SOIL SURVEY OF

Saline County, Arkansas

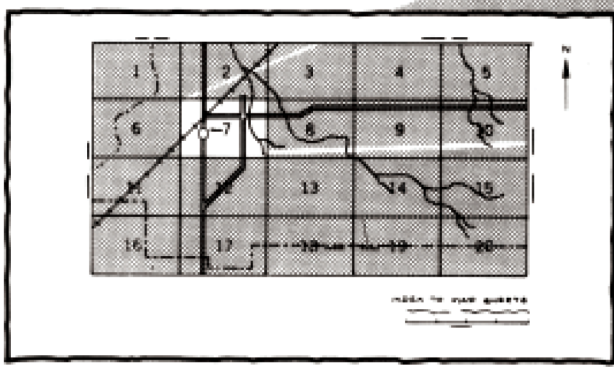
United States Department of Agriculture
Soil Conservation Service

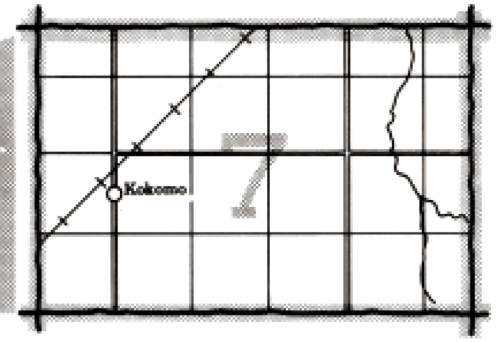
in cooperation with

Arkansas Agricultural Experiment Station

HOW TO USE

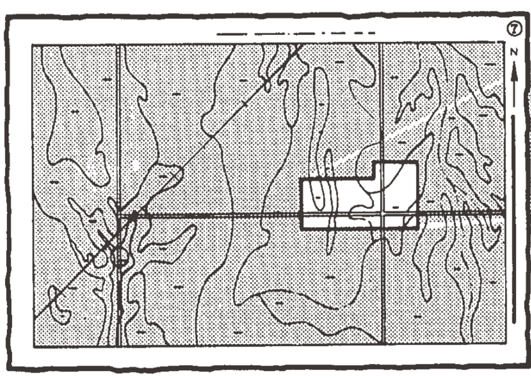
1. Locate your area of interest on the "Index to Map Sheets"

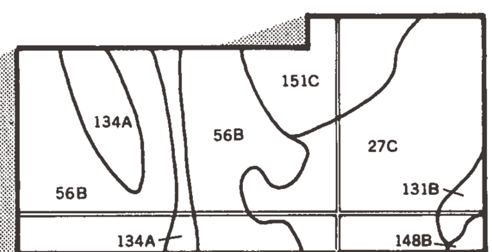




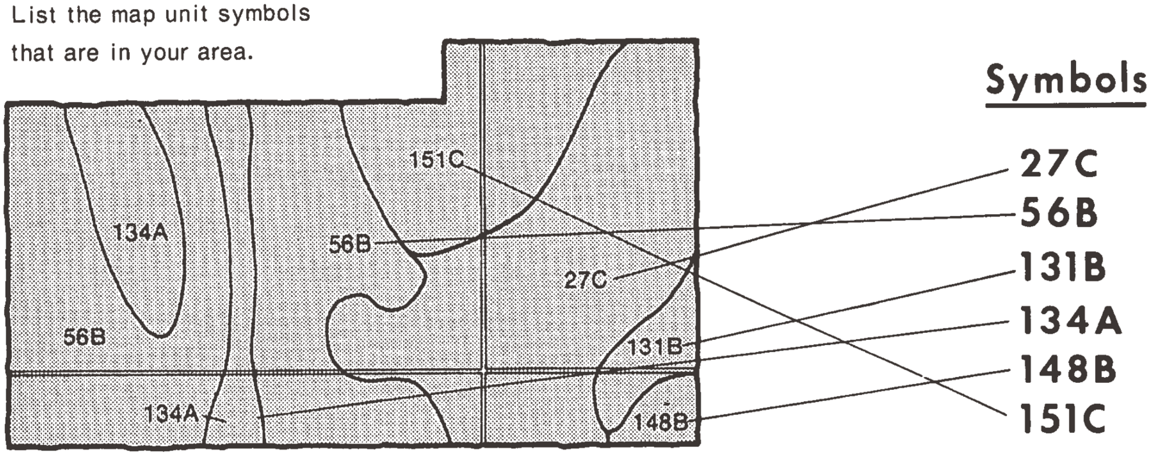
2. Note the number of the map sheet and turn to that sheet.

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



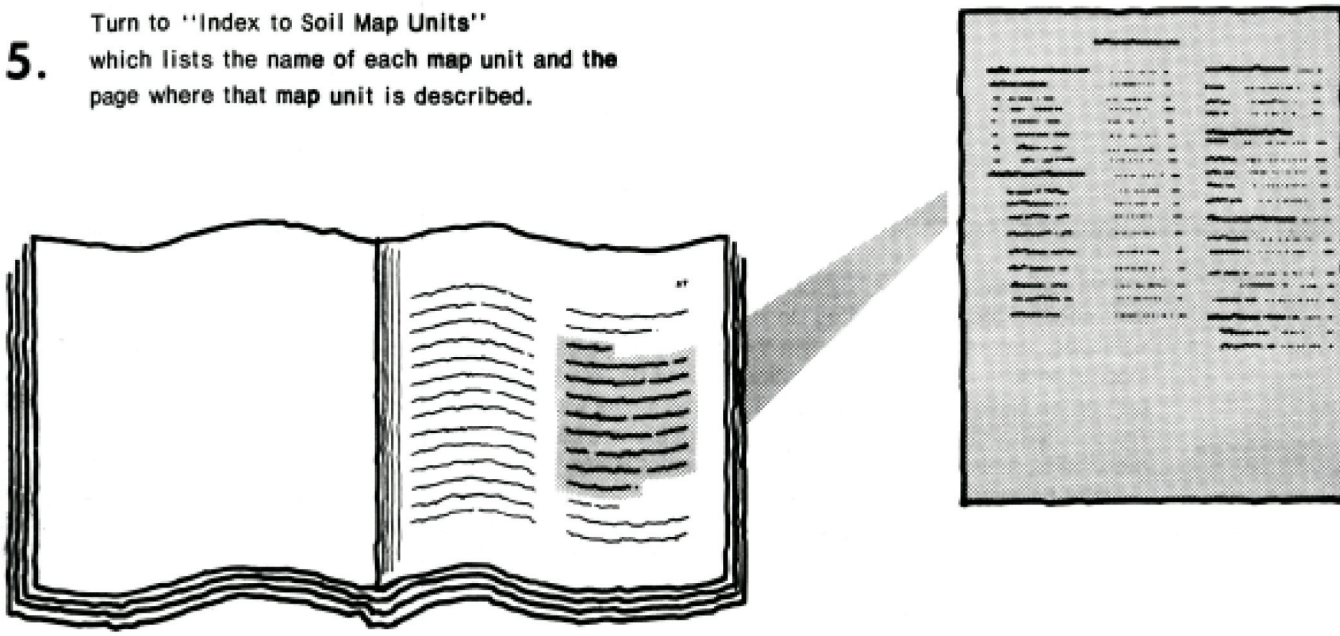


4. List the map unit symbols that are in your area.

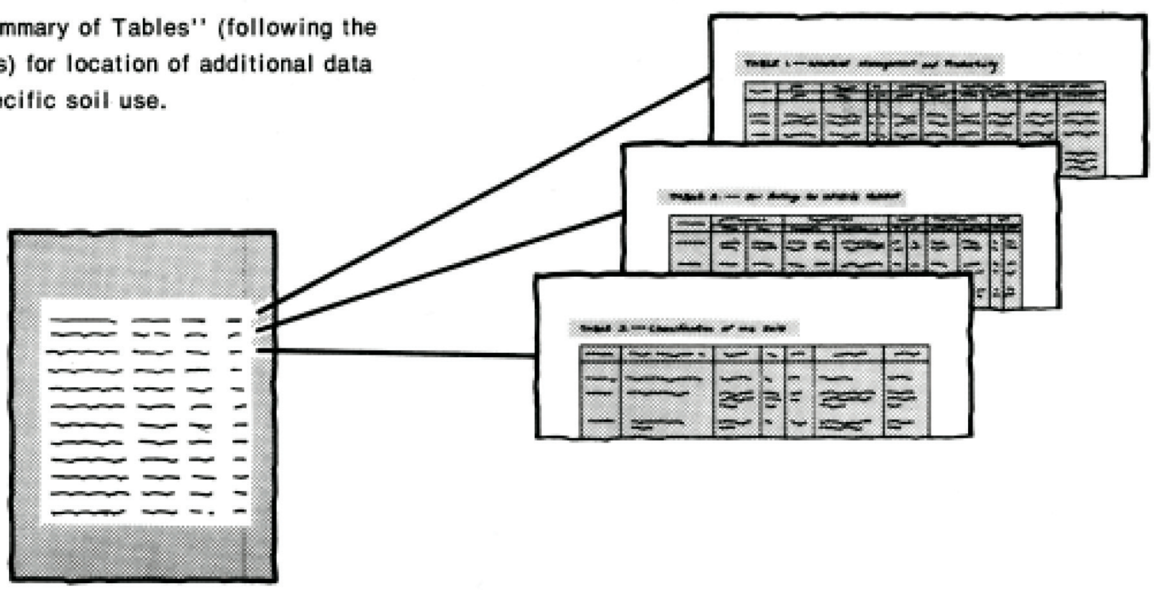


THIS SOIL SURVEY

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 1971-75. 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 Saline County Conservation District.

Soil maps in this survey may be copied without permission, but any enlargement of these maps can 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.

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Issued April 1979

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Summary of Tables

Foreword

The Soil Survey of Saline County, Arkansas contains much information useful in any land-planning program. 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.

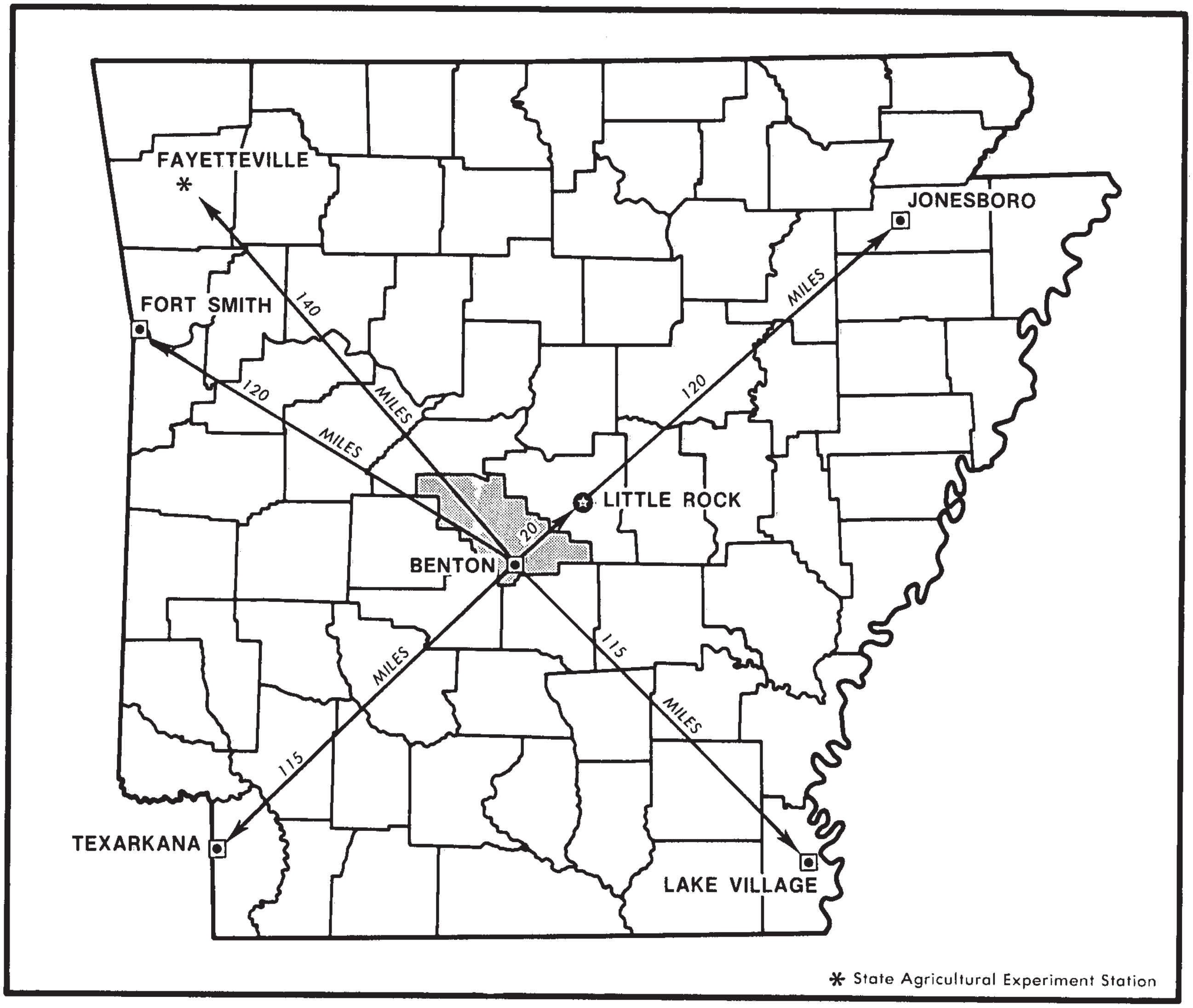
This soil survey has been prepared for many different users. Farmers, ranchers, foresters, and agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community officials, engineers, developers, builders, and homebuyers 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 Saline County in Arkansas.

SOIL SURVEY OF SALINE COUNTY, ARKANSAS

By George J. Haley, Soil Conservation Service
Soils surveyed by George J. Haley, Dorris F. Festervand, Randle O. Buchner, and James A. Woods, Soil Conservation Service

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

SALINE COUNTY, ARKANSAS is in the central part of Arkansas (see facing page). The area of the county is 463,168 acres, or about 728 square miles, including about 4,793 acres of water.

Saline County is bounded on the south by Garland, Hot Spring, and Grant Counties, on the west by Perry and Garland Counties, on the north by Perry and Pulaski Counties, and on the east by Pulaski County.

In 1970, the population was 36,107. Benton, the county seat and main trading center, had a population of 16,499. Bryant, the next largest town, had a population of 1,199.

Forestry is important over all of Saline County. Mining, manufacturing, construction, transportation, merchandising, banking, and supporting businesses are most important in the economy. Urban expansion is proceeding rapidly in the areas of Benton, Bryant, Salem, and East End, and along the Pulaski County line. Many tracts in these areas are now held for future urban expansion, and most are idle. There are many small hobby farms. Most rural residents are employed full time or part time in businesses in the metropolitan area.

General nature of the county

The soils of Saline County formed in a variety of sediments. In the northern and western parts of the county are soils that formed mainly in residuum from moderately hard to hard bedrock in the Ouachita Mountains. These soils contain low amounts of plant nutrients. Nearly all of this acreage is forest.

In the eastern and southern parts of the county are soils that formed mainly in loamy and clayey sediments laid down in a former shallow sea. These soils contain low amounts of plant nutrients. Nearly all of this acreage is forest. Except in a few places, it is suitable for improved pasture and cultivated crops. Excess water is a moderate to very severe hazard on the level tracts. Erosion is a moderate to very severe hazard in the more sloping areas.

Elevation in the northern and western parts of the survey area ranges from about 500 to 1,800 feet above mean sea level. Elevation decreases toward the east and south. In the eastern and southern part it ranges from about 270 to 500 feet.

The northern part of Saline County has irregular topography. The southern part, on the Gulf Coastal Plain, is nearly level or gently rolling. Elevation ranges from 270 feet just southeast of Benton to 1,800 feet near Lake Winona.

Most of the county is drained by the Saline River, which is a part of the Ouachita River Basin. The northern part of the county is drained by Maumelle Creek in the northeast corner and by the Fourche La Fave River in the northwestern part. Both Maumelle Creek and the Fourche La Fave River are a part of the Arkansas River Basin. A small area in the southeastern part of the county also is drained by the Arkansas River.

Farming

Early settlers in Saline County located above the flood plain of the Saline River where the old Missouri Trail crossed the Saline River. Settlement then started in the communities of Collegeville, Salem, and Kentucky Church. The settlers cleared a few acres of land, using the timber for fuel and for building cabins, and grew a small quantity of corn and vegetables for food. Game and fish were plentiful. No attention was paid to livestock.

Hunting and fishing were not only a principal pastime, but also a means of livelihood. Farm products, bear, deer, turkey, and fish were taken to Little Rock and traded for other needed commodities.

According to the 1969 Census of Agriculture, about 13 percent of Saline County was in farms. The rest consisted of extensive wooded tracts, cities, and towns and transportation and utility facilities. Farming has become more general. Table 1 shows the acreage in principal crops in the survey area in 1964 and 1969. Table 2 shows the kinds and number of livestock and poultry in the survey area in these years. Lumbering also is important to the economy of the county.

Farms in Saline County, as in most of the State, are decreasing in number and increasing in size. Between 1964 and 1969, the number of farms decreased from 661 to 339 and the average farm increased from 122 to 181 acres.

Most farms are small enough that the family can do most of the work, with outside labor hired during peak seasons. Laborers supervised by the owner, manager, or tenant farm the larger acreages. Tenants pay a fixed rent or a percentage of the crop for use of the land. Most of the land is farmed by operators who have enough modern equipment to farm efficiently. Most farmers fertilize according to the needs of the crop and use chemicals for weed control.

Physiography and drainage

The surface formations exposed in Saline County are chiefly sedimentary rock. There are some exposures of igneous rock. The sedimentary rock is shale, sandstone, chert, novaculite, and a small amount of limestone. In some areas the shale has been altered to slate, and the sandstone to quartzite. The only known exposures of igneous rock are in the southeastern part of the county around Bauxite, Arkansas. Probably many of these rocks were originally at a considerable depth and were uncovered by erosion.

The geologic age of the rock exposed ranges from Ordovician to Tertiary. The older formations crop out to the north and west, and the youngest to the east and south. Tertiary sediments cover folded Paleozoic rock in the southeastern part.

Part of Saline County is within the physiographic division known as the Ouachita province, which usually is subdivided into the Fourche Mountains, the Novaculite uplift, and the Athens Piedmont. The northern part of the county lies within the Fourche Mountains. Adjoining this area to the south is an area in the Novaculite uplift. The rest of the county lies within a physiographic division known as the Gulf Coastal Plain.

Most of the tributary streams in the uplands are intermittent, but some flow the year around. The principal streams are the North Fork, the Alum Fork, and the Middle Fork of the Saline River.

Water for livestock is obtained from the creeks, wells, and ponds. Domestic water supplies are from wells. In most places, the ground water supply is insufficient for irrigation. Water for irrigation on the bottom land is obtained from deep wells, from oxbow lakes, and from surface water impounded in reservoirs.

Climate

Saline 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 is well distributed throughout the year. It is generally adequate for all crops in most of the county, but the lower available water holding capacity of sandy or gravelly soils results in brief droughts on those soils nearly every year. Snow falls nearly every winter, but snow cover lasts only a few days.

Table 3 gives data on temperature and precipitation for the survey area, as recorded at Alum Fork, Arkansas, for the period 1951 to 1973. Table 4 shows probable dates of the first freeze in fall and the last freeze in spring. Table 5 provides data on length of the growing season.

In winter the average temperature is 43 degrees F, and the average daily minimum temperature is 32 degrees. The lowest temperature on record, which occurred at Alum Fork on February 2, 1959, is -7 degrees. In summer the average temperature is 79 degrees, and the average daily maximum temperature is 91 degrees. The highest recorded temperature, which occurred on July 13, 1954, is 109 degrees.

Growing degree days, shown in table 3, are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

Of the total annual precipitation, 27 inches, or 52 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 20 inches. The heaviest 1-day rainfall during the period of record was 7.20 inches at Alum Fork on June 9, 1959. Thunderstorms number about 55 each year, 22 of which occur in summer.

Average seasonal snowfall is 4 inches. The greatest snow depth at any one time during the period of record was 10 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 about 55 percent. Humidity is higher at night, and the average at dawn is about 85 percent. The percentage of possible sunshine is 72 in summer and 50 in winter. The prevailing wind is from the southwest. Average windspeed is highest, 10 miles per hour, in March.

Climatic data in this section were specially prepared for the Soil Conservation Service by the National Climatic Center, Asheville, North Carolina.

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. 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.

Major land uses considered are cultivated farm crops, specialty crops, woodland, and urban uses. Cultivated farm crops are those grown extensively by farmers in the survey area. Specialty crops include vegetables, fruits, and nursery crops grown on limited acreage and generally requiring intensive management. Woodland refers to land that is producing either trees native to the area or introduced species. Urban uses include residential, commercial, and industrial developments.

1. Carnasaw-Townley-Pirum

Well drained, undulating to steep, moderately deep and deep, gravelly and stony loamy soils on hills, mountains, ridges, and colluvial areas

This unit is in the northwestern part of Saline County. Carnasaw and Townley soils are on the tops of hills and mountains, on side slopes and benches, and on low ridges within valleys. They formed in a thin layer of loamy material and the underlying clayey material weathered from shale. This material is underlain by tilted and fractured shale, sandstone, or quartzite. Pirum soils are in colluvial positions. They formed in loamy colluvial material over bedrock that is tilted and fractured shale, sandstone, or quartzite.

This unit occupies about 12 percent of the county. It is about 43 percent Carnasaw soils, 25 percent Townley soils, 21 percent Pirum soils, and 11 percent rock outcrop and water areas.

The Carnasaw and Townley soils are dominantly at higher elevations than Pirum soils. All are well drained. Carnasaw and Townley soils have a gravelly silt loam surface layer and a clayey subsoil. Pirum soils have a loamy surface layer and subsoil. The depth to underlying shale is 30 to 60 inches in Carnasaw soils, 20 to 40 inches in Townley soils, and 22 to 50 inches in Pirum soils.

This unit is mainly woodland. Cleared areas are used mainly for pasture. Steep slopes, the depth to bedrock, the gravelly or stony surface layer, and the clayey subsoil are the main limitations.

This unit has fair potential for woodland and poor potential for row crops and pasture. Because of steep slopes, the depth to bedrock, the stony or gravelly surface layer, the clayey subsoil, and low strength, the soils in this unit have poor potential for residential and urban uses.

2. Carnasaw-Townley

Well drained, undulating to steep, moderately deep and deep, gravelly and stony loamy soils on hills, mountains, and ridges

This unit is in the northern and western parts of the county, on the tops of hills and mountains, on side slopes and benches, and on low ridges within valleys. The soils formed in a thin layer of loamy material and the underlying clayey material weathered from shale. This material is underlain by tilted and fractured shale, sandstone, or quartzite.

This unit occupies about 49 percent of the county. It is about 47 percent Carnasaw soils, 21 percent Townley soils, and 32 percent soils of minor extent.

The Carnasaw and Townley soils are well drained. Typically, Carnasaw soils have a very dark grayish brown gravelly silt loam surface layer and a clayey subsoil. Depth to the underlying shale is 30 to 60 inches. Typically, Townley soils have a brown gravelly silt loam surface layer and a clayey subsoil. Depth to the underlying shale is 20 to 40 inches.

The minor soils in this unit are the well drained Avilla, Ouachita, and Zafra soils; the moderately well drained Leadvale and Messer soils; and the poorly drained Caddo soils. In some small areas on higher ridgetops and on irregular escarpments of side slopes and benches, rock crops out. The rock outcrop is tilted and fractured and is dominantly shale and lesser amounts of sandstone and quartzite.

This unit is mainly woodland. Cleared areas are used mainly for pasture. Steep slopes, the depth to bedrock, the gravelly or stony surface layer, and the clayey subsoil are the main limitations.

This unit has fair potential for woodland and poor potential for row crops and pasture. Because of steep slopes, the depth to bedrock, the gravelly or stony surface layer, the clayey subsoil, and the low strength, the soils in this unit have poor potential for residential and urban uses.

3. Amy-Ouachita

Poorly drained and well drained, level to gently undulating loamy soils on flood plains of local streams and drainageways

This unit is in the south-central part of Saline County, on flood plains of local streams and drainageways. The soils formed in thick beds of loamy sediment.

This unit occupies about 10 percent of the county. It is about 56 percent Amy soils and 44 percent Ouachita soils.

In most places Amy soils are slightly lower in elevation than Ouachita soils. Amy soils are poorly drained, and Ouachita soils are well drained. Both soils have a silt loam surface layer and formed in thick beds of loamy sediment. Amy soils have a seasonal high water table.

This unit is mainly woodland, but a few small areas of better drained soils are cleared and mostly in pasture. Frequent flooding and wetness are the main limitations.

This unit has good potential for woodland and poor potential for row crops and pasture. Because of frequent flooding, this unit has poor potential for residential and urban uses.

4. Tiak-Savannah

Moderately well drained, nearly level to moderately sloping loamy soils on uplands and stream terraces

This unit is in the eastern part of Saline County, on broad flats broken by ridges. The soils formed in thick beds of loamy and clayey sediments. Natural drainageways are mainly slow-flowing intermittent streams.

This unit occupies about 8 percent of the county. It is about 55 percent Tiak soils, 30 percent Savannah soils, and 15 percent Angie soils and water areas.

Tiak soils are on ridges. They have a loamy surface layer and a clayey subsoil. They are moderately well drained. Savannah soils are on broad flats, ridges, and stream terraces. They have a loamy surface layer and a fragipan in the subsoil. They are moderately well drained. Both soils have a seasonal high water table. Minor in this unit are the moderately well drained Angie soils.

This unit is mainly woodland. Some small tracts are used for cultivated crops and pasture. Wetness and erosion are the main limitations.

This unit has fair potential for woodland. It has fair potential for row crops in all but the gently sloping and moderately sloping areas. Because of the high shrink-swell, low strength, and slow percolation, the soils in this unit have poor potential for urban uses.

5. Udorthents-Sherwood

Excessively drained and well drained, nearly level to steep loamy soils on uplands

This unit is in the central part of Saline County. Udorthents are in nearly level to very steep areas of mine spoil where bauxite ore has been mined. Sherwood soils formed in loamy residuum weathered from nepheline-syenite rock.

This unit occupies about 2 percent of the county. It is about 62 percent Udorthents; 9 percent Sherwood soils; and 29 percent rock outcrop, Ouachita soils, and water areas.

Udorthents are areas altered by mining. Sherwood soils are the undisturbed areas in this unit. Udorthents are excessively drained, have variable soil material, and in most areas are barren of vegetation. The well drained Sherwood soils have a loamy surface layer and subsoil and are underlain by weathered nepheline-syenite bedrock at a depth of 30 to 50 inches.

This unit is mainly woodland. Many tracts are idle and barren. Moderately rapid permeability, the low available water capacity, the high acidity, and the rock outcrop are the main limitations.

This unit has poor potential for woodland and row crops. Because of steep slopes, the depth to bedrock, the stony surface layer, and the extreme acidity, these soils have poor potential for residential and urban uses.

6. Allen-Linker

Well drained, gently sloping to steep, moderately deep and deep loamy soils on mountaintops and mountainsides

This unit is in the eastern part of Saline County. The major soils are on the tops and sides of low mountains. They formed in loamy material weathered from sandstone.

This unit occupies about 1 percent of the county. It is about 46 percent Allen soils, 31 percent Linker soils, and 23 percent water areas.

Allen soils are on mountainsides. They are deep and well drained and have a loamy surface layer and subsoil. Linker soils are on mountaintops. They are moderately deep, are well drained, and have a loamy surface layer and subsoil. Sandstone bedrock is at a depth of 20 to 40 inches.

This unit is mainly woodland. Small tracts are pasture. Steep slopes and erosion are the main limitations.

Allen soils have poor potential for row crops and fair potential for woodland. Linker soils have fair potential for row crops and poor potential for woodland. Because of steep slopes and the depth to bedrock, the soils have poor potential for residential and urban uses.

7. Smithdale-Savannah-Amy

Poorly drained to well drained, level to moderately sloping loamy soils on uplands and stream terraces

This unit is in the eastern part of Saline County, on broad flats broken by ridges. The soils formed in thick beds of loamy sediment. Natural drainageways are mainly slow-flowing intermittent streams.

This unit occupies about 16 percent of the county. It is about 41 percent Smithdale soils; 24 percent Savannah soils; 15 percent Amy silt loam; and 20 percent Saffell soils and water areas.

Smithdale soils are on ridges. They are well drained and have a loamy surface layer and subsoil. Savannah soils are on broad flats, ridges, and stream terraces. They are moderately well drained. They have a loamy surface layer and a fragipan in the subsoil. Amy soils are on broad flats and stream terraces along natural drainageways. They are poorly drained and have a loamy surface layer and subsoil. Minor in this unit are the well drained Saffell soils.

This unit is mainly woodland. Some small tracts are used for cultivated crops and pasture. Wetness and erosion are the main limitations.

Smithdale and Savannah soils have fair potential for woodland. Amy soils have good potential. Smithdale and Amy soils have poor potential for cultivated crops. The gently sloping Savannah soil has fair potential. Smithdale soils have good potential for residential and urban uses, Savannah soils have fair potential, and Amy soils have poor potential because of slow percolation and wetness.

8. Savannah-Wrightsville

Poorly drained and moderately well drained, level to gently sloping loamy soils on uplands and stream terraces

This unit is in the eastern part of Saline County, on broad flats broken by ridges. The soils formed in thick beds of loamy sediment.

This unit occupies about 2 percent of the county. It is about 47 percent Savannah soils, 42 percent Wrightsville soils, and 11 percent water areas.

Savannah soils are on ridges. They are moderately well drained. They have a loamy surface layer and a fragipan in the subsoil. Wrightsville soils are on broad flats of old stream terraces. They are poorly drained. They have a loamy surface layer and a clayey subsoil.

This unit is mainly woodland. Some small tracts are pasture. Wetness and erosion are the main limitations.

This unit has fair potential for woodland. Wrightsville soils have poor potential for cultivated crops, and Savannah soils have fair potential. Wrightsville soils have poor potential for residential and urban uses because of slow permeability and wetness. Savannah soils have fair potential for residential and urban uses.

Broad land use considerations

Deciding what land should be used for urban development is an important issue in the survey area. Each year, land is developed for urban uses in Benton and other cities in the county. About 8,000 acres is urban or built-up land. The general soil map is most helpful in planning the general outline of urban areas, but it cannot be used in selecting sites for specific urban structures. In general, the soils that have good potential for cultivated crops also have good potential for urban development. Data about specific soils can be helpful in planning future land use patterns.

Areas where the soils are so unfavorable that urban development is prohibitive are not extensive in the survey area. The Amy-Ouachita unit is a flood plain on which flooding is a severe limitation unless it is protected by levees. The Carnasaw-Townley-Pirum unit has poor potential for urban development because of steep slopes, moderate depth to bedrock, a gravelly or stony surface layer, and a clayey subsoil.

Some areas of the county are soils that can be developed for urban uses at lower cost than can the soils of the Amy-Ouachita and the Carnasaw-Townley-Pirum units. The Smithdale soil in the Smithdale-Savannah-Amy unit is an example. The Linker soil in the Allen-Linker and Tiak-Savannah units has only fair potential for farmland and should not be overlooked when broad land uses are considered.

Vegetables and other specialty crops are particularly well suited to Smithdale soils in the Smithdale-Savannah-Amy unit where proper erosion control practices have been applied. The Smithdale soil is well drained and warms up earlier in spring than the heavier, wetter soils. Nurseries are also well suited to these soils.

The Amy-Ouachita unit has good potential for woodland. The Savannah-Wrightsville unit has fair potential for woodland and is best suited to pine. The Carnasaw-Townley-Pirum unit also has fair potential for woodland.

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 a profile that is 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. Avilla is the name of a soil series.

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, Avilla silt loam, 1 to 3 percent slopes, is one of several phases within the Avilla series.

Some map units are made up of two or more dominant kinds of soil. Such map units are called soil complexes, soil associations, and undifferentiated groups.

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. Ouachita-Amy complex, frequently flooded, 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. Carnasaw-Townley association, undulating, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because there is little value in separating them. The pattern and proportion of the soils are not uniform. An area shown on the map has at least one of the dominant (named) soils or may have all of them. Smithdale and Darco loamy sands, 12 to 30 percent slopes, is an undifferentiated group in this survey area.

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. Rock outcrop 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 6, 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.

Map unit descriptions

1—Allen loam, 20 to 40 percent slopes. This well drained, steep soil is on mountainsides. Individual areas are about 50 to 300 acres.

Typically, the surface layer is very dark grayish brown loam about 4 inches thick. The subsurface layer is brown fine sandy loam about 5 inches thick. The upper part of the subsoil is strong brown and yellowish red loam to a depth of about 23 inches. The middle and lower parts of the subsoil are red clay loam that extends to 72 inches or more.

Included with this soil in mapping are a few intermingled areas of Linker soils. Also included are areas where the surface layer and subsoil are gravelly. The included areas make up less than 10 percent of the unit.

This soil is low in natural fertility. It is medium acid to very strongly acid in the surface layer and upper part of the subsoil and strongly acid or very strongly acid in the middle and lower parts. Permeability is moderate, and the available water capacity is high. Runoff is medium.

This soil has poor potential for farming because of the steep slopes. Erosion is a very severe hazard if cultivated crops are grown. All areas are woodland.

This soil has fair potential for loblolly pine. The erosion hazard and the difficulty in using equipment on steep slopes are the main limitations in managing and harvesting tree crops.

This soil has poor potential for most urban uses. Steep slopes are severe limitations for dwellings, streets, industrial sites, and septic tank absorption fields. These limitations are difficult or impractical to overcome. Capability unit VIIe-1; woodland suitability group 3r8; pasture and hayland group 8B.

2—Amy silt loam. This poorly drained, level soil is on broad upland flats. Slopes are less than 1 percent. Individual areas range from about 20 to 600 acres.

Typically, the surface layer is grayish brown silt loam about 3 inches thick. The subsurface layer is light brownish gray, mottled silt loam about 9 inches thick. The subsoil is light gray, mottled silt loam to a depth of about 45 inches. The underlying material is gray, mottled silty clay loam that extends to 72 inches or more.

Included with this soil in mapping are small areas of Savannah, Smithdale, and Wrightsville soils that make up less than 10 percent of the unit. Also included are a few small areas that have a less acid subsoil.

This soil is low in natural fertility. The available water capacity is high. The surface layer and subsoil are strongly acid or very strongly acid. Permeability and runoff are slow. The water table is seasonally high and is within 12 inches of the surface in winter and early in spring.

Most areas of this soil are woodland. Most cleared areas are pasture. Suitable pasture plants are bermudagrass, bahiagrass, tall fescue, dallisgrass, annual lespedeza, white clover, and sericea lespedeza. Lime and fertilization improve stands and yields. In areas where surface drainage is adequate, suitable crops are soybeans and winter small grain.

This soil has good potential for loblolly pine and sweetgum. Wetness, the main limitation to the use of equipment in managing and harvesting the tree crop, can usually be overcome by logging during the drier seasons.

This soil has poor potential for most urban uses. Poor drainage and the seasonal high water table are severe limitations for dwellings, streets, and industrial sites. The slow permeability and the seasonal high water table are severe limitations for septic tank absorption fields. All are difficult or impractical to overcome. Capability unit IIIw-1; woodland suitability group 2w9; pasture and hayland group 2B.

3—Amy silt loam, frequently flooded. This poorly drained, level soil is on flood plains of local drainageways. It is inundated two or three times each year. Slopes are less than 1 percent. Individual areas range from 20 to 500 acres.

Typically, the surface layer is grayish brown silt loam about 3 inches thick. The subsurface layer is light brownish gray, mottled silt loam about 9 inches thick. The subsoil is light gray, mottled silt loam to a depth of about 45 inches. The underlying material is gray, mottled silty clay loam that extends to 72 inches or more.

Included with this soil in mapping are spots of Ouachita soils and spots of low oval mounds. They make up less than 10 percent of the unit. Also included on narrow flood plains are a few small areas of soils that have a sandy surface layer.

The surface layer and subsoil are strongly acid or very strongly acid. Natural fertility is low. The available water capacity is high. Permeability and runoff are slow. The water table is seasonally high. Flooding is frequent during winter and spring.

This soil has poor potential for cultivated crops because of the hazard of frequent flooding. In most years, flooding occurs from December to June. Most areas are used as woodland and wildlife habitat.

This soil has good potential for loblolly pine, sweetgum, and water oak. Wetness and flooding limit the use of equipment in managing and harvesting the tree crop. These limitations can be overcome by using special equipment and by logging during the drier seasons.

This soil has poor potential for urban use. Flooding and wetness, the main limitations, can be overcome only by major flood control and drainage measures. Capability unit Vw-1; woodland suitability group 2w9; pasture and hayland group 2B.

4—Amy soils. This map unit consists of poorly drained Amy soils in level intermound areas and somewhat poorly drained to moderately well drained soils on rounded mounds that are 2 to 3 feet high and 65 to 100 feet in diameter. These soils are closely associated, but the pattern is irregular. Most mapped areas contain both soils, but a few contain only one. Because of present and predicted use, the soils were not mapped separately. They formed in deep loamy sediment of the Coastal Plain. Individual areas range from about 10 to 300 acres.

Amy silt loam makes up about 75 percent of each mapped area. Typically, the surface layer is grayish brown silt loam about 3 inches thick. The subsurface layer is light brownish gray, mottled silt loam about 9 inches thick. The subsoil is light gray, mottled silt loam to a depth of about 45 inches. The underlying material is gray, mottled silty clay loam that extends to more than 72 inches.

This soil is low in natural fertility. The available water capacity is high. The surface layer and subsoil are strongly acid or very strongly acid. Permeability and runoff are slow. The water table is seasonally high. It is within 12 inches of the surface in winter and early in spring.

Soils on the rounded mounds make up about 25 percent of each mapped area. They have a variable profile but are generally brownish, acid loamy material throughout.

This unit has low potential for cultivated crops because excess water is a severe hazard on the Amy soils. Fieldwork is delayed several days after rain unless surface drains are installed. The mounds limit the use of some kinds of farm equipment. Most areas are pasture and meadow.

This unit has good potential for loblolly pine and sweetgum. Wetness, the main limitation in the use of equipment in managing and harvesting the tree crops, can usually be overcome by logging during the drier seasons.

The soils in this unit have poor potential for most urban uses. Poor drainage and the seasonal high water table are severe limitations for dwellings, streets, and industrial sites. The slow permeability and the seasonal high water table are severe limitations for septic tank absorption fields. All are difficult or impractical to overcome. Capability unit IIIw-1; woodland suitability group 2w9; pasture and hayland group 2B.

5—Angie fine sandy loam, 3 to 8 percent slopes. This moderately well drained, gently sloping soil is on uplands of the Coastal Plain. Individual areas are 20 to 200 acres.

Typically, the surface layer is very dark grayish brown fine sandy loam about 4 inches thick. The subsurface layer is pale brown fine sandy loam about 6 inches thick. The subsoil is strong brown heavy silty clay loam to a depth of about 19 inches; yellowish brown, mottled silty clay and gray, mottled clay to about 49 inches; and mottled gray and brownish yellow clay that extends to 72 inches or more.

Included with this soil in mapping are small areas of Savannah and Tiak soils that make up less than 10 percent of the unit. Also included are small areas where slopes are less than 3 pecent.

This soil is low in natural fertility. Reaction in the surface layer ranges from medium acid to strongly acid unless the soil has been limed. Permeability is slow. The available water capacity is high, and runoff is medium.

Most areas of this soil are woodland. Most cleared areas are pasture. Suitable pasture plants are bermudagrass and bahiagrass. This soil has fair potental for cultivated crops. Suitable crops are cotton, corn, soybeans, and small grain. The soil responds well to fertilization. Erosion is a hazard if cultivated crops are grown. Minimum tillage, contour farming, and the use of cover crops, including grasses and legumes in the cropping system, help to reduce runoff and control erosion.

This soil has good potential for loblolly pine, shortleaf pine, and sweetgum. There are no significant limitations in woodland use and management.

This soil has poor potential for most urban uses. Shrink-swell and low strength are moderate limitations for dwellings and industrial sites. Low strength is a severe limitation for roads and streets. Slow percolation is a severe limitation for septic tank absorption fields. All are difficult to overcome. Capability unit IIIe-1; woodland suitability group 2w8; pasture and hayland group 7A.

6—Avilla silt loam, 1 to 3 percent slopes. This well drained, nearly level soil is on stream terraces in valleys of the Ouachita Mountains. Individual areas are 20 to 150 acres.

Typically, the surface layer is brown silt loam about 3 inches thick. The subsurface layer is dark yellowish brown silt loam about 6 inches thick. The subsoil is yellowish red and red clay loam to a depth of about 31 inches; mottled red, brown, and yellow clay loam to about 56 inches; and mottled red, brown, and gray very gravelly clay loam that extends to 72 inches or more.

Included with this soil in mapping are a few intermingled spots of Leadvale soils. These included spots make up less than 10 percent of the unit.

This soil is moderate to low in natural fertility. It is medium to very strongly acid throughout unless the surface layer has been limed. Permeability is moderate, and the available water capacity is medium to high. Runoff is slow to medium. Tilth is easy to maintain.

This soil has fair potential for farming. The dominant use is pasture or hay crops. Suitable pasture plants are bahiagrass, bermudagrass, tall fescue, white clover, sericea lespedeza, and annual lespedeza. The soil responds well to fertilization. Erosion is a moderate hazard if cultivated crops are grown. Minimum tillage, contour farming, and the use of cover crops, including grasses and legumes in the cropping system, help to reduce runoff and control erosion.

This soil has poor potential for loblolly and shortleaf pine. There are no significant limitations in woodland use or management.

This soil has good potential for most urban uses. Limitations are slight for dwellings and industrial sites. They are moderate for septic tank absorption fields and local roads and streets. They can usually be overcome with proper engineering design. Capability unit IIe-1; woodland suitability group 3o7; pasture and hayland group 8A.

7—Avilla silt loam, 3 to 8 percent slopes. This well drained, gently sloping soil is on stream terraces in valleys of the Ouachita Mountains. Individual areas are 20 to 150 acres.

Typically, the surface layer is brown silt loam about 3 inches thick. The subsurface layer is dark yellowish brown silt loam about 6 inches thick. The subsoil is yellowish red and red clay loam to a depth of about 31 inches; mottled red, brown, and yellow clay loam to about 56 inches; and mottled red, brown, and gray very gravelly clay loam that extends to 72 inches or more.

Included with this soil in mapping are a few intermingled spots of Carnasaw and Leadvale soils. These included spots make up less than 10 percent of the unit.

This soil is moderate to low in natural fertility. It is medium acid to very strongly acid throughout unless the surface layer has been limed. Permeability is moderate, and the available water capacity is medium to high. Runoff is slow to medium. Tilth is easy to maintain.

This soil has fair potential for farming. The dominant use is pasture or hay crops. Suitable pasture plants are bahiagrass, bermudagrass, tall fescue, white clover, sericea lespedeza, and annual lespedeza. The soil responds well to fertilization. Erosion is a hazard if cultivated crops are grown. Minimum tillage, contour farming, and the use of cover crops, including grasses and legumes in the cropping system, help to reduce runoff and control erosion.

This soil has poor potential for loblolly and shortleaf pine. There are no significant limitations in woodland use or management.

This soil has fair potential for most urban uses. Limitations are slight for dwellings and moderate for septic tank absorption fields, industrial sites, and local roads and streets. These limitations can usually be overcome with proper engineering design. Capability unit IIIe-2; woodland suitability group 3o7; pasture and hayland group 8A.

8—**Caddo Variant-Messer Variant complex.** This map unit consists of the poorly drained Caddo Variant in level intermound areas and the moderately well drained Messer Variant on rounded mounds that are 3 to 4 feet high and 50 to 85 feet in diameter. The soils form such an intricate pattern that it was not practical to map them separately at the scale selected for mapping. They formed in deep loamy material on stream terraces or broad uplands in the Ouachita Mountains. Individual areas range from about 15 to 800 acres.

The Caddo Variant makes up about 50 percent of each mapped area. Typically, the surface layer is grayish brown, mottled silt loam about 3 inches thick. The subsurface layer is about 7 inches of gray, mottled silt loam. The subsoil is gray, mottled silty clay loam that extends to 72 inches or more.

This soil is moderate in natural fertility. Reaction ranges from medium acid to strongly acid in the surface layer and upper part of the subsoil and from slightly acid to mildly alkaline in the lower part of the subsoil. Permeability is slow, and the available water capacity is high. Runoff is slow.

The Messer Variant makes up about 25 percent of each mapped area. Typically, the surface layer is brown silt loam about 2 inches thick. The subsurface layer is yellowish brown silt loam about 9 inches thick. The subsoil is yellowish brown silt loam to a depth of about 23 inches and silt loam mottled in shades of gray, brown, and red to about 42 inches. The underlying material is brown, mottled very gravelly loam that extends to 72 inches or more.

This soil is moderate in natural fertility. Reaction ranges from medium acid to very strongly acid unless the surface layer has been limed. Permeability is slow, and the available water capacity is high.

The remaining 25 percent of this unit is soils that are similar to the Caddo Variant but are gravelly throughout, soils that have a clayey subsoil, soils that are similar to the Messer Variant but are gravelly below the surface layer, and soils that have a dark colored surface layer.

This unit has poor potential for row crops and small grain. The main use is pasture (fig. 1) and meadow. Suitable pasture plants are bermudagrass, bahiagrass, tall fescue, white clover, annual lespedeza, and sericea lespedeza. Soils in this unit respond well to fertilization. Excess water is a very severe hazard in level areas, and erosion is a moderate hazard in nearly level areas. Fieldwork is delayed several days after rain unless surface drains are installed. The mounds limit the use of some kinds of farm equipment.

This unit has good potential for loblolly pine and sweetgum. Wetness is the main limitation to the use of equipment in managing and harvesting tree crops.

The Caddo Variant has poor potential for urban uses. Wetness is a severe limitation for dwellings, streets, industrial sites, and septic tank absorption fields. This limitation is difficult or impractical to overcome. The Messer Variant has fair potential for urban use. Caddo Variant in capability unit IIIw-1; woodland suitability group 2w9; pasture and hayland group 8A; Messer Variant in capability unit IIe-2; woodland suitability group 2w8; pasture and hayland group 8A.

9—**Carnasaw-Townley association, undulating.** This unit consists of well drained soils in an irregular pattern, but in about the same relative proportions in each area. It is in the Piedmont area of the Ouachita Mountains. The deeper Carnasaw soils and the shallower Townley soils are on the nearly level tops and moderately sloping sides of hills, benches, and low ridges in valleys. They formed in a thin layer of loamy material and the underlying clayey material weathered from shale. Slopes range from 1 to 12 percent. The mapped areas range from about 100 to 800 acres.

Carnasaw gravelly silt loam makes up about 40 percent of the unit. Typically, it has a very dark grayish brown surface layer about 1 inch thick. The subsurface layer is strong brown gravelly silt loam about 2 inches thick. The subsoil is yellowish red silty clay loam and red clay to a depth of 21 inches and red, mottled clay and silty clay to about 40 inches. The underlying material is mottled gray, red, and yellow soft shale that extends to 72 inches or more.

The Carnasaw soil is low in natural fertility. It is strongly acid or very strongly acid throughout unless the surface layer has been limed. Permeability is slow, and the available water capacity is medium.

Townley silt loam makes up about 30 percent of the unit. Typically, it has a brown surface layer about 6 inches thick. The subsoil is yellowish red silty clay loam, red silty clay, and yellowish red silty clay to a depth of about 23 inches. The underlying material is tilted and fractured shale that extends to 25 inches or more.

The Townley soil is low in natural fertility. It is strongly acid to extremely acid unless the surface layer has been limed. Permeability is slow, and the available water capacity is low.

The remaining 30 percent of the unit is loamy soils that are 20 to 40 inches deep over bedrock, soils that are similar to the Townley soil but are less than 18 inches deep over bedrock, and a few areas of rock outcrop.

This unit has poor potential for cultivated crops. It is best suited to wildlife habitat and woodland. A few small areas are used as pasture. Surface stones, droughtiness in the Townley soil, and irregular slopes make pasture management difficult. Suitable pasture plants are bahiagrass, bermudagrass, white clover, sericea lespedeza, and annual lespedeza. Runoff is medium to rapid, and the hazard of erosion is severe to very severe.

This unit has fair potential for loblolly pine (fig. 2) and shortleaf pine. There are no significant limitations in woodland use and managment.

This unit has poor potential for most urban uses. High shrink-swell and low strength are severe limitations for dwellings, local roads and streets, and industrial sites. Slow percolation is a severe hazard for septic tank absorption fields. All are difficult or impractical to overcome. Carnasaw soil in capability unit IVe-1, woodland suitability group 3o1, pasture and hayland group 8A; Townley soil in capability unit IVe-1, woodland suitability group 4o1, pasture and hayland group 8A.

10—Carnasaw-Townley association, steep. This unit consists of well drained soils in an irregular pattern, but in about the same relative proportions in each area. It is in the Ouachita Mountains. The deeper Carnasaw soils and the shallower Townley soils are on the tops and sides of hills, benches, and low ridges in valleys. They formed in a thin layer of loamy material and the underlying clayey material weathered from shale. Slopes range from 12 to 40 percent. The mapped areas range from about 100 to 800 acres.

Carnasaw gravelly silt loam makes up about 60 percent of the unit. Typically, it has a very dark grayish brown surface layer about 1 inch thick. The subsurface layer is strong brown gravelly silt loam about 2 inches thick. The subsoil is yellowish red silty clay loam and red clay to a depth of 21 inches and red, mottled clay and silty clay to about 40 inches. The underlying material is mottled gray, red, and yellow soft shale that extends to 72 inches or more.

The Carnasaw soil is low in natural fertility. It is strongly acid or very strongly acid throughout unless the surface layer has been limed. Permeability is slow, and the available water capacity is medium.

Townley silt loam makes up 20 percent of the unit. Typically, it has a brown surface layer about 6 inches thick. The subsoil is yellowish red silty clay loam, red silty clay, and yellowish red silty clay to a depth of about 23 inches. The underlying material is tilted and fractured shale that extends to 25 inches or more.

The Townley soil is low in natural fertility. It is strongly acid to extremely acid unless the surface layer has been limed. Permeability is slow, and the available water capacity is low.

The remaining 20 percent is areas of loamy soils that are 20 to 40 inches deep to bedrock, soils that are similar to the Townley soil but are less than 18 inches deep to tilted bedrock (fig. 3), soils that are similar to the Carnasaw soil but are more than 60 inches deep to tilted bedrock, small areas of rock or shale outcrop, and areas where slopes are as much as 60 percent.

This unit is not suited to cultivated crops and is poorly suited to pasture. It is best suited to wildlife habitat and woodland. A few small areas are used as pasture. Steep slopes, surface stones, droughtiness in the Townley soil, and irregular slopes make pasture management difficult. Suitable pasture plants are bahiagrass, bermudagrass, white clover, sericea lespedeza, and annual lespedeza. Runoff is very rapid, and the hazard of erosion is very severe.

This unit has fair potential for southern red oak and shortleaf pine. The erosion hazard and the difficulty in using equipment on the steep slopes are limitations in woodland use and management.

This unit has poor potential for most urban uses. High shrink-swell, steep slopes, and low strength are severe limitations for dwellings, local roads and streets, and industrial sites. Slow percolation, steep slopes, and large stones are severe hazards for septic tank absorption fields. These limitations are difficult or impractical to overcome. Carnasaw soil in capability unit VIIe-2, woodland suitability group 3x9, pasture and hayland group 8B; Townley soil in capability unit VIe-1, woodland suitability group 4r2, pasture and hayland group 8B.

11—Carnasaw-Pirum-Townley association, undulating. This unit consists of well drained soils in an irregular pattern, but in about the same relative proportions in each area. It is at the higher elevations in the Ouachita Mountains. The deeper Carnasaw soils and the shallower Townley soils are on the nearly level tops and the moderately sloping sides of hills, benches, and mountains. They formed in a thin layer of loamy material and the underlying clayey material weathered from shale. The Pirum soils are in colluvial positions. They formed in loamy colluvial material over bedrock. Slopes range from 1 to 12 percent. The mapped areas range from about 100 to 800 acres.

Carnasaw gravelly silt loam makes up about 45 percent of the unit. Typically, it has a very dark grayish brown surface layer about 1 inch thick. The subsurface layer is strong brown gravelly silt loam about 2 inches thick. The subsoil is yellowish red silty clay loam and red clay to a depth of 21 inches and red, mottled clay and silty clay to about 40 inches. The underlying material is mottled gray, red, and yellow soft shale that extends to 72 inches or more.

The Carnasaw soil is low in natural fertility. It is strongly acid or very strongly acid throughout unless the surface layer has been limed. Permeability is slow, and the available water capacity is medium.

Pirum loam makes up about 25 percent of the unit. Typically, it has a brown surface layer about 2 inches thick. The subsurface layer is light yellowish brown loam about 8 inches thick. The subsoil is yellowish brown and strong brown loam to a depth of about 34 inches. The underlying material is hard tilted shale bedrock.

The Pirum soil is low in natural fertility. It is strongly acid or very strongly acid unless the surface layer has been limed. Permeability is moderate, and the available water capacity is low.

Townley silt loam makes up about 23 percent of the unit. Typically, it has a brown surface layer about 6 inches thick. The subsoil is yellowish red silty clay loam, red silty clay, and yellowish red silty clay to a depth of about 23 inches. The underlying material is tilted and fractured shale that extends to 25 inches or more.

The Townley soil is low in natural fertility. It is strongly acid to extremely acid unless the surface layer has been limed. Permeability is slow, and the available water capacity is low.

The remaining 7 percent of the unit is small areas of rock outcrop, soils that are similar to the Carnasaw soil but are more than 60 inches deep to bedrock, and soils that are similar to the Townley soil but are less than 18 inches deep to bedrock.

This unit has poor potential for cultivated crops. It is best suited to wildlife habitat and woodland. A few small areas are pasture. Surface stones, droughtiness in the Townley soil, and irregular slopes make pasture management difficult. Suitable pasture plants are bahiagrass, bermudagrass, white clover, sericea lespedeza, and annual lespedeza. Runoff is medium to rapid, and the hazard of erosion is very severe.

This unit has fair potential for loblolly and shortleaf pine. There are no significant limitations in woodland use and management.

This unit has poor potential for most urban uses. High shrink-swell and low strength are severe limitations for dwellings, local roads and streets, and industrial sites on the Carnasaw and Townley soils. Depth to bedrock is a severe limitation for septic tank absorption fields, dwellings with basements, and industrial sites on the Pirum soil. Slow percolation is a severe hazard for septic tank absorption fields on the Carnasaw and Townley soils. Depth to bedrock and low strength are moderate limitations for local roads and streets on the Pirum soil. These limitations are difficult or impractical to overcome. Carnasaw soil in capability unit IVe-1, woodland suitability group 3o1, pasture and hayland group 8A; Pirum soil in capability unit IIIe-3, woodland suitability group 3o7, pasture and hayland group 8A; Townley soil in capability unit IVe-1, woodland suitability group 4o1, pasture and hayland group 8A.

12—Carnasaw-Townley-Pirum association, steep. This unit consists of well drained soils in an irregular pattern, but in about the same relative proportions in each area. It is at the higher elevations in the Ouachita Mountains. The deeper Carnasaw soils and the shallower Townley soils are on the tops and sides of hills, benches, and mountains. They formed in a thin layer of loamy material and the underlying clayey material weathered from shale. The Pirum soils are in colluvial positions. They formed in loamy colluvial material over bedrock. Slopes range from 12 to 40 percent. The mapped areas range from about 100 to 800 acres.

Carnasaw gravelly silt loam makes up about 41 percent of the unit. Typically, it has a very dark grayish brown surface layer about 1 inch thick. The subsurface layer is strong brown about 2 inches thick. The subsoil is yellowish red silty clay loam and red clay to a depth of 21 inches and red, mottled clay and silty clay to about 40 inches. The underlying material is mottled gray, red, and yellow soft shale that extends to 72 inches or more.

The Carnasaw soil is low in natural fertility. It is strongly acid or very strongly acid throughout unless the surface layer has been limed. Permeability is slow, and the available water capacity is medium.

Townley silt loam makes up 31 percent of the unit. Typically, it has a brown surface layer about 6 inches thick. The subsoil is yellowish red silty clay loam, red silty clay, and yellowish red silty clay that extends to a depth of about 23 inches. The underlying material is tilted and fractured shale that extends to 25 inches or more.

The Townley soil is low in natural fertility. It is strongly acid to extremely acid unless the surface layer has been limed. Permeability is slow, and the available water capacity is low.

Pirum loam makes up 18 percent of the unit. Typically, it has a brown surface layer about 2 inches thick. The subsurface layer is light yellowish brown loam about 8 inches thick. The subsoil is yellowish brown and strong brown loam that extends to a depth of about 34 inches. The underlying material is hard tilted shale bedrock.

The Pirum soil is low in natural fertility. It is strongly acid or very strongly acid unless the surface layer has been limed. Permeability is moderate, and the available water capacity is low.

The remaining 10 percent of the unit is small areas of sandstone or shale outcrop, soils that are similar to the Carnasaw soil but are more than 60 inches deep to bedrock, soils that are similar to the Townley soil but are less than 18 inches deep to bedrock, and areas where slopes are as much as 60 percent.

This unit has poor potential for cultivated crops. It is best suited to wildlife habitat and woodland. A few small areas are pasture. Stones on the surface, droughtiness, and steep slopes make pasture management difficult. Suitable pasture plants are bahiagrass, bermudagrass, white clover, sericea lespedeza, and annual lespedeza. Runoff is rapid, and the hazard of erosion is very severe.

Potential is fair for loblolly and shortleaf pines. Steep slopes and seedling mortality are the main limitations in woodland use and management.

This unit has poor potential for most urban uses. High shrink-swell, steep slopes, and low strength are severe limitations for dwellings, local roads and streets, and industrial sites on the Carnasaw and Townley soils. Depth to bedrock and steep slopes are severe limitations for septic tank absorption fields, dwellings with basements, and industrial sites on the Pirum soil. Slow percolation and steep slopes are severe hazards for septic tank absorption fields on the Carnasaw and Townley soils. Depth to bedrock and slope are severe limitations for local roads and streets on the Pirum soil. These limitations are difficult or impractical to overcome. Carnasaw soil in capability unit VIIe-2, woodland suitability group 3x9, pasture and hayland group 8B; Townley soil in capability unit VIe-1, woodland suitability group 4r2, pasture and hayland group 8B; Pirum soil in capability unit VIe-1, woodland suitability group 3o7, pasture and hayland group 8B.

13—Leadvale silt loam, 1 to 3 percent slopes. This moderately well drained, nearly level soil is in valleys and on colluvial foot slopes in the Ouachita Mountains. Individual areas are 10 to 200 acres.

Typically, the surface layer is brown silt loam about 5 inches thick. The subsoil to a depth of about 27 inches is strong brown silt loam. The fragipan extends to about 49 inches. It is yellowish brown, mottled silt loam. Below is shale bedrock.

Included with this soil in mapping are a few intermingled spots of Avilla and Carnasaw soils. Also included are a few small areas where the subsoil is gravelly.

This soil is low in natural fertility. It is strongly acid or very strongly acid throughout unless the surface layer has been limed. Permeability is moderately slow in the upper part of the subsoil and slow in the fragipan. The available water capacity is medium, and runoff is medium. Tilth is easy to maintain. The fragipan restricts the penetration of roots.

This soil has fair potential for cultivated crops. Such crops as soybeans, grain sorghum, winter small grain, and truck crops are suited and are grown in a few areas. Crops respond well to fertilization. Erosion is a moderate hazard if cultivated crops are grown. Minimum tillage, contour farming, and the use of cover crops, including grasses and legumes in the cropping system, help to reduce runoff and control erosion. Most areas of this soil are pasture. Suitable pasture plants are bermudagrass, bahiagrass, and tall fescue.

This soil has fair potential for loblolly pine and shortleaf pine. There are no significant limitations in woodland use or management.

This soil has fair potential for most urban uses. Wetness is a moderate limitation for dwellings and industrial sites. Low strength is a moderate limitation for roads and streets. Slow percolation is a severe limitation for septic tank absorption fields. All are difficult to overcome. Capability unit IIe-3; woodland suitability group 3o7; pasture and hayland group 8A.

14—Leadvale silt loam, 3 to 8 percent slopes. This moderately well drained, gently sloping soil is in valleys and on colluvial foot slopes in the Ouachita Mountains. Individual areas are 10 to 200 acres.

Typically, the surface layer is brown silt loam about 5 inches thick. The subsoil to a depth of about 27 inches is strong brown silt loam. The fragipan extends to about 49 inches. It is yellowish brown, mottled silt loam. Below is shale bedrock.

Included with this soil in mapping are a few intermingled spots of Avilla and Carnasaw soils. Also included are a few small areas where the subsoil is gravelly.

This soil is low in natural fertility. It is strongly acid or very strongly acid throughout unless the surface layer has been limed. Permeability is moderately slow in the upper part of the subsoil and slow in the fragipan. The available water capacity is medium, and runoff is medium. Tilth is easy to maintain. The fragipan restricts the penetration of roots.

This soil has fair potential for farming. Such crops as soybeans, grain sorghum, winter small grain, and truck crops are suited and are grown in a few areas. Crops respond well to fertilization. Erosion is a moderate hazard if cultivated crops are grown. Minimum tillage, contour farming, and the use of cover crops, including grasses (fig. 4) and legumes in the cropping system, help to reduce runoff and control erosion. Most areas of this soil are pasture. Suitable pasture plants are bermudagrass, bahiagrass, and tall fescue.

This soil has fair potential for loblolly pine and shortleaf pine. There are no significant limitations in woodland use or management.

This soil has fair potential for most urban uses. Wetness is a moderate limitation for dwellings and industrial sites. Low strength is a moderate limitation for roads and streets. Slow percolation is a severe limitation for septic tank absorption fields. All are difficult to overcome. Capability unit IIIe-4; woodland suitability group 3o7; pasture and hayland group 8A.

15—Linker fine sandy loam, 3 to 8 percent slopes. This moderately deep, well drained, gently sloping soil is on Alexander Mountain near the county line in the northeastern part of Saline County. Individual areas are 10 to 200 acres.

Typically, the surface layer is brown fine sandy loam about 5 inches thick. The subsoil extends to a depth of about 33 inches. The upper part is yellowish red sandy clay loam, the next layer is red clay loam; and the lower part is red, mottled sandy clay loam. Below this is red and brown hard sandstone bedrock.

Included with this soil in mapping are a few intermingled spots of Allen soils and spots where the surface layer is gravelly. These included spots make up less than 10 percent of this unit.

This soil is low in natural fertility. It is strongly acid to extremely acid throughout unless the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. Runoff is medium. Tilth is easy to maintain.

Most of the acreage is pasture or meadow. Suitable pasture plants are bahiagrass, bermudagrass, white clover, sericea lespedeza, and annual lespedeza. Other suitable crops are corn, grain sorghum, soybeans, winter small grain, and truck crops. Grapes and fruit crops, such as peaches, apples, and pears are also suitable. Crops respond well to fertilization. Erosion is a severe hazard if cultivated crops are grown. Minimum tillage, contour farming, and the use of cover crops, including grasses and legumes in the cropping system, help to reduce runoff and control erosion.

This soil has fair potential for shortleaf pine and poor potential for loblolly pine. There are no significant limitations in woodland use and management.

This soil has poor potential for most urban uses. Limitations are severe for septic tank absorption fields, dwellings with basements, and small commercial buildings because of depth to bedrock. Limitations are moderate for dwellings without basements and for local roads and streets because of depth to bedrock. All are difficult or impractical to overcome. Capability unit IIIe-4; woodland suitability group 4o7; pasture and hayland group 8A.

16—Ouachita silt loam, frequently flooded. This well drained, deep, level and nearly level soil is on flood plains along drainageways. Slopes are 0 to 2 percent. Individual areas range from about 20 to 150 acres.

Typically, the surface layer is brown silt loam about 11 inches thick. The subsoil to a depth of 26 inches is yellowish brown silt loam. The lower part is dark yellowish brown silt loam that extends to 72 inches or more.

Included with this soil in mapping are small areas of Amy soils, which make up less than 10 percent of the unit. Also included are a few small areas of soils that are similar to the Ouachita soil but have gravel in the profile and narrow areas near streams where the surface layer varies in texture.

Because flooding is a severe hazard, this soil is not suited to cultivated crops. Natural fertility is moderate. The available water capacity is high. Reaction ranges from strongly acid to very strongly acid unless the surface layer has been limed. Runoff is slow, and permeability is moderately slow.

This soil has poor potential for cultivated crops because of the hazard of frequent flooding. Flooding occurs at least once each year and may occur several times each year. It occurs in winter and spring and may occur at least once during the growing season. Most areas are pasture and meadow.

This soil has good potential for loblolly pine, sweetgum, and eastern cottonwood. Flooding limits the use of equipment in managing and harvesting the tree crop, but this limitation can be overcome by logging during drier seasons.

This soil has poor potential for urban use. Flooding, a severe limitation, can be overcome only by major flood control measures. Capability unit IVw-1; woodland suitability group 1w8; pasture and hayland group 2A.

17—Ouachita-Amy complex, frequently flooded. This deep, nearly level, well drained and poorly drained unit is on flood plains along drainageways in the Coastal Plain. Slopes are 0 to 2 percent. Individual areas range from 50 to 300 acres. These soils were so intricately mixed that it was not practical to map them separately at the scale selected for mapping.

Ouachita silt loam makes up about 55 percent of each mapped area. Typically, the surface layer is brown silt loam about 11 inches thick. The subsoil is yellowish brown silt loam to a depth of 26 inches. The lower part is dark yellowish brown silt loam that extends to 72 inches or more.

This soil is moderate in natural fertility. Reaction ranges from strongly acid to very strongly acid unless the surface layer has been limed. Permeability is moderately slow, and the available water capacity is high.

Amy silt loam makes up about 40 percent of each mapped area. Typically, the surface layer is grayish brown silt loam about 3 inches thick. The subsurface layer is light brownish gray, mottled silt loam about 9 inches thick. The subsoil is light gray, mottled silt loam to a depth of about 45 inches. The underlying material is gray, mottled silty clay loam that extends to 72 inches or more.

This soil is low in natural fertility. Reaction ranges from strongly acid to very strongly acid. Permeability is slow, and the available water capacity is high.

The remaining 5 percent of this unit is soils near streams that have a sandy surface layer and soils that are similar to the Ouachita soil but have gray mottles in the subsoil.

This unit is flooded at least once each year, mainly in winter and spring. It has poor potential for cultivated crops because of frequent flooding. Because floods occur mainly in winter and spring, the soils are only fairly well suited to warm-season pasture. The best suited pasture plant is bermudagrass (fig. 5).

This unit has good potential for loblolly pine and sweetgum. Wetness and flooding limit the use of the equipment in managing and harvesting the tree crop, but this limitation can be overcome by using special equipment and by logging during drier seasons.

This unit has poor potential for urban use. Flooding and wetness are the main limitations and can be overcome only by major flood control and drainage measures. Ouachita soil in capability unit IVw-1, woodland suitability group 1w8, pasture and hayland group 2A; Amy soil in capability unit Vw-1, woodland suitability group 2w9, pasture and hayland group 2B.

18—Saffell gravelly fine sandy loam, 3 to 8 percent slopes. This well drained, gently sloping soil is on uplands of the Coastal Plain. Individual areas are 40 to 300 acres.

Typically, the surface layer is brown gravelly fine sandy loam about 4 inches thick. The subsoil to a depth of about 9 inches is reddish brown gravelly fine sandy loam. The lower part is yellowish red very gravelly sandy clay loam and very gravelly loam that extends to about 36 inches. The underlying material is yellowish red and red, stratified very gravelly loamy coarse sand and very gravelly loam that extends to 76 inches or more.

Included with this soil in mapping are small areas of Darco and Smithdale soils, which make up less than 10 percent of the unit. Also included are small areas where slopes are more than 8 percent.

This soil is low in natural fertility. The available water capacity is low. Reaction is strongly acid or very strongly acid unless the surface layer has been limed. Permeability is moderate, and runoff is medium.

Most areas of this soil are woodland. Most cleared areas are pasture. Suitable pasture crops are bahiagrass, bermudagrass, dallisgrass, white clover, annual lespedeza, and sericea lespedeza. Crops respond to fertilization. The soil is droughty and difficult to till because of the gravel content. It has only fair potential for cultivated crops. Erosion is a severe hazard if cultivated crops are grown. Minimum tillage, contour farming, and the use of cover crops, including grasses and legumes in the cropping system, help to reduce runoff and control erosion.

This soil has fair potential for loblolly pine and shortleaf pine. There are no significant limitations in woodland use and management.

This soil has good potential for most urban uses. Limitations are slight for septic tank absorption fields, dwellings, and local roads and streets. Slope is a moderate limitation for industrial sites. This limitation can be easily overcome with proper engineering design. Capability unit IIIe-5; woodland suitability group 4f2; pasture and hayland group 8G.

19—Saffell-Urban land complex, 3 to 8 percent slopes. This well drained, gently sloping map unit consists of Saffell soils and land modified by urban development that is mainly Savannah soil material. It occurs in the city of Benton and in urban areas in the south half of Saline County. Individual areas range from 20 to 150 acres in size. The areas of Saffell soils and Urban land were so intricately mixed that it was not feasible to map them separately at the scale selected for mapping.

The Saffell soil makes up about 25 to 75 percent of this map unit. Typically, the surface layer is brown gravelly fine sandy loam about 4 inches thick. The subsoil is reddish brown gravelly fine sandy loam to a depth of about 9 inches and yellowish red very gravelly sandy clay loam and very gravelly loam to about 36 inches. The underlying material is yellowish red and red, stratified very gravelly loamy coarse sand and very gravelly loam that extends to 76 inches or more.

This soil is low in natural fertility and available water capacity. Reaction is strongly acid or very strongly acid unless the surface layer has been limed. Permeability is moderate and runoff is medium.

Urban land makes up 20 to 65 percent of the unit. It consists of Saffell soils and other soils that have been so altered or so obscured by buildings or other urban structures that identifying the soil is not possible. Typical structures are single- and multiple-unit dwellings, streets, schools, parks, and a shopping center less than 40 acres in size.

The remaining 5 to 10 percent of the unit is small areas of Smithdale soil and small areas where slopes are greater than 8 percent. In some areas, the Saffell soil has not been altered but is covered by 6 to 24 inches of loamy material.

The Saffell soil has high potential for most urban uses. Limitations are slight for septic tank absorption fields, dwellings, and local roads and streets. Slope is a moderate limitation for industrial sites. This limitation can usually be overcome with proper engineering design. Saffell soil in capability unit IIIe-5; woodland suitability group 4f2; pasture and hayland group 8G. Urban land not assigned to interpretive groups.

20—Savannah fine sandy loam, 1 to 3 percent slopes. This moderately well drained, nearly level soil is on the smoother parts of the Coastal Plain. Individual areas are 10 to 200 acres.

Typically, the surface layer is brown fine sandy loam about 8 inches thick. The subsurface layer is yellowish brown fine sandy loam about 6 inches thick. The subsoil is yellowish brown loam to a depth of about 32 inches; brownish yellow and yellowish brown, mottled, compact and brittle loam to about 55 inches; and mottled yellow, brown, and gray, compact and brittle sandy clay loam that extends to 72 inches or more.

Included with this soil in mapping are a few intermingled spots of Smithdale, Wrightsville, and Amy soils. Spots of these soils make up less than 10 percent of the unit.

This soil is low in natural fertility. It is strongly acid or extremely acid throughout unless the surface layer has been limed. Permeability is moderate in the upper part of the subsoil and moderately slow in the fragipan. The available water capacity is medium, and runoff is medium. Tilth is easy to maintain. The fragipan restricts the penetration of roots.

This soil has fair potential for farming. Suitable crops are cotton, soybeans, and small grain. Crops respond well to fertilization. Erosion is a moderate hazard if cultivated crops are grown. Minimum tillage, contour farming, and the use of cover crops, including grasses and legumes in the cropping system, help to reduce runoff and control erosion. This soil has fair potential for forage plants, such as bermudagrass, bahiagrass, tall fescue, white clover, and annual lespedeza.

This soil has fair potential for loblolly pine, shortleaf pine, and southern red oak. There are no significant limitations in woodland use or management.

This soil has fair potential for most urban uses. Low strength is a moderate limitation for roads and streets. Moderately slow permeability is a severe limitation for septic tank absorption fields. These limitations are difficult to overcome. Capability unit IIw-1; woodland suitability group 3o7; pasture and hayland group 8A.

21—Savannah-Urban land complex, 1 to 3 percent slopes. This moderately well drained, nearly level map unit consists of Savannah soils and land modified by urban development that is mainly Savannah soil material. It occurs in the town of Benton and in urban areas in the south half of Saline County. Most areas range from 20 to 250 acres. Slopes range from 1 to 3 percent but average less than 2 percent. The areas of Savannah soils and Urban land were so intricately mixed that it was not feasible to map them separately at the scale selected for mapping.

Savannah soils make up about 25 to 65 percent of this map unit. Typically, the surface layer is brown fine sandy loam about 8 inches thick. The subsurface layer is yellowish brown fine sandy loam about 6 inches thick. The subsoil is yellowish brown loam to a depth of about 32 inches; compact and brittle, brownish yellow and yellowish brown mottled loam to about 55 inches; and mottled yellow, brown, and gray sandy clay loam that is also compact and brittle and extends to 72 inches or more.

The Savannah soil is low in natural fertility. It is strongly acid or extremely acid throughout unless the surface layer has been limed. Permeability is moderate in the upper part of the subsoil and moderately slow in the fragipan. The available water capacity is medium. Runoff is medium and erosion is a moderate hazard unless the soil is protected by vegetation. The fragipan restricts the penetration of roots.

Urban land makes up 25 to 70 percent of the unit. It consists of Savannah soils and other soils that have been so altered or so obscured by buildings or other structures that identifying the soil is impossible. Typical structures are single- and multiple unit dwellings, streets, and roads.

The remaining 5 to 10 percent of the unit is a few intermingled areas of Smithdale and Tiak soils. In some areas, the Savannah soil has not been altered but is covered by 6 to 24 inches of loamy material.

This map unit has medium potential for most urban uses. Wetness is a moderate limitation for dwellings and industrial sites. Low strength is a moderate limitation for roads and streets. These limitations can usually be overcome with proper engineering design. Moderately slow permeability is a severe limitation for septic tank absorption fields. This limitation is difficult to overcome. The potential is medium for lawn grasses, shrubs, and trees. During wet periods the seasonal high water table is within the root zone. This limitation can be overcome by selecting plants that tolerate wetness and planting during drier seasons. Savannah soil in capability unit IIw-1; woodland suitability group 3o7; pasture and hayland group 8A. Urban land not assigned to interpretive groups.

22—Savannah fine sandy loam, 3 to 8 percent slopes. This moderately well drained, gently sloping soil is on uplands of the Coastal Plain. Individual areas are 10 to 300 acres.

Typically, the surface layer is brown fine sandy loam about 8 inches thick. The subsurface layer is yellowish brown fine sandy loam about 6 inches thick. The subsoil is yellowish brown loam to a depth of about 32 inches; brownish yellow and yellowish brown, mottled, compact and brittle loam to about 55 inches; and mottled yellow, brown, and gray, compact and brittle sandy clay loam that extends to 72 inches or more.

Included with this soil in mapping are a few intermingled spots of Smithdale and Tiak soils. Spots of these soils make up less than 10 percent of the unit.

This soil is low in natural fertility. Reaction ranges from strongly acid to extremely acid throughout unless the surface layer has been limed. Permeability is moderate in the upper part of the subsoil and moderately slow in the fragipan. The available water capacity is medium, and runoff is medium. Tilth is easy to maintain. The fragipan restricts the penetration of roots.

This soil has fair potential for farming. Suitable crops are cotton, soybeans, and small grains. Crops respond well to fertilization. Erosion is a severe hazard if cultivated crops are grown. Minimum tillage, contour farming, and the use of cover crops, including grasses and legumes in the cropping system, help to reduce runoff and control erosion. This soil has fair potential for forage plants, such as bermudagrass, bahiagrass, tall fescue, white clover, and annual lespedeza.

This soil has fair potential for loblolly pine, shortleaf pine, and southern red oak. There are no significant limitations in woodland use or management.

This soil has fair potential for most urban uses. Wetness is a moderate limitation for dwellings and industrial sites. Low strength is a moderate limitation for roads and streets. Moderately slow permeability is a severe limitation for septic tank absorption fields. All are difficult to overcome. Capability unit IIIe-4; woodland suitability group 3o7; pasture and hayland group 8A.

23—Savannah-Urban land complex, 3 to 8 percent slopes. This moderately well drained, gently sloping map unit consists of Savannah soils and land modified by urban development that is mainly Savannah soil material. It occurs in the town of Benton and in urban areas in the south half of Saline County. Most areas range from 20 to 250 acres. Slopes range from 3 to 8 percent. The areas of Savannah soils and Urban land were so intricately mixed that it was not feasible to map them separately at the scale selected for mapping.

Savannah soils make up about 25 to 60 percent of this map unit. Typically, the surface layer is brown fine sandy loam about 8 inches thick. The subsurface layer is yellowish brown fine sandy loam about 6 inches thick. The subsoil is yellowish brown loam to a depth of about 32 inches; compact and brittle, brownish yellow and yellowish brown mottled loam to about 55 inches; and mottled yellow, brown, and gray sandy clay loam that is also compact and brittle and extends to 72 inches or more.

The Savannah soil is low in natural fertility. It is strongly acid or extremely acid unless the surface layer has been limed. Permeability is moderate in the upper part of the subsoil and moderately slow in the fragipan. The available water capacity is medium. Runoff is medium and erosion is a severe hazard unless the soil is protected by vegetation. The fragipan restricts the penetration of roots.

Urban land makes up 25 to 70 percent of the unit. It consists of Savannah soils and other soils that have been so altered or so obscured by buildings or other structures that identifying the soil is impossible. Typical structures are single- and multiple-unit dwellings, streets, and roads.

The remaining 5 to 15 percent of this unit is a few intermingled areas of Smithdale and Tiak soils.

This map unit has fair potential for most urban uses. Wetness is a moderate limitation for dwelling and industrial sites. Low strength is a moderate limitation for roads and streets. These limitations can usually be overcome with proper engineering design. Moderately slow permeability is a severe limitation for septic tank absorption fields. This limitation is difficult to overcome. The potential is fair for lawn grasses, shrubs, and trees. During wet periods the seasonal high water table is within the root zone. This limitation can be overcome by selecting plants that tolerate wetness and planting during the drier seasons. Erosion is a severe hazard unless areas are protected by vegetation. Savannah soil in capability unit IIIe-4; woodland suitability group 3o7; pasture and hayland group 8A. Urban land not assigned to interpretive groups.

24—Sherwood-Rock outcrop complex, 3 to 12 percent slopes. This unit consists of small areas of Sherwood soil and Rock outcrop that are in such an irregular pattern that they could not be mapped separately at the scale selected for mapping. Individual areas range from 200 to 500 acres.

Sherwood loam makes up about 50 percent of each mapped area. Typically, the surface layer is very dark brown loam about 9 inches thick. The subsurface layer is brown loam about 7 inches thick. The subsoil is yellowish red clay loam to a depth of about 40 inches. The underlying material is variegated red, strong brown, and yellowish brown loamy material that extends to 61 inches. Below is hard syenite bedrock.

This soil is low in natural fertility. The surface layer is very strongly acid to medium acid unless it has been limed. The subsoil and underlying material are very strongly acid or strongly acid. Permeability is moderate, and the available water capacity is medium.

Rock outcrop makes up about 30 percent of each mapped area. The remaining 20 percent of this unit is soils that are similar to the Sherwood soil but are shallower to bedrock and areas where stones or boulders are on the surface.

This unit has poor potential for farming. Large stones and the depth to bedrock are severe limitations that are very difficult to overcome.

Potential is poor for locally grown trees. Most of the acreage is in scrub mixed upland oaks. The use of logging equipment is restricted because of large stones and rock outcrop.

This unit has good potential as woodland wildlife habitat (fig. 6) and extensive recreation areas. It has fair potential for most urban uses. Limitations are moderate for dwellings, small commercial buildings, and streets and roads. They can usually be overcome with proper engineering design. Sherwood soil in capability unit IVe-1, woodland suitability group 4o7, pasture and hayland group 8A; Rock outcrop not assigned to interpretive groups.

25—Smithdale loamy sand, 3 to 8 percent slopes. This well drained, gently sloping soil is on uplands of the Coastal Plain. Individual areas are 40 to 300 acres.

Typically, the surface layer is yellowish brown loamy sand about 6 inches thick. The subsoil is strong brown fine sandy loam to a depth of about 15 inches; yellowish red and red, mottled sandy clay loam and fine sandy loam to about 102 inches; and red loamy fine sand to about 111 inches. The underlying material is yellowish red loamy fine sand that extends to 123 inches or more.

Included with this soil in mapping are a few intermingled spots of Saffell, Tiak, and Savannah soils. Also included are small areas where the upper part of the subsoil is sandy. The included spots and areas make up less than 10 percent of the unit.

This soil is moderate in natural fertility. It is strongly acid or very strongly acid throughout unless the surface layer has been limed. Permeability is moderate, and the available water capacity is high. Runoff is medium. Tilth is easy to maintain.

This soil has fair potential for farming: The main crops are truck crops. Other suitable crops are cotton, corn, soybeans, and small grain. The dominant use of this soil is pasture. Suitable pasture crops are bermudagrass, bahiagrass, and tall fescue. Crops respond well to fertilization. Erosion is a severe hazard if cultivated crops are grown. Minimum tillage, contour farming, and the use of cover crops, including grasses and legumes in the cropping system, help to reduce runoff and control erosion.

This soil has fair potential for loblolly pine. There are no significant limitations in woodland use or management.

This soil has good potential for most urban uses. Limitations are slight for septic tank absorption fields, dwellings, and local roads and streets. Slope is a moderate limitation for industrial sites. This limitation can usually be overcome with proper engineering design. Capability unit IIIe-4; woodland suitability group 3o1; pasture and hayland group 9A.

26—Smithdale-Urban land complex, 3 to 8 percent slopes. This well drained, gently sloping map unit consists of Smithdale soils and land modified by urban development that is mainly Smithdale soil material. It occurs in the town of Benton and in urban areas in the south half of Saline County. Most areas range from 20 to 150 acres. Slopes range from 3 to 8 percent. The areas of Smithdale soils and Urban land were so intricately mixed that it was not feasible to map them separately at the scale selected for mapping.

Smithdale soils make up about 25 to 65 percent of this map unit. Typically, the surface layer is yellowish brown loamy sand about 6 inches thick. The subsoil is strong brown fine sandy loam to a depth of about 15 inches; yellowish red and red, mottled sandy clay loam and fine sandy loam to about 102 inches; and red loamy fine sand to about 111 inches. The underlying material is yellowish red loamy fine sand that extends to 123 inches or more.

The Smithdale soil is moderate in natural fertility. It is strongly acid or very strongly acid throughout unless the surface layer has been limed. Permeability is moderate, and the available water capacity is high. Runoff is medium and erosion is a severe hazard unless the soil is protected by vegetation.

Urban land makes up 25 to 70 percent of the unit. It consists of Smithdale soils and other soils that have been so altered or so obscured by buildings or other structures that identifying the soil is impossible. Typical structures are single- and multiple-unit dwellings, streets, and roads.

The remaining 5 to 10 percent of the unit is a few intermingled areas of Savannah, Saffell, and Tiak soils, and spots where slopes are greater than 8 percent.

This unit has good potential for most urban uses. Limitations are slight for dwellings, roads and streets, and septic tank absorption fields. Slope is a moderate limitation for industrial sites. This limitation can usually be overcome with proper engineering design. The potential is high for lawn grasses, shrubs, and trees. Erosion is a severe hazard unless areas are protected by vegetation. Smithdale soil in capability unit IIIe-4; woodland suitability group 3o1; pasture and hayland group 9A. Urban land not assigned to interpretive groups.

27—Smithdale loamy sand, 8 to 12 percent slopes. This well drained, moderately sloping soil is on uplands of the Coastal Plain. Individual areas are 5 to 150 acres.

Typically, the surface layer is yellowish brown loamy sand about 6 inches thick. The subsoil is strong brown fine sandy loam to a depth of about 15 inches; yellowish red and red, mottled sandy clay loam and fine sandy loam to about 102 inches; and red loamy fine sand to about 111 inches. The underlying material is yellowish red loamy fine sand that extends to 123 inches or more.

Included with this soil in mapping are a few intermingled spots of Saffell soils and small areas where slopes are less than 8 percent. Also included are a few small areas where the upper part of the subsoil is sandy. The included spots and areas make up less than 10 percent of the unit.

This soil is moderate in natural fertility. It is strongly acid or very strongly acid throughout unless the surface layer has been limed. Permeability is moderate, and the available water capacity is high. Runoff is rapid. Tilth is easy to maintain.

This soil has poor potential for farming. Suitable pasture plants are bermudagrass, bahiagrass, and tall fescue. Erosion is a severe hazard if cultivated crops are grown. Minimum tillage, contour farming, and the use of cover crops, including grasses and legumes in the cropping system, help to reduce runoff and control erosion.

Most areas are woodland. The soil has fair potential for loblolly pine. There are no significant limitations in woodland use or management.

This soil has fair potential for most urban uses. Slope is a moderate limitation for dwellings, local roads and streets, and septic tank absorption fields and a severe limitation for industrial sites. This limitation can usually be overcome with proper engineering design. Capability unit IVe-2; woodland suitability group 3o1; pasture and hayland group 9A.

28—Smithdale and Darco loamy sands, 12 to 30 percent slopes. This unit consists of well drained, steep soils on uplands of the Coastal Plain. It consists of irregular patterns of Smithdale loamy sand and Darco loamy fine sand. Most mapped areas contain both soils, but a few contain only one. Individual areas were large enough to be mapped separately, but such mapping was not warranted because of the low intensity of use and management. Slopes range from 12 to 30 percent. Individual areas range from 40 to 300 acres.

Typically, the Smithdale soil has a yellowish brown loamy sand surface layer about 6 inches thick. The subsoil is strong brown fine sandy loam to a depth of about 15 inches; yellowish red and red, mottled sandy clay loam and fine sandy loam to about 102 inches; and red loamy fine sand to about 111 inches. The underlying material is yellowish red loamy fine sand that extends to 123 inches or more.

The Smithdale soil is moderate in natural fertility. It is strongly acid or very strongly acid throughout unless the surface layer has been limed. Permeability is moderate, and the available water capacity is high. Runoff is rapid.

Typically, the Darco soil has a dark grayish brown loamy fine sand surface layer about 4 inches thick. The subsurface layer is pale brown and light yellowish brown loamy fine sand about 41 inches thick. The subsoil is yellowish red sandy loam that extends to 80 inches or more.

The Darco soil is low in natural fertility. It is strongly acid or very strongly acid throughout unless the surface layer has been limed. Permeability is moderately rapid, and the available water capacity is low. Runoff is rapid.

Included with this unit in mapping are small areas of Savannah and Tiak soils, areas where stones and boulders are on the surface, and areas where slopes are more than 30 percent.

Because of steep slopes, this unit is poorly suited to cultivated crops. All areas are mixed pine and hardwood forest.

This unit has fair potential for loblolly pine and shortleaf pine. There are no significant limitations in woodland use or management.

This unit has low potential for most urban uses. Slope is a severe limitation for dwellings, local roads and streets, septic tank absorption fields, and industrial sites. This limitation is difficult or impractical to overcome. Smithdale soil in capability unit VIe-2, woodland suitability group 3o1, pasture and hayland group 9A; Darco soil in capability unit VIe-1, woodland suitability group 4s3, pasture and hayland group 9A.

29—Tiak silt loam, 3 to 8 percent slopes. This deep, moderately well drained, gently sloping soil is on uplands of the Coastal Plain. Individual areas are 20 to 200 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The subsurface layer is light yellowish brown loam about 5 inches thick. The subsoil is red clay to a depth of about 22 inches; red, mottled clay to about 32 inches; red and gray, mottled clay to about 53 inches; light gray, mottled clay to 64 inches; and mottled gray, red, and yellowish red sandy clay loam that extends to 72 inches or more.

Included with this soil in mapping are small areas of Savannah soils. These soils make up less than 10 percent of the unit.

This soil is low in natural fertility. Reaction is very strongly acid unless the surface layer has been limed. The available water capacity is high, and runoff is medium. Permeability is slow.

Most of the acreage is woodland and pasture. This soil has fair potential for cultivated crops. Suitable crops are soybeans, grain sorghum, winter small grain, and truck crops. Suitable pasture crops are bahiagrass, bermudagrass, tall fescue, white clover, sericea lespedeza, and annual lespedeza. Crops respond well to fertilization. Erosion is a severe hazard if cultivated crops are grown year after year. Minimum tillage, contour farming, and the use of cover crops, including grasses and legumes in the cropping system, help to reduce runoff and control erosion.

This soil has fair potential for loblolly pine and shortleaf pine. There are no significant limitations in woodland use and management.

This soil has poor potential for most urban uses. Shrink-swell and low strength are severe limitations for dwellings, industrial sites, and roads and streets. Slow percolation is a severe limitation for septic tank absorption fields. These limitations are difficult to overcome. Capability unit IIIe-1; woodland suitability group 3c2; pasture and hayland group 8C.

30—Tiak-Urban land complex, 3 to 8 percent slopes. This deep, moderately well drained, gently sloping map unit consists of Tiak soils and land modified by urban development that is mainly Tiak soil material. It occurs in the town of Benton and in urban areas in the south half of Saline County. Most areas range from 20 to 200 acres. The areas of Tiak soils and Urban land were so intricately mixed that it was not feasible to map them separately at the scale selected for mapping.

Tiak soils make up about 25 to 60 percent of this map unit. Typically, the surface layer is brown silt loam about 7 inches thick. The subsurface layer is light yellowish brown loam about 5 inches thick. The subsoil is red clay to a depth of about 22 inches; red, mottled clay to about 32 inches; red and gray, mottled clay to about 53 inches; light gray, mottled clay to 64 inches; and gray and red, mottled sandy clay loam that extends to 72 inches or more.

The Tiak soil is low in natural fertility. It is very strongly acid throughout unless the surface layer has been limed. Permeability is slow and the available water capacity is high. Runoff is medium and erosion is a severe hazard unless the soil is protected by vegetation.

Urban land makes up 25 to 70 percent of the unit. It consists of Tiak soils and other soils that have been so altered or so obscured by buildings or other structures that identifying the soil is impossible. Typical structures are single- and multiple-unit dwellings, streets, and roads.

The remaining 5 to 15 percent is a few intermingled areas of Savannah and Smithdale soils and spots where slopes are greater than 8 percent.

This complex has a poor potential for most urban uses. Shrink-swell (fig. 7) and low strength are severe limitations for dwellings, industrial sites, and roads and streets. Slow percolation is a severe limitation for septic tank absorption fields. These limitations are difficult to overcome. This complex has good potential for growing lawn grasses, shrubs, and trees. Tiak soil in capability unit IIIe-1; woodland suitability group 3c2; pasture and hayland group 8C. Urban land not assigned to interpretive groups.

31—Tiak silt loam, 8 to 12 percent slopes. This deep, moderately well drained, moderately sloping soil is on uplands of the Coastal Plain. Individual areas are 20 to 200 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The subsurface layer is light yellowish brown loam about 5 inches thick. The subsoil is red clay to a depth of about 22 inches; red, mottled clay to about 32 inches; red and gray, mottled clay to about 53 inches; light gray, mottled clay to 64 inches; and gray and red, mottled sandy clay loam that extends to 72 inches or more.

Included with this soil in mapping are small areas where slopes are less than 8 percent. These areas make up less than 10 percent of the unit.

This soil is low in natural fertility. Reaction is very strongly acid unless the surface layer has been limed. The available water capacity is high, and runoff is rapid. Permeability is slow.

Most areas of this soil are woodland and pasture. Suitable pasture crops are bahiagrass, bermudagrass, tall fescue, white clover, sericea lespedeza, and annual lespedeza. Crops respond well to fertilization. Erosion is a severe hazard if cultivated crops are grown. Minimum tillage, contour farming, and the use of cover crops, including grasses and legumes in the cropping system, help to reduce runoff and control erosion.

This soil has fair potential for loblolly pine and shortleaf pine. There are no significant limitations in woodland use and management.

This soil has poor potential for most urban uses. Shrink-swell and low strength are severe limitations for dwellings, industrial sites, and roads and streets. Slow percolation is a severe limitation for septic tank absorption fields. These limitations are difficult to overcome. Capability unit VIe-3; woodland suitability group 3c2; pasture and hayland group 8C.

32—**Udorthents.** This map unit consists of bauxite pits and abandoned pits and nearly level to very steep areas of mine spoil of excavated material. The pits are long, open excavations from which soil and the underlying material have been removed. Slopes range from 3 to 60 percent. Individual areas are about 50 to 200 acres.

This unit is about 40 percent bauxite pits that are actively mined. About 50 percent is areas of mine spoil. A few areas are planted to pine trees, and a few are experimental grass plots. The remaining 10 percent is small areas of Smithdale and Savannah soils.

Udorthents are excessively drained soils that have been altered or obscured by mining operations. Soil classification is impractical. The surface layer ranges from very fine sandy loam to gravelly fine sandy loam. The underlying material ranges from gravelly loamy sand to very gravelly silty clay loam.

Permeability is moderately rapid. Fertility and the organic matter content are extremely low. The available water capacity is low. The soil material is extremely acid to moderately alkaline in the A horizon and extremely acid or very strongly acid in the underlying material.

This unit is not suited to cultivated crops. If reclaimed, it would have fair potential for grasses and eastern redcedar.

Udorthents have poor potential for most urban uses. Areas where slopes are 8 to 12 percent have moderate limitations and areas where slopes are more than 15 percent have severe limitations for dwellings, roads and streets, and septic tank absorption fields. Capability unit VIIs-1; woodland suitability group 5r9; pasture and hayland group 8B.

33—**Wrightsville silt loam.** This deep, poorly drained soil is on level to depressional old stream terraces. Slopes are less than 1 percent. Individual areas range from about 40 to 200 acres.

Typically, the surface layer is dark grayish brown silt loam about 2 inches thick. The subsurface layer is gray and light brownish gray, mottled silt loam about 28 inches thick. The subsoil is gray, mottled silty clay to a depth of about 50 inches. The underlying material is mottled grayish brown and reddish yellow silty clay loam that extends to 72 inches or more.

Included with this soil in mapping are small areas of Amy and Savannah soils. These soils make up less than 10 percent of this unit.

This soil is low in natural fertility. The available water capacity is high. Reaction ranges from strongly acid to extremely acid unless the surface layer has been limed. Permeability is very slow, and runoff is slow. The water table is seasonally high. It is within 12 inches of the surface in winter and early in spring.

Most of the acreage is woodland. Some cleared areas are pasture. Suitable pasture plants are bermudagrass, bahiagrass, tall fescue, white clover, annual lespedeza, and sericea lespedeza. Lime and fertilization improve stands and yields. In areas where surface drainage is adequate, suitable cultivated crops are soybeans and winter small grain.

This soil has fair potential for loblolly pine and sweetgum. Wetness is the main limitation in the use of equipment in managing and harvesting the tree crop. Usually this limitation can be overcome by logging during the drier seasons.

This soil has poor potential for most urban uses. Poor drainage and the seasonal high water table are severe limitations for dwellings, streets, and industrial sites. The very slow permeability and the seasonal high water table are severe limitations for septic tank absorption fields. These limitations are difficult or impractical to overcome. Capability unit IIIw-2; woodland suitability group 3w9; pasture and hayland group 7C.

34—**Zafra-Leadvale complex, 3 to 8 percent slopes.** This unit consists of small areas of Zafra soils and Leadvale soils in such an irregular pattern that they could not be mapped separately at the scale selected for mapping. Individual areas range from 50 to 300 acres.

Zafra loam makes up about 45 percent of each mapped area. Typically, the surface layer is dark brown loam about 8 inches thick. The subsoil extends to a depth of about 40 inches. The upper part is yellowish red gravelly clay loam, the next layer is yellowish red very gravelly clay loam, and the lower part is strong brown very gravelly clay loam. Below this is hard shale bedrock.

This soil is low in natural fertility. Reaction is medium acid or strongly acid. Permeability is moderate, and the available water capacity is medium to high.

Leadvale silt loam makes up about 30 percent of each mapped area. Typically, the surface layer is brown silt loam about 5 inches thick. The subsoil to a depth of about 27 inches is strong brown silt loam. The fragipan, which extends to a depth of about 49 inches, is yellowish brown, mottled silt loam. Below is shale bedrock.

This soil is low in natural fertility. It is strongly acid or very strongly acid throughout unless the surface layer has been limed. Permeability is moderately slow in the upper part of the subsoil and slow in the fragipan. The available water capacity is medium.

The remaining 25 percent of this unit is areas of Ouachita soils, soils that are similar to the Leadvale soil but have a gravelly subsoil, soils that are similar to the Avilla soil, and gravel bars along creeks.

This unit has poor potential for farming. Most of the acreage is woodland, and the soil has good potential for this use. Some areas have been cleared and are pastured. Suitable pasture plants are bahiagrass, bermudagrass, tall fescue, white clover, sericea lespedeza, and annual lespedeza.

This unit has fair potential for most urban uses. On the Leadvale soil, wetness is a moderate limitation for dwellings and industrial sites; low strength is a moderate limitation for roads and streets; and slow percolation is a severe limitation for septic tank absorption fields. These limitations are difficult to overcome. On the Zafra soil, limitations are slight for dwellings and industrial sites and depth to bedrock is a moderate limitation for roads and streets and a severe limitation for septic tank absorption fields. These limitations are also difficult to overcome. Zafra soil in capability unit IVe-3, woodland suitability group 3o7, pasture and hayland group 8G; Leadvale soil in capability unit IIIe-4, woodland suitability group 3o7, pasture and hayland group 8A.

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. In addition, the crops or pasture plants best suited to the soil, including some not commonly grown in the survey area, are discussed; the system of land capability classification used by the Soil Conservation Service is described; the estimated yields of the main crops and hay and pasture plants are presented for each soil; and the pasture and hayland groups are explained.

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.

More than 24,971 acres in the survey area was used for crops and pasture in 1969, according to the Census of Agriculture. Of this total 8,539 acres was harvested cropland. See table 1 for principal crops harvested.

The acreage in crops and pasture is gradually decreasing as more and more land is used for urban development. The use of this soil survey in making land use decisions that will influence the future role of farming in the county is suggested in the section "General soil map for broad land use planning."

The potential of the soils in Saline County for increased production of food is fair. Food production could be increased by extending the latest crop production technology to all cropland in the county. This soil survey can greatly faciliitiate the application of such technology.

Row arrangement and suitable surface drainage are needed for dependable crop growth in wet areas. Many tracts that are subject to frequent flooding are unsuited or only marginally suited to most crops commonly grown in the county.

Annual cover crops or grasses and legumes should be grown regularly in the cropping system if the erosion hazard is severe or if the crops grown leave only small amounts of residue. Seedbed preparation should be delayed until spring for maximum benefit from residue.

Crop residue should be shredded and spread evenly to provide protective cover and organic matter to the soils.

A plowpan commonly develops in loamy soils that are improperly tilled or tilled frequently with heavy equipment. Keeping tillage to a minimum, varying the depth of tillage, and tilling when the soil moisture content is favorable help to prevent the formation of a plowpan. Growing deep-rooting grasses and legumes in the cropping system helps to break up the plowpan.

If left bare, many soils tend to puddle, pack, and crust during periods of heavy rainfall. Growing cover crops and managing crop residue preserve or improve tilth.

Perennial grasses or legumes or a mixture is grown for pasture and hay. Generally, the mixture consists of either a summer or a winter perennial grass and a suitable legume.

Coastal bermudagrass and common bermudagrass, dallisgrass, and Pensacola bahiagrass are the summer perennials most commonly grown. Coastal bermudagrass and Pensacola bahiagrass are fairly new to this county, but both are highly satisfactory in production of good quality forage. Tall fescue, the chief winter perennial grass now grown, grows well only on soils that have a favorable soil-moisture relationship. All of these grasses respond well to fertilizer, particularly to nitrogen. White clover, crimson clover, annual lespedeza, and sericea lespedeza are the most commonly grown legumes.

Proper grazing is essential for high-quality forage production, stand survival, and erosion control. Other treatments and management practices, for example brush and weed control, fertilization, and renovation of the pasture, are also important.

The soils of Saline County have been assigned to nine pasture and hayland groups. These groups are prepared to assist land users in selecting and managing suitable forage plants. The soils included in each group grow similar kinds of forage plants and require similar treatment and management. Forage production on all soils in the group is essentially the same if managment and treatment are the same. The pasture and hayland groups are identified in the description of each soil map unit under the heading "Soil maps for detailed planning." The local office of the Soil Conservation Service can provide additional information about these groups.

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 7. 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 crop is not suited to or 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 and legumes suited to the climate and the soil. A few farmers may be obtaining average yields higher than those shown in table 7.

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.

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 7 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, cranberries, 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

JAMES T. BEENE, forester, Soil Conservation Service, helped prepare this section.

Originally, Saline County was covered with virgin forest except for river sandbars and scattered small openings where Indians grew such crops as corn, beans, and squash.

In the lowlands, the principal tree species were sweetgum, water tupelo, baldcypress, bottomland oaks, ash, sycamore, cottonwood, and hickory. On the uplands were loblolly pine, shortleaf pine, southern red oak, black oak, white oak, hickory, ash, and sweetgum.

Forest covers about 372,600 acres, or 80 percent of the land area (*6*) in Saline County. In recent years, there has been a trend toward converting woodland to urban uses. This trend is expected to continue.

Table 8 contains information useful to woodland owners or forest managers planning use of soils for wood crops. Map unit symbols for soils suitable for wood crops are listed, and the woodland suitability group symbol for each soil is given. All soils bearing the same woodland suitability group symbol require the same general kinds of woodland management and have about the same potential productivity.

The first part of the *woodland suitability group 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; *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, c, s, f, and r.

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

In table 8 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 hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if 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 needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or 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, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Site index ratings are based on age 30 for eastern cottonwood, age 35 for American sycamore, and age 50 for all other species. 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.

Engineering

JAMES L. JANSK, civil engineer, and RAYMOND INGRAM, design 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 uses; (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 9 shows, for each kind of soil, the degree and kind of limitations for building site development; table 10, for sanitary facilities; and table 12, for water management. Table 11 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 9. 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, and open ditches. 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 9 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 9 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 10 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*, or *poor*, which, respectively, mean about the same as the terms *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.

Percolation tests are performed to determine the absorptive capacity of the soil and its suitability for septic tank absorption fields. These tests should be performed during the season when the water table is highest and the soil is at minimum absorptive capacity.

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 10 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.

Where 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 11 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 materials. 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 15 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 potential frost action, 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 11 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 15.

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 limit or prevent 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 and very firm clayey soils; soils with suitable layers less than 8 inches thick; soils having 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 12 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 a 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 12 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 13 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 13 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 10, and interpretations for dwellings without basements and for local roads and streets, given in table 9.

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.

Wildlife habitat

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

Soils are related to the kinds and abundance of wildlife through the vegetation they support and the habitat the vegetation provides. Desirable habitat depends on the diversity of food, cover, and nearness of vegetation to water. The kind and amount of vegetation is closely related to soil characteristics and land use.

All wildlife and fish respond to the basic characteristics of soils. This response is affected in many ways by fertility, slope, wetness, and other characteristics of soils. The permeability rate determines whether or not the soil can be used to impound water in ponds and lakes.

Extensive wooded areas, such as the Saline River bottom land, are well suited as habitat for deer, wild turkey, squirrel, and other woodland wildlife. These areas and similar ones on private land provide suitable food, cover, and drinking water for wildlife if they are not unduly disturbed.

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 14, 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 wildlife 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, grain sorghum, wheat, and millet.

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 bahiagrass, bermudagrass, panic grass, and clover.

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, goatweed (wooly croton), greenbrier, 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 native plants are oak, cherry, dogweed, and hickory.

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, baldcypress, and cedar.

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.

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 pondweeds.

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, doves, 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, thrushes, 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, herons, muskrat, mink, and beaver.

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 15 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 15 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 15 in the standard terms used by (*4*) the U.S. Department of Agriculture. 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 (Unified) (*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 AASHTO classification for soils tested in the survey area, with group index numbers in parentheses, is given in table 20. The estimated classification, without group index numbers, is given in table 15. Also in table 15 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 both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Ranges in liquid limit and plasticity index are 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 16 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.

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.

Salinity is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of the nonirrigated soils. The salinity of individual irrigated fields is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of individual fields can differ greatly from the value given in table 16. Salinity affects the suitability of a soil for crop production, its stability when used as a construction material, and its potential to corrode metal and concrete.

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.

Risk of corrosion pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Uncoated steel intersecting soil boundaries or soil horizons is more susceptible to corrosion than an installation that is entirely within one kind of soil or within one soil horizon.

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 17 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 17 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 is 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 can be useful 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 nonfarm uses, that is, for residential, industrial, recreational, or transportational use.

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

In Saline County, soils representing two soil series were selected for laboratory analyses. Profiles of these soils are described under "Soil series and morphology." The analyses were made by the University of Arkansas in Fayetteville. Tables 18 and 19 show the results.

Silt and clay particle size distribution was determined by the hydrometer method (*3*). Sands were measured by sieving (*5*).

Organic matter was determined by a modified Walkley-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 1:1 soil to water mixture. Available phosphorus was extracted with the Bray No. 1 solution (0.03*N* ammonium fluoride and 0.025*N* 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 (*5*).

The total extractable calcium, potassium, magnesium, 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.

Engineering test data

Table 20 contains the results of engineering tests performed by the Arkansas State Highway Department on two soils important in Saline County. The table shows the specific location where samples were taken, the depth to which sampling was done, and the results of tests to determine particle-size distribution and other properties significant in soil engineering.

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 (*4*). Unless otherwise noted, colors described are for moist soil. Gravel is reported as a percentage of the total volume of the soil material.

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

Allen series

The Allen series consists of well drained, deep, moderately permeable soils that formed in loamy material weathered from sandstone. These steep soils are on mountainsides. The native vegetation is mixed pines and hardwoods. Slopes are 20 to 40 percent.

Allen soils are geographically associated with Linker and Smithdale soils. The gently sloping Linker soils are on mountaintops. They are shallower than Allen soils. The gently sloping to moderately sloping Smithdale soils are on uplands of the Coastal Plain. They are less clayey in the lower part of the B horizon than Allen soils.

Typical pedon of Allen loam in moist wooded area of Allen loam, 20 to 40 percent slopes, SE1/4SE1/4NW1/4 sec. 30, T. 1 S., R. 13 W.:

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) loam; weak fine granular structure; friable; 5 percent gravel; many fine and medium roots; medium acid; clear smooth boundary.

A2—4 to 9 inches; brown (10YR 4/3) fine sandy loam; weak fine granular structure; friable; 5 percent gravel; many fine and medium roots; medium acid; clear smooth boundary.

B11—9 to 13 inches; strong brown (7.5YR 5/6) loam; weak fine subangular blocky structure; very friable; common fine and medium roots; medium acid; clear smooth boundary.

B12—13 to 23 inches; yellowish red (5YR 5/6) loam; weak fine subangular blocky structure; friable; few fine roots; common fine pores; strongly acid; gradual irregular boundary.

B21t—23 to 47 inches; red (2.5YR 4/8) clay loam; moderate medium subangular blocky structure; friable; discontinuous clay films on faces of peds; few fine roots; few fine pores; strongly acid; gradual irregular boundary.

B22t—47 to 62 inches; red (2.5YR 5/8) clay loam; moderate medium subangular blocky structure; friable; discontinuous clay films on faces of peds; very strongly acid; clear smooth boundary.

B23t—62 to 72 inches; red (2.5YR 4/8) clay loam; moderate medium subangular blocky structure; friable; thick discontinuous clay films on faces of peds; few fine pores; very strongly acid.

Solum thickness ranges from 60 to 80 inches. Reaction is medium acid to very strongly acid. Reaction of the A1, A2, and B1 horizons is one reaction class too high for that allowed in the series but is within the normal errors of observation.

The A horizon is dominantly about 9 inches thick, but in places it is less than 5 inches. 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 4 or 5, and chroma of 3. Content of coarse fragments ranges from 1 to 10 percent.

The B1 horizon has hue of 10YR, value of 5, and chroma of 6 or 8; hue of 7.5YR, value of 5, and chroma of 4, 6, or 8; or hue of 5YR, value of 5, and chroma of 4 or 6. The Bt horizon has hue of 5YR, value of 4 or 5, and chroma of 6 or 8 or hue of 2.5YR, value of 4 or 5, and chroma of 8. Texture is clay loam or sandy clay loam. Content of coarse fragments ranges from 0 to 10 percent.

Amy series

The Amy series consists of poorly drained, deep, slowly permeable soils that formed in silty sediment of the Coastal Plain. These soils are on broad upland flats and on flood plains. They are saturated with water late in winter and early in spring. The native vegetation is mixed pines and hardwoods. Slopes are dominantly less than 1 percent.

Amy soils are geographically associated with Savannah, Ouachita, Smithdale, and Wrightsville soils. The nearly level to gently sloping Savannah soils are on uplands. They are moderately well drained. They have a fragipan. Ouachita soils are on flood plains. They lack an argillic horizon and are better drained than Amy soils. The gently sloping to moderately sloping Smithdale soils are on uplands. They are well drained. The level to depressional Wrightsville soils are on old stream terraces. They have more clay throughout the B horizon than the Amy soils.

Typical pedon of Amy silt loam in moist wooded area of Amy silt loam, frequently flooded, SW1/4SE1/4SE1/4 sec. 34, T. 2 S., R. 15 W.:

A1—0 to 3 inches; grayish brown (10YR 5/2) silt loam; common fine distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; common fine roots; few fine pores; very strongly acid; clear smooth boundary.

A2g—3 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 fine roots; common fine pores; few dark brown concretions; very strongly acid; clear wavy boundary.

B21tg—12 to 28 inches; light gray (10YR 7/1) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; patchy thin clay films in voids and on faces of peds; few fine roots; common fine and medium pores; few dark brown concretions; very strongly acid; clear smooth boundary.

B22tg—28 to 45 inches; light gray (10YR 7/1) silt loam; common medium distinct yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; friable; patchy clay films on faces of peds; common fine and medium pores; many concretions with black interiors and strong brown exteriors; very strongly acid; clear smooth boundary.

C—45 to 72 inches; gray (10YR 6/1) silty clay loam; many medium distinct dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4 and 5/8) mottles; massive; firm; few fine pores; few dark brown concretions; very strongly acid.

Solum thickness ranges from 40 to 70 inches. Reaction is strongly acid or very strongly acid.

The A horizon is dominantly about 15 inches thick, but in places it is less than 10 inches. The A1 horizon has hue of 10YR, value of 4 or 5, and chroma of 2. The A2 horizon has hue of 10YR, value of 6, and chroma of 1 or 2.

The B horizon has hue of 10YR; value of 5, 6, or 7; and chroma of 1 or value of 6 and chroma of 2. Texture is silt loam or silty clay loam. Mottles in shades of brown are common or many and fine or medium.

The C horizon is similar to the B horizon in color, texture, and mottles.

Angie series

The Angie series consists of deep, moderately well drained, slowly permeable soils that formed in clayey sediment. These gently sloping soils are on uplands of the Coastal Plain. The native vegetation is mixed hardwoods and pines. Slopes range from 3 to 8 percent.

Angie soils are geographically associated with Savannah and Wrightsville soils. The nearly level and gently sloping Savannah soils are on uplands. They have a fragipan. The level to depressional Wrightsville soils are on old stream terraces. They are poorly drained.

Typical pedon of Angie fine sandy loam in wooded area of Angie fine sandy loam, 3 to 8 percent slopes, SE1/4SE1/4SW1/4 sec. 25, T. 2 S., R. 12 W.:

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak fine granular structure; friable; many fine and medium roots; medium acid; clear smooth boundary.

A2—4 to 10 inches; pale brown (10YR 6/3) fine sandy loam; moderate medium and coarse granular structure; friable; common fine and medium roots; medium acid; clear smooth boundary.

B21t—10 to 19 inches; strong brown (7.5YR 5/6) heavy silty clay loam; moderate medium subangular blocky structure; friable; common roots; common pores; thin patchy clay films on faces of peds; extremely acid; gradual wavy boundary.

B22t—19 to 25 inches; yellowish brown (10YR 5/6) silty clay; common medium distinct light brownish gray (10YR 6/2) and yellowish red (5YR 5/8) mottles; moderate medium subangular blocky structure; friable; few roots; few pores; distinct patchy clay films on faces of peds; extremely acid; gradual wavy boundary.

B23t—25 to 49 inches; mottled gray (10YR 6/1) clay; many medium distinct yellowish brown (10YR 5/8) and common medium prominent red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; firm; few fine roots; common fine pores; patchy clay films on faces of peds; extremely acid; gradual wavy boundary.

B24t—49 to 72 inches; mottled gray (10YR 6/1) and brownish yellow (10YR 6/8) clay; moderate coarse subangular blocky structure; firm; few patchy clay films on faces of peds; extremely acid.

Solum thickness ranges from 60 to 90 inches. Reaction is medium acid to strongly acid in the A horizon, medium acid to extremely acid in the Bt horizon, and medium acid to very strongly acid in the C horizon.

The A horizon ranges from 4 to 12 inches in thickness. It has hue of 10YR, value of 3 to 6, and chroma of 1 to 3.

The B2t horizon has hue of 10YR, value of 5 or 6, and chroma of 4 to 8 or hue of 7.5YR, value of 5, and chroma of 6. Few to common gray mottles occur within 30 inches of the surface. The lower part of the B2t horizon has mottles in shades of red, gray, yellow, or brown. Texture is silty clay loam, silty clay, or clay.

The C horizon, where present, is mottled in shades of red or gray. Texture ranges from fine sandy loam to clay.

Avilla series

The Avilla series consists of deep, well drained, moderately permeable soils that formed in loamy alluvium from acid sandstone and shale. These soils are on stream terraces in and adjacent to the Ouachita Mountains. The native vegetation is mixed pines and hardwoods. Slopes range from 1 to 8 percent.

Avilla soils are geographically associated with Carnasaw and Leadvale soils. The gently sloping to steep Carnasaw soils are on uplands. They are clayey. The nearly level to gently sloping Leadvale soils are on terraces. They are moderately well drained. They have a fragipan.

Typical pedon of Avilla silt loam in moist pasture of Avilla silt loam, 1 to 3 percent slopes, NW1/4SE1/4SE1/4 sec. 25, T. 2 N., R. 17 W.:

Ap1—0 to 3 inches; brown (10YR 4/3) silt loam; weak fine and medium granular structure; friable; many fine roots; 1 percent gravel 2 to 75 millimeters; slightly acid; clear smooth boundary.

Ap2—3 to 9 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine and medium granular structure; friable; common fine roots; 1 percent gravel 2 to 75 millimeters; medium acid; clear smooth boundary.

B21t—9 to 19 inches; yellowish red (5YR 5/8) clay loam; weak medium subangular blocky structure; friable; few fine roots; common fine pores; 5 percent gravel 2 to 75 millimeters; thin patchy clay films on faces of some peds; strongly acid; clear wavy boundary.

B22t—19 to 31 inches; red (2.5YR 5/8) clay loam; moderate medium subangular blocky structure; firm; many fine pores; few fine roots; 7 percent gravel 2 to 75 millimeters; patchy clay films on faces of most peds; very strongly acid; clear wavy boundary.

B23t—31 to 56 inches; mottled red (2.5YR 4/8), strong brown (7.5YR 5/8), and brownish yellow (10YR 6/6) clay loam; moderate medium subangular blocky structure; friable; few fine pores; 12 percent gravel 2 to 75 millimeters; patchy clay films on most faces of peds; very strongly acid; gradual wavy boundary.

B24t—56 to 72 inches; mottled red (2.5YR 4/8), yellowish red (5YR 5/8), strong brown (7.5YR 5/8), and light gray (10YR 7/2) very gravelly clay loam; moderate medium and coarse subangular blocky structure; friable; few fine pores; patchy clay films on most faces of peds and on gravel; 60 percent gravel 2 to 75 millimeters; very strongly acid.

Solum thickness ranges from 60 to 85 inches. Reaction is strongly acid to very strongly acid unless the surface layer has been limed.

The A horizon ranges from 2 to 14 inches in thickness. It has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. Some pedons have an A1 horizon that has hue of 10YR, value of 3, and chroma of 1 or 2.

The B21t horizon has hue of 7.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8. Some pedons have a B1 horizon that is similar to the B2 horizon in color. The B22t and B23t horizons have hue of 5YR or 2.5YR, value of 4 to 6, and chroma of 4 to 8. Some pedons have a B3 horizon that is similar to the B2t horizon in color. Texture of the B21t, B22t, and B23t horizons is loam, clay loam, or sandy clay loam. Content of coarse fragments ranges from 1 to 15 percent. The B24t and B3 horizons, where present, are gravelly loam, gravelly clay loam, gravelly sandy clay loam, or their very gravelly phases. Content of coarse fragments ranges from 15 to 70 percent.

Caddo Variant

The Caddo Variant consists of deep, poorly drained, slowly permeable soils that formed in loamy material. These soils are the intermound areas of a mound-intermound complex. The native vegetation is mixed pines and hardwoods. Slopes are 0 to 1 percent.

Caddo Variant soils are geographically associated with Messer Variant soils. Messer Variant soils are on low, rounded mounds. They are moderately well drained.

Typical pedon of Caddo Variant in moist wooded area of Caddo Variant-Messer Variant complex, NE1/4SE1/4NE1/4 sec. 3, T. 1 S., R. 15 W.:

A1—0 to 3 inches; grayish brown (10YR 5/2) silt loam; common fine distinct yellowish brown mottles; moderate fine and medium granular structure; friable; many fine and medium roots; many fine pores; medium acid; clear smooth boundary.

A2g—3 to 10 inches; gray (10YR 6/1) silt loam; common fine distinct yellowish brown mottles; moderate medium granular structure; friable; many fine roots; many fine pores; strongly acid; clear smooth boundary.

B21tg—10 to 15 inches; gray (10YR 6/1) silty clay loam; common medium distinct brownish yellow (10YR 6/6) mottles; moderate fine and medium subangular blocky structure; firm; 20 percent light gray (10YR 7/1) silt loam tongues 1 to 3 inches wide; common fine roots; common fine pores; medium acid; clear smooth boundary.

B22tg—15 to 22 inches; gray (10YR 6/1) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; 15 percent light gray (10YR 7/1) silt loam tongues 1 to 3 inches wide; common fine roots; common fine pores; slightly acid; clear smooth boundary.

B23tg—22 to 35 inches; gray (10YR 6/1) silty clay loam; common medium distinct strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm; 10 to 15 percent light gray (10YR 7/1) silt tongues; few fine roots; few fine pores; neutral; clear smooth boundary.

B3g—35 to 72 inches; gray (10YR 5/1) silty clay loam; common fine distinct yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; firm; few light gray (10YR 7/1) silt tongues tapering with depth; few fine roots; few fine pores; mildly alkaline.

Solum thickness ranges from 60 to 72 inches. Reaction is medium acid to strongly acid in the A horizon and upper part of the B horizon and slightly acid to mildly alkaline in the lower part of the B horizon.

The A horizon is dominantly about 10 inches thick, but in places it is less than 8 inches. The A1 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 2.

The matrix of the B horizon has hue of 10YR, value of 5, 6, or 7; and chroma of 1 or 2 and has mottles in shades of brown and yellow. Texture is silt loam or silty clay loam.

The Caddo Variant has a thinner A2 horizon than is typical for the Caddo series. Reaction ranges from medium acid in the upper part of the B horizon to mildly alkaline in the lower part. These soils are similar to the Caddo series in use, management, and behavior characteristics.

Carnasaw series

The Carnasaw series consists of well drained, deep or moderately deep, slowly permeable soils. These soils formed in a thin layer of loamy material and the underlying clayey material weathered from shale. This is underlain by tilted and fractured shale, sandstone, or quartzite. These soils are in the Ouachita Mountains on the nearly level tops and steep sides of hills, mountains, and benches and on low ridges in valleys. The native vegetation is mixed hardwoods and pines. Slopes range from 3 to 40 percent.

Carnasaw soils are geographically associated with Townley, Pirum, Avilla, and Zafra soils. Townley soils are on the same landscape as the Carnasaw soils but are shallower to bedrock. Pirum soils are in colluvial positions in the Ouachita Mountains and are not so clayey as the Carnasaw soils. Avilla and Zafra soils are on stream terraces and are not so clayey as the Carnasaw soils.

Typical pedon of Carnasaw gravelly silt loam in moist wooded area of Carnasaw-Townley association, steep, NW1/4NW1/4NE1/4 sec. 5, T. 1 S., R. 17 W.:

A1—0 to 1 inch; very dark grayish brown (10YR 3/2) gravelly silt loam; weak fine and medium granular structure; friable; many fine and medium roots; common fine pores; 20 percent angular fragments of sandstone and quartzite 1/4 to 3 inches in diameter; strongly acid; abrupt smooth boundary.

A2—1 to 3 inches; strong brown (7.5YR 5/6) gravelly silt loam; weak fine subangular blocky structure; friable; common fine and medium roots; common fine pores; 20 percent angular fragments of sandstone and quartzite 1/4 to 1 inch in diameter; strongly acid; abrupt smooth boundary.

B21t—3 to 6 inches; yellowish red (5YR 5/8) silty clay loam; moderate medium subangular blocky structure; firm; many fine and medium roots; few fine and medium pores; 7 percent fragments of sandstone and quartzite 1/4 to 1 inch in diameter; patchy clay films on faces of some peds; very strongly acid; gradual irregular boundary.

B22t—6 to 21 inches; red (2.5YR 4/8) clay; strong medium subangular blocky structure; firm; 5 percent fragments of sandstone and quartzite 1/4 to 1 inch in diameter; discontinuous clay films on faces of peds; few fine roots; few fine and medium pores; very strongly acid; gradual irregular boundary.

B23t—21 to 29 inches; red (2.5YR 4/8) clay; common fine distinct brownish yellow (10YR 6/6) mottles; strong medium subangular blocky structure; firm; continuous clay films on faces of peds; few fine roots; few fine and medium pores; about 5 percent fragments of red and yellow shale; very strongly acid; gradual irregular boundary.

B24t—29 to 40 inches; red (2.5YR 4/8) silty clay; many coarse prominent yellowish red (5YR 5/6) mottles; strong coarse blocky structure; very firm; continuous clay films on faces of peds; few fine and medium roots; common fine pores; 10 percent relic fragments of gray shale; very strongly acid; gradual irregular boundary.

Cr—40 to 72 inches; mottled gray (10YR 6/1), red (2.5YR 4/8), and yellow (10YR 7/6) soft shale that rubs to clayey fine earth; layers of weathered shale tilted 30 to 40 degrees from horizontal gives appearance of medium to coarse platy structure parting to moderate medium subangular blocky; firm; few fine roots; hardness of shale increases with depth; very strongly acid.

Solum thickness ranges from 30 to 60 inches. The A horizon ranges from 3 to 12 inches in thickness. The A1 horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. The A2 horizon has hue of 7.5YR, value of 5, and chroma of 6 or hue of 10YR, value of 5 or 6, and chroma of 3 or 4. Content of coarse fragments in the A horizon is 15 to 30 percent. Reaction is strongly acid unless the surface layer has been limed.

The B21t horizon has hue of 7.5YR or 5YR, value of 5, and chroma of 6 or 8. Texture is silty clay loam, silty clay, or clay. Reaction is strongly acid or very strongly acid. Content of coarse fragments is 5 to 10 percent. The B22t horizon has hue of 5YR, value of 4 or 5, and chroma of 6 or 8 or hue of 2.5YR, value of 4, and chroma of 8. In places the B22t horizon has mottles in shades of brown or yellow. Reaction is strongly acid or very strongly acid. Content of coarse fragments is 2 to 10 percent.

The Cr horizon is soft shale mottled in shades of gray, yellow, and red. Reaction is strongly acid or very strongly acid.

Darco series

The Darco series consists of deep, well drained to somewhat excessively drained, moderately rapidly permeable soils that formed in loamy sediment of the Coastal Plain. These soils are on steep uplands of the Coastal Plain. The native vegetation is mixed hardwoods and pines. Slopes range from 12 to 30 percent.

Darco soils are geographically associated with Smithdale and Saffell soils. The gently sloping to steep Smithdale soils are on uplands. They have a thinner A horizon than Darco soils. The gently sloping Saffell soils also are on uplands. They have a loamy-skeletal control section.

Typical pedon of Darco loamy fine sand in moist wooded area of Smithdale and Darco loamy sands, 12 to 30 percent slopes, NE1/4NE1/4SW1/4 sec. 30, T. 2 S., R. 14 W.:

A1—0 to 4 inches; dark grayish brown (10YR 4/2) loamy fine sand; weak fine granular structure; loose and very friable; strongly acid; clear wavy boundary.

A21—4 to 28 inches; pale brown (10YR 6/3) loamy fine sand; weak fine granular structure; loose and very friable; very strongly acid; gradual wavy boundary.

A22—28 to 45 inches; light yellowish brown (10YR 6/4) loamy fine sand; weak fine granular structure; very friable; very strongly acid; gradual wavy boundary.

B21t—45 to 52 inches; yellowish red (5YR 5/8) sandy loam; weak medium subangular blocky structure; friable; sand grains coated and bridged with clay; very strongly acid; gradual wavy boundary.

B22t—52 to 70 inches; yellowish red (5YR 4/8) sandy loam; common medium prominent brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; friable; sand grains coated and bridged with clay; very strongly acid; gradual wavy boundary.

B23t—70 to 80 inches; yellowish red (5YR 5/8) sandy loam; many medium prominent brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; friable; sand grains coated and bridged with clay; very strongly acid.

Solum thickness ranges to more than 80 inches. Reaction is strongly acid or very strongly acid throughout unless the surface layer has been limed.

The A horizon ranges from 40 to 72 inches in thickness. The A1 horizon has hue of 10YR, value of 4, and chroma of 2. The A2 horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4.

The B2t horizon has hue of 5YR, value of 4 or 5, and chroma of 8.

Leadvale series

The Leadvale series consists of deep, moderately well drained soils that formed in loamy sediment washed from uplands of weathered sandstone, siltstone, and shale. Permeability is moderately slow in the upper part of the subsoil and slow in the fragipan. These nearly level and gently sloping soils are on terraces and colluvial foot slopes in the Ouachita Mountains. The native vegetation is mixed hardwoods and pines. Slopes range from 1 to 8 percent.

Leadvale soils are geographically associated with Avilla, Ouachita, and Zafra soils. The nearly level to gently sloping Avilla soils are on terraces. They have a fine-loamy control section and lack a fragipan. Ouachita soils are on flood plains of local drainageways and lack a fragipan. Zafra soils are on the same landscape as Leadvale soils but lack a fragipan.

Typical pedon of Leadvale silt loam in native grass area of Leadvale silt loam, 1 to 3 percent slopes, SE1/4NW1/4SW1/4 sec. 23, T. 1 N., R. 16 W.:

Ap—0 to 5 inches; brown (10YR 4/3) silt loam; weak medium granular structure; friable; many fine roots; strongly acid; clear smooth boundary.

B1—5 to 7 inches; strong brown (7.5YR 5/6) silt loam; weak and moderate medium subangular blocky structure; friable; common fine roots; common fine and medium pores; strongly acid; clear smooth boundary.

B21t—7 to 16 inches; strong brown (7.5YR 5/6) silt loam; moderate medium subangular blocky structure; friable; patchy clay films on faces of peds; common fine roots; common fine pores; very strongly acid; clear smooth boundary.

B22t—16 to 27 inches; strong brown (7.5YR 5/8) silt loam; moderate medium subangular blocky structure; friable; patchy clay films on faces of peds; common fine roots; common fine pores; very strongly acid; clear wavy boundary.

Bx1—27 to 33 inches; yellowish brown (10YR 5/6) silt loam; common medium distinct pale brown (10YR 6/3) and common fine distinct gray mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm and brittle; discontinuous clay films on faces of peds; common fine pores; very strongly acid; gradual wavy boundary.

Bx2—33 to 49 inches; yellowish brown (10YR 5/6) silt loam; common fine distinct light brownish gray and common medium distinct brown (10YR 5/3) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm and brittle; discontinuous clay films on faces of peds; common medium dark brown accretions; very strongly acid.

Cr—49 to 60 inches; shale bedrock.

Solum thickness ranges from 48 to more than 72 inches. Reaction is strongly acid to very strongly acid throughout the profile.

The A horizon ranges from 5 to 10 inches in thickness. The Ap horizon has hue of 10YR, value of 4, and chroma of 2 or 3. The A1 horizon, where present, has hue of 10YR, value of 3, and chroma of 1 or 2. The A2 horizon, where present, has hue of 10YR, value of 5 or 6, and chroma of 3 or value of 6 and chroma of 4.

The B1 horizon has hue of 7.5YR, value of 5, and chroma of 6 or hue of 10YR, value of 6, and chroma of 6 or 8. The B2t horizon has hue of 10YR, value of 5 or 6, and chroma of 6 or 8 or hue of 7.5YR, value of 5, and chroma of 6 or 8. Texture of the B2t and the Bx horizons is silt loam or silty clay loam. The Bx horizon has hue of 10YR, value of 5, and chroma of 6 or 8 and has mottles in shades of brown, yellow, and gray.

Linker series

The Linker series consists of moderately deep, well drained, moderately permeable soils that formed on mountaintops in loamy material weathered from sandstone. The native vegetation is mixed pines and hardwoods. Slopes range from 3 to 8 percent.

Linker soils are geographically associated with Allen soils. The steep Allen soils are on mountainsides. They are deeper to bedrock than Linker soils.

Typical pedon of Linker fine sandy loam in moist wooded area of Linker fine sandy loam, 3 to 8 percent slopes, NE1/4SW1/4NE1/4 sec. 19, T. 1 S., R. 13 W.:

Ap—0 to 5 inches; brown (10YR 4/3) fine sandy loam; moderate fine granular structure; very friable; many fine and medium roots; common fine pores; 5 percent gravel; medium acid; abrupt smooth boundary.

B21t—5 to 9 inches; yellowish red (5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable; few thin patchy clay films on some faces of peds; common fine and medium roots; common fine pores; strongly acid; clear wavy boundary.

B22t—9 to 24 inches; red (2.5YR 4/8) clay loam; moderate medium subangular blocky structure; friable; few thin patchy clay films on some faces of peds, in root channels, and around pebbles; few fine pores; extremely acid; clear wavy boundary.

B23t—24 to 30 inches; red (2.5YR 5/8) clay loam; moderate medium subangular blocky structure; friable; few thin patchy clay films on faces of peds; sand grains coated and bridged with clay; very strongly acid; clear wavy boundary.

B24t—30 to 33 inches; red (2.5YR 5/8) sandy clay loam; few red and yellow relic fragments of sandstone; moderate medium subangular blocky structure; friable; patchy clay films on faces of peds; few fine roots; common fine pores; 5 percent gravel; extremely acid.

R—33 to 35 inches; red and brown hard sandstone bedrock.

Solum thickness ranges from 20 to 40 inches. Reaction is strongly acid to extremely acid unless the surface layer has been limed.

The A horizon is dominantly about 5 inches thick, but in places it is less than 4 inches thick. It has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. Content of coarse fragments ranges from 5 to 15 percent.

The B1 horizon, where present, has hue of 7.5YR or 5YR, value of 5, and chroma of 6. Texture is fine sandy loam or loam. The B2t horizon has hue of 5YR or 2.5YR, value of 5, and chroma of 6 or 8. Texture is sandy clay loam or clay loam. The B3 horizon, where present, has hue of 5YR or 2.5YR, value of 5, and chroma of 6 or 8. Texture is sandy clay loam or clay loam. Content of coarse fragments in the B horizon ranges from 0 to 15 percent.

Messer Variant

The Messer Variant consists of moderately well drained, deep, slowly permeable soils that formed in loamy material. These soils are the mound areas of a mound-intermound complex. The native vegetation is mixed pines and hardwoods. Slopes are 1 to 3 percent.

Messer Variant soils are geographically associated with Caddo Variant soils. Caddo Variant soils are in level intermound areas. They are poorly drained.

Typical pedon of Messer Variant in moist wooded area of Caddo Variant-Messer Variant complex, SE1/4NE1/4SW1/4 sec. 1, T. 1 S., R. 15 W.:

A1—0 to 2 inches; brown (10YR 4/3) silt loam; moderate medium granular structure; friable; many fine roots; common fine pores; strongly acid; abrupt smooth boundary.

B1—2 to 11 inches; yellowish brown (10YR 5/6) silt loam; weak fine and medium subangular blocky structure; friable; many fine roots; common fine pores; very strongly acid; clear smooth boundary.

B21t—11 to 23 inches; yellowish brown (10YR 5/8) silt loam; moderate medium subangular blocky structure; friable; patchy clay films on faces of peds; common pale brown (10YR 6/3) silt coatings on faces of peds; few fine roots; few fine pores; very strongly acid; clear smooth boundary.

B22t—23 to 35 inches; mottled yellowish brown (10YR 5/6), light reddish brown (2.5YR 6/4), and strong brown (7.5YR 5/8) silt loam; moderate medium subangular blocky structure; friable; 10 percent gravel; few fine roots; few fine pores; patchy clay films on faces of peds; very strongly acid; clear wavy boundary.

B23t—35 to 42 inches; mottled light brownish gray (10YR 6/2), strong brown (7.5YR 5/8), and yellowish red (5YR 5/8) silt loam; moderate medium subangular blocky structure; friable; patchy clay films on faces of peds; few fine roots; 10 percent gravel; medium acid; clear smooth boundary.

B3—42 to 72 inches; mottled yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8) very gravelly loam; weak medium and coarse subangular blocky structure; friable; 40 percent gravel; medium acid.

Solum thickness ranges from 60 to 75 inches. Reaction is medium acid to very strongly acid throughout unless the surface layer has been limed.

The A horizon is dominantly about 2 inches thick. It has hue of 10YR, value of 4, and chroma of 2 or 3 or value of 5 and chroma of 2, 3, or 4.

The B1 horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. The B21t horizon has hue of 10YR, value of 5, and chroma of 8. It has pale brown silt coatings. The B22t horizon has hue of 10YR, value of 5 or 6, and chroma of 4 or 6 or is mottled in shades of brown. Texture is silt loam or clay loam. The B23t horizon is mottled gray, brown, and red. Texture is silt loam or clay loam. The B3 horizon is mottled in shades of brown. Texture is very gravelly loam or very gravelly clay loam.

The Messer Variant lacks tongues of A2 material and has more clay in the argillic horizon than is typical for the Messer series. These soils are similar to the Messer series in use, management, and behavior characteristics.

Ouachita series

The Ouachita series consists of deep, well drained, moderately slowly permeable soils on flood plains of local drainageways. These soils formed in alluvium washed from uplands of weathered sandstone and shale. The native vegetation is mixed hardwoods and pine. Slopes are 0 to 2 percent.

Ouachita soils are geographically associated with Amy and Leadvale soils. Amy soils are in depressions. They are poorly drained. Leadvale soils are on terraces. They have a fragipan.

Typical pedon of Ouachita silt loam in moist pasture of Ouachita silt loam, frequently flooded, NE1/4NW1/4NE1/4 sec. 19, T. 1 S., R. 16 W.:

Ap—0 to 11 inches; brown (10YR 4/3) silt loam; weak medium and coarse granular structure; friable; many fine roots; strongly acid; abrupt smooth boundary.

B21—11 to 20 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; friable; few fine roots; few fine pores; strongly acid; clear smooth boundary.

B22—20 to 26 inches; yellowish brown (10YR 5/6) silt loam; moderate medium and coarse subangular blocky structure; friable; few fine roots; common fine pores; very strongly acid; clear wavy boundary.

B23—26 to 47 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; friable; common fine pores; streaks of light yellowish brown (10YR 6/4) silt loam material; very strongly acid; clear smooth boundary.

B24—47 to 60 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure; friable; few fine pores; very strongly acid; clear smooth boundary.

B3—60 to 72 inches; dark yellowish brown (10YR 4/4) silt loam; common fine distinct pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; friable; common fine pores; very strongly acid.

Solum thickness ranges from 40 to 80 inches. Reaction is strongly acid or very strongly acid throughout unless the soil has been limed.

The A horizon is dominantly about 11 inches thick, but it ranges from 7 to 18 inches in thickness. It has hue of 10YR, value of 4 or 5, and chroma of 3.

The B2 horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4 or value of 5 and chroma of 6. The B3 horizon, where present, is mottled in shades of gray and brown.

Pirum series

The Pirum series consists of moderately deep, well drained, moderately permeable soils that formed in loamy colluvial material over bedrock that is tilted and fractured shale, sandstone, or quartzite. These soils are in colluvial positions in the Ouachita Mountains. The native vegetation is mixed hardwoods and pines. Slopes range from 1 to 30 percent.

Pirum soils are geographically associated with Carnasaw and Townley soils. Carnasaw and Townley soils are in the Ouachita Mountains on the tops and sides of hills, mountains, and benches and on low ridges in valleys. These soils are more clayey than Pirum soils.

Typical pedon of Pirum loam in moist wooded area of Carnasaw-Townley-Pirum association, steep, NE1/4NW1/4NW1/4 sec. 9, T. 2 N., R. 17 W.:

A1—0 to 2 inches; brown (10YR 5/3) loam; weak fine granular structure; friable; 5 percent gravel; many fine roots; strongly acid; clear smooth boundary.

A2—2 to 10 inches; light yellowish brown (10YR 6/4) loam; weak fine and medium granular structure; friable; 5 percent gravel; many fine roots; few medium and common fine pores; strongly acid; clear smooth boundary.

B21t—10 to 17 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; friable; patchy clay films on faces of peds and in voids; few fine roots; common fine pores; 10 to 15 percent fragments of shale and sandstone 1/4 inch to 3 inches in diameter; very strongly acid; clear wavy boundary.

B22t—17 to 34 inches; strong brown (7.5YR 5/6) loam; moderate medium subangular blocky structure; friable; patchy clay films on faces of peds and in voids; few fine roots; common fine pores; 10 to 15 percent fragments of shale and sandstone 1/4 inch to 3 inches in diameter; very strongly acid; abrupt irregular boundary.

R—34 to 36 inches; hard, tilted and fractured, gray and brown shale bedrock.

Solum thickness ranges from 22 to 50 inches. Reaction is strongly acid or very strongly acid unless the surface layer has been limed.

The A horizon ranges from 8 to 15 inches in thickness. The A1 horizon has hue of 10YR, value of 4, and chroma of 2 or 3 or value of 5 and chroma of 3. The A2 horizon has hue of 10YR, value of 5 or 6, and chroma of 4.

The B2t horizon has hue of 10YR, value of 5 or 6, and chroma of 6 or 8 or hue of 7.5YR, value of 5, and chroma of 6 or 8. Texture is loam or clay loam.

Saffell series

The Saffell series consists of deep, well drained, moderately permeable soils that formed in gravelly and loamy sediments. These gently sloping soils are on uplands of the Coastal Plain. The native vegetation is mixed hardwoods and pines. Slopes range from 3 to 8 percent.

Saffell soils are geographically associated with Darco and Smithdale soils. The moderately steep to steep Darco soils are on uplands. They have a loamy control section. The gently sloping to moderately sloping Smithdale soils also are on uplands. They have a fine-loamy control section.

Typical pedon of Saffell gravelly fine sandy loam in a pasture of Saffell gravelly fine sandy loam, 3 to 8 percent slopes, SW1/4NE1/4SE1/4 sec. 21, T. 2 S., R. 13 W.:

Ap—0 to 4 inches; brown (10YR 4/3) gravelly fine sandy loam; weak fine granular structure; friable; 25 percent gravel; many fine roots; strongly acid; clear smooth boundary.

B1—4 to 9 inches; reddish brown (5YR 4/4) gravelly fine sandy loam; moderate medium subangular blocky structure; friable; thin patchy clay films on some peds; sand grains coated and bridged with clay; common fine roots; few fine pores; 25 percent gravel; very strongly acid; clear smooth boundary.

B21t—9 to 20 inches; yellowish red (5YR 4/8) very gravelly sandy clay loam; moderate fine subangular blocky structure; friable; common fine roots; 65 percent gravel; sand grains coated and bridged with clay; very strongly acid; clear wavy boundary.

B22t—20 to 36 inches; yellowish red (5YR 4/8) very gravelly loam; weak very fine subangular blocky structure; friable; few fine roots; 60 percent gravel; grains coated and bridged with clay; very strongly acid; clear wavy boundary.

C1—36 to 45 inches; yellowish red (5YR 5/8) very gravelly loamy coarse sand; single grained; loose; 70 percent gravel; very strongly acid; clear wavy boundary.

C2—45 to 76 inches; red (2.5YR 4/8) very gravelly loam; massive; loose; 70 percent gravel; very strongly acid.

Solum thickness ranges from 35 to 60 inches. Reaction is strongly acid or very strongly acid unless the surface layer has been limed.

The A horizon is dominantly about 4 inches thick, but it ranges from 2 to 8 inches. It has hue of 10YR, value of 4, and chroma of 2 or 3 or hue of 7.5YR, value of 4, and chroma of 4. Gravel content of the A horizon ranges from less than 2 percent to 15 percent.

The B1 horizon has hue of 7.5YR or 5YR, value of 4, and chroma of 4. The B21t horizon has hue of 5YR, value of 4, and chroma of 8. The B22t horizon has hue of 2.5YR, value of 4, and chroma of 6; hue of 5YR, value of 4 or 5, and chroma of 6 or 8; or hue of 7.5YR, value of 5, and chroma of 6 or 8. Texture is very gravelly sandy clay loam or very gravelly loam. The B23t horizon, where present, has hue of 2.5YR, value of 4, and chroma of 6 or hue of 5YR, value of 4 or 5, and chroma of 6 or 8. Gravel content of the B2t horizon ranges from 35 to 65 percent.

Savannah series

The Savannah series consists of deep, moderately well drained soils that formed in thick beds of loamy sediment. Permeability is moderate in the upper part of the subsoil and moderately slow in the fragipan. These nearly level and gently sloping soils are on uplands and stream terraces of the Coastal Plain. The native vegetation is mixed hardwoods and pines. Slopes range from 1 to 8 percent.

Savannah soils are geographically associated with Amy, Angie, Smithdale, Tiak, Udorthents, and Wrightsville soils. The level Amy soils are on broad upland flats and on flood plains. They are fine-silty and do not have a fragipan. The gently sloping Angie soils are on uplands. They are clayey and do not have a fragipan. The gently sloping and moderately sloping Smithdale soils also are on uplands. They are well drained and lack a fragipan. The gently sloping Tiak soils are on uplands. They are clayey. The somewhat excessively drained Udorthents are nearly level to very steep. They are in areas of mine spoils. The level to depressional Wrightsville soils are on old stream terraces. They are poorly drained and lack a fragipan.

Typical pedon of Savannah fine sandy loam, in wooded area of Savannah fine sandy loam, 3 to 8 percent slopes, SW1/4NE1/4NE1/4 sec. 19, T. 2 S., R. 12 W.:

Ap—0 to 8 inches; brown (10YR 5/3) fine sandy loam; weak fine and medium granular structure; very friable; many fine roots; strongly acid; clear smooth boundary.

A2—8 to 14 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine and medium granular and weak subangular blocky structure; friable; few fine roots; strongly acid; clear smooth boundary.

B1—14 to 19 inches; yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; friable; common fine pores; strongly acid; clear smooth boundary.

B2t—19 to 32 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; friable; thin patchy clay films on some faces of peds; few fine pores; very strongly acid; clear smooth boundary.

Bx1—32 to 44 inches; brownish yellow (10YR 6/6) loam; common medium distinct strong brown (7.5YR 5/8) and gray (10YR 6/1) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm and brittle; patchy clay films on some faces of peds; common fine and medium pores; very strongly acid; clear smooth boundary.

Bx2—44 to 55 inches; yellowish brown (10YR 5/6) loam; common medium distinct gray (10YR 6/1) and strong brown (7.5YR 5/8) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm and brittle; patchy clay films on faces of peds; common fine pores; very strongly acid; clear smooth boundary.

Bx3—55 to 62 inches; mottled gray (10YR 6/1) and strong brown (7.5YR 5/8) sandy clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; firm and brittle; clay films on some faces of peds and in voids and pores; few fine and medium pores; very strongly acid; clear smooth boundary.

Bx4—62 to 72 inches; mottled gray (10YR 6/1), brownish yellow (10YR 6/6), and strong brown (7.5YR 5/8) sandy clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; firm and brittle; clay films on most faces of peds; few fine voids; few fine pores; light gray (10YR 7/2) very fine sand grains on some faces of peds; extremely acid.

Solum thickness ranges from 60 to more than 80 inches. Reaction is strongly acid to extremely acid throughout the profile.

The A horizon ranges from 8 to 16 inches in thickness. It has hue of 10YR, value of 4, and chroma of 2; value of 5 and chroma of 3 or 4; or value of 6 and chroma of 3.

The Bt horizon has hue of 7.5YR, value of 5, and chroma of 6 or 8 or hue of 10YR, value of 5, and chroma of 4, 6, or 8. The Bx horizon is mottled yellow, brown, and gray or is yellowish brown mottled with gray.

Sherwood series

The Sherwood series consists of moderately deep to deep, well drained, moderately permeable soils that formed in loamy residuum weathered from nepheline-syenite. These gently sloping to moderately sloping soils are on uplands. The native vegetation is mixed hardwoods and pines. Slopes range from 3 to 12 percent.

Sherwood soils are geographically associated with Udorthents. The Udorthents are excessively drained soils that have been altered by mining operations, and the soil material is quite variable.

Typical pedon of Sherwood loam in wooded area of Sherwood-Rock outcrop complex, 3 to 12 percent slopes, NW1/4SE1/4SW1/4 sec. 23, T. 2 S., R. 14 W.:

A1—0 to 9 inches; very dark brown (10YR 2/2) loam; weak fine granular structure; friable; common fine roots; slightly acid; clear wavy boundary.

A2—9 to 16 inches; brown (10YR 4/3) loam; weak fine granular structure; loose and very friable; strongly acid; clear smooth boundary.

B21t—16 to 27 inches; yellowish red (5YR 4/8) clay loam; moderate medium subangular blocky structure; firm; patchy clay films on faces of peds; approximately 20 to 25 percent uncoated syenite particles 2 millimeters and smaller in size; very strongly acid; clear smooth boundary.

B22t—27 to 40 inches; yellowish red (5YR 4/6) clay loam; moderate medium subangular blocky structure; firm; patchy clay films on faces of peds; peds vary in syenite particle content, and some contain as much as 50 percent uncoated syenite particles 2 millimeters and smaller in size; few particles resemble mica flakes; very strongly acid; clear smooth boundary.

C—40 to 61 inches; variegated yellowish red (5YR 5/6), strong brown (7.5YR 5/8), and yellowish brown (10YR 5/6) highly weathered nepheline-syenite that crushes to loam; massive; friable; strongly acid.

R—61 to 63 inches; hard nepheline-syenite bedrock.

Solum thickness ranges from 30 to 50 inches. Reaction is very strongly acid to medium acid in the A horizon unless the soil has been limed, very strongly acid or strongly acid in the B2t horizon, and very strongly acid or strongly acid in the C horizon where present.

The A horizon ranges from 6 to 18 inches in thickness. It has hue of 10YR, value of 2, 3, or 4, and chroma of 2 or value of 3 or 4 and chroma of 3.

The B2t horizon has hue of 5YR and 2.5YR, value of 4 or 5, and chroma of 6 or 8.

Soils in the Sherwood series have darker colors in the A horizon than is typical for the series. Otherwise, they are similar in morphology, use, management, and behavior characteristics.

Smithdale series

The Smithdale series consists of deep, well drained, moderately permeable soils that formed in thick beds of loamy sediment. These gently sloping and steep soils are on uplands of the Coastal Plain. The native vegetation is mixed hardwoods and pines. Slopes range from 3 to 30 percent.

Smithdale soils are geographically associated with Allen, Amy, Savannah, Saffell, Tiak, and Darco soils and Udorthents. The steep Allen soils are on mountainsides. They have more clay in the lower part of the B horizon than Smithdale soils. Amy soils are on broad upland flats. They are poorly drained. The nearly level and gently sloping Savannah soils are on uplands. They are moderately well drained and have a fragipan. The gently sloping Saffell soils are on uplands and are gravelly throughout. The gently sloping Tiak soils also are on uplands. They have a clayey control section. The steep Darco soils are on uplands. They have a thicker A horizon than Smithdale soils. The nearly level to very steep Udorthents are somewhat excessively drained. They are in areas of mine spoils.

Typical pedon of Smithdale loamy sand in moist orchard area of Smithdale-Urban land complex, 3 to 8 percent slopes, NW1/4NE1/4NE1/4 sec. 7, T. 2 S., R. 12 W.:

Ap—0 to 6 inches; yellowish brown (10YR 5/4) loamy sand; weak medium subangular blocky structure parting to weak fine granular; friable; common fine roots; few medium pores; medium acid; abrupt wavy boundary.

B1—6 to 15 inches; strong brown (7.5YR 5/8) fine sandy loam; weak medium subangular blocky structure parting to weak fine granular; friable; common fine roots; few medium pores; medium acid; abrupt wavy boundary.

B21t—15 to 26 inches; yellowish red (5YR 5/8) sandy clay loam; few coarse prominent yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; friable; few fine roots; few fine and medium pores; patchy clay films on faces of peds; strongly acid; gradual wavy boundary.

B22t—26 to 37 inches; yellowish red (5YR 5/8) fine sandy loam; common coarse prominent yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; few medium roots; many fine pores; patchy clay films on faces of peds; few pockets of uncoated sand grains and few uncoated sand grains on faces of peds; strongly acid; gradual wavy boundary.

B23t—37 to 49 inches; yellowish red (5YR 5/8) fine sandy loam; common coarse prominent yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; very friable; few pockets of uncoated sand grains and few uncoated sand grains on faces of peds; strongly acid; gradual wavy boundary.

B24t—49 to 72 inches; yellowish red (5YR 5/8) fine sandy loam; common coarse prominent yellowish brown (10YR 5/8) and common medium prominent red (2.5YR 4/8) mottles; pockets of clean sand grains within red mottles; weak medium subangular blocky structure; friable; clay films on faces of peds; uncoated sand grains on ped faces and few vertical streaks of uncoated sand grains; strongly acid; clear smooth boundary.

B25t—72 to 102 inches; red (2.5YR 4/8) fine sandy loam with few pockets of sandy clay loam; weak fine and medium subangular blocky structure; friable; most sand grains coated and bridged with clay and oxides; few pockets of uncoated sand grains; strongly acid; clear smooth boundary.

B3—102 to 111 inches; red (2.5YR 5/8) loamy fine sand with few pockets of red (2.5YR 4/8) sandy loam; weak fine and medium subangular blocky structure; very friable; many pockets of brownish yellow (10YR 6/6) uncoated sand grains; strongly acid; clear smooth boundary.

C—111 to 123 inches; yellowish red (5YR 5/8) loamy fine sand; massive; very friable; few pockets of bleached sand grains; strongly acid.

Solum thickness ranges from 60 to more than 100 inches. Reaction is strongly acid or very strongly acid throughout unless the surface layer has been limed.

The Ap horizon ranges from 5 to 8 inches in thickness. It has hue of 10YR, value of 5 or 6, and chroma of 3 or 4.

The B1 horizon has hue of 7.5YR, value of 5, and chroma of 6 or 8. The Bt horizon has hue of 5YR, value of 4 or 5, and chroma of 6 or 8 or hue of 2.5YR, value of 4, and chroma of 8. Texture is fine sandy loam or sandy clay loam.

Tiak series

The Tiak series consists of moderately well drained, deep, slowly permeable soils that formed in loamy and clayey sediments. These gently sloping to moderately sloping soils are on uplands of the Coastal Plain. The native vegetation is mixed hardwoods and pines. Slopes range from 3 to 12 percent.

Tiak soils are geographically associated with Savannah and Smithdale soils. The nearly level and gently sloping Savannah soils are on uplands, are not clayey, and have a fragipan. The gently sloping and moderately sloping Smithdale soils are on uplands. They are well drained and are not clayey.

Typical pedon of Tiak silt loam in a moist wooded area of Tiak silt loam, 3 to 8 percent slopes, SW1/4SW1/4NE1/4 sec. 33, T. 2 S., R. 12 W.:

Ap—0 to 7 inches; brown (10YR 5/3) silt loam; weak fine granular structure; very friable; many fine and medium roots; about 5 percent sandstone gravel as much as 2 inches in diameter; very strongly acid; clear smooth boundary.

A2—7 to 12 inches; light yellowish brown (10YR 6/4) loam; weak fine granular structure; very friable; common fine and medium roots; many fine pores; 5 percent sandstone gravel 1/4 inch to 3 inches in diameter; very strongly acid; clear smooth boundary.

B21t—12 to 22 inches; red (2.5YR 4/8) clay; weak medium subangular blocky structure; firm; few fine and medium roots; few medium pores; clay films on faces of peds; very strongly acid; clear smooth boundary.

B22t—22 to 32 inches; red (2.5YR 4/8) clay; many medium prominent gray (10YR 6/1) mottles; moderate medium subangular blocky structure; firm; few medium roots; many fine pores; clay films on most faces of peds; very strongly acid; clear wavy boundary.

B23t—32 to 53 inches; mottled red (2.5YR 4/8) and gray (10YR 6/1) clay; moderate medium and fine subangular blocky structure; firm; few medium roots; few fine pores; clay films on some faces of peds; very strongly acid; clear smooth boundary.

B24t—53 to 64 inches; light gray (10YR 7/1) clay; common medium prominent red (2.5YR 4/8) mottles; moderate medium and fine subangular blocky structure; firm; common fine pores; thick clay films on vertical and horizontal faces of peds; very strongly acid; clear smooth boundary.

B3—64 to 72 inches; mottled gray (10YR 6/1), red (2.5YR 4/8), and yellowish red (5YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; many fine pores; clay films on some faces of peds; sand grains coated and bridged with clay in the red parts; very strongly acid.

Solum thickness is more than 60 inches. Reaction is very strongly acid unless the surface layer has been limed.

The A horizon ranges from 5 to 12 inches in thickness. It has hue of 10YR, value of 3 or 4, and chroma of 2 or 3 or value of 5 or 6 and chroma of 3 or 4.

The B21t horizon has hue of 5YR, value of 5, and chroma of 8 or hue of 2.5YR, value of 4, and chroma of 8. In places the B21t horizon is mottled yellowish brown or light brownish gray. The B22t horizon has hue of 2.5YR, value of 4, and chroma of 8 and has gray mottles, or it is mottled in shades of red, brown, and gray. The B23t and B24t horizons are mottled in shades of red, brown, yellow, and gray. The B3 horizon is mottled gray and red sandy clay loam or fine sandy loam.

Townley series

The Townley series consists of moderately deep, well drained, slowly permeable soils that formed in a thin layer of loamy material and the underlying material weathered from shale. This is underlain by tilted and fractured shale, sandstone, or quartzite. These soils are in the Ouachita Mountains on nearly level tops and steep sides of hills, mountains, and benches and on low ridges in valleys. The native vegetation is mixed hardwoods and pines. Slopes range from 1 to 40 percent.

Townley soils are geographically associated with Carnasaw and Pirum soils. Carnasaw soils are on the same landscape as Townley soils but are deeper to bedrock. Pirum soils are in colluvial positions in the Ouachita Mountains. They are not so clayey as Townley soils.

Typical pedon of Townley silt loam in moist wooded area of Carnasaw-Townley-Pirum association, steep, NE1/4NW1/4NE1/4 sec. 17, T. 2 N., R. 17 W.:

A1—0 to 6 inches; brown (10YR 4/3) silt loam; weak medium granular structure; friable; common fine roots; 10 percent shale and sandstone fragments 1/4 inch to 3 inches in diameter; strongly acid; abrupt smooth boundary.

B21t—6 to 10 inches; yellowish red (5YR 5/8) silty clay loam; weak fine subangular blocky structure; friable; 10 percent shale and sandstone fragments 1/4 inch to 3 inches in diameter; continuous clay films on ped faces; few fine roots; many fine pores; very strongly acid; clear smooth boundary.

B22t—10 to 17 inches; red (2.5YR 4/8) silty clay; moderate fine and medium subangular blocky structure; friable; continuous clay films on faces of peds; 10 percent shale and sandstone fragments 1/4 inch to 3 inches in diameter; common fine and medium roots; many fine pores; extremely acid; clear smooth boundary.

B23t—17 to 23 inches; yellowish red (5YR 4/8) silty clay; moderate medium subangular blocky structure; friable; thin nearly continuous clay films on faces of most peds; 10 percent shale and sandstone fragments 1/4 inch to 3 inches in diameter; common fine and medium roots; many fine pores; brown (7.5YR 5/4) silty clay material around shale fragments; very strongly acid; clear wavy boundary.

Cr—23 to 25 inches; gray (10YR 5/1) tilted and fractured shale with a hardness less than 3 on Mohs' scale; rippable by hand; roots have horizontal spacing of more than 4 inches; very strongly acid.

Solum thickness ranges from 18 to 30 inches. Reaction is strongly acid to extremely acid unless the surface layer has been limed.

The A horizon ranges from 4 to 9 inches in thickness. The A1 horizon has hue of 10YR, value of 3, and chroma of 2; value of 4 and chroma of 2 or 3; or value of 5 and chroma of 3.

The B1 horizon, where present, has hue of 7.5YR, value of 5, and chroma of 6 or 8. The B2t horizon has hue of 7.5YR, value of 5, and chroma of 6 or 8; hue of 5YR, value of 4 or 5, and chroma of 6 or 8; or hue of 2.5YR, value of 4 or 5, and chroma of 8. Texture is silty clay loam or silty clay.

The Cr horizon is tilted and fractured weathered shale.

Udorthents

Udorthents consist of excessively drained, moderately rapidly permeable, nearly level to very steep soils on uplands of the Coastal Plain. The soils have been altered or obscured by bauxite mining operations, and the soil material, therefore, is quite variable. These soils are extremely acid to moderately alkaline in the surface layer. Texture ranges from very fine sandy loam to gravelly fine sandy loam. The C horizon is extremely acid or very strongly acid. Texture ranges from gravelly loamy sand to very gravelly silty clay loam.

Udorthents are geographically associated with Smithdale, Savannah, and Sherwood soils. The gently sloping and moderately sloping Smithdale soils are on uplands of the Coastal Plain. They are well drained, moderately permeable soils that formed in thick beds of loamy sediment. The nearly level and gently sloping Savannah soils also are on uplands of the Coastal Plain. They are moderately well drained, moderately permeable soils that have a fragipan. The gently sloping to moderately sloping Sherwood soils are on uplands. They formed in loamy residuum weathered from nepheline-syenite.

Wrightsville series

The Wrightsville series consists of deep, poorly drained, very slowly permeable soils that formed in loamy and clayey sediments. These level to depressional soils are on old stream terraces on the Coastal Plain. They are saturated with water late in winter and early in spring. The native vegetation is mixed pines and hardwoods. Slopes are dominantly less than 1 percent.

Wrightsville soils are geographically associated with Amy, Angie, and Savannah soils. Amy soils are on broad upland flats and on flood plains. They are not so clayey in the B horizon as the Wrightsville soils. The gently sloping Angie soils are on uplands of the Coastal Plain. They are moderately well drained. The nearly level and gently sloping Savannah soils also are on uplands of the Coastal Plain. They are moderately well drained and have a fragipan.

Typical pedon of Wrightsville silt loam in moist wooded area of Wrightsville silt loam, NE1/4NW1/4NW1/4 sec. 15, T. 2 S., R. 12 W.:

A1—0 to 2 inches; dark grayish brown (10YR 4/2) silt loam; weak fine and medium granular structure; friable; many fine and medium roots; strongly acid; abrupt smooth boundary.

A21g—2 to 6 inches; gray (10YR 5/1) silt loam; weak medium subangular blocky structure; very friable; common fine and medium roots; many fine pores; strongly acid; clear smooth boundary.

A22g—6 to 30 inches; light brownish gray (10YR 6/2) silt loam; many medium distinct yellowish brown (10YR 5/8) and few medium prominent yellowish red (5YR 5/8) mottles; moderate medium subangular blocky structure; friable; few fine roots; many fine pores; clay films on most faces of peds; very strongly acid; gradual wavy boundary.

B2tg—30 to 50 inches; gray (10YR 5/1) silty clay; many large distinct yellowish brown (10YR 5/4) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; many fine pores; thick continuous clay films on faces of peds; 15 percent light gray (10YR 7/1) silt tongues 1/4 inch to 2 inches wide; very strongly acid; clear wavy boundary.

C—50 to 72 inches; mottled grayish brown (10YR 5/2) and reddish yellow (7.5YR 6/8) silty clay loam; massive; firm; extremely acid.

Solum thickness ranges from 40 to 70 inches. Reaction is strongly acid to extremely acid unless the surface layer has been limed.

The A horizon is dominantly about 30 inches thick, but in places it is less than 25 inches. The Ap or A1 horizon has hue of 10YR, value of 4 or 5, and chroma of 2. The A2 horizon has hue of 10YR, value of 6 or 7, and chroma of 1 or 2 or value of 5 and chroma of 1. Some A2 horizons have mottles of brownish yellow or yellowish brown.

The B2tg horizon has hue of 10YR, value of 5 or 6, and chroma of 1. Texture is silty clay loam or silty clay with tongues of silt loam material into or through the horizon. Mottles, where present, are in shades of brown.

The C horizon is mottled in shades of brown and yellow.

Zafra series

The Zafra series consists of moderately deep to deep, well drained, moderately permeable soils that formed on stream terraces in alluvium washed from uplands of the Ouachita Mountains. The native vegetation is mixed pines and hardwoods. Slopes range from 3 to 8 percent.

Zafra soils are geographically associated with Carnasaw and Leadvale soils. The gently sloping to steep Carnasaw soils are on uplands. They are clayey. The nearly level to gently sloping Leadvale soils are on terraces. They are moderately well drained and have a fragipan.

Typical pedon of Zafra loam, in moist grassed area of Zafra-Leadvale complex, 3 to 8 percent slopes, SW1/4SW1/4NW1/4 sec. 15, T. 1 N., R. 18 W.:

Ap—0 to 8 inches; dark brown (10YR 4/3) loam; moderate medium granular structure; friable; many fine roots; 10 percent sandstone and quartzite gravel; medium acid; abrupt irregular boundary.

B21t—8 to 16 inches; yellowish red (5YR 4/6) gravelly clay loam; moderate medium subangular blocky structure; friable; 30 percent gravel; few fine roots; few fine pores; continuous clay films on many faces of peds; medium acid; clear wavy boundary.

B22t—16 to 29 inches; yellowish red (5YR 4/8) very gravelly clay loam; moderate fine and medium subangular blocky structure; friable; few fine roots; many fine pores; 60 percent gravel; patchy clay films on most faces of peds; strongly acid; gradual wavy boundary.

B23t—29 to 40 inches; strong brown (7.5YR 5/8) very gravelly clay loam; common fine distinct yellowish red mottles; moderate fine subangular blocky structure; friable; 80 percent gravel 1/8 inch to 3 inches in diameter; very strongly acid; abrupt wavy boundary.

R—40 to 42 inches; hard tilted black shale bedrock.

Solum thickness ranges from 25 to 60 inches. Reaction is strongly acid or medium acid.

The A horizon ranges from 2 to 14 inches in thickness. The A1 horizon has hue of 10YR, value of 4, and chroma of 2 or 3. The A2 horizon, where present, has hue of 10YR, value of 5, and chroma of 4.

The B1 horizon, where present, has hue of 7.5YR, value of 5, and chroma of 6 or 8. The Bt horizon has hue of 7.5YR, value of 5, and chroma of 8; hue of 5YR, value of 4 or 5, and chroma of 6 or 8; or hue of 2.5YR, value of 4 or 5, and chroma of 8. Texture is gravelly clay loam, very gravelly loam, very gravelly clay loam, or very gravelly sandy clay loam.

Classification of the soils

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to "Soil taxonomy" (*7*).

The system of classification has six categories. 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 21, 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 Ultisol.

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 Aquult (*Aqu*, meaning water, plus *ult*, from Ultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of 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 Ochraquults (*Ochr*, meaning pale surface horizon, plus *aquult*, the suborder of Ochraquults that have an aquic moisture regime).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, 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 groups but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceeding the name of the great group. The adjective *Typic* identifies the subgroup that is thought to typify the great group. An example is Typic Ochraquults.

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, siliceous, thermic Typic Ochraquults.

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

The following pages describe the factors of soil formation, relate them to soils in the survey area, and explain the processes of soil formation.

Factors of soil formation

Soil forms through weathering and other processes that act upon the regolith. 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 effects of the other four. If climate, living organisms, or any other one of the five factors significantly differs, a different soil can form.

Climate and living organisms are the active forces in soil formation. Relief modifies the effects of climate and living organisms, mainly through its influence on temperature and runoff. Because climate, vegetation, parent material, and relief interact over a period of time, time is the fifth factor of soil formation. Thus, the effect of time is also reflected in the soil characteristics.

Climate

The climate of Saline County is characterized by mild winters, warm or hot summers, and generally abundant rainfall. The present climate probably is similar to the climate under which the soils in the county formed. The climate is uniform throughout the county, but its effect is modified locally by runoff. Climate alone does not account for differences among the soils of the county. For additional information about the climate, refer to the section, "General nature of the county."

The warm, moist climate promotes rapid soil formation, and the warm temperature encourages rapid chemical reactions. The large amount of water that moves through the soil is instrumental in translocating or removing dissolved or suspended materials. The remains of plants decompose rapidly, and the organic acids thus formed hasten the formation of clay minerals and the removal of carbonates. Because the soil is frozen only to shallow depths and for short periods, the processes of soil formation continue almost the year round.

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 nitrogen in the soil, gains or losses in plant nutrients, and changes in structure and porosity.

Before Saline County was settled, the native vegetation had more influence on soil formation than did animal activity. The entire county was covered by forests.

On the Coastal Plain, the native vegetation was mixed stands of shortleaf and loblolly pine, oak, and hickory. Amy, Angie, Saffell, Smithdale, Tiak, and Wrightsville soils formed in these areas. They differ chiefly in parent material and relief. Ouachita soils and some Amy soils formed along drainageways where the native vegetation was mainly mixed hardwoods.

In the Ouachita Mountains in the northern and western parts of the county, the native vegetation was upland oaks, hickory, and shortleaf pine. Carnasaw and Townley soils formed in material that remained in place. Leadvale and Avilla soils formed on stream terraces in this area.

With the development of agriculture in the county, man is influencing the formation of the soils. Man is changing the direction of soil formation by clearing forests and tilling the soil; by introducing new plants; by fertilizing; by adding chemicals for insect, disease, and weed control; and by improving drainage and controlling floods. Even in many of the areas that have remained in woodland, man is influencing soil formation through woodland management practices, such as selective harvesting, timber stand improvement, and planting pure stands of preferred species. Only a few results of man's activities can be seen now, for example, changes in structure, color, organic matter and nutrient content, and thickness of the surface horizon or plow layer. Many results of man's activities will probably not be evident for several centuries.

Parent material

Parent material is the unconsolidated mass from which a soil forms. It determines the chemical and mineral composition of the undisturbed soil. In Saline County, the soils formed in two broad classes of parent material—(1) Coastal Plain sediments deposited in the Gulf of Mexico when it covered southern and eastern Arkansas and (2) residuum derived from rock of the Ouachita Mountains.

The gulf deposits are mainly noncalcareous loamy and clayey sediments and include some gravelly strata. These sediments have been strongly leached, and the content of bases is low. In the Ouachita Mountains, the soils formed mainly in residuum from moderately hard to hard bedrock. These rock layers have been folded and faulted and in many places are tilted toward the vertical. The soils formed in material weathered mainly from the upturned, broken edges of the rocks. The rock includes shale, sandstone, and quartzite. The soils have been strongly leached, and the content of bases is low.

Relief

Relief, or inequalities in elevation, in Saline County is the result chiefly of faulting and folding and the subsequent entrenchment of drainage channels into the land surface. The highest elevation in the county, about 1,800 feet above sea level, is in the northwestern part. The lowest elevation, about 270 feet, is in the southeastern part.

Some of the greatest differences in the soils of Saline County are caused by differences in relief through its effect on drainage, runoff, erosion, and percolation of water through the soil. The relief ranges from nearly vertical bluffs to broad flats.

The Ouachita Mountains are in the western and northern parts of the county. The slope is mainly 1 to 12 percent but ranges from 1 to 60 percent.

The Coastal Plain in the eastern and southern parts of the county is level to rolling. The slope is mainly 3 to 8 percent but ranges from 0 to 12 percent.

Time

The length of time required for soil formation depends largely on the other factors of soil formation. Generally, less time is required if the climate is warm and humid, the vegetation is luxuriant, and the parent material is loamy. Older soils usually show a greater degree of differentiation between horizons than do younger ones.

Most soils in Saline County have developed a B horizon. Some soils on flood plains, such as Ouachita soils, have been in place too little time to form an argillic horizon, but they have formed a cambic horizon. Most soils in the county have been forming long enough and in stable enough material to have developed an argillic horizon, and many have a fragipan. Generally, the soils on uplands of the Coastal Plain have been forming over a greater span of time. They have the most strongly developed argillic horizons and are the most mature soils in the county.

Processes of soil formation

In the following paragraphs, horizon nomenclature is briefly defined, and processes responsible for soil formation are explained.

The effects of the soil-forming factors are recorded in the soil profile, which is a succession of layers, or horizons, from the surface down to the parent material that has been but 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, an A, a B, and a C. Very young soils do not have a B horizon.

The A horizon can be the horizon of maximum accumulation of organic matter—the A1 horizon or the surface layer—or it can be the horizon of maximum leaching of dissolved or suspended material—the A2 horizon or the subsurface layer.

The B horizon, directly below the A horizon, 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 directly above and below it.

Below the B horizon is the C horizon, which has been little affected by the soil-forming processes. The C horizon can be materially modified by weathering. In some young soils where the C horizon underlies the A horizon, it has been slightly modified by living organisms, as well as by weathering.

Several processes have been active in the formation of soil horizons in the soils of Saline County. Among these processes 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 minerals. In most 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 in soil formation. The soils of Saline County range from medium to low in content of organic matter.

Leaching of carbonates and bases has occurred to some degree in nearly all of the soils of the county. It is generally accepted that bases are leached downward in soils before silicate clay minerals begin to move. Most of the soils in the county are moderately or strongly leached. Leaching 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 layer 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 Amy and Wrightsville soils.

In some soils of Saline 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, but in areas where an A2 horizon occurs, its structure is blocky to platy, clay content is less than in the lower horizons, and the soil is lighter in color. Generally, clay films have accumulated in pores and on surfaces of peds in the B horizon. The soils were probably leached of carbonates and soluble salts to a great extent before translocation of silicate clay occurred, even though the content of bases is still high in many soils in the county. Smithdale soils are examples of soils that show the effects of these processes.

Leaching of bases and translocation of silicate clay are among the most important processes in horizon differentiation in the soils of Saline County.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

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.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single mapping unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	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.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Bottom land. The normal flood plain of a stream, subject to frequent flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

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.

Channery soil. A soil, that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.

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. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

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 earthmoving equipment. The soil sloughs easily.

Depth to rock. Bedrock at a depth that adversely affects the specified use.

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.

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.

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 single 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 characterisitc that affects management. These differencees are too small to justify separate series.

pH value. (See Reaction, soil). A numerical designation of acidity and alkalinity in soil.

Piping. Moving water of 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.

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.

Saline-alkali soil. A soil that contains a harmful concentration of salts and exchangeable sodium; contains harmful salts and is strongly alkaline; or contains harmful salts and exchangeable sodium and is very strongly alkaline. The salts, exchangeable sodium, and alkaline reaction are in the soil in such location that growth of most crop plants is less than normal.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

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 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.

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.

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.

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *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* (0.005 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 characteristics 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."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use or management.

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."

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.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but the limited geographic soil area does not justify creation of a new series.

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.—Bermudagrass pasture on Caddo Variant-Messer Variant complex. The Caddo Variant is in the swales. The Messer Variant is on the mounds.

Figure 2.—A good stand of young loblolly pine on Carnasaw-Townley association, undulating.

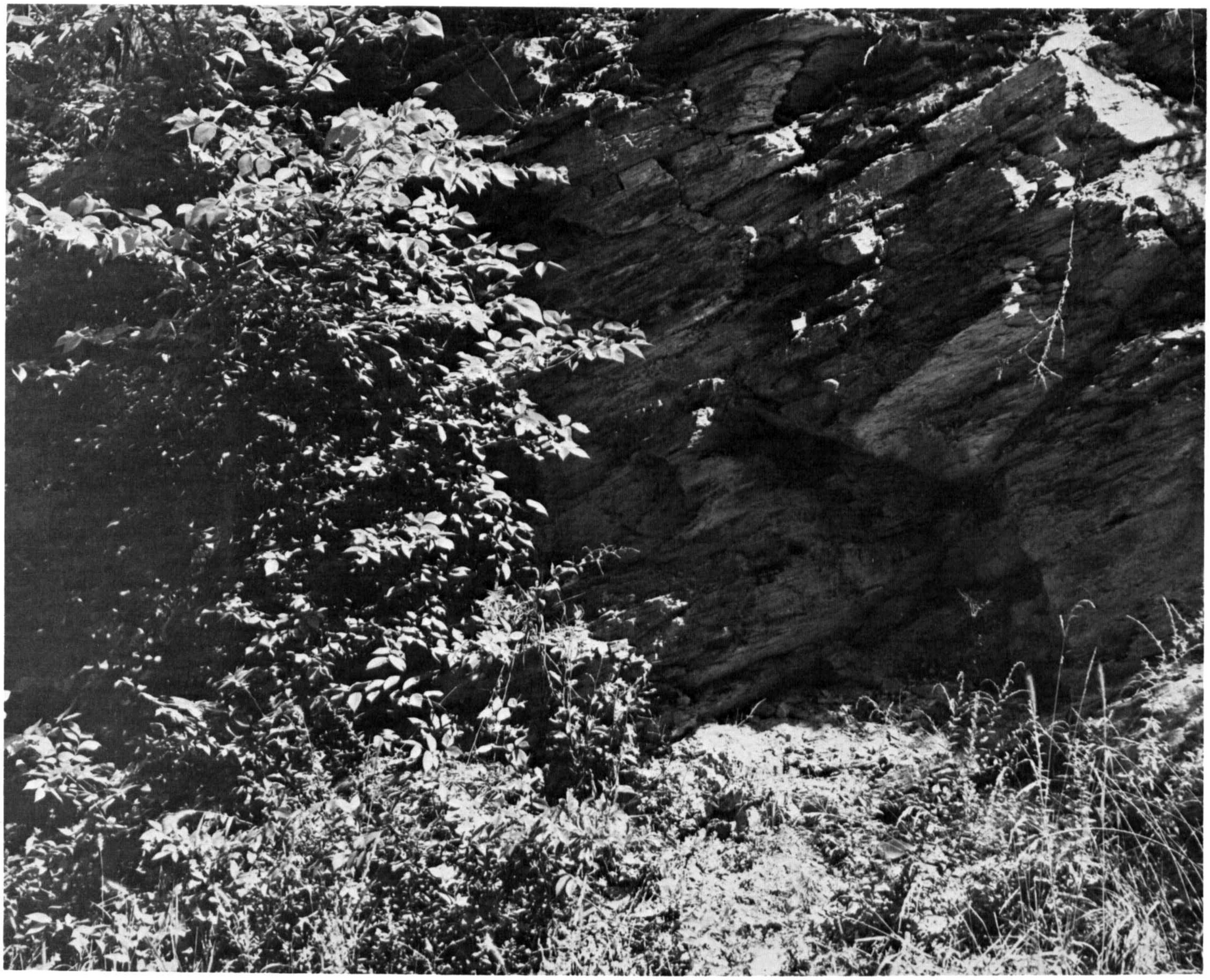

Figure 3.—Such tilted bedrock underlies soils in the Carnasaw-Townley association, steep.

Figure 4.—Hay harvested on Leadvale silt loam, 3 to 8 percent slopes.

Figure 5.—Pasture of bermudagrass and legumes on Ouachita silt loam, frequently flooded.

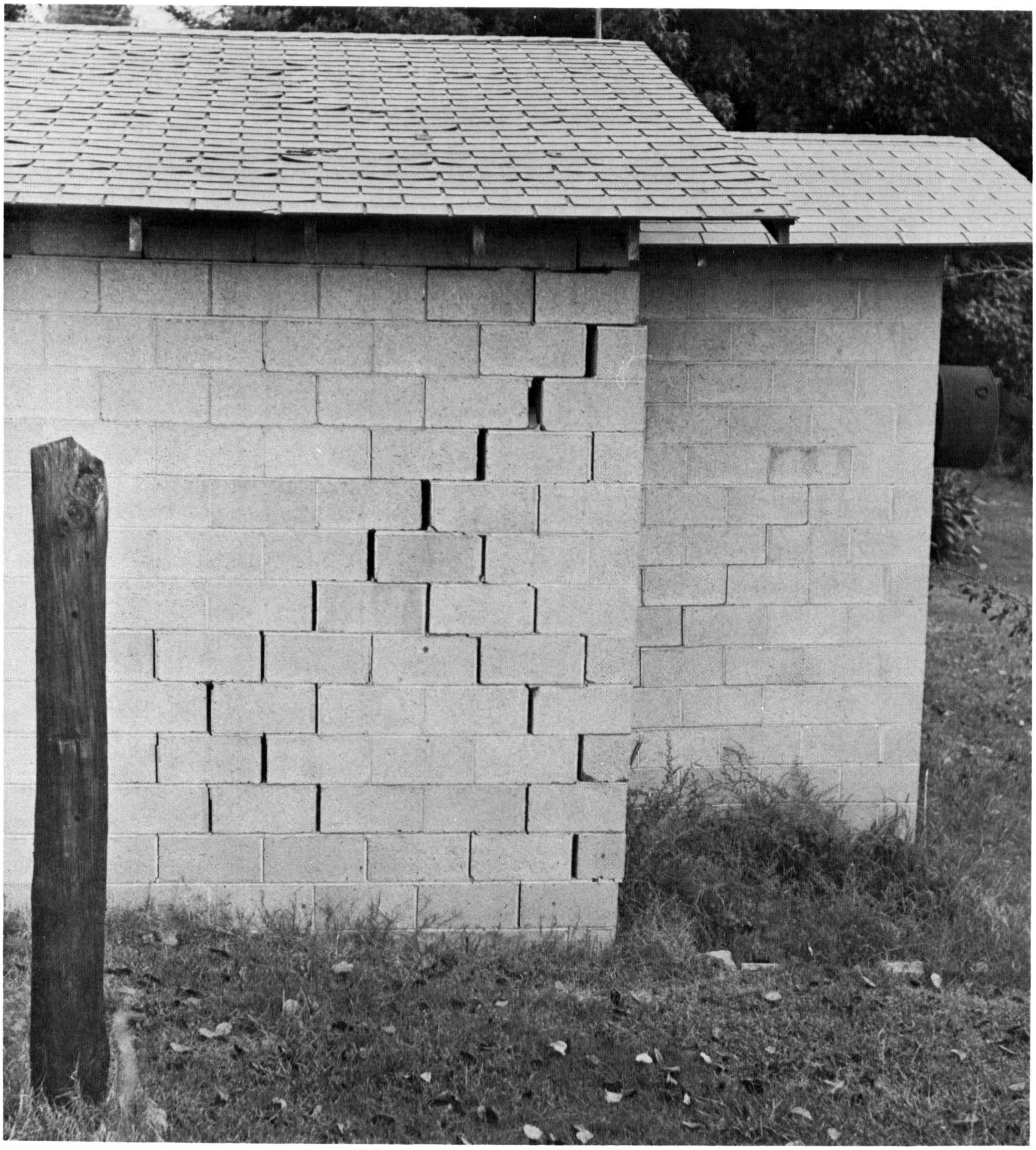

Figure 6.—A good area for wildlife habitat on Sherwood-Rock outcrop complex, 3 to 12 percent slopes.

Figure 7.—Cracks in a concrete wall because of the high shrink-swell of Tiak soils in the Tiak-Urban land complex, 3 to 8 percent slopes.

Tables

TABLE 1.--ACREAGE OF PRINCIPAL CROPS IN 1964 AND 1969

Crop	1964	1969
Soybeans	555	1,106
Hay (except for sorghum hay)	8,286	7,142
Pasture and rangeland	5,974	6,774

TABLE 2.--NUMBER OF LIVESTOCK AND POULTRY IN 1964 AND 1969

Livestock and Poultry	1964	1969
All cattle and calves	13,874	10,833
Milk cows	1,434	825
Hogs and pigs	743	361
Chickens[1]	46,805	35,414

[1]More than 3 months old.

TABLE 3.--TEMPERATURE AND PRECIPITATION DATA

Month	Temperature[1]						Precipitation[1]				
	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[2]	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----	52.2	30.1	41.2	74	7	17	4.18	1.78	6.12	6	2.0
February---	56.4	33.1	44.8	76	11	40	3.76	2.04	5.16	6	1.1
March------	63.9	39.2	51.6	85	19	175	5.15	2.92	6.97	8	.4
April------	75.1	49.7	62.4	89	30	376	5.17	2.48	7.36	7	.0
May--------	82.0	57.6	69.8	93	40	614	5.37	2.61	7.62	7	.0
June-------	88.9	65.3	77.1	99	50	813	4.44	1.55	6.76	6	.0
July-------	92.6	68.8	80.7	103	56	952	4.14	2.39	5.56	7	.0
August-----	92.1	67.6	79.9	102	55	927	3.43	1.40	5.10	5	.0
September--	86.2	61.8	74.1	98	44	723	4.41	1.38	6.84	5	.0
October----	76.5	50.7	63.7	91	31	425	3.32	1.06	5.12	4	.0
November---	63.2	39.9	51.6	81	19	126	4.17	2.01	5.92	5	.3
December---	54.1	33.3	43.7	75	10	31	4.29	2.36	5.95	6	.7
Year-----	73.6	49.8	61.7	104	4	5,219	51.83	42.41	60.82	72	4.5

[1]Recorded in the period 1951-73 at Alum Fork, Arkansas.

[2]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 4.--FREEZE DATES IN SPRING AND FALL

Probability	Temperature[1]		
	24 F or lower	28 F or lower	32 F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	March 23	March 31	April 18
2 years in 10 later than--	March 16	March 27	April 13
5 years in 10 later than--	March 2	March 18	April 5
First freezing temperature in fall:			
1 year in 10 earlier than--	November 7	October 31	October 25
2 years in 10 earlier than--	November 15	November 6	October 29
5 years in 10 earlier than--	November 29	November 16	November 6

[1]Recorded in the period 1951-73 at Alum Fork. Arkansas.

TABLE 5.--GROWING SEASON LENGTH

Probability	Daily minimum temperature during growing season[1]		
	Higher than 24 F	Higher than 28 F	Higher than 32 F
	Days	Days	Days
9 years in 10	242	220	196
8 years in 10	252	228	202
5 years in 10	271	243	214
2 years in 10	290	258	226
1 year in 10	300	266	232

[1]Recorded in the period 1951-73 at Alum Fork, Arkansas.

TABLE 6.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Allen loam, 20 to 40 percent slopes	2,147	0.5
2	Amy silt loam	10,650	2.3
3	Amy silt loam, frequently flooded	22,742	4.9
4	Amy soils	3,174	0.7
5	Angie fine sandy loam, 3 to 8 percent slopes	1,476	0.3
6	Avilla silt loam, 1 to 3 percent slopes	3,072	0.7
7	Avilla silt loam, 3 to 8 percent slopes	3,960	0.9
8	Caddo Variant-Messer Variant complex	7,236	1.6
9	Carnasaw-Townley association, undulating	43,430	9.4
10	Carnasaw-Townley association, steep	145,688	31.4
11	Carnasaw-Pirum-Townley association, undulating	1,840	0.4
12	Carnasaw-Townley-Pirum association, steep	64,208	13.9
13	Leadvale silt loam, 1 to 3 percent slopes	2,919	0.6
14	Leadvale silt loam, 3 to 8 percent slopes	2,065	0.4
15	Linker fine sandy loam, 3 to 8 percent slopes	1,452	0.3
16	Ouachita silt loam, frequently flooded	20,477	4.4
17	Ouachita-Amy complex, frequently flooded	3,363	0.7
18	Saffell gravelly fine sandy loam, 3 to 8 percent slopes	6,191	1.3
19	Saffell-Urban land complex, 3 to 8 percent slopes	2,297	0.5
20	Savannah fine sandy loam, 1 to 3 percent slopes	7,295	1.6
21	Savannah-Urban land complex, 1 to 3 percent slopes	1,404	0.3
22	Savannah fine sandy loam, 3 to 8 percent slopes	25,060	5.4
23	Savannah-Urban land complex, 3 to 8 percent slopes	1,239	0.3
24	Sherwood-Rock outcrop complex, 3 to 12 percent slopes	1,646	0.4
25	Smithdale loamy sand, 3 to 8 percent slopes	23,661	5.1
26	Smithdale-Urban land complex, 3 to 8 percent slopes	3,411	0.7
27	Smithdale loamy sand, 8 to 12 percent slopes	3,702	0.8
28	Smithdale and Darco loamy sands, 12 to 30 percent slopes	2,140	0.5
29	Tiak silt loam, 3 to 8 percent slopes	18,610	4.0
30	Tiak-Urban land complex, 3 to 8 percent slopes	1,305	0.3
31	Tiak silt loam, 8 to 12 percent slopes	1,387	0.3
32	Udorthents	5,815	1.3
33	Wrightsville silt loam	3,893	0.8
34	Zafra-Leadvale complex, 3 to 8 percent slopes	9,420	2.0
	Water	4,793	1.0
	Total	463,168	100.0

TABLE 7.--YIELDS PER ACRE OF CROPS AND PASTURE

[All yields were estimated for a high level of management in 1976. Absence of a yield figure indicates the crop is seldom grown or is not suited]

Soil name and map symbol	Cotton lint	Soybeans	Wheat	Common bermudagrass	Improved bermudagrass	Bahiagrass
	Lb	Bu	Bu	AUM[1]	AUM[1]	AUM[1]
Allen:						
1	---	---	---	---	---	---
Amy:						
2, [2]4	450	25	---	6.0	---	7.5
3	---	---	---	6.0	---	7.5
Angie:						
5	400	---	---	5.0	---	6.5
Avilla:						
6	---	25	35	7.0	8.5	---
7	---	20	30	7.0	8.5	---
Caddo Variant:						
[2]8:						
Caddo part	---	24	---	5.2	---	6.4
Messer part	---	25	---	5.5	---	6.0
Carnasaw:						
[2]9:						
Carnasaw part	---	---	---	---	5.5	6.0
Townley part	450	---	---	---	---	6.0
[2]10:						
Carnasaw part	---	---	---	---	---	---
Townley part	---	---	---	---	---	---
[2]11:						
Carnasaw part	---	---	---	---	5.5	6.0
Pirum part	450	20	---	6.5	7.5	7.0
Townley part	450	---	---	---	---	5.0
[2]12:						
Carnasaw part	---	---	---	---	---	---
Townley part	---	---	---	---	---	---
Pirum part	---	---	---	---	---	---
Leadvale:						
13	675	32	45	6.0	8.0	7.0
14	600	30	40	6.0	8.0	7.0
Linker:						
15	500	20	25	5.5	---	---
Ouachita:						
16	---	35	---	7.0	9	7.0
[2]17	---	---	---	6.6	---	7.3
Saffell:						
18	---	---	30	4.0	5.0	5.0
[2]19	---	---	---	---	---	---

See footnotes at end of table.

TABLE 7.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Cotton lint	Soybeans	Wheat	Common bermudagrass	Improved bermudagrass	Bahiagrass
	Lb	Bu	Bu	AUM[1]	AUM[1]	AUM[1]
Savannah:						
20	625	35	---	---	8.5	9.0
[2]21	---	---	---	---	---	---
22	525	30	---	---	8.0	9.0
[2]23	---	---	---	---	---	---
Sherwood:						
[2]24	---	---	---	---	---	---
Smithdale:						
25	600	30	---	5.5	9.0	---
[2]26	---	---	---	---	---	---
27	400	25	---	5.0	9.0	---
[2]28:						
Smithdale part	---	---	---	---	7.0	6.0
Darco part	---	---	---	---	5.0	5.0
Tiak:						
29	400	---	---	---	5.0	---
[2]30	---	---	---	---	---	---
31	300	---	---	---	4.5	---
Udorthents:						
32	---	---	---	---	---	---
Wrightsville:						
33	450	25	25	7.0	---	7.5
Zafra:						
[2]34:						
Zafra part	---	---	---	---	5.0	---
Leadvale part	600	30	40	6.0	8.0	7.0

[1]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.

[2]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed in this table. Absence of an entry in a column means the information was not available]

Soil name and map symbol	Wood-land suita-bility group	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Important trees	Site index	
Allen:							
1	3r8	Moderate	Moderate	Slight	Shortleaf pine Southern red oak	60 71	Loblolly pine, black walnut, shortleaf pine.
Amy:							
2, [1]4	2w9	Slight	Severe	Severe	Loblolly pine Shortleaf pine Sweetgum	90 80 90	Loblolly pine, sweetgum.
3	2w9	Slight	Severe	Severe	Loblolly pine Sweetgum Water oak	90 90 90	Loblolly pine, sweetgum, eastern cottonwood, green ash, American sycamore, Nuttall oak.
Angie:							
5	2w8	Slight	Moderate	Slight	Loblolly pine Shortleaf pine Sweetgum	86 79 90	Loblolly pine, sweetgum.
Avilla:							
6, 7	3o7	Slight	Slight	Slight	Shortleaf pine Southern red oak Loblolly pine Cherrybark oak Sweetgum Black walnut	65 65 70 --- 70 ---	Loblolly pine, shortleaf pine, black walnut, cherrybark oak.
Caddo Variant:							
[1]8:							
Caddo part	2w9	Slight	Severe	Moderate	Loblolly pine Sweetgum Water oak Shortleaf pine	86 94 88 75	Loblolly pine.
Messer part	2w8	Slight	Moderate	Slight	Loblolly pine Sweetgum	90 90	Loblolly pine.
Carnasaw:							
[1]9:							
Carnasaw part	3o1	Slight	Slight	Slight	Shortleaf pine Loblolly pine	70 80	Loblolly pine, shortleaf pine.
Townley part	4o1	Slight	Slight	Slight	Loblolly pine Shortleaf pine	70 60	Loblolly pine, shortleaf pine.
[1]10:							
Carnasaw part	3x9	Severe	Severe	Moderate	Shortleaf pine Southern red oak	70 ---	Shortleaf pine, loblolly pine.
Townley part	4r2	Moderate	Moderate	Slight	Loblolly pine Shortleaf pine	70 60	Loblolly pine, shortleaf pine.
[1]11:							
Carnasaw part	3o1	Slight	Slight	Slight	Shortleaf pine Loblolly pine	70 80	Loblolly pine, shortleaf pine.
Pirum part	3o7	Slight	Slight	Slight	Loblolly pine Shortleaf pine Southern red oak White oak	80 70 70 70	Loblolly pine, shortleaf pine, southern red oak.
Townley part	4o1	Slight	Slight	Slight	Loblolly pine Shortleaf pine	70 60	Loblolly pine, shortleaf pine.

See footnote at end of table.

TABLE 8.--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
Carnasaw:							
[1]12:							
Carnasaw part	3x9	Severe	Severe	Moderate	Shortleaf pine Southern red oak	70 ---	Shortleaf pine, loblolly pine.
Townley part	4r2	Moderate	Moderate	Slight	Loblolly pine Shortleaf pine	70 60	Loblolly pine.
Pirum part	3o7	Slight	Slight	Slight	Loblolly pine Shortleaf pine Southern red oak White oak	80 70 70 70	Loblolly pine, shortleaf pine, southern red oak.
Leadvale:							
13, 14	3o7	Slight	Slight	Slight	Southern red oak Loblolly pine Shortleaf pine	60 80 70	Loblolly pine, shortleaf pine.
Linker:							
15	4o7	Slight	Slight	Slight	Shortleaf pine Southern red oak White oak Eastern redcedar Loblolly pine	60 50 50 40 ---	Loblolly pine, shortleaf pine, eastern redcedar.
Ouachita:							
16	1w8	Slight	Moderate	Slight	Loblolly pine Sweetgum Eastern cottonwood	100 100 100	Loblolly pine, sweetgum, Nuttall oak, American sycamore, eastern cottonwood.
[1]17:							
Ouachita part	1w8	Slight	Moderate	Slight	Loblolly pine Sweetgum Eastern cottonwood	100 100 100	Loblolly pine, sweetgum, Nuttall oak, yellow-poplar, American sycamore, eastern cottonwood.
Amy part	2w9	Slight	Severe	Severe	Loblolly pine Sweetgum Water oak	90 90 90	Loblolly pine, sweetgum, eastern cottonwood, green ash, American sycamore, Nuttall oak.
Saffell:							
18	4f2	Slight	Slight	Moderate	Loblolly pine Shortleaf pine Eastern redcedar	70 60 ---	Loblolly pine, shortleaf pine, eastern redcedar.
[1]19:							
Saffell part	4f2	Slight	Slight	Moderate	Loblolly pine Shortleaf pine Eastern redcedar	70 60 ---	Loblolly pine, shortleaf pine, eastern redcedar.
Urban land part.							
Savannah:							
20, 22	3o7	Slight	Slight	Slight	Loblolly pine Shortleaf pine Sweetgum Southern red oak	81 76 80 75	Loblolly pine, shortleaf pine.
[1]21:							
Savannah part	3o7	Slight	Slight	Slight	Loblolly pine Shortleaf pine Sweetgum Southern red oak	81 76 80 75	Loblolly pine, shortleaf pine.

See footnote at end of table.

TABLE 8.--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	
Savannah:							
Urban land part.							
[1]23:							
Savannah part---	3o7	Slight	Slight	Slight	Loblolly pine------- Shortleaf pine------ Sweetgum------------ Southern red oak----	81 76 80 75	Loblolly pine.
Urban land part.							
Sherwood:							
[1]24:							
Sherwood part---	4o7	Slight	Slight	Slight	Shortleaf pine------ Southern red oak---- White oak----------- Sweetgum------------	60 60 55 60	Shortleaf pine, southern red oak, eastern redcedar.
Rock outcrop part.							
Smithdale:							
25, 27------------	3o1	Slight	Slight	Slight	Loblolly pine------- Shortleaf pine------	80 69	Loblolly pine, shortleaf pine.
[1]26:							
Smithdale part--	3o1	Slight	Slight	Slight	Loblolly pine------- Shortleaf pine------	80 69	Loblolly pine, shortleaf pine.
Urban land part.							
[1]28:							
Smithdale part--	3o1	Slight	Slight	Slight	Loblolly pine------- Shortleaf pine------	80 69	Loblolly pine.
Darco part------	4s3	Slight	Moderate	Severe	Loblolly pine------- Shortleaf pine------	70 65	Loblolly pine, shortleaf pine.
Tiak:							
29, 31------------	3c2	Slight	Moderate	Moderate	Loblolly pine------- Shortleaf pine------	80 70	Loblolly pine, shortleaf pine.
[1]30:							
Tiak part-------	3c2	Slight	Moderate	Moderate	Loblolly pine------- Shortleaf pine------	80 70	Loblolly pine, shortleaf pine.
Urban land part.							
Udorthents:							
32----------------	5r9	Severe	Severe	Slight	Shortleaf pine------ Sweetgum------------ Loblolly pine-------	50 --- ---	Shortleaf pine, loblolly pine, eastern redcedar.
Wrightsville:							
33----------------	3w9	Slight	Severe	Moderate	Loblolly pine------- Sweetgum------------ Water oak-----------	80 80 80	Loblolly pine, sweetgum, water oak, willow oak.
Zafra:							
[1]34:							
Zafra part------	3o7	Slight	Slight	Slight	Shortleaf pine------ Southern red oak----	70 70	Shortleaf pine.

See footnote at end of table.

TABLE 8.--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	
Zafra:							
Leadvale part---	3o7	Slight	Slight	Slight	Yellow-poplar------- Southern red oak---- Loblolly pine------- Shortleaf pine------	90 60 80 70	Loblolly pine, shortleaf pine.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 9.--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 an entry means soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Allen:					
1	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Amy:					
2, [1]4	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
3	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
Angie:					
5	Moderate: wetness, too clayey.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength, slope.	Severe: low strength.
Avilla:					
6	Slight	Slight	Slight	Slight	Moderate: low strength.
7	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.
Caddo Variant:					
[1]8:					
Caddo part	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Messer part	Moderate: wetness.	Slight	Moderate: wetness.	Slight	Moderate: low strength.
Carnasaw:					
[1]9:					
Carnasaw part	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Townley part	Moderate: depth to rock, slope.	Moderate: low strength, slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope.
[1]10:					
Carnasaw part	Severe: too clayey, slope, large stones.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, low strength, slope.
Townley part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
[1]11:					
Carnasaw part	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Pirum part	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Moderate: depth to rock, low strength.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Carnasaw:					
Townley part	Moderate: depth to rock, slope.	Moderate: low strength, slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope.
[1]12:					
Carnasaw part	Severe: too clayey, slope, large stones.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, low strength, slope.
Townley part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Pirum part	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Leadvale:					
13	Moderate: wetness.	Slight	Moderate: wetness.	Moderate: low strength.	Moderate: low strength.
14	Moderate: wetness.	Slight	Moderate: wetness.	Moderate: slope, low strength.	Moderate: low strength.
Linker:					
15	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.
Ouachita:					
16	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
[1]17:					
Ouachita part	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Amy part	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
Saffell:					
18	Severe: small stones.	Slight	Slight	Moderate: slope.	Slight.
[1]19:					
Saffell part	Severe: small stones.	Slight	Slight	Moderate: slope.	Slight.
Urban land part.					
Savannah:					
20	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, corrosive.	Moderate: low strength.
[1]21:					
Savannah part	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, corrosive.	Moderate: low strength.
Urban land part.					

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Savannah:					
22	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, slope, corrosive.	Moderate: low strength.
[1]23:					
Savannah part	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, slope, corrosive.	Moderate: low strength.
Urban land part.					
Sherwood:					
[1]24:					
Sherwood part	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: low strength, slope.	Moderate: low strength.
Rock outcrop part.					
Smithdale:					
25	Slight	Slight	Slight	Moderate: slope.	Slight.
[1]26:					
Smithdale part	Slight	Slight	Slight	Moderate: slope.	Slight.
Urban land part.					
27	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
[1]28:					
Smithdale part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Darco part	Severe: cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Tiak:					
29, 31	Severe: wetness, too clayey.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, wetness, low strength.	Severe: shrink-swell, wetness, low strength.	Severe: shrink-swell, wetness, low strength.
[1]30:					
Tiak part	Severe: wetness, too clayey.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, wetness, low strength.	Severe: shrink-swell, wetness, low strength.	Severe: shrink-swell, wetness, low strength.
Urban land part.					
Udorthents:					
32	Severe· slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Wrightsville:					
33	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.
Zafra:					
[1]34:					
Zafra part	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Moderate: depth to rock.
Leadvale part	Moderate: wetness.	Slight	Moderate: wetness.	Moderate: slope, low strength.	Moderate: low strength.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 10.--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
Allen:					
1	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Amy:					
2, [1]4	Severe: percs slowly, wetness.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
3	Severe: floods, percs slowly, wetness.	Severe: floods.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
Angie:					
5	Severe: percs slowly.	Moderate: wetness, slope.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey.
Avilla:					
6, 7	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Good.
Caddo Variant:					
[1]8:					
Caddo part	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Messer part	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Carnasaw:					
[1]9:					
Carnasaw part	Severe: percs slowly.	Moderate: depth to rock, slope.	Severe: too clayey.	Slight	Poor: too clayey.
Townley part	Severe: depth to rock.	Severe: depth to rock, slope.	Moderate: depth to rock.	Moderate: slope.	Fair: thin layer, slope.
[1]10:					
Carnasaw part	Severe: percs slowly, slope, large stones.	Severe: slope, large stones.	Severe: too clayey, slope, large stones.	Severe: slope.	Poor: too clayey, slope, large stones.
Townley part	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Poor: slope.
[1]11:					
Carnasaw part	Severe: percs slowly.	Moderate: depth to rock, slope.	Severe: too clayey.	Slight	Poor: too clayey.
Pirum part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Fair: thin layer.

See footnote at end of table.

TABLE 10.--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
Carnasaw:					
Townley part	Severe: depth to rock.	Severe: depth to rock, slope.	Moderate: depth to rock.	Moderate: slope.	Fair: thin layer, slope.
[1]12:					
Carnasaw part	Severe: percs slowly, slope, large stones.	Severe: slope, large stones.	Severe: too clayey, slope, large stones.	Severe: slope.	Poor: too clayey, slope, large stones.
Townley part	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Poor: slope.
Pirum part	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer.
Leadvale:					
13, 14	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey, wetness.	Slight	Fair: too clayey, hard to pack.
Linker:					
15	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Fair: thin layer.
Ouachita:					
16	Severe: floods, percs slowly.	Severe: floods.	Severe: floods.	Severe: floods.	Fair: too clayey.
[1]17:					
Ouachita part	Severe: floods, percs slowly.	Severe: floods.	Severe: floods.	Severe: floods.	Fair: too clayey.
Amy part	Severe: floods, percs slowly, wetness.	Severe: floods.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
Saffell:					
18	Slight	Moderate: slope, seepage.	Slight	Slight	Poor: small stones.
[1]19:					
Saffell part	Slight	Moderate: slope, seepage.	Slight	Slight	Poor: small stones.
Urban land part.					
Savannah:					
20	Severe: percs slowly.	Slight	Slight	Slight	Good.
[1]21:					
Savannah part	Severe: percs slowly.	Slight	Slight	Slight	Good.
Urban land part.					
22	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Good.

See footnote at end of table.

TABLE 10.--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
Savannah:					
[1]23:					
Savannah part	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Good.
Urban land part.					
Sherwood:					
[1]24:					
Sherwood part	Moderate: percs slowly.	Severe: slope.	Moderate: depth to rock.	Slight	Fair: small stones.
Rock outcrop part.					
Smithdale:					
25	Slight	Severe: seepage, slope.	Slight	Slight	Good.
[1]26:					
Smithdale part	Slight	Severe: seepage, slope.	Slight	Slight	Good.
Urban land part.					
27	Moderate: slope.	Severe: seepage, slope.	Slight	Moderate: slope.	Fair: slope.
[1]28:					
Smithdale part	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: slope.
Darco part	Severe: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage, slope.	Poor: too sandy, slope.
Tiak:					
29, 31	Severe: percs slowly, wetness.	Severe: slope.	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
[1]30:					
Tiak part	Severe: percs slowly, wetness.	Severe: slope.	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
Urban land part.					
Udorthents:					
32	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
Wrightsville:					
33	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness, too clayey.
Zafra:					
[1]34:					
Zafra part	Severe: depth to rock.	Moderate: seepage, depth to rock.	Severe: depth to rock.	Slight	Poor: small stones.

See footnote at end of table.

TABLE 10.--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
Zafra:					
Leadvale part----	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey, wetness.	Slight-----------	Fair: too clayey, hard to pack.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 11.--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
Allen:				
1	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Amy:				
2, 3, [1]4	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Angie:				
5	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Avilla:				
6, 7	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Caddo Variant:				
[1]8:				
Caddo part	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Messer part	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Carnasaw:				
[1]9:				
Carnasaw part	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, small stones.
Townley part	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, area reclaim.
[1]10:				
Carnasaw part	Poor: shrink-swell, low strength, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, large stones.
Townley part	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, area reclaim.
[1]11:				
Carnasaw part	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, small stones.
Pirum part	Fair: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Townley part	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, area reclaim.
[1]12:				
Carnasaw part	Poor: shrink-swell, low strength, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, large stones.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Carnasaw:				
Townley part	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, area reclaim.
Pirum part	Fair: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, thin layer.
Leadvale:				
13, 14	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, area reclaim.
Linker:				
15	Fair: low strength, thin layer.	Poor: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Ouachita:				
16	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
[1]17:				
Ouachita part	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Amy part	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Saffell:				
18	Good	Poor: excess fines.	Fair: excess fines.	Poor: small stones.
[1]19:				
Saffell part	Good	Poor: excess fines.	Fair: excess fines.	Poor: small stones.
Urban land part.				
Savannah:				
20, 22	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
[1]21:				
Savannah part	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Urban land part.				
[1]23:				
Savannah part	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Urban land part.				
Sherwood:				
[1]24:				
Sherwood part	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Rock outcrop part.				
Smithdale:				
25	Good	Unsuited: excess fines.	Unsuited: excess fines.	Good.
[1]26:				
Smithdale part	Good	Unsuited: excess fines.	Unsuited: excess fines.	Good.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Smithdale: Urban land part.				
27	Good	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope.
[1]28: Smithdale part	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Darco part	Fair: slope.	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy, slope.
Tiak: 29, 31	Poor: low strength, wetness, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
[1]30: Tiak part	Poor: low strength, wetness, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Urban land part.				
Udorthents: 32	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Wrightsville: 33	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Zafra: [1]34: Zafra part	Fair: thin layer.	Unsuited: excess fines.	Poor: excess fines.	Fair: thin layer, small stones.
Leadvale part	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, area reclaim.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 12.--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-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Allen:							
1	Moderate: seepage.	Slight	Severe: no water.	Not needed	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
Amy:							
2, [1]4	Slight	Moderate: compressible, low strength, piping.	Severe: no water.	Percs slowly, wetness.	Slow intake, percs slowly, wetness.	Percs slowly, wetness.	Percs slowly, wetness.
3	Slight	Moderate: compressible, low strength, piping.	Severe: no water.	Floods, percs slowly, wetness.	Slow intake, percs slowly, wetness.	Percs slowly, wetness.	Percs slowly, wetness.
Angie:							
5	Slight	Moderate: low strength, shrink-swell, compressible.	Severe: no water.	Not needed	Slope, percs slowly.	Percs slowly	Favorable.
Avilla:							
6	Moderate: seepage.	Moderate: seepage.	Severe: deep to water.	Not needed	Favorable	Favorable	Favorable.
7	Moderate: seepage.	Moderate: seepage.	Severe: deep to water.	Not needed	Slope	Favorable	Erodes easily, slope.
Caddo Variant:							
[1]8:							
Caddo part	Slight	Moderate: erodes easily, compressible, low strength.	Severe: no water.	Favorable	Erodes easily, slope, percs slowly.	Erodes easily, percs slowly.	Wetness.
Messer part	Slight	Slight	Severe: no water.	Not needed	Percs slowly, slope.	Erodes easily, complex slope.	Favorable.
Carnasaw:							
[1]9:							
Carnasaw part	Moderate: depth to rock.	Moderate: thin layer, compressible, unstable fill.	Severe: deep to water.	Not needed	Slow intake, erodes easily.	Percs slowly, slope.	Percs slowly, slope.
Townley part	Moderate: depth to rock.	Moderate: thin layer.	Severe: no water.	Not needed	Droughty, slope.	Depth to rock, rooting depth, slope.	Droughty, rooting depth, slope.

See footnote at end of table.

TABLE 12.--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
Carnasaw:							
[1]10:							
Carnasaw part	Moderate: depth to rock.	Severe: large stones.	Severe: deep to water.	Not needed	Slow intake, erodes easily.	Percs slowly, slope.	Percs slowly, slope.
Townley part	Moderate: depth to rock.	Moderate: thin layer.	Severe: no water.	Not needed	Droughty, slope.	Depth to rock, rooting depth, slope.	Droughty, rooting depth, slope.
[1]11:							
Carnasaw part	Moderate: depth to rock.	Moderate: thin layer, compressible, unstable fill.	Severe: deep to water.	Not needed	Slow intake, erodes easily.	Percs slowly, slope.	Percs slowly, slope.
Pirum part	Severe: depth to rock.	Moderate: thin layer, compressible, low strength.	Severe: no water.	Not needed	Complex slope, erodes easily, slope.	Slope, depth to rock, erodes easily.	Erodes easily, slope.
Townley part	Moderate: depth to rock.	Moderate: thin layer.	Severe: no water.	Not needed	Droughty, slope.	Depth to rock, rooting depth, slope.	Droughty, rooting depth, slope.
[1]12:							
Carnasaw part	Moderate: depth to rock.	Severe: large stones.	Severe: deep to water.	Not needed	Slow intake, erodes easily.	Percs slowly, slope.	Percs slowly, slope.
Townley part	Moderate: depth to rock.	Moderate: thin layer.	Severe: no water.	Not needed	Droughty, slope.	Depth to rock, rooting depth, slope.	Droughty, rooting depth, slope.
Pirum part	Severe: depth to rock.	Moderate: thin layer, compressible, low strength.	Severe: no water.	Not needed	Complex slope, erodes easily, slope.	Slope, depth to rock, erodes easily.	Erodes easily, slope.
Leadvale:							
13, 14	Slight	Moderate: piping.	Severe: no water.	Percs slowly	Favorable	Favorable	Favorable.
Linker:							
15	Severe: depth to rock.	Moderate: thin layer, compressible.	Severe: no water.	Not needed	Slope, erodes easily.	Slope, depth to rock, erodes easily.	Erodes easily, slope.
Ouachita:							
16	Moderate: seepage.	Moderate: compressible, piping.	Severe: no water.	Not needed	Floods	Not needed	Not needed.
[1]17:							
Ouachita part	Moderate: seepage.	Moderate: compressible, piping.	Severe: no water.	Not needed	Floods	Not needed	Not needed.

See footnote at end of table.

TABLE 12.--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
Ouachita:							
Amy part	Slight	Moderate: compressible, low strength, piping.	Severe: no water.	Floods, percs slowly, wetness.	Slow intake, percs slowly, wetness.	Percs slowly, wetness.	Percs slowly, wetness.
Saffell:							
18	Moderate: seepage.	Moderate: seepage, piping, thin layer.	Severe: no water.	Not needed	Droughty, fast intake, slope.	Erodes easily, slope, small stones.	Droughty, erodes easily, slope.
[1]19:							
Saffell part	Moderate: seepage.	Moderate: seepage, piping, thin layer.	Severe: no water.	Not needed	Droughty, fast intake, slope.	Erodes easily, slope, small stones.	Droughty, erodes easily, slope.
Urban land part.							
Savannah:							
20	Moderate: seepage.	Moderate: low strength, piping.	Severe: deep to water.	Percs slowly, slope.	Percs slowly	Percs slowly, erodes easily.	Percs slowly.
[1]21:							
Savannah part	Moderate: seepage.	Moderate: low strength, piping.	Severe: deep to water.	Percs slowly, slope.	Percs slowly	Percs slowly, erodes easily.	Percs slowly.
Urban land part.							
22	Moderate: seepage.	Moderate: low strength, piping.	Severe: deep to water.	Percs slowly, slope.	Percs slowly	Percs slowly, erodes easily.	Percs slowly.
[1]23:							
Savannah part	Moderate: seepage.	Moderate: low strength, piping.	Severe: deep to water.	Percs slowly, slope.	Percs slowly	Percs slowly, erodes easily.	Percs slowly.
Urban land part.							
Sherwood:							
[1]24:							
Sherwood part	Moderate: seepage, depth to rock.	Moderate: thin layer, unstable fill.	Severe: deep to water.	Not needed	Slope	Slope	Slope.
Rock outcrop part.							

See footnote at end of table.

TABLE 12.--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
Smithdale:							
25	Severe: seepage.	Moderate: piping, unstable fill.	Severe: no water.	Not needed, slope.	Fast intake, seepage, complex slope.	Favorable	Favorable.
[1]26:							
Smithdale part	Severe: seepage.	Moderate: piping, unstable fill.	Severe: no water.	Not needed, slope.	Fast intake, seepage, complex slope.	Favorable	Favorable.
Urban land part.							
27	Severe: seepage.	Moderate: piping, unstable fill.	Severe: no water.	Not needed, slope.	Fast intake, seepage, complex slope.	Slope, erodes easily.	Slope, erodes easily.
[1]28:							
Smithdale part	Severe: seepage.	Moderate: piping, unstable fill.	Severe: no water.	Not needed, slope.	Fast intake, seepage, complex slope.	Slope, erodes easily.	Slope, erodes easily.
Darco part	Severe: seepage.	Moderate: seepage, piping.	Severe: no water.	Not needed	Droughty, fast intake, soil blowing.	Slope, piping, erodes easily.	Droughty, erodes easily.
Tiak:							
29	Slight	Moderate: unstable fill, compressible.	Severe: no water.	Favorable	Slow intake	Favorable	Favorable.
[1]30:							
Tiak part	Slight	Moderate: unstable fill, compressible.	Severe: no water.	Favorable	Slow intake	Favorable	Favorable.
Urban land part.							
31	Slight	Moderate: unstable fill, compressible.	Severe: no water.	Favorable	Slow intake	Slope	Favorable.
Udorthents:							
32	Severe: seepage.	Moderate: unstable fill.	Severe: no water.	Not needed	Slope	Complex slope	Slope.
Wrightsville:							
33	Slight	Severe: unstable fill, compressible.	Severe: no water.	Favorable, wetness, percs slowly.	Favorable, wetness, slow intake.	Not needed	Not needed.
Zafra:							
[1]34:							
Zafra part	Severe: depth to rock.	Moderate: thin layer.	Severe: deep to water.	Not needed	Erodes easily, rooting depth, slope.	Depth to rock, rooting depth.	Erodes easily, rooting depth.

See footnote at end of table.

TABLE 12.--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
Zafra:							
Leadvale part	Slight	Moderate: piping.	Severe: no water.	Percs slowly	Favorable	Favorable	Favorable.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 13.--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
Allen:				
1	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Amy:				
2, [1]4	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
3	Severe: floods, wetness.	Severe: wetness.	Severe: floods, wetness.	Severe: wetness.
Angie:				
5	Moderate: percs slowly.	Slight	Moderate: percs slowly, slope.	Slight.
Avilla:				
6, 7	Slight	Slight	Moderate: slope.	Slight.
Caddo Variant:				
[1]8:				
Caddo part	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Messer part	Slight	Slight	Moderate: slope.	Slight.
Carnasaw:				
[1]9:				
Carnasaw part	Moderate: percs slowly.	Slight	Moderate: percs slowly.	Slight.
Townley part	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Slight.
[1]10:				
Carnasaw part	Severe: slope, large stones.	Severe: slope.	Severe: slope.	Severe: slope, large stones.
Townley part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
[1]11:				
Carnasaw part	Moderate: percs slowly.	Slight	Moderate: percs slowly.	Slight.
Pirum part	Slight	Slight	Moderate: slope.	Slight.
Townley part	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Slight.
[1]12:				
Carnasaw part	Severe: slope, large stones.	Severe: slope.	Severe: slope.	Severe: slope, large stones.

See footnote at end of table.

TABLE 13.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Carnasaw:				
Townley part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Pirum part	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Leadvale:				
13	Moderate: percs slowly.	Slight	Moderate: slope, percs slowly.	Slight.
14	Moderate: percs slowly.	Slight	Severe: slope.	Slight.
Linker:				
15	Slight	Slight	Moderate: slope.	Slight.
Ouachita:				
16	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.
[1]17:				
Ouachita part	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.
Amy part	Severe: floods, wetness.	Severe: wetness.	Severe: floods, wetness.	Severe: wetness.
Saffell:				
18	Severe: small stones.	Moderate: small stones.	Severe: small stones, slope.	Moderate: small stones.
[1]19:				
Saffell part	Severe: small stones.	Moderate: small stones.	Severe: small stones, slope.	Moderate: small stones.
Urban land part.				
Savannah:				
20	Slight	Slight	Slight	Slight.
[1]21:				
Savannah part	Slight	Slight	Slight	Slight.
Urban land part.				
22	Slight	Slight	Severe: slope.	Slight.
[1]23:				
Savannah part	Slight	Slight	Severe: slope.	Slight.
Urban land part.				
Sherwood:				
[1]24:				
Sherwood part	Slight	Slight	Severe: slope.	Slight.
Rock outcrop part.				

See footnote at end of table.

TABLE 13.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Smithdale:				
25	Slight	Slight	Severe: slope.	Slight.
[1]26:				
Smithdale part	Slight	Slight	Severe: slope.	Slight.
Urban land part.				
27	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
[1]28:				
Smithdale part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Darco part	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: too sandy.
Tiak:				
29	Moderate: percs slowly.	Slight	Moderate: percs slowly, slope.	Slight.
[1]30:				
Tiak part	Moderate: percs slowly.	Slight	Moderate: percs slowly, slope.	Slight.
Urban land part.				
31	Moderate: percs slowly.	Slight	Moderate: percs slowly, slope.	Slight.
Udorthents:				
32	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wrightsville:				
33	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, percs slowly.	Severe: wetness.
Zafra:				
[1]34:				
Zafra part	Slight	Slight	Moderate: slope, small stones.	Slight.
Leadvale part	Moderate: percs slowly.	Slight	Moderate: slope, percs slowly.	Slight.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 14.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates the soil was not rated]

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	Rangeland wildlife
Allen:												
1	Very poor.	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
Amy:												
2, [1]4	Poor	Fair	Fair	Good	Fair	---	Good	Good	Fair	Good	Good	---
3	Poor	Fair	Fair	Good	Fair	---	Good	Poor	Fair	Good	Fair	---
Angie:												
5	Good	Good	Good	---	Good	---	Poor	Very poor.	Good	Good	Very poor.	---
Avilla:												
6, 7	Good	Good	Good	Good	---	---	Very poor.	Very poor.	Good	Good	Very poor	---
Caddo Variant:												
[1]8:												
Caddo part	Fair	Fair	Fair	---	Fair	---	Good	Good	Fair	Fair	Good	---
Messer part	Good	Good	Good	---	Good	---	Poor	Very poor.	Good	Good	Very poor.	---
Carnasaw:												
[1]9:												
Carnasaw part	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.	---
Townley part	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.	---
[1]10:												
Carnasaw part	Very poor.	Poor	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.	---
Townley part	Very poor.	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.	---
[1]11:												
Carnasaw part	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.	---
Pirum part	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.	---
Townley part	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.	---
[1]12:												
Carnasaw part	Very poor.	Poor	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.	---
Townley part	Very poor.	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.	---
Pirum part	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.	---
Leadvale:												
13	Fair	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor	---

See footnote at end of table.

TABLE 14.--WILDLIFE HABITAT POTENTIALS--Continued

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	Rangeland wildlife
Leadvale:												
14	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
Linker:												
15	Fair	Good	Good	Fair	Fair	---	Poor	Very poor.	Good	Good	Very poor.	---
Ouachita:												
16	Poor	Fair	Fair	Good	Poor	---	Good	Fair	Fair	Good	Fair	---
[1]17:												
Ouachita part	Poor	Fair	Fair	Good	Poor	---	Good	Fair	Fair	Good	Fair	---
Amy part	Poor	Fair	Fair	Good	Fair	---	Good	Poor	Fair	Good	Fair	---
Saffell:												
18	Fair	Fair	Fair	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.	---
[1]19:												
Saffell part	Fair	Fair	Fair	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.	---
Urban land part.												
Savannah:												
20	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.	---
[1]21:												
Savannah part	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.	---
Urban land part.												
22	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.	---
[1]23:												
Savannah part	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.	---
Urban land part.												
Sherwood:												
[1]24:												
Sherwood part	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.	---
Rock outcrop part.												
Smithdale:												
25, 27	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.	---
[1]26:												
Smithdale part	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.	---
Urban land part.												
[1]28:												
Smithdale part	Very poor.	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.	---

See footnote at end of table.

TABLE 14.--WILDLIFE HABITAT POTENTIALS--Continued

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	Rangeland wildlife
Smithdale:												
Darco part	Very poor.	Fair	Good	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.	---
Tiak:												
29	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Poor	---
[1]30:												
Tiak part	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Poor	---
Urban land part.												
31	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.	---
Udorthents:												
32	Very poor.	Poor	Poor	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.	---
Wrightsville:												
33	Fair	Fair	Fair	Fair	Fair	---	Good	Good	Fair	Fair	Good	---
Zafra:												
[1]34:												
Zafra part	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.	---
Leadvale part	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 15.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means greater 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	
Allen:											
1	0-9	Loam, fine sandy loam.	ML, CL-ML, SM, SM-SC	A-4	0-5	90-100	75-100	65-98	40-80	14-26	2-7
	9-23	Clay loam, sandy clay loam, loam.	CL-ML, CL	A-4, A-6, A-7	0-10	85-100	75-100	65-98	50-80	22-43	5-19
	23-72	Clay loam, sandy clay loam, clay.	CL-ML, CL, SC, SM-SC	A-4, A-6, A-7	0-10	85-100	70-95	60-95	45-80	22-48	6-22
Amy:											
2, 3, [1]4	0-45	Silt loam	ML, CL-ML	A-4	0	100	95-100	90-100	70-95	<30	NP-5
	45-72	Silt loam, silty clay loam.	CL	A-4, A-6	0	100	95-100	95-100	85-95	25-40	8-20
Angie:											
5	0-10	Fine sandy loam	SM, ML	A-4	0	100	100	85-100	36-75	---	NP
	10-72	Silty clay, silty clay loam.	CH, CL	A-7, A-6	0	100	100	90-100	80-90	35-55	15-30
Avilla:											
6, 7	0-9	Silt loam	ML, CL-ML, CL	A-4	0	100	85-100	80-90	60-80	<23	NP-10
	9-56	Loam, clay loam, sandy clay loam.	CL, SC, CL-ML	A-6, A-4	0	100	85-100	80-90	45-80	23-38	7-15
	56-72	Very gravelly loam, very gravelly clay loam, very gravelly sandy clay loam.	SC, GC	A-2	0-10	40-60	20-50	15-35	12-20	23-38	7-15
Caddo Variant:											
[1]8:											
Caddo part	0-10	Silt loam	ML, CL-ML	A-4	0	100	100	95-100	70-95	<27	NP-7
	10-72	Silt loam, loam, silty clay loam.	CL	A-6	0	100	100	85-100	50-90	30-40	11-18
Messer part	0-42	Silt loam	ML, CL-ML	A-4	0	100	100	95-100	80-95	<25	NP-5
	42-72	Very gravelly loam.	GC, SC, SM-SC, GM-GC	A-2, A-1	0-15	35-85	25-70	20-25	15-20	20-40	4-18
Carnasaw:											
[1]9:											
Carnasaw part	0-3	Gravelly silt loam.	SM, ML, SM-SC, GM-GC	A-2, A-1, A-4	0-10	55-75	55-75	40-70	20-70	<20	NP-7
	3-6	Silty clay loam, clay loam, clay.	CL, CH	A-6, A-7	0	85-100	83-97	80-95	70-95	37-65	16-35
	6-40	Clay, silty clay	CL, CH, MH	A-7	0	85-100	83-97	80-96	75-97	41-67	18-35
	40-72	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Townley part	0-6	Silt loam	ML, CL	A-4	0-2	80-98	70-95	65-90	50-65	<35	NP-10
	6-23	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	0-2	80-100	80-100	75-99	70-95	30-55	12-30
	23-25	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

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	
Carnasaw:											
[1]10:											
Carnasaw part	0-3	Gravelly silt loam.	SM, ML, SM-SC, GM-GC	A-2, A-1, A-4	0-10	55-75	55-75	40-70	20-70	<20	NP-7
	3-6	Silty clay loam, clay loam, clay.	CL, CH	A-6, A-7	0	85-100	83-97	80-95	70-95	37-65	16-35
	6-40	Clay, silty clay	CL, CH, MH	A-7	0	85-100	83-97	80-96	75-97	41-67	18-35
	40-72	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Townley part	0-6	Silt loam	ML, CL	A-4	0-2	80-98	70-95	65-90	50-65	<35	NP-10
	6-23	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	0-2	80-100	80-100	75-99	70-95	30-55	12-30
	23-25	Weathered bedrock.	---	---	---	---	---	---	---	---	---
[1]11:											
Carnasaw part	0-3	Gravelly silt loam.	SM, ML, SM-SC, GM-GC	A-2, A-1, A-4	0-10	55-75	55-75	40-70	20-70	<20	NP-7
	3-6	Silty clay loam, clay loam, clay.	CL, CH	A-6, A-7	0	85-100	83-97	80-95	70-95	37-65	16-35
	6-40	Clay, silty clay	CL, CH, MH	A-7	0	85-100	83-97	80-96	75-97	41-67	18-35
	40-72	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Pirum part	0-10	Loam	SM, ML	A-4	0	75-100	75-100	70-90	35-65	<20	NP-3
	10-34	Sandy clay loam, clay loam, loam.	CL, CL-ML	A-4, A-6	0	75-100	75-100	70-90	50-70	22-35	5-15
	34-36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Townley part	0-6	Silt loam	ML, CL	A-4	0-2	80-98	70-95	65-90	50-65	<35	NP-10
	6-23	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	0-2	80-100	80-100	75-99	70-95	30-55	12-30
	23-25	Weathered bedrock.	---	---	---	---	---	---	---	---	---
[1]12:											
Carnasaw part	0-3	Gravelly silt loam.	SM, ML, SM-SC, GM-GC	A-2, A-1, A-4	0-10	55-75	55-75	40-70	20-70	<20	NP-7
	3-6	Silty clay loam, clay loam, clay.	CL, CH	A-6, A-7	0	85-100	83-97	80-95	70-95	37-65	16-35
	6-40	Clay, silty clay	CL, CH, MH	A-7	0	85-100	83-97	80-96	75-95	41-67	18-35
	40-72	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Townley part	0-6	Silt loam	ML, CL	A-4	0-2	80-98	70-95	65-90	50-65	<35	NP-10
	6-23	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	0-2	80-100	80-100	75-99	70-95	30-55	12-30
	23-25	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Pirum part	0-10	Loam	SM, ML	A-4	0	75-100	75-100	70-90	35-65	<20	NP-3
	10-34	Sandy clay loam, clay loam, loam.	CL, CL-ML	A-4, A-6	0	75-100	75-100	70-90	50-70	22-35	5-15
	34-36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--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	
Leadvale:											
13, 14------------	0-5	Silt loam-------	ML, CL-ML, CL	A-4	0	100	95-100	85-95	65-85	18-32	2-10
	5-27	Silt loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	95-100	90-98	75-90	24-36	5-14
	27-49	Silt loam, silty clay loam.	CL-ML, CL	A-4, A-6, A-7	0	100	95-100	80-98	70-90	24-42	5-18
	49-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Linker:											
15----------------	0-5	Fine sandy loam	SM, ML, GM, CL-ML	A-2, A-4	0-5	65-100	60-100	55-100	25-70	<30	NP-7
	5-33	Fine sandy loam, sandy clay loam, clay loam.	CL, SC, SM, ML	A-4, A-6	0-10	90-100	80-100	70-100	40-80	<40	NP-18
	33-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ouachita:											
16----------------	0-11	Silt loam-------	ML, CL, CL-ML	A-4, A-6	0	100	100	85-100	75-95	<30	NP-12
	11-72	Silt loam, loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	85-100	80-100	25-40	5-20
[1]17:											
Ouachita part---	0-11	Silt loam-------	ML, CL, CL-ML	A-4, A-6	0	100	100	85-100	75-95	<30	NP-12
	11-72	Silt loam, loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	85-100	80-100	25-40	5-20
Amy part--------	0-45	Silt loam-------	ML, CL-ML	A-4	0	100	95-100	90-100	70-95	<30	NP-5
	45-72	Silt loam, silty clay loam.	CL	A-4, A-6	0	100	95-100	95-100	85-95	25-40	8-20
Saffell:											
18----------------	0-9	Gravelly fine sandy loam.	GM, SM	A-1, A-2, A-4	0-5	70-80	50-75	40-65	25-40	<20	NP-3
	9-36	Very gravelly sandy clay loam, very gravelly fine sandy loam, very gravelly loam.	GC, SC, SM-SC, GM-GC	A-2, A-1	0-15	35-85	25-70	20-55	15-35	20-40	4-18
	36-76	Gravelly sandy loam, very gravelly loam, very gravelly loamy coarse sand.	GM, GC, SM, SC	A-1, A-2, A-3	0-5	25-80	10-70	5-60	5-35	<35	NP-15
[1]19:											
Saffell part----	0-9	Gravelly fine sandy loam.	GM, SM	A-1, A-2, A-4	0-5	70-80	50-75	40-65	25-40	<20	NP-3
	9-36	Very gravelly sandy clay loam, very gravelly fine sandy loam, very gravelly loam.	GC, SC, SM-SC, GM-GC	A-2, A-1	0-15	35-85	25-70	20-55	15-35	20-40	4-18
	36-76	Gravelly sandy loam, very gravelly sandy loam, gravelly loamy sand.	GM, GC, SM, SC	A-1, A-2, A-3	0-5	25-80	10-70	5-60	5-35	<35	NP-15

See footnote at end of table.

TABLE 15.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
Saffell:											
Urban land part.											
Savannah:											
20, 22------------	0-14	Fine sandy loam	SM, ML	A-2, A-4	0	100	100	60-85	30-55	<25	NP-4
	14-32	Sandy clay loam, clay loam, loam.	CL, SC, CL-ML	A-4, A-6	0	100	100	80-100	40-80	23-40	7-19
	32-72	Loam, clay loam, sandy clay loam.	CL, SC, CL-ML	A-4, A-6, A-7	0	100	100	80-100	40-80	23-43	7-19
[1]21:											
Savannah part---	0-14	Fine sandy loam	SM, ML	A-2, A-4	0	100	100	60-85	30-55	<25	NP-4
	14-32	Sandy clay loam, clay loam, loam.	CL, SC, CL-ML	A-4, A-6	0	100	100	80-100	40-80	23-40	7-19
	32-72	Loam, clay loam, sandy clay loam.	CL, SC, CL-ML	A-4, A-6, A-7	0	100	100	80-100	40-80	23-43	7-19
Urban land part.											
[1]23:											
Savannah part---	0-14	Fine sandy loam	SM, ML	A-2, A-4	0	100	100	60-85	30-55	<25	NP-4
	14-32	Sandy clay loam, clay loam, loam.	CL, SC, CL-ML	A-4, A-6	0	100	100	80-100	40-80	23-40	7-19
	32-72	Loam, clay loam, sandy clay loam.	CL, SC, CL-ML	A-4, A-6, A-7	0	100	100	80-100	40-80	23-43	7-19
Urban land part.											
Sherwood:											
[1]24:											
Sherwood part---	0-16	Loam------------	ML, CL, SM, SC	A-4	0	80-100	75-100	70-100	45-65	<30	NP-10
	16-40	Loam, clay loam, sandy clay loam.	CL, SC	A-4, A-6	0	70-97	65-97	60-90	45-65	25-40	8-18
	40-61	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop part.											
Smithdale:											
25, 27------------	0-15	Loamy sand, fine sandy loam.	SM	A-2, A-3	0	100	85-100	50-75	15-30	---	NP
	15-26	Clay loam, sandy clay loam, loam.	SM-SC, SC, CL, CL-ML	A-6, A-4	0	100	85-100	80-95	45-75	23-38	7-15
	26-99	Loam, sandy loam	SM, ML, CL, SC	A-4	0	100	85-100	65-80	36-70	<30	NP-10
[1]26:											
Smithdale part--	0-15	Loamy sand------	SM	A-2, A-3	0	100	85-100	50-75	15-30	---	NP
	15-26	Clay loam, sandy clay loam, loam.	SM-SC, SC, CL, CL-ML	A-6, A-4	0	100	85-100	80-95	45-75	23-38	7-15
	26-80	Loam, fine sandy loam.	SM, ML, CL, SC	A-4	0	100	85-100	65-80	36-70	<30	NP-10
Urban land part.											

See footnote at end of table.

TABLE 15.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

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	
Smithdale:											
[1]28:											
Smithdale part--	0-15	Loamy sand------	SM	A-2, A-3	0	100	85-100	50-75	15-30	---	NP
	15-26	Clay loam, sandy clay loam, loam.	SM-SC, SC, CL, CL-ML	A-6, A-4	0	100	85-100	80-95	45-75	23-38	7-15
	26-80	Loam, fine sandy loam.	SM, ML, CL, SC	A-4	0	100	85-100	65-80	36-70	<30	NP-10
Darco part------	0-45	Loamy fine sand	SM	A-2	0-5	95-100	95-100	60-90	15-30	<20	NP-3
	45-80	Sandy clay loam, sandy loam.	SC, SM-SC	A-2, A-4, A-6	0	100	95-100	75-90	25-50	20-40	5-20
Tiak:											
29, 31------------	0-12	Silt loam, loam	ML, CL, CL-ML	A-4, A-6	0	100	100	85-100	75-95	22-37	2-14
	12-32	Clay loam, clay	CL, CH	A-7	0	100	100	96-100	80-95	41-67	20-43
	32-72	Clay------------	CL, CH	A-7	0	100	100	96-100	90-95	45-65	22-40
[1]30:											
Tiak part-------	0-12	Silt loam, loam	ML, CL, CL-ML	A-4, A-6	0	100	100	85-100	75-95	22-37	2-14
	12-32	Clay loam, clay	CL, CH	A-7	0	100	100	96-100	80-95	41-67	20-43
	32-72	Clay, sandy clay loam.	CL, CH	A-7	0	100	100	96-100	90-95	45-65	22-40
Urban land part.											
Udorthents:											
32----------------	0-6	Loam------------	ML, CL	A-4	0	60-85	40-65	35-60	30-50	<23	<15
	6-36	Very gravelly loam, very gravelly sandy clay loam.	SC, GC	A-2, A-4	0-10	40-60	20-50	15-35	12-20	23-38	<15
	36-61	Gravelly silty clay loam.	SC	A-4, A-6	0-10	60-90	50-85	35-60	30-50	23-38	<15
Wrightsville:											
33----------------	0-30	Silt loam-------	ML, CL, CL-ML	A-4	0	100	95-100	90-100	75-100	<31	NP-10
	30-50	Silty clay, clay, silty clay loam.	CH, CL	A-7	0	100	100	95-100	90-100	41-65	22-40
	50-72	Silty clay loam, silty clay, clay.	CL, CH	A-7, A-6	0	100	95-100	95-100	90-100	35-65	16-40
Zafra:											
[1]34:											
Zafra part------	0-8	Loam------------	SM, ML	A-4	0-2	75-90	70-90	65-85	36-75	<24	NP-4
	8-40	Gravelly loam, gravelly clay loam, very gravelly clay loam.	GC, GP-GC, GM, GM-GP	A-2, A-1	0-5	30-50	25-50	15-45	10-35	<37	NP-18
	40-42	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Leadvale part---	0-5	Silt loam-------	ML, CL-ML, CL	A-4	0	100	95-100	85-95	65-85	18-32	2-10
	5-27	Silt loam, silty clay loam.	CL-ML, CL, ML	A-4, A-6	0	100	95-100	90-98	75-90	24-36	5-14
	27-49	Silt loam, silty clay loam.	CL-ML, CL, ML	A-4, A-6, A-7	0	100	95-100	80-98	70-90	24-42	5-18
	49-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 16.--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	Salinity	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodibility group
	In	In/hr	In/in	pH	Mmhos/cm						
Allen:											
1	0-9	0.6-2.0	0.14-0.19	4.5-5.5	<2	Low	Low	Moderate	0.24	5	---
	9-23	0.6-2.0	0.15-0.18	4.5-5.5	<2	Low	Low	Moderate	0.20		
	23-72	0.6-2.0	0.12-0.17	4.5-5.5	<2	Low	Low	Moderate	0.20		
Amy:											
2, 3, [1]4	0-45	0.6-2.0	0.13-0.24	4.5-5.5	<2	Low	High	Moderate	0.43	5	---
	45-72	0.06-0.2	0.16-0.24	4.5-5.5	<2	Low	High	Moderate	0.43		
Angie:											
5	0-10	0.6-2.0	0.14-0.16	5.5-6.5	<2	Low	Low	Moderate	0.32	3	---
	10-72	0.06-0.2	0.18-0.20	4.5-5.5	<2	Moderate	High	High	0.32		
Avilla:											
6, 7	0-9	0.6-2.0	0.10-0.24	4.5-6.5	<2	Low	Low	Low	0.24	4	---
	9-56	0.6-2.0	0.12-0.20	4.5-5.5	<2	Low	Low	Moderate	0.28		
	56-72	2.0-6.0	0.04-0.12	4.5-5.5	<2	Low	Low	Moderate	0.20		
Caddo Variant:											
[1]8:											
Caddo part	0-10	0.6-2.0	0.18-0.23	4.5-6.0	<2	Low	High	Moderate	0.43	3	---
	10-72	0.06-0.2	0.20-0.22	4.5-6.0	<2	Low	High	Moderate	0.37		
Messer part	0-42	0.6-2.0	0.16-0.20	4.5-6.0	<2	Low	High	Moderate	0.43	4	---
	42-72	0.06-0.2	0.16-0.20	4.5-7.3	<2	Low	High	Moderate	0.37		
Carnasaw:											
[1]9:											
Carnasaw part	0-3	0.6-2.0	0.08-0.16	4.5-6.0	<2	Low	Low	High	0.43	3	---
	3-6	0.2-0.6	0.12-0.20	4.5-5.5	<2	High	Moderate	High	0.37		
	6-40	0.06-0.2	0.12-0.18	4.5-5.5	<2	High	High	High	0.32		
	40-72	---	---	---	---	---	---	---	---		
Townley part	0-6	0.6-2.0	0.12-0.14	4.2-5.5	<2	Low	Moderate	High	0.37	3	---
	6-23	0.06-0.2	0.12-0.18	4.2-5.5	<2	Moderate	Moderate	High	0.32		
	23-25	---	---	---	---	---	---	---	---		
[1]10:											
Carnasaw part	0-3	0.6-2.0	0.08-0.16	4.5-6.0	<2	Low	Low	High	0.43	3	---
	3-6	0.2-0.6	0.12-0.20	4.5-5.5	<2	High	Moderate	High	0.37		
	6-40	0.06-0.2	0.12-0.18	4.5-5.5	<2	High	High	High	0.32		
	40-72	---	---	---	---	---	---	---	---		
Townley part	0-6	0.6-2.0	0.12-0.14	4.2-5.5	<2	Low	Moderate	High	0.37	3	---
	6-23	0.06-0.2	0.12-0.18	4.2-5.5	<2	Moderate	Moderate	High	0.32		
	23-25	---	---	---	---	---	---	---	---		
[1]11:											
Carnasaw part	0-3	0.6-2.0	0.08-0.16	4.5-6.0	<2	Low	Low	High	0.43	3	---
	3-6	0.2-0.6	0.12-0.20	4.5-5.5	<2	High	Moderate	High	0.37		
	6-40	0.06-0.2	0.12-0.18	4.5-5.5	<2	High	High	High	0.32		
	40-72	---	---	---	---	---	---	---	---		
Pirum part	0-10	0.6-2.0	0.12-0.16	4.5-5.5	<2	Low	Low	High	0.24	3	---
	10-34	0.6-2.0	0.14-0.18	4.5-5.5	<2	Low	Low	High	0.32		
	34-36	---	---	---	---	---	---	---	---		
Townley part	0-6	0.6-2.0	0.12-0.14	4.2-5.5	<2	Low	Moderate	High	0.37	3	---
	6-23	0.06-0.2	0.12-0.18	4.2-5.5	<2	Moderate	Moderate	High	0.32		
	23-25	---	---	---	---	---	---	---	---		
[1]12:											
Carnasaw part	0-3	0.6-2.0	0.08-0.16	4.5-6.0	<2	Low	Low	High	0.43	3	---
	3-6	0.2-0.6	0.12-0.20	4.5-5.5	<2	High	Moderate	High	0.37		
	6-40	0.06-0.2	0.12-0.18	4.5-5.5	<2	High	High	High	0.32		
	40-72	---	---	---	---	---	---	---	---		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permea-bility	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodi-bility group
	In	In/hr	In/in	pH	Mmhos/cm						
Carnasaw:											
Townley part----	0-6	0.6-2.0	0.12-0.14	4.2-5.5	<2	Low-------	Moderate	High-----	0.37	3	---
	6-23	0.06-0.2	0.12-0.18	4.2-5.5	<2	Moderate	Moderate	High-----	0.32		
	23-25	---	---	---	---	---------	---------	---------	---		
Pirum part------	0-10	0.6-2.0	0.12-0.16	4.5-5.5	<2	Low-------	Low------	High-----	0.24	3	---
	10-34	0.6-2.0	0.14-0.18	4.5-5.5	<2	Low-------	Low------	High-----	0.32		
	34-36	---	---	---	---	---------	---------	---------	---		
Leadvale:											
13, 14------------	0-5	0.6-2.0	0.17-0.22	4.5-5.5	<2	Low-------	Moderate	Moderate	0.43	3	---
	5-27	0.6-2.0	0.17-0.20	4.5-5.5	<2	Low-------	Moderate	Moderate	0.43		
	27-49	0.06-0.6	0.06-0.11	4.5-5.5	<2	Low-------	Moderate	Moderate	0.43		
	49-60	---	---	---	---	---------	---------	---------	---		
Linker:											
15----------------	0-5	0.6-2.0	0.11-0.17	3.6-5.5	<2	Low-------	Low------	High-----	0.28	3	---
	5-33	0.6-2.0	0.11-0.20	3.6-5.5	<2	Low-------	Low------	High-----	---		
	33-35	---	---	---	---	---------	---------	---------	---		
Ouachita:											
16----------------	0-11	0.6-2.0	0.15-0.24	4.5-6.0	<2	Low-------	Low------	Moderate	0.37	5	---
	11-72	0.2-0.6	0.15-0.24	4.5-5.5	<2	Low-------	Moderate	Moderate	0.32		
[1]17:											
Ouachita part---	0-11	0.6-2.0	0.15-0.24	4.5-6.0	<2	Low-------	Low------	Moderate	0.37	5	---
	11-72	0.2-0.6	0.15-0.24	4.5-5.5	<2	Low-------	Moderate	Moderate	0.32		
Amy part--------	0-45	0.6-2.0	0.13-0.24	4.5-5.5	<2	Low-------	High-----	Moderate	0.43	5	---
	45-72	0.06-0.2	0.16-0.24	4.5-5.5	<2	Low-------	High-----	Moderate	0.43		
Saffell:											
18----------------	0-9	2.0-6.0	0.05-0.10	4.5-5.5	<2	Low-------	Low------	Moderate	0.20	4	---
	9-36	0.6-2.0	0.06-0.12	4.5-5.5	<2	Low-------	Low------	Moderate	0.28		
	36-76	0.6-6.0	0.04-0.11	4.5-5.5	<2	Low-------	Low------	Moderate	0.17		
[1]19:											
Saffell part----	0-9	2.0-6.0	0.05-0.10	4.5-5.5	<2	Low-------	Low------	Moderate	0.20	4	---
	9-36	0.6-2.0	0.06-0.12	4.5-5.5	<2	Low-------	Low------	Moderate	0.28		
	36-76	0.6-6.0	0.04-0.11	4.5-5.5	<2	Low-------	Low------	Moderate	0.17		
Urban land part.											
Savannah:											
20, 22------------	0-14	0.6-2.0	0.10-0.15	4.0-5.5	<2	Low-------	Moderate	High-----	0.24	3	---
	14-32	0.6-2.0	0.13-0.20	4.0-5.5	<2	Low-------	Moderate	High-----	0.28		
	32-72	0.2-0.6	0.05-0.10	4.0-5.5	<2	Low-------	Moderate	High-----	0.24		
[1]21:											
Savannah part---	0-14	0.6-2.0	0.10-0.15	4.0-5.5	<2	Low-------	Moderate	High-----	0.24	3	---
	14-32	0.6-2.0	0.13-0.20	4.0-5.5	<2	Low-------	Moderate	High-----	0.28		
	32-72	0.2-0.6	0.05-0.10	4.0-5.5	<2	Low-------	Moderate	High-----	0.24		
Urban land part.											
[1]23:											
Savannah part---	0-14	0.6-2.0	0.10-0.15	4.0-5.5	<2	Low-------	Moderate	High-----	0.24	3	---
	14-32	0.6-2.0	0.13-0.20	4.0-5.5	<2	Low-------	Moderate	High-----	0.28		
	32-72	0.2-0.6	0.05-0.10	4.0-5.5	<2	Low-------	Moderate	High-----	0.24		
Urban land part.											
Sherwood:											
[1]24:											
Sherwood part---	0-16	2.0-6.0	0.10-0.18	4.5-6.0	<2	Low-------	Low------	Moderate	0.37	3	---
	16-40	0.6-2.0	0.11-0.18	4.5-5.5	<2	Low-------	Moderate	Moderate	0.32		
	40-61	---	---	---	---	---------	---------	---------	---		
Rock outcrop part.											

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodibility group
	In	In/hr	In/in	pH	Mmhos/cm						
Smithdale:											
25, 27	0-15	2.0-6.0	0.05-0.10	4.5-5.5	<2	Low	Low	Moderate	0.17	5	---
	15-26	0.6-2.0	0.15-0.17	4.5-5.5	<2	Low	Low	Moderate	0.24		
	26-99	2.0-6.0	0.14-0.16	4.5-5.5	<2	Low	Low	Moderate	0.28		
26[1]:											
Smithdale part	0-15	2.0-6.0	0.05-0.10	4.5-5.5	<2	Low	Low	Moderate	0.17	5	---
	15-26	0.6-2.0	0.15-0.17	4.5-5.5	<2	Low	Low	Moderate	0.24		
	26-80	2.0-6.0	0.14-0.16	4.5-5.5	<2	Low	Low	Moderate	0.28		
Urban land part.											
28[1]:											
Smithdale part	0-15	2.0-6.0	0.05-0.10	4.5-5.5	<2	Low	Low	Moderate	0.17	5	---
	15-26	0.6-2.0	0.15-0.17	4.5-5.5	<2	Low	Low	Moderate	0.24		
	26-80	2.0-6.0	0.14-0.16	4.5-5.5	<2	Low	Low	Moderate	0.28		
Darco part	0-45	6.0-20	0.07-0.11	4.5-6.5	<2	Low	Low	Moderate	0.17	5	---
	45-80	0.6-2.0	0.11-0.16	4.5-6.5	<2	Low	Moderate	High	0.24		
Tiak:											
29, 31	0-12	0.6-2.0	0.11-0.20	4.5-6.0	<2	Low	Low	High	0.37	4	---
	12-32	0.06-0.2	0.11-0.20	4.5-5.5	<2	High	High	High	0.37		
	32-72	0.06-0.2	0.11-0.18	4.5-5.5	<2	High	High	High	0.37		
30[1]:											
Tiak part	0-12	0.6-2.0	0.11-0.20	4.5-6.0	<2	Low	Low	High	0.37	4	---
	12-32	0.06-0.2	0.11-0.20	4.5-5.5	<2	High	High	High	0.37		
	32-72	0.06-0.2	0.11-0.18	4.5-5.5	<2	High	High	High	0.37		
Urban land part.											
Udorthents:											
32	0-6	0.6-2.0	0.12-0.24	4.5-6.5	<2	Low	Moderate	High	0.24	4	---
	6-36	2.0-6.0	0.04-0.12	4.5-5.5	<2	Low	Moderate	High	0.20		
	36-61	0.6-2.0	0.06-0.15	3.6-5.5	<2	Low	High	High	0.24		
Wrightsville:											
33	0-30	0.2-0.6	0.16-0.24	3.6-5.5	<2	Low	High	High	0.49	5	---
	30-50	<0.06	0.14-0.22	3.6-5.5	<2	High	High	High	0.37		
	50-72	<0.06	0.14-0.22	3.6-8.4	<2	High	High	High	0.43		
Zafra:											
34[1]:											
Zafra part	0-8	0.6-2.0	0.10-0.19	5.1-6.0	<2	Low	Low	Moderate	0.37	3	---
	8-40	0.6-2.0	0.10-0.15	4.5-5.0	<2	Low	Moderate	High	0.32		
	40-42	---	---	---	---	---	---	---	---		
Leadvale part	0-5	0.6-2.0	0.17-0.22	4.5-5.5	<2	Low	Moderate	Moderate	0.43	3	---
	5-27	0.6-2.0	0.17-0.20	4.5-5.5	<2	Low	Moderate	Moderate	0.43		
	27-49	0.06-0.6	0.06-0.11	4.5-5.5	<2	Low	Moderate	Moderate	0.43		
	49-60	---	---	---	---	---	---	---	---		

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 17.--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 less than; > means greater than]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Cemented pan	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Depth	Hardness
					Ft			In		In	
Allen:											
1	B	None	---	---	>6.0	---	---	>60	---	---	---
Amy:											
2, 3, [1]4	C	None to common.	Brief to very long.	Dec-May	0-1.0	Perched	Dec-Apr	>60	---	---	---
Angie:											
5	C	None	---	---	3.0-5.0	Apparent	Dec-Mar	>60	---	---	---
Avilla:											
6, 7	B	None	---	---	>6.0	---	---	>60	---	---	---
Caddo Variant:											
[1]8:											
Caddo part	D	None	---	---	0-2.0	Apparent	Dec-Apr	>60	---	---	---
Messer part	C	None	---	---	1.5-3.0	Apparent	Dec-Apr	>60	---	---	---
Carnasaw:											
[1]9:											
Carnasaw part	C	None	---	---	>6.0	---	---	30-60	Rippable	---	---
Townley part	C	None	---	---	>6.0	---	---	20-40	Rippable	---	---
[1]10:											
Carnasaw part	C	None	---	---	>6.0	---	---	30-60	Rippable	---	---
Townley part	C	None	---	---	>6.0	---	---	20-40	Rippable	---	---
[1]11:											
Carnasaw part	C	None	---	---	>6.0	---	---	30-60	Rippable	---	---
Pirum part	B	None	---	---	>6.0	---	---	22-50	Hard	---	---
Townley part	C	None	---	---	>6.0	---	---	20-40	Rippable	---	---
[1]12:											
Carnasaw part	C	None	---	---	>6.0	---	---	30-60	Rippable	---	---
Townley part	C	None	---	---	>6.0	---	---	20-40	Rippable	---	---
Pirum part	B	None	---	---	>6.0	---	---	22-50	Hard	---	---
Leadvale:											
13, 14	C	None	---	---	2.0-3.0	Perched	Jan-Apr	>48	Rippable	---	---
Linker:											
15	B	None	---	---	>6.0	---	---	20-40	Hard	---	---

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Cemented pan: Depth	Cemented pan: Hardness
					Ft			In		In	
Ouachita:											
16	C	Common	Long to very long.	Dec-May	>6.0	---	---	>60	---	---	---
[1]17:											
Ouachita part	C	Common	Long to very long.	Dec-May	>6.0	---	---	>60	---	---	---
Amy part	D	None to common.	Brief to very long.	Dec-May	0-1.0	Perched	Dec-Apr	>60	---	---	---
Saffell:											
18	B	None	---	---	>6.0	---	---	>60	---	---	---
[1]19:											
Saffell part	B	None	---	---	>6.0	---	---	>60	---	---	---
Urban land part.											
Savannah:											
20, 22	C	None	---	---	1.5-3.0	Perched	Jan-Mar	>60	---	---	---
[1]21:											
Savannah part	C	None	---	---	1.5-3.0	Perched	Jan-Mar	>60	---	---	---
Urban land part.											
[1]23:											
Savannah part	C	None	---	---	1.5-3.0	Perched	Jan-Mar	>60	---	---	---
Urban land part.											
Sherwood:											
[1]24:											
Sherwood part	B	None	---	---	>6.0	---	---	30-60	Rippable	---	---
Rock outcrop part.											
Smithdale:											
25, 27	B	None	---	---	>6.0	---	---	>60	---	---	---
[1]26:											
Smithdale part	B	None	---	---	>6.0	---	---	>60	---	---	---
Urban land part.											
[1]28:											
Smithdale part	B	None	---	---	>6.0	---	---	>60	---	---	---
Darco part	A	None	---	---	>6.0	---	---	>60	---	---	---
Tiak:											
29, 31	C	None	---	---	1.0-2.0	Perched	Nov-Mar	>60	---	---	---
[1]30:											
Tiak part	C	None	---	---	1.0-2.0	Perched	Nov-Mar	>60	---	---	---

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Cemented pan	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Depth	Hard-ness
					Ft			In		In	
Tiak:											
Urban land part.											
Udorthents:											
32	B	None	---	---	>6.0	---	---	>60	---	---	---
Wrightsville:											
33	D	None	---	---	0.6-1.5	Perched	Dec-Apr	>60	---	---	---
Zafra:											
[1]34:											
Zafra part	B	None	---	---	>6.0	---	---	25-60	Hard	---	---
Leadvale part	C	None	---	---	2.0-3.0	Perched	Jan-Apr	>48	Rip-pable	---	---

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 18.--PHYSICAL ANALYSES OF SELECTED SOILS

Soil name and sample number	Depth	Horizon	Particle-size distribution (percent less than 2.0 mm): Very coarse sand through medium sand (2.0-0.25 mm)	Fine sand (0.25)- 0.10 mm)	Very fine sand (0.10-0.05 mm)	Total sand (2.0- 0.05 mm)	Silt (0.05- 0.002 mm)	Clay (<0.002 mm
	In							
Smithdale loamy sand: S-74-AR-125-1-(1-9)	0-6	Ap	28	46	4	78	17	5
	6-15	B1	22	46	4	72	22	6
	15-26	B21t	15	37	4	56	19	25
	26-37	B22t	16	51	6	73	15	12
	37-49	B23t	19	57	3	79	11	10
	49-61	B24t	16	59	3	78	10	12
	61-72	B24t	15	64	3	82	5	13
Tiak silt loam: S-74-AR-125-5-(1-7)	0-7	Ap	7	3	30	40	54	6
	7-12	A2	7	4	36	47	45	8
	12-22	B21t	4	2	22	28	31	41
	22-32	B22t	2	1	28	31	20	49
	32-43	B23t	2	2	26	30	22	48
	43-53	B23t	1	2	28	31	25	44
	53-64	B24t	1	1	6	8	35	57
	64-72	B3	2	32	22	56	14	30

TABLE 19.--CHEMICAL ANALYSES OF SELECTED SOILS

Soil name and sample number	Depth	Horizon	Extractable bases: Ca	Mg	Na	K	Extractable acidity	Base saturation	Reaction (1:1 soil) water	Organic matter	Available phosphorus
	In		Meq/ 100 g	Meq/ 100 g	Meq/ 100 g	Meq/ 100 g	Meq/ 100 g	Pct	pH	Pct	P/m
Smithdale loamy sand: S74-AR-125-1-(1-9)	0-6	Ap	1.1	0.3	0.1	0.1	9.8	14	5.7	0.9	5
	6-15	B1	0.9	0.2	0.2	0.1	7.7	15	5.8	0.2	3
	15-26	B21t	1.8	1.4	0.2	0.2	9.7	27	5.3	0.4	5
	26-37	B22t	0.8	0.7	0.2	0.1	5.9	23	5.3	0.1	4
	37-49	B23t	0.7	0.7	0.2	0.1	4.6	27	5.2	0.1	4
	49-61	B24t	0.4	0.6	0.2	0.1	5.1	20	5.2	0.1	3
	61-72	B24t	0.4	0.5	0.2	0.1	5.0	19	5.2	0.1	4
Tiak silt loam: S-74-AR-125-5-(1-7)	0-7	Ap	1.2	0.5	0.2	0.1	7.4	21	4.7	2.4	10
	7-12	A2	1.0	0.4	0.2	0.1	5.1	25	5.0	1.1	7
	12-22	B21t	0.3	1.4	0.2	0.2	22.3	9	4.8	0.6	4
	22-32	B22t	0.3	2.6	0.3	0.2	24.4	12	4.6	0.3	1
	32-43	B23t	0.3	2.0	0.3	0.2	24.7	10	4.7	0.3	2
	43-53	B23t	0.3	1.8	0.4	0.2	28.0	9	4.8	0.2	2
	53-64	B24t	0.3	3.2	0.7	0.3	39.5	10	4.7	0.1	2
	64-72	B3	0.3	1.4	0.5	0.2	17.3	12	4.9	0.2	2

TABLE 20.--ENGINEERING TEST DATA

[Tests performed by Arkansas State Highway Department, in cooperation with the Bureau of Public Roads, U.S. Department of Commerce, in accordance with standard procedures of the American Association of State Highway and Transportation Officials (AASHTO) [1]]

Soil name and location	Arkansas State Highway Laboratory Nos	Depth from surface	Moisture-density[1] Optimum moisture	Moisture-density[1] Maximum dry density	Percentage passing sieve--[2] No. 10	No. 40	No. 200	Liquid limit	Plasticity index	Classification AASHTO[3]	Classification Unified[4]
		In		Pct				Pct			
Carnasaw gravelly silt loam:	2-4	6-21	87	33	99	96	94	67	30	A-7-5(36)	MH
NW1/4NW1/4NE1/4 sec. 5,	2-5	21-29	91	29	98	93	90	63	29	A-7-5(33)	MH
T. 1 S., R. 17 W.	2-6	29-40	89	27	100	98	94	59	24	A-7-5(28)	MH
Tiak silt loam:	5-4	22-32	95	22	100	99	91	67	43	A-7-6(44)	CH
NW1/4SW1/4NE1/4 sec. 33,	5-5	32-53	98	24	100	99	89	58	34	A-7-6(34)	CH
T. 2 S., R. 12 W.	5-6	53-64	92	27	100	99	90	57	29	A-7-6(30)	CH

[1]Based on AASHTO Designation: T 99-57, Method A (1)

[2]Mechanical analysis according to AASHTO Designation T 88-57 (1). Results by this procedure may differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHTO procedure, the fine material is analyzed by the hydrometer method and the various grain-sized fractions are calculated on the basis of all material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-sized fractions. The mechanical analysis data used in this table are not suitable for naming textural classes for soils.

[3]Based on AASHTO Designation M 145-66 (1).

[4]Based on ASTM Designation D 2487-66T.

TABLE 21.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics of this taxadjunct that are outside the range of the series]

Soil name	Family or higher taxonomic class
Allen	Fine-loamy, siliceous, thermic Typic Paleudults
Amy	Fine-silty, siliceous, thermic Typic Ochraquults
Angie	Clayey, mixed, thermic Aquic Paleudults
Avilla	Fine-loamy, siliceous, thermic Typic Paleudults
Caddo Variant	Fine-silty, siliceous, thermic Typic Glossaqualfs
Carnasaw	Clayey, mixed, thermic Typic Hapludults
Darco	Loamy, siliceous, thermic Grossarenic Paleudults
Leadvale	Fine-silty, siliceous, thermic Typic Fragiudults
Linker	Fine-loamy, siliceous, thermic Typic Hapludults
Messer Variant	Coarse-silty, siliceous, thermic Typic Hapludalfs
Ouachita	Fine-silty, siliceous, thermic Fluventic Dystrochrepts
Pirum	Fine-loamy, siliceous, thermic Typic Hapludults
Saffell	Loamy-skeletal, siliceous, thermic Typic Hapludults
Savannah	Fine-loamy, siliceous, thermic Typic Fragiudults
*Sherwood	Fine-loamy, mixed, thermic Typic Hapludults
Smithdale	Fine-loamy, siliceous, thermic Typic Paleudults
Tiak	Clayey, mixed, thermic Aquic Paleudults
Townley	Clayey, mixed, thermic Typic Hapludults
Udorthents	Udorthents
Wrightsville	Fine, mixed, thermic Typic Glossaqualfs
Zafra	Loamy-skeletal, siliceous, thermic Typic Hapludults

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