and have more sand in the B horizon than Bosket soils, but do not have a mollic epipedon. Dundee soils are on the lower parts of natural levees. They have less sand than Bosket soils and are somewhat poorly drained. McCrory soils are on broad flats and on lower parts of natural levees. They are gray throughout and have a natric horizon. Patterson soils are in depressions on natural levees. They have a coarse-loamy control section.

Typical pedon of Bosket fine sandy loam, undulating, in a cultivated area, in SE1/4SW1/4SW1/4 sec. 36, T. 20 N., R. 2 E.:

Ap—0 to 8 inches; dark brown (10YR 3/3) fine sandy loam; weak medium granular structure; very friable; common fine roots; slightly acid; clear smooth boundary.

A3—8 to 14 inches; dark yellowish brown (10YR 3/4) fine sandy loam; weak medium subangular blocky structure; very friable; common fine roots; medium acid; clear smooth boundary.

B21t—14 to 26 inches; brown (7.5YR 4/4) fine sandy loam; moderate medium subangular blocky structure; friable; few fine roots; few fine pores; patchy distinct clay films on faces of peds; medium acid; clear wavy boundary.

B22t—26 to 44 inches; brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; firm; few fine roots; few fine pores; continuous distinct clay films on faces of peds; few dark brown and black stains; strongly acid; clear wavy boundary.

C1—44 to 58 inches; dark brown (7.5YR 4/4) fine sandy loam; massive; friable; medium acid; gradual wavy boundary.

C2—58 to 72 inches; yellowish brown (10YR 5/6) loamy fine sand; massive; very friable; medium acid.

The solum ranges from 30 inches to more than 50 inches in thickness. Reaction is slightly acid to strongly acid throughout.

The A horizon is 8 to 20 inches thick. Some pedons have an A3 horizon that has hue of 7.5YR, value of 4, and chroma of 4, or it has hue of 10YR, value of 3 or 4, and chroma of 4.

The B2t horizon has hue of 10YR, value of 5, and chroma of 3, 4, or 6; or hue of 7.5YR, value of 5, and chroma of 6; or hue of 7.5YR, value of 4, and chroma of 4. Texture is fine sandy loam, sandy clay loam, or clay loam.

The C horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 6 or 8 or has hue of 7.5YR, value of 4, and chroma of 4. It is fine sandy loam, sandy loam, or loamy fine sand.

Brocket series

The Brocket series consists of deep, well drained, moderately permeable, gently sloping to moderately sloping soils. These soils formed in loamy sediment over loamy residuum from sandstone bedrock. They are on hill crests and upper parts of side slopes of uplands. The native vegetation is hardwoods. Slope is 3 to 12 percent.

Brocket soils are geographically associated with Captina, Doniphan, and Gepp soils. Captina soils are on the lower parts of side slopes and have a fragipan. Doniphan soils are on hilltops and broad ridgetops at higher elevations. They are yellower than Brocket soils and have a clayey control section. Gepp soils are on hilltops and steeper side slopes at higher elevations. They are more than 60 percent clay in the control section.

Typical pedon of Brocket gravelly fine sandy loam, 3 to 8 percent slopes, in a moist pasture, NW1/4 sec. 15, T. 21 N., R. 2 E.:

Ap—0 to 6 inches; dark yellowish brown (10YR 4/4) gravelly fine sandy loam; moderate medium granular structure; friable; common fine roots; common medium pores; about 25 percent by volume rounded gravel; medium acid; abrupt wavy boundary.

B1—6 to 16 inches; strong brown (7.5YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable; common fine roots; common medium pores; about 10 percent by volume rounded gravel; strongly acid; clear wavy boundary.

B21t—16 to 30 inches; yellowish red (5YR 4/8) loam; moderate medium subangular blocky structure; firm; few fine roots; common medium and fine pores; thin patchy clay films on faces of peds; few particles of mica; strongly acid; clear wavy boundary.

B22t—30 to 58 inches; yellowish red (5YR 4/6) sandy clay loam; common medium distinct red (2.5YR 4/8) and yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm; few fine roots; few medium and fine pores; sand grains bridged by clay; medium clay films on most faces of peds; few pockets of uncoated sand grains; many particles of mica; few black stains; very strongly acid; clear wavy boundary.

B23t—58 to 72 inches; yellowish red (5YR 4/8) fine sandy loam; common medium prominent yellowish brown (10YR 5/4) and brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure; friable; few fine roots; few fine pores; common pockets and vertical streaks of uncoated sand grains; many sand grains coated and bridged by clay; clay films in voids and root channels and on some faces of peds; many particles of mica; about 5 percent by volume angular fragments of sandstone less than 3 inches in diameter; strongly acid.

The solum ranges from 60 to 90 inches in thickness. Reaction is slightly acid to very strongly acid in the A horizon and medium acid to very strongly acid in the B horizon.

The A horizon is 2 to 8 inches thick. The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. Where present, the A1 horizon has hue of 10YR, value of 4, and chroma of 2 to 4. Where present, the A2 horizon has hue of 10YR, value of 5, and chroma of 4 or 6.

The B1 horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 5, 6, or 8. The B2t horizon has hue of 7.5YR or 5YR, value of 5, and chroma of 6 or 8 or hue of 5YR or 2.5YR, value of 4, and chroma of 6 or 8. The B21t and B22t horizons are sandy clay loam or clay loam. The B23t horizon is fine sandy loam, sandy loam, or sandy clay loam. The B2t horizon has few to many mottles in shades of brown and yellow.

Broseley series

The Broseley series consists of deep, somewhat excessively drained, moderately rapidly permeable, undulating soils. These soils are on the higher parts of older natural levees along abandoned river channels. They formed in stratified loamy and sandy sediment. The native vegetation is hardwoods and an understory of vines and canes. Slope is 0 to 3 percent.

Broseley soils are geographically associated with Bosket, McCrory, and Patterson soils. Bosket soils are on lower adjacent natural levees. They have less sand in the B horizon than Broseley soils. McCrory soils are on broad flats and on lower parts of natural levees. They have a natric horizon. Patterson soils are in depressions of natural levees. They are more poorly drained than Broseley soils and have a coarse-loamy control section.

Typical pedon of Broseley loamy fine sand, undulating, in a moist cultivated area, in NW1/4NE1/4SW1/4 sec. 36, T. 20 N., R. 2 E.:

Ap—0 to 8 inches; brown (10YR 4/3) loamy fine sand; weak fine granular structure; very friable; common fine roots; medium acid; abrupt smooth boundary.

A2—8 to 26 inches; dark yellowish brown (10YR 3/4) loamy fine sand; weak medium subangular blocky structure; very friable; common fine roots; medium acid; clear wavy boundary.

B21t—26 to 34 inches; dark brown (7.5YR 4/4) sandy clay loam; moderate medium subangular blocky structure; friable; few fine roots; few fine pores; patchy distinct clay films on faces of peds; strongly acid; clear wavy boundary.

B22t—34 to 44 inches; dark brown (7.5YR 4/4) fine sandy loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; few old root channels; few fine pores; patchy distinct clay films on faces of peds; strongly acid; clear wavy boundary.

B3—44 to 60 inches; yellowish brown (10YR 5/6) loamy fine sand; weak medium subangular blocky structure; very friable; strongly acid; gradual wavy boundary.

C—60 to 72 inches; pale brown (10YR 6/3) loamy fine sand; massive; very friable; medium acid.

The solum ranges from 48 to more than 72 inches in thickness. Reaction is medium acid or strongly acid throughout, except where the surface layer has been limed.

The A horizon is 24 to 36 inches thick. It has hue of 10YR, value of 3, and chroma of 4 or value of 4 and chroma of 3.

The B2t horizon has hue of 10YR or 7.5YR, value of 4, and chroma of 4. It is fine sandy loam or sandy clay loam. The B3 horizon has hue of 10YR, value of 5, and chroma of 4, 6, and 8. It is loamy fine sand, sandy loam, or fine sandy loam. The B3 horizon is mottled in shades of brown.

Captina series

The Captina series consists of deep, moderately well drained, slowly permeable, gently sloping to moderately sloping soils. These soils formed in thin deposits of loess or old valley fill over loamy material weathered from cherty limestone. They are in valleys and on lower parts of hillsides. The native vegetation is hardwoods. Slope is 3 to 12 percent.

Captina soils are geographically associated with Brocket, Peridge, and Razort soils. Brocket soils are on hill crests and upper parts of side slopes. They are redder and have more sand throughout the B horizon than Captina soils. Peridge soils are on adjacent side slopes and terraces. They are redder throughout than Captina soils. Brocket and Peridge soils do not have a fragipan. Razort soils are on narrow flood plains parallel to small streams on uplands and have a fine loamy control section.

Typical pedon of Captina silt loam, 3 to 8 percent slopes, in a pasture, in NE1/4SE1/4NE1/4 sec. 26, T. 19 N., R. 1 W.:

Ap—0 to 4 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; very friable; common fine roots; slightly acid; abrupt wavy boundary.

B1—4 to 12 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable; common fine roots; few fine pores; medium acid; clear wavy boundary.

B2t—12 to 20 inches; strong brown (7.5YR 5/6) silt loam; moderate medium subangular blocky structure; firm; few fine roots; few fine pores; continuous distinct clay films on faces of peds; very strongly acid; clear wavy boundary.

Bx1—20 to 32 inches; yellowish brown (10YR 5/6) silt loam; common medium distinct gray (10YR 6/1) and few fine prominent strong brown mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm, 60 percent by volume brittle and compact; few light gray (10YR 7/1) silt coatings on faces of prisms; few fine roots in light gray streaks; continuous distinct clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bx2—32 to 46 inches; mottled yellowish brown (10YR 5/6) and gray (10YR 6/1) silt loam; common medium distinct yellowish brown (10YR 5/8) and few fine prominent yellowish red mottles; moderate medium prismatic structure parting to moderate subangular blocky; firm, brittle, 75 percent by volume brittle and compact; few fine roots in light gray streaks; common light gray (10YR 7/1) silt coatings on faces of prisms; continuous distinct clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bx3—46 to 58 inches; mottled yellowish brown (10YR 5/6), grayish brown (10YR 5/2), and yellowish red (5YR 5/8) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; firm, 75 percent by volume brittle and compact; few dark concretions; very strongly acid; clear wavy boundary.

C—58 to 72 inches; brown (7.5YR 4/4) silt loam; common medium distinct yellowish brown (10YR 5/6) and few fine distinct light gray mottles; weak medium subangular blocky structure; firm; few soft dark accretions; very strongly acid.

The solum ranges from 40 to 72 inches in thickness. Reaction is slightly acid to strongly acid in the A horizon and strongly acid or very strongly acid in the B horizon. Depth to the fragipan ranges from 16 to 30 inches.

The A horizon is 2 to 6 inches thick. The Ap horizon has hue of 10YR, value of 4, and chroma of 2 or 3.

The B1 and B2t horizons have hue of 10YR or 7.5YR, value of 5, and chroma of 6 or 8 or hue of 10YR, value of 5, and chroma of 4. The Bx horizon has hue of 10YR, value of 5, and chroma of 6 or 8. It is mottled in shades of red, brown, and gray.

Clarksville series

The Clarksville series consists of deep, somewhat excessively drained, moderately rapidly permeable, moderately sloping and moderately steep soils. These soils formed in residuum from cherty limestone. They are on high ridgetops and adjacent side slopes. The native vegetation is hardwoods. Slope is 8 to 20 percent.

Clarksville soils are geographically associated with Doniphan and Gepp soils. Doniphan soils are on broad ridgetops and plateaus. They have less chert throughout the B horizon and more clay in the control section than Clarksville soils. Gepp soils are on lower parts of steep hilltops and side slopes. They have less chert and more clay in the control section than Clarksville soils.

Typical pedon of Clarksville cherty silt loam, 12 to 20 percent slopes, in a moist pasture, in SE1/4SW1/4SW1/4 sec. 16, T. 19 N., R. 1 E.:

Ap—0 to 4 inches; brown (10YR 5/3) cherty silt loam; weak fine granular structure; very friable; common fine roots; 30 percent by volume fragments of chert; strongly acid; abrupt wavy boundary.

A2—4 to 16 inches; pale brown (10YR 6/3) cherty silt loam; weak medium subangular blocky structure; very friable; common fine roots; 30 percent by volume, fragments of chert; very strongly acid; clear wavy boundary.

B21t—16 to 26 inches; yellowish red (5YR 5/6) very cherty silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; few fine pores; few red oxide coatings around small chert fragments; 40 percent by volume fragments of chert; continuous distinct clay films on faces of peds; very strongly acid; clear wavy boundary.

B22t—26 to 40 inches; yellowish red (5YR 5/6) very cherty silty clay loam; common medium prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few fine pores; common red oxide coatings around small chert fragments; 50 percent by volume fragments of chert; continuous distinct clay films on faces of peds; very strongly acid; gradual wavy boundary.

B23t—40 to 52 inches; red (2.5YR 4/6) very cherty silty clay; common medium prominent yellowish brown (10YR 5/6) and yellowish red (5YR 5/6) mottles; moderate medium subangular blocky structure; firm; 50 percent by volume fragments of chert; continuous distinct clay films on faces of peds; very strongly acid; gradual wavy boundary.

B3—52 to 72 inches; mottled red (2.5YR 4/6) and yellowish brown (10YR 5/6) very cherty silty clay; weak medium subangular blocky structure; firm; common light gray (10YR 7/1) silt coatings on faces of peds; 60 percent by volume fragments of chert; very strongly acid.

The solum ranges from 60 inches to more than 90 inches in thickness. Reaction is very strongly acid throughout, except where the surface layer has been limed.

The A horizon is 10 to 24 inches thick. The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or value of 5 and chroma of 4. Where present, the A1 horizon has hue of 10YR, value of 5, and chroma of 2 or value of 6 and chroma of 3. The A2 horizon has hue of 10YR, value of 5, and chroma of 4, 6, or 8 or value of 6 and chroma of 3. Chert fragments less than 3 inches in diameter are 15 to 35 percent of the horizon.

The B1 horizon, present in some pedons, has hue of 10YR or 7.5YR, value of 5, and chroma of 5 or 6 or has hue of 5YR, value of 4 or 5, and chroma of 6 or 8. The B2t horizon has hue of 7.5YR or 5YR, value of 5, and chroma of 6 or 8; hue of 7.5YR, value of 4, and chroma of 4; or hue of 5YR or 2.5YR, value of 4, and chroma of 6 or 8. Texture is silt loam, silty clay loam, or silty clay. Chert fragments are 35 to 75 percent of the B2t horizon.

Some pedons have a C horizon that is 35 to 90 percent chert fragments.

Crowley series

The Crowley series consists of deep, somewhat poorly drained, very slowly permeable, level soils. These soils formed in a thin layer of silty sediment of alluvial origin and in the underlying clayey sediment. They are on broad flats at higher elevations than adjacent natural drainageways and abandoned backswamps. These soils are saturated with water for brief periods late in winter and early in spring. The native vegetation is hardwoods, mainly water-tolerant species of oak. Slope is 0 to 1 percent.

Crowley soils are geographically associated with Jackport, Kobel, and McCrory soils. Jackport soils are in abandoned backswamps. They have a very fine textured control section and do not have the abrupt textural change between the A and B horizon that Crowley soils have. Kobel soils are on flood plains of rivers and in backswamps. They have vertic properties and are nonacid. McCrory soils are on broad flats and the lower parts of natural levees. They are more poorly drained than Crowley soils and have a fine-loamy control section.

Typical pedon of Crowley silt loam, in a moist cultivated area, in SE1/4SE1/4SW1/4 sec. 33, T. 18 N., R. 2 E.:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam; weak medium granular structure; friable; few fine roots; strongly acid; clear smooth boundary.

A2g—6 to 16 inches; gray (10YR 6/1) silt loam; few medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few fine roots; few fine pores; common dark concretions; very strongly acid; abrupt smooth boundary.

B21tg—16 to 26 inches; grayish brown (10YR 5/2) silty clay; common fine prominent red mottles; moderate medium subangular blocky structure; firm; few fine roots; continuous distinct clay films on faces of peds; very strongly acid; clear wavy boundary.

B22tg—26 to 46 inches; grayish brown (10YR 5/2) silty clay; few fine prominent red mottles; moderate medium subangular blocky structure; firm; few fine roots; few old root channels; continuous distinct clay films on faces of peds; few soft black concretions; strongly acid; gradual wavy boundary.

B3g—46 to 60 inches; grayish brown (2.5Y 5/2) silty clay; few fine prominent yellowish red and yellowish brown mottles; weak medium subangular blocky structure; friable; many dark brown stains; common soft black concretions; medium acid.

The solum ranges from 40 to 72 inches or more in thickness. Reaction is slightly acid to very strongly acid throughout.

The A horizon is 12 to 22 inches thick. The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2. The A2g horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or value of 5 and chroma of 2. Mottles are in shades of brown or yellowish brown.

The B2t horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or value of 5 and chroma of 2. The B2t horizon is mottled in shades of yellowish red or red. The B3g horizon has hue of 10YR, value of 5 or 6, and chroma of 1; hue of 10YR, value of 6, and chroma of 2; or hue of 2.5Y or 5Y, value of 5, and chroma of 2. Texture of the B3g horizon is silty clay loam or silty clay.

Doniphan series

The Doniphan series consists of deep, well drained, moderately permeable, gently sloping to rolling soils. These soils formed in a thin layer of cherty, loamy material and in the underlying clayey material that weathered from siltstone, cherty limestone, and shale. They are on hilltops, broad ridgetops, plateaus, and the upper parts of hillsides. The native vegetation is hardwoods. Slope is 3 to 20 percent.

Doniphan soils are geographically associated with Brocket, Clarksville, Gepp, and Ventris soils. Brocket soils are on hilltops and side slopes at lower elevations than Doniphan soils. They have a fine-loamy control section. Clarksville soils are on ridgetops and adjacent side slopes at higher elevations. They have less clay and more coarse fragments throughout than Doniphan soils. Gepp soils are on steeper hilltops and side slopes. Their B horizon has more coarse fragments throughout and redder colors than Doniphan soils. Ventris soils are on the lower parts of hilltops, on side slopes, and on benches. They are not so well drained as Doniphan soils and are shallower to bedrock.

Typical pedon of Doniphan cherty silt loam, 3 to 8 percent slopes, in idle pasture, in NE1/4NW1/4SW1/4 sec. 28, T. 20 N., R. 2 W.:

A1—0 to 2 inches; dark grayish brown (10YR 4/2) cherty silt loam; weak fine granular structure; very friable; common fine roots; common wormholes and castings; about 25 percent by volume chert fragments; strongly acid; clear boundary.

A2—2 to 9 inches; yellowish brown (10YR 5/4) cherty silt loam; weak fine subangular blocky structure; friable; common fine roots; few wormholes and castings; about 25 percent by volume chert fragments; strongly acid; clear smooth boundary.

B1—9 to 16 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; firm; few medium and fine roots; few fine pores; continuous distinct clay films on faces of peds; about 10 percent by volume chert fragments; strongly acid; clear wavy boundary.

B21t—16 to 32 inches; strong brown (7.5YR 5/6) silty clay; common medium prominent yellowish brown (10YR 5/8), yellowish red (5YR 4/6), and pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; firm; few medium roots; continuous distinct clay films on faces of peds; very strongly acid; gradual wavy boundary.

B22t—32 to 47 inches; strong brown (7.5YR 5/6) clay; many medium distinct light gray (10YR 7/2) and many medium prominent red (2.5YR 4/8) mottles; weak medium subangular blocky structure; firm; few medium roots; continuous distinct clay films on faces of peds; few relict fragments of siltstone; very strongly acid; gradual wavy boundary.

B23t—47 to 72 inches; yellowish brown (10YR 5/8) clay; common medium distinct light gray (10YR 7/1) and few medium prominent red (2.5YR 4/8) mottles; weak medium subangular blocky structure; firm; patchy distinct clay films on faces of peds; common relict fragments of siltstone; very strongly acid.

The solum ranges from 60 to 80 inches in thickness. Reaction is slightly acid to very strongly acid in the A horizon and strongly acid to extremely acid in the B horizon.

The A horizon is 4 to 12 inches thick. The A1 horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. Where present, the Ap horizon has hue of 10YR, value of 4, and chroma of 3 or 4. The A2 horizon has hue of 10YR, value of 5, and chroma of 3 or 4 or value of 6 and chroma of 3.

The B21t and B22t horizons have hue of 5YR or 7.5YR, value of 5, and chroma of 6 or 8. The B23t horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 6 or 8. The B23t horizon is mottled in shades of gray and red. The B2t horizon is silty clay or clay.

Dundee series

The Dundee series consists of deep, somewhat poorly drained, moderately slowly permeable, level to nearly level soils. These soils formed in stratified beds of loamy alluvial sediment. They are on the lower parts of older natural levees along streams and abandoned river channels. The native vegetation is mainly bottomland water-tolerant hardwoods. Slope is 0 to 2 percent.

Dundee soils are geographically associated with Amagon, Bosket, Kobel, and Loring soils. Amagon soils are on the lower parts of old native levees and in shallow depressions along natural drainageways. They are more poorly drained than Dundee soils. Bosket soils are on higher and older natural levees. They have more sand in the B horizon than Dundee soils. Kobel soils are in backswamps and have a fine textured control section. Loring soils are on adjacent hillsides, hilltops, and terraces. They have a fragipan.

Typical pedon of Dundee silt loam, in a moist cultivated area, in SE1/4SE1/4SE1/4 sec. 13, T. 19 N., R. 1 E.:

Ap—0 to 4 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; few fine roots; medium acid; abrupt smooth boundary.

B21tg—4 to 16 inches; grayish brown (10YR 5/2) silt loam; common medium distinct dark yellowish brown (10YR 4/4) and few medium distinct gray (10YR 6/1) mottles; weak medium subangular blocky structure; friable; few fine roots; few fine pores; patchy distinct clay films on faces of peds; strongly acid; clear wavy boundary.

B22tg—16 to 28 inches; grayish brown (10YR 5/2) silt loam; common medium distinct yellowish brown (10YR 5/4) and gray (10YR 6/1) mottles; moderate medium subangular blocky structure; firm; few fine pores; patchy distinct clay films on faces of peds; few dark accretions and concretions; very strongly acid; clear wavy boundary.

B3g—28 to 40 inches; light brownish gray (10YR 6/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6) and gray (10YR 6/1) mottles; weak medium subangular blocky structure; friable; few fine pores; common dark accretions and concretions; medium acid; gradual wavy boundary.

IIC1g—40 to 56 inches; light brownish gray (10YR 6/2) silty clay; many medium distinct yellowish brown (10YR 5/4) and few medium distinct gray (10YR 6/1) mottles; firm; few fine pores; many dark accretions and concretions; medium acid; gradual wavy boundary.

IIC2g—56 to 72 inches; light brownish gray (10YR 6/2) silt loam, common medium distinct yellowish brown (10YR 5/6) and few medium distinct gray (10YR 6/1) mottles; massive; firm; few dark accretions; slightly acid.

The solum ranges from 24 to 42 inches in thickness. Reaction is medium acid to very strongly acid throughout the A and B horizons and neutral to very strongly acid in the C horizon.

The A horizon is 4 to 8 inches thick. The Ap horizon has hue of 10YR, value of 4, and chroma of 2 or 3.

The B2t horizon has hue of 2.5Y or 10YR, value of 5, and chroma of 2 or hue of 10YR, value of 4, and chroma of 2. The B3 horizon has hue of 10YR, value of 6, and chroma of 1 or 2 or value of 5 and chroma of 2. The B horizon is mottled in shades of brown or gray. It is silt loam, loam, or silty clay loam.

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

Gepp series

The Gepp series consists of deep, well drained, moderately permeable, and moderately sloping to steep soils. These soils formed in a thin layer of cherty, loamy material and in the underlying clayey material weathered from cherty limestone or limestone and clayey shale. They are on hilltops, narrow ridges, and hillsides. The native vegetation is hardwoods. Slope is 8 to 30 percent.

Gepp soils are geographically associated with Brocket, Clarksville, Doniphan, and Ventris soils. Brocket soils are on hilltops and side slopes at lower elevations than Gepp soils. They have a fine-loamy control section. Clarksville soils are on tops and sides of ridges at higher elevations. They have less clay and more coarse fragments in the B horizon than the Gepp soils. Doniphan soils are on broad ridgetops and plateaus. Their B horizon has fewer coarse fragments throughout and yellower colors than Gepp soils. Ventris soils are on lower parts of hilltops, side slopes, and benches and are more poorly drained and are shallower to bedrock than Gepp soils.

Typical pedon of Gepp very cherty silt loam, 12 to 20 percent slopes, in a moist wooded area, in SE1/4SE1/4SW1/4 sec. 11, T. 21 N., R. 3 W.:

O1—1/2 inch to 0; partly decomposed organic matter.

A1—0 to 1 inch; dark grayish brown (10YR 4/2) very cherty silt loam; weak fine granular structure; very friable; common fine and medium roots; few wormholes and castings; about 50 percent by volume chert fragments; medium acid; abrupt smooth boundary.

A2—1 to 7 inches; yellowish brown (10YR 5/4) very cherty silt loam; weak medium subangular blocky structure; friable; common fine and medium roots; few fine pores; few wormholes; 40 percent by volume chert fragments; strongly acid; clear wavy boundary.

B1—7 to 13 inches; yellowish red (5YR 5/8) silty clay loam; weak medium subangular blocky structure; friable; some mixing of yellowish brown material from above horizon; few fine and medium roots; few fine pores; about 10 percent by volume chert fragments 1/8 inch to 3 inches in diameter; strongly acid; clear smooth boundary.

B21t—13 to 28 inches; red (2.5YR 4/8) clay; moderate to strong medium subangular blocky structure parting to strong fine angular blocky; very firm; few fine roots; few fine pores; continuous thin clay films on faces of peds; less than 5 percent by volume chert fragments; very strongly acid; clear smooth boundary.

B22t—28 to 53 inches; red (2.5YR 4/8) clay; common medium distinct strong brown (7.5YR 5/8) mottles; moderate to strong medium subangular blocky structure parting to strong fine angular blocky; very firm; few medium roots; few pores lined with clay films; continuous thin clay films on faces of peds; about 5 percent by volume fragments of chert 1/2 inch to 3 inches in diameter; strongly acid; gradual smooth boundary.

B23t—53 to 72 inches; yellowish red (5YR 4/8) clay; common medium prominent strong brown (7.5YR 5/8) and red (10R 4/6) mottles and few fine prominent light gray mottles; moderate to strong coarse subangular blocky structure parting to strong fine angular blocky; very firm; continuous thin clay films; 10 percent by volume fragments of chert and siltstone as much as 3 inches in diameter; strongly acid.

The solum ranges from 60 inches to more than 80 inches in thickness. Reaction is medium acid or strongly acid in the A horizon and lower part of the B horizon and strongly acid or very strongly acid in the upper part of the B horizon.

The A horizon is 4 to 10 inches thick. The A1 horizon has hue of 10YR, value of 3 or 4, and chroma of 2. The A2 horizon has hue of 10YR, value of 5, and chroma of 2 to 4. The content of chert fragments less than 3 inches in diameter ranges from 25 to 50 percent.

The B2t horizon has hue of 2.5YR or 5YR, value of 4, and chroma of 6 or 8. The lower part of the B2t horizon is mottled in shades of brown or gray. The content of chert or siltstone fragments less than 3 inches in diameter ranges from 0 to 10 percent.

Hontas series

The Hontas series consists of deep, moderately well drained, moderately permeable, level soils. These soils formed in loamy alluvial sediment washed from soils derived from predominantly cherty limestone material. They are on flood plains of creeks and rivers. These soils flood frequently and are saturated by water for brief periods late in winter and early in spring. The native vegetation is hardwoods. Slope is 0 to 1 percent.

Hontas soils are geographically associated with Ashton and Razort soils. Ashton soils are in long, narrow strips along major streams. They are well drained and have a mollic epipedon. Razort soils are on narrow flood plains and are parallel to small upland streams. They have a fine-loamy control section and are well drained.

Typical pedon of Hontas silt loam, frequently flooded, in a moist cultivated area, in NW1/4NW1/4SE1/4 sec. 16, T. 20 N., R. 1 E.:

Ap—0 to 6 inches; brown (10YR 4/3) silt loam; weak fine granular structure; friable; common fine roots; slightly acid; abrupt wavy boundary.

B21—6 to 14 inches; dark yellowish brown (10YR 4/4) silt loam; few fine distinct grayish brown mottles; weak medium subangular blocky structure; friable; few fine roots; few fine pores; few dark brown stains; slightly acid; clear wavy boundary.

B22—14 to 30 inches; yellowish brown (10YR 5/4) silt loam; common medium distinct dark yellowish brown (10YR 4/4) and grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; friable; few fine roots; few fine pores; few black concretions; few dark brown stains; slightly acid; gradual wavy boundary.

C1—30 to 42 inches; grayish brown (10YR 5/2) silt loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; massive; friable; few fine pores; common fine black concretions; common dark brown and black stains; slightly acid; gradual wavy boundary.

C2—42 to 56 inches; gray (10YR 5/1) silty clay loam; common medium distinct dark yellowish brown (10YR 4/4) and gray (10YR 6/1) mottles; massive; firm; few fine black concretions; few dark brown stains; slightly acid; gradual wavy boundary.

C3—56 to 72 inches; gray (10YR 6/1) silty clay loam; common medium distinct yellowish brown (10YR 5/4) mottles; massive; firm; few fine pores; few dark brown stains; slightly acid.

The solum ranges from 30 to about 50 inches in thickness. Reaction is medium acid to mildly alkaline throughout.

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

The B horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam or silty clay loam and is mottled in shades of brown and gray.

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

Jackport series

The Jackport series consists of deep, poorly drained, very slowly permeable, level soils. These soils formed in clayey sediment. They are in abandoned backswamps of former streams. These soils are saturated for brief periods late in winter and in spring. The native vegetation is hardwoods, mainly water-tolerant oaks. Slope is 0 to 1 percent.

Jackport soils are geographically associated with Crowley and Kobel soils. Crowley soils are on broad flats at higher elevations than Jackport soils. They have an abrupt textural change between the A and B horizons. Kobel soils are on flood plains of rivers and in backswamps. They have a fine control section and are nonacid.

Typical pedon of Jackport silty clay loam, in a moist cultivated area, in NE1/4NE1/4NE1/4 sec. 13, T. 18 N., R. 2 E.:

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) silty clay loam; common medium distinct gray (10YR 5/1) mottles; weak medium subangular blocky structure; firm; few fine roots; medium acid; abrupt smooth boundary.

A2g—5 to 12 inches; gray (10YR 5/1) silty clay loam; common medium faint gray (10YR 6/1) mottles; common red and strong brown stains from plant materials; weak medium subangular blocky structure; firm; common fine roots; many black accretions; medium acid; clear smooth boundary.

B21tg—12 to 17 inches; dark grayish brown (10YR 4/2) silty clay; moderate medium subangular blocky structure; very firm; few fine roots; yellowish red and brown stains around root channels; thin patchy clay films on many faces of peds; common pressure faces; few fine black accretions; very strongly acid; clear smooth boundary.

B22tg—17 to 48 inches; grayish brown (10YR 5/2) clay; few medium distinct yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; very firm; few fine roots; brown stains in root channels; thin patchy clay films on many faces of peds; few slickensides; common pressure faces; very strongly acid; clear wavy boundary.

B3g—48 to 58 inches; olive gray (5Y 5/2) silty clay; weak medium subangular blocky structure; very firm; few roots; common black and brown stains around accretions; very strongly acid; clear wavy boundary.

Cg—58 to 72 inches; olive gray (5Y 5/2) silty clay loam; common medium distinct brown (10YR 4/3) and gray (10YR 6/1) mottles; moderate medium subangular blocky structure; very firm; few black stains; few fine pores; mildly alkaline.

The solum ranges from 40 to 60 inches in thickness. Reaction is medium acid to very strongly acid in the A horizon, strongly acid or very strongly acid in the B horizon, and mildly alkaline to slightly acid in the C horizon.

The A horizon is 4 to 14 inches thick. The Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 2. Where present, the A2g horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or value of 6 and chroma of 2. It is mottled in shades of gray.

The B horizon has hue of 10YR, 2.5Y, or 5Y, value of 5, and chroma of 2 or hue of 10YR, value of 4, and chroma of 2. The B2tg and B3g horizons are silty clay or clay.

The C horizon has hue of 10YR, 2.5Y, or 5Y, value of 5, and chroma of 2. It is silt loam or silty clay loam.

Kobel series

The Kobel series consists of deep, poorly drained, very slowly permeable, level soils. These soils formed in clayey alluvium on flood plains of rivers and in backswamps. They are saturated by water late in winter and early in spring. The native vegetation is hardwoods—mainly water-tolerant species (fig. 12). Slope is 0 to 1 percent.

Kobel soils are geographically associated with Amagon, Crowley, Dundee, and Jackport soils. Amagon soils are on broad flats on the lower parts of old natural levees. They have a fine-silty control section that is more acid than Kobel soils. Crowley soils are on broad flats at higher elevations than Kobel soils. They have an argillic horizon and an abrupt textural change between the A and B horizons. Dundee soils are on the lower parts of older natural levees that border abandoned stream channels. They are better drained than Kobel soils and have a fine-silty control section. Jackport soils are in abandoned backswamps. They have an argillic horizon and a very fine control section.

Typical pedon of Kobel silty clay loam in a moist cultivated area, in NE1/4SW1/4SE1/4 sec. 27, T. 19 N., R. 2 E.:

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) silty clay loam; weak fine granular structure; friable; common fine roots; common pores; medium acid; abrupt smooth boundary.

A12—6 to 10 inches; gray (10YR 5/1) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; common fine roots; few fine pores; many brown stains; many dark concretions; slightly acid; clear wavy boundary.

B21g—10 to 24 inches; gray (10YR 5/1) silty clay; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; very firm; many fine roots; few pressure faces; few slickensides; few vertical cracks 1/2 inch to 1 inch wide; neutral; gradual wavy boundary.

B22g—24 to 36 inches; gray (10YR 5/1) silty clay; common medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; very firm; few fine roots; few slickensides; mildly alkaline; gradual wavy boundary.

C1g—36 to 46 inches; gray (10YR 6/1) silty clay; common medium prominent gray (N 5/0) and distinct strong brown (7.5YR 5/6) mottles; massive; very firm; few brown stains; few dark accretions; mildly alkaline; gradual wavy boundary.

C2g—46 to 72 inches; gray (10YR 5/1) silty clay; common medium distinct strong brown (7.5YR 5/6) mottles; massive; very firm; many dark stains; mildly alkaline.

The solum ranges from 30 to 60 inches in thickness. Reaction is neutral to strongly acid in the A horizon and moderately alkaline to slightly acid in the B and C horizons.

The A horizon is 4 to 12 inches thick. Where it has value of 3 it is less than 10 inches thick. The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2. Where present, the A11 horizon has hue of 10YR, value of 3, and chroma of 1.

The Bg horizon has hue of 10YR, value of 4 or 5, and chroma of 1. It is silty clay loam, silty clay, or clay and is mottled in shades of brown.

The C horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or hue of N, value of 5, and chroma of 0. It is clay loam, silty clay, or clay and is mottled in shades of gray or brown.

Loring series

The Loring series consists of deep, moderately well drained, moderately slowly permeable, gently sloping to moderately sloping soils. These soils formed in loamy loessal material. They are on hilltops, hillsides, and terraces on uplands adjacent to the bottom lands. The native vegetation is hardwoods. Slope is 3 to 12 percent.

Loring soils are geographically associated with Amagon and Dundee soils. Amagon and Dundee soils are on lower parts of old natural levees on the bottom lands. They do not have a fragipan. Amagon soils are more poorly drained than Loring soils and are dominantly gray in the B horizon. Dundee soils are more poorly drained and are grayer in the argillic horizon than Loring soils. Both Amagon and Dundee soils do not have a fragipan.

Typical pedon of Loring silt loam, 8 to 12 percent slopes, in an idle pasture, in SE1/4SE1/4SW1/4 sec. 32, T. 19 N., R. 1 E.:

Ap—0 to 4 inches; yellowish brown (10YR 5/4) silt loam; weak fine granular structure; very friable; many medium and fine roots; very strongly acid; abrupt smooth boundary.

B1—4 to 8 inches; strong brown (7.5YR 5/6) silt loam; weak medium subangular blocky structure; very friable; common medium and fine roots; very strongly acid; clear wavy boundary.

B21t—8 to 14 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; common medium and fine roots; continuous distinct clay films on faces of peds; very strongly acid; clear wavy boundary.

B22t—14 to 24 inches; yellowish brown (10YR 5/6) silty clay loam; few medium distinct brown (10YR 5/3) mottles; moderate medium subangular blocky structure; firm; few medium and fine roots; continuous distinct clay films on faces of peds; very strongly acid; clear wavy boundary.

Bx1—24 to 40 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct brown (7.5YR 5/4) and gray (10YR 6/1) mottles; moderate coarse prismatic structure parting to moderate medium subangular blocky; firm, 70 percent by volume brittle and compact; few fine roots in vertical cracks between prisms; patchy distinct clay films on faces of peds; few dark brown concretions; very strongly acid; gradual boundary.

Bx2—40 to 56 inches; strong brown (7.5YR 5/6) silt loam; many coarse distinct gray (10YR 6/1) and common medium distinct yellowish brown (10YR 5/4) and brownish yellow (10YR 6/8) mottles; moderate coarse prismatic structure parting to moderate medium subangular blocky; very firm, 70 percent by volume brittle and compact; few fine roots; patchy distinct clay films on faces of peds; few trellis-shaped black stains on faces of prisms; few dark brown concretions; very strongly acid; gradual wavy boundary.

Bx3—56 to 72 inches; brown (7.5YR 5/4) silt loam; many medium distinct gray (10YR 6/1) and common medium distinct yellowish brown (10YR 5/6) mottles; moderate coarse prismatic structure parting to moderate medium subangular blocky; very firm, 80 percent by volume brittle and compact; few fine roots; patchy distinct clay films on faces of peds; few trellis-shaped black stains on faces of prisms; medium acid.

The solum ranges from 45 inches to more than 72 inches in thickness. Reaction is medium acid to very strongly acid throughout. Depth to the fragipan ranges from 22 to 35 inches.

The A horizon is 2 to 9 inches thick. The Ap horizon has hue of 10YR, value of 5, and chroma of 4 or value of 4 and chroma of 3.

The B horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 4 or 6. It is silt loam or silty clay loam. The Bx horizon is mottled in shades of yellow, brown, and gray.

McCrory series

The McCrory series consists of deep, poorly drained, moderately slowly permeable, level soils. These soils formed in beds of loamy alluvial sediment. They are on broad flats and on lower parts of natural levees. These soils are saturated for brief periods late in winter and early in spring. The native vegetation is hardwoods, mainly water-tolerant species. Slope is 0 to 1 percent.

McCrory soils are geographically associated with Bosket, Broseley, Crowley, and Patterson soils. These associated soils do not have a natric horizon. Bosket soils are on higher and older natural levees. They are browner throughout than McCrory soils and have a mollic epipedon. Broseley soils are on the higher part of older natural levees along abandoned river channels. They have more sand throughout than McCrory soils. Crowley soils are on broad flats at higher elevations. They have a fine control section. Patterson soils are in depressions on natural levees. They are better drained than McCrory soils and have a coarse-loamy control section.

Typical pedon of McCrory fine sandy loam, in a cultivated area, in NW1/4SE1/4NE1/4 sec. 3, T. 18 N., R. 1 E.:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable; few roots; few dark concretions; strongly acid; abrupt smooth boundary.

A21g—8 to 14 inches; grayish brown (10YR 5/2) fine sandy loam; few medium distinct brown (10YR 4/3) mottles; weak medium subangular blocky structure; very friable; few fine roots; common fine pores; strongly acid; clear smooth boundary.

A22g—14 to 19 inches; gray (10YR 5/1) fine sandy loam; few medium distinct yellowish brown (10YR 5/6) and brown (10YR 4/3) mottles; weak medium subangular blocky structure; friable; few fine roots; common fine pores; few dark concretions; medium acid; clear wavy boundary.

B21tg—19 to 28 inches; gray (10YR 6/1) sandy clay loam; common medium distinct yellowish brown (10YR 5/8) and grayish brown (10YR 5/2) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; few fine pores; light gray interfingering and coatings on faces of prisms; patchy distinct clay films and uncoated sand grains on faces of some peds; neutral; clear wavy boundary.

B22tg—28 to 36 inches; gray (10YR 5/1) sandy clay loam; common medium distinct yellowish brown (10YR 5/8) and few medium faint dark grayish brown (10YR 4/2) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; patchy distinct clay films and uncoated sand grains between peds; neutral; clear wavy boundary.

B3g—36 to 49 inches; gray (10YR 6/1) fine sandy loam; common medium distinct grayish brown (10YR 5/2) mottles; weak coarse prismatic structure parting to weak medium subangular blocky; friable; few thick clay films on faces of prisms; mildly alkaline; clear smooth boundary.

Cg—49 to 72 inches; gray (10YR 6/1) loamy fine sand; massive; very friable; moderately alkaline.

The solum ranges from 35 to 55 inches in thickness. Reaction is neutral to very strongly acid in the A horizon, neutral to strongly acid in the B21 horizon, and moderately alkaline to neutral in the lower part of the B horizon and in the C horizon.

The A horizon is 6 to 20 inches thick. The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2. The A2 horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or value of 5 and chroma of 2. It is mottled in shades of brown.

The B horizon has hue of 10YR, value of 4 to 6, and chroma of 1. It is fine sandy loam or sandy clay loam and is mottled in shades of brown.

The C horizon has hue of 10YR, value of 4 to 6, and chroma of 1. It is loamy fine sand or fine sandy loam and is mottled in shades of brown.

Patterson series

The Patterson series consists of deep, somewhat poorly drained, moderately rapidly permeable, level soils. These soils formed in beds of loamy, alluvial sediment. They are in depressions of natural levees. These soils are saturated for brief periods late in winter and early in spring. The native vegetation is hardwoods. Slope is 0 to 1 percent.

Patterson soils are geographically associated with Bosket, Broseley, and McCrory soils. Bosket soils are on higher and older natural levees. They have a mollic epipedon and a fine loamy control section. Broseley soils are on the higher parts of older natural levees along abandoned river channels. They have a browner control section that contains more clay than Patterson soils. McCrory soils are on broad flats and the lower parts of natural levees. They have a natric horizon in the lower part of the B horizon.

Typical pedon of Patterson fine sandy loam, in a cultivated area, in NW1/4NW1/4NW1/4 sec. 35, T. 18 N., R. 1 E.:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak medium granular structure; very friable; many fine roots; strongly acid; clear smooth boundary.

A2—8 to 14 inches; dark grayish brown (10YR 4/2) fine sandy loam; common medium distinct grayish brown (10YR 5/2) mottles; weak fine subangular blocky structure; very friable; common fine roots; very strongly acid; clear wavy boundary.

B21tg—14 to 26 inches; grayish brown (10YR 5/2) fine sandy loam; few fine distinct light brownish gray (10YR 5/2) mottles; moderate medium subangular blocky structure; friable; few fine roots; sand grains bridged and coated; very strongly acid; clear wavy boundary.

B22tg—26 to 34 inches; grayish brown (10YR 5/2) sandy loam; common medium distinct gray (10YR 6/1) mottles; weak medium subangular blocky structure; friable; sand grains bridged and coated; very strongly acid; gradual wavy boundary.

C1g—34 to 50 inches; gray (10YR 6/1) loamy fine sand; massive; very friable; very strongly acid; gradual wavy boundary.

C2g—50 to 72 inches; light brownish gray (10YR 6/2) loamy sand; common medium distinct light gray (10YR 7/1) and yellowish brown (10YR 5/4) mottles; massive; very friable; common brown stains; very strongly acid.

The solum ranges from 30 to 50 inches in thickness. Reaction is medium acid to very strongly acid in the A horizon and strongly acid or very strongly acid in the B and C horizons.

The A horizon is 6 to 10 inches thick. It has hue of 10YR, value of 4, and chroma of 2 or 3 or value of 5 and chroma of 3. The A2 horizon is mottled in shades of brown.

The B horizon has hue of 10YR, value of 4 or 5, and chroma of 2. It is sandy loam or fine sandy loam and is mottled in shades of gray or brown.

The C horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. It is loamy sand or loamy fine sand. It is mottled in shades of gray or brown.

Peridge series

The Peridge series consists of deep, well drained, moderately permeable, gently sloping soils. These soils formed in thick beds of loamy and clayey, alluvial sediment derived from chert and limestone. They are on old stream terraces of uplands. The native vegetation is mixed hardwoods. Slope is 3 to 8 percent.

Peridge soils are geographically associated with Arkana, Ashton, Captina, and Razort soils. Arkana soils are on side slopes and benches. They have a very fine control section. Ashton soils are in long narrow strips along major streams. They have a mollic epipedon. Captina soils are on lower parts of side slopes. They have a fragipan. Razort soils are on narrow flood plains and are parallel to small upland streams. They have a fine-loamy control section.

Typical pedon of Peridge silt loam, 3 to 8 percent slopes, in a pasture, in SE1/4SW1/4NE1/4 sec. 28, T. 20 N., R. 1 W.:

Ap—0 to 5 inches; brown (10YR 4/3) silt loam; few small peds of yellowish red (5YR 5/8) B2t material; weak medium subangular blocky structure; friable; common fine roots; few wormholes and casts; strongly acid; abrupt smooth boundary.

B21t—5 to 24 inches; yellowish red (5YR 4/6) silty clay loam; moderate medium subangular blocky structure; friable; continuous distinct clay films on faces of peds and in pores; few fine dark concretions; 3 percent by volume fragments of chert 1/2 inch to 1 inch in diameter; few organic-matter stains on faces of peds; very strongly acid; gradual wavy boundary.

B22t—24 to 36 inches; yellowish red (5YR 4/6) silty clay loam; few fine yellowish brown (10YR 5/6) mottles; moderate medium angular blocky structure; friable; few fine roots; few fine pores; continuous distinct clay films on faces of peds; few fine black concretions; few faint brown silt coatings on peds; few worm channels; 3 percent by volume fragments of chert; very strongly acid; gradual wavy boundary.

B23t—36 to 48 inches; red (2.5YR 4/6) silty clay loam; few medium distinct yellowish red (5YR 4/6) mottles; strong medium subangular blocky structure; friable; few fine roots; few fine pores; broken prominent clay films on faces of larger peds; few distinct pale brown (10YR 6/3) silt coatings on faces of peds; few organic-matter stains on faces of peds; very strongly acid; clear wavy boundary.

B24t—48 to 61 inches; yellowish red (5YR 5/6) silty clay loam; few medium prominent red (2.5YR 4/6) mottles; moderate medium blocky structure parting to fine blocky; friable; few fine pores; continuous distinct clay films on faces of peds; and few distinct gray (10YR 6/1) silty clay fills between cracks; few old wormholes and root channels; silt coatings on vertical peds; 5 percent by volume fragments of chert; common black stains on faces of peds; very strongly acid; clear wavy boundary.

B25t—61 to 72 inches; yellowish red (5YR 5/6) silty clay loam; few medium distinct strong brown (7.5YR 5/6) and red (2.5YR 4/6) mottles and coatings on faces of peds; strong medium angular blocky structure parting to fine angular blocky; continuous distinct clay films; common distinct gray (10YR 6/1) clay fills in cracks; few pores; very strongly acid.

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

The A horizon is 4 to 10 inches thick. The Ap horizon has hue of 10YR, value of 4, and chroma of 2 or 3.

The B2t horizon has hue of 2.5YR or 5YR, value of 4, and chroma of 6 to 8. It is mottled in shades of red and brown.

Razort series

The Razort series consists of deep, well drained, moderately permeable, level to nearly level soils. These soils formed in loamy alluvium over nonconforming residuum of various kinds of rock. They are on narrow flood plains and are parallel to small upland streams. The native vegetation is bottom-land hardwoods with an understory of vines and canes. Slope is 0 to 3 percent.

Razort soils are geographically associated with Captina, Hontas, and Peridge soils. Captina soils are on uplands above the adjacent Razort soils. They are not so well drained as Razort soils, and they have a fragipan. Hontas soils are on wider parts of flood plains of creeks and rivers. They are not so well drained as

Razort soils, and they have a fine-silty control section. Peridge soils are on adjacent terraces. They have a redder B horizon than Razort soils and a fine-silty control section.

Typical pedon of Razort silt loam, frequently flooded, in a moist meadow, in SW1/4NE1/4SW1/4 sec. 18, T. 19 N., R. 2 W.:

Ap—0 to 8 inches; dark brown (10YR 3/3) silt loam; weak fine granular structure; friable; common fine roots; about 5 percent by volume fragments; chert; neutral; abrupt smooth boundary.

B1—8 to 12 inches; brown (10YR 4/3) silt loam; weak medium subangular blocky structure; friable; common fine roots; few fine pores; about 5 percent by volume fragments of chert; slightly acid; clear smooth boundary.

B21t—12 to 22 inches; brown (10YR 4/3) loam; moderate medium subangular blocky structure; friable; few fine roots; few fine pores; patchy distinct clay films on faces of peds; slightly acid; clear wavy boundary.

B22t—22 to 36 inches; dark brown (10YR 3/3) clay loam; moderate medium subangular blocky structure; friable; patchy distinct clay films on faces of peds; slightly acid; gradual wavy boundary.

B23t—36 to 46 inches; dark brown (10YR 4/3) loam; common medium distinct dark grayish brown (10YR 4/2) mottles; weak medium subangular blocky structure; friable; few fine roots; few fine pores; patchy distinct clay films on faces of peds; less than 5 percent by volume fine mica particles on ped exteriors; slightly acid; gradual wavy boundary.

IIC—46 to 54 inches; dark brown (10YR 4/3) very cherty silty clay loam; common medium distinct dark grayish brown (10YR 4/2) mottles; massive; firm; about 40 percent by volume fragments of angular chert and rounded gravel less than 1/2 inch in diameter; slightly acid; gradual wavy boundary.

IIC2—54 to 66 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam; common medium distinct dark gray (10YR 4/1) mottles; massive; firm; about 30 percent by volume angular and rounded gravel less than 1/2 inch in diameter; slightly acid.

The solum ranges from 38 to 70 inches in thickness. Reaction is neutral to slightly acid in the A horizon and slightly acid or medium acid in the B and C horizons.

The A horizon is 6 to 10 inches thick. It hue hue of 10YR, value of 3, and chroma of 3 or 4.

The B2t horizon has hue of 10YR. It has value of 3 or 4 and chroma of 3; value of 5 and chroma of 3; or value of 4 and chroma of 4. Texture is silt loam, loam, or clay loam.

The IIC horizon has hue of 10YR. It has value of 5 or 6 and chroma of 1; value of 4 to 6 and chroma of 2; or value of 4 or 5 and chroma of 3 or 4. Texture is sandy loam, fine sandy loam, silt loam, clay loam, or silty clay loam or gravelly, very gravelly, cherty, or very cherty analogs of these textures.

Ventris series

The Ventris series consists of moderately deep, moderately well drained, very slowly permeable, gently sloping to moderately sloping soils. These soils formed in clayey material derived from limestone or mixed limestone and calcareous shale. They are on lower parts of hilltops, on side slopes, and on benches. The native vegetation is mainly poor quality upland oak and a few redcedar. Slope is 3 to 30 percent.

Ventris soils are geographically associated with Arkana, Doniphan, and Gepp soils. Arkana soils are on side slopes and benches. They are better drained than Ventris soils and have a mollic epipedon. Doniphan soils are on broad ridgetops and plateaus, are deeper to bedrock and are better drained than Ventris soils. Gepp soils are on steeper hilltops and side slopes. They are better drained and deeper to bedrock than Ventris soils.

Typical pedon of Ventris silt loam, in an area of Ventris-Rock outcrop complex, 3 to 12 percent slopes, in a wooded area, in NW1/4NE1/4NW1/4 sec. 26, T. 19 N., R. 2 W.:

A1—0 to 5 inches; very dark grayish brown (10YR 3/2) silt loam, weak fine subangular blocky structure; friable; common wormholes and castings; many fine roots; about 10 percent by volume chert fragments as much as 6 inches in diameter; slightly acid; clear smooth boundary.

B21t—5 to 14 inches; light olive brown (2.5Y 5/4) silty clay; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure parting to weak fine angular blocky; firm; common fine roots; continuous distinct clay films on faces of peds; few wormholes; few dark concretions; few small chert fragments; neutral; gradual wavy boundary.

B22t—14 to 32 inches; yellowish brown (10YR 5/6) clay; common fine prominent light olive brown (2.5Y 5/4) and common medium distinct gray (10YR 6/1) mottles; moderate medium subangular blocky structure; very firm; few fine roots; few slickensides; few fine dark concretions; few chert and limestone fragments less than 1 inch in diameter; mildly alkaline; abrupt irregular boundary.

R—32 inches; limestone bedrock.

The solum ranges from 24 to 40 inches in thickness. Reaction is neutral to medium acid in the A horizon and mildly alkaline to slightly acid in the B horizon.

The A horizon is 4 to 10 inches thick. The A1 horizon has hue of 10YR, value of 3, and chroma of 2 or 3. Where present, the A2 horizon has hue of 10YR, value of 5, and chroma of 2 or 3. It is silt loam or silty clay loam. The A horizon is 0 to 15 percent chert or flat limestone fragments less than 6 inches in length.

The B2t horizon has hue of 10YR or 2.5Y, value of 5, and chroma of 4 or 6. It is silty clay or clay and is mottled in shades of gray and brown.

Classification of the soils

The system of soil classification used was by the National Cooperative Soil Survey has six categories (*7*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In this system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 18, the soils of the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

ORDER. Ten soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aqualf (*Aqu*, meaning water, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Ochraqualfs (*Ochr*, meaning pale horizon, plus *aqualf*, the suborder of Alfisols that have an aquic moisture regime).

SUBGROUP. Each great group may be divided into three kinds of subgroup: the central (typic) concept of the great group, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are 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 is thought to typify the great group. An example is Typic Ochraqualf.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is fine-silty, mixed, thermic, Typic Ochraqualfs.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition.

Formation of the soils

In this section the factors that affect soil formation in Randolph County and the processes of horizon differentiation are discussed.

Factors of soil formation

Soil is formed by weathering and other soil-forming processes that act upon the materials deposited or accumulated by geologic agencies. The characteristics of the soil at any given point depend upon climate, living organisms, parent material, relief, and time. Each factor acts on the soil and modifies the effect of the other four. When climate, living organisms, or any other one of the five soil-forming factors is varied significantly, a different soil may form (*4*).

Climate and living organisms are the active forces in soil formation. They act on parent material, slowly changing it into soil. Relief modifies the effects of climate and living organisms, mainly by its influence on temperature and runoff. Because climate, vegetation, parent material, and relief interact over a period of time, time is needed to change parent material into a soil.

The interaction of the five factors of soil formation is more complex for some soils than for others. The five factors and how they interact to form some of the soils in the county are discussed in the following paragraphs.

Climate

The climate of Randolph County is characterized by mild winters, warm or hot summers, and generally abundant rainfall. The generally warm temperatures and high precipitation probably are similar to the climate under which the soils in the county formed. The average temperature at Pocahontas in July is about 80 degrees, and in January is about 37 degrees. In the Ozark Highlands, temperatures are generally a few degrees cooler. The total annual rainfall is about 47 inches and is well distributed throughout the year. For additional information about the climate, refer to the section "General nature of the county."

The warm, moist climate promotes rapid soil formation. The warm temperature permits rapid chemical reactions; and abundant rainfall makes a large amount of water available for moving dissolved or suspended material downward in the profile. As a result, the remains of plants decompose rapidly, and the organic acids thus produced hasten the development of clay minerals and the removal of carbonates. Because the soil is frozen only to a shallow depth and for short periods, these soil-forming processes can continue almost throughout the year. The climate throughout the county is relatively uniform, although its effect is modified locally by runoff and slope. Climate alone does not account for differences in the soils of the county.

Living organisms

The higher plants and animals, as well as insects, bacteria, and fungi are important in the formation of soils. Among the changes they cause are gains in organic matter and addition of nitrogen to the soil, gains or losses in other plant nutrients, and changes in structure and porosity.

Before Randolph County was settled, native vegetation probably influenced soil formation more than animal activity did. Hardwood forests, broken by swamps and a few canebrakes, covered the lowlands of the county. The uplands also had hardwood trees except in small areas that were dominated by rock outcrops. Differences in native vegetation appear to have been related mainly to variations in drainage or relief, and to a lesser degree, in parent material. Because the type of vegetation was relatively uniform throughout the county, differences among the soils cannot be directly related to vegetation.

Man is important to the future rate and direction of soil formation. He clears the forests, cultivates the soils, and introduces new kinds of plants. He adds fertilizers and lime and chemicals for insect, disease, and weed control. He builds levees for flood control, improves drainage, grades and smooths the soil surface, and controls fire to affect the future formation of soils. Some results of these changes may not be evident for many centuries, but the complex of living organisms that affects soil formation in this county has been drastically changed by man.

Parent material

Randolph County extends from the Ozark Highlands in the west to the broad areas of Southern Mississippi River Alluvium and Southern Mississippi Valley Silty Uplands in the east. Consequently, the soils of the county formed in parent material of considerable variety.

The Salem Plateau of the Ozark Highlands begins to rise to the west of the Black River and Current River flood plains. The exposed bedrock in this area is limestone of the Black Rock and Smithville Formations and Cotter and Powell Dolomite (fig. 13) of the Lower Ordovician epoch. These formations also contain small beds of shale. Except for the places capped by silty loess deposits, the soils in this area formed in material weathered from limestone and shale or other similar rock.

Loring soils formed at lower elevations, where the loess cap was thickest, on the foot slopes of the Salem River Plateau adjacent to Black River and Current River flood plains. Farther westward the soils formed partly in loess and partly in material weathered from the sedimentary rock of Ordovician age.

Brocket soils formed in residuum mainly from the sandstone within limestone formations or from sandy dolomitic or limestone materials.

Clarksville, Doniphan, Gepp, and Ventris soils formed in residual or colluvial materials derived from limestone or dolomite that has varying content of chert and from some beds of shale. The Cotter and Powell Formations that crop out in the northwestern part of the county appear to contain more chert than the Black Rock and Smithville Formations to the east. Clarksville soils are most prevalent in areas of the Cotter Formation. Ventris soils are most prevalent in areas of the Black Rock and Smithville Formations.

Chert weathers less rapidly than limestone. Consequently, such soils as Clarksville soils that contain large quantities of chert are generally on the peaks and points of ridges. The Doniphan and Gepp soils weathered from materials containing somewhat less chert and are generally at lower elevations. The chert in these soils is concentrated in the surface layer and few or no chert fragments are in the subsoil. Ventris soils formed in materials almost free of chert. They have a high calcium content that reflects the effects of the calcareous parent rock. The Doniphan, Gepp, and Ventris soils have a clayey subsoil that is inherited from the parent material.

Deposits from streams flowing through the Ozark Highland have a high sediment content. The more readily transported soil material was washed from the upland soils, but most of the resistant chert fragments were left in place. Most of the clay particles were suspended in the runoff and not deposited locally. Ashton, Hontas, Peridge, and Razort soils formed in the resulting loamy, predominantly chert-free material.

In the Southern Mississippi Alluvium area, the soils formed in mixed sediment deposited by large rivers. The wide range in textures of the sediment is related to differences in the site of deposition. As a river overflows its banks and spreads over the flood plain, the coarser sediment is dropped first. Thus, sand is commonly deposited in bands parallel to and near the channel. These bands of sand form low ridges known as natural levees. The main soils in such areas are the Bosket, Broseley, McCrory, and Patterson soils. As the floodwaters continue to spread, the finer sediment, such as silt, is deposited. The silt generally is mixed with some sand and clay. Dundee and Amagon soils formed in this sediment of intermediate texture. When the floodwaters recede and water is left standing as shallow lakes or swamps in the lowest part of the flood plain, the finest particles, the clays, settle out. Jackport and Kobel soils formed in these beds of fine sediment.

Thousands of years ago the wide trough carved between Crowley Ridge and the Ozark Highlands was partly refilled with alluvial sediment by the Mississippi River in almost the same manner as sediment of recent times is deposited. The alluvium came from the multitude of soils, rocks, and unconsolidated sediment from throughout the Mississippi River basin, which extends from Montana to Pennsylvania. The alluvium, therefore, consists of a mixture of many kinds of minerals. The Black River flood plain is superimposed on a flood plain previously occupied by the Mississippi River. The Mississippi River then breached Crowley Ridge to form its present flood plain.

The Amagon, Dundee, Hontas, and Kobel soils are on the Black River flood plain.

The Black River does not transport enough sediment to maintain young soils. Therefore, the Amagon and Dundee soils have continued to form in older loamy sediment; some Hontas soils formed in the more recent loamy deposits where the river has meandered; and Kobel soils formed in the younger clay deposits in the backswamps.

Between the Black River and Current River flood plains and the broad flats to the east are high natural levees that were deposited by the Mississippi River. These levees consist of stratified loamy sediment that contains more sand than the sediment in the rest of the county. The Brosket, Broseley, McCrory, and Patterson soils formed in this stratified, loamy sediment and similar sediment in insular areas elsewhere. Where the high natural levees merge with the broad flats, sand content of the sediment decreases and silt content increases. Some of the Amagon and Dundee soils formed in such sediment.

When the Mississippi River finally abandoned the vast complex of alluvial terraces, which form much of Randolph County and some adjacent counties, in favor of channels to the east, the broad abandoned backswamps were drained by smaller, more localized streams. These streams, such as Village Creek, Grassy Slough, and Big Running Water Ditch, occupied former braided channels of the Mississippi River but were inadequate to maintain broad areas as active flood plains. That part of the alluvial plain above the stream overflow was progressively mantled with silty loess deposits. This loess gradually thickens in an easterly direction. The loess deposits probably were laid down at the same time as the deposits on Crowley Ridge. Crowley soils formed where the silt is the thickest in Randolph County. Jackport soils formed where there are clay lenses in the thinnest silt deposits. Amagon and Dundee soils formed in remnants of old natural levees within the broad areas of Crowley and Jackport soils.

Relief

Relief is uneveness of elevation. In Randolph County, it is caused by entrenchment of streams into the land surface by faulting and by deposition of sediment. The highest elevation in the county, at the Arkansas-Missouri line in the northwestern part of the county, is 880 feet above sea level. The lowest elevation, near the mouth of Spring River, is about 240 feet above sea level. These differences in relief, which affect drainage, runoff, erosion, and percolation of water through the soil, cause some of the greatest differences among the soils.

In the uplands of Randolph County, relief ranges from steep hillsides to nearly level plateaus, hill crests, and sides of valleys. Local differences in elevation range to as much as 400 feet in areas of dissected hillsides and ridges. Along the foot slopes of the Ozark Highlands, they range from 50 to 100 feet. Throughout this area, slope is such that excess water is removed soon after it falls. Even when precipitation is more than sufficient, the soils are saturated for only short periods during and after rainfall or snowfall. Consequently, the soils are moderately well drained to somewhat excessively drained even through some soils are very slowly permeable. The drainage of these soils is reflected by the dominant soil colors of brown or red, which are caused by the oxidation of iron. Arkana, Brocket, Captina, Clarksville, Doniphan, Gepp, Loring, Peridge, and Ventris soils are in this area.

In Randolph County, the lowlands above the flood plains of streams have relief ranging from broad flats and depressions to undulating areas of alternating swales and low ridges. Local differences in elevation range to as much as 20 feet, but are generally 5 to 10 feet in undulating areas. The highest elevation, near the town of Biggers, is about 290 feet above sea level. On the broad flats and in depressions on flats and between ridges, differences in local elevation are negligible. Surface drainage is slow or very slow. Soils in these areas are poorly drained or somewhat poorly drained and most are slowly permeable. They have a seasonal perched water table. These soils are dominantly gray, or they have grayish colors and are mottled because of the reduction of iron. Amagon, Crowley, Dundee, Jackport, McCrory, and Patterson soils are in these areas.

The well drained Bosket soils and the somewhat excessively drained Broseley soils have been little affected by relief.

The present flood plains along streams in the county are generally level to gently undulating. Some areas are concave. Most areas on the flood plains are subject to occasional or frequent flooding. Slope and runoff are such that sediment deposits remain relatively static or accumulate very slowly. Amagon, Ashton, and Dundee soils in level and gently undulating areas have relatively static depositions. Hontas and Kobel soils, in level or concave areas, receive minute deposits of sediment.

In contrast to deposition, geological erosion has more than kept pace with soil formation in some areas of uplands. Therefore, rock outcrops have appeared. In other areas where slope is strong, the Clarksville, Doniphan, and Gepp soils formed over cherty limestone. Large quantities of chert fragments have remained on the surface and within the surface layer and have retarded geological erosion while weathering continues. These soils, deep to bedrock, have developed a thick argillic horizon. Arkana and Ventris soils, without the protective chert mantle, have undergone geological erosion at a faster rate. They have a thinner argillic horizon and are only moderately deep to bedrock. Brocket soils, intermediate in weathering and erosion, have a thinner argillic horizon than Clarksville and Gepp soils but are deeper to bedrock than Arkana or Ventris soils. Because some Captina soils, without the protective mantle of coarse fragments, have weathered faster than they have eroded, they have developed a thick argillic horizon.

Some soils on foot slopes in the uplands have deep accumulations of material that, in part, washed or sloughed down from adjacent higher slopes. Loring soils formed in this material, and some of the Captina soils formed in the thinner deposits that remained on higher slopes.

Peridge soils are on gently sloping stream terraces. They formed in deep, loamy and clayey material that washed from the uplands and deposited on flood plains before the streams were further entrenched.

Time

The length of time required for formation of a soil depends largely upon the other factors. Less time generally is required if the climate is warm and humid and if the vegetation is luxuriant than if climate is cold and vegetation is sparse. When other factors are equal, less time is required for sandy or loamy parent material than for clayey parent material. In terms of geological time and in terms of soil formation, the soils of Randolph County range from relatively young to old. But formation of soil does not always coincide with geological time. Mature soils have to be in place long enough for distinct horizons to be evident.

Sediments that are now forming the land surface in the eastern part of the county probably were deposited during and after the advance of the continental glaciers. The last of these glaciers retreated from the North-Central States about 11,000 years ago. In terms of geological time, these soils are young, but in terms of soil formation, the maturity of the soils varies widely. On broad flats, the soils are more mature because they have been in place for a long time. The less developed soils are on natural levees and in slack-water areas within the flood plains of present streams. They receive fresh sediment very slowly; and although they show some evidence of horizon development, they lack evidence of the translocation of clay that more mature soils have. Hontas and Kobel soils are examples of the less developed soils, and Crowley and Jackport soils are examples of the more mature soils of this geologically young area.

The soils in most of the western part of the county formed in material weathered from rock of Ordovician age. In terms of geological time, these soils are old. Most of the soils in this area show evidence of age in that they have a thick, well defined, argillic horizon, have lost cations, and are deep to bedrock. Less developed soils of about the same geological age have a thinner argillic horizon, have retained cations, and are moderately deep to bedrock because geologic erosion has kept pace with the weathering process. In this geologically old area, Clarksville and Gepp soils are examples of mature soils, and Arkana and Ventris soils are examples of less developed soils. Arkana and Ventris soils are less developed than many soils of geologically young deposits.

Processes of soil formation

In this section horizon nomenclature is defined briefly and processes responsible for soil formation are described.

The marks that the soil-forming factors leave on the soils are recorded in the soil profile. The soil profile is a succession of layers, or horizons, from the surface down to the parent material, which has been little altered by soil-forming processes. The horizons differ in one or more properties, such as color, texture, structure, consistence, porosity, and reaction.

Most soil profiles contain three major horizons, called the A, B, and C horizons. Very young soils do not have a B horizon.

The A horizon can include only the horizon of maximum accumulation of organic matter, called the A1 horizon or the surface layer; or it can include the horizon of maximum leaching of dissolved or suspended materials, called the A2 horizon or the subsurface layer.

The B horizon lies immediately beneath the A horizon and is sometimes called the subsoil. It is a horizon of maximum accumulation of dissolved or suspended materials, such as iron and clay. Commonly, the B horizon has blocky structure (*8*) and is firmer than the horizons immediately above and below it.

Beneath the B horizon is the C horizon, which has been little affected by the soil-forming processes, although the C horizon can be materially modified by weathering. In some young less developed soils, the C horizon immediately underlies 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 soil horizons in Randolph County. Among these are: (1) the accumulation of organic matter, (2) the leaching of calcium carbonates and bases, (3) the reduction and transfer of iron, and (4) the formation and translocation of silicate clay materials. In most of the soils of the county, more than one of these processes has been active.

Accumulation of organic matter in the upper part of the profile to form an A1 horizon has been an important process of soil formation. The soils of Randolph County range from medium to low in content of organic matter.

Leaching of carbonates and bases has occurred to some degree in nearly all the soils of Randolph County. Bases are leached downward in soils before silicate clay minerals begin to move. Some of the soils, such as Ventris and Ashton soils, are only slightly leached; but most of the soils are moderately leached, which is an important factor in horizon development.

Reduction and transfer of iron has occurred to a significant degree in the somewhat poorly drained and poorly drained soils of the county. In the naturally wet soils, this process is called gleying. Gray colors in the layers below the surface indicate the reduction and loss of iron. Some horizons contain reddish or yellowish mottles and concretions derived from segregated iron. Gleying is pronounced in many of the soils. Among the strongly gleyed soils are the Amagon, Crowley, Jackport, and McCrory soils.

In several soils of Randolph County, the translocation of clay minerals has contributed to the formation of horizons. In many places, the eluviated A2 horizon has been destroyed by cultivation. In areas where there is an A2 horizon, its structure is blocky to platy, clay content is less than in the lower horizons, and the soil material is lighter in color. Generally, in the B horizon, clay films have accumulated in pores and on surfaces of peds. Probably carbonates and soluble salts were leached from the B horizon before translocation of silicate clay occurred, although the content of bases is still high in the B horizon of many soils in the county. Captina soils show the effect of both leaching of bases and translocation of silicate clay, the most important processes of horizon differentiation in the soils of Randolph County.

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Glossary

Accretions. Soft local concentrations of certain chemical compounds that form unindurated bodies of various sizes, shapes, and colors. The composition of most accretions is unlike that of the surrounding soil. Calcium carbonate and iron and manganese oxides are common compounds in accretions.

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.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim. An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

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	More than 9

Base saturation. The degree to which material having base exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the 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.

Bottom land. The normal flood plain of a stream, subject to frequent flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

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 loosen the subsoil and bring clods to the surface. A form of emergency tillage to control soil blowing.

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 coat, 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. Mineral or rock particles up to 3 inches (2 millimeters to 7.5 centimeters) in diameter.

Coarse textured (light 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 bases of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures is difficult.

Complex, soil. A mapping unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

Compressible. Excessive decrease in volume of soft soil under load.

Concretions. Hardended local concentrations of certain chemical compounds that form indurated grains, pellets, or nodules of various sizes, shapes, and colors. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron and manganese oxides 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.

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 40 or 80 inches (1 or 2 meters).

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cutbanks cave. Unstable walls of cuts made by earth-moving equipment. The soil sloughs easily.

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 for 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, as for example in "hillpeats" and "climatic moors."

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.

Erosion. The wearing away of the land surface by running 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 a bare surface.

Excess fines. Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Excess salts. Excess water soluble salts. Excessive salts restrict the growth of most plants.

Fast intake. The rapid movement of water into the soil.

Favorable. Favorable soil features for the specified use.

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 (heavy textured) soil. Sandy clay, silty clay, and clay.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of 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.

Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered 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.

Forage. Plant material used as feed by domestic animals. Forage can be grazed or cut for hay.

Forb. Any herbaceous plant not a grass or a sedge.

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.

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.

Gilgai. Typically, the microrelief of Vertisols—clayey soils having a high coefficient of expansion and contraction with changes in moisture content. Commonly a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope.

Gleyed soil. A soil having one or more neutral gray horizons as a result of waterlogging and lack of oxygen. The term "gleyed" also designates gray horizons and horizons having yellow and gray mottles as a result of intermittent waterlogging.

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 from 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, which is the upper limit of saturation.

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.

Habitat. The natural abode of a plant or animal; refers to the kind of environment in which a plant or animal normally lives, as opposed to the range or geographical distribution.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming 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.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks 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 from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II 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.

Hummocky. Refers to a landscape of hillocks, separated by low sags, having sharply rounded tops and steep sides. Hummocky relief resembles rolling or undulating relief, but the tops of ridges are narrower and the sides are shorter and less even.

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.

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.

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. Rock fragments 10 inches (25 centimeters) or more across. Large stones adversely affect the specified use.

Leaching. The removal of soluble material from soil or other material by percolating water.

Light textured soil. Sand and loamy sand.

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.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. Inadequate strength for supporting loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is greater than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous areas. Areas that have little or no natural soil, are too nearly inaccessible for orderly examination, or cannot otherwise be feasibly classified.

Moderately coarse textured (moderately light textured) soil. Sandy loam and fine sandy loam.

Moderately fine textured (moderately heavy 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.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Plant nutrients are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil; and carbon, hydrogen, and oxygen obtained largely from the air and water.

Pan. A compact, dense layer in a soil. A pan impedes the movement of water and the growth of roots. The word "pan" is commonly combined with other words that more explicitly indicate the nature of the layer; for example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

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. The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are *very slow* (less than 0.06 inch), *slow* (0.06 to 0.20 inch), *moderately slow* (0.2 to 0.6 inch), *moderate* (0.6 to 2.0 inches), *moderately rapid* (2.0 to 6.0 inches), *rapid* (6.0 to 20 inches), and *very rapid* (more than 20 inches).

Phase, soil. A subdivision of a soil series or other unit in the soil classification system based on differences in the soil that affect its management. A soil series, for example, may be divided into phases on the bases of differences in slope, stoniness, thickness, or some other characteristic that affects management. These differences are too small to justify separate series.

pH value (See Reaction, soil). A numerical designation of acidity and alkalinity in soil.

Piping. Moving water forms subsurface tunnels or pipelike cavities in 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 a semisolid to a plastic state.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Polypedon. A volume of soil having properties within the limits of a soil series, the lowest and most homogeneous category of soil taxonomy. A "soil individual."

Poorly graded. Refers to 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. Surface or subsurface drainage outlets difficult or expensive to install.

Productivity (soil). The capability of a soil for producing a specified plant or sequence of plants under a specified system of management. Productivity is measured in terms of output, or harvest, in relation to input.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. The degree 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. Soil scientists regard as soil only the part of the regolith that is modified by organisms and other soil-building forces. Most engineers describe the whole regolith, even to a great depth, as "soil."

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulates over disintegrating rock.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth. Shallow root zone. The soil is shallow over a layer that greatly restricts roots. See Root zone.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground 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.

Saprolite (geology). Soft, earthy, clay-rich, thoroughly decomposed rock formed in place by chemical weathering of igneous and metamorphic rock. In a soil survey, the term saprolite is applied to any unconsolidated residual material underlying the soil and grading to hard bedrock below.

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. The rapid 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.

Series, soil. A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

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 runoff water.

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.

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.

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.

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. The slow movement of water into the soil.

Slow refill. The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones. Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Small stones adversely affect the specified use.

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: *very coarse sand* (2.0 millimeters to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.05 to 0.002 millimeter); and *clay* (less than 0.002 millimeter).

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature 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 other plant and animal life characteristic of the soil are largely confined to the solum.

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.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining 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).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

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 soil. 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."

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by 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, silt loam, 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. Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The condition of the soil, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Unstable fill. Risk of caving or sloughing in banks of fill material.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.
Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.
Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.
Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

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 a soil or soil material consisting of particles well distributed over a wide range in size or diameter. Such a soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

ILLUSTRATIONS

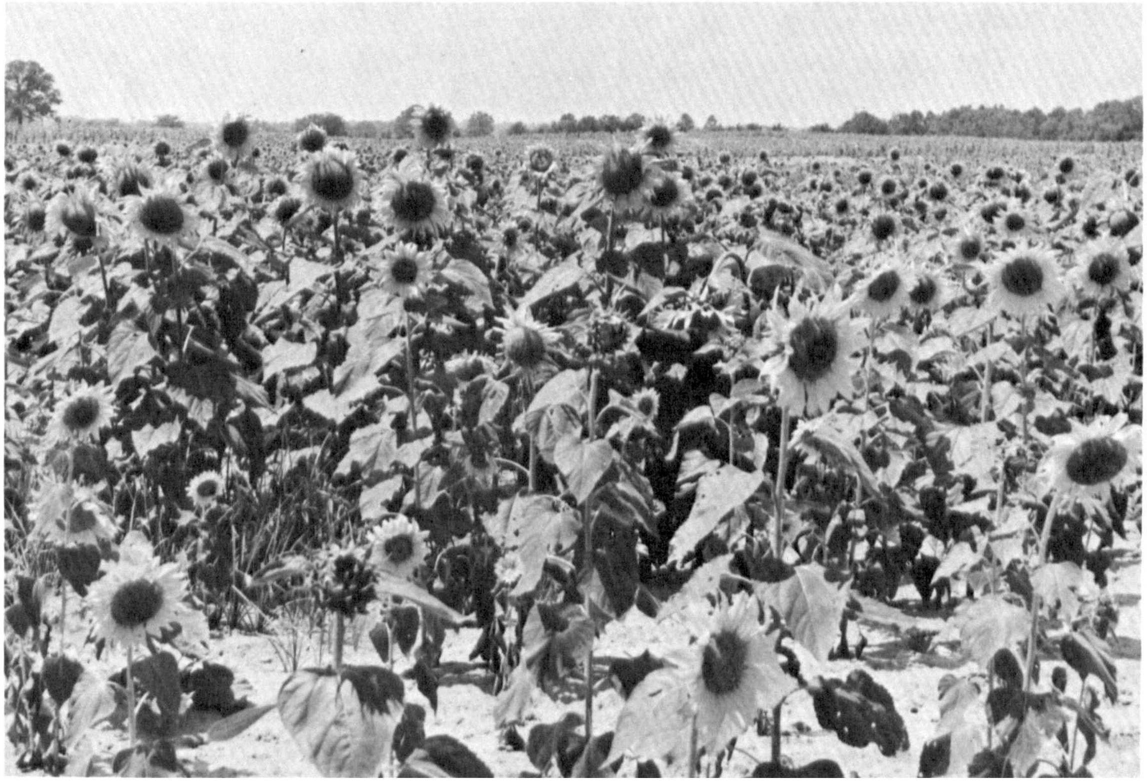

Figure 1.—Sunflowers grown commercially for oil on Broseley loamy fine sand, undulating.

Figure 2.—Rice and soybeans in the Amagon-Dundee soil map unit; pasture in foreground is in Loring map unit.

Figure 3.—Kobel-Amagon map unit developed for wetland wildlife habitat in a State-owned wildlife management area.

Figure 4.—Soybeans on Amagon silt loam. An eroded area of Loring silt loam, 8 to 12 percent slopes, is in background.

Figure 5.—Arkana-Rock outcrop complex is unsuitable for cultivated crops or pasture because of surface stones and rock outcrops.

Figure 6.—Pasture on Ashton silt loam, occasionally flooded.

Figure 7.—Bosket fine sandy loam, undulating, can produce high yields of cotton.

Figure 8.—Wheat on Bosket fine sandy loam, undulating, gives good yields and helps prevent soil blowing.

Figure 9.—Native hardwoods on Doniphan-Gepp association, undulating.

Figure 10.—A well managed crop of soybeans on Dundee silt loam.

Figure 11.—Pits borrowed for gravel and sand for use in road construction.

Figure 12.—Native vegetation on Kobel silty clay loam is water-tolerant hardwoods.

Figure 13.—Dolomitic-limestone outcrop of the Cotter Formation in the western part of the county.

TABLES

TABLE 1.--TEMPERATURE AND PRECIPITATION DATA

[Recorded in the period 1951-74 at Pocahontas, 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----	47.5	26.5	37.1	74	2	6	3.94	1.74	5.71	6	2.2
February---	52.2	29.9	41.1	75	5	23	3.55	2.03	4.78	6	2.3
March------	60.5	37.0	48.8	82	14	133	4.80	2.58	6.60	7	1.3
April------	72.5	47.4	59.9	88	27	303	4.81	2.41	6.75	8	.0
May--------	80.8	55.7	68.3	93	36	567	5.14	2.48	7.30	6	.0
June-------	88.7	64.6	76.7	101	48	801	3.11	1.86	4.22	5	.0
July-------	91.7	68.3	80.0	102	54	930	3.87	2.34	5.23	6	.0
August-----	90.8	66.1	78.5	102	53	884	2.79	1.21	4.08	5	.0
September--	84.2	59.3	71.7	98	41	651	3.85	1.04	6.10	5	.0
October----	74.7	47.5	61.1	91	27	353	2.50	.77	3.88	4	.0
November---	60.3	36.8	48.6	80	15	66	4.85	2.38	6.86	6	.4
December---	50.1	29.8	40.0	73	4	30	3.69	1.89	5.16	6	1.2
Year-----	71.2	47.4	59.3	104	0	4,747	46.90	38.70	54.69	70	7.4

[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 1951-74 at Pocahontas, 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--	March 26	April 10	April 17
2 years in 10 later than--	March 22	April 6	April 13
5 years in 10 later than--	March 14	March 29	April 5
First freezing temperature in fall:			
1 year in 10 earlier than--	October 31	October 24	October 16
2 years in 10 earlier than--	November 4	October 28	October 20
5 years in 10 earlier than--	November 13	November 5	October 27

TABLE 3.--GROWING SEASON LENGTH

[Recorded in the period 1951-74 at Pocahontas, Arkansas]

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	224	205	186
8 years in 10	231	210	192
5 years in 10	243	220	205
2 years in 10	256	229	217
1 year in 10	262	234	223

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Amagon silt loam	19,238	4.6
2	Arkana-Rock outcrop complex, 3 to 12 percent slopes	4,750	1.1
3	Ashton silt loam, occasionally flooded	17,013	4.1
4	Bosket fine sandy loam, undulating	16,496	4.0
5	Brocket gravelly fine sandy loam, 3 to 8 percent slopes	5,901	1.4
6	Brocket gravelly fine sandy loam, 8 to 12 percent slopes	9,232	2.2
7	Broseley loamy fine sand, undulating	6,192	1.5
8	Captina silt loam, 3 to 8 percent slopes	42,334	10.2
9	Captina silt loam, 8 to 12 percent slopes	7,334	1.8
10	Clarksville cherty silt loam, 8 to 12 percent slopes	1,888	0.5
11	Clarksville cherty silt loam, 12 to 20 percent slopes	4,025	1.0
12	Crowley silt loam	8,573	2.1
13	Doniphan cherty silt loam, 3 to 8 percent slopes	4,010	1.0
14	Doniphan cherty silt loam, 8 to 12 percent slopes	10,736	2.6
15	Doniphan-Gepp association, undulating	13,589	3.3
16	Dundee silt loam	12,521	3.0
17	Gepp very cherty silt loam, 8 to 12 percent slopes	55,559	13.5
18	Gepp very cherty silt loam, 12 to 20 percent slopes	12,067	2.9
19	Gepp-Doniphan association, rolling	29,427	7.1
20	Gepp-Ventris association, rolling	16,768	4.1
21	Gepp-Ventris association, steep	10,744	2.6
22	Hontas silt loam, frequently flooded	13,855	3.3
23	Jackport silty clay loam	5,809	1.4
24	Kobel silty clay loam	13,679	3.3
25	Loring silt loam, 3 to 8 percent slopes	8,659	2.1
26	Loring silt loam, 8 to 12 percent slopes	10,029	2.4
27	McCrory fine sandy loam	10,908	2.6
28	Patterson fine sandy loam	3,934	1.0
29	Peridge silt loam, 3 to 8 percent slopes	12,558	3.0
30	Pits	571	0.1
31	Razort silt loam, frequently flooded	8,275	2.0
32	Ventris-Rock outcrop complex, 3 to 12 percent slopes	13,190	3.2
	Water	4,088	1.0
	Total	413,952	100.0

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[All yields were estimated for a high level of management in 1975. Absence of data indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Cotton lint	Soybeans	Rice	Wheat	Common bermuda-grass	Improved bermuda-grass	Tall fescue
	Lb	Bu	Bu	Bu	AUM*	AUM*	AUM*
1 Amagon	575	35	120	---	7.5	9.0	9.0
2 Arkana	---	---	---	---	2.0	---	2.0
3 Ashton	---	35	---	40	5.0	---	6.0
4 Bosket	750	35	---	50	10.0	---	9.0
5 Brocket	---	25	---	40	5.0	7.0	7.0
6 Brocket	---	20	---	30	5.0	6.0	6.0
7 Broseley	500	35	---	45	---	---	---
8 Captina	---	---	---	---	7.0	---	7.0
9 Captina	---	---	---	---	6.0	---	6.0
10 Clarksville	---	---	---	---	2.0	---	3.0
11 Clarksville	---	---	---	---	2.0	---	3.0
12 Crowley	450	30	130	---	5.5	---	5.0
13 Doniphan	---	---	---	---	3.0	---	5.0
14 Doniphan	---	---	---	---	3.0	---	4.2
15**:							
Doniphan	---	---	---	---	3.0	---	4.2
Gepp	---	---	---	45	6.5	---	5.5
16 Dundee	750	40	---	---	---	9.0	9.0
17 Gepp	---	---	---	45	6.5	---	5.5
18 Gepp	---	---	---	---	5.5	---	5.0
19**:							
Gepp	---	---	---	---	5.5	---	5.0
Doniphan	---	---	---	---	3.0	---	3.4
20**:							
Gepp	---	---	---	---	5.5	---	5.0

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Cotton lint	Soybeans	Rice	Wheat	Common bermuda-grass	Improved bermuda-grass	Tall fescue
	Lb	Bu	Bu	Bu	AUM*	AUM*	AUM*
20**: Ventris	---	---	---	---	2.5	---	2.5
21**:							
Gepp	---	---	---	---	4.0	---	4.0
Ventris	---	---	---	---	2.5	---	2.5
22 Hontas	---	35	---	---	5.0	8.5	7.5
23 Jackport	550	35	130	---	7.0	---	8.0
24 Kobel	550	40	130	---	---	10.0	9.0
25 Loring	650	25	---	35	6.0	8.0	5.0
26 Loring	500	20	---	30	6.0	8.0	5.0
27 McCrory	650	30	120	40	6.0	---	8.0
28 Patterson	550	30	---	30	---	8.0	7.0
29 Peridge	---	25	---	45	6.0	7.5	6.0
30**. Pits							
31 Razort	---	---	---	---	6.0	10.0	10.0
32 Ventris	---	---	---	---	2.5	---	2.5

* 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 a period of 30 days.
** See map unit description for the composition and behavior of the map unit.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed in this table. Absence of data indicates that the information was not available. Site index was calculated at age 30 for eastern cottonwood, at age 35 for American sycamore, and at age 50 for all other species]

Soil name and map symbol	Woodland suitability group	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Important trees	Site index	
1 Amagon	1w6	Slight	Severe	Moderate	Eastern cottonwood Water oak Willow oak Cherrybark oak Nuttall oak Green ash Sweetgum	100 100 100 90 100 80 100	Eastern cottonwood, cherrybark oak, Nuttall oak, Shumard oak, water oak, willow oak, sweetgum, American sycamore, green ash.
2*: Arkana	5c2	Slight	Moderate	Moderate	Shortleaf pine Southern red oak Eastern redcedar White oak	55 55 35 ---	Shortleaf pine, eastern redcedar.
Rock outcrop.							
3 Ashton	1o7	Slight	Slight	Slight	Black oak Northern red oak Sweetgum Shumard oak	80 85 --- ---	Black walnut, sweetgum, cherrybark oak, loblolly pine.
4 Bosket	2o4	Slight	Slight	Slight	Eastern cottonwood Green ash Sweetgum Cherrybark oak Water oak Willow oak	100 80 90 90 90 90	Eastern cottonwood, green ash, sweetgum, cherrybark oak, water oak, willow oak, Shumard oak, American sycamore.
5, 6 Brocket	3o7	Slight	Slight	Slight	Black oak Shortleaf pine	70 70	Yellow-poplar, shortleaf pine, loblolly pine.
7 Broseley	4s5	Slight	Slight	Moderate	Eastern cottonwood	80	Eastern cottonwood, American sycamore.
8, 9 Captina	4o7	Slight	Slight	Slight	Shortleaf pine Southern red oak Eastern redcedar Black locust Black walnut	60 65 40 --- ---	Shortleaf pine, eastern redcedar, black walnut,** black locust,** black oak, loblolly pine.
10 Clarksville	4f7	Slight	Slight	Slight	White oak Shortleaf pine Black oak	55 55 60	Shortleaf pine, loblolly pine, black oak,** black locust.**
11 Clarksville	4f8	Slight	Moderate	Moderate	White oak Shortleaf pine Black oak	55 55 60	Shortleaf pine, loblolly pine, black oak,** black locust.
12 Crowley	3w9	Slight	Severe	Moderate	Loblolly pine Water oak	80 80	Loblolly pine, American sycamore.

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Woodland suitability group	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Important trees	Potential productivity: Site index	Trees to plant
13, 14 Doniphan	4o1	Slight	Slight	Slight	Shortleaf pine Eastern redcedar	60 40	Loblolly pine, shortleaf pine, eastern redcedar.
15*:							
Doniphan	4o1	Slight	Slight	Slight	Shortleaf pine Eastern redcedar	60 40	Loblolly pine, shortleaf pine, eastern redcedar.
Gepp	3o7	Slight	Slight	Slight	White oak Shortleaf pine Black oak Northern red oak	70 75 70 70	Black walnut,** loblolly pine, shortleaf pine, eastern redcedar, black oak.**
16 Dundee	2w5	Slight	Moderate	Slight	Cherrybark oak Eastern cottonwood Sweetgum Water oak	105 100 100 95	Cherrybark oak, eastern cottonwood, sweetgum, water oak, yellow-poplar.
17, 18 Gepp	3o7	Slight	Slight	Slight	White oak Shortleaf pine Black oak Northern red oak	70 75 70 70	Black walnut, loblolly pine, shortleaf pine, eastern redcedar, black oak.**
19*:							
Gepp	3o7	Slight	Slight	Slight	White oak Shortleaf pine Black oak Northern red oak	70 75 70 70	Black walnut,** loblolly pine, shortleaf pine, eastern redcedar, black oak.**
Doniphan	4r2	Moderate	Moderate	Moderate	Shortleaf pine Eastern redcedar	60 40	Loblolly pine, shortleaf pine, eastern redcedar.
20*, 21*:							
Gepp	3o7	Slight	Slight	Moderate	White oak Shortleaf pine Black oak Northern red oak	70 75 70 70	Black walnut,** loblolly pine, shortleaf pine, eastern redcedar, black oak.**
Ventris	5c2	Slight	Slight	Moderate	Shortleaf pine Southern red oak Eastern redcedar	55 55 35	Shortleaf pine, loblolly pine, eastern redcedar.
22 Hontas	2w8	Slight	Moderate	Moderate	Shortleaf pine Shumard oak Sweetgum Eastern cottonwood American sycamore Black walnut Water oak	80 --- --- --- --- --- ---	Shortleaf pine, loblolly pine, eastern cottonwood, American sycamore, Shumard oak, sweetgum.
23 Jackport	2w6	Slight	Severe	Moderate	Green ash Cherrybark oak Water oak Willow oak Sweetgum	80 90 90 90 80	Green ash, eastern cottonwood, Nuttall oak, willow oak, sweetgum, American sycamore.

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Woodland suitability group	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Important trees	Site index	
24----------------- Kobel	2w6	Slight	Severe	Moderate	Water oak-------------- Green ash-------------- Eastern cottonwood----- Cherrybark oak--------- Sweetgum--------------- Pecan------------------ American sycamore------	90 85 --- --- --- --- ---	Eastern cottonwood, American sycamore, sweetgum, Nuttall oak.
25, 26------------- Loring	3o7	Slight	Slight	Slight	Shortleaf pine--------- Southern red oak------- Loblolly pine----------	60 74 ---	Loblolly pine, yellow-poplar,** shortleaf pine.
27----------------- McCrory	3w6	Slight	Severe	Moderate	Sweetgum--------------- Water oak--------------	85 80	Sweetgum, American sycamore.
28----------------- Patterson	2s5	Slight	Moderate	Moderate	Green ash-------------- Cherrybark oak--------- Nuttall oak------------ Water oak-------------- Willow oak------------- Sweetgum---------------	70 95 85 90 85 90	Green ash, cherrybark oak, Nuttall oak, water oak, willow oak, sweetgum, American sycamore.
29----------------- Peridge	3o7	Slight	Slight	Slight	Shortleaf pine--------- Southern red oak------- Eastern redcedar------- Black walnut----------- White oak-------------- White ash-------------- Black cherry----------- Black locust-----------	70 70 50 --- --- --- --- ---	Shortleaf pine, loblolly pine, black walnut,** black locust,** black oak,** white ash, eastern redcedar.
30*: Pits.							
31----------------- Razort	2o7	Slight	Slight	Slight	Shortleaf pine--------- Southern red oak------- Eastern cottonwood----- American sycamore------ Sweetgum--------------- White oak--------------	80 80 90 85 80 ---	Shortleaf pine, loblolly pine, black oak, white oak, black walnut, American sycamore, eastern cottonwood, sweetgum, cherrybark oak, shumard oak.
32*: Ventris-----------	5c2	Slight	Slight	Moderate	Shortleaf pine--------- Southern red oak------- Eastern redcedar-------	55 55 35	Shortleaf pine, loblolly pine, eastern redcedar.
Rock outcrop.							

* See map unit description for the composition and behavior of the map unit.
** Confined to northeast slopes, cones, benches, and slope bases.

TABLE 7.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for: Openland wildlife	Woodland wildlife	Wetland wildlife
1 Amagon	Fair	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good
2*:											
Arkana	Fair	Good	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
Rock outcrop.											
3 Ashton	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
4 Bosket	Good	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
5 Brocket	Fair	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
6 Brocket	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
7 Broseley	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
8, 9 Captina	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
10, 11 Clarksville	Poor	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
12 Crowley	Fair	Fair	Fair	Fair	Good	Fair	Good	Good	Fair	Fair	Good
13, 14 Doniphan	Fair	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
15*:											
Doniphan	Fair	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Gepp	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
16 Dundee	Fair	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
17 Gepp	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
18 Gepp	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
19*:											
Gepp	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Doniphan	Poor	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
20*:											
Gepp	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 7.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
20*:											
Ventris	Fair	Good	Good	Fair	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
21*:											
Gepp	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Ventris	Fair	Good	Good	Fair	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
22 Hontas	Poor	Fair	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor
23 Jackport	Fair	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good
24 Kobel	Fair	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good
25, 26 Loring	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
27 McCrory	Fair	Fair	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair
28 Patterson	Fair	Good	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor
29 Peridge	Fair	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
30*. Pits											
31 Razort	Poor	Fair	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
32*:											
Ventris	Fair	Good	Good	Fair	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Rock outcrop.											

* See map unit description for the composition and behavior of the map unit.

TABLE 8.--BUILDING SITE DEVELOPMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of data indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
1----------------- Amagon	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, low strength.
2*:					
Arkana-----------	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: slope, shrink-swell, depth to rock.	Severe: low strength, shrink-swell.
Rock outcrop.					
3----------------- Ashton	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods, low strength.
4----------------- Bosket	Slight-----------	Slight-----------	Slight-----------	Slight------------	Moderate: low strength.
5----------------- Brocket	Moderate: small stones.	Slight-----------	Slight-----------	Moderate: slope.	Moderate: low strength.
6----------------- Brocket	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, low strength.
7----------------- Broseley	Slight-----------	Slight-----------	Slight-----------	Slight------------	Moderate: low strength.
8----------------- Captina	Moderate: depth to rock.	Moderate: low strength.	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.
9----------------- Captina	Moderate: slope, depth to rock.	Moderate: slope, low strength.	Moderate: slope, low strength.	Severe: slope.	Moderate: slope, low strength.
10---------------- Clarksville	Moderate: small stones.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: frost action.
11---------------- Clarksville	Moderate: small stones.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
12---------------- Crowley	Severe: wetness, too clayey.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: low strength, shrink-swell.
13---------------- Doniphan	Severe: too clayey.	Severe: low strength.	Severe: low strength.	Severe: low strength.	Severe: low strength.
14---------------- Doniphan	Severe: too clayey.	Severe: low strength.	Severe: low strength.	Severe: slope, low strength.	Severe: low strength.
15*:					
Doniphan---------	Severe: too clayey.	Severe: low strength.	Severe: low strength.	Severe: slope, low strength.	Severe: low strength.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
15*:					
Gepp----------	Severe: too clayey.	Moderate: low strength, shrink-swell, slope.	Moderate: low strength, shrink-swell, slope.	Severe: slope.	Moderate: low strength, shrink-swell, slope.
16---------- Dundee	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Moderate: wetness, shrink-swell.
17---------- Gepp	Severe: too clayey.	Moderate: low strength, shrink-swell, slope.	Moderate: low strength, shrink-swell, slope.	Severe: slope.	Moderate: low strength, shrink-swell, slope.
18---------- Gepp	Severe: slope, too clayey.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
19*:					
Gepp----------	Severe: slope, too clayey.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Doniphan----------	Severe: slope, too clayey.	Severe: slope, low strength.	Severe: slope, low strength.	Severe: slope, low strength.	Severe: slope, low strength.
20*, 21*:					
Gepp----------	Severe: slope, too clayey.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ventris----------	Severe: slope, too clayey, depth to rock.	Severe: slope, low strength, shrink-swell.	Severe: slope, depth to rock, low strength.	Severe: slope, depth to rock, low strength.	Severe: slope, low strength, shrink-swell.
22---------- Hontas	Severe: floods, wetness.	Severe: floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods.
23---------- Jackport	Severe: wetness, too clayey.	Severe: wetness, low strength, shrink-swell.	Severe: wetness, low strength, shrink-swell.	Severe: wetness, low strength, shrink-swell.	Severe: wetness, low strength, shrink-swell.
24---------- Kobel	Severe: wetness, too clayey.	Severe: wetness, shrink-swell.	Severe: wetness, low strength, shrink-swell.	Severe: wetness, low strength, shrink-swell.	Severe: wetness, low strength, shrink-swell.
25---------- Loring	Moderate: low strength, wetness.	Moderate: low strength.	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.
26---------- Loring	Moderate: slope, wetness, low strength.	Moderate: slope, low strength.	Moderate: slope, low strength.	Severe: slope.	Moderate: slope, low strength.
27---------- McCrory	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
28---------- Patterson	Severe: wetness, too sandy, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
29----------------- Peridge	Moderate: too clayey.	Slight-----------	Slight-----------	Moderate: slope.	Moderate: low strength.
30*. Pits					
31----------------- Razort	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
32*:					
Ventris-----------	Severe: too clayey, depth to rock.	Severe: low strength, shrink-swell.	Severe: depth to rock, low strength, shrink-swell.	Severe: depth to rock, low strength, shrink-swell.	Severe: low strength, shrink-swell.
Rock outcrop.					

* See map unit description for the composition and behavior of the map unit.

TABLE 9.--SANITARY FACILITIES

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms used to rate soils. Absence of an entry means soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1: Amagon	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
2*:					
Arkana	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Fair: thin layer.
Rock outcrop.					
3: Ashton	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Good.
4: Bosket	Slight	Moderate: slope, seepage.	Severe: seepage.	Slight	Good.
5: Brocket	Slight	Moderate: slope, seepage.	Slight	Moderate: slope.	Fair: small stones.
6: Brocket	Moderate: slope.	Severe: slope, seepage.	Slight	Moderate: slope.	Fair: slope.
7: Broseley	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
8: Captina	Severe: depth to rock, percs slowly.	Moderate: slope, depth to rock.	Severe: depth to rock.	Slight	Fair: too clayey.
9: Captina	Severe: depth to rock, percs slowly.	Severe: slope.	Severe: depth to rock.	Moderate: slope.	Fair: slope, too clayey.
10: Clarksville	Moderate: slope.	Severe: seepage, small stones.	Severe: seepage, small stones.	Severe: seepage.	Poor: seepage, small stones.
11: Clarksville	Severe: slope.	Severe: seepage, small stones.	Severe: seepage, small stones.	Severe: seepage.	Poor: seepage, small stones.
12: Crowley	Severe: percs slowly, wetness.	Slight	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
13: Doniphan	Slight	Moderate: slope, seepage, small stones.	Severe: too clayey, small stones.	Slight	Poor: small stones, too clayey.
14: Doniphan	Moderate: slope.	Severe: slope.	Severe: too clayey, small stones.	Moderate: slope.	Poor: small stones, too clayey.
15*:					
Doniphan	Moderate: slope.	Severe: slope.	Severe: too clayey, small stones.	Moderate: slope.	Poor: small stones, too clayey.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
15*:					
Gepp	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
16 Dundee	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey.
17 Gepp	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
18 Gepp	Severe: slope.	Severe: slope.	Severe: too clayey.	Severe: slope.	Poor: slope, too clayey.
19*:					
Gepp	Severe: slope.	Severe: slope.	Severe: too clayey.	Severe: slope.	Poor: slope, too clayey.
Doniphan	Severe: slope.	Severe: slope.	Severe: too clayey, small stones.	Severe: slope.	Poor: slope, small stones, too clayey.
20*:					
Gepp	Severe: slope.	Severe: slope.	Severe: too clayey.	Severe: slope.	Poor: slope, too clayey.
Ventris	Severe: slope, percs slowly.	Severe: slope, depth to rock.	Severe: too clayey, depth to rock.	Severe: slope.	Poor: slope, too clayey.
21*:					
Gepp	Severe: slope.	Severe: slope.	Severe: too clayey, slope.	Severe: slope.	Poor: slope, too clayey.
Ventris	Severe: slope, percs slowly.	Severe: slope, depth to rock.	Severe: too clayey, depth to rock.	Severe: slope.	Poor: slope, too clayey.
22 Hontas	Severe: floods, wetness.	Severe: floods.	Severe: floods, wetness.	Severe: floods, wetness.	Good.
23 Jackport	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness, too clayey.
24 Kobel	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, wetness.
25 Loring	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Good.
26 Loring	Severe: percs slowly.	Severe: slope.	Slight	Moderate: slope.	Fair: slope.
27 McCrory	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
28------------------ Patterson	Severe: wetness.	Severe: seepage.	Severe: wetness, seepage, too sandy.	Severe: wetness, seepage.	Fair: thin layer.
29------------------ Peridge	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
30*. Pits					
31------------------ Razort	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Good.
32*:					
Ventris------------	Severe: percs slowly.	Severe: depth to rock.	Severe: too clayey, depth to rock.	Slight-----------	Poor: too clayey.
Rock outcrop.					

* See map unit description for the composition and behavior of the map unit.

TABLE 10.--CONSTRUCTION MATERIALS

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," and "unsuited." Absence of an entry means soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1 Amagon	Poor: wetness, low strength.	Unsuited	Unsuited	Poor: wetness.
2*:				
Arkana	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Fair: thin layer.
Rock outcrop.				
3 Ashton	Fair: low strength.	Poor: excess fines.	Unsuited	Good.
4 Bosket	Fair: low strength.	Poor	Unsuited	Good.
5, 6 Brocket	Fair: low strength.	Unsuited	Unsuited	Poor: small stones.
7 Broseley	Fair: low strength.	Poor: excess fines.	Unsuited	Poor: too sandy.
8, 9 Captina	Fair: low strength.	Unsuited	Unsuited	Fair: thin layer.
10, 11 Clarksville	Fair: frost action.	Unsuited	Unsuited	Poor: small stones.
12 Crowley	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Fair: thin layer, wetness.
13, 14 Doniphan	Poor: low strength.	Unsuited	Unsuited	Poor: small stones.
15*:				
Doniphan	Poor: low strength.	Unsuited	Unsuited	Poor: small stones.
Gepp	Fair: low strength, shrink-swell.	Unsuited	Unsuited	Poor: small stones, thin layer.
16 Dundee	Fair: wetness, shrink-swell.	Unsuited	Unsuited	Fair: thin layer.
17 Gepp	Fair: low strength, shrink-swell.	Unsuited	Unsuited	Poor: small stones, thin layer.
18 Gepp	Fair: low strength, shrink-swell, slope.	Unsuited	Unsuited	Poor: small stones, thin layer.
19*:				
Gepp	Fair: low strength, shrink-swell, slope.	Unsuited	Unsuited	Poor: small stones, thin layer.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
19*:				
Doniphan	Poor: low strength.	Unsuited	Unsuited	Poor: slope, small stones.
20*, 21*:				
Gepp	Fair: low strength, shrink-swell, slope.	Unsuited	Unsuited	Poor: small stones, thin layer.
Ventris	Poor: thin layer, low strength, shrink-swell.	Unsuited	Unsuited	Poor: slope, thin layer, too clayey.
22 Hontas	Fair: low strength, wetness.	Unsuited	Unsuited	Good.
23 Jackport	Poor: wetness, low strength, shrink-swell.	Unsuited	Unsuited	Poor: wetness, too clayey.
24 Kobel	Poor: wetness, shrink-swell.	Unsuited	Unsuited	Poor: too clayey, wetness.
25, 26 Loring	Fair: low strength.	Unsuited	Unsuited	Good.
27 McCrory	Poor: wetness.	Poor: excess fines.	Unsuited	Poor: wetness.
28 Patterson	Fair: wetness.	Poor: excess fines.	Unsuited	Good.
29 Peridge	Fair: low strength.	Unsuited	Unsuited	Fair: thin layer.
30*. Pits				
31 Razort	Fair: low strength.	Unsuited	Unsuited	Good.
32*:				
Ventris	Poor: thin layer, low strength, shrink-swell.	Unsuited	Unsuited	Poor: thin layer, too clayey.
Rock outcrop.				

* See map unit description for the composition and behavior of the map unit.

TABLE 11.--WATER MANAGEMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not evaluated]

Soil name and map symbol	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1 Amagon	Slight	Moderate: unstable fill, compressible, low strength.	Severe: no water.	Percs slowly, wetness.	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
2*:							
Arkana	Severe: depth to rock.	Moderate: shrink-swell, low strength.	Severe: deep to water.	Not needed	Percs slowly	Depth to rock, slope.	Erodes easily, percs slowly, slope.
Rock outcrop.							
3 Ashton	Moderate: seepage.	Moderate: piping.	Severe: no water.	Not needed	Erodes easily, slope.	Erodes easily, slope.	Erodes easily, slope.
4 Bosket	Severe: seepage.	Moderate: piping, unstable fill.	Severe: no water.	Not needed	Complex slope, erodes easily, slope.	Erodes easily, slope.	Erodes easily, slope.
5 Brocket	Moderate: seepage.	Moderate: low strength.	Severe: deep to water.	Not needed	Slope	Favorable	Slope.
6 Brocket	Moderate: seepage.	Moderate: low strength.	Severe: deep to water.	Not needed	Slope	Slope	Slope.
7 Broseley	Severe: seepage.	Severe: piping, erodes easily.	Severe: no water.	Not needed	Complex slope, droughty, fast intake.	Complex slope, too sandy.	Droughty.
8, 9 Captina	Moderate: depth to rock.	Moderate: thin layer, unstable fill, compressible.	Severe: no water.	Not needed	Complex slope, slope.	Slope, depth to rock, erodes easily.	Erodes easily, slope.
10, 11 Clarksville	Severe: seepage, slope.	Severe: large stones.	Severe: deep to water.	Not needed	Slope, droughty, fast intake.	Large stones, slope.	Droughty, large stones, slope.
12 Crowley	Slight	Moderate: compressible, low strength.	Severe: no water.	Percs slowly	Slow intake, percs slowly.	Not needed	Favorable.
13, 14 Doniphan	Moderate: seepage, slope.	Moderate: hard to pack, low strength.	Severe: no water.	Not needed	Droughty, slope.	Slope	Slope, droughty.
15*:							
Doniphan	Moderate: seepage, slope.	Moderate: hard to pack, low strength.	Severe: no water.	Not needed	Droughty, slope.	Slope	Slope, droughty.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
15*:							
Gepp	Moderate: seepage.	Moderate: compressible, unstable fill.	Severe: no water.	Not needed	Complex slope	Complex slope	Slope.
16 Dundee	Moderate: seepage.	Moderate: seepage, compressible, piping.	Severe: deep to water.	Favorable	Wetness, slow intake.	Not needed	Wetness, percs slowly.
17, 18 Gepp	Moderate: seepage.	Moderate: compressible, unstable fill.	Severe: no water.	Not needed	Complex slope	Complex slope	Slope.
19*:							
Gepp	Moderate: seepage.	Moderate: compressible, unstable fill.	Severe: no water.	Not needed	Complex slope	Complex slope	Slope.
Doniphan	Moderate: seepage, slope.	Moderate: hard to pack, low strength.	Severe: no water.	Not needed	Droughty, slope.	Slope	Slope, droughty.
20*, 21*:							
Gepp	Moderate: seepage.	Moderate: compressible, unstable fill.	Severe: no water.	Not needed	Complex slope	Complex slope	Slope.
Ventris	Severe: depth to rock.	Severe: thin layer, unstable fill, compressible.	Severe: no water.	Not needed	Erodes easily, slope, slow intake.	Depth to rock, erodes easily, slope.	Erodes easily, percs slowly, slope.
22 Hontas	Moderate: seepage.	Moderate: compressible, low strength, piping.	Severe: deep to water.	Floods, poor outlets, wetness.	Favorable	Not needed	Not needed.
23 Jackport	Slight	Moderate: unstable fill, compressible, low strength.	Severe: no water.	Wetness, percs slowly.	Slow intake, wetness.	Wetness	Wetness.
24 Kobel	Slight	Moderate: low strength, shrink-swell, compressible.	Severe: deep to water.	Percs slowly, poor outlets.	Slow intake, wetness.	Wetness, percs slowly.	Wetness, percs slowly.
25, 26 Loring	Moderate: seepage.	Moderate: piping, low strength.	Severe: no water.	Not needed	Rooting depth, erodes easily, slope.	Erodes easily, slope.	Rooting depth, erodes easily, slope.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
27----------------- McCrory	Moderate: seepage.	Moderate: unstable fill, seepage, piping.	Severe: no water.	Wetness, percs slowly.	Wetness--------	Wetness--------	Wetness.
28----------------- Patterson	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Cutbanks cave, wetness.	Favorable------	Not needed-----	Not needed.
29----------------- Peridge	Moderate: seepage.	Moderate: low strength, compressible.	Severe: no water.	Not needed-----	Complex slope	Favorable------	Slope.
30*. Pits							
31----------------- Razort	Moderate: seepage.	Moderate: unstable fill, piping, compressible.	Severe: no water.	Not needed-----	Floods---------	Floods---------	Favorable.
32*:							
Ventris-----------	Severe: depth to rock.	Severe: thin layer, unstable fill, compressible.	Severe: no water.	Not needed-----	Erodes easily, slope, slow intake.	Depth to rock, erodes easily, slope.	Erodes easily, percs slowly, slope.
Rock outcrop.							

* See map unit description for the composition and behavior of the map unit.

TABLE 12.--RECREATIONAL DEVELOPMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
1 Amagon	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
2*:				
Arkana	Severe: percs slowly.	Moderate: slope.	Severe: slope, percs slowly.	Slight.
Rock outcrop.				
3 Ashton	Severe: floods.	Moderate: floods.	Moderate: floods.	Slight.
4 Bosket	Slight	Slight	Slight	Slight.
5 Brocket	Slight	Slight	Moderate: slope.	Slight.
6 Brocket	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
7 Broseley	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.
8 Captina	Moderate: wetness, percs slowly.	Slight	Moderate: slope, wetness, percs slowly.	Slight.
9 Captina	Moderate: slope, wetness, percs slowly.	Moderate: slope.	Severe: slope.	Slight.
10, 11 Clarksville	Severe: small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.
12 Crowley	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, percs slowly.	Severe: wetness.
13 Doniphan	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
14 Doniphan	Moderate: small stones, slope.	Moderate: small stones, slope.	Severe: slope, small stones.	Moderate: small stones.
15*:				
Doniphan	Moderate: small stones, slope.	Moderate: small stones, slope.	Severe: slope, small stones.	Moderate: small stones.
Gepp	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
16 Dundee	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness, percs slowly.	Moderate: wetness.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
17 Gepp	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
18 Gepp	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.
19*:				
Gepp	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.
Doniphan	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: small stones, slope.
20*, 21*:				
Gepp	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.
Ventris	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, percs slowly.	Moderate: slope.
22 Hontas	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.
23 Jackport	Severe: wetness, percs slowly, too clayey.	Severe: wetness, too clayey.	Severe: wetness, percs slowly, too clayey.	Severe: wetness, too clayey.
24 Kobel	Severe: wetness, percs slowly, too clayey.	Severe: wetness, too clayey.	Severe: wetness, too clayey, percs slowly.	Severe: wetness, too clayey.
25 Loring	Slight	Slight	Moderate: slope.	Slight.
26 Loring	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
27 McCrory	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
28 Patterson	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
29 Peridge	Slight	Slight	Moderate: slope.	Slight.
30*. Pits				
31 Razort	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.
32*:				
Ventris	Severe: percs slowly.	Slight	Severe: percs slowly.	Slight.
Rock outcrop.				

* See map unit description for the composition and behavior of the map unit.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means more than. Absence of an entry means data were not estimated]

Soil name and map symbol	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------------------ Amagon	0-6	Silt loam-------	ML, CL, CL-ML	A-4	0	---	100	85-100	85-100	<30	NP-10
	6-30	Silt loam, silty clay loam.	CL	A-6, A-7	0	---	100	85-100	85-100	30-45	11-22
	30-72	Silt loam, loam, silty clay loam.	ML, CL	A-4, A-6, A-7	0	---	100	80-100	60-100	20-45	1-22
2*:											
Arkana------------	0-8	Silty clay loam	ML, CL-ML, CL	A-4, A-6	0	100	100	90-100	70-95	<35	NP-15
	8-33	Clay, silty clay.	CH	A-7	0-10	70-90	70-85	65-85	60-80	51-80	31-50
	33-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
3------------------ Ashton	0-8	Silt loam-------	ML, CL	A-4	0	95-100	90-100	75-100	60-95	<35	NP-10
	8-72	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-100	75-100	25-42	5-20
4------------------ Bosket	0-14	Fine sandy loam	SM	A-2, A-4	0	100	100	75-100	25-45	<20	NP-3
	14-44	Sandy clay loam, clay loam, sandy loam.	SC, SM-SC, CL-ML, CL	A-2, A-4, A-6	0	100	100	85-100	30-70	25-40	5-17
	44-72	Fine sandy loam, sandy loam, sand, loamy fine sand.	SM	A-2, A-4	0	100	100	65-100	15-45	<20	NP-3
5, 6--------------- Brocket	0-16	Gravelly fine sandy loam.	SM, SM-SC	A-2, A-1, A-4	0	90-100	65-85	40-70	20-45	<20	NP-7
	16-58	Sandy clay loam, clay loam, loam.	CL, SC	A-4, A-6	0	100	100	80-95	36-80	25-38	8-20
	58-72	Fine sandy loam, sandy loam, sandy clay loam.	SM, SM-SC, CL-ML, ML	A-4, A-2	0	100	100	60-85	30-55	<25	NP-9
7------------------ Broseley	0-26	Loamy fine sand	SM	A-2, A-4	0	100	100	60-95	20-50	<20	NP-3
	26-44	Fine sandy loam, sandy clay loam.	SM, SC, SM-SC	A-4, A-6	0	100	100	65-95	36-50	20-35	2-15
	44-72	Stratified loamy sand to sandy loam.	SM, SM-SC	A-4, A-2	0	100	100	60-80	20-50	<25	NP-7
8, 9--------------- Captina	0-4	Silt loam-------	ML, CL-ML	A-4	0	95-100	90-100	85-100	75-95	<35	NP-7
	4-20	Silty clay loam, silt loam.	CL-ML, CL	A-4, A-6	0	95-100	95-100	90-100	85-95	20-45	5-20
	20-72	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

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	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	
10, 11----------- Clarksville	0-16	Cherty silt loam.	GC, GM, CL	A-6, A-4	5-20	45-75	45-75	35-65	25-55	20-40	5-15
	16-40	Very cherty silty clay loam, very cherty silty clay.	GC, GP-GC,	A-2-6, A-1, A-6	5-20	30-70	10-60	10-50	5-45	30-40	15-25
	40-72	Very cherty silty clay.	GC	A-2, A-1 A-7	5-20	30-70	10-60	10-50	10-45	55-65	35-45
12--------------- Crowley	0-16	Silt loam-------	ML, CL-ML, CL	A-4	0	100	100	95-100	80-100	<30	NP-10
	16-60	Silty clay, silty clay loam.	CH, CL	A-7	0	100	100	95-100	85-100	41-60	20-35
13, 14----------- Doniphan	0-16	Cherty silt loam	CL-ML, ML, GM, GM-GC	A-4	5-30	50-80	45-70	45-65	35-60	20-30	2-8
	16-72	Clay, silty clay	CH	A-7	0-5	90-100	90-100	85-100	70-95	51-70	25-35
15*: Doniphan----------	0-16	Cherty silt loam	CL-ML, ML, GM GM-GC	A-4	5-30	50-80	45-70	45-65	35-60	20-30	2-8
	16-72	Clay, silty clay	CH	A-7	0-5	90-100	90-100	85-100	70-95	51-70	25-35
Gepp--------------	0-7	Very cherty silt loam.	GM, GC, SM-SC	A-1, A-2	10-30	30-70	20-50	10-40	5-20	<30	NP-10
	7-13	Cherty silty clay loam, cherty clay loam, silty clay loam.	CL	A-6, A-4	0-15	65-100	65-100	55-95	51-90	25-40	8-20
	13-72	Clay------------	MH, CH	A-7	0-15	70-100	70-100	65-100	60-95	55-75	25-40
16--------------- Dundee	0-4	Silt loam-------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	75-98	20-35	4-11
	4-40	Loam, silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	90-100	70-95	28-44	12-22
	40-72	Silty clay, loam, silt loam	CH, ML, CL	A-7, A-6 A-4	0	100	100	90-100	80-95	40-75	10-50
17, 18----------- Gepp	0-7	Very cherty silt loam.	GM, GC	A-1, A-2	10-30	30-70	20-50	10-40	5-20	<30	NP-10
	7-13	Cherty silty clay loam, cherty clay loam, silty clay loam.	CL	A-6, A-4	0-15	65-100	65-100	55-95	51-90	25-40	8-20
	13-72	Clay------------	MH, CH	A-7	0-15	70-100	70-100	65-100	60-95	55-75	25-40
19*: Gepp--------------	0-7	Very cherty silt loam.	GM, GC, SM-SC	A-1, A-2	10-30	30-70	20-50	10-40	5-20	<30	NP-10
	7-13	Cherty silty clay loam, cherty clay loam, silty clay loam.	CL	A-6, A-4	0-15	65-100	65-100	55-95	51-90	25-40	8-20
	13-72	Clay------------	MH, CH	A-7	0-15	70-100	70-100	65-100	60-95	55-75	25-40

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
19*: Doniphan----------	0-16	Cherty silt loam	CL-ML, GM, GM-GC	A-4	5-30	50-80	45-70	45-65	35-60	20-30	2-8
	16-72	Clay, silty clay	CH	A-7	0-5	90-100	90-100	85-100	70-95	51-70	25-35
20*, 21*: Gepp--------------	0-7	Cherty silt loam	GM, GC, ML, CL	A-2, A-4	10-25	45-75	45-75	35-65	25-55	<30	NP-10
	7-13	Cherty silty clay loam, cherty clay loam, silty clay loam.	CL	A-6, A-4	0-15	65-100	65-100	55-95	51-90	25-40	8-20
	13-72	Clay------------	MH, CH	A-7	0-15	70-100	70-100	65-100	60-95	55-75	25-40
Ventris-----------	0-5	Silt loam-------	ML, CL, GM, GC	A-4, A-6	3-6	50-85	45-80	40-70	36-65	<35	NP-15
	5-32	Clay, silty clay	CH	A-7	0	70-95	70-95	65-95	60-90	50-80	35-55
	32-34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
22---------------- Hontas	0-72	Silt loam-------	CL, CL-ML	A-4, A-6	0	100	100	90-100	85-95	20-35	5-15
23---------------- Jackport	0-12	Silty clay loam	CL, CH	A-6, A-7	0	100	100	95-100	85-100	30-55	12-30
	12-58	Silty clay, clay	CH	A-7	0	100	100	95-100	90-100	51-85	25-55
	58-72	Clay, silty clay, silty clay loam.	CH	A-7	0	100	100	95-100	90-100	51-85	25-55
24---------------- Kobel	0-10	Silty clay loam	CL, CH	A-7	0	100	100	95-100	85-95	45-55	25-35
	10-72	Clay, silty clay, silty clay loam.	CH, CL	A-7	0	100	100	95-100	90-95	45-75	25-50
25, 26------------ Loring	0-8	Silt loam-------	ML, CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	20-35	4-15
	8-24	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	95-100	90-100	35-45	15-25
	24-72	Silt loam, silty clay loam.	CL, ML	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	8-25
27---------------- McCrory	0-19	Fine sandy loam	SM, ML	A-4	0	100	100	70-95	40-65	<25	NP-3
	19-28	Sandy clay loam, fine sandy loam, loam.	SM, SC, ML, CL	A-4	0	100	100	70-95	40-85	<30	NP-10
	28-49	Sandy clay loam, fine sandy loam, loam.	SM, SC, ML, CL	A-4	0	100	100	70-95	40-85	<30	NP-10
	49-72	Loamy fine sand, fine sandy loam.	SM, ML	A-4, A-2	0	100	100	60-95	25-75	<30	NP-3
28---------------- Patterson	0-8	Fine sandy loam	SM	A-2, A-4	0	100	100	75-100	25-45	---	NP
	8-34	Fine sandy loam, sandy loam, very fine sandy loam.	SM, SM-SC	A-2, A-4	0	100	100	75-100	25-50	<25	NP-7
	34-72	Loamy fine sand, loamy sand.	SM	A-2, A-4	0	100	100	55-100	15-40	---	NP
29---------------- Peridge	0-5	Silt loam-------	ML, CL-ML	A-4	0	95-100	90-100	85-90	80-85	<20	NP-5
	5-72	Silty clay loam	CL	A-6	0	95-100	90-100	85-95	80-95	30-40	11-20
30*. Pits											

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
31----------------- Razort	0-12	Silt loam-------	ML, CL-ML	A-4	0	75-100	70-100	65-90	65-90	<25	NP-7
	12-46	Silt loam, loam, clay loam.	ML, CL, CL-ML	A-4, A-6	0	85-100	85-100	75-85	70-80	25-40	7-15
	46-66	Gravelly sandy loam, very cherty silt loam.	GM, GC, ML, CL-ML	A-2, A-4	0	25-75	20-70	20-65	20-60	25-35	2-15
32*:											
Ventris-----------	0-5	Silt loam-------	ML, CL, GM, GC	A-4, A-6	3-6	50-85	45-80	40-70	36-65	<35	NP-15
	5-32	Clay, silty clay	CH	A-7	0	70-95	70-95	65-95	60-90	50-80	35-55
	32-34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											

* See map unit description for the composition and behavior of the map unit.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means greater than. The erosion tolerance factor (T) is for the entire profile. Absence of an entry means data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T
	In	In/hr	In/in	pH			
1----------------- Amagon	0-6	0.6-2.0	0.16-0.24	4.5-6.0	Low------------	0.43	5
	6-30	0.06-0.2	0.16-0.24	4.5-6.0	Moderate-------	0.37	
	30-72	0.06-0.6	0.15-0.24	5.1-7.3	Low------------	0.43	
2*:							
Arkana----------	0-8	0.6-2.0	0.16-0.24	5.6-7.8	Low------------	0.37	2
	8-33	<0.06	0.12-0.18	5.6-7.8	High-----------	0.32	
	33-35	---	---	---	---------------	---	
Rock outcrop.							
3----------------- Ashton	0-8	0.6-2.0	0.16-0.23	5.6-7.3	Low------------	0.28	4
	8-72	0.6-2.0	0.18-0.23	5.6-7.3	Low------------	0.43	
4----------------- Bosket	0-14	2.0-6.0	0.10-0.15	5.1-6.5	Low------------	0.24	4
	14-44	0.6-2.0	0.10-0.20	5.1-6.5	Low------------	0.32	
	44-72	>2.0	0.02-0.15	5.1-6.5	Low------------	0.24	
5, 6------------- Brocket	0-16	0.6-2.0	0.08-0.16	4.5-6.5	Low------------	0.24	5
	16-58	0.6-2.0	0.12-0.20	4.5-6.0	Low------------	0.32	
	58-72	0.6-2.0	0.10-0.15	4.5-6.0	Low------------	0.24	
7----------------- Broseley	0-26	6.0-20	0.09-0.12	5.6-6.5	Low------------	0.17	5
	26-44	2.0-6.0	0.12-0.16	5.1-6.0	Low------------	0.24	
	44-72	2.0-20	0.08-0.14	5.1-6.0	Low------------	0.17	
8, 9------------- Captina	0-4	0.6-2.0	0.16-0.24	5.1-6.5	Low------------	0.43	3
	4-20	0.6-2.0	0.16-0.24	4.5-5.5	Low------------	0.37	
	20-72	0.06-0.2	0.08-0.12	4.5-5.5	Low------------	0.32	
10, 11----------- Clarksville	0-16	2.0-6.0	0.07-0.12	4.5-5.0	Very low-------	0.24	2
	16-40	2.0-6.0	0.06-0.10	4.5-5.0	Low------------	0.24	
	40-72	2.0-6.0	0.05-0.08	4.5-5.0	Low------------	0.24	
12---------------- Crowley	0-16	0.2-0.6	0.20-0.23	4.5-6.5	Low------------	0.43	4
	16-60	<0.06	0.19-0.21	4.5-6.5	High-----------	0.32	
13, 14----------- Doniphan	0-16	2.0-6.0	0.08-0.15	4.5-6.5	Low------------	0.28	2
	16-72	0.6-2.0	0.08-0.10	3.6-5.5	Moderate-------	0.28	
15*:							
Doniphan--------	0-16	2.0-6.0	0.08-0.15	4.5-6.5	Low------------	0.28	2
	16-72	0.6-2.0	0.08-0.10	3.6-5.5	Moderate-------	0.28	
Gepp------------	0-7	0.6-2.0	0.08-0.18	5.1-6.0	Low------------	0.28	4
	7-13	0.6-2.0	0.10-0.22	4.5-5.5	Low------------	0.28	
	13-72	0.6-2.0	0.08-0.18	4.5-6.0	Moderate-------	0.28	
16---------------- Dundee	0-4	0.6-2.0	0.15-0.20	4.5-6.0	Low------------	0.37	4
	4-40	0.2-0.6	0.15-0.20	4.5-6.0	Moderate-------	0.32	
	40-72	0.06-2.0	0.14-0.18	4.5-7.3	High-----------	0.32	
17, 18----------- Gepp	0-7	0.6-2.0	0.08-0.18	5.1-6.0	Low------------	0.28	4
	7-13	0.6-2.0	0.10-0.22	4.5-5.5	Low------------	0.28	
	13-72	0.6-2.0	0.08-0.18	4.5-6.0	Moderate-------	0.28	
19*:							
Gepp------------	0-7	0.6-2.0	0.08-0.18	5.1-6.0	Low------------	0.28	4
	7-13	0.6-2.0	0.10-0.22	4.5-5.5	Low------------	0.28	
	13-72	0.6-2.0	0.08-0.18	4.5-6.0	Moderate-------	0.28	
Doniphan--------	0-16	2.0-6.0	0.08-0.15	4.5-6.5	Low------------	0.28	2
	16-72	0.6-2.0	0.08-0.10	3.6-5.5	Moderate-------	0.28	

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
20*, 21*:							
Gepp------------	0-7	0.6-2.0	0.08-0.18	5.1-6.0	Low------------	0.28	4
	7-13	0.6-2.0	0.10-0.22	4.5-5.5	Low------------	0.28	
	13-72	0.6-2.0	0.08-0.18	4.5-6.0	Moderate--------	0.28	
Ventris---------	0-5	0.6-2.0	0.12-0.20	5.6-7.3	Low------------	0.43	2
	5-32	<0.06	0.10-0.18	6.1-7.8	High-----------	0.37	
	32-34	---	---	---	---------------	---	
22--------------- Hontas	0-72	0.6-2.0	0.16-0.24	5.6-7.8	Low------------	0.37	5
23--------------- Jackport	0-12	0.2-0.6	0.18-0.22	4.5-6.0	Moderate--------	0.43	5
	12-58	<0.06	0.12-0.18	4.5-5.5	High-----------	0.32	
	58-72	<0.06	0.12-0.18	4.5-7.8	High-----------	0.32	
24--------------- Kobel	0-10	0.2-0.6	0.18-0.22	5.1-7.3	Moderate--------	0.43	5
	10-72	<0.06	0.12-0.22	6.1-8.4	Very high------	0.37	
25, 26----------- Loring	0-8	0.6-2.0	0.20-0.23	4.5-6.0	Low------------	0.43	3
	8-24	0.6-2.0	0.20-0.22	4.5-6.0	Low------------	0.43	
	24-72	0.2-0.6	0.06-0.13	4.5-6.0	Low------------	0.43	
27--------------- McCrory	0-19	0.6-2.0	0.11-0.15	4.5-7.3	Low------------	0.24	3
	19-28	0.2-0.6	0.11-0.17	5.1-7.3	Low------------	0.32	
	28-49	0.2-0.6	0.05-0.08	6.6-8.4	Low------------	0.49	
	49-72	0.6-2.0	0.03-0.08	6.6-8.4	Low------------	0.49	
28--------------- Patterson	0-8	2.0-6.0	0.11-0.15	4.5-6.0	Low------------	0.20	5
	8-34	2.0-6.0	0.12-0.16	4.5-5.5	Low------------	0.20	
	34-72	>6.0	0.06-0.10	4.5-5.5	Low------------	0.17	
29--------------- Peridge	0-5	0.6-2.0	0.16-0.24	4.5-6.0	Low------------	0.37	5
	5-72	0.6-2.0	0.18-0.22	4.5-6.0	Low------------	0.32	
30*. Pits							
31--------------- Razort	0-12	0.6-2.0	0.10-0.22	6.1-7.3	Low------------	0.37	5
	12-46	0.6-2.0	0.13-0.22	5.6-6.5	Low------------	0.37	
	46-66	2.0-6.0	0.08-0.12	5.6-6.5	Low------------	0.32	
32*:							
Ventris---------	0-5	0.6-2.0	0.12-0.20	5.6-7.3	Low------------	0.43	2
	5-32	<0.06	0.10-0.18	6.1-7.8	High-----------	0.37	
	32-34	---	---	---	---------------	---	
Rock outcrop.							

* See map unit description for the composition and behavior of the map unit.

TABLE 15.--SOIL AND WATER FEATURES

[Absence of an entry indicates the feature is not a concern. See text for descriptions of symbols and such terms as "rare," "brief," and "perched." The symbol > means more than]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness
					Ft			In	
1 Amagon	D	None	---	---	1.0-2.0	Perched	Dec-Apr	>60	---
2*:									
Arkana	C	None	---	---	>6.0	---	---	20-36	Hard
Rock outcrop.									
3 Ashton	B	Occasional	Very brief	Dec-Jun	>6.0	---	---	>60	---
4 Bosket	B	None	---	---	>6.0	---	---	>60	---
5, 6 Brocket	C	None	---	---	>6.0	---	---	>60	---
7 Broseley	B	None	---	---	>6.0	---	---	>60	---
8, 9 Captina	C	None	---	---	2.0-3.0	Perched	Dec-Apr	40-72	Rippable
10, 11 Clarksville	B	None	---	---	>6.0	---	---	>60	---
12 Crowley	D	None	---	---	0.5-1.5	Perched	Dec-Apr	>60	---
13, 14 Doniphan	B	None	---	---	>6.0	---	---	>60	---
15*:									
Doniphan	B	None	---	---	>6.0	---	---	>60	---
Gepp	B	None	---	---	>6.0	---	---	>60	Hard
16 Dundee	C	None	---	---	1.5-3.5	Apparent	Jan-Apr	>60	---
17, 18 Gepp	B	None	---	---	>6.0	---	---	>60	Hard
19*:									
Gepp	B	None	---	---	>6.0	---	---	>60	Hard
Doniphan	B	None	---	---	>6.0	---	---	>60	---
20*, 21*:									
Gepp	B	None	---	---	>6.0	---	---	>60	Hard
Ventris	D	None	---	---	>6.0	---	---	24-40	Hard
22 Hontas	B	Frequent	Very brief to brief.	Dec-Jun	2.0-2.5	Apparent	Dec-Apr	>60	---
23 Jackport	D	None	---	---	0-1.0	Perched	Dec-Apr	>60	---
24 Kobel	D	None	---	---	0-1.0	Perched	Dec-Apr	>60	---

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness
					Ft			In	
25, 26----------- Loring	C	None--------	---	---	2.0-3.0	Perched	Dec-Mar	>60	---
27--------------- McCrory	D	None--------	---	---	0-1.0	Perched	Dec-Apr	>60	---
28--------------- Patterson	C	None--------	---	---	0-1.0	Apparent	Dec-Apr	>60	---
29--------------- Peridge	B	None--------	---	---	>6.0	---	---	>60	---
30*. Pits									
31--------------- Razort	B	Frequent----	Very brief to brief.	Jan-Apr	>6.0	---	---	>60	---
32*: Ventris----------	D	None--------	---	---	>6.0	---	---	24-40	Hard
Rock outcrop.									

* See map unit description for the composition and behavior of the map unit.

TABLE 16.--PHYSICAL ANALYSES OF SELECTED SOILS

Soil name and sample number	Depth	Horizon	Particle size distribution (less than 2.0 mm)					
			Sand					
			Very coarse to medium (2.0-0.25 mm)	Fine (0.25-0.10 mm)	Very fine (0.10-0.05 mm)	Total	Silt (0.05-0.002 mm)	Clay (<0.002 mm)
	In		Pct	Pct	Pct	Pct	Pct	Pct
Doniphan cherty silt loam:								
S74-AR-121-3-1	0-2	A1	12	6	5	23	68	9
S74-AR-121-3-2	2-9	A2	11	6	4	21	67	12
S74-AR-121-3-3	9-16	B1	8	4	4	16	67	17
S74-AR-121-3-4	16-32	B21t	6	3	3	12	41	47
S74-AR-121-3-5	32-47	B22t	6	4	4	14	30	56
S74-AR-121-3-5	47-60	B23t	1	0	2	3	15	82
S74-AR-121-3-6	60-72	B23t	0	1	1	2	18	80
Loring silt loam:								
S75-AR-121-2-1	0-4	Ap	1	1	2	4	84	12
S75-AR-121-2-2	4-8	B1	1	1	1	3	77	20
S75-AR-121-2-3	8-14	B21t	1	0	1	2	72	26
S75-AR-121-2-4	14-24	B22t	1	0	1	2	72	26
S75-AR-121-2-5	24-40	Bx1	1	0	1	2	71	27
S75-AR-121-2-6	40-56	Bx2	1	0	1	2	67	31

TABLE 17.--CHEMICAL ANALYSES OF SELECTED SOILS

Soil name and sample number	Depth	Horizon	Milliequivalents per 100 grams of soil--					Base saturation	Reaction 1:1 soil:water	Organic matter	Available phosphorus
			Extractable bases				Extractable acidity				
			Ca	Mg	Na	K					
	Inches							Percent	pH	Percent	Parts per million
Doniphan cherty silt loam:											
S74-AR-121-3-1----------	0-2	A1	3	1	0	0	8	33	5.2	3	8
S74-AR-121-3-2----------	2-9	A2	2	1	0	0	6	30	5.6	2	4
S74-AR-121-3-3----------	9-16	B1	2	1	0	0	6	30	5.6	1	2
S74-AR-121-3-4----------	16-32	B21t	1	3	0	0	15	24	5.1	1	1
S74-AR-121-3-5----------	32-47	B22t	1	2	0	0	19	17	4.9	0	1
S74-AR-121-3-6----------	47-60	B23t	1	1	0	0	23	11	4.8	0	1
S74-AR-121-3-7----------	60-72	B23t	1	1	0	0	20	10	4.7	0	2
Loring silt loam:											
S75-AR-121-2-1	0-4	Ap	1	1	0	0	10	11	4.5	2	4
S75-AR-121-2-2	4-8	B1	1	1	0	0	13	13	4.7	1	3
S75-AR-121-2-3	8-14	B21t	1	2	0	0	17	13	4.7	1	3
S75-AR-121-2-4	14-24	B22t	0	2	0	0	15	14	5.0	0	3
S75-AR-121-2-5	24-40	Bx1	1	4	0	0	15	24	5.0	0	3
S75-AR-121-2-6	40-56	Bx2	2	6	1	0	11	44	4.9	0	3

TABLE 18.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Amagon	Fine-silty, mixed, thermic Typic Ochraqualfs
Arkana	Very-fine, mixed, mesic Mollic Hapludalfs
Ashton	Fine-silty, mixed, mesic Mollic Hapludalfs
Bosket	Fine-loamy, mixed, thermic Mollic Hapludalfs
Brocket	Fine-loamy, siliceous, mesic Typic Paleudults
Broseley	Loamy, mixed, thermic Arenic Hapludalfs
Captina	Fine-silty, mixed, mesic Typic Fragiudults
Clarksville	Loamy-skeletal, siliceous, mesic Typic Paleudults
Crowley	Fine, montmorillonitic, thermic Typic Albaqualfs
Doniphan	Clayey, mixed, mesic Typic Paleudults
Dundee	Fine-silty, mixed, thermic Aeric Ochraqualfs
Gepp	Very-fine, mixed, mesic Typic Paleudalfs
Hontas	Fine-silty, mixed, mesic Fluvaquentic Eutrochrepts
Jackport	Very-fine, montmorillonitic, thermic Vertic Ochraqualfs
Kobel	Fine, montmorillonitic, nonacid, thermic Vertic Haplaquepts
Loring	Fine-silty, mixed, thermic Typic Fragiudalfs
McCrory	Fine-loamy, mixed, thermic Albic Glossic Natraqualfs
Patterson	Coarse-loamy, mixed, thermic Aeric Ochraqualfs
Peridge	Fine-silty, mixed, mesic Typic Paleudalfs
Razort	Fine-loamy, mixed, mesic Mollic Hapludalfs
Ventris	Very-fine, mixed, mesic Albaquic Hapludalfs

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